Section : 12.05
Site 20903-5640 (White Oak)
Doc. #: 0007 Vol II

N60921.AR.000322
NSWC WHITE OAK
5090.3a

RCRA Facility Investigation

for

Sites 2, 3, 4, 7, 8, 9 and Paint Branch

Naval Surface Warfare Center White Oak

Silver Spring, Maryland

VOLUME II – APPENDICES A-E

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298

Contract Task Order 0298

October 2000

TETRA TECH NUS, INC.

APPENDIX A

FRACTURE TRACE ANALYSIS

Memorandum

To: Ron Kotun

From: Michael Martin, P.G.

Subject: Fracture Trace Analysis

Date: 21 April 1999

1.0 PURPOSE AND SCOPE

This memorandum presents the results of a fracture trace analysis (FTA) completed as part of a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and Corrective Measures Study (CMS) for the former Naval Surface Warfare Center, Dahlgren Division, White Oak Detachment (NSWC – White Oak). The work was conducted under Contract Task Order (CTO) 298 of the Comprehensive Long Term Action Navy (CLEAN), Contract Number N62472-90-D-1298. This analysis was conducted in accordance with the approved RFI/CMS Work Plan (B&R Environmental, 1998).

The analysis included a geological data search, assessment of available aerial photographs, and field reconnaissance during which fracture and joint plane orientation data were collected. Additionally, data from an azimuthal resistivity survey were evaluated in concert with the conclusions of the FTA. The purpose of the FTA was to identify the location and orientation of site fracture traces, manifested as linear surface features. That information was then to be used to determine whether fracture traces would provide insight into identifying preferential groundwater flow paths. Wells installed along fracture traces, or more optimally at intersecting fracture traces, may be expected to intercept preferential groundwater flow paths and, as such, are ideally suited for investigation of groundwater quality.

This memorandum is presented in five sections. Section 1.0 provides this introduction. Section 2.0 discusses the technical approach used to complete the FTA. Section 3.0 presents the results while Section 4.0 provides conclusions for the FTA. References are provided in Section 5.0.

2.0 TECHNICAL APPROACH

A detailed data search was conducted to identify available aerial photographs for NSWC – White Oak. Usable photographs were obtained from the U.S. Environmental Protection Agency (USEPA) (USEPA, 1996), the U.S. Geological Survey (USGS) (USGS, 1963 and 1964), the U.S. Navy (U.S. Navy, 1985 and 1991), and a private supplier (NAR, 1948 and 1959). Both low altitude (generally 1 in. = 1500 to 2000 ft.) and higher altitude (1 in. = 5000 ft.) photographs were obtained. Relevant geological information was also obtained from the USGS (Froelich, 1975a, 1975b, and 1975c; Withington and Froelich, 1974).

Evaluation of aerial photographs was completed using a low power stereoscope on stereo-paired photographs, when available. For photographs which were not stereopairs, a direct visual approach was used. The photographs were inspected for surface expressions of fracture traces such as swales in the land surface, vegetation differences resulting from changes in soil moisture or depth to the water table, tonal variations in soil types, alignment of vegetation type, and straight stream and valley segments.

Once fracture traces were identified, field reconnaissance was performed. The field evaluation served two purposes. First, potential fracture traces were viewed to evaluate the nature of a trace and eliminate man-made linear features that may have been misinterpreted from the aerial photographs. Second, joint and fracture orientations (strike and dip) were collected, using a Brunton compass adjusted for magnetic declination, to correlate with trends identified for fracture traces. The majority of rock outcrops within the boundary of NSWC-White Oak occur along the deeply incised valley created by Paint Branch Creek.

Azimuthal resistivity surveying, following radial grids established using ten degree rotations around a fixed center point, was conducted at selected sites within NSWC - White Oak. Resistivity measurements were collected along each radial grid line, where possible, at distances of 2, 3, 5, 7, 10, 13, 21, 28, 36, and 42 meters. The azimuthal resistivity survey was performed to evaluate preferred fracture orientation and trends in bedrock based on the hypothosis that water filled fractures will provide a more conductive media than surrounding bedrock. Surveys were completed at Sites 4, 7, 9 (Bldg. 309), 9 (South Side), and 11. Physical constraints (slopes, wooded areas, and fences) present at Sites 4 and 7 precluded extending the grid a sufficient distance to obtain geophysical data from within bedrock. Data from Sites 9 and 11, however, were interpreted to be representative of bedrock conditions.

3.0 RESULTS

NSWC-White Oak lies along the boundary between the Piedmont and Coastal Plain physiographic provinces. The topography is characterized by rolling hills with steeply eroded stream valleys. Unconsolidated sedimentary units of the Coastal Plain Province overlie fractured metamorphic and igneous rocks of the Piedmont Province. Geological mapping for the White Oak area indicates the depth to bedrock generally increases to the east, southeast (Froelich, 1975a and 1975b). Bedrock outcrops, primarily a diamictite gneiss facies of the Wissahickon Formation, are prominent along the deeply incised valley associated with Paint Branch Creek (Withington and Groelich, 1974). Coastal Plain sediments blanket much of the remaining surface at the Base with a thickness greater than 50 feet possibly present to the east and west of Paint Branch Creek (Froelich, 1975c).

Fracture traces identified on aerial photographs are shown on Figure 3-1. Generally, the traces are evident only in the central portion of NSWC - White Oak, along Paint Branch Creek and its associated drainage channels. Fracture traces represent straight segments of the creek or its associated drainage pathways. Preferential stream flow along near vertical fracture traces has produced the steeply eroded stream valley. Fracture traces are not evident to the east of Paint Branch Creek, probably due to the significant increase in the depth to bedrock. Coastal Plain sediments apparently mask any evidence of fractures in the underlying bedrock east of Paint Branch Creek. Significant thicknesses of overburden sediments are also present to the west of Paint Branch Creek and, likewise, mask surficial expressions of fracture traces in the bedrock.

Fracture and joint orientations were measured at 21 locations along Paint Branch Creek. Three prominent strike orientations were evident. First, jointing was common trending generally to the north/northeast. These joints are parallel to the dominant foliation in the gneiss. Figure 3-2 presents the strike direction and dip measurements for joint planes parallel to foliation. Figure 3-3 shows a frequency diagram for strike orientations parallel to foliation. The north/northeast trend is clearly evident in these figures. The remaining two joint sets were striking at relatively high angles to the foliation. Strike and dip data depicted on Figure 3-4 and Figure 3-5 presents a frequency diagram for this data set. Dominant strike directions trend east-west and also northwest-southeast. A stereonet projection, using poles of joint planes, is presented as Figure 3-6. In general, joints were abundant in

outcrop with spacings commonly three feet apart but locally closer spacing was evident. Bedrock in the vicinity of NSWC-White Oak tends to split into large polygonal blocks.

The results of the azimuthal resistivity survey for Site 9 (Bldg. 309) and Site 11 appeared to be consistent with results obtained during the FTA. Fractures interpreted from geophysical results generally coincide with the orientations of fractures striking at high angles to the bedrock foliation. East-west trending fractures as well as northwest-southeast trends are apparent. This possibly indicates groundwater is migrating along these fracture traces and flow parallel to the foliation is less pronounced.

4.0 CONCLUSIONS

Fracture traces identified from aerial photographs are coincident with straight stream segments in Paint Branch Creek or tributary drainage channels. The traces were only evident in the vicinity of Paint Branch Creek with the presence of Coastal Plain overburden suspected to be masking any traces in areas located to the east and west of Paint Branch Creek. Fracture traces coincide with strike directions recorded for joints and fractures oriented along three preferential directions: one set parallel to the dominant foliation and two sets striking at high angles to foliation. Results of azimuthal resistivity surveying from two sites seems to corroborate the dominant fracture orientations. The geophysical results may also indicate groundwater flow is preferential along the joint planes striking at high angles to the bedrock foliation. The implication for siting groundwater monitoring wells may be a preference for flow to be directed along east-west and northwest-southeast flow paths. However, the highly fractured nature of the bedrock would likely negate the impact of this localized anisotropy and the flow system is expected to act in a manner similar to a porous media.

5.0 REFERENCES

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Froelich, 1975a. Bedrock Map of Montgomery County. Prepared for the Department of the Interior, U.S. Geological Survey.

Froelich, 1975b. Contour Map of the Base of Saprolite, Montgomery County, Maryland. Prepared for the Department of the Interior, U.S. Geological Survey.

Froelich, 1975c. Thickness of Overburden Map of Montgomery County, Maryland. Prepared for the Department of the Interior, U.S. Geological Survey.

NAR (National Aerial Resources), 1948. Aerial Photographs, stereo pairs.

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U.S. Navy, 1985. Aerial Photographs, stereo pairs.

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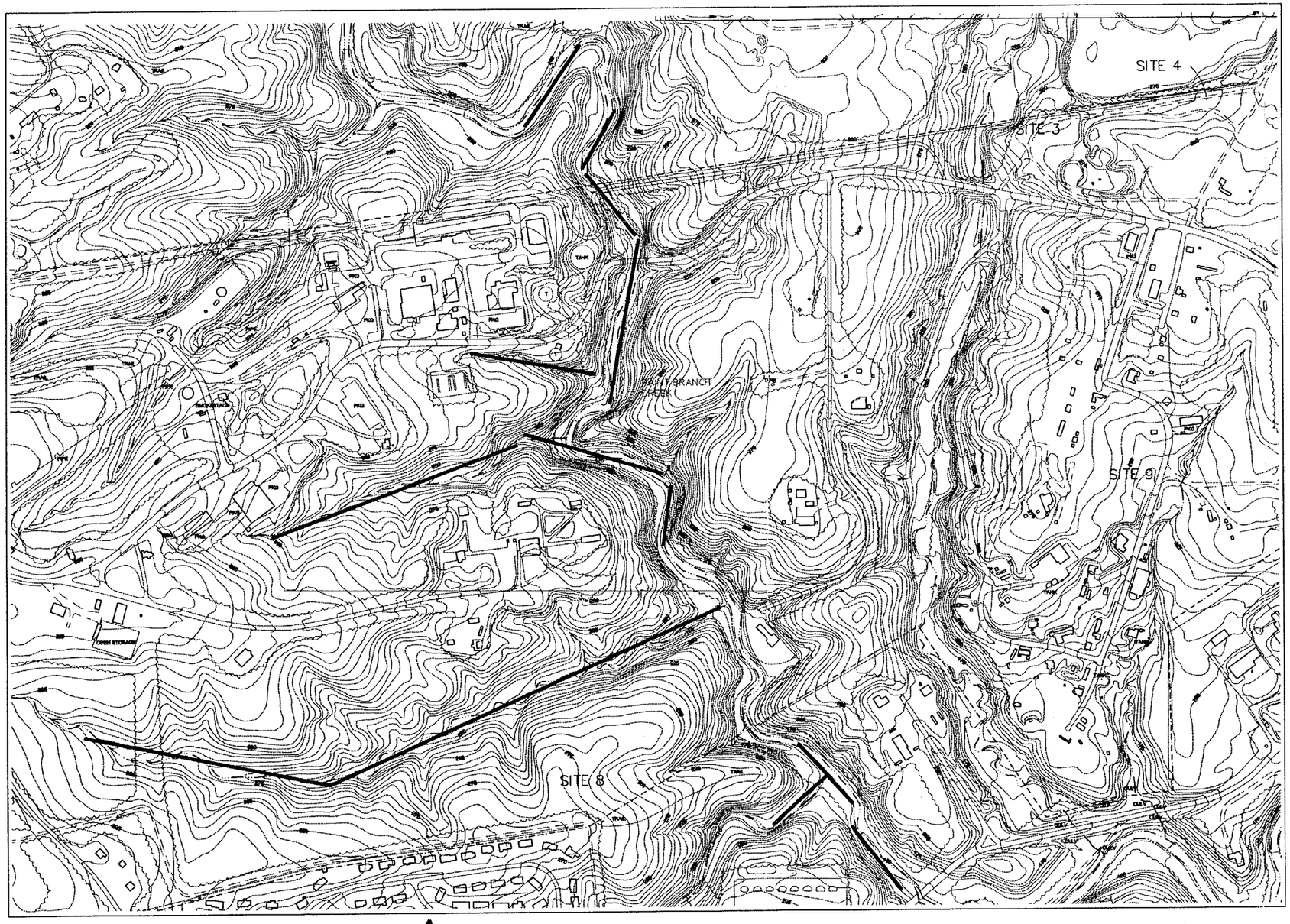
USGS (U.S. Geological Survey), 1963. Aerial Photograph.

USGS (U.S. Geological Survey), 1964. Aerial Photograph.

USGS (U.S. Geological Survey), 1971. Beltsville Quadrangle, Maryland, 7.5 Minute Series (Topographic).

Withington and Froelich, 1974. Preliminary Geologic Map of the Beltsville Quadrangle, Prince George's, Montgomery, and Howard Counties. Prepared for the U.S. Geological Survey.



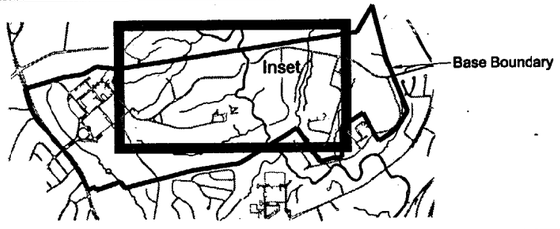
N

LEGEND

— Fracture Trace

0 400 800
SCALE IN FEET

Source: Tallamy, Van Kuran, Gertis, and Associates.



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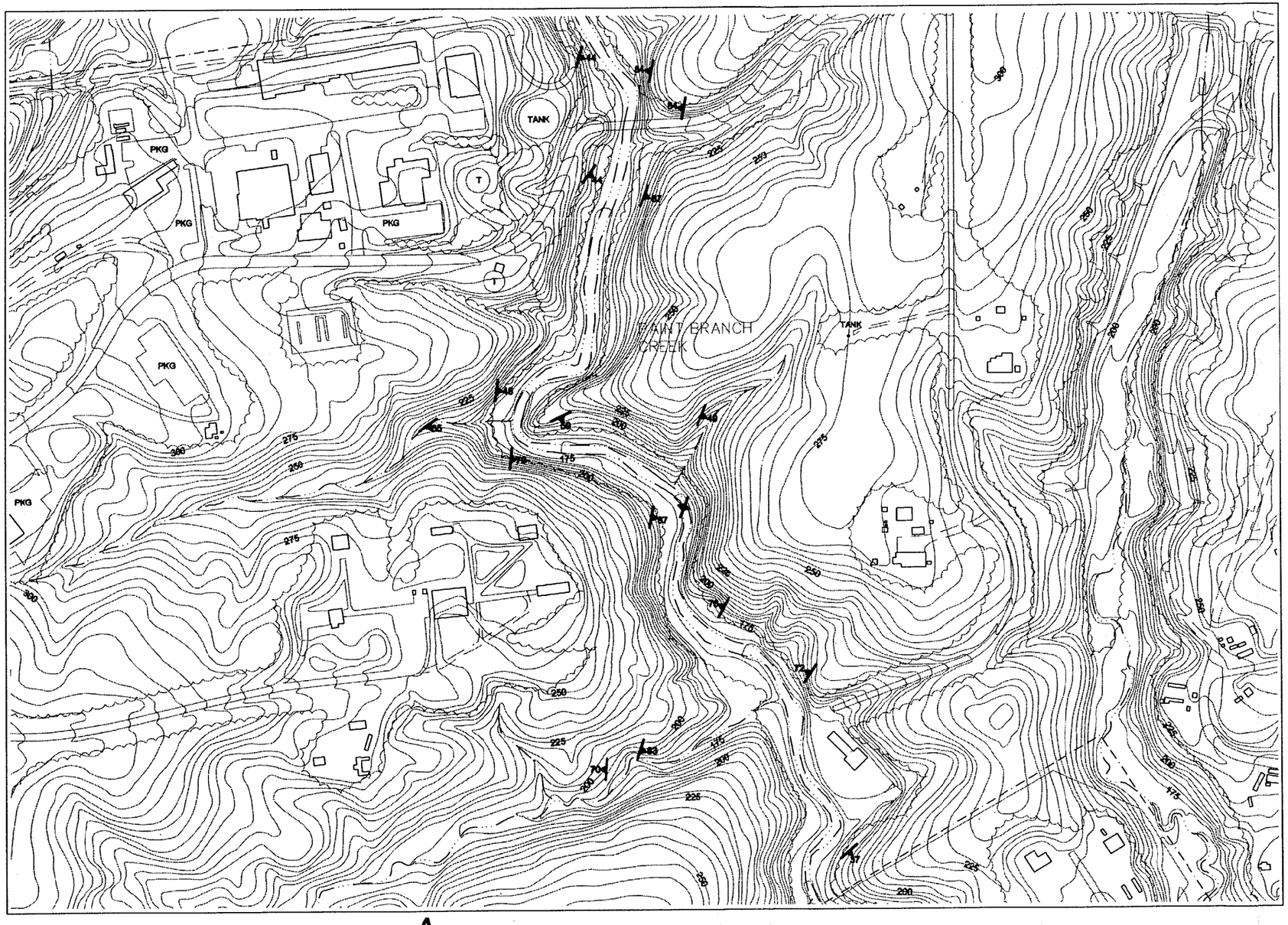
CHECKED BY MM	DATE DEC 98	Potential Fracture Traces	APPROVED BY	DATE
COST/SCHED-AREA			APPROVED BY	DATE
SCALE AS SHOWN		NSWC - White Oak Silver Spring, Maryland	DRAWING NO. Figure 3-1	REV. 0

00410 F B192



LEGEND

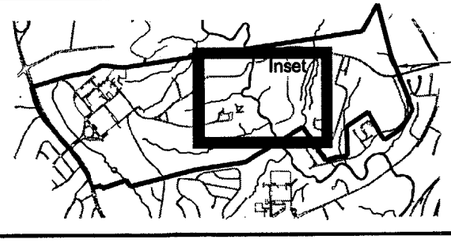
Strike and Dip of Dominant Foliation

Inclined (with angle of dip annotated)

Vertical

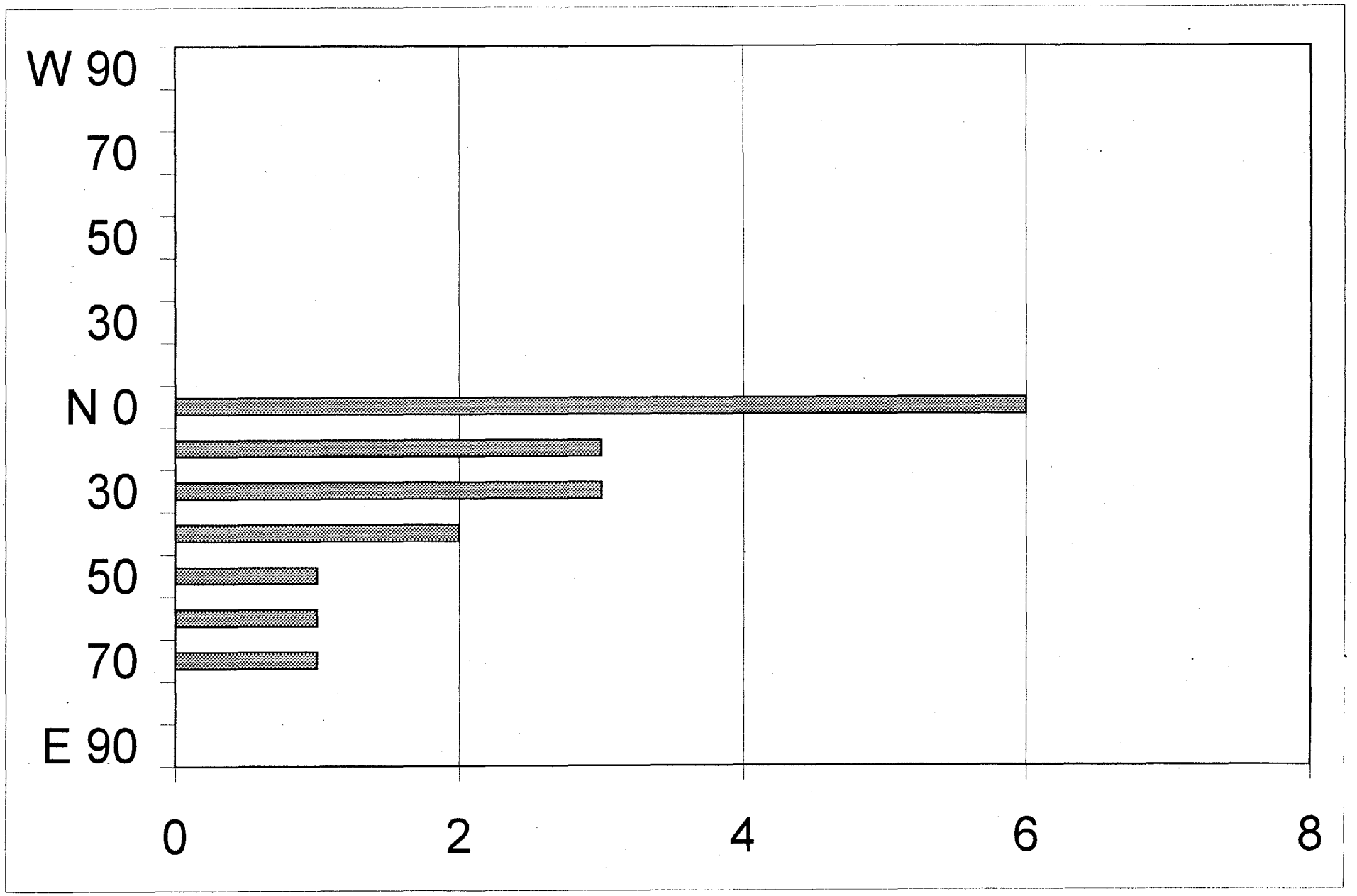
0 400 800
SCALE IN FEET

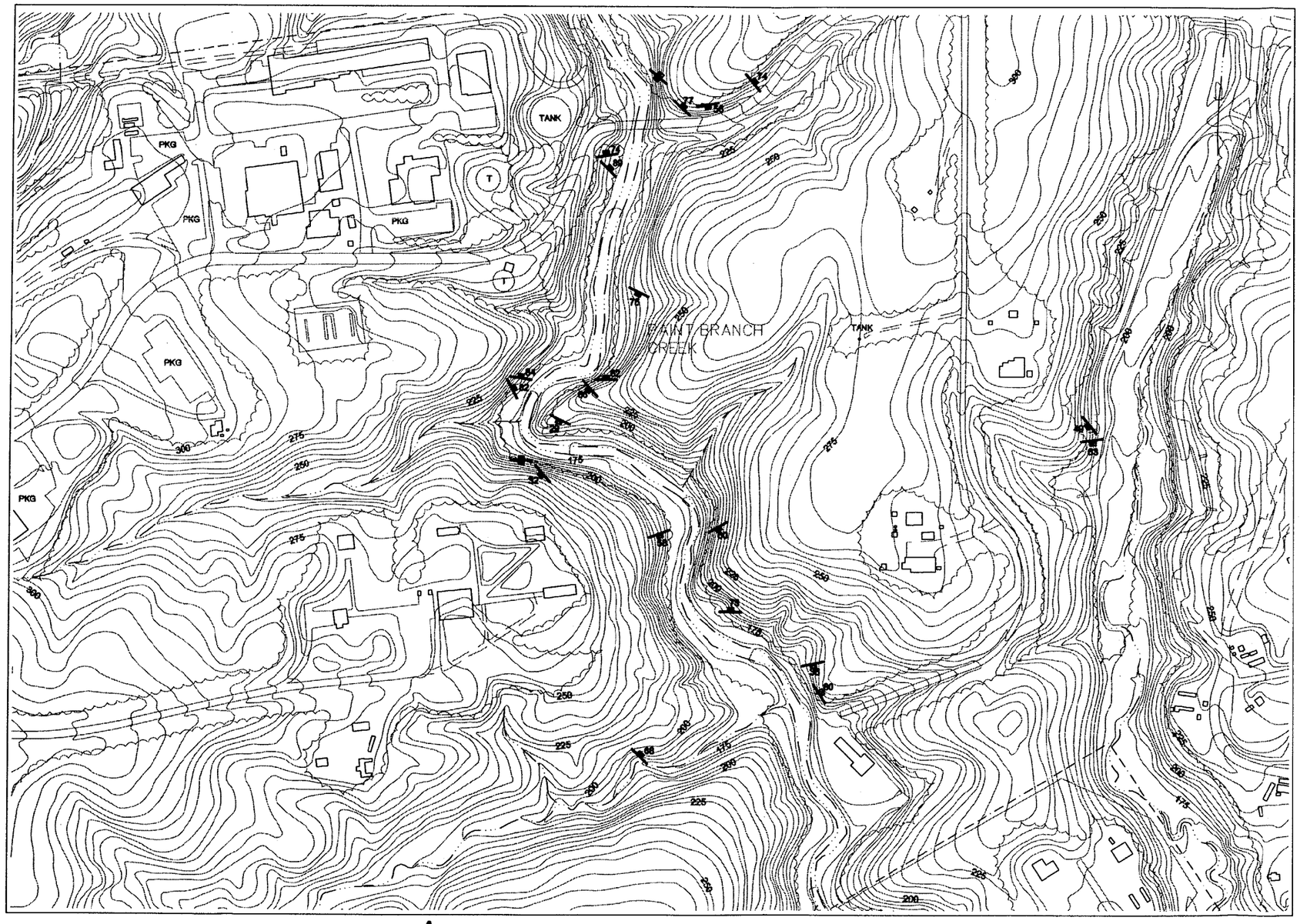
Source: Tallamy, Van Kuran, Gertis, and Associates.



DRAWN BY WLR	DATE DEC 98	Tetra Tech NUS, Inc.	CONTRACT NO. 7687	OWNER NO. CTO 298
CHECKED BY MM	DATE DEC 98	Orientation of Dominant Foliation	APPROVED BY	DATE
COST/SCHED-AREA			APPROVED BY	DATE
SCALE AS SHOWN		NSWC - White Oak Silver Spring, Maryland	DRAWING NO. Figure 3-2	REV. 0

Figure 3-3 Frequency Diagram - Foliation





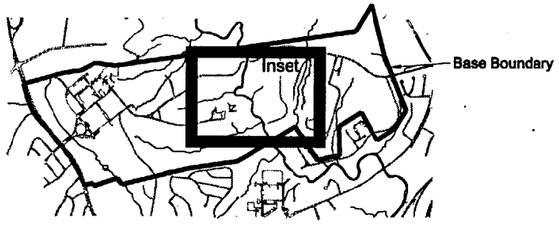
LEGEND

Strike and Dip of Joints/Fractures Inclined (with angle of dip annotated)

Vertical

0 400 800
SCALE IN FEET

Source: Tallamy, Van Kuran, Gertis, and Associates.



DRAWN BY WLR	DATE DEC 98	Tetra Tech NUS, Inc.	CONTRACT NO. 7687	OWNER NO. CTO 298
CHECKED BY MM	DATE DEC 98	Orientation of Joints/ Fractures	APPROVED BY	DATE
COST/SCHED-AREA			APPROVED BY	DATE
SCALE AS SHOWN		NSWC - White Oak Silver Spring, Maryland	DRAWING NO. Figure 3-4	REV. 0

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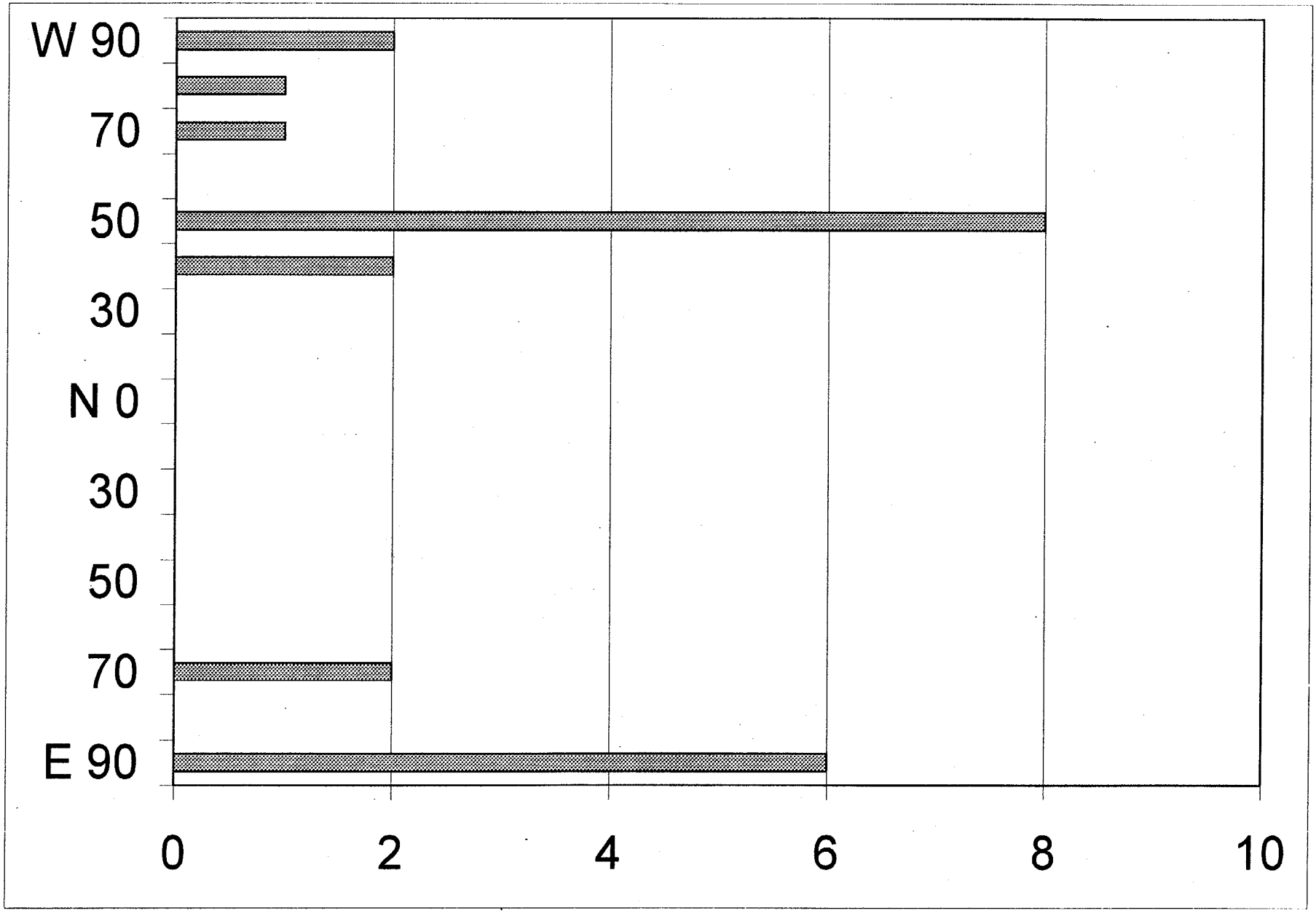
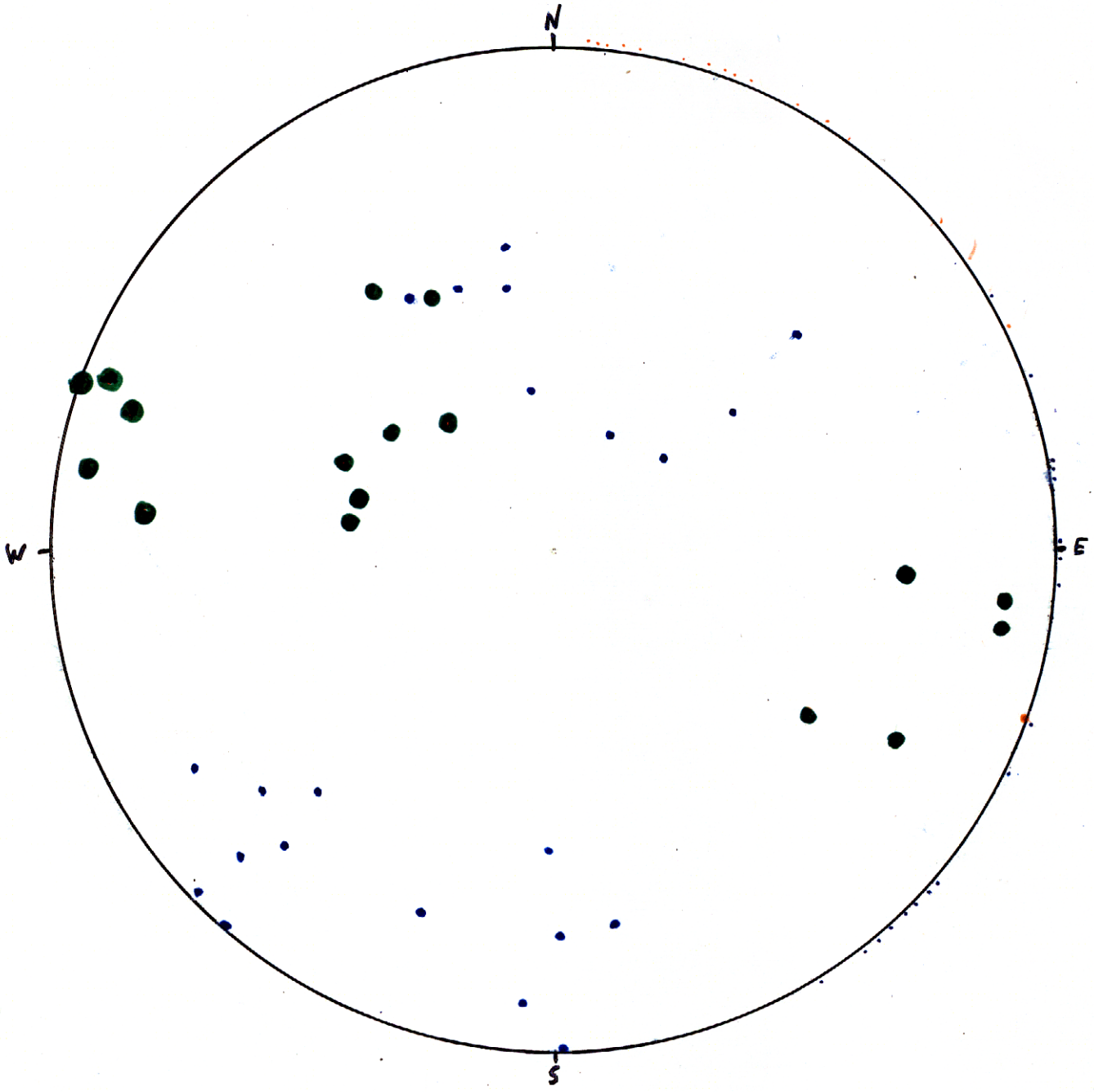
Figure 3-5 Frequency Diagram - Joints/Fractures



NSWC - White Oak
Fracture Trace Analy
Pole Diagram
Figure 3-6



Foliation –

Joints/Fractures -

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APPENDIX B

AZIMUTHAL RESISTIVITY SURVEY

AND

EM GEOPHYSICAL SURVEY

Memorandum

To: Ron Kotun

Subject: Geophysical Survey Results

Date: 22 February, 1999

From: K. Sprietzer

1.0 PURPOSE AND SCOPE

This memorandum describes the results of the geophysical field investigation program for the RCRA Facility Investigation and Corrective Field Measures Study conducted at five sites at the former Naval Surface Warfare Center, White Oak. The work was conducted under Contract Task Order (CTO) 298 for the Comprehensive Long term Action Navy (CLEAN), Contract Number N62472-90-D-1298. The investigation described herein was conducted in general accord with the work plan for this effort, Work Plan for RCRA Facility Investigation and Corrective Measures Study, Naval Surface Warfare Center (NSWC), White Oak, Silver Spring, Maryland, Sites 2, 3, 4, 7, 8, 9 and 11 (Brown and Root Environmental, 1998). Five sites were part of this study, and included areas within Site 4 – Chemical Burn Area, Site 7 – Ordnance Burn Area, Site 9 – Industrial Wastewater Disposal Area 300, and Site 11 – Industrial Wastewater Disposal Area 100. Field activities were conducted between November 2, 1998 and December 13, 1998.

Geophysical surveys are non-intrusive, indirect methods of sub-surface exploration. Geophysical data are characterized to the extent that they produce recognizable responses when compared to background or surrounding data. The presence of dissolved and sorbed contaminants in the strata, including trichloroethene (TCE), the primary contaminant of concern at the White Oak site, would not affect the geophysical data collected for this study.

This memorandum is presented in six sections. Section 1 provides a general introduction and the purpose and scope of the work. Section 2 discusses the purpose and objectives of the field investigation. Section 3 describes field procedures used to perform the geophysical surveys. Section 4 presents the results of the investigation, and Section 5 summarizes the findings of the investigation. Section 6 provides the references. The data figures are presented after Section 6. Appendix A displays the vertical electrical sounding of azimuthal data. Azimuthal data are in Appendix B.

2.0 FIELD INVESTIGATION OBJECTIVES

As stated in the work plan, the geophysical field investigation program was intended to satisfy two objectives, namely to establish preferred fracture orientations and trends in the bedrock, and to determine the absence or presence of abandoned leaching wells. The determination of preferred fracture trends, and by inference the preferred groundwater flow paths, would likely allow refinement of proposed monitoring well locations selected for the site.

Azimuthal resistivity surveys were performed to detect preferred fracture orientations and trends in the bedrock. An azimuthal electromagnetic survey was also performed at two of the locations surveyed using azimuthal resistivity methods for confirmation purposes. Resistivity is a measure of the earth's electrical resistance and is derived from the voltages produced when a current is applied between two points on the earth's surface. Ground currents are mainly carried by ions moving in pore waters in the subsurface (Telford et al., 1992). In bedrock, fractures containing water will be more conductive (less resistive) than the surrounding soil or bedrock (Lane, 1995). Therefore, low apparent resistivity values imply preferential fracturing.

Electromagnetic surveys were performed to determine the absence or presence of abandoned leaching wells. A pilot-scale ground penetrating radar (GPR) survey was also performed at one location to determine the absence or presence of a leaching well, in accordance with the work plan.

3.0 FIELD PROCEDURES

3.1 SURVEY GRIDS

Azimuthal Resistivity Surveys

Radial grids were established using ten degree rotations around a center point in accordance with the approved project Work Plan. The rotations were not adjusted for magnetic declination; therefore, zero degrees represents magnetic north and not true north. Apparent resistivity measurements were collected along each radial grid line where possible at distances of 2, 3, 5, 7, 10, 13, 21, 28, 36, and 42 meters from the center point. Grids were established and data were collected at Site 4, Site 7, Site 9 (Bldg. 309), Site 9 (South Site), and Site 11. Due to site constraints (the presence of obstacles and /or surface features which would inhibit instrument response), not all arrays could be established to the maximum distance of 42 meters. The electromagnetic (EM) surveys were conducted measuring apparent conductivity. These values were converted to apparent resistivities and are expressed as azimuthal electromagnetic measurements. These surveys were performed for confirmation purposes at Site 9 (Bldg. 309) and Site 11, on the same grids established at those locations for the azimuthal resistivity surveys.

Electromagnetic Surveys

Conventional Cartesian coordinate grids were established parallel to existing site features such as buildings and fences. Electromagnetic (EM) data were collected continuously along grid lines spaced five feet apart. Grids were established and data were collected at Site 9 (Bldg. 311), Site 11 (softball field), and Site 11.

GPR Survey

The GPR survey was performed at Site 9 (Bldg. 311) over three lines which were part of the EM grid, in the vicinity of the presumed location of the leaching well. This area was selected due to the many surface features that had a high potential to interfere with the EM survey. Because the GPR uses a shielded antenna, it is less likely to be affected by surface features.

3.2 GEOPHYSICAL SURVEYS

Azimuthal Resistivity Surveys

The azimuthal resistivity surveys were performed using four electrodes placed in a square array. The array is rotated around a center point. Furthermore, the size of the square is increased by $A(2)^{1/2}$, where A is the length of the side of the square. By increasing the size of the square, the depth of exploration is increased. In this way, stratigraphic boundaries can be established, and resistivity data can be interpreted as a function of the geologic unit.

The surveys were initially performed using an IRIS Syscal Junior 50 Watt Transmitter/Receiver with four individual electrodes (Site 11). An AGI STING Resistivity Meter was used at all subsequent sites. Use of this meter increases the rate of data acquisition, because it is configured to use a multi-electrode square array. The AGI STING requires less grid reconfiguration as the grid is rotated and the size of the square increases.

Azimuthal EM Surveys

The azimuthal EM surveys were performed at Site 9 (Bldg. 309) and Site 11 using a Geonics EM-34 conductivity meter. Standard coil separations (distance between transmitter and receiver) of 10, 20, and 40 meters were used. By increasing the coil separation, the depth of exploration is increased. In this way, conductivity data can be interpreted as a function of depth and geologic unit.

Electromagnetic Surveys

The EM surveys intended to determine the presence or absence of former leaching wells were performed using a Geonics EM-31 conductivity meter. The EM-31 surveys were conducted in

two orientations (north-south and east-west) to better detect potential subsurface targets. Terrain conductivity data and in-phase data, which is significantly more sensitive to buried metallic objects, were collected during the survey.

GPR Survey

The GPR survey was performed at Site 9 (Bldg. 311) using a GSSI SIR-2 in monostatic (single antenna) mode using a 300 MHz antenna.

3.3 DATA PROCESSING

Azimuthal Resistivity Surveys

Each apparent resistivity value measured by the instrument was first multiplied by a constant (geometric factor) unique to each square size. This was done manually for data collected by the IRIS resistivity meter and by specialty software provided with the STING resistivity meter. Data for Site 11 were collected over a two-day period, and adjusted for soil moisture. Soil moisture typically affects only the shallow resistivity data. Although data for Site 4 were also collected over a two-day period, adjustments for soil moisture were not made due to poor contact between the electrodes and soil (indicated by missing data in some of the radial diagrams provided as Figures 1 through 11). Lastly, when necessary to smooth the data, a weighted average for each point was calculated using the data point and points immediately adjacent to it.
This technique was used on data collected at Site 9 (Bldg 309) and Site 11.

Azimuthal EM Surveys

Azimuthal EM data were converted from conductivity values (mS/m) to apparent resistivity values using a constant. Data collected at the 40 meter coil separation were not evaluated due to poor quality associated with cultural interference (i.e., power lines, buildings), which affected the instrument response. The results of the surveys are plotted as radial diagrams provided as Figures 8 and 12.

Electromagnetic Surveys

Conductivity and in-phase data collected by the EM-31 were stored in a data logger with line positions and data values. The data were downloaded to a computer and contoured using SURFER for interpretation. These contour plots are provided as Figures 13 through 19.

GPR Survey

GPR data were viewed in the field for anomalies that could be attributed to a former leaching system. No such anomalies were found, and subsequent processing was not warranted.

4.0 RESULTS

4.1 RESISTIVITY SURVEYS

Azimuthal resistivity data can be used to establish stratigraphic boundaries, allowing preferred fracture orientations to be interpreted as a function of the bedrock unit. Figures 1 through 5 in Appendix A shows apparent resistivity for one azimuthal direction plotted against square size. These figures represent a vertical electrical sounding with a sloping apparent resistivity curve. Each significant change in slope represents a change in resistivity, typically at a geologic boundary. Three primary stratigraphic units are known to exist at the Sites investigated during this element of the study, namely the overburden, saprolite, and bedrock. These units vary greatly in thickness and, in the case of the overburden and saprolite, are very thin or nearly absent at some locations.

Site 4 and Site 7

Based on the vertical electrical soundings and boring log data from monitoring wells installed after the surveys were conducted, it appears that azimuthal resistivity data collected at Site 4 (Figure 1, Appendix A) and Site 7 (Figure 2, Appendix A) did not extend below the bedrock surface. Site constraints (steep slopes, wooded areas, and/or fences) precluded extending the arrays further to collect additional resistivity data.

Site 9 (South Site)

The vertical electrical sounding for Site 9 (South Site), (Figure 3, Appendix A) has the first change in slope at the 3rd square 10(m). This change in slope may be the change from the surface soils to the saprolite or bedrock. This geologic assumption is supported by the fairly constant value of the apparent resistivity values in the first two squares. Constant apparent resistivity values are usually caused by relatively homogeneous geology (Lane, 1995), which is likely to be present in surface soils. Depth to bedrock at Site 9 (South Site) was confirmed to be approximately 10 feet below grade by monitoring well 9GW83. It is therefore likely that the apparent resistivity values for squares 4,5 6, and 7 are in the bedrock.

As shown on the radial diagrams (Figures 1 to 4), there is one zone of low apparent resistivity values for Site 9 (South Site). This azimuthal orientation is at 60 degrees, corresponding to a northeast / southwest preferred fracture orientation.

Site 9 (Bldg. 309)

The vertical electrical sounding for Site 9 (Bldg. 309), (Figure 4, Appendix A) had the first change in slope at the 3rd square (10m). This is a small variation in the slope (~100 ohm-m) and may be a localized area that is less resistive than the soils above and below it. The second change in

slope is after square 4 (15m). This may be the change from overburden to saprolite or overburden to bedrock. The latter is suspected because the curve is similar to that observed at Site 11 (Figure 5, Appendix A), which was confirmed to be in bedrock. The vertical electrical sounding indicated that data collected for squares 6, 7, and 8 are likely in bedrock.

As shown on the radial diagrams provided as Figures 5 to 7, zones of low apparent resistivity values correspond to a northwest / southeast preferred fracture orientation. A secondary fracture zone observed only in the shallow bedrock corresponds to an east / west fracture trend.

The EM azimuthal survey results for the 20 meter coil separation confirmed a northwest / southeast preferred fracture orientation, as well as inferring a conjugate set of fractures at 90 degrees, trending northeast / southwest (Figure 8).

Site 11

The vertical electrical sounding for Site 11, (Figure 5, Appendix A) has the first change in slope at the 5th square (20m). This is interpreted as a change from overburden to saprolite. There is a second change in slope at the 9th square (70m). This is interpreted as the change from saprolite to bedrock. Depth to bedrock at Site 11 is approximately 25 feet (confirmed by monitoring well 11GW71). Therefore, it is probable that the resistivity values for squares 9,10, and 11 are in the bedrock.

As shown on the radial diagrams (Figures 9 to 11), there are two zones of low apparent resistivity values for Site 11. The azimuthal zones correspond to a conjugate set of preferred fracture orientations, trending west-northwest / east-southeast.

The EM azimuthal survey results for the 20 meter coil separation confirmed west-northwest / east-southeast preferred fracture orientation, as well as inferring a conjugate set of fractures trending north-northeast / south-southwest (Figure 12).

4.2 EM SURVEY FOR LEACHING WELL DETECTION RESULTS

Site 9 – Building 311

Surface metallic features (the building, metal shed, and surface debris) significantly affected the response of the EM-31 at Site 9. Conductivity and in-phase anomalies shown on the contour maps provided as Figures 13 and 14 are a result of these features. The presence or absence of a leaching well could not be assessed in the survey area by the EM-31, due to these anomalies.

Site 11 —Building 112

The EM-31 contoured data for Site 11 (Bldg. 112) (Figures 15 and 16) displays no indication of a leaching well or drainage field. However, significant anomalies associated with buildings on the eastern and western survey boundaries precluded detection of targets in the subsurface in these areas.

Site 11—Softball Field

The EM-31 contoured data for Site 11 (Softball Field) (Figures 17 to 19) displays a significant linear anomaly on the northwestern edge of the survey site. This anomaly is caused by the metal fence located ten feet north of the survey area. The inphase contour data for Site 11 displays discrete anomalies north and south of the monitoring well (Figures 18 and 19). There is also a discrete magnetic anomaly that was detected during the survey with a Schonstedt metal locator, which is depicted in the diagrams as an X (Figures 17 to 19). These anomalies may represent an abandoned leaching well or other subsurface target and warrant further investigation.

4.3 GPR RESULTS

In accordance with the approved Project Work Plan a pilot-scale GPR survey was performed at one location. The GPR survey was performed at Site 9 (Bldg. 311) over the presumed leaching well location. The results did not reveal any anomalies. No additional GPR surveys were required or performed.

5.0 SUMMARY

5.1 Azimuthal/EM Resistivity Surveys

Azimuthal resistivity data collected at Site 4 and Site 7 did not extend below the bedrock surface, and site constraints prevented extension of the radial grids for additional data collection. The resistivity surveys performed at the remaining sites demonstrated that preferred fracture orientations occur in conjugate sets, and generally trend northeast / southwest and northwest / southeast.

5.2 EM Survey/GPR Survey

The electromagnetic data for Site 11 (Softball Field) shows discrete anomalies north and south of the monitoring well which may represent an abandoned leaching well or other subsurface target. These anomalies warrant further investigation. While anomalies that could be attributed to a former leaching well were not present at the remaining sites, surface interference greatly inhibited the response of the EM-31 in these areas.

6.0 REFERENCES

Brown and Root Environmental, 1998. Work Plan for RCRA Facility Investigation and Corrective Measures Study, Naval Surface Warfare Center (NSWC), White Oak, Silver Spring, Maryland, Sites 2, 3, 4, 7, 8, 9 and 11. Contract Task Order (CTO) 298 for the Comprehensive Long Term Action Navy (CLEAN), Contract Number N62472-90-D-1298

Lane J. W., Haeni F. P., and Watson W.M., 1995. Use of a Square-array Direct Current Resistivity Method to Detect Fractures in Crystalline Bedrock in New Hampshire. Ground Water, v.33, n. 3, p. 476-485.

Telford W.M., Geldart L. P., and Sheriff R. E., 1990. Applied Geophysics. Cambridge University Press, New York.

Figure 1

Former NSWC White Oak
Site 9 (South Site)
Azimuthal Resistivity Square Array (Ohm-m)
12/18/98

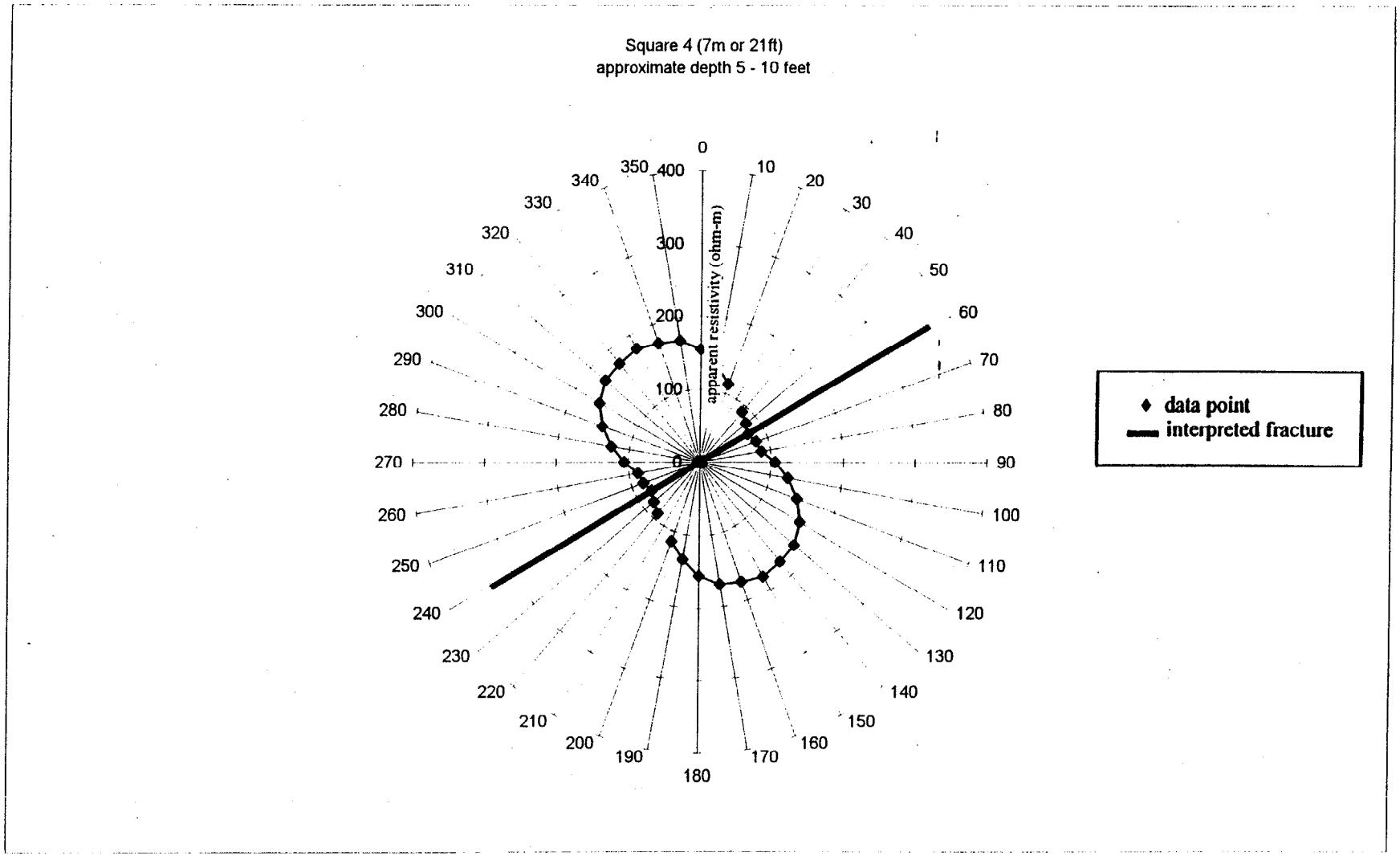


Figure 2

Former NSWC White Oak
Site 9 (South Site)
Azimuthal Resistivity Square Array (Ohm-m)
12/18/98

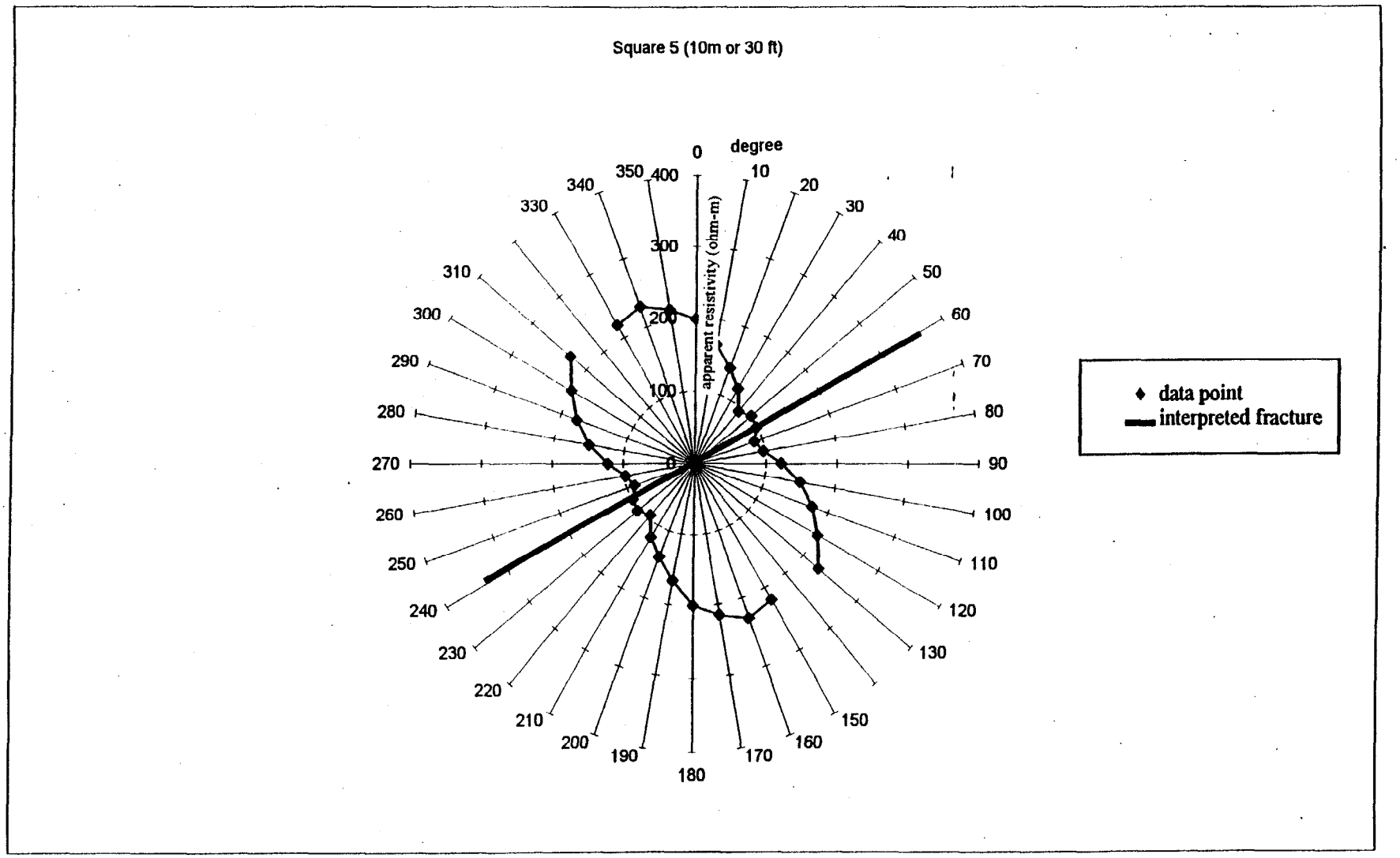


Figure 3

Former NSWC White Oak
Site 9 (South Site)
Azimuthal Resistivity Square Array (Ohm-m)
12/18/98

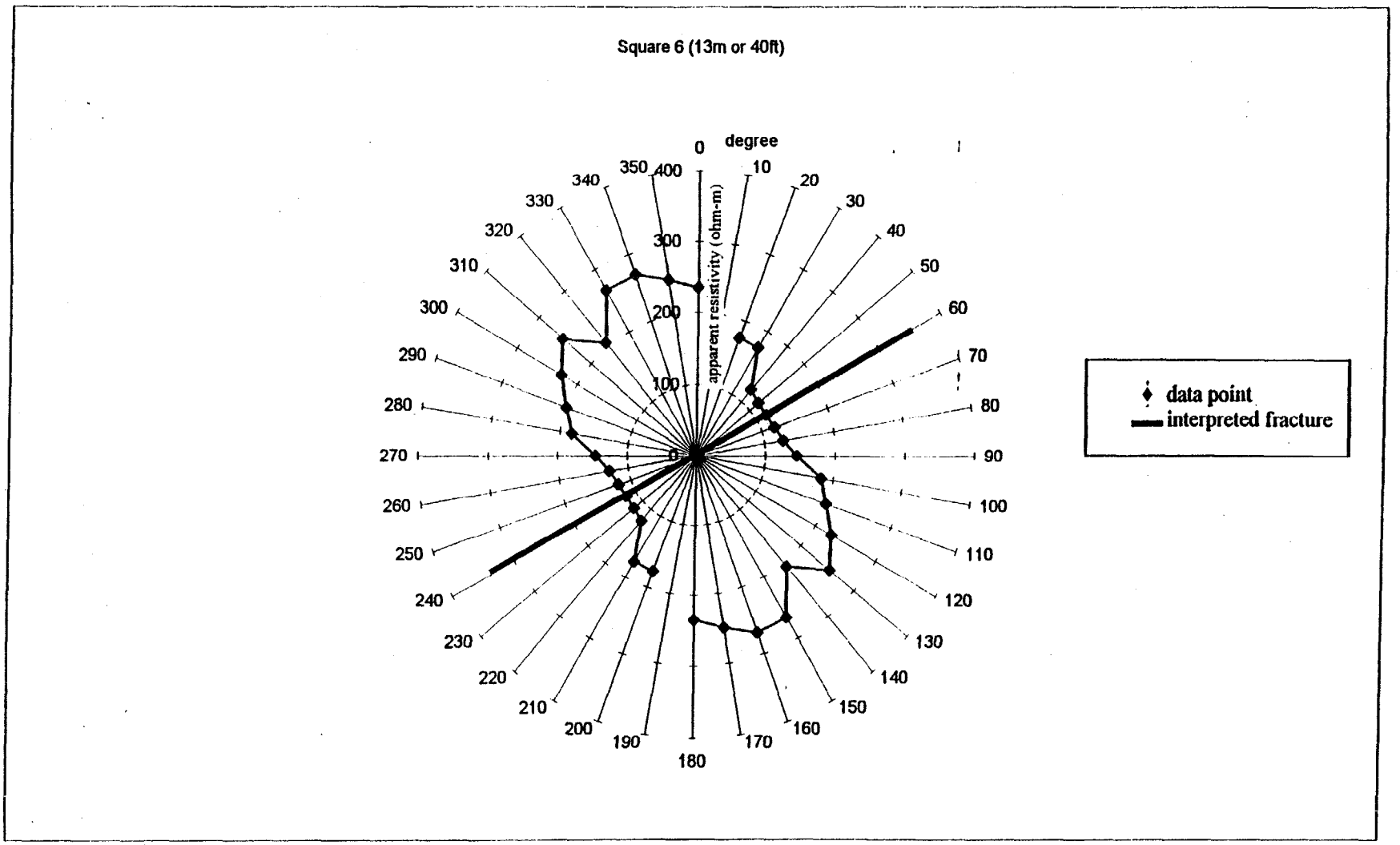


Figure 4

Former NSWC White Oak
Site 9 (South Site)
Azimuthal Resistivity Square Array (Ohm-m)
12/18/98

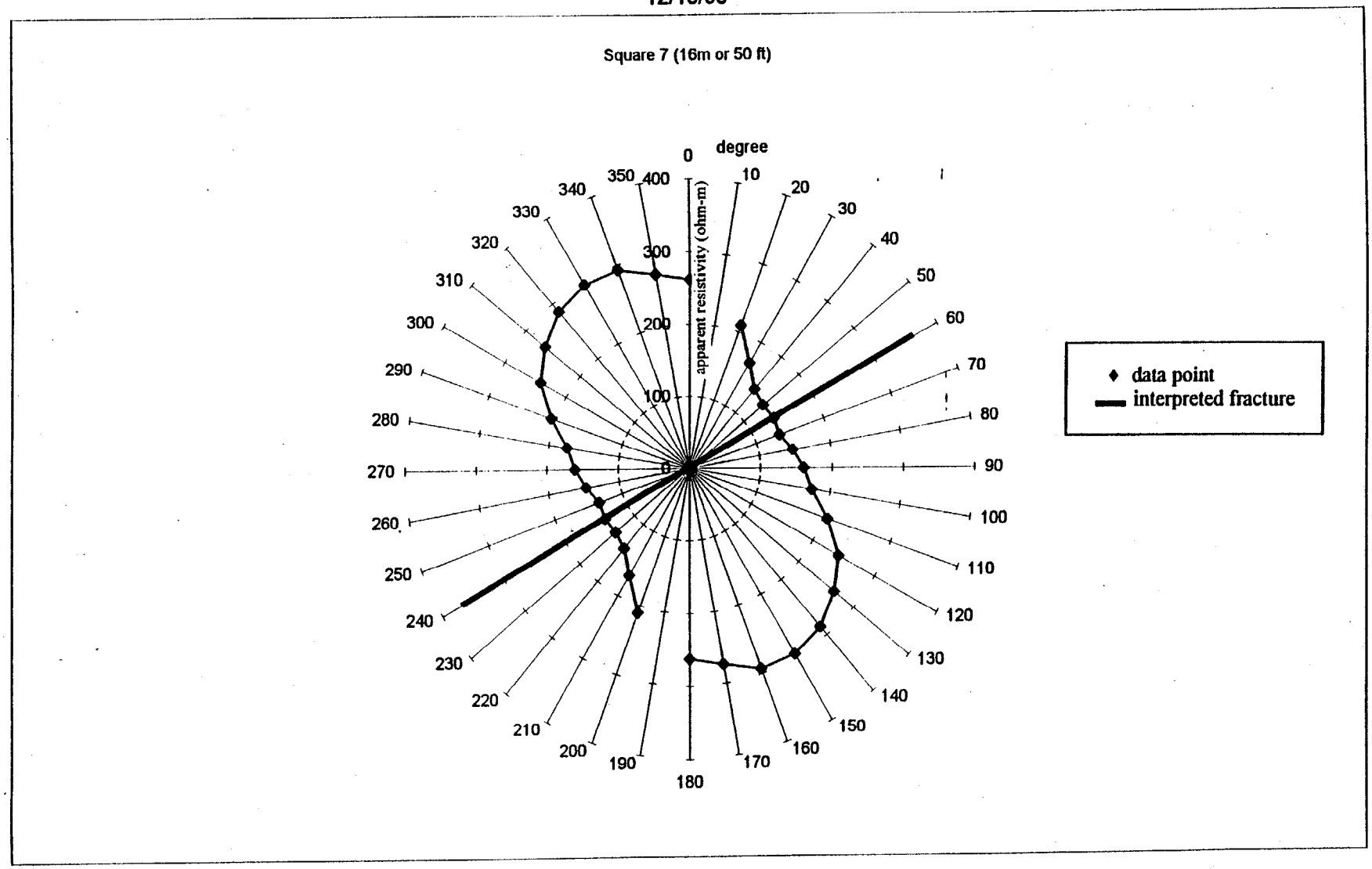


Figure 5

Former NSWC White Oak
Site 9 Bldg 309
Three Point Averaging on Data
Azimuthal Resistivity Square Array (Ohm-m)
11/09/98

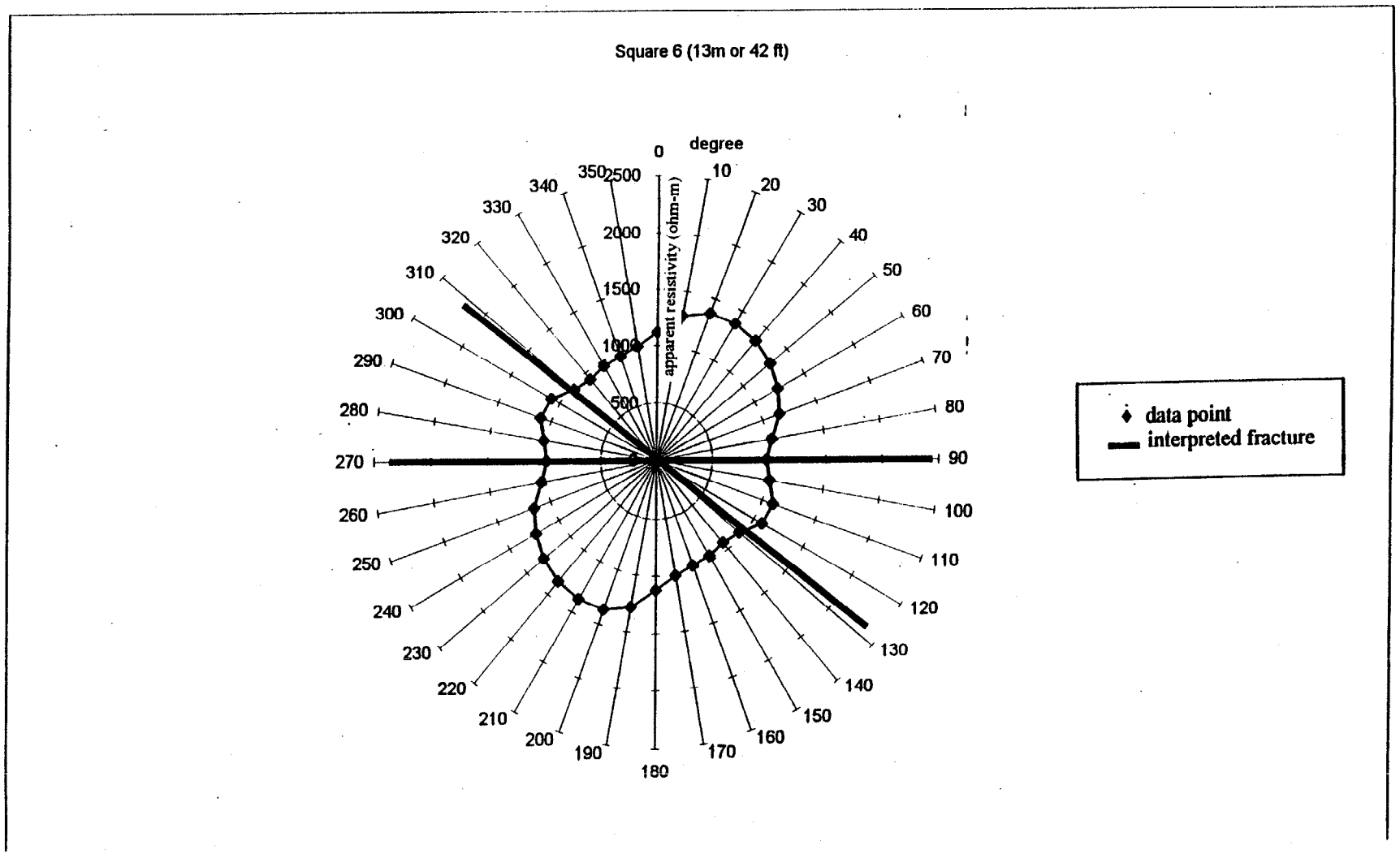


Figure 6

Former NSWC White Oak
Site 9 Bldg 309
Three Point Averaging on Data
Azimuthal Resistivity Square Array (Ohm-m)
11/09/98

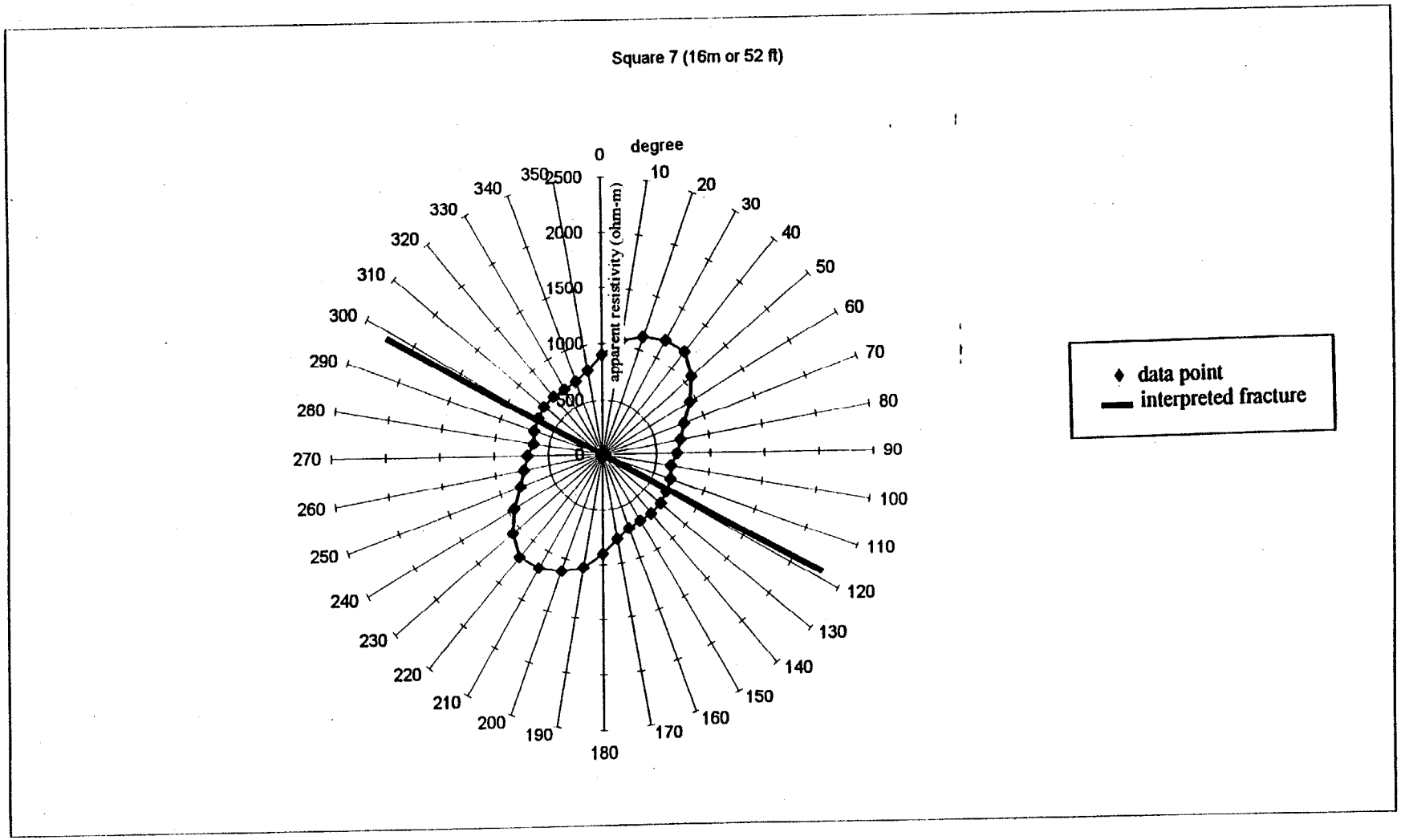


Figure 7

Former NSWC White Oak
Site 9 Bldg 309
Three Point Averaging on Data
Azimuthal Resistivity Square Array (Ohm-m)
11/09/98

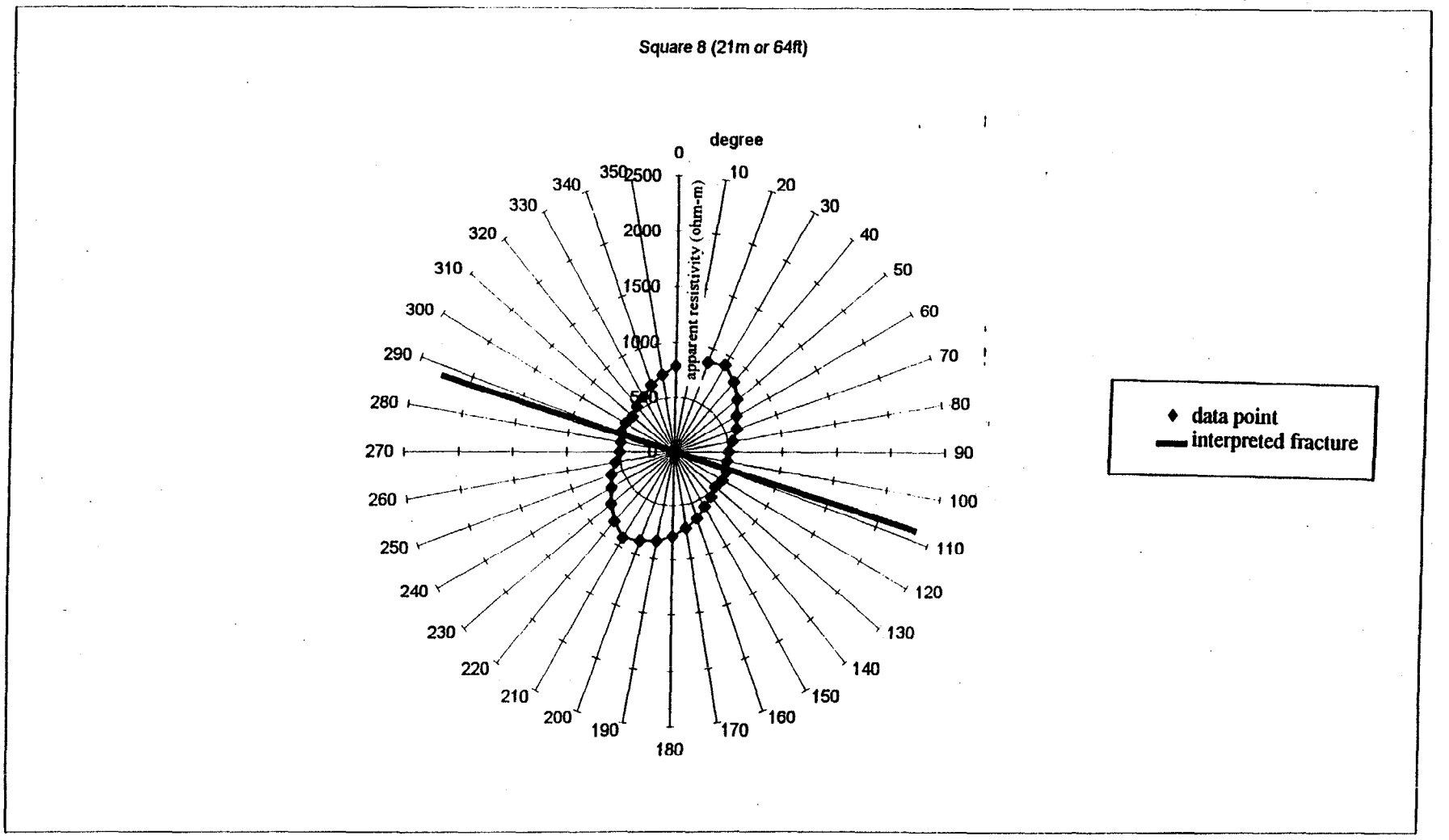


Figure 8

Former NSWC White Oak
Site 9 Bldg 309
EM-34 Survey (Ohm-m)
November 11, 1998

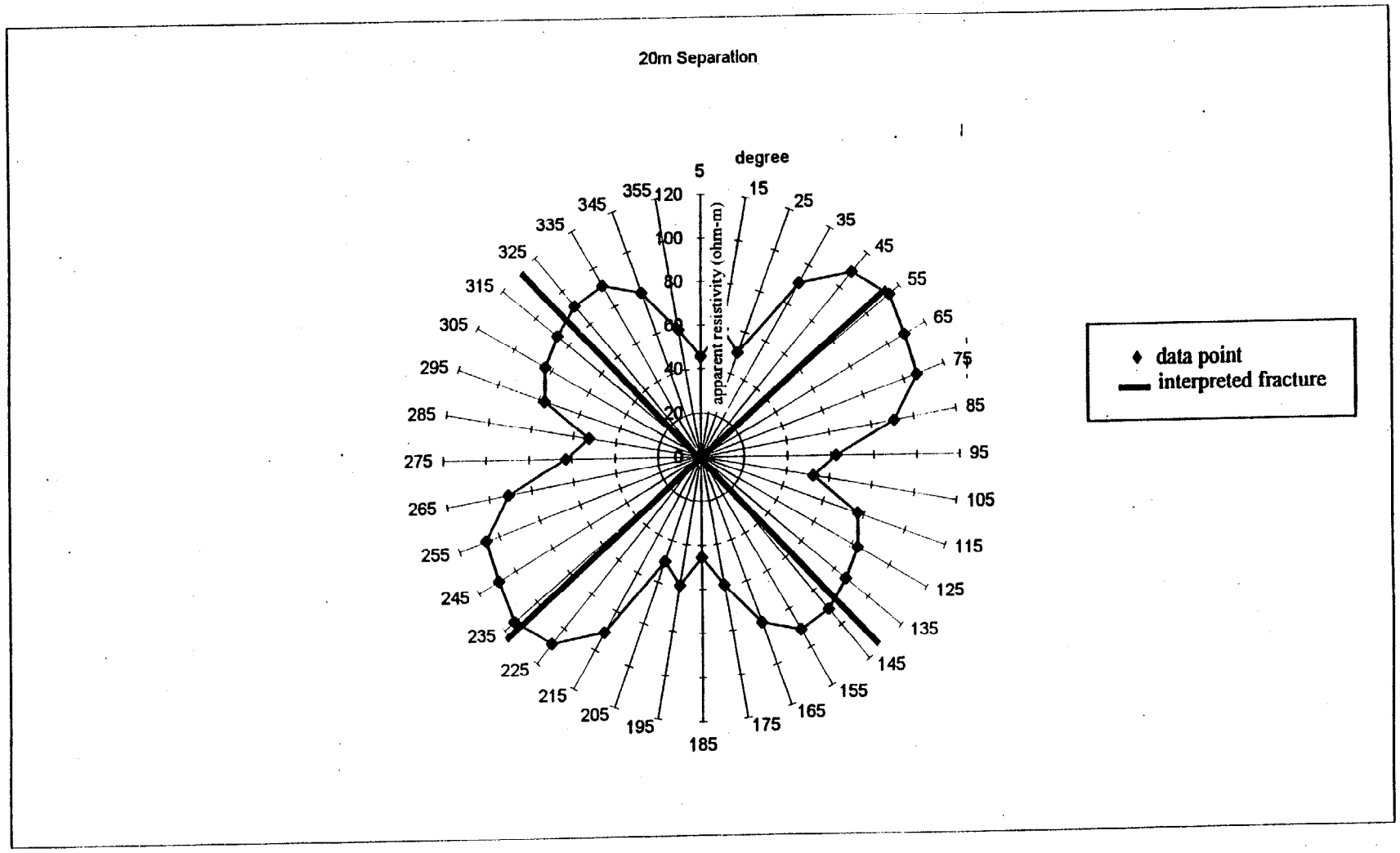


Figure 9

Former NSWC White Oak
Site 11 Baseball Field
Three Point Averaging on Data
Azimuthal Resistivity Square Array (Ohm-m)
November 3-5, 1998

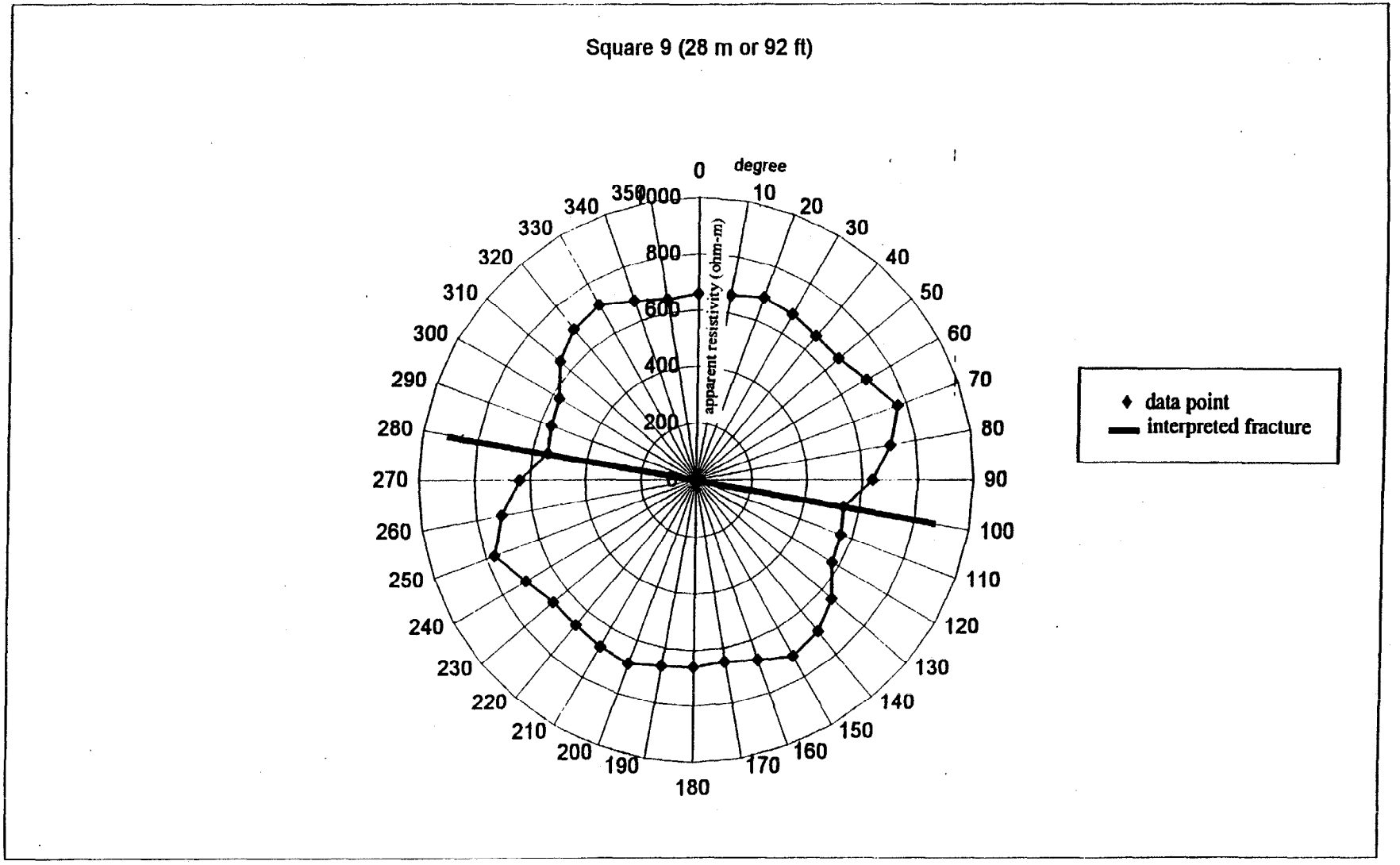


Figure 10

Former NSWC White Oak
Site 11 Baseball Field
Three Point Averaging on Data
Azimuthal Resistivity Square Array (Ohm-m)
November 3-5, 1998

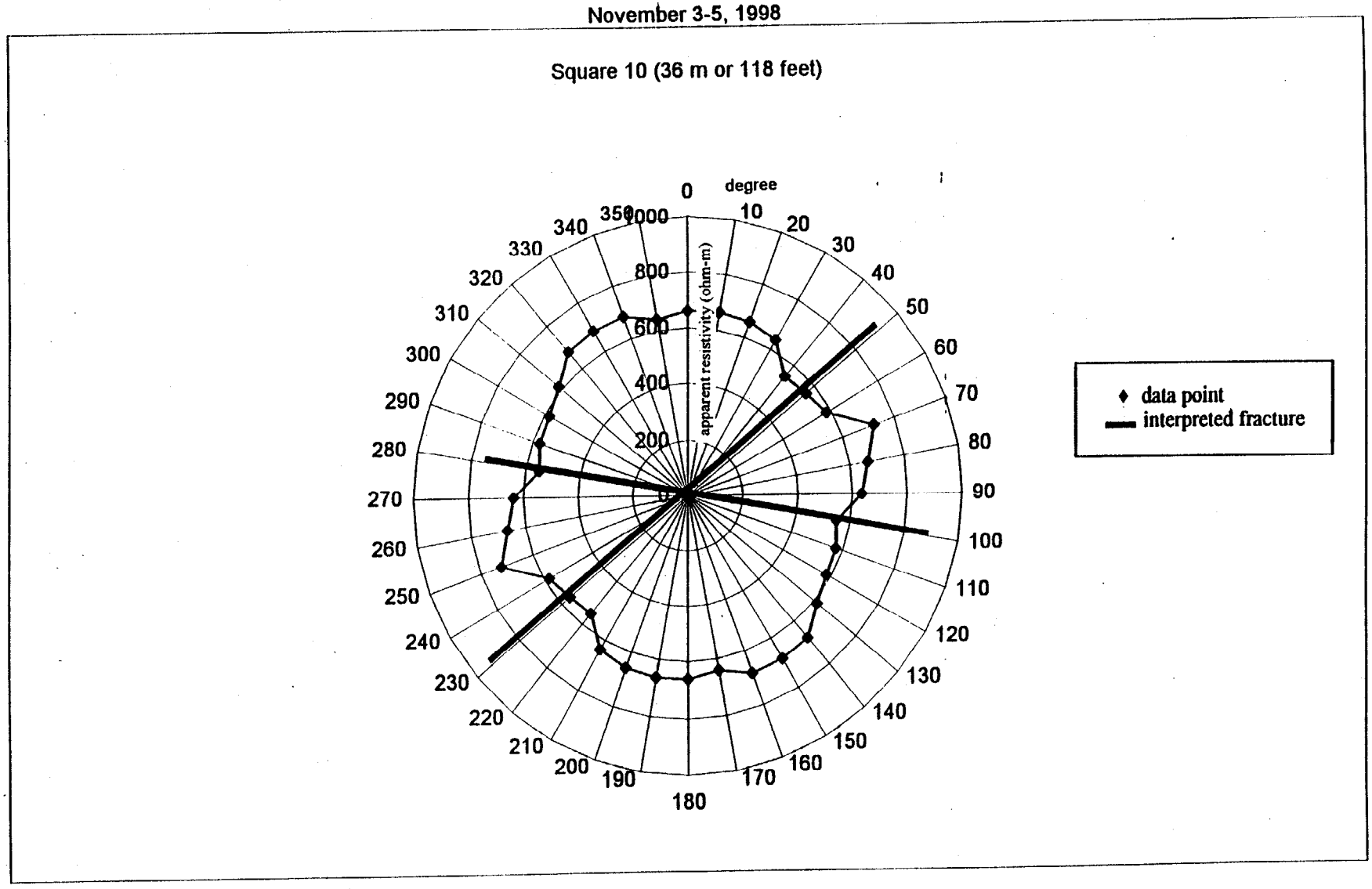


Figure 11

Former NSWC White Oak
Site 11 Baseball Field
Three Point Averaging on Data
Azimuthal Resistivity Square Array (Ohm-m)
November 3-5, 1998

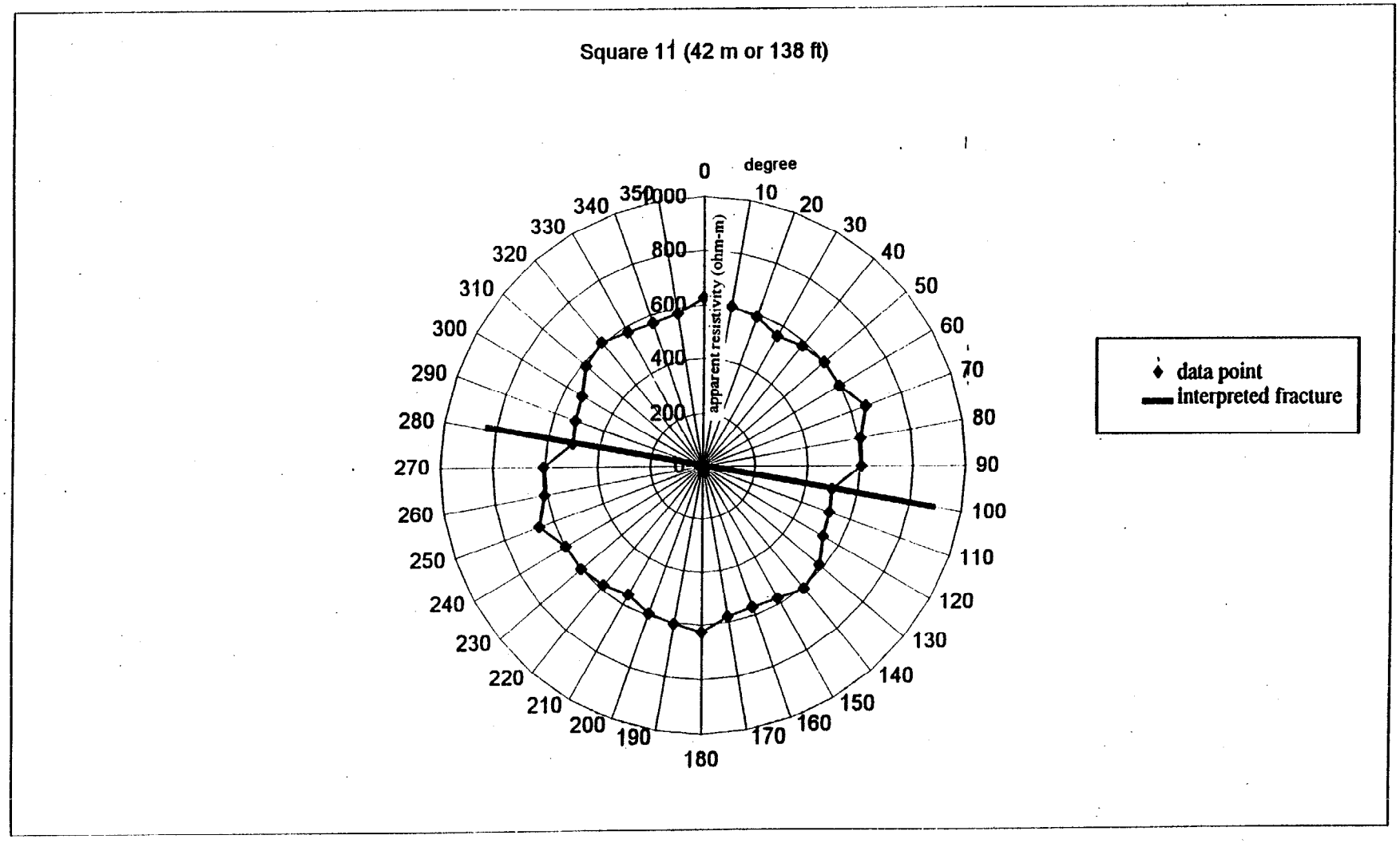
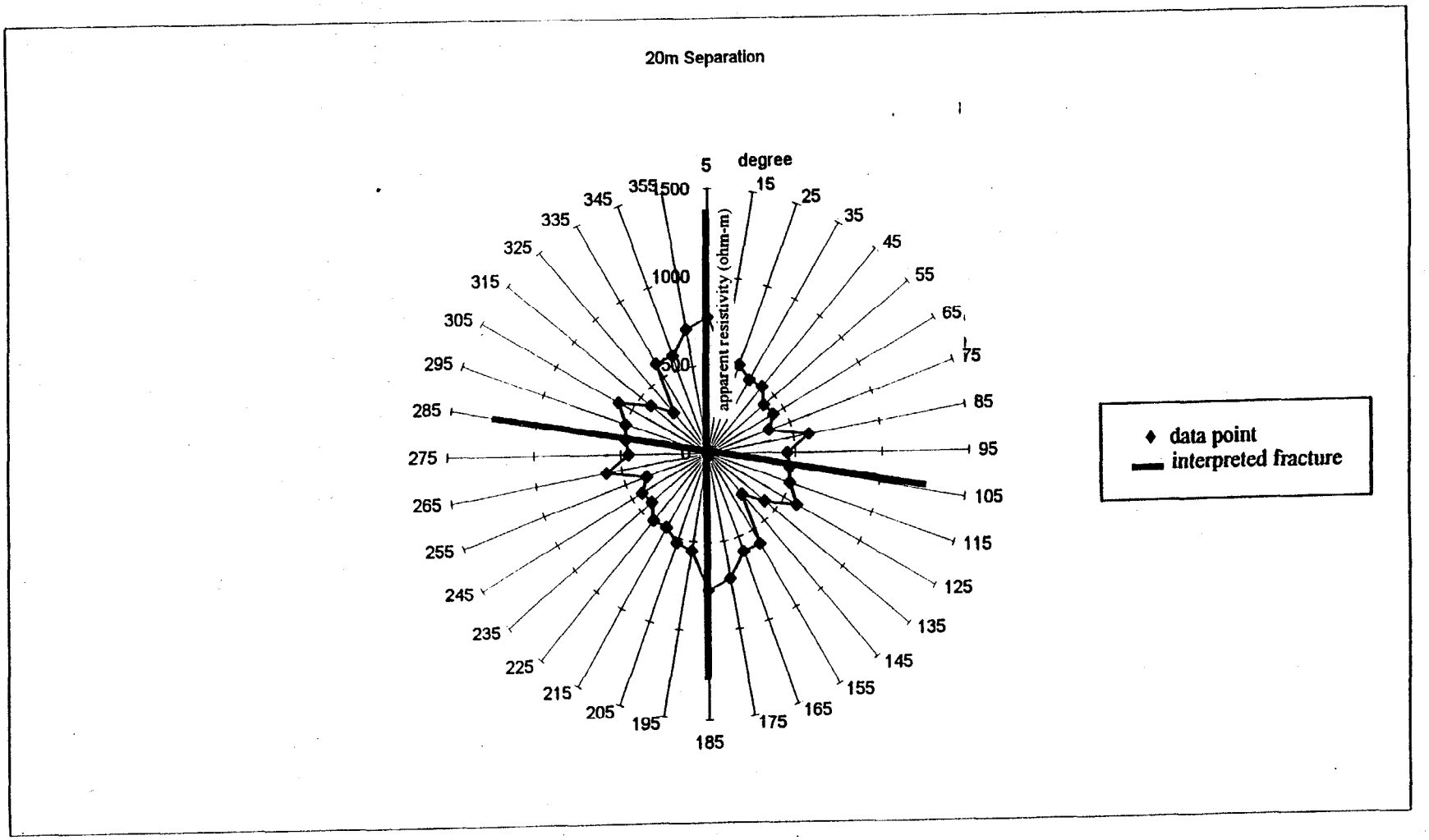
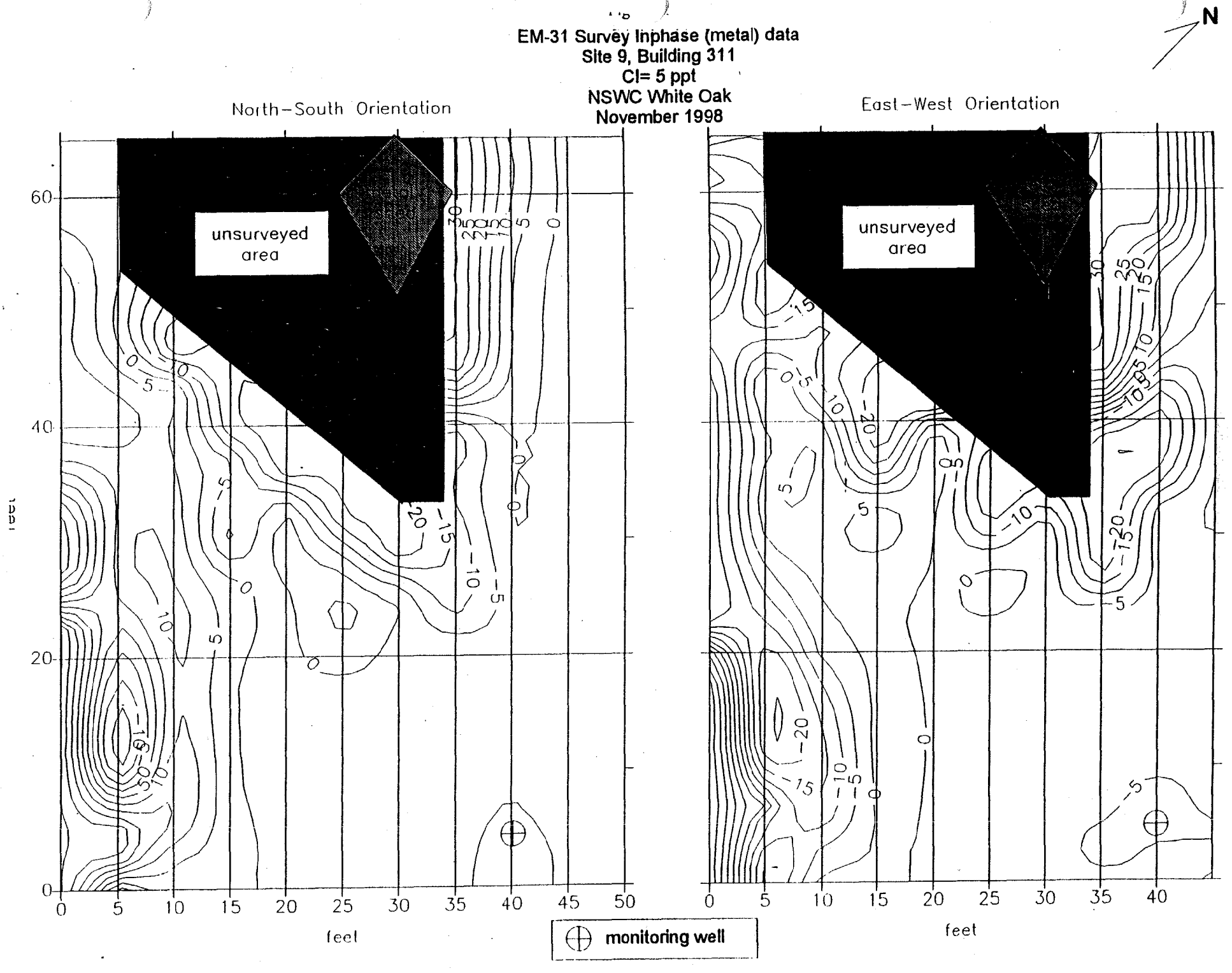


Figure 12

Former NSWC White Oak
Site 11 Baseball Field
EM-34 Survey (Ohm-m)
November 8 1998



EM-31 Survey Inphase (metal) data
Site 9, Building 311
CI= 5 ppt
NSWC White Oak
November 1998



EM-31 Survey Conductivity Data
Site 9, Building 311
CI= 10 μS/m
NSWC White Oak
November 1998

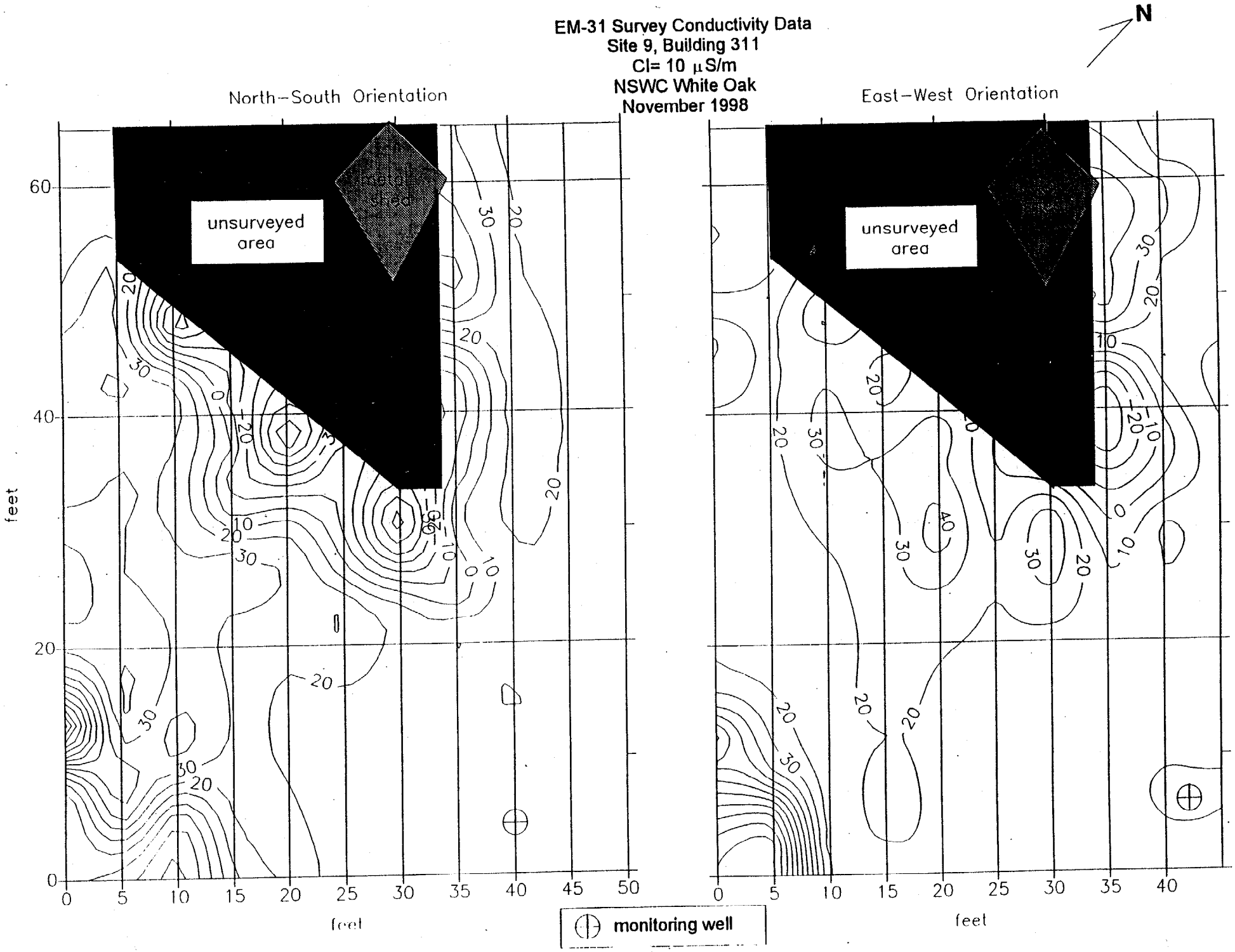


Figure 15

EM-31 Geophysical Survey
Site 11, NSWC White Oak

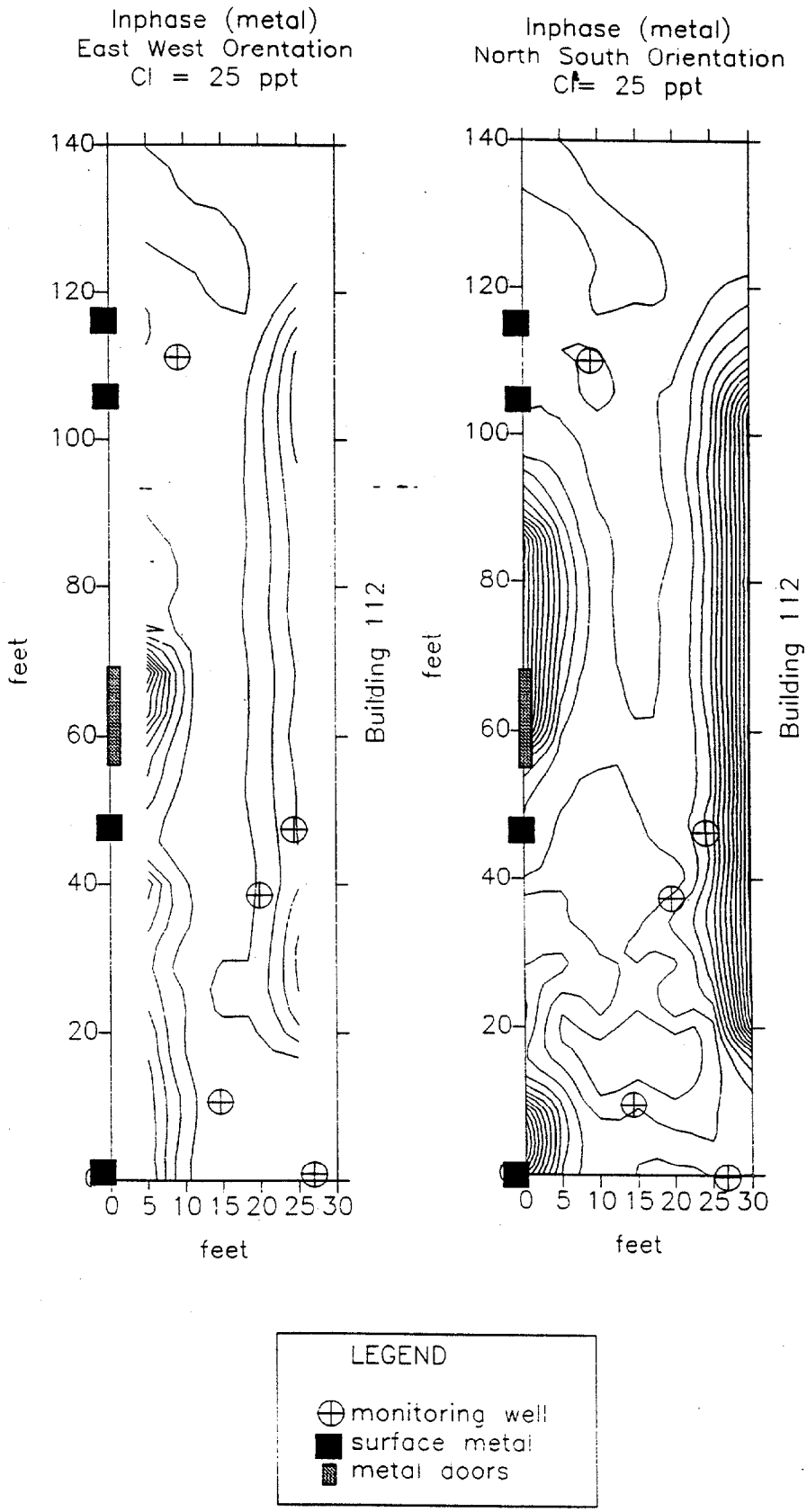


Figure 16

EM-31 Geophysical Survey
Site 11, NSWC White Oak

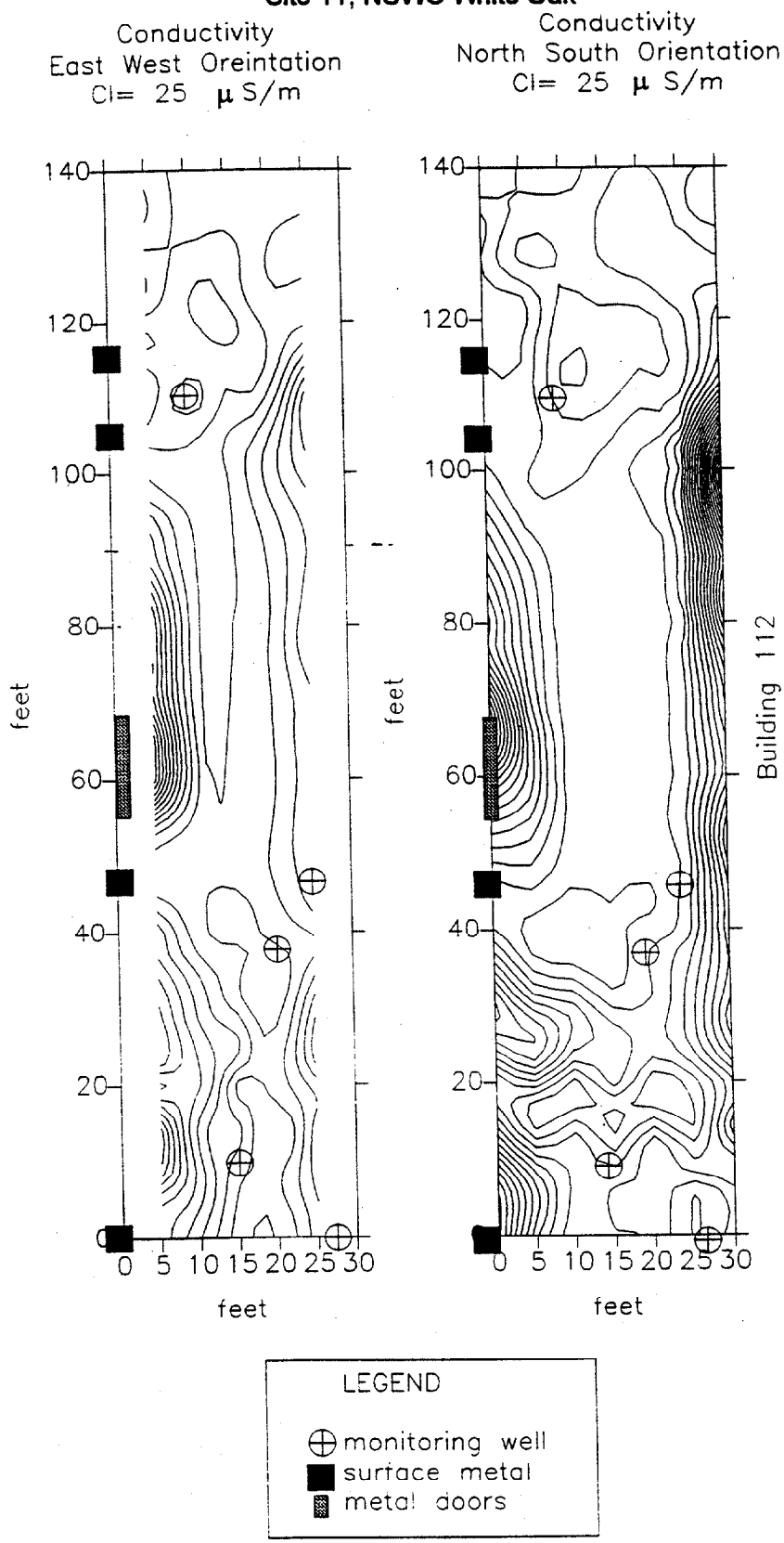


Figure 17

Geophysical Survey
EM-31 North South Orientation
Conductivity (C.I.=0.5 μ S/cm)
Site 11, NSWC White Oak
November 1998

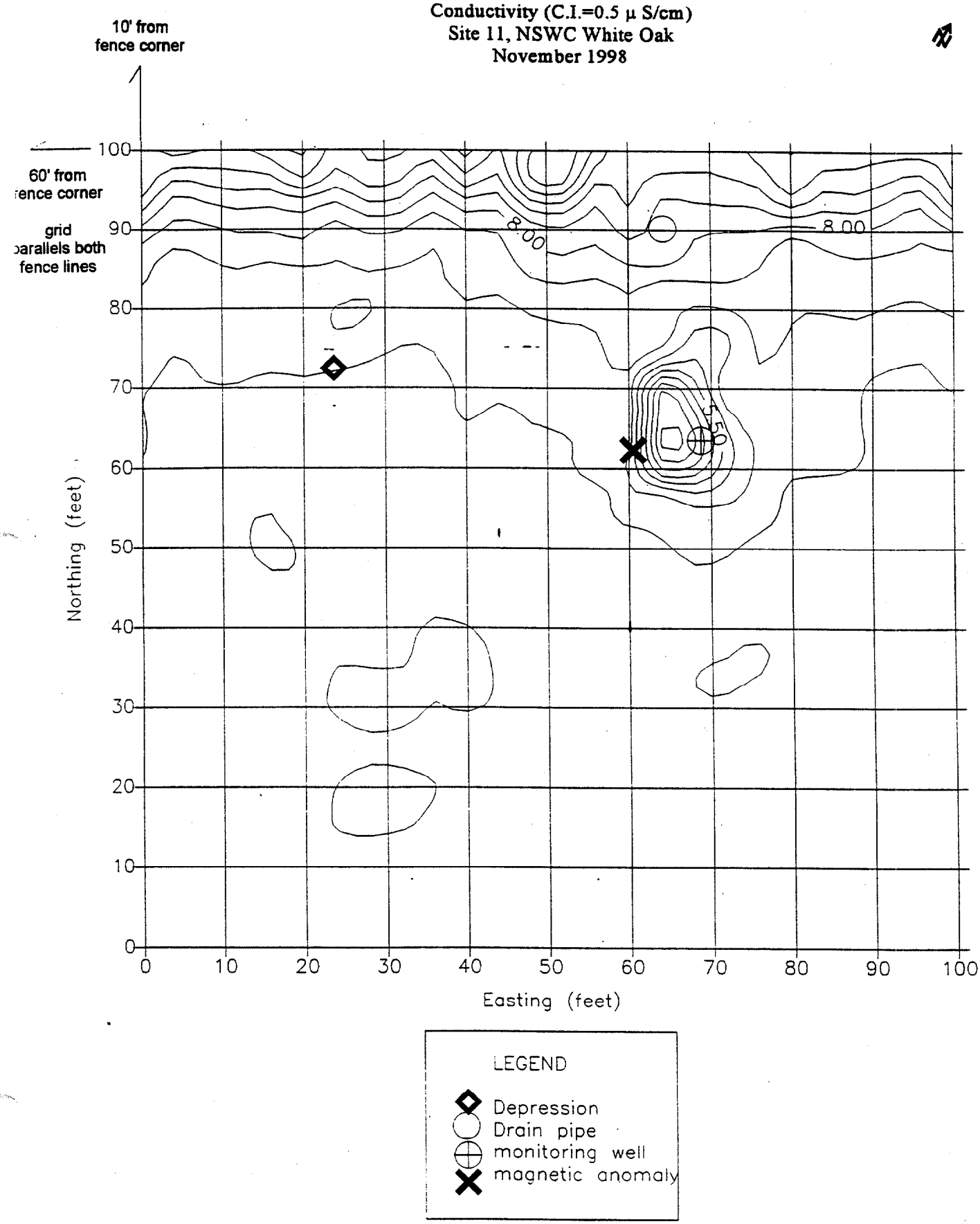


Figure 18

Geophysical Survey
EM-31 East West Orientation
Inphase (metal) C.I. = 0.2 ppt
Site 11, NSWC White Oak
November 1998

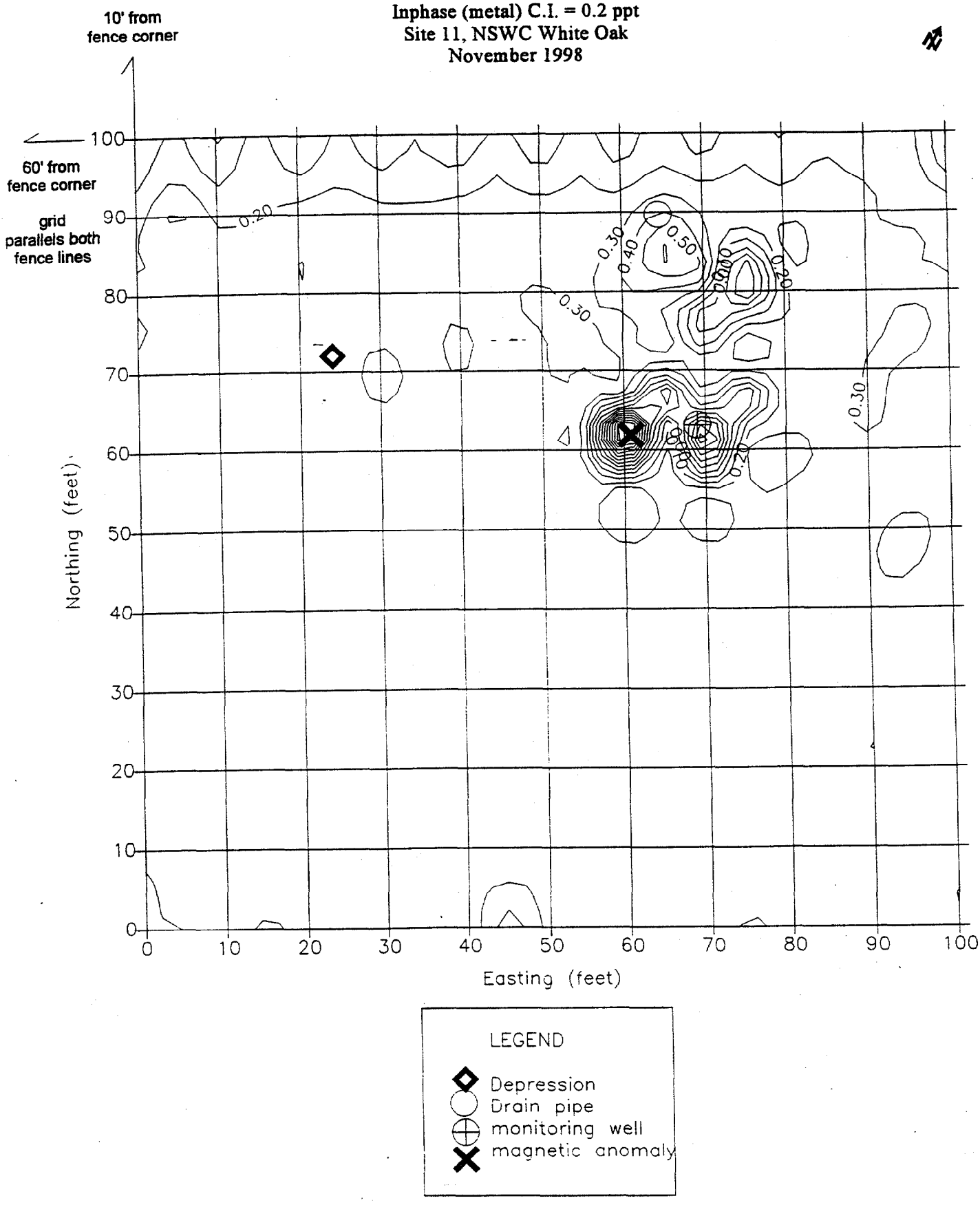
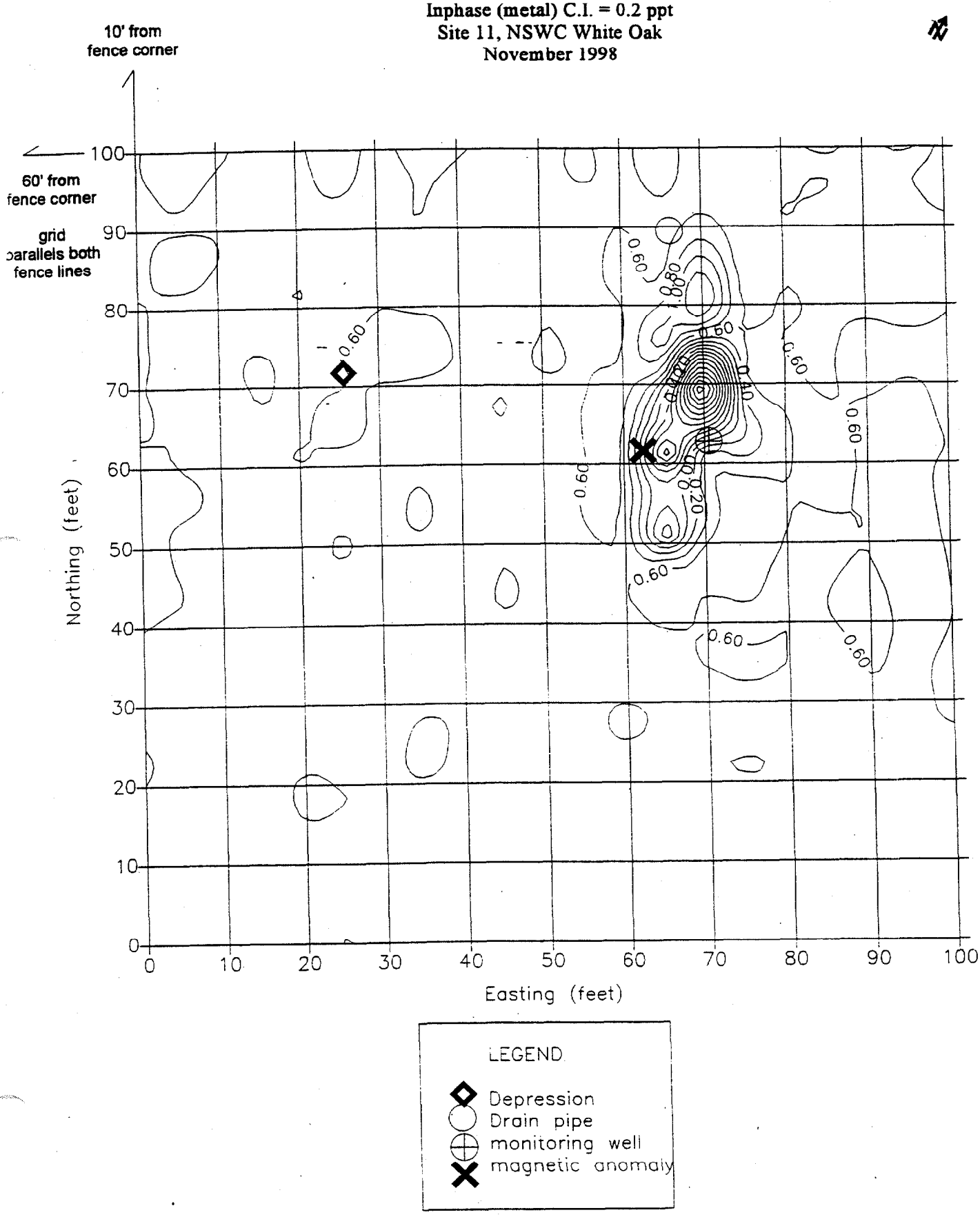


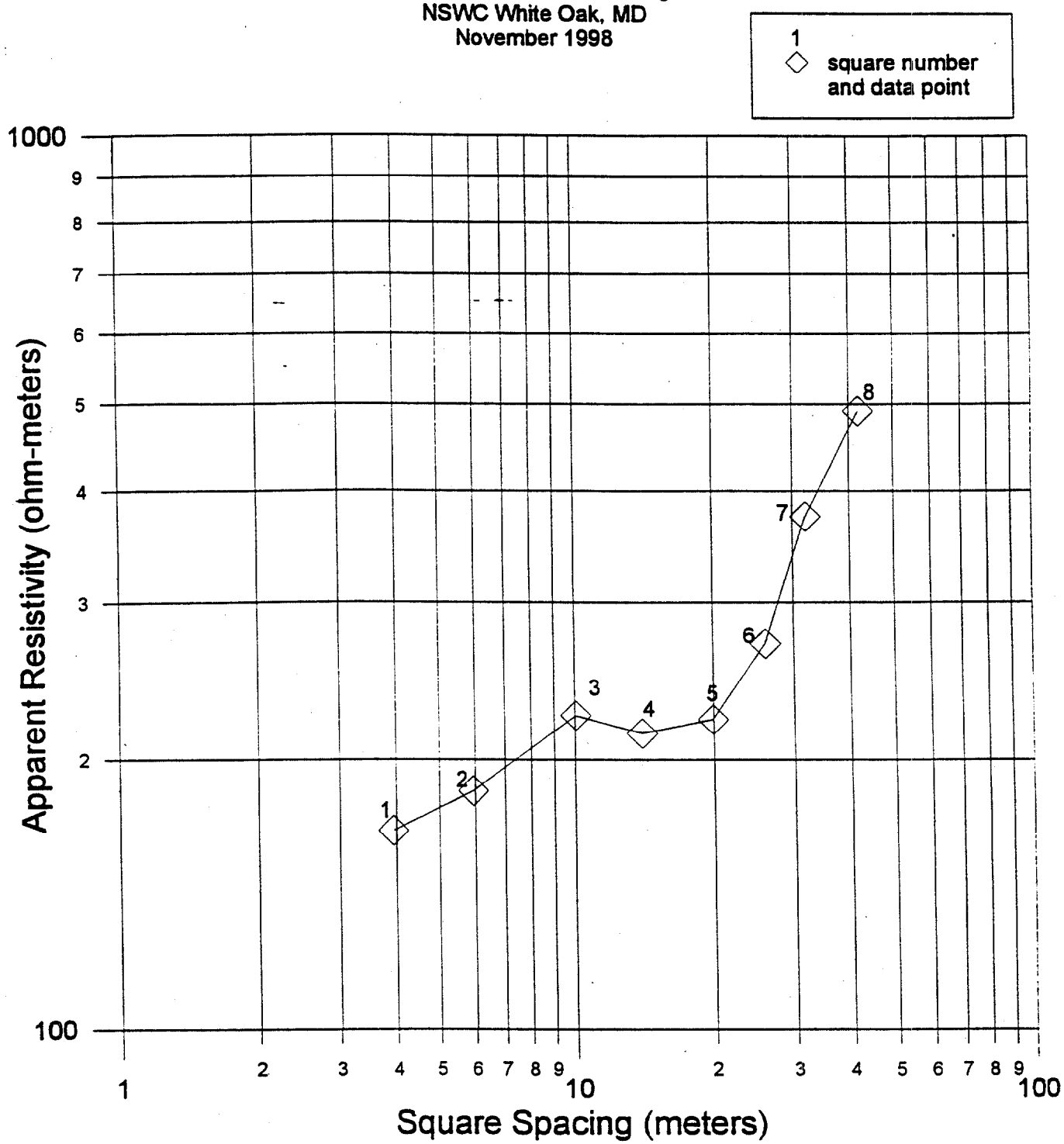
Figure 19

Geophysical Survey
EM-31 North South Orientation
Inphase (metal) C.I. = 0.2 ppt
Site 11, NSWC White Oak
November 1998



Appendix A
Vertical Electrical Sounding Of Azimuthal Data

Figure 1
Site 4
Vertical Electrical Sounding
NSWC White Oak, MD
November 1998



Figre 2
Site 7
Vertical Electrical Sounding
NSWC White Oak, MD
November 1998

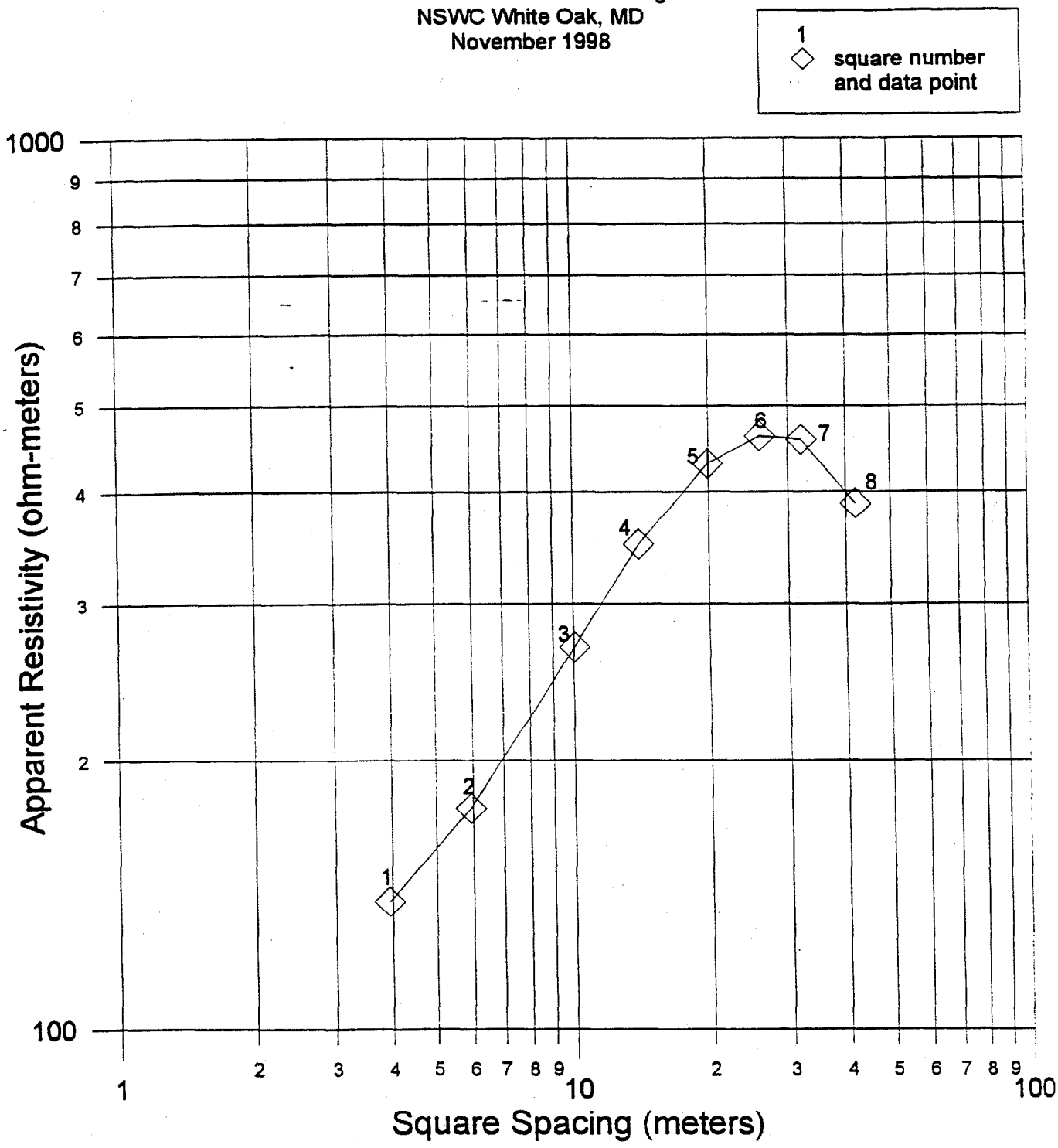


Figure 3
Site 9 (South Site)
Vertical Electrical Sounding
NSWC White Oak, MD
November 1998

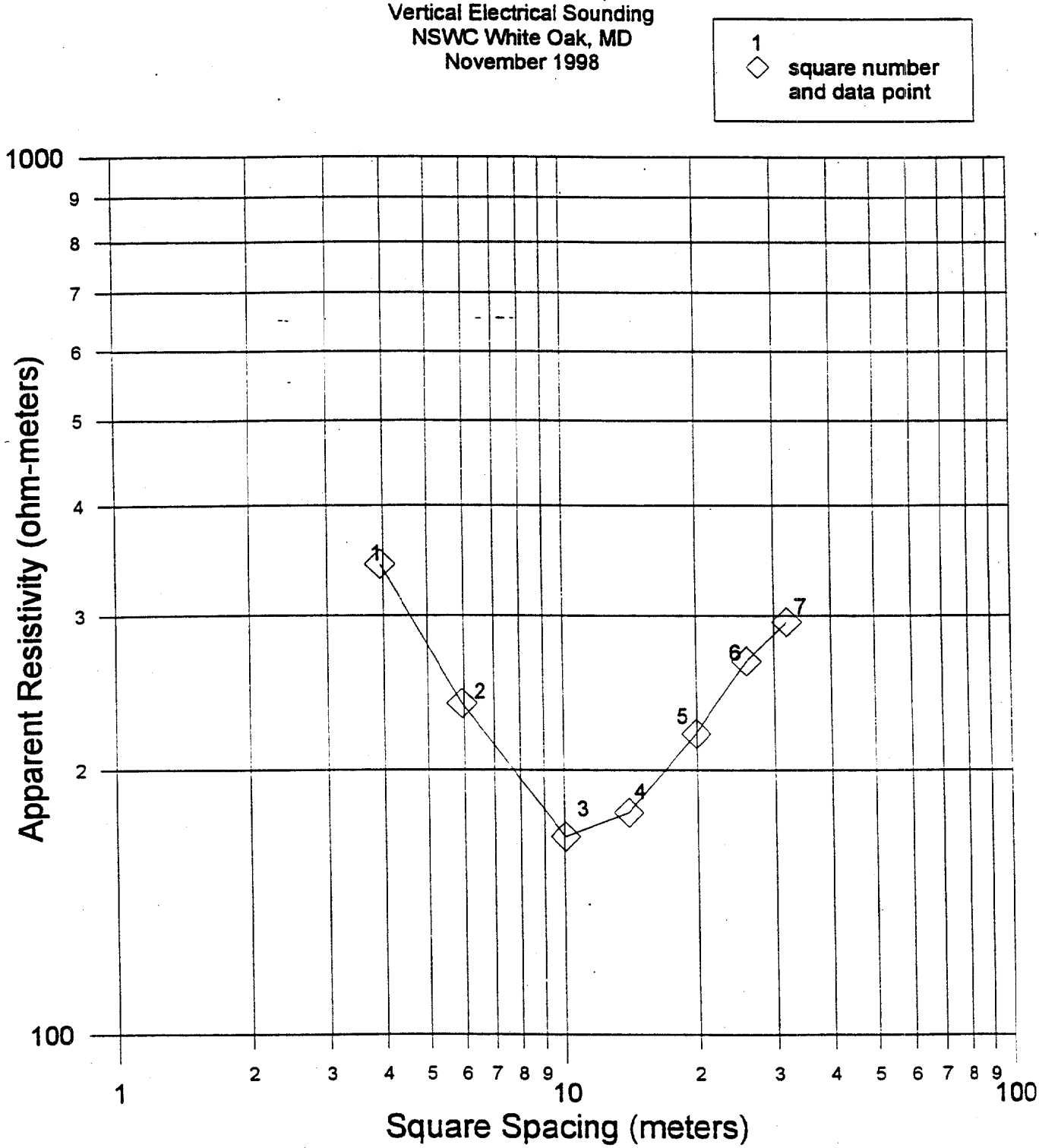


Figure 1
Site 4
Vertical Electrical Sounding
NSWC White Oak, MD
November 1998

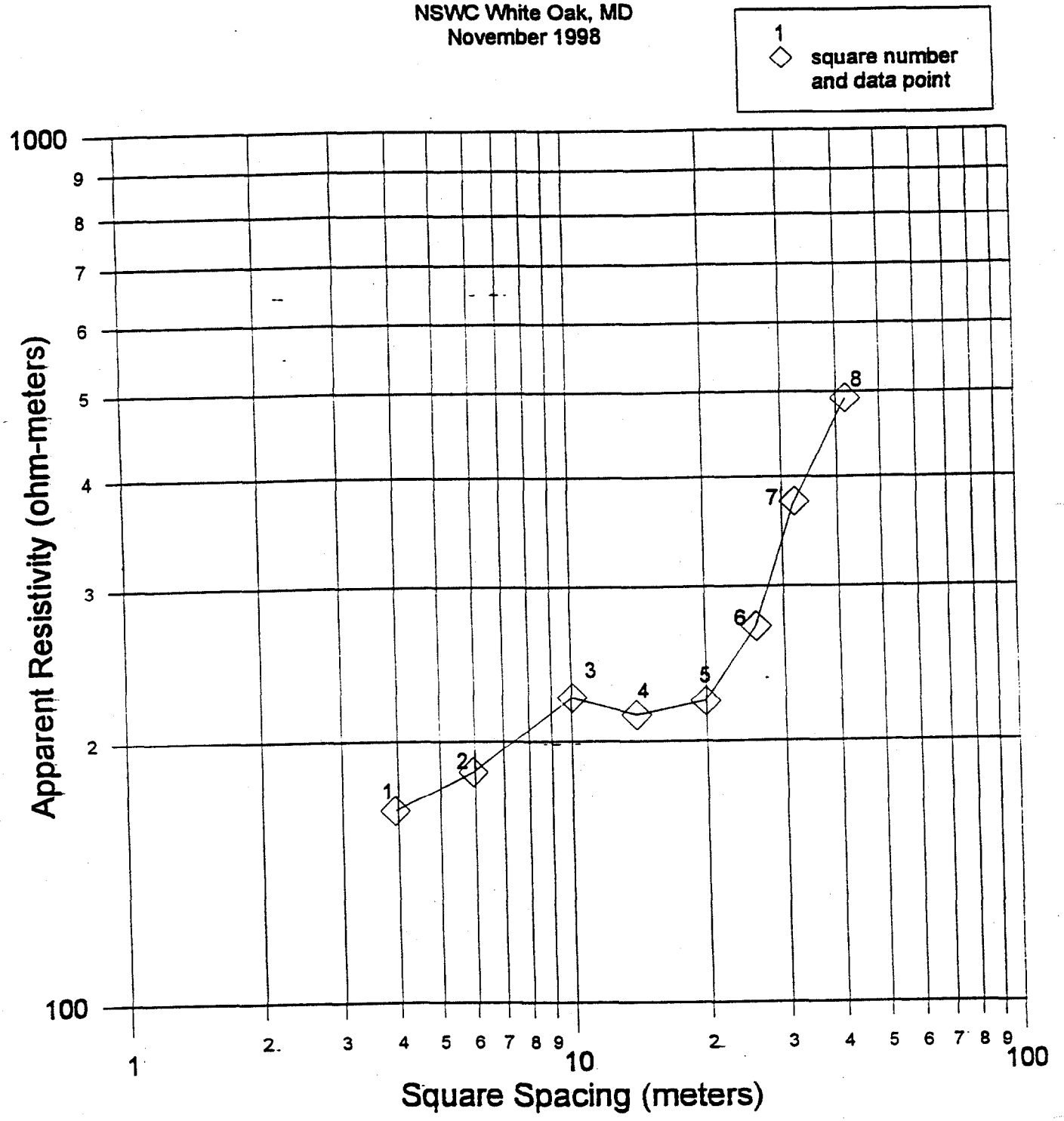
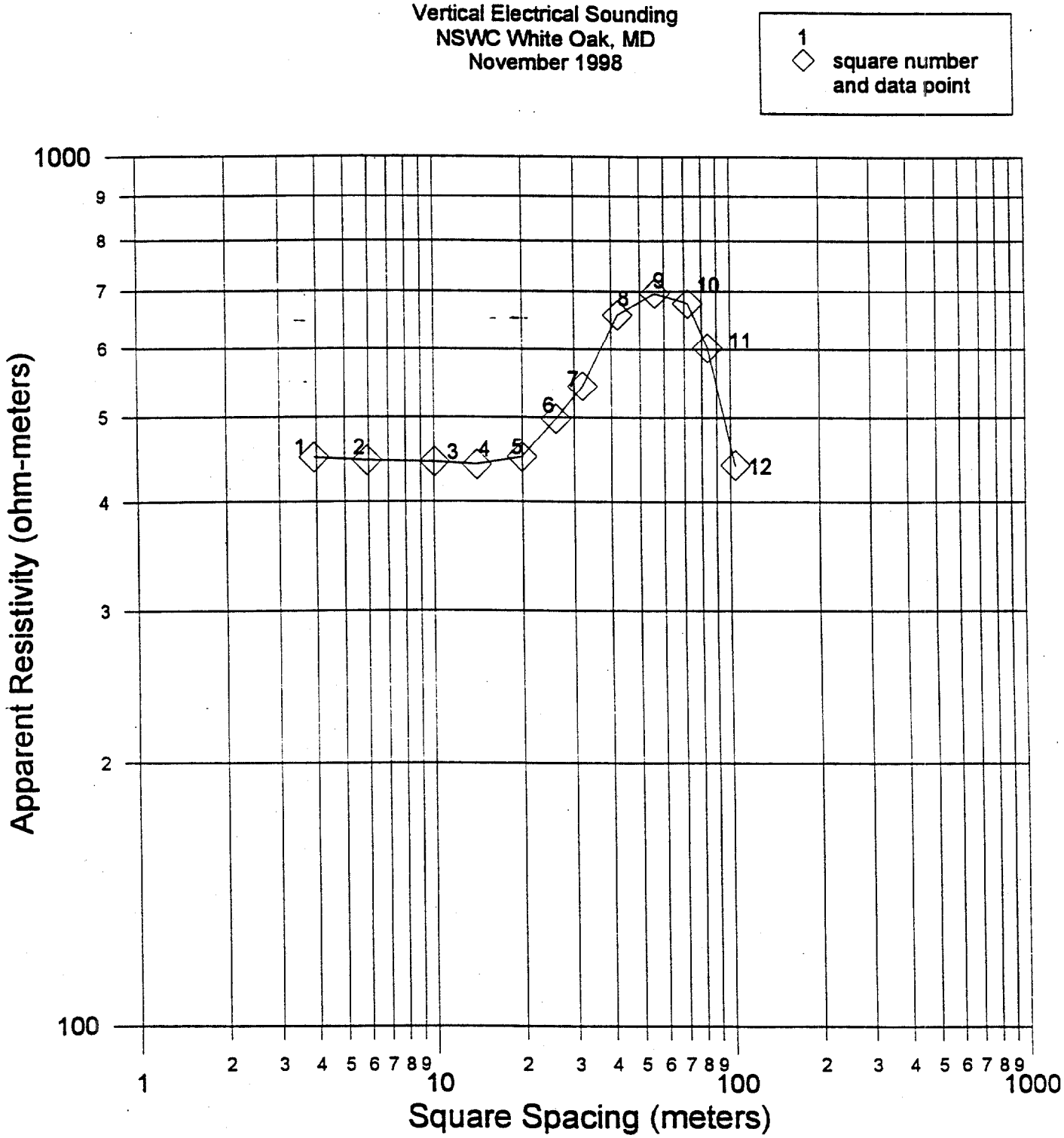


Figure 5
Site 11
Vertical Electrical Sounding
NSWC White Oak, MD
November 1998



Appendix B
Azimuthal Data

Raw Data								
Site 4 November 10, 1998								
	Square 1	Square 2	Square 3	Square 4	Square 5	Square 6	Square 7	Square 8
0	169.2	183.2	297.2	313.8	377.5	372.3	346.1	
10	174.3	194.0	326.1	297.9	383.5	447.2	401.7	395.6
20	154.5	188.6	292.6	341.3	354.9	445.2	476.7	574.2
30								746.5
40	184.5	207.0	279.7	256.5	312.6	327.0	442.9	634.8
50	166.8	184.5	224.0	214.1	222.0	269.9	375.1	491.3
60	163.5	170.6	225.6	222.6	265.8	264.0	261.4	315.2
70	159.9	182.3	225.6	218.4	285.4	267.9	268.6	
80	169.2	176.4	233.2	241.7	306.5	297.5	309.8	0.0
90	163.8	186.3	214.1	236.4	306.5	329.0	341.2	0.0
100	163.5	166.1	201.9	258.6	315.6	321.1	350.9	256.5
110	177.0	169.7	217.2	260.8	329.2	332.9	309.8	316.1
120								287.1
130	138.6	169.7	243.1	291.5	321.6	354.6	324.3	282.0
140	160.5	203.9	304.0	331.8	362.4	323.1	326.7	299.5
150	165.0	225.9	288.0	308.5	318.6	305.4	309.8	283.6
160	165.3	222.3	303.3	336.0	317.1	275.8	275.9	
170	159.0	220.5		322.2	327.7	260.0	256.5	379.6
180	169.2	183.2	297.2	313.8	377.5	372.3	346.1	
190	174.3	194.0	326.1	297.9	383.5	447.2	401.7	395.6
200	154.5	188.6	292.6	341.3	354.9	445.2	476.7	574.2
210								746.5
220	184.5	207.0	279.7	256.5	312.6	327.0	442.9	634.8
230	166.8	184.5	224.0	214.1	222.0	269.9	375.1	491.3
240	163.5	170.6	225.6	222.6	265.8	264.0	261.4	315.2
250	159.9	182.3	225.6	218.4	285.4	267.9	268.6	
260	169.2	176.4	233.2	241.7	306.5	297.5	309.8	0.0
270	163.8	186.3	214.1	236.4	306.5	329.0	341.2	0.0
280	163.5	166.1	201.9	258.6	315.6	321.1	350.9	256.5
290	177.0	169.7	217.2	260.8	329.2	332.9	309.8	316.1
300								287.1
310	138.6	169.7	243.1	291.5	321.6	354.6	324.3	282.0
320	160.5	203.9	304.0	331.8	362.4	323.1	326.7	299.5
330	165.0	225.9	288.0	308.5	318.6	305.4	309.8	283.6
340	165.3	222.3	303.3	336.0	317.1	275.8	275.9	
350	159.0	220.5		322.2	327.7	260.0	256.5	379.6

Site 4 November 10,1998

Three point smoothing

Degree	Square 1	Square 2	Square 3	Square 4	Square 5	Square 6	Square 7	Square 8
0	167.5	199.2	207.8	311.3	362.9	359.9	334.8	
10	166.0	188.6	305.3	317.6	372.0	421.6	408.2	395.6
20	164.4	191.3	309.4	319.6	369.2	446.2	439.2	574.2
30	169.5	197.8	286.1	298.9	333.7	386.1	459.8	746.5
40	175.7	195.8	251.8	235.3	267.3	298.5	409.0	634.8
50	171.6	187.4	243.1	231.1	266.8	287.0	359.8	491.3
60	163.4	179.1	225.0	218.4	257.7	267.3	301.7	315.2
70	164.2	176.4	228.1	227.5	285.9	276.5	279.9	
80	164.3	181.7	224.3	232.1	299.5	298.1	306.5	
90	165.5	176.3	216.4	245.6	309.6	315.9	334.0	
100	168.1	174.0	211.1	251.9	317.1	327.7	334.0	256.5
110	170.3	167.9	209.6	259.7	322.4	327.0	330.3	316.1
120	157.8	169.7	230.1	276.1	325.4	343.8	317.0	287.1
130	149.6	186.8	273.6	311.6	342.0	338.8	325.5	282.0
140	154.7	199.8	278.4	310.6	334.2	327.7	320.2	299.5
150	163.6	217.4	298.5	325.4	332.7	301.4	304.1	283.6
160	163.1	222.9	197.1	322.2	321.1	280.4	280.7	
170	164.5	208.7	200.2	324.0	340.8	302.7	292.8	379.6
180	167.5	199.2	207.8	311.3	362.9	359.9	334.8	
190	166.0	188.6	305.3	317.6	372.0	421.6	408.2	395.6
200	164.4	191.3	309.4	319.6	369.2	446.2	439.2	574.2
210	169.5	197.8	286.1	298.9	333.7	386.1	459.8	746.5
220	175.7	195.8	251.8	235.3	267.3	298.5	409.0	634.8
230	171.6	187.4	243.1	231.1	266.8	287.0	359.8	491.3
240	163.4	179.1	225.0	218.4	257.7	267.3	301.7	315.2
250	164.2	176.4	228.1	227.5	285.9	276.5	279.9	
260	164.3	181.7	224.3	232.1	299.5	298.1	306.5	
270	165.5	176.3	216.4	245.6	309.6	315.9	334.0	
280	168.1	174.0	211.1	251.9	317.1	327.7	334.0	256.5
290	170.3	167.9	209.6	259.7	322.4	327.0	330.3	316.1
300	157.8	169.7	230.1	276.1	325.4	343.8	317.0	287.1
310	149.6	186.8	273.6	311.6	342.0	338.8	325.5	282.0
320	154.7	199.8	278.4	310.6	334.2	327.7	320.2	299.5
330	163.6	217.4	298.5	325.4	332.7	301.4	304.1	283.6
340	163.1	222.9	197.1	322.2	321.1	280.4	280.7	
350	164.5	208.7	200.2	324.0	340.8	302.7	292.8	379.6

Site 1

Degree	Square 1	Square 2	Square 3	Square 4	Square 5	Square 6	Square 7	Square 8
0	1170.6	1541.0	2026.4	2570.6	3082.2	3293.9	3328.7	2819.3
10	1115.6	1523.7	2316.3	2763.9	3345.3	3618.3	3522.2	2869.0
20	1205.7	1573.5	2323.4	3035.3	3717.6	3999.2	3810.4	3069.2
30	1176.6	1580.7	2381.2	3141.9	3877.9	4253.2	4093.7	3267.5
40	1239.0	1661.0	2500.7	3413.3	4162.8	4559.5	4484.8	3727.4
50	1321.5	1730.5	2545.3	3476.0	4226.6	4476.1	4397.4	
60	1350.1	1779.8	2576.6		4118.5	4450.2	4441.4	3654.5
70	1391.7	1768.4	2683.9	3500.6	4302.9	4617.7	4583.7	3884.1
80	1372.5	1774.1	2809.7	3609.9	4276.6	4606.5	4522.6	3847.1
90	1235.7	1640.9	2721.1	3461.7	4186.1	4570.3	4569.3	3935.5
100	1306.0	1658.2	2385.6	3267.8	3946.4	4263.0	4355.2	3934.5
110	1196.5	1591.9	2368.4	2984.2	3582.3	3972.7	4142.7	3934.3
120	1232.6	1594.1	2312.9	2869.7	3426.9	3749.7	3933.7	3726.9
130	1183.1	1519.3	2201.3	2613.9	3146.6	3442.9	3497.5	3202.2
140	1098.6	1457.5	2182.2	2542.0	3037.5	3464.5	3517.6	3280.3
150	1073.5	1413.7	2168.2	2651.0	3079.1	3473.9	3447.4	3173.9
160	1060.5	1430.9	2078.4	2526.8	2933.3	3264.4	3312.2	2877.9
170	1078.8	1431.2	1961.3	2466.4	3017.4	3275.4	3373.4	2918.7
180	1170.6	1541.0	2026.4	2570.6	3082.2	3293.9	3328.7	2819.3
190	1115.6	1523.7	2316.3	2763.9	3345.3	3618.3	3522.2	2869.0
200	1205.7	1573.5	2323.4	3035.3	3717.6	3999.2	3810.4	3069.2
210	1176.6	1580.7	2381.2	3141.9	3877.9	4253.2	4093.7	3267.5
220	1239.0	1661.0	2500.7	3413.3	4162.8	4559.5	4484.8	3727.4
230	1321.5	1730.5	2545.3	3476.0	4226.6	4476.1	4397.4	
240	1350.1	1779.8	2576.6		4118.5	4450.2	4441.4	3654.5
250	1391.7	1768.4	2683.9	3500.6	4302.9	4617.7	4583.7	3884.1
260	1372.5	1774.1	2809.7	3609.9	4276.6	4606.5	4522.6	3847.1
270	1235.7	1640.9	2721.1	3461.7	4186.1	4570.3	4569.3	3935.5
280	1306.0	1658.2	2385.6	3267.8	3946.4	4263.0	4355.2	3934.5
290	1196.5	1591.9	2368.4	2984.2	3582.3	3972.7	4142.7	3934.3
300	1232.6	1594.1	2312.9	2869.7	3426.9	3749.7	3933.7	3726.9
310	1183.1	1519.3	2201.3	2613.9	3146.6	3442.9	3497.5	3202.2
320	1098.6	1457.5	2182.2	2542.0	3037.5	3464.5	3517.6	3280.3
330	1073.5	1413.7	2168.2	2651.0	3079.1	3473.9	3447.4	3173.9
340	1060.5	1430.9	2078.4	2526.8	2933.3	3264.4	3312.2	2877.9
350	1078.8	1431.2	1961.3	2466.4	3017.4	3275.4	3373.4	2918.7

Site 7									
Three Point Averaged									
Degrees	Square 1	Square 2	Square 3	Square 4	Square 5	Square 6	Square 7	Square 8	Square 9
0	907	1025	899	1141	1082	914	762	606	48
10	1342	1517	1407	1678	1606	1372	1177	908	30
20	1315	1494	1455	1650	1540	1348	1188	837	27
30	1304	1506	1567	1813	1532	1305	1083	749	27
40	1343	1529	1549	1816	1517	1234	937	657	36
50	1371	1466	1433	1721	1480	1155	803	615	18
60	1281	1355	1336	1484	1386	1036	735	544	722
70	1126	1170	1453	1382	1301	977	690	501	395
80	1034	1055	1717	1350	1212	1018	641	503	-375
90	981	1049	2202	1459	1241	1099	668	527	12
100	1026	1106	2073	1562	1302	1081	682	520	17
110	1086	1130	1839	1611	1423	965	698	506	29
120	1122	1115	1443	1728	1471	922	700	544	26
130	1084	1091	1483	1788	1504	949	690	578	30
140	1017	1136	1626	1816	1535	965	707	651	54
150	1042	1239	1796	1890	1586	1007	773	715	-1064
160	1161	1416	1849	2010	1611	1118	901	780	-188
170	1259	1548	1745	2088	1651	1279	1039	834	-1016
180	1352	1565	1471	1862	1626	1362	1118	866	48
190	1342	1517	1407	1678	1606	1372	1177	908	30
200	1315	1494	1455	1650	1540	1348	1188	837	27
210	1304	1506	1567	1813	1532	1305	1083	749	27
220	1343	1529	1549	1816	1517	1234	937	657	36
230	1371	1466	1433	1721	1480	1155	803	615	18
240	1281	1355	1336	1484	1386	1036	735	544	722
250	1126	1170	1453	1382	1301	977	690	501	395
260	1034	1055	1717	1350	1212	1018	641	503	-375
270	981	1049	2202	1459	1241	1099	668	527	12
280	1026	1106	2073	1562	1302	1081	682	520	17
290	1086	1130	1839	1611	1423	965	698	506	29
300	1122	1115	1443	1728	1471	922	700	544	26
310	1084	1091	1483	1788	1504	949	690	578	30
320	1017	1136	1626	1816	1535	965	707	651	54
330	662	768	1123	1159	1052	640	478	437	-1064
340	336	405	605	558	534	303	250	244	-188
350	434	537	500	636	574	463	388	297	-1016

Site 9 (Bldg 309)									
Raw Data									
Degrees	Square 1	Square 2	Square 3	Square 4	Square 5	Square 6	Square 7	Square 8	Square 9
0	1140	1413	2019	2194	1601	1103	886	833	48
10	1335	1620	1715	2162	1631	1344	1067	778	30
20	1302	1611	1501	1908	1721	1389	1164	890	27
30	1419	1463	1196	1516	1525	1353	1123	928	27
40	1305	1476	1524	1611	1570	1373	1244	906	36
50	1221	1544	1646	1823	1525	1318	1198	676	18
60	1386	1499	1532	2003	1501	1223	806	664	722
70	1422	1544	1471	1622	1525	1160	806	632	395
80	1305	1355	1295	1537	1413	1082	796	549	-375
90	1116	1166	1242	1293	1219	867	603	453	12
100	957	990	1821	1314	1271	983	670	501	17
110	1029	1008	2088	1442	1146	1206	651	555	29
120	957	1148	2697	1622	1305	1107	682	526	26
130	1092	1161	1433	1622	1456	930	714	479	30
140	1209	1080	1387	1590	1508	859	697	514	54
150	1065	1103	1509	1972	1448	977	690	641	-1064
160	978	1089	1554	1802	1555	1011	682	581	-188
170	1008	1215	1814	1675	1601	908	750	731	-1016
180	1140	1413	2019	2194	1601	1103	886	833	48
190	1335	1620	1715	2162	1631	1344	1067	778	30
200	1302	1611	1501	1908	1721	1389	1164	890	27
210	1419	1463	1196	1516	1525	1353	1123	928	27
220	1305	1476	1524	1611	1570	1373	1244	906	36
230	1221	1544	1646	1823	1525	1318	1198	676	18
240	1386	1499	1532	2003	1501	1223	806	664	722
250	1422	1544	1471	1622	1525	1160	806	632	395
260	1305	1355	1295	1537	1413	1082	796	549	-375
270	1116	1166	1242	1293	1219	867	603	453	12
280	957	990	1821	1314	1271	983	670	501	17
290	1029	1008	2088	1442	1146	1206	651	555	29
300	957	1148	2697	1622	1305	1107	682	526	26
310	1092	1161	1433	1622	1456	930	714	479	30
320	1209	1080	1387	1590	1508	859	697	514	54
330	1065	1103	1509	1972	1448	977	690	641	-1064
340	978	1089	1554	1802	1555	1011	682	581	-188
350	1008	1215	1814	1675	1601	908	750	731	-1016

Site 9 (Bldg 309)									
Three Point Averaged									
Degrees	Square 1	Square 2	Square 3	Square 4	Square 5	Square 6	Square 7	Square 8	Square 9
0	907	1025	899	1141	1082	914	762	606	48
10	1342	1517	1407	1678	1606	1372	1177	908	30
20	1315	1494	1455	1650	1540	1348	1188	837	27
30	1304	1506	1567	1813	1532	1305	1083	749	27
40	1343	1529	1549	1816	1517	1234	937	657	36
50	1371	1466	1433	1721	1480	1155	803	615	18
60	1281	1355	1336	1484	1386	1036	735	544	722
70	1126	1170	1453	1382	1301	977	690	501	395
80	1034	1055	1717	1350	1212	1018	641	503	-375
90	981	1049	2202	1459	1241	1099	668	527	12
100	1026	1106	2073	1562	1302	1081	682	520	17
110	1086	1130	1839	1611	1423	965	698	506	29
120	1122	1115	1443	1728	1471	922	700	544	26
130	1084	1091	1483	1788	1504	949	690	578	30
140	1017	1136	1626	1816	1535	965	707	651	54
150	1042	1239	1796	1890	1586	1007	773	715	-1064
160	1161	1416	1849	2010	1611	1118	901	780	-188
170	1259	1548	1745	2088	1651	1279	1039	834	-1016
180	1352	1565	1471	1862	1626	1362	1118	866	48
190	1342	1517	1407	1678	1606	1372	1177	908	30
200	1315	1494	1455	1650	1540	1348	1188	837	27
210	1304	1506	1567	1813	1532	1305	1083	749	27
220	1343	1529	1549	1816	1517	1234	937	657	36
230	1371	1466	1433	1721	1480	1155	803	615	18
240	1281	1355	1336	1484	1386	1036	735	544	722
250	1126	1170	1453	1382	1301	977	690	501	395
260	1034	1055	1717	1350	1212	1018	641	503	-375
270	981	1049	2202	1459	1241	1099	668	527	12
280	1026	1106	2073	1562	1302	1081	682	520	17
290	1086	1130	1839	1611	1423	965	698	506	29
300	1122	1115	1443	1728	1471	922	700	544	26
310	1084	1091	1483	1788	1504	949	690	578	30
320	1017	1136	1626	1816	1535	965	707	651	54
330	662	768	1123	1159	1052	640	478	437	-1064
340	336	405	605	558	534	303	250	244	-188
350	434	537	500	636	574	463	388	297	-1016

Site 9 (South Site)							
Raw Data							
Degree	Square 1	Square 2	Square 3	Square 4	Square 5	Square 6	Square 7
0	319.5	218.0	126.3	154.8	199.3	235.2	262.5
10	328.0	216.0	114.2	134.1	166.1		
20	352.3	206.3	120.9	114.0	139.9	175.1	210.7
30	345.5	187.0	112.3	68.6	119.2	174.9	168.3
40	358.6	184.6	103.9	90.2	94.1	121.5	142.1
50	401.8	215.5	97.4	83.0	102.4	115.9	134.8
60	344.2	181.5		77.1	99.0	115.6	136.1
70	377.7	179.1	94.4	83.0	89.6	119.4	134.4
80	339.1	190.3	106.9	87.7	98.1	126.9	147.3
90	350.4	190.5	125.9	105.3	121.8	144.9	160.4
100	335.0	196.1	139.3	125.4	149.7	182.7	174.5
110	302.5	190.0	131.2	144.9	176.5	199.3	206.1
120	329.3	213.0	152.6	162.4	200.7	226.3	241.7
130	324.4	218.6	158.9	173.2	229.1	254.0	264.7
140	304.7	208.5	164.1	176.4		206.0	286.1
150	342.6	237.8	167.9	179.4	220.3	266.3	295.1
160	318.0	225.5	154.5	173.7	229.7	269.1	292.9
170	320.3	215.0	142.3	169.3	216.0	249.1	273.5
180	319.5	218.0	126.3	154.8	199.3	235.2	262.5
190	328.0	216.0	114.2	134.1	166.1		
200	352.3	206.3	120.9	114.0	139.9	175.1	210.7
210	345.5	187.0	112.3	68.6	119.2	174.9	168.3
220	358.6	184.6	103.9	90.2	94.1	121.5	142.1
230	401.8	215.5	97.4	83.0	102.4	115.9	134.8
240	344.2	181.5		77.1	99.0	115.6	136.1
250	377.7	179.1	94.4	83.0	89.6	119.4	134.4
260	339.1	190.3	106.9	87.7	98.1	126.9	147.3
270	350.4	190.5	125.9	105.3	121.8	144.9	160.4
280	335.0	196.1	139.3	125.4	149.7	182.7	174.5
290	302.5	190.0	131.2	144.9	176.5	199.3	206.1
300	329.3	213.0	152.6	162.4	200.7	226.3	241.7
310	324.4	218.6	158.9	173.2	229.1	254.0	264.7
320	304.7	208.5	164.1	176.4		205.6	286.1
330	342.6	237.8	167.9	179.4	220.3	266.3	295.1
340	318.0	225.5	154.5	173.7	229.7	269.1	292.9
350	320.3	215.0	142.3	169.3	216.0	249.1	273.5

Site 11
Raw Data

Degree	12	11	10	9	8	7	6	5	4	3	2	1
0	474.5	709.1	727.1	714.3	531.3	686.3	619.9	565.6	535.3	514.9	490.2	398.5
10	521.5	662.7	693.9	687.3	693.5	641.2	589.2	548.3	505	500.5	456.3	429.5
20	460.3	519.1	652	674.8	675.6	616.17	574	556.1	500.9	506	491.2	478.1
30	476.9	586.8	629.6	690.7	685.7	609.6	477.2	529.3	473	498.4	483.9	537.6
40	530	561.7	626.4	662.3	625.8	561.3	499.3	460.4	408.2	452.2	480.5	483.7
50	500	564.1	410.6	596.3	621.4	533.5	538.1	505.4	510.9	538	542.1	535.1
60	543.1	601.4	620.6	641.2	772	645.8	566	544.5	533	550.8	460.6	511.3
70	476.8	537.5	636.1	705.4	667.2	634.6	596	698.1	565.2	582.8	532.8	499.9
80	550.5	699.5	728.5	745	699.8	646.7	631	560.2	554.3	577.6	507.5	468.4
90	1024.1	560.7	567.7	583.5	419.2	465.4	442.8	429.1	437.2	500.1	562.9	592.5
100	442.5	542.7	586.6	558.4	539.8	495.4	459.7	439.9	451.6	521.4	583.2	575.4
110	464.8	464.8	561.9	552.6	550.6	503.2	477.3	436	450	503.2	527.3	497.6
120	468.6	537.8	572.1	563.2	549.9	506.5	579.6	456.9	481.2	498.9	518.8	436.8
130	465.9	589.5	614.5	601.5	587.8	561.3	529.4	500.9	528.2	533.6	523.3	478.8
140	452.2	586.6	608.7	704.4	649.7	528.1	491.2	456.3	420.7	411	390.9	418.8
150	431.6	565.6	695.4	648.7	627.9	513.5	473.2	420.9	416.2	428.9	460.6	473.7
160	456.6	505.8	595.3	611.8	580	487.7	451.1	410.9	420.4	422.5	491.1	490.5
170	474.5	561.1	605.1	614.4	554.7	482.5	438.9	417.4	430	441.5	541.4	634
180	455.2	709.1	727.1	714.3	531.3	686.3	619.9	565.6	535.3	514.9	490.2	398.5
190	474.5	662.7	693.9	687.3	693.5	641.2	589.2	548.3	505	500.5	456.3	429.5
200	521.5	460.3	652	674.8	675.6	616.17	574	556.1	500.9	506	491.2	478.1
210	460.3	476.9	629.6	690.7	685.7	609.6	477.2	529.3	473	498.4	483.9	537.6
220	476.9	465.9	626.4	662.3	625.8	561.3	499.3	460.4	408.2	452.2	480.5	483.7
230	530	564.1	410.6	596.3	621.4	533.5	538.1	505.4	510.9	538	542.1	535.1
240	500	601.4	620.6	641.2	772	645.8	566	544.5	533	550.8	460.6	511.3
250	543.1	537.5	636.1	705.4	667.2	634.6	596	698.1	565.2	582.8	532.8	499.9
260	476.8	699.5	728.5	745	699.8	646.7	631	560.2	554.3	577.6	507.5	468.4
270	550.5	560.7	567.7	583.5	419.2	465.4	442.8	429.1	437.2	500.1	562.9	592.5
280	1024.1	542.7	586.6	558.4	539.8	495.4	459.7	439.9	451.6	521.4	583.2	575.4
290	442.5	464.8	561.9	552.6	550.6	503.2	477.3	436	450	503.2	527.3	497.6
300	464.8	468.6	572.1	563.2	549.9	506.5	579.6	456.9	481.2	498.9	518.8	436.8
310	468.6	530	614.5	601.5	587.8	561.3	529.4	500.9	528.2	533.6	523.3	478.8
320	465.9	586.6	608.7	704.4	649.7	528.1	491.2	456.3	420.7	411	390.9	418.8
330	452.2	565.6	695.4	648.7	627.9	513.5	473.2	420.9	416.2	428.9	460.6	473.7
340	431.6	505.8	595.3	611.8	580	487.7	451.1	410.9	420.4	422.5	491.1	490.5
350	456.6	561.1	605.1	614.4	554.7	482.5	438.9	417.4	430	441.5	541.4	634

Site 11

Processed Data with 3 point smoothing

Degree	Square 12	Square 11	Square 10	Square 9	Square 8	Square 7	Square 6	Square 5	Square 4	Square 3	Square 2	Square 1
0	472.9	625.1	660.2	658.5	582.0	576.6	521.0	482.4	465.0	462.8	485.4	491.5
10	468.9	602.2	662.0	663.8	614.1	620.9	570.6	535.6	494.2	488.6	461.9	422.5
20	486.2	589.5	658.5	684.3	684.9	622.3	546.8	544.6	493.0	501.6	477.1	481.7
30	489.1	555.9	636.0	675.9	662.4	595.7	516.8	515.3	460.7	485.5	485.2	499.8
40	504.5	580.2	547.8	662.6	659.9	574.0	511.3	501.1	467.4	502.6	509.0	524.9
50	533.5	598.5	560.4	664.0	721.1	604.4	550.4	513.3	493.3	527.9	499.1	519.5
60	515.4	596.7	580.9	703.3	755.6	646.0	595.4	616.7	555.0	582.8	522.3	527.1
70	537.8	656.9	722.1	769.3	790.4	696.3	636.7	641.1	574.3	600.4	506.9	497.5
80	573.8	609.1	667.7	710.3	626.6	601.7	571.1	581.1	521.8	557.8	522.3	498.7
90		604.5	634.0	636.4	563.4	538.2	512.9	470.9	474.5	526.0	533.3	521.7
100	442.5	501.9	550.9	542.9	489.3	471.9	444.9	420.7	431.5	490.4	536.9	532.8
110	458.6	515.1	573.5	558.1	546.8	501.7	505.5	444.3	460.9	507.8	543.1	503.3
120	466.4	530.7	582.8	572.4	562.8	523.7	528.8	464.6	486.5	511.9	523.1	471.1
130	459.1	583.1	612.7	647.9	614.6	537.3	534.6	468.7	470.1	473.5	467.8	438.0
140	441.4	601.8	677.6	695.1	656.9	543.3	498.4	450.1	441.3	444.4	446.2	449.5
150	435.7	576.7	684.0	713.1	665.4	519.6	469.0	412.4	398.7	401.0	436.6	454.6
160	445.6	565.4	682.4	673.1	623.2	499.3	445.8	395.1	402.9	414.6	503.5	550.2
170	448.7	575.7	640.1	647.9	555.3	526.2	471.7	428.9	430.1	430.4	498.2	513.0
180	472.9	625.1	660.2	658.5	582.0	576.6	521.0	482.4	465.0	462.8	485.4	491.5
190	468.9	602.2	662.0	663.8	614.1	620.9	570.6	535.6	494.2	488.6	461.9	422.5
200	486.2	589.5	658.5	684.3	684.9	622.3	546.8	544.6	493.0	501.6	477.1	481.7
210	489.1	555.9	636.0	675.9	662.4	595.7	516.8	515.3	460.7	485.5	485.2	499.8
220	504.5	580.2	547.8	662.6	659.9	574.0	511.3	501.1	467.4	502.6	509.0	524.9
230	533.5	598.5	560.4	664.0	721.1	604.4	550.4	513.3	493.3	527.9	499.1	519.5
240	515.4	596.7	580.9	703.3	755.6	646.0	595.4	616.7	555.0	582.8	522.3	527.1
250	537.8	656.9	722.1	769.3	790.4	696.3	636.7	641.1	574.3	600.4	506.9	497.5
260	573.8	609.1	667.7	710.3	626.6	601.7	571.1	581.1	521.8	557.8	522.3	498.7
270		604.5	634.0	636.4	563.4	538.2	512.9	470.9	474.5	526.0	533.3	521.7
280	442.5	501.9	550.9	542.9	489.3	471.9	444.9	420.7	431.5	490.4	536.9	532.8
290	458.6	515.1	573.5	558.1	546.8	501.7	505.5	444.3	460.9	507.8	543.1	503.3
300	466.4	530.7	582.8	572.4	562.8	523.7	528.8	464.6	486.5	511.9	523.1	471.1
310	459.1	583.1	612.7	647.9	614.6	537.3	534.6	468.7	470.1	473.5	467.8	438.0
320	441.4	601.8	677.6	695.1	656.9	543.3	498.4	450.1	441.3	444.4	446.2	449.5
330	435.7	576.7	684.0	713.1	665.4	519.6	469.0	412.4	398.7	401.0	436.6	454.6
340	445.6	565.4	682.4	673.1	623.2	499.3	445.8	395.1	402.9	414.6	503.5	550.2
350	448.7	575.7	640.1	647.9	555.3	526.2	471.7	428.9	430.1	430.4	498.2	513.0

TO:	Ron Kotun, Ph.D. Project Manager, Tetra Tech NUS Inc. (TtNUS)
FROM:	Mr. Raye Lahti, P. G., Tetra Tech EM Inc. (TtEMI)
DATE:	March 8, 1999
SUBJECT:	Memorandum Report Geophysical Surveys for Site 9 (300 Area) Leach Fields
RE:	Comprehensive Long-Term Environmental Action Navy (CLEAN) CLEAN Contract No. N62472-90-D-1298 Contract Task Order No. 298 Tetra Tech EM Inc. Project No. I3401/CON

1.0 Introduction

This memorandum report presents the results of EM31 terrain conductivity surveys conducted at the former Naval Surface Warfare Center (NSWC), White Oak, Silver Spring, Maryland. NSWC is now known as the Federal Research Center at White Oak. The surveys were conducted at several 300 Area buildings as part of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and Corrective Measures Study. The geophysical surveys were performed to locate several leach fields and sump tanks that are depicted on base maps but are not visible in the field. This memorandum is organized into nine sections: an introduction; background; purpose; geophysical approach; acquisition, data processing, and interpretation; results for the 18 areas surveyed; a summary; and references.

2.0 Background

As part of NSWC's mission of munitions and explosives research, activities were conducted at several laboratories on base. Most research activities were conducted in the 300 and 600 Area buildings of the base, located in the eastern portion of the facility. The 300 and 600 Area buildings were constructed from 1945 to 1980, before sanitary sewer lines were installed at the site. Consequently, all wastewater was managed using sump tanks and leach fields. The solids precipitated in a sump tank, and liquids discharged to the subsurface through the leach fields. According to U.S. Department of the Navy (Navy)-supplied engineering drawings, the leach fields were later disconnected from the buildings when the buildings were connected to a sanitary sewer. The leach fields were abandoned in place after 1980 (TtNUS 1998).

In 1995, Halliburton NUS, Inc., completed a survey of 20 leach fields, identified as LW01 to LW20 (Halliburton NUS, Inc. 1995). The presence and location of the leach fields were determined from site records, engineering drawings, and field observations. Halliburton NUS, Inc., identified LW01 and LW09 as contaminated with possible explosives or other unknown chemical compounds. These leach fields were removed (TtNUS 1998).

An RFI was subsequently initiated, which called for geophysical investigations to locate remaining leach fields at several locations at NSWC (Brown and Root Environmental 1998). This memorandum reports on the EM31 geophysical surveys at Site 9.

3.0 Purpose

The purpose of the geophysical surveys was to locate leach field sites and sump tanks. Few surface indications are present in the 18 leach fields discussed in the August 1998 work plan (Brown and Root Environmental 1998). Geophysical surveys were specified to identify areas with suspected leach fields and sump tanks, where later intrusive investigation would be focused.

4.0 Geophysical Approach

Three geophysical techniques for the detection of leach fields and sump tanks were considered: (1) terrain conductivity surveys using the Geonics EM31, (2) ground penetrating radar surveys, and (3) magnetometer surveys. The terrain conductivity technique was chosen for a variety of reasons. First, suspended solids discharged into the leach field would most likely have a higher conductivity than surrounding soils. The conductivity of the natural soils and bedrock of NWSC White Oak is generally very low. Second, piping (either vitrified clay or cast iron) associated with leach fields may be detected by EM31 conductivity measurements. Third, EM31 terrain conductivity measurements can detect metallic materials, such as reinforced concrete. For these reasons, the EM31 was selected for this survey. Magnetometers were not selected, because the method might detect sump tanks but could only detect the leach field if cast iron piping were present.

The Geonics EM31 terrain conductivity meter is an electromagnetic induction instrument consisting of a transmitter and a receiver fixed about 12 feet apart. A frequency of 9,800 Hertz is transmitted to induce electrical current in the ground. The induced current in turn creates secondary electromagnetic fields in

the ground. The secondary fields are detected by the receiver coil. The intensity and phase of the secondary fields are related to electrical properties of the materials in the subsurface. The secondary magnetic field has an in-phase and quadrature phase (90 degrees out-of-phase) component associated with the current wave form driven through the transmitter. Both components are small over ground, with conductivities less than 100 milli-Siemens per meter (mS/m) (less than 1 part in 10,000[mS/m]). The EM31 is designed to directly measure apparent terrain conductivity (quadrature phase) and the in-phase component of the electromagnetic field. Values of apparent terrain conductivity are expressed as mS/m and identify differences in soil types and other materials. The in-phase component is sensitive to the presence of highly conductive material and is generally considered to be the metal detection mode. The in-phase response of secondary to primary magnetic field measurement is expressed in parts per thousand and is commonly used to interpret the presence of all types of metal.

5.0 Data Acquisition

Eighteen suspected leach fields, designated as LW02 through LW08 and LW10 through LW20, were investigated during this geophysical survey. The locations of 17 of these areas are shown in Figure 3-6 of the work plan (Brown and Root Environmental 1998). LW20 is not shown in Figure 3-6 of the August 1998 work plan, but it is identified on Map 19 of the May 1998 letter report (TtNUS 1998). The LW20 area was geophysically surveyed as part of the LW16, LW17, and LW18 areas. As another reference to this project, a map titled Utility Map, "300" Area - Sanitary Sewer, Public Works Drawing No. QY 901-875-SD was used for the surveys (Navy 1985). The map has sketches of the suspected leach fields and a penciled date of February 1985.

From January 5 through 11, 1999, Raye Lahti, geophysicist from TtEMI, and Mark Shoemaker, geophysicist from TtNUS, established a local coordinate grid system over each suspected leach field area using compass and tape measurements. The grid systems were correlated to buildings and other permanent features found at each leach field site. Flags or semipermanent paint marks were placed in appropriate points to later locate the survey area. Sketch maps of each site, including grid coordinates, were drawn in the site Log Book No. 6, field map, or sketch pad. The starting point for each survey was located in the southern and western portion of each leach field area (designated x=0 feet and y=0 feet). The grids were positioned to maximize data collection efficiency, usually parallel to building walls, and not necessarily following compass bearings. In addition, survey lines were placed so that data would be collected in lines perpendicular to a potential leach field area.

EM31 measurements of terrain conductivity and in-phase values were collected and stored electronically at a paced interval of 5 feet along lines spaced 5 feet apart. Measuring tapes were used at the ends of the survey lines for control, and intermediate flags or paint spots were marked on the grid to guide the instrument operator.

6.0 Data Processing and Interpretation

Data from the EM31 data logger were downloaded to a computer and entered into software packages to check for accuracy and completeness and to correct operator entry errors from the field data collection process. Each data set was then entered into SURFER® data processing software for visual display. Contour maps of terrain conductivity and in-phase data were displayed on the computer screen or printed out for interpretation. Contour maps were examined in the field, comparing existing sidewalks, surface piping, overhead lines, and other features that could cause anomalous EM31 data. At each leach field area, EM31 operators marked anomalous trends in geophysical data that were suspected leach fields or sump tanks. Survey personnel expected that a leach field would be indicated by higher conductivity than the surrounding soil and that a sump tank would cause negative conductivity readings or an anomalous in-phase response. After completing all geophysical surveys, a site walkover was conducted by TtNUS and TtEMI personnel to visually observe the locations of the marked anomalous suspect areas. The results of each survey are discussed below.

7.0 Results

The following sections discuss results at leach field areas LW02 through LW08 and LW10 through LW20. The figures supplied for each section display contours of apparent terrain conductivity and in-phase measurements. Scales, presented in feet, have been adjusted to fit on the figure. The lowest local grid coordinate values correspond to the southern and western regions of the survey areas. North and east coordinates are labeled. The 300 Area geophysical survey grid areas can be found in Figure 3-6 of the work plan (Brown and Root Environmental 1998). Features, such as metal, sidewalks, overhead power lines, and obstructions, were present at most sites. These features were considered during interpretation, but are not marked on each individual geophysical survey map.

7.1 LW02

Leach field area LW02 is located northwest of Building 348. The topography of the site slopes toward the southeast. The leach field apparently was associated with Buildings 349 and 341. These buildings are located upgradient from the LW02 leach field area (see Figure 3-6 of the work plan) (Brown and Root Environmental 1998).

The EM31 geophysical survey defined several anomalous features in the area. Most of these features were ruled out as possible leach fields or sump tanks by visually inspecting the site. Only one feature was suspected as a possible leach field line, as shown in the terrain conductivity contour map (see Figure 1). A linear feature appears to originate from Building 349 and is located along the geophysical grid east coordinate line at about 50 feet. The feature was marked in the field and is shown as a "suspect area" in Figure 1. This feature can also be seen on the in-phase map (see Figure 2), but is not as evident.

7.2 LW03

Leach field area LW03 is located southeast of Building 328. The topography of the site slopes toward the north and east. The utility map indicates the presence of a leach field near the southeastern corner of the building. This leach field location corresponds with what appears to be a cinder block addition to the original building.

The EM31 geophysical survey defined several features that could be explained by utilities and aboveground interference. An isolated apparent conductivity and in-phase anomaly about 12 feet from the northeastern corner of the cinder block portion of building was marked in the field. This anomaly is also identified as a "suspect area" in Figure 3, the apparent conductivity contour map, and in Figure 4, the in-phase contour map. The origin of this anomaly is unknown. It could represent a possible sump tank.

7.3 LW04

Leach field area LW04 is located south of Building 319. The topography slopes toward the south. The utility map indicates a leach field in the vicinity of a mobile home trailer southwest of Building 319.

The EM31 survey identified several subsurface anomalies (see Figures 5 and 6). Many of the anomalies are explained by underground utility lines, manhole covers, and sidewalks. A line between Buildings 319 and 322 was marked in the field as suspect, but it could likely represent an underground electrical conduit observed to originate at Building 319. In the vicinity of the mobile home trailer, no definitive anomaly was observed that would indicate the presence of a leach field. However, the trailer may be located on a portion of the leach field and may interfere with EM31 measurements in the area.

7.4 LW05

Leach field area LW05 is located north of Building 314 and southeast of Building 315. The topography of the area is flat. A prior excavation between Buildings 315 and 314 appears to have uncovered the lid cover to a sump tank. The EM31 experienced considerable interference from buildings, water lines, sidewalks, drain lines, and other features in the area. Further investigation of LW05 is warranted.

EM31 geophysical data was unable to identify subsurface features associated with a leach field or sump tank because of other interference in the measurements. EM31 conductivity and in-phase measurement data are presented as contour maps in Figures 7 and 8, respectively.

7.5 LW06

Leach field area LW06 is located southwest of Building 311. Leach fields are indicated in this region on the utility map. The topography of the area slopes down southeasterly towards Isherwood Creek.

No geophysical survey was conducted during this investigation because of significant interference from aboveground structures and the nearby ravine area.

7.6 LW07

Leach field area LW07 is located northeast of Building 327. A steel-reinforced concrete pad apron extends outward from the building in the area.

EM31 geophysical data were collected adjacent to the concrete apron northeast of Building 327. No EM31 apparent conductivity or in-phase anomalies indicated the presence of a leach field or sump tank. The EM31 apparent conductivity data is presented in Figure 9, and the in-phase data is presented in Figure 10.

7.7 LW08

Leach field area LW08 is located south of a parking area adjacent to the southern side of Building 336. The utility map indicates a leach field present under the eastern portion of the parking lot and a second leach field located south of the western end of Building 336. The second leach field continues into the lawn area downgradient from the parking lot, and it branches to the east and west. Each branch extends out about 75 feet before turning to the south and extending about 50 additional feet. The eastern branch extends toward the Isherwood Creek, and the western branch extends toward Isherwood Road.

EM31 geophysical data did not cover the entire leach field area indicated on the utility map. Data indicate a suspect area that coincides with the larger leach field area. The suspect area is visible in both the terrain conductivity data (see Figure 11) and the in-phase data (see Figure 12). The area was marked in the field using pin flags and is labeled as a suspect area on the geophysical data contour maps. The suspect area likely represents piping, the sump tank, or other metallic objects.

7.8 LW10

Leach field area LW10 is located northwest of Building 339 and east of Building 306. A sidewalk terminates in the approximate location of the proposed subsurface soil boring and leaching well sampling location (see Figure 3-6 of the work plan) (Brown and Root Environmental 1998). The utility map indicates that a leach field exits from Building 306 and extends toward the LW10 area. Topography in the LW10 area slopes downward to the south. The area was covered with snow during the survey.

EM31 geophysical data do not indicate any anomalous areas that would define a leach field or sump tank. However, interference from overhead power lines, sidewalks, abrupt changes in topography, and other features at the LW10 site appear to affect the data. The presence of this interference makes it difficult to identify a leach field. The EM31 apparent conductivity contour map is shown in Figure 13, and in-phase data is shown in Figure 14.

7.9 LW11

Leach field area LW11 is located east of Building 306 and adjacent to LW10. The utility map indicates that a leach field exits from Building 306 and extends toward the east. The utility map plot of the leach field is adjacent to an abrupt change in slope downward to the south in the lawn area. The LW11 area was covered with snow during the survey.

EM31 geophysical data does not indicate any anomalous areas that would define a leach field or sump tank. However, interference from overhead power lines, abrupt changes in topography, and other surface features appear to affect the data. The presence of this interference makes it difficult to identify a leach field. The EM31 apparent conductivity contour map is shown in Figure 15, and in-phase data is shown in Figure 16.

7.10 LW12

Leach field area LW12 is located south of Building 363. The area is partially in the trees and slopes toward the southeast. The utility map indicates that a leach field extends from about 75 to 150 feet south of Building 363. A possible sump tank cover was marked in the field. A clay pipe was also marked in the field.

EM31 geophysical data contains interference from several surface features, including surface metal and debris. The area of the possible sump tank cover is labeled as a "suspect area" in the apparent conductivity contour map (see Figure 17) and the in-phase contour map (see Figure 18).

7.11 LW13

Leach field area LW13 is located west of Building 301 and Holland Road, as shown on the utility map. The topography of the area slopes gently toward the southwest. The utility map indicates that a leach field located directly west of Building 301 extends under Holland Road a distance of about 100 feet. At this point, the leach field turns toward the southwest and extends an additional 60 feet. On the ground surface, the plot of the end of the leach field is in a tree-covered area.

The EM31 apparent conductivity contour map (see Figure 19) and the in-phase contour map (see Figure 20) do not indicate any anomalous areas that would indicate the presence of a leach field. Surface features and utilities in the northern and eastern portion of the survey area caused interference in the data. No geophysical data were collected in the tree-covered area.

7.12 LW14

Leach field area LW14 is located west of Building 307 and extends under Building 366. The utility map indicates that the leach field exited Building 307 and extended north of Building 366. The surface topography in the area of Building 307 is relatively flat. The natural topography near Building 366 slopes toward the northwest and has been filled for the building's construction. The area was covered with snow during the survey.

The EM31 apparent conductivity data (see Figure 21) and the in-phase data (see Figure 22) indicate interference from buildings and other surface features. One suspect area was marked in the field and is indicated on the contour maps. The suspect area is located southeast of Building 366. The suspect anomaly may be related to a sump tank or other subsurface metal object, such as underground utilities, guard posts, or lighting.

7.13 LW15

Leach field area LW15 is located west of Building 323. The topography slopes gently toward the west and steeply toward the north (toward Dahlgren Road). The utility map indicates that a leach field exits west of Building 323 a distance of about 200 feet and then spreads out along an area about 25 by 100 feet in a wooded area. The area was covered with snow during the survey.

EM31 data was collected along the linear portion of the leach field plotted on the utility map. No data was collected at the western extent of the plotted leach field. The apparent conductivity contour map (see Figure 23) and the in-phase contour map (see Figure 24) indicate an anomalous area about 50 feet west of Building 323. The suspect area was marked in the field and is indicated on the contour maps. The anomalous area could be related to a sump tank or other subsurface metallic structure.

7.14 LW16, LW17, AND LW20

Leach field areas LW16, LW17, and LW20 are located between Buildings 304 and 344. Topography in the area is flat. No leach fields are indicated on the utility map in this area. Leach field LW20 is not plotted in Figure 3-6 of the work plan (Brown and Root Environmental 1998), but it is shown in Figure 19 of the 1998 letter report (TtNUS 1998). The area was covered with snow during the geophysical survey.

The EM31 apparent conductivity contour map (see Figure 25) and the in-phase contour map (see Figure 26) indicate significant interference from sidewalks, buildings, manholes, overhead power lines, and other features. Underground utilities appear to dominate the data. No attempt was made to interpret leach fields or sump tanks with these data sets.

As snow melted, survey personnel noticed a linear feature on the ground surface leading to a concrete slab. The feature was marked in the field and is indicated as a suspect area on the geophysical contour maps (see Figures 25 and 26). The feature could be a leach field line or some other underground utility.

7.16 LW18

Leach field area LW18 is located north of Building 304. The geophysical survey grid for LW18 is an extension of the LW16, LW17, and LW20 grid, which originates about 15 feet from the southwestern corner of Building 344. The utility map indicates that a leach field is present to the north and extends to the east of Building 304. The topography of the LW18 area slopes downward gently toward the north.

The EM31 apparent conductivity contour map (see Figure 27) and the in-phase contour map (see Figure 28) indicate several interference features, such as manholes and buried utility lines. An area marked in the field is adjacent to an apparent buried sewer line (indicated by a sewer manhole in the area); however, the utility map indicates that the sewer line is located east of this area. The marked feature is likely a buried utility and is also indicated on the contour maps.

7.17 LW19

Leach field area LW19 is located west of former Building 309 and current Building 376. The topography of the area is steep uphill east of Building 376 and down toward the southwest. The utility map indicates

that a leach field exits former Building 309 and projects under Building 376 toward the northwest. The leach field extends a distance of about 150 feet toward the northwest. A depression in the soil is present in the expected area of the leach field about 15 feet west of Building 376.

The EM31 apparent conductivity contour map (see Figure 29) and the in-phase contour map (see Figure 30) show interference from Building 376 and a power pole at the northwestern corner of the building. In-phase data indicate a feature extending toward the northwest, coinciding with the utility line plot of the leach field indicated as a "suspect area" in Figures 29 and 30. This trend also coincides with the depression in the soil discussed above. The feature was not marked in the field, because data processing was not completed on this site at the time of the field survey, but it was delineated during the field survey walkover.

8.0 Summary

Survey results indicate that the EM31 was successful in identifying some subsurface features suspected of being associated with leach fields, sump tanks, or unknown buried objects at nine locations: LW02, LW03, LW08, LW12, LW14, LW15, LW16/LW17/LW20, LW18, and LW19. Suspect areas were marked in the field and identified on the geophysical data contour maps, as discussed in Section 7. TtNUS and TtEMI personnel walked each leach field area following a review of the geophysical data and field markings of anomalous suspect features.

9.0 References

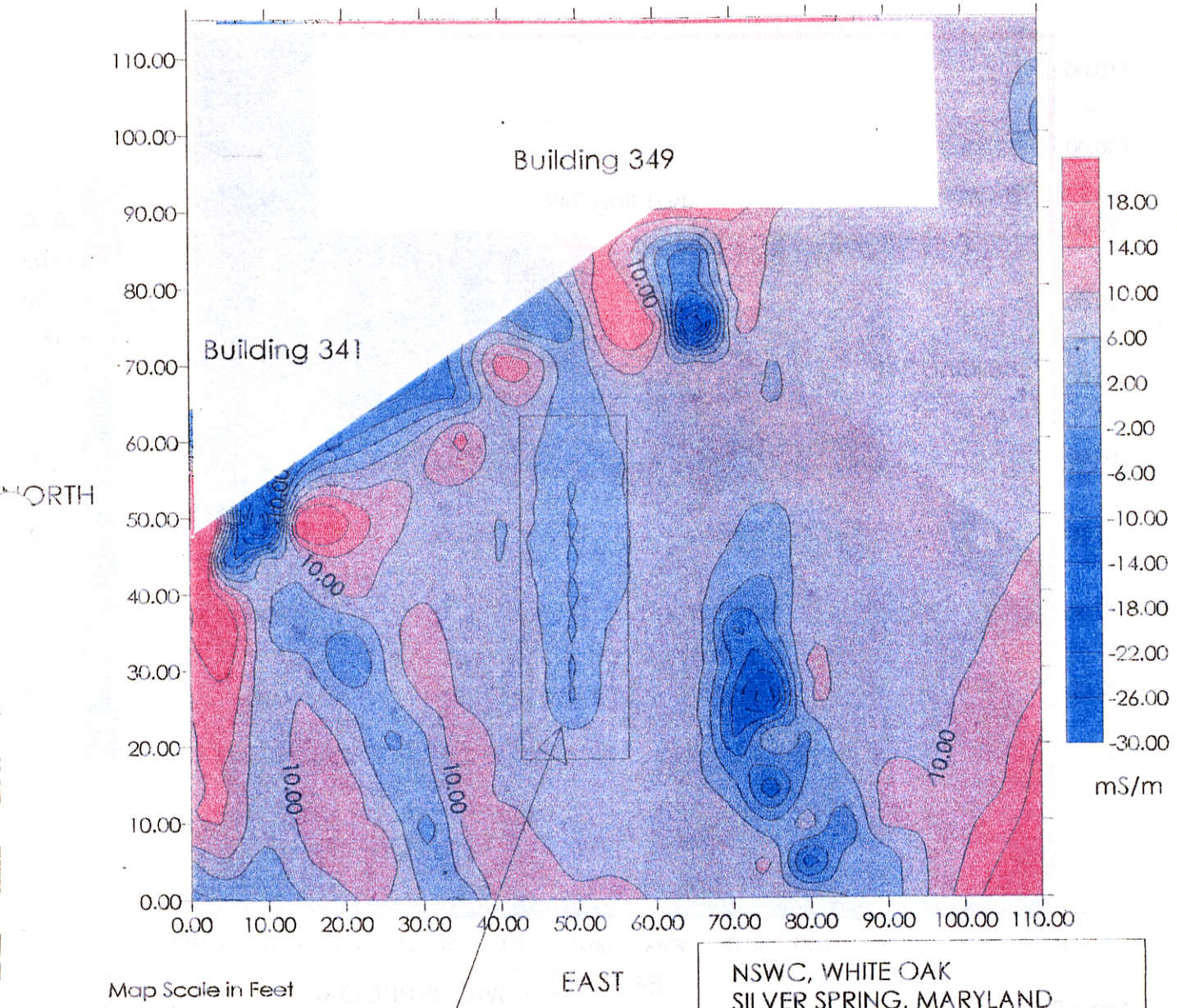
Brown and Root Environmental. 1998. "Work Plan for RCRA Facility Investigation and Corrective Measures Study, Naval Surface Warfare Center (NSWC), White Oak, Silver Spring, Maryland, Sites 2, 3, 4, 7, 8, 9, and 11." Engineering Field Activity Chesapeake. Submitted by Contract No. N62472-90-D-1298. Contract Task Order No. 0298. August.

Halliburton NUS Corporation. 1995. "Design Verification Report for Remedial Actions at Sites 8, 9, and 11, NSWC, White Oak." August.

Tetra Tech NUS, Inc. (TtNUS) 1998. "May 1998 Site Visit - Letter Report." Federal Research Center at White Oak. Silver Spring Maryland. June 12.

U.S. Department of the Navy. 1985 (Revised). Public Works Office. Utility Map of "300" Area, Sanitary Sewer. Public Works Office. NSWC, White Oak. Silver Spring, Maryland. Navy Public Works Drawing No. QY 901-875-SD. February.

LW02 - EM31 - CONDUCTIVITY DATA



Map Scale in Feet

Milli-siemens per Meter = mS/m

N

Suspect Area

NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 1

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM, INC.

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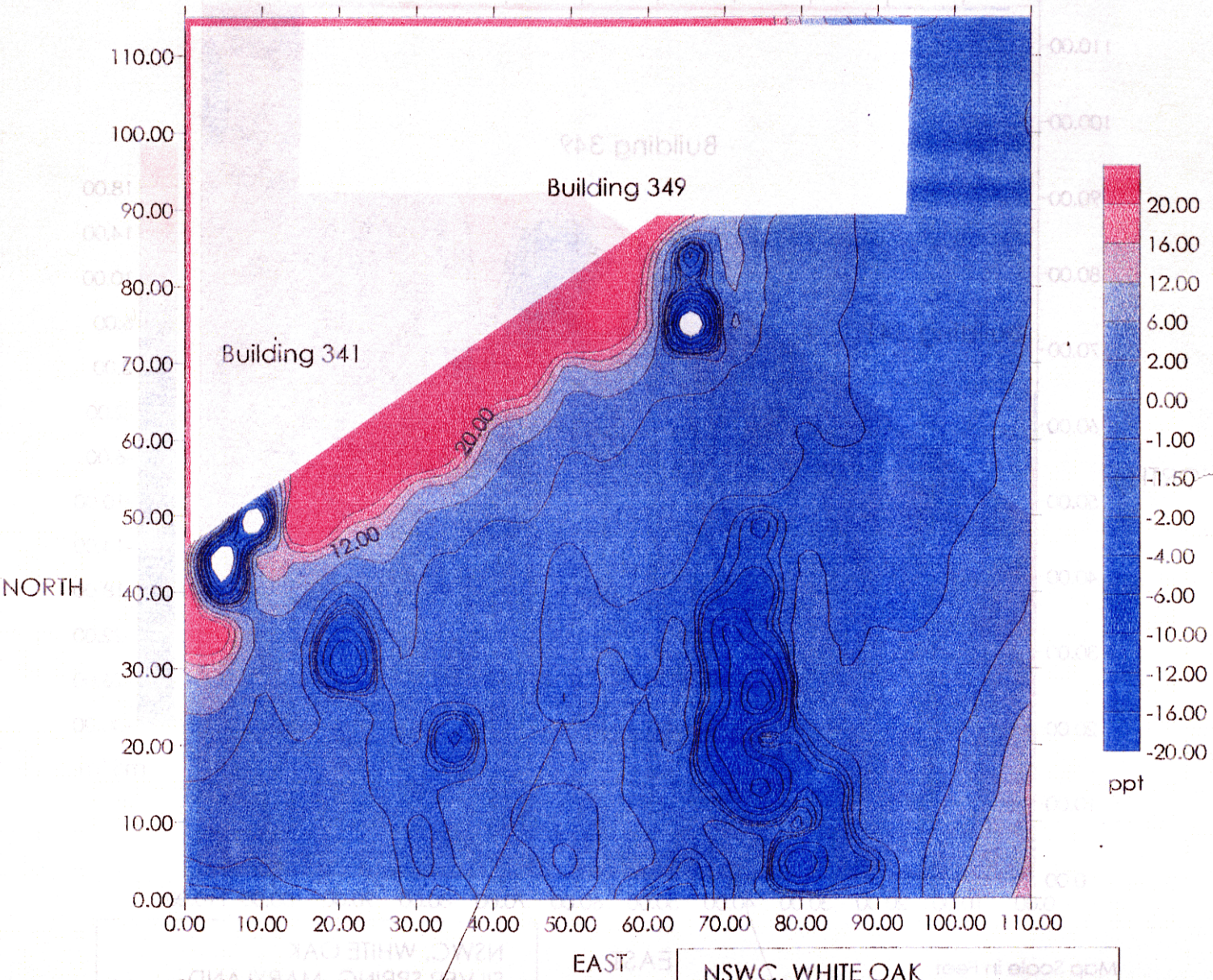
LW02 - IN-PHASE DATA



Map Scale in Feet

Parts per Thousand = ppt

Suspect Area

February 1999

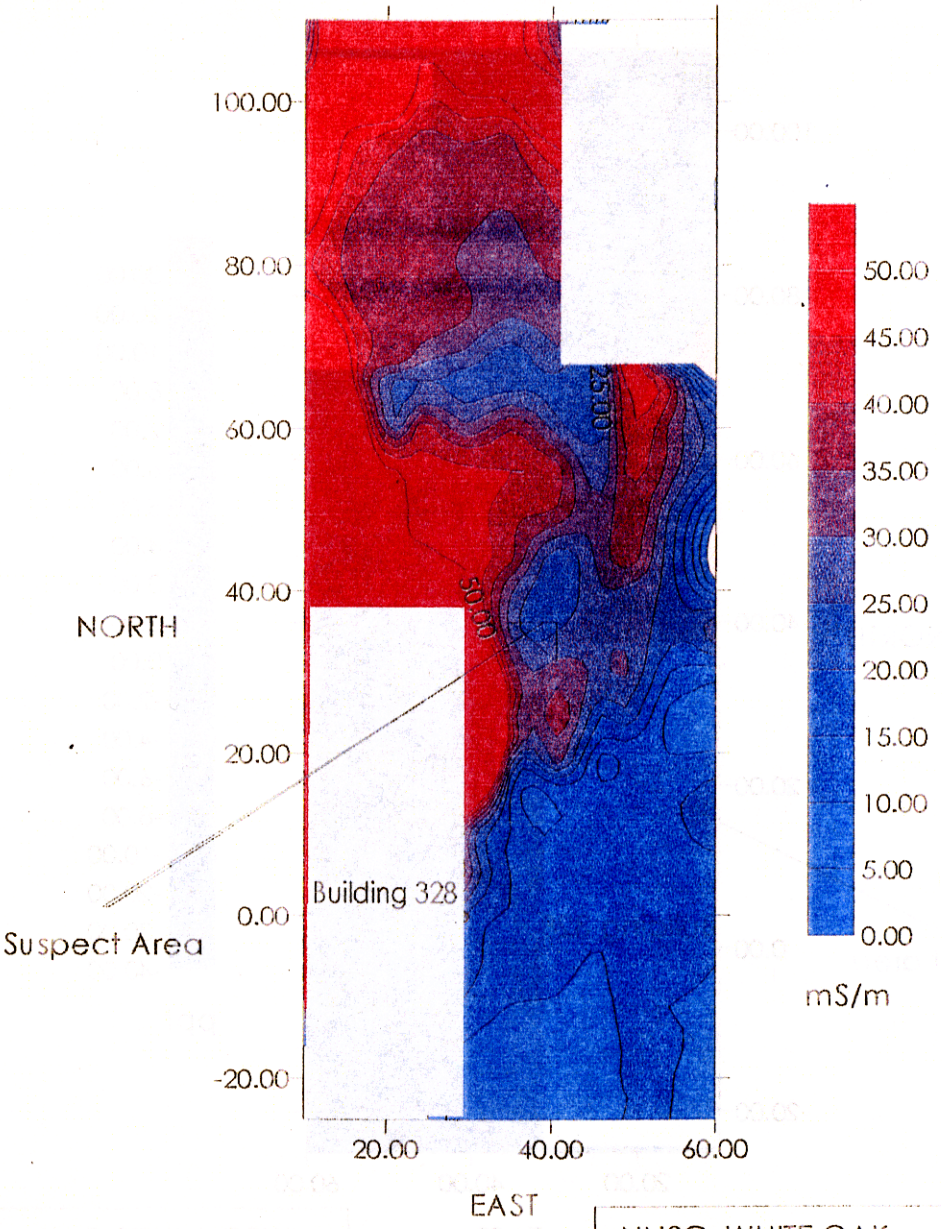
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 2

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW03 - CONDUCTIVITY



Map Scale in Feet

Milli-siemens per Meter = mS/m

N

February 1999

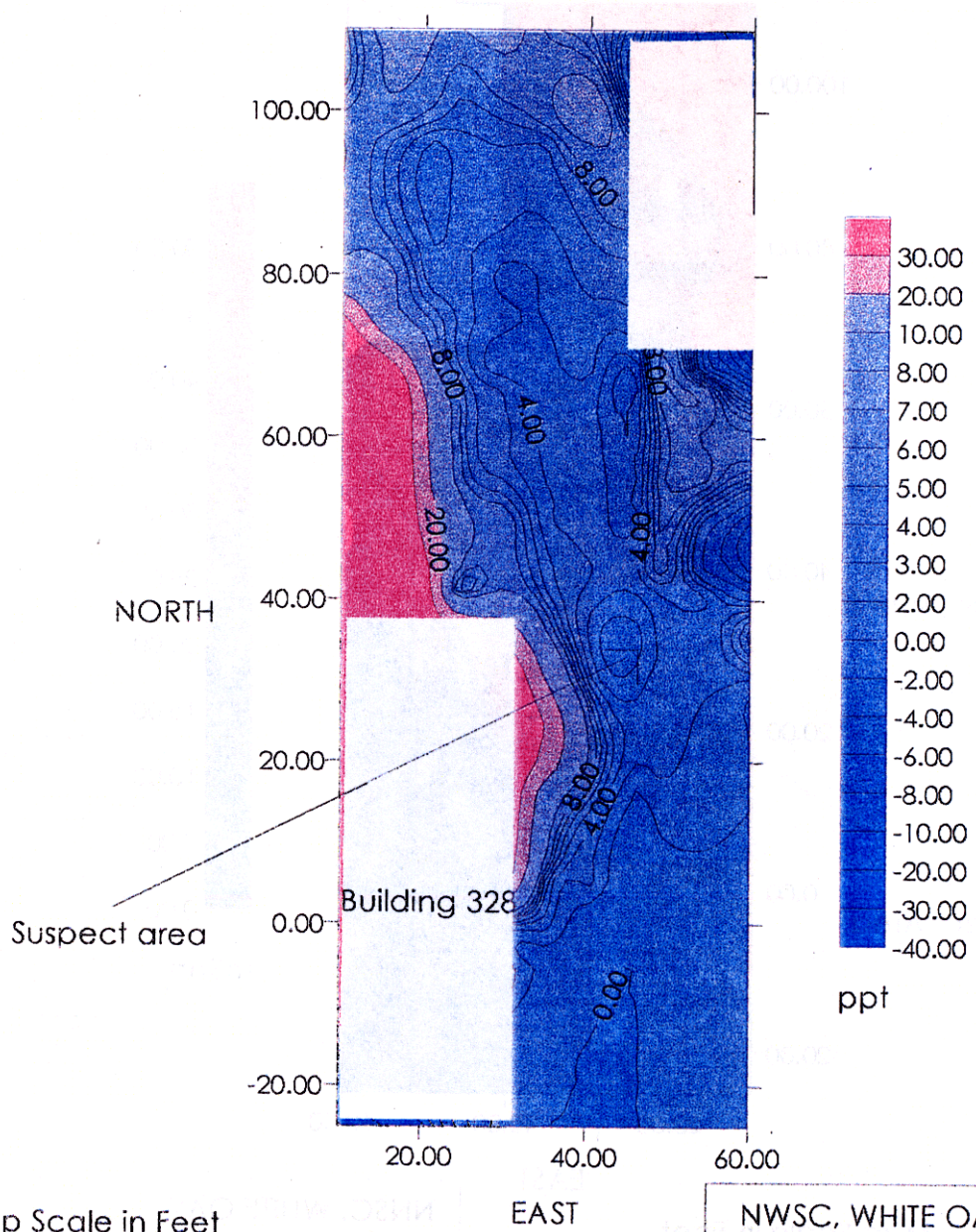
NNSC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 3

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW03 - IN-PHASE DATA



Map Scale in Feet

Parts per Thousand = ppt

N

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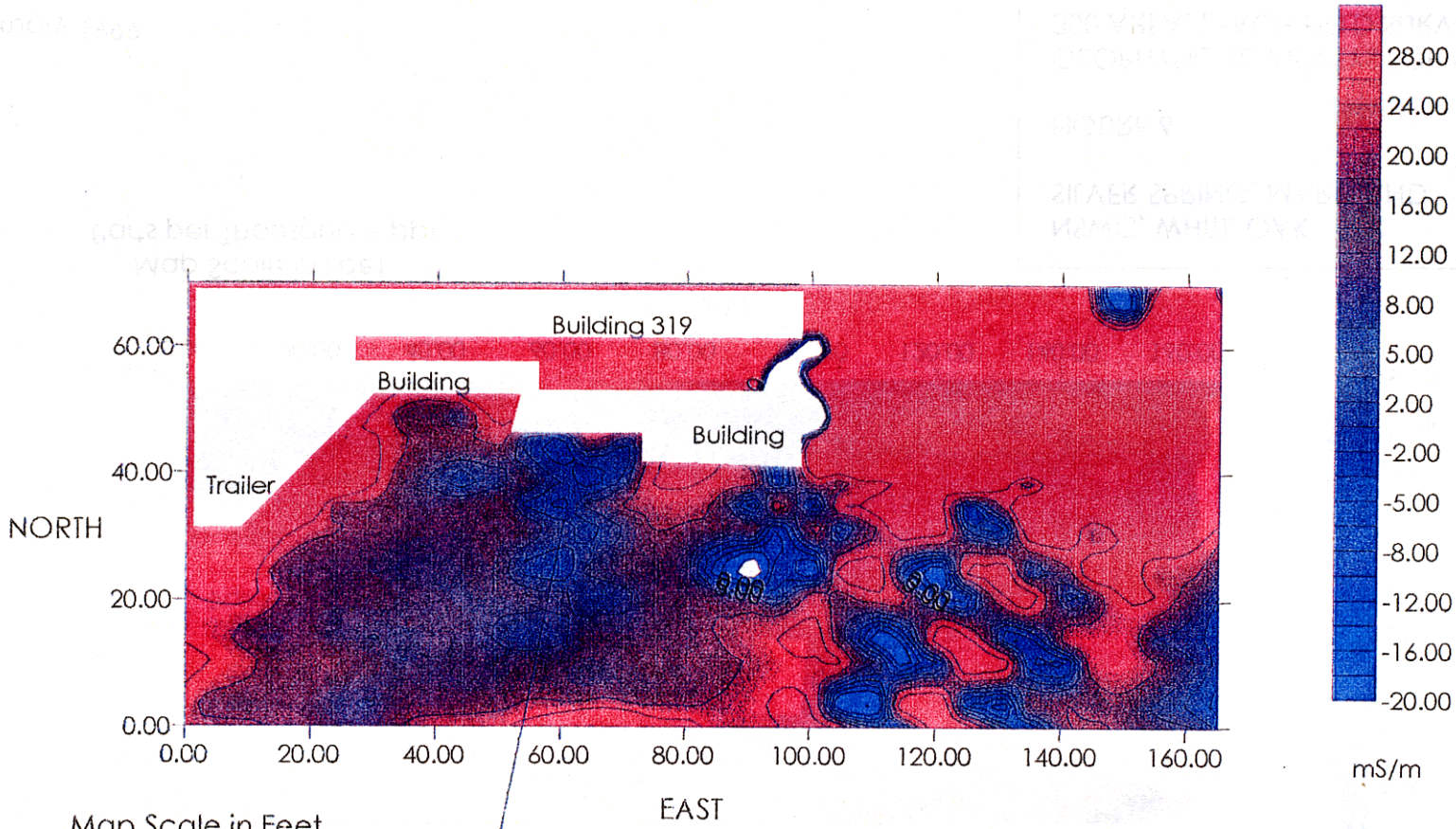
NWSC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 4

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW04 - CONDUCTIVITY DATA



Map Scale in Feet
Milli-siemens per Meter = mS/m

N

Suspect Area
Likely Utility

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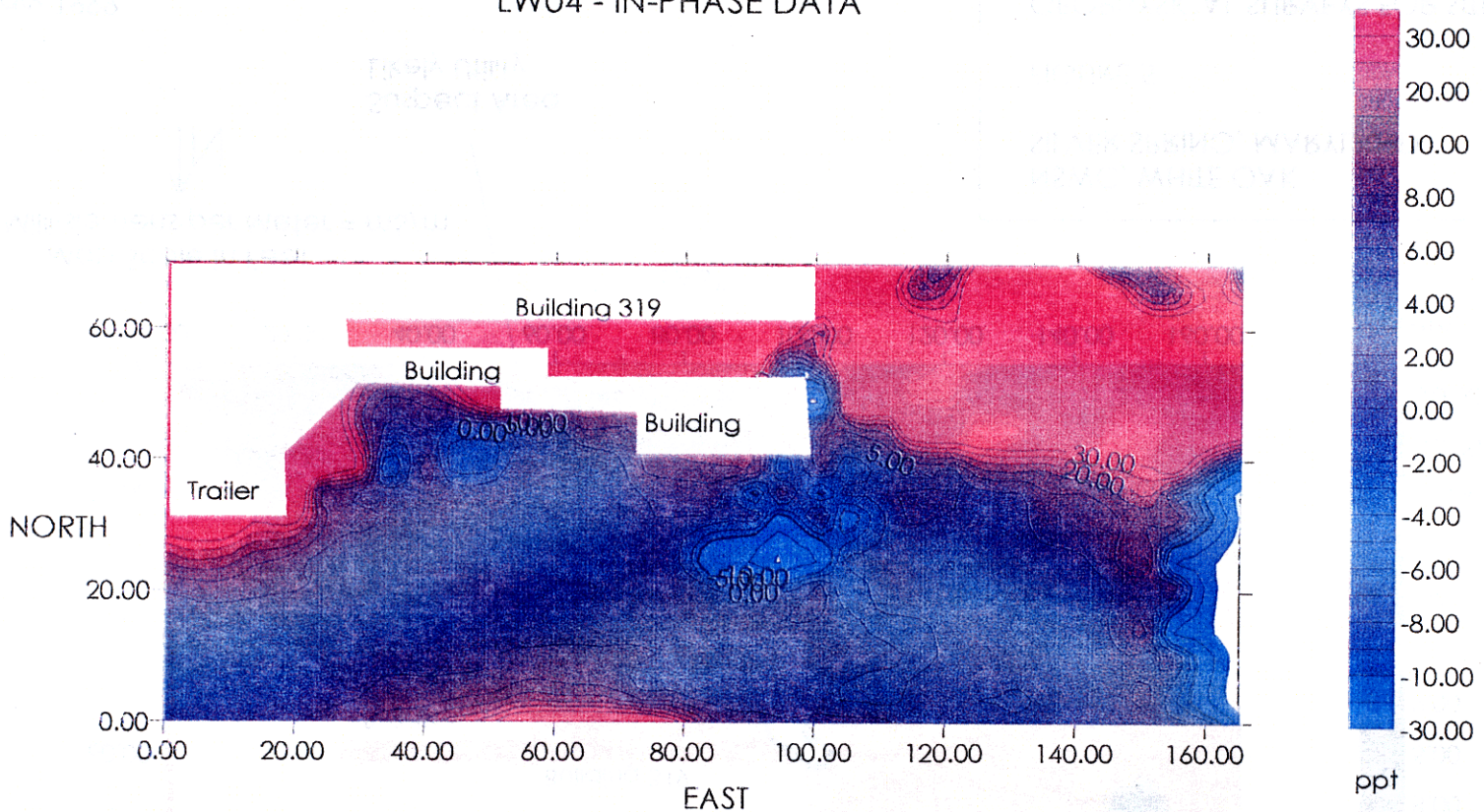
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 5

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW04 - IN-PHASE DATA



Map Scale in Feet
Parts per Thousand = ppt

N

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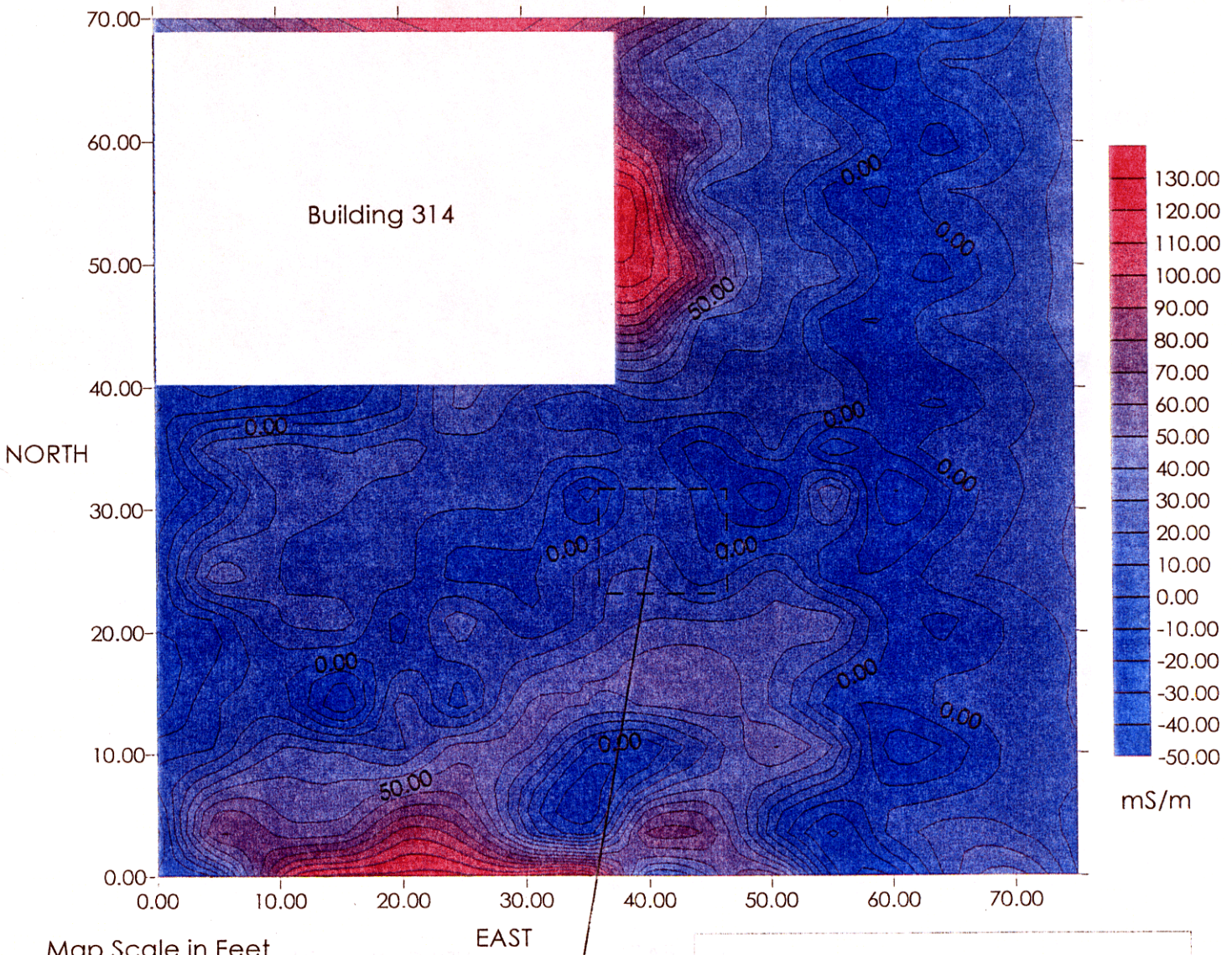
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 6

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW05 - CONDUCTIVITY DATA



Map Scale in Feet

Milli-siemens per Meter = mS/m

Note: Building 315 is located south of survey area.

Approximate Leach Well Location

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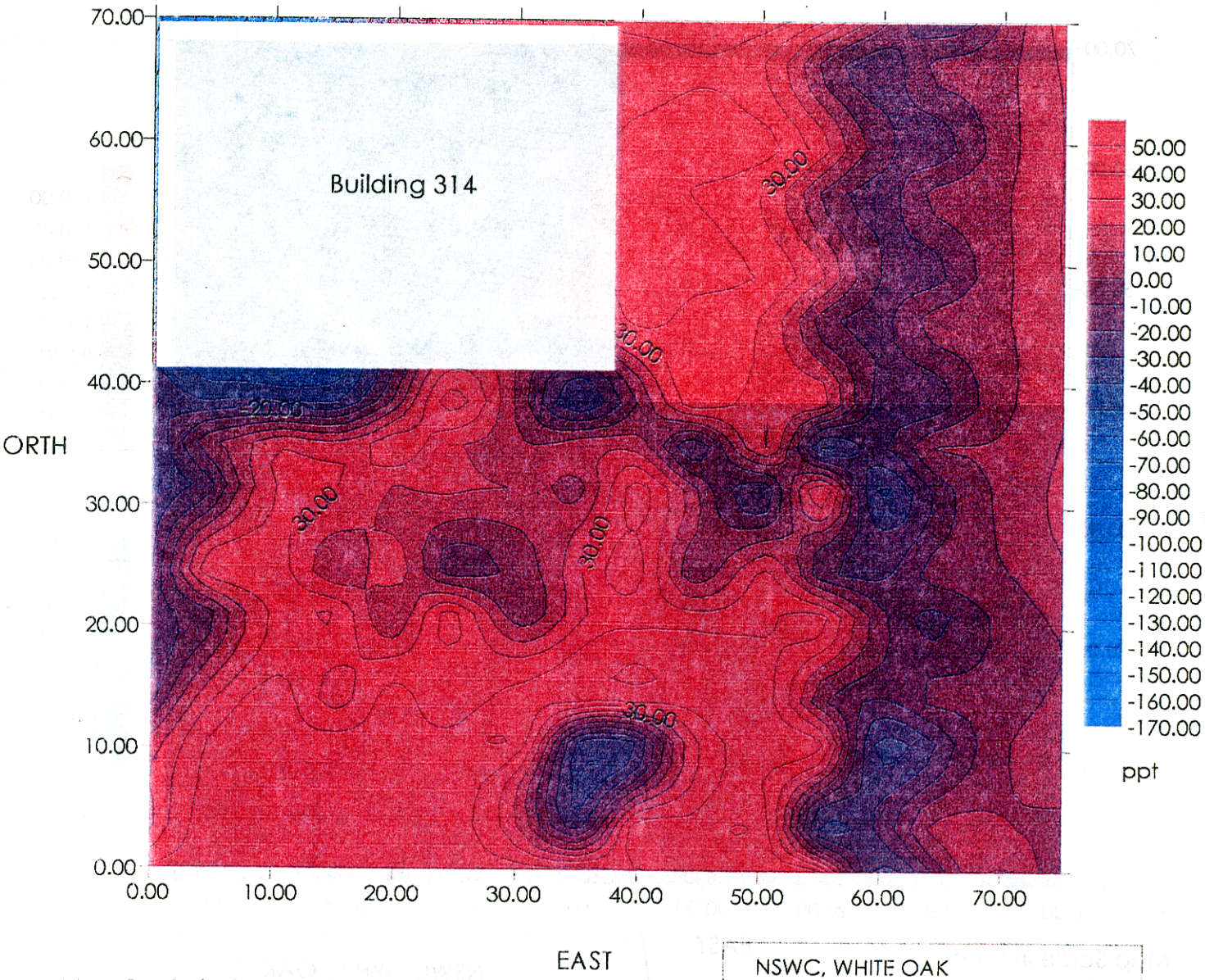
SILVER SPRING, MARYLAND

FIGURE 7

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW05 - IN-PHASE DATA



Map Scale in Feet
Parts per Thousand = ppt

N

February 1999

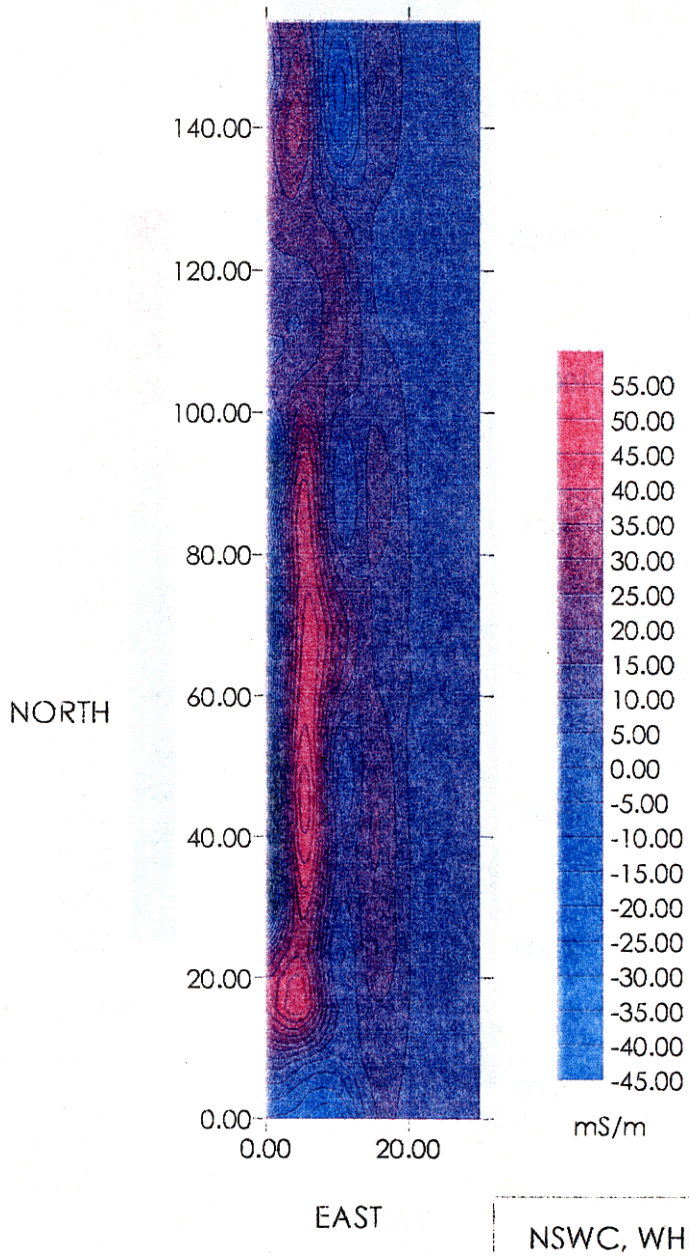
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 8

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW07 - CONDUCTIVITY DATA



Map Scale in Feet
Milli-siemens per Meter = mS/m

GRID

NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 9

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

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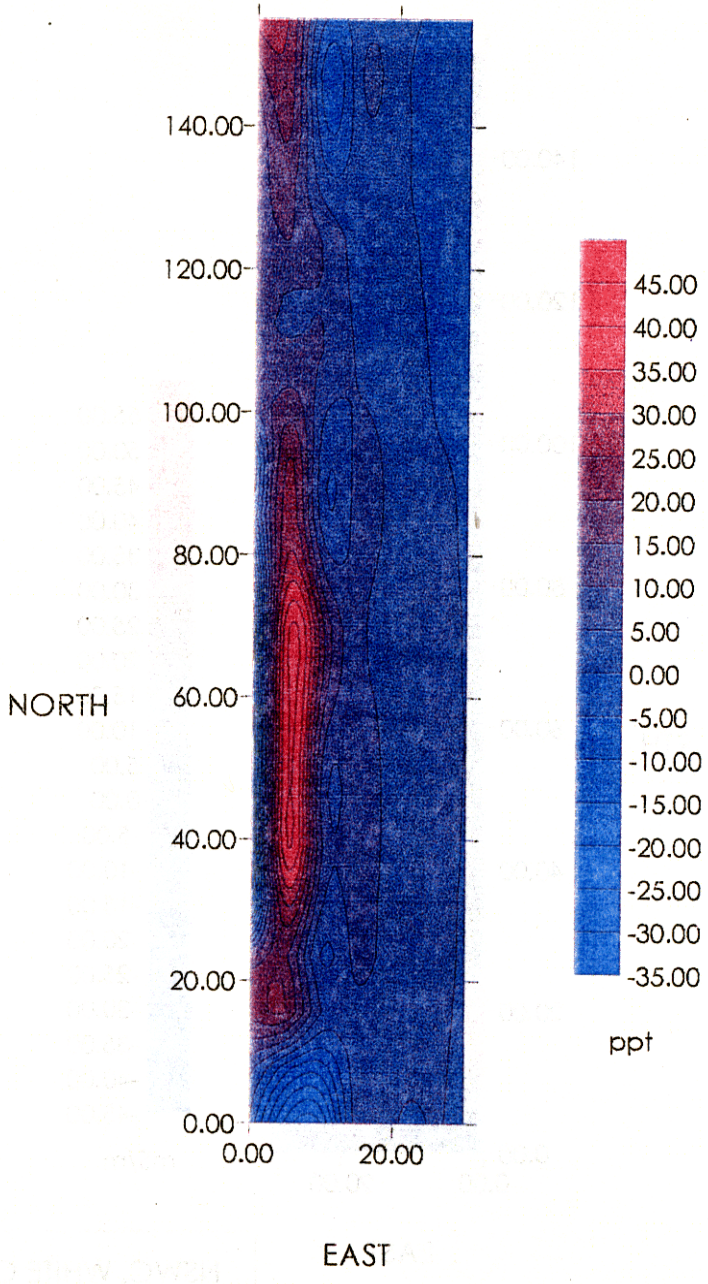
LW07 - IN-PHASE DATA



Map Scale in Feet
Parts per Thousand = ppt

IN

February 1999

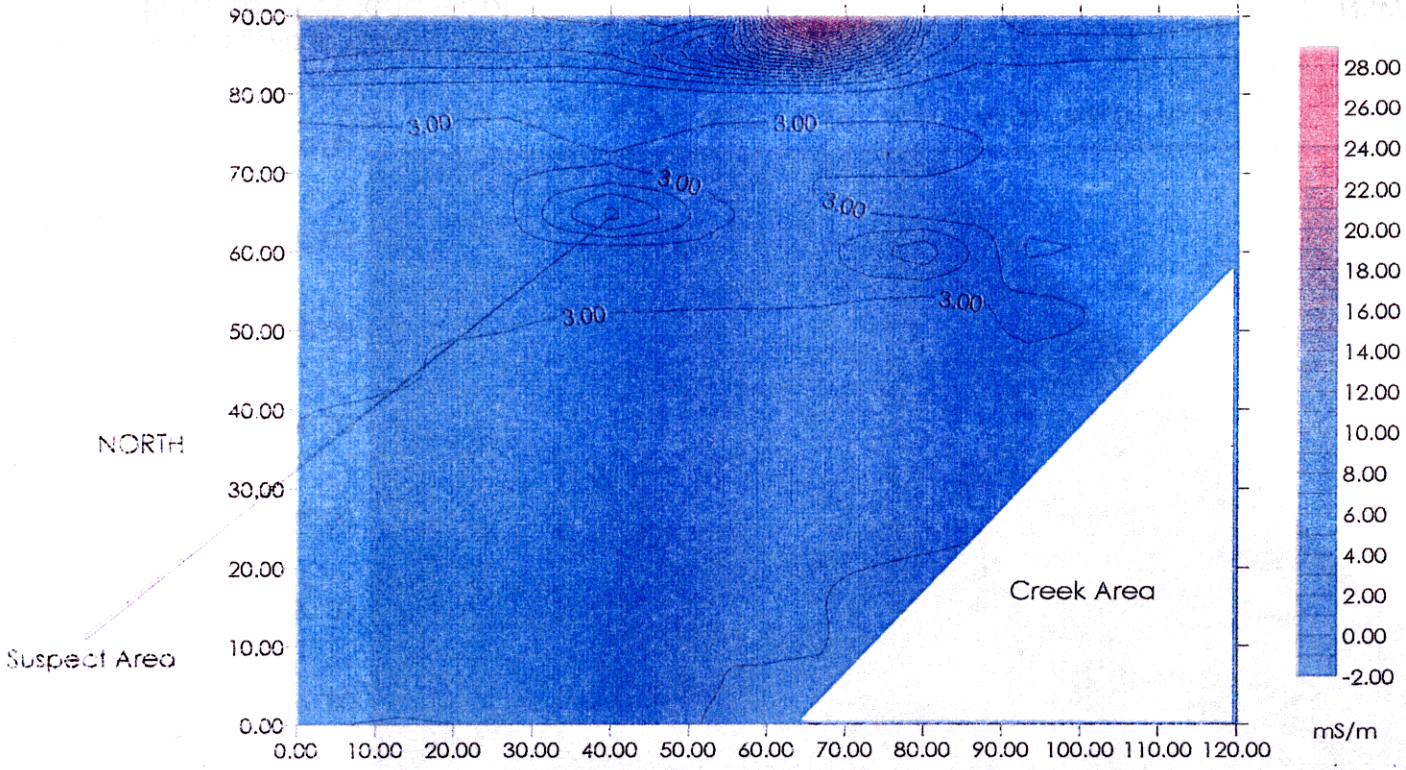
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 10

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW08 - CONDUCTIVITY DATA



Map Scale in Feet
Milli-siemens per Meter = mS/m

EAST

NSWC, WHITE OAK
SILVER SPRING, MARYLAND

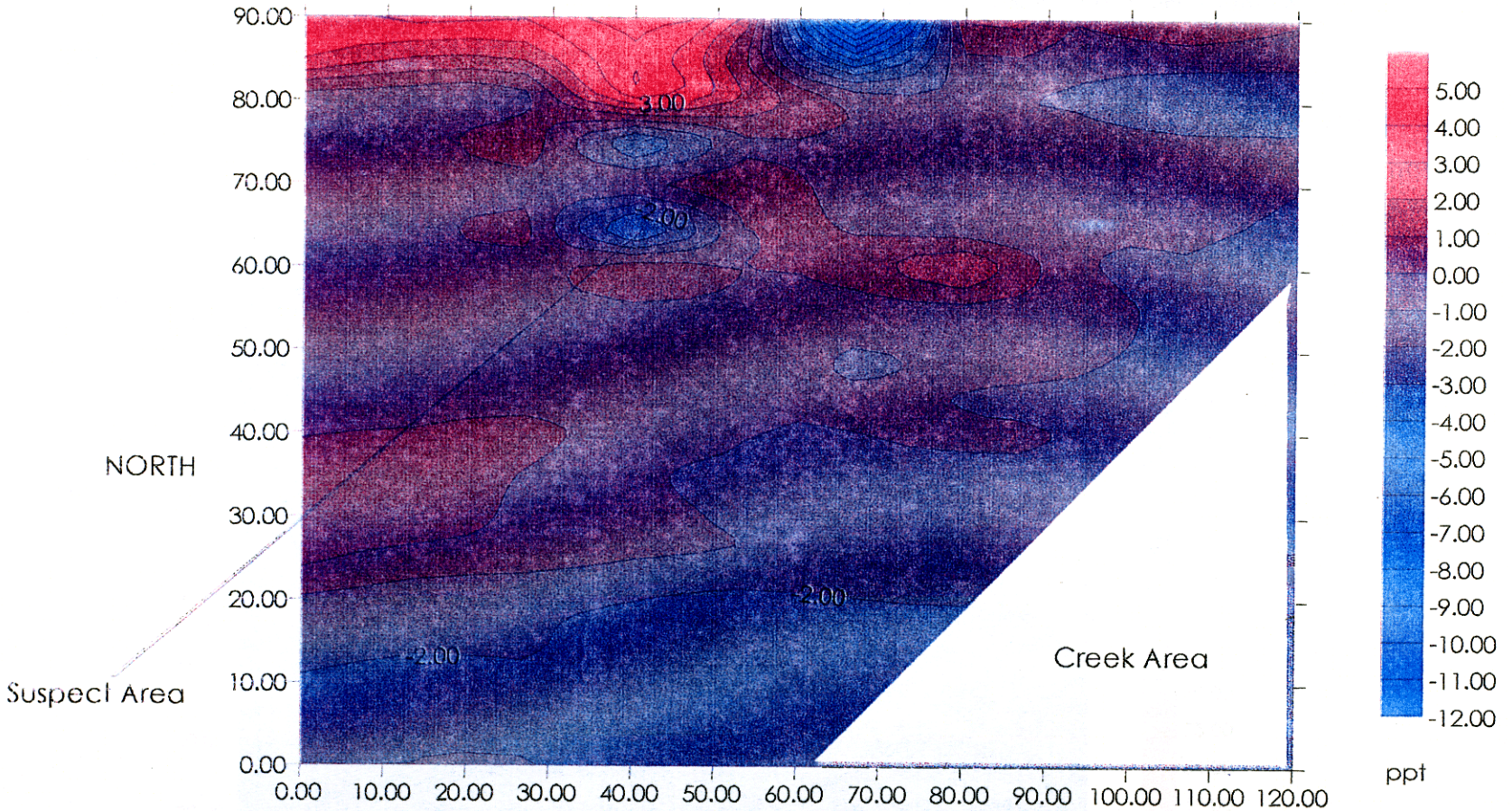
FIGURE 11

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

February 1999

LW08 - IN-PHASE DATA



Map Scale in Feet
Parts per Thousand = ppt

IN

February 1999

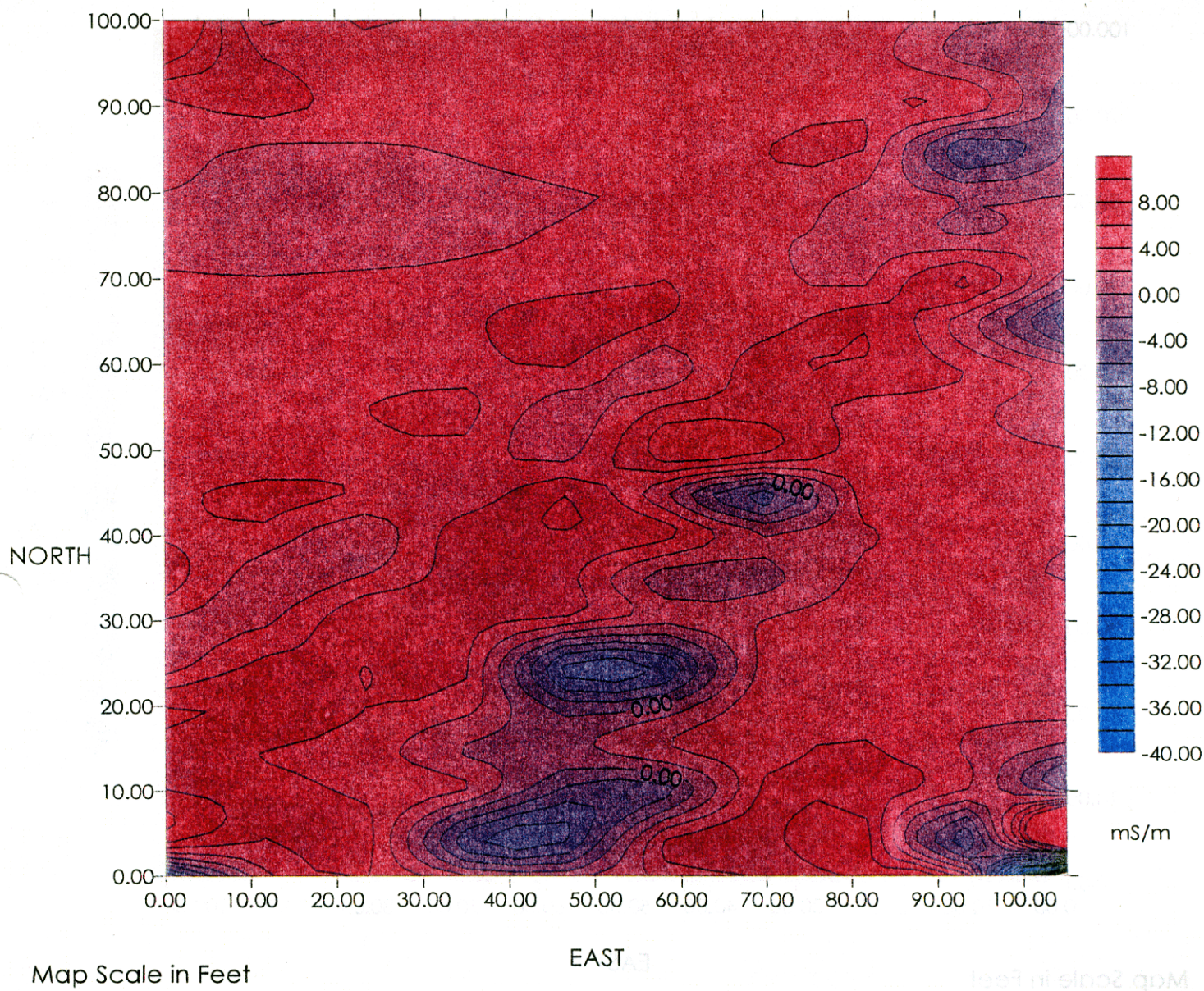
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 12

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW10 - CONDUCTIVITY DATA



Map Scale in Feet
Milli-siemens per Meter = mS/m

February 1999

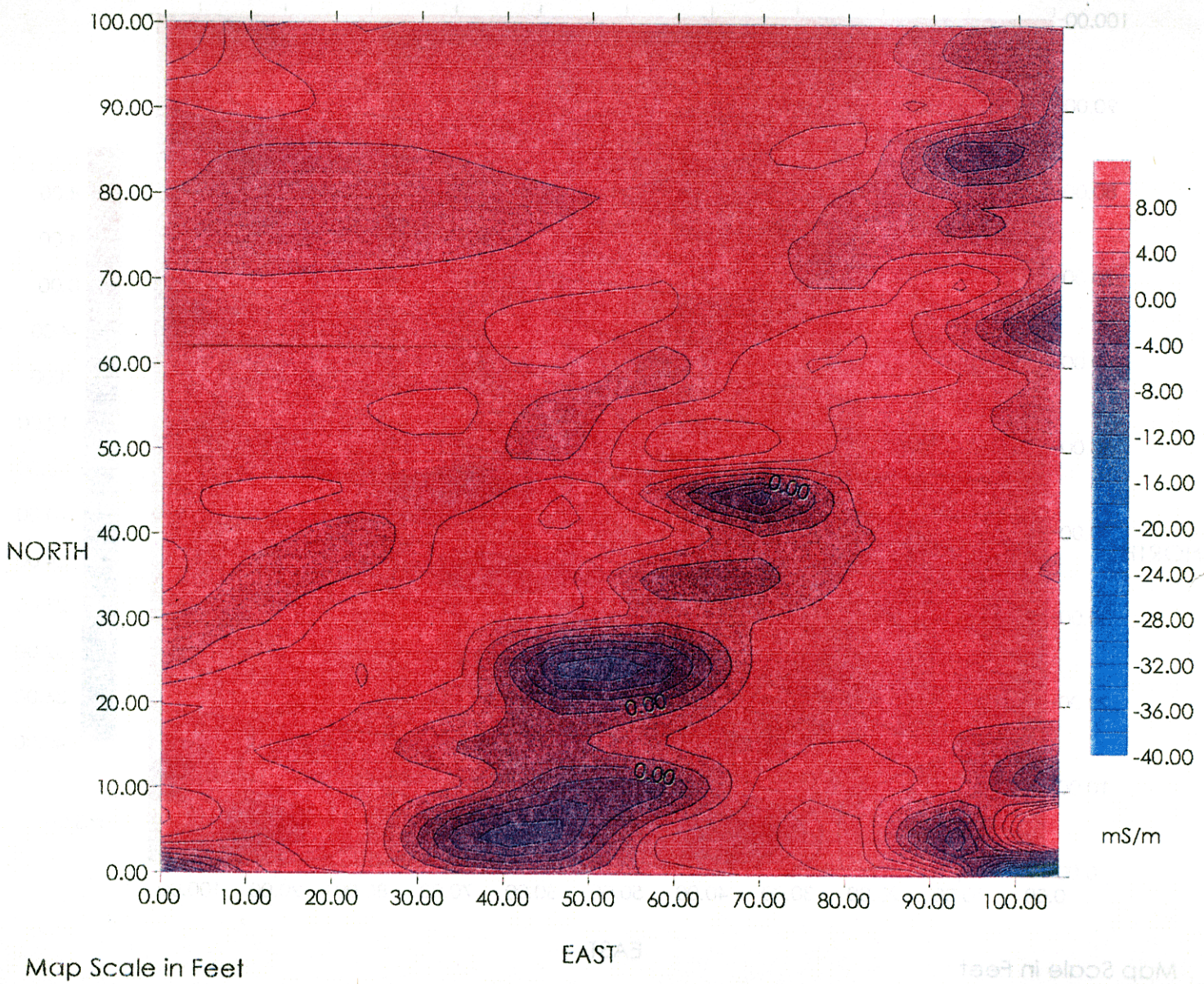
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 13

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW10 - CONDUCTIVITY DATA



Map Scale in Feet
Millisiemens per Meter = mS/m

February 1999

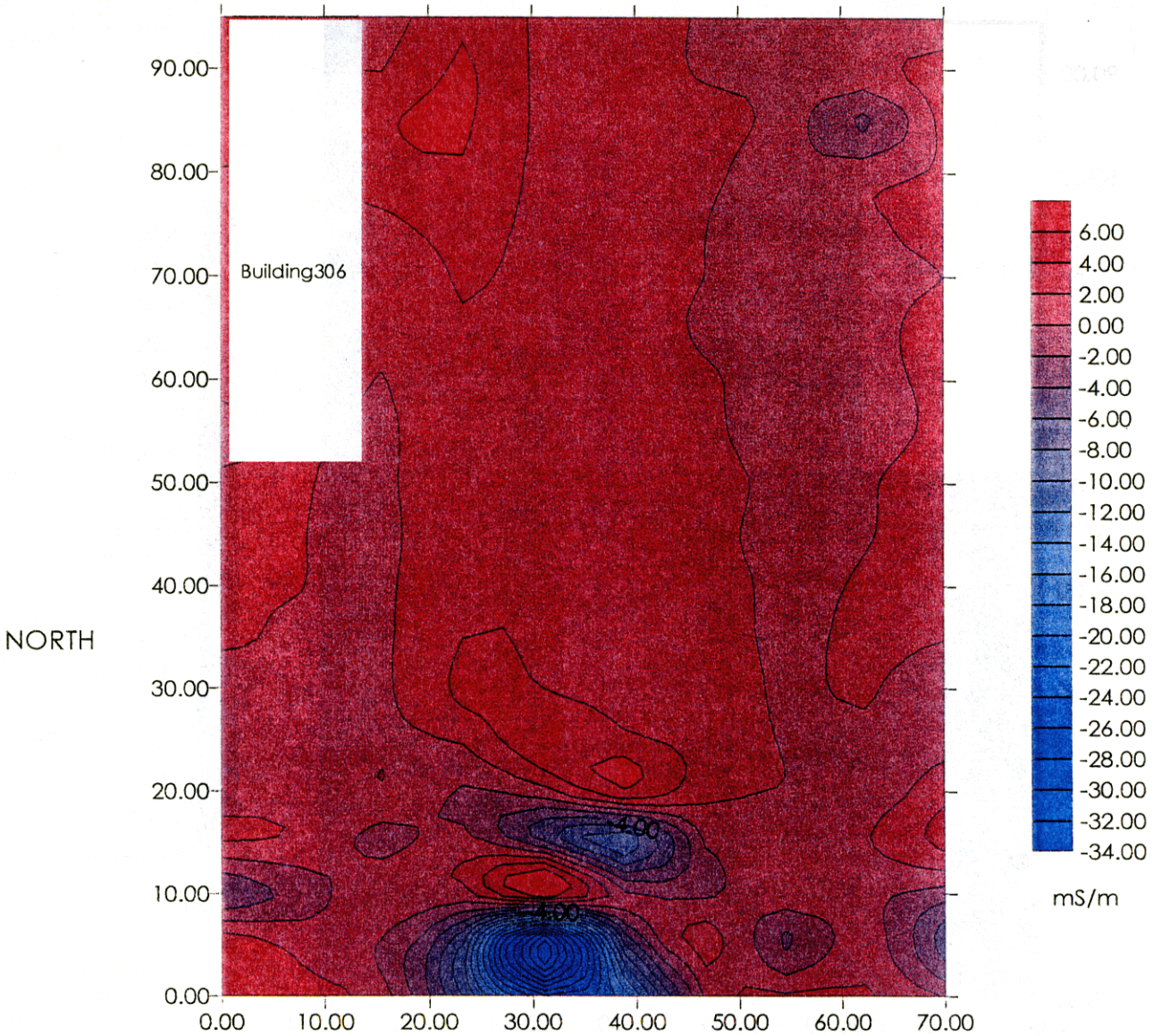
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 13

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW11 - CONDUCTIVITY DATA



Map Scale in Feet
Milli-siemens per Meter = mS/m

EAST

February 1999

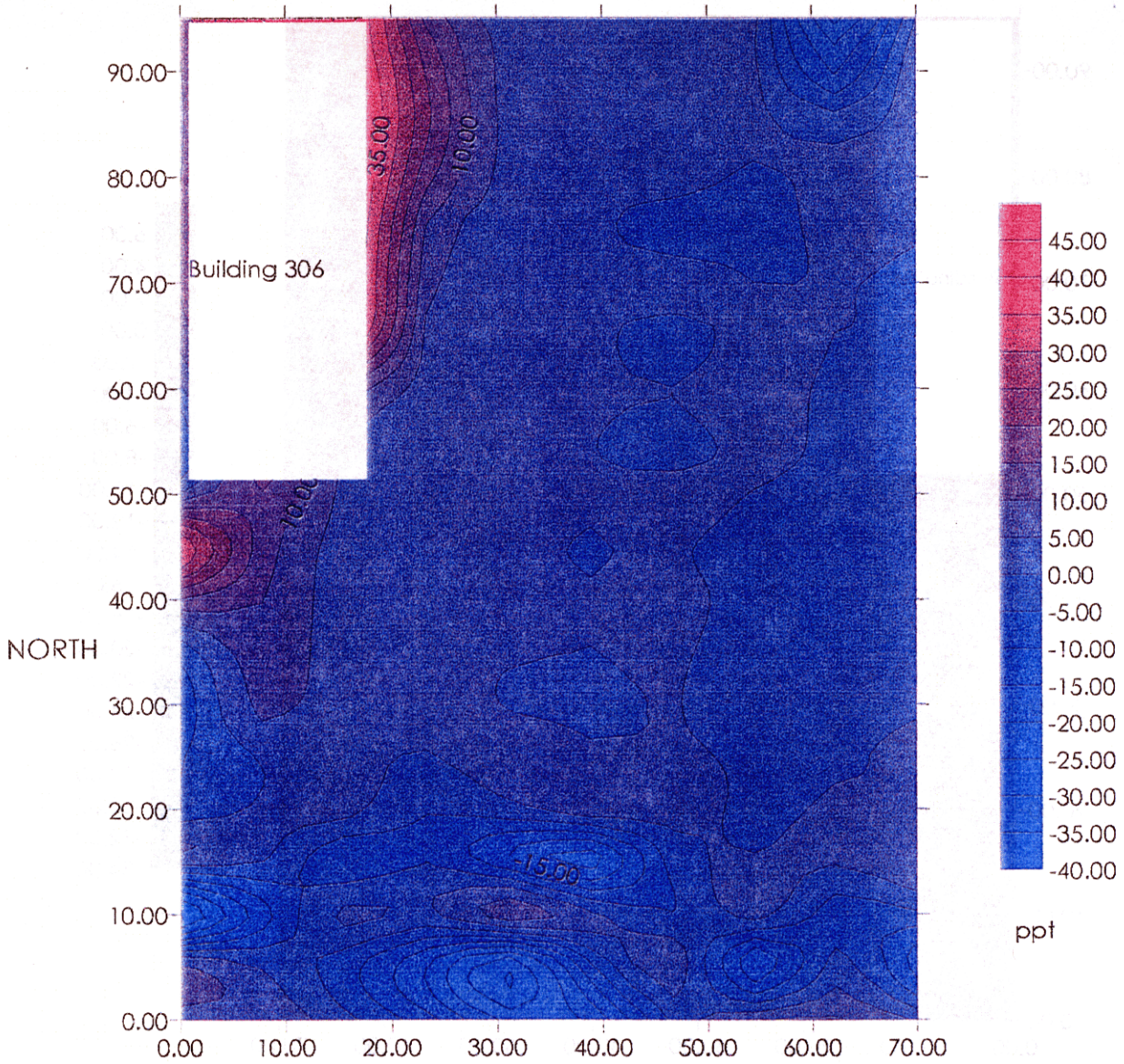
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 15

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW11 - IN-PHASE DATA



Map Scale in Feet
Parts per Thousand = ppt

N

February 1999

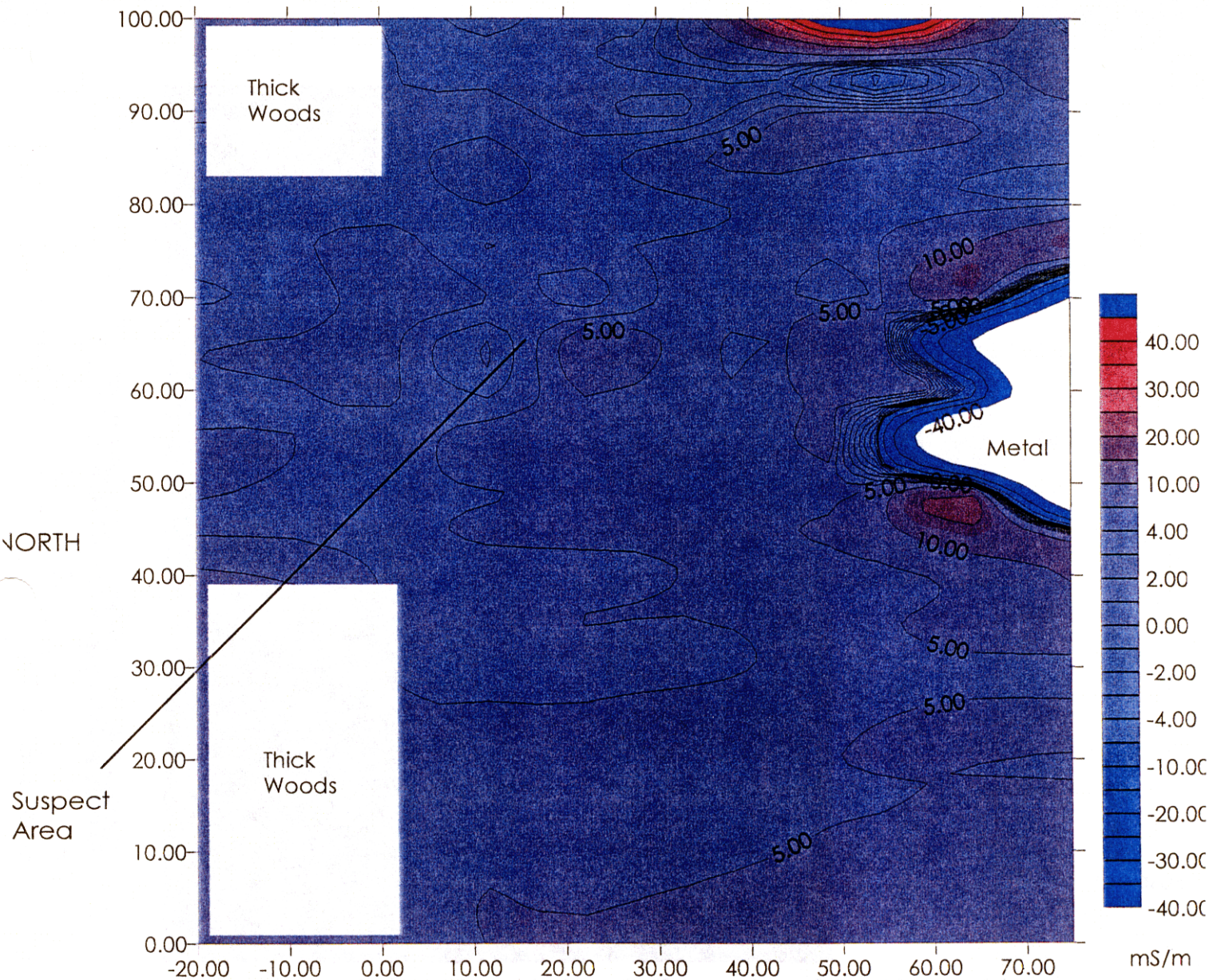
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 16

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW12 - CONDUCTIVITY DATA



EAST

Map Scale in Feet
Milli-siemens per Meter = mS/m

February 1999

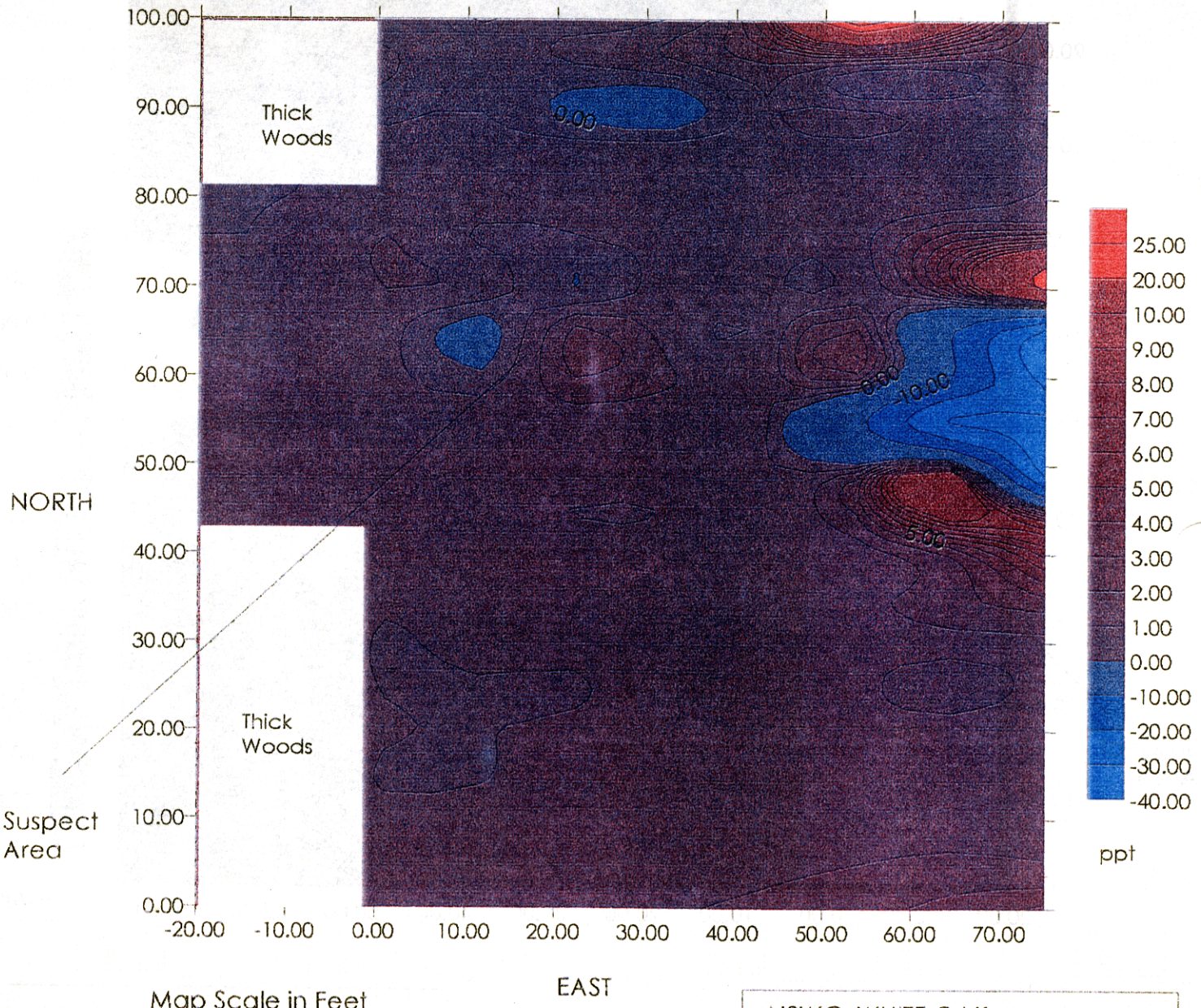
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 17

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW12 - IN-PHASE DATA



Map Scale in Feet
Parts per Thousand = ppt

February 1999

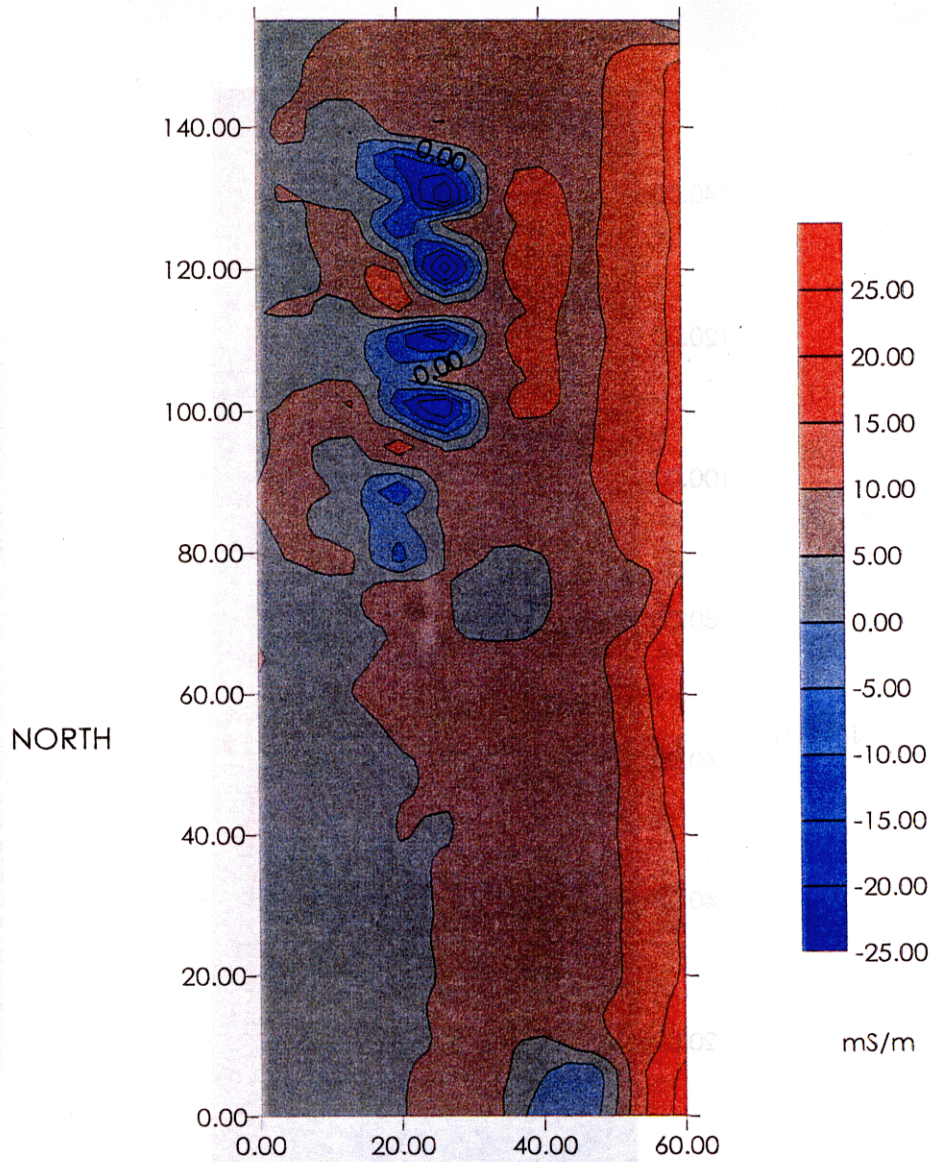
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 18

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW13 - CONDUCTIVITY DATA



Map Scale in Feet
Milli-siemens per meter = mS/m

N

February 1999

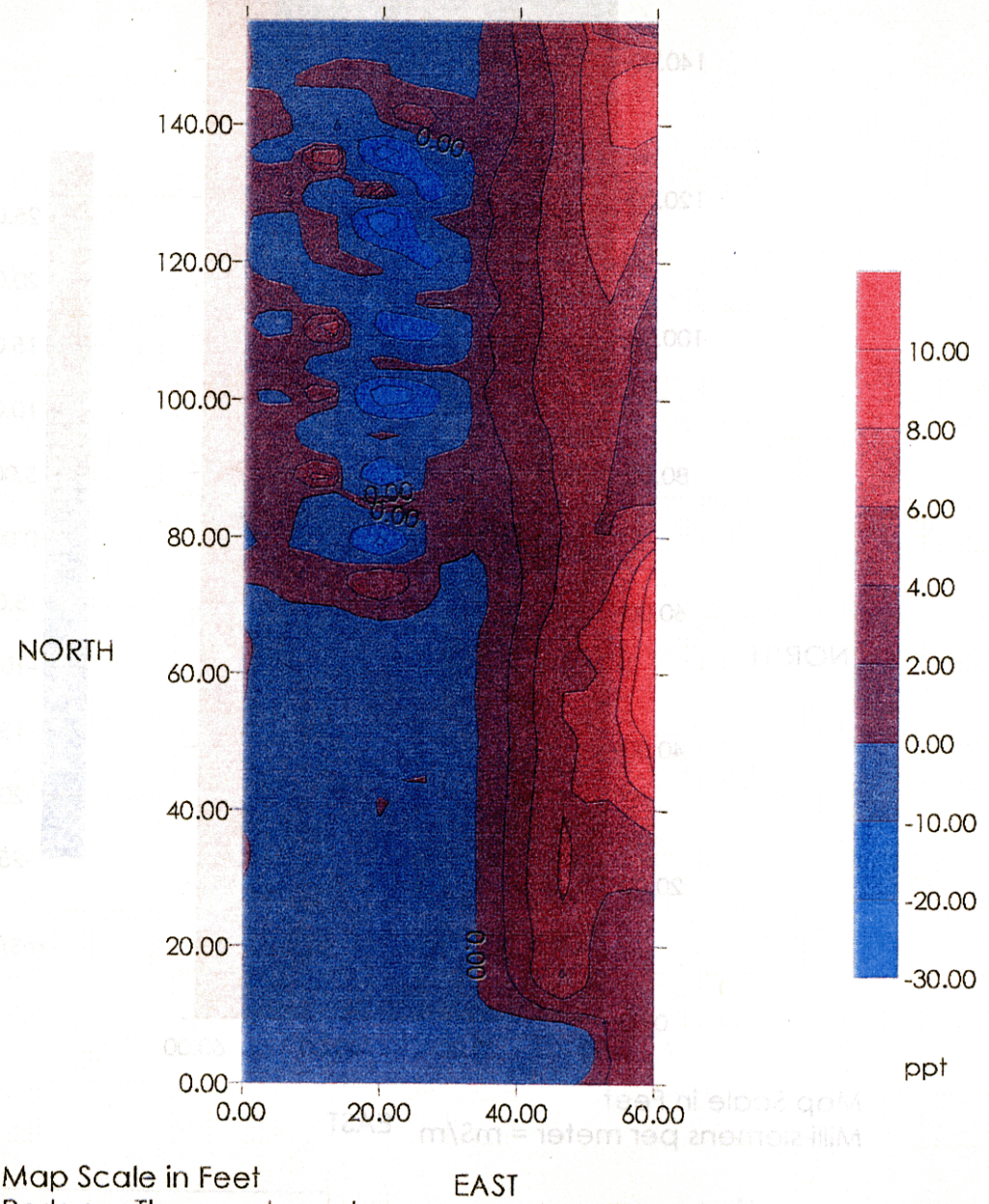
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 19

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW13 - IN-PHASE DATA



Map Scale in Feet
Parts per Thousand = ppt

N

February 1999

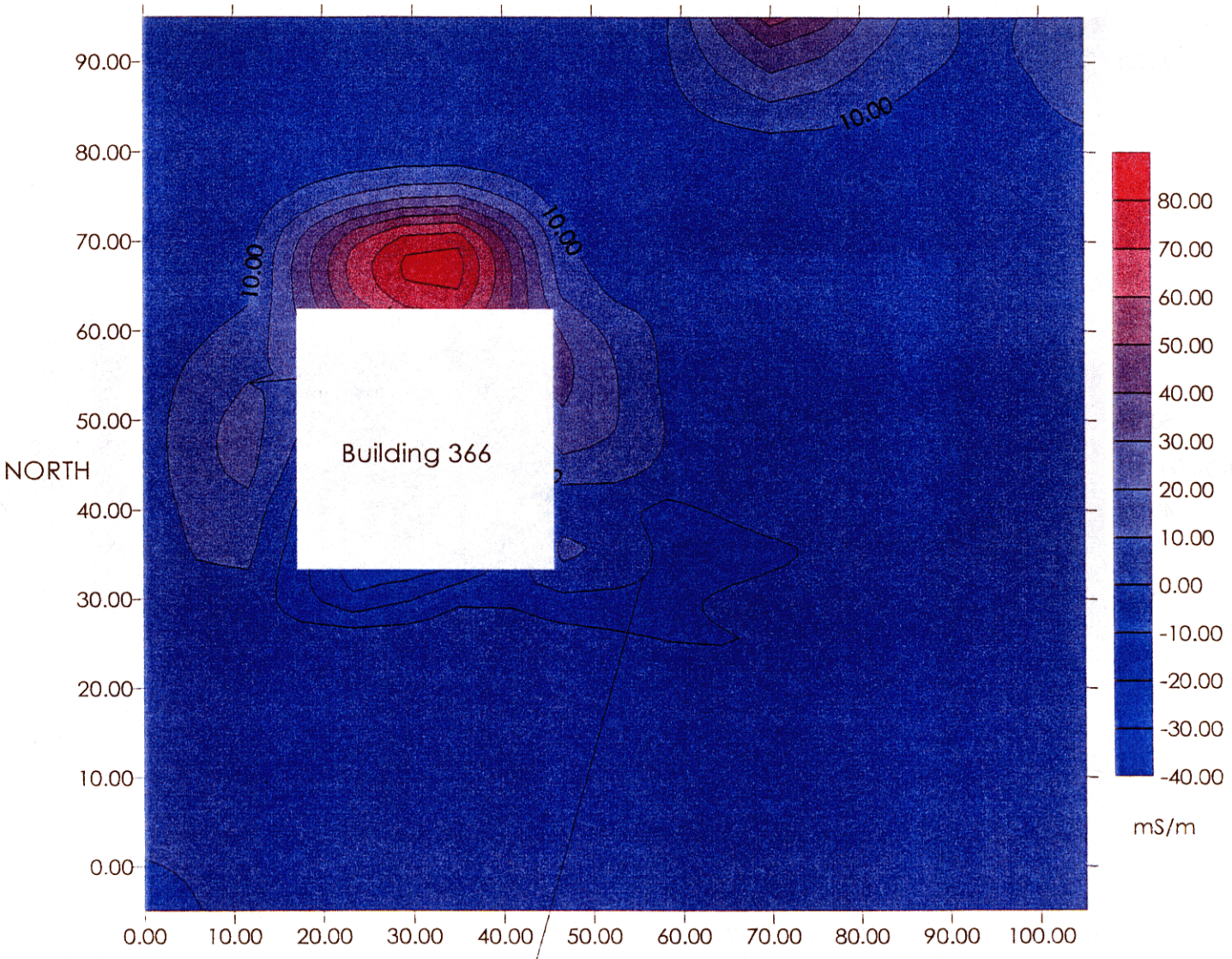
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 20

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW14 - CONDUCTIVITY DATA



Map Scale in Feet
Milli-siemens per Meter = mS/m

Suspect Area

February 1999

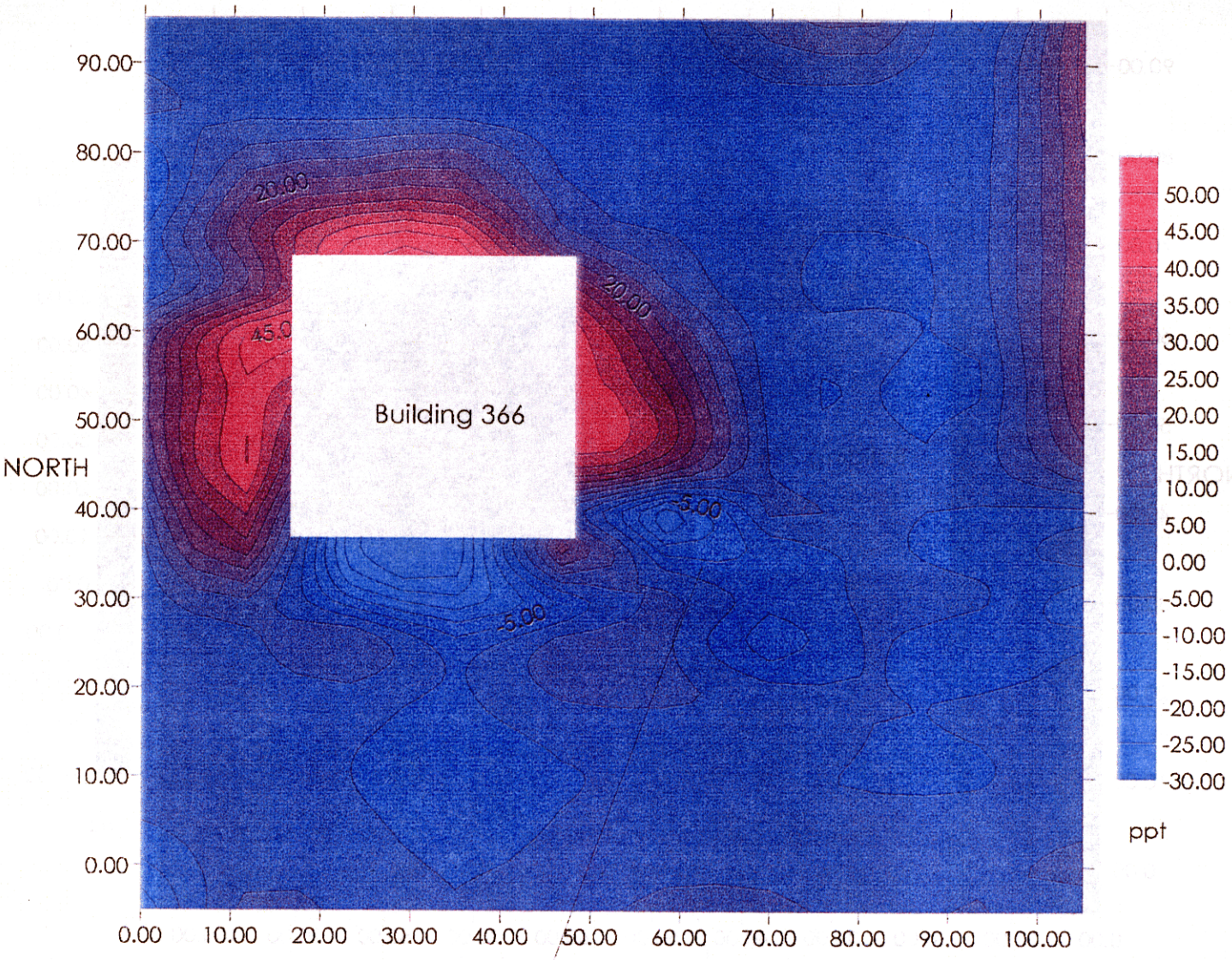
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 21

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW14 - IN-PHASE DATA



Map Scale in Feet
Parts per Thousand = ppt

EAST

IN

Suspect Area

February 1999

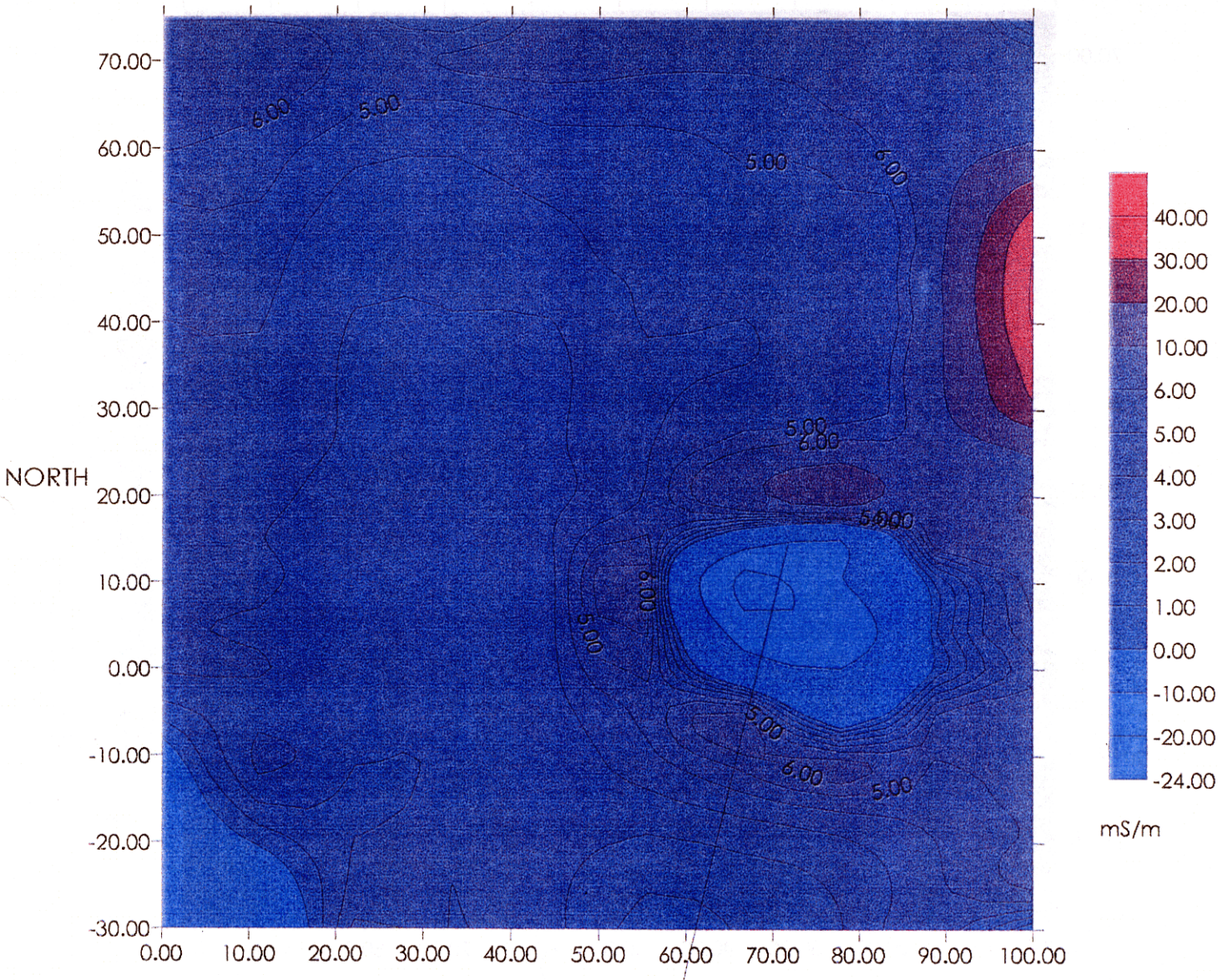
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 22

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW15 - CONDUCTIVITY DATA



Map Scale in Feet
Millisiemens per Meter = mS/m

N

Suspect Area

February 1999

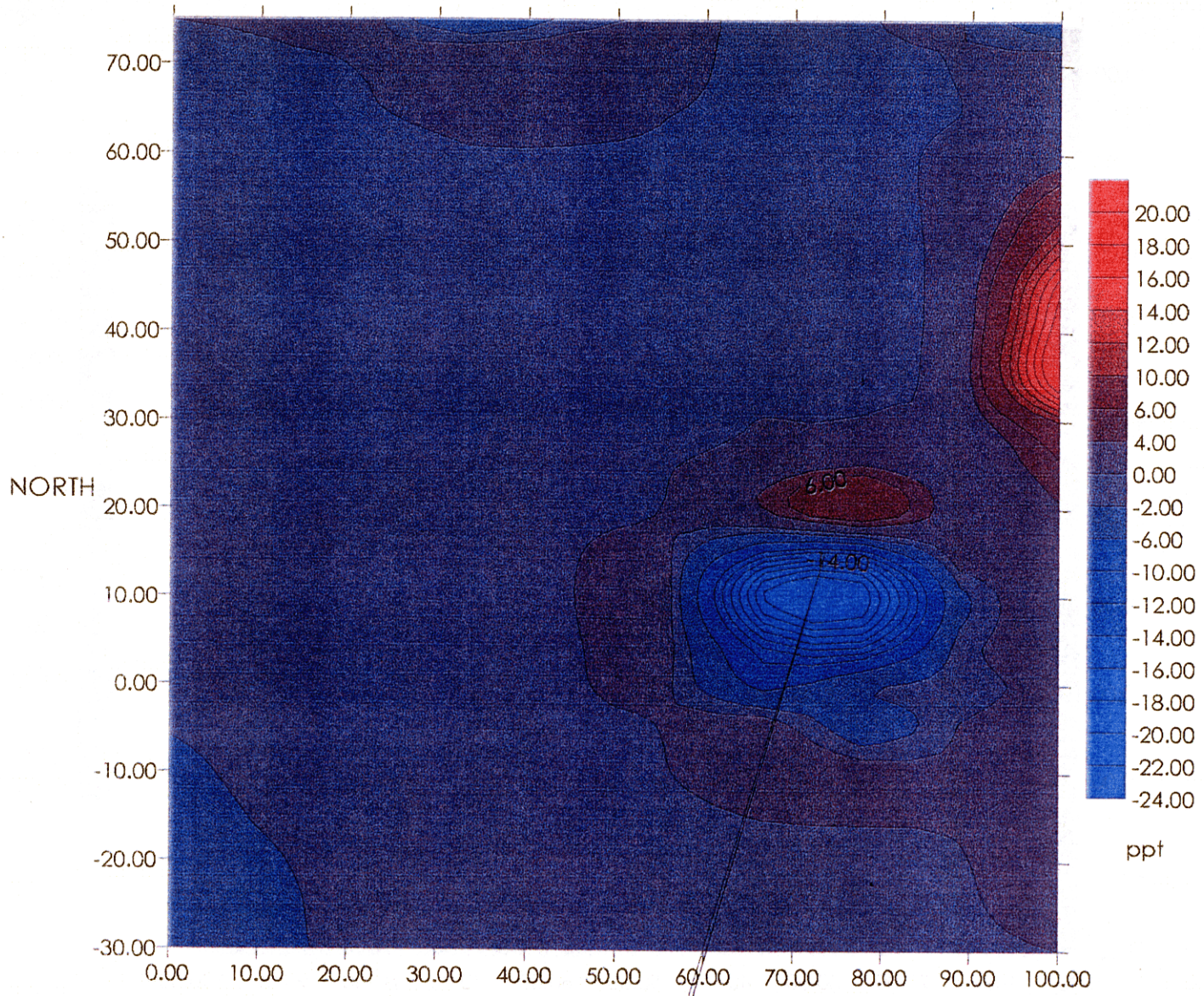
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 23

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW15 - IN-PHASE DATA



Map Scale in Feet
Parts per Thousand = ppt

EAST

N

Suspect Area

February 1999

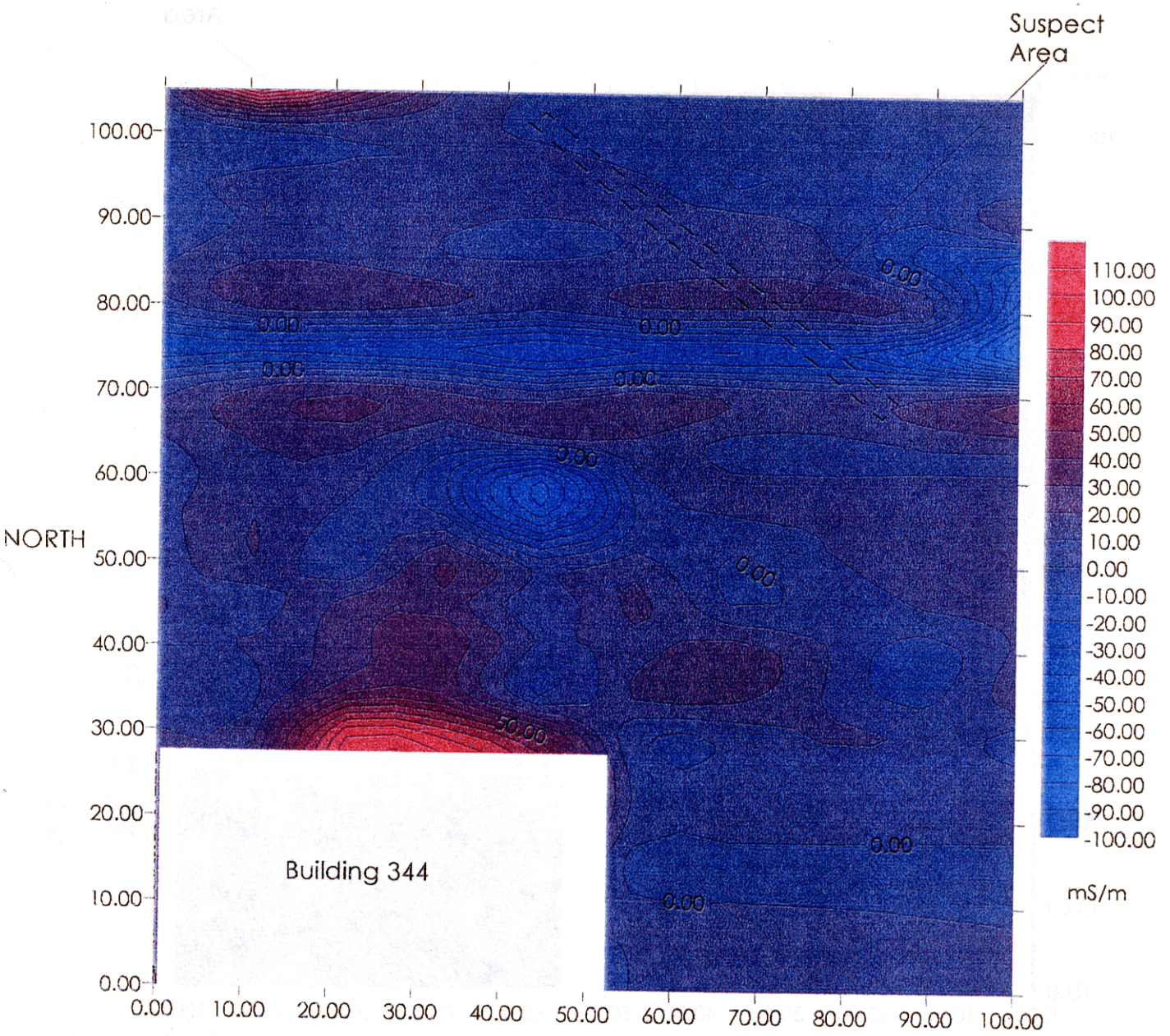
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 24

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW16/LW17/LW20 - CONDUCTIVITY DATA



Map Scale in Feet
Milli-siemens per Meter = mS/m

N

February 1999

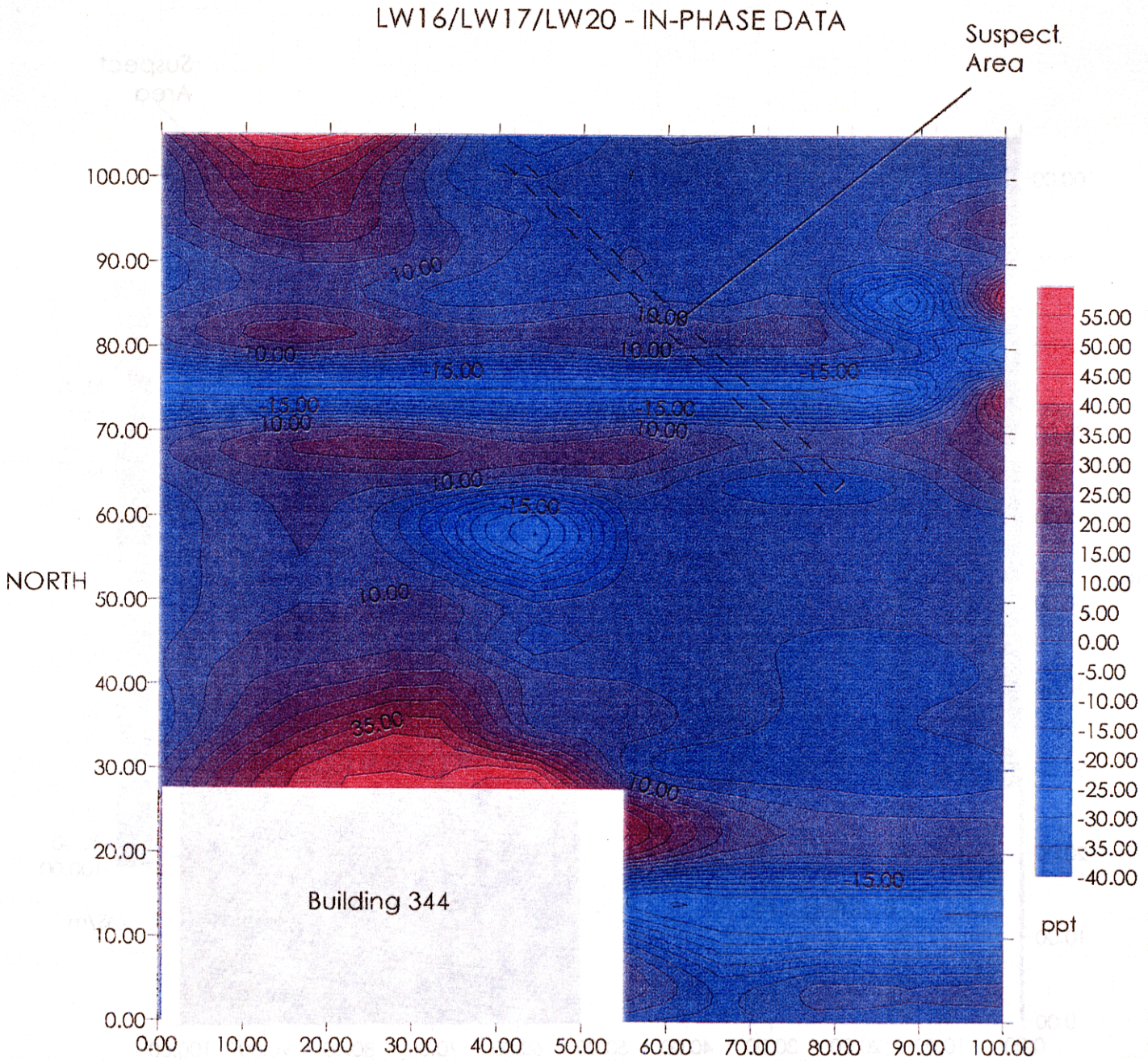
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 25

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW16/LW17/LW20 - IN-PHASE DATA



Map Scale in Feet
Parts per Thousand = ppt

N

February 1999

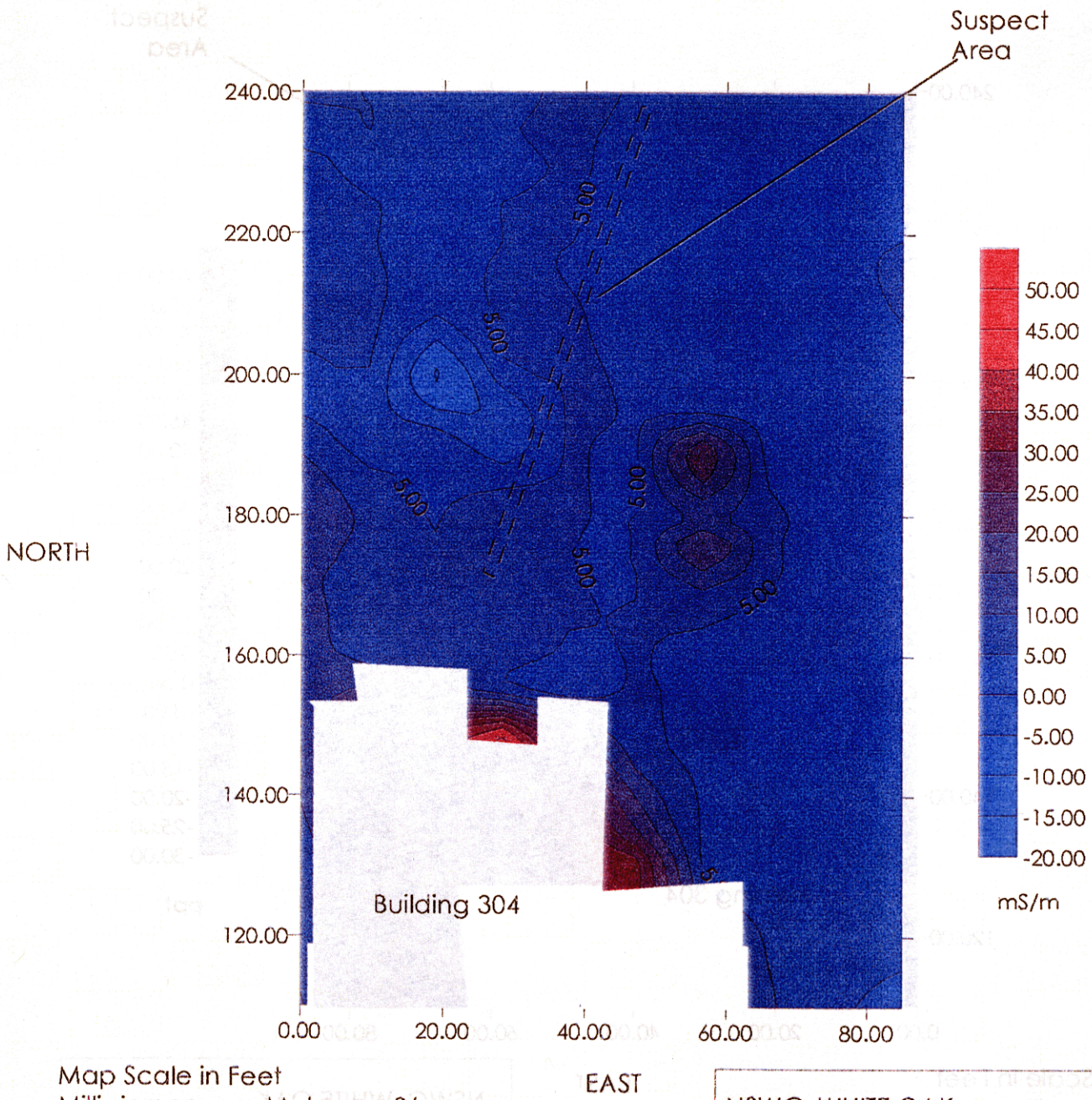
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 26

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW18 - CONDUCTIVITY DATA



Map Scale in Feet
Milli-siemens per Meter = mS/m

N

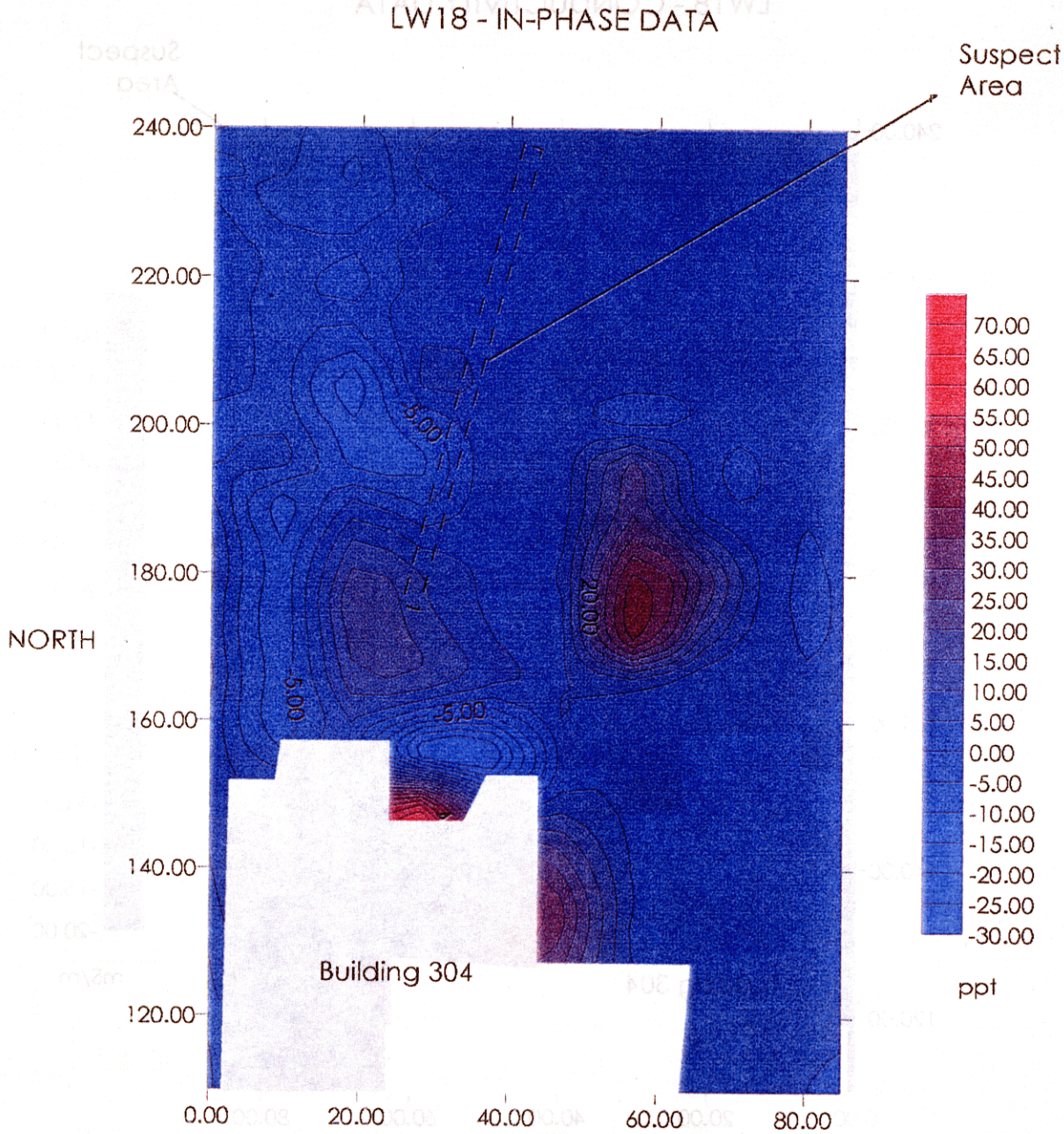
February 1999

NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 27

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.



Map Scale in Feet
Parts per Thousand = ppt

N

February 1999

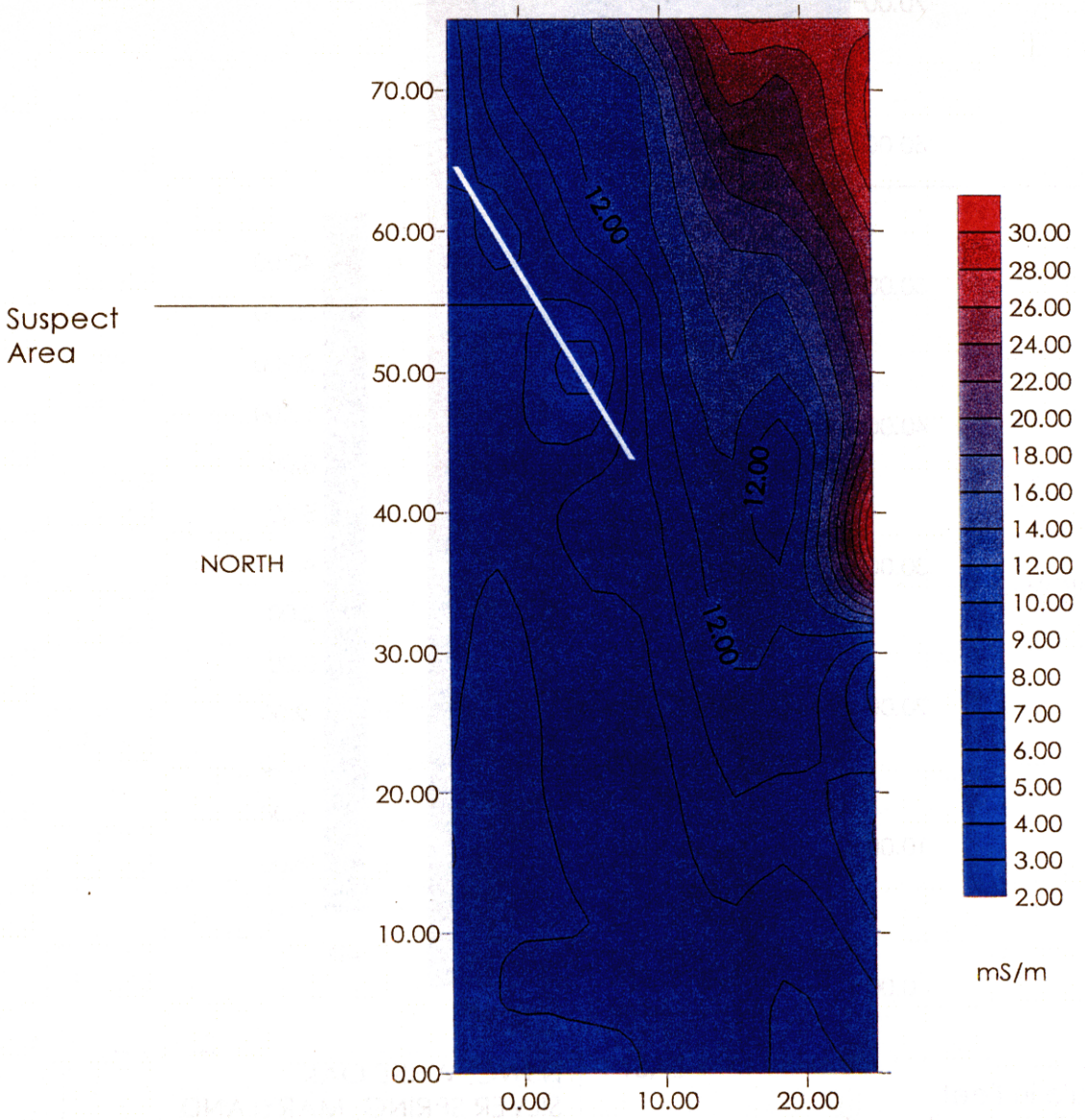
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 28

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW19 - CONDUCTIVITY DATA



Map Scale in Feet
Milli-siemens per Meter = mS/m

February 1999

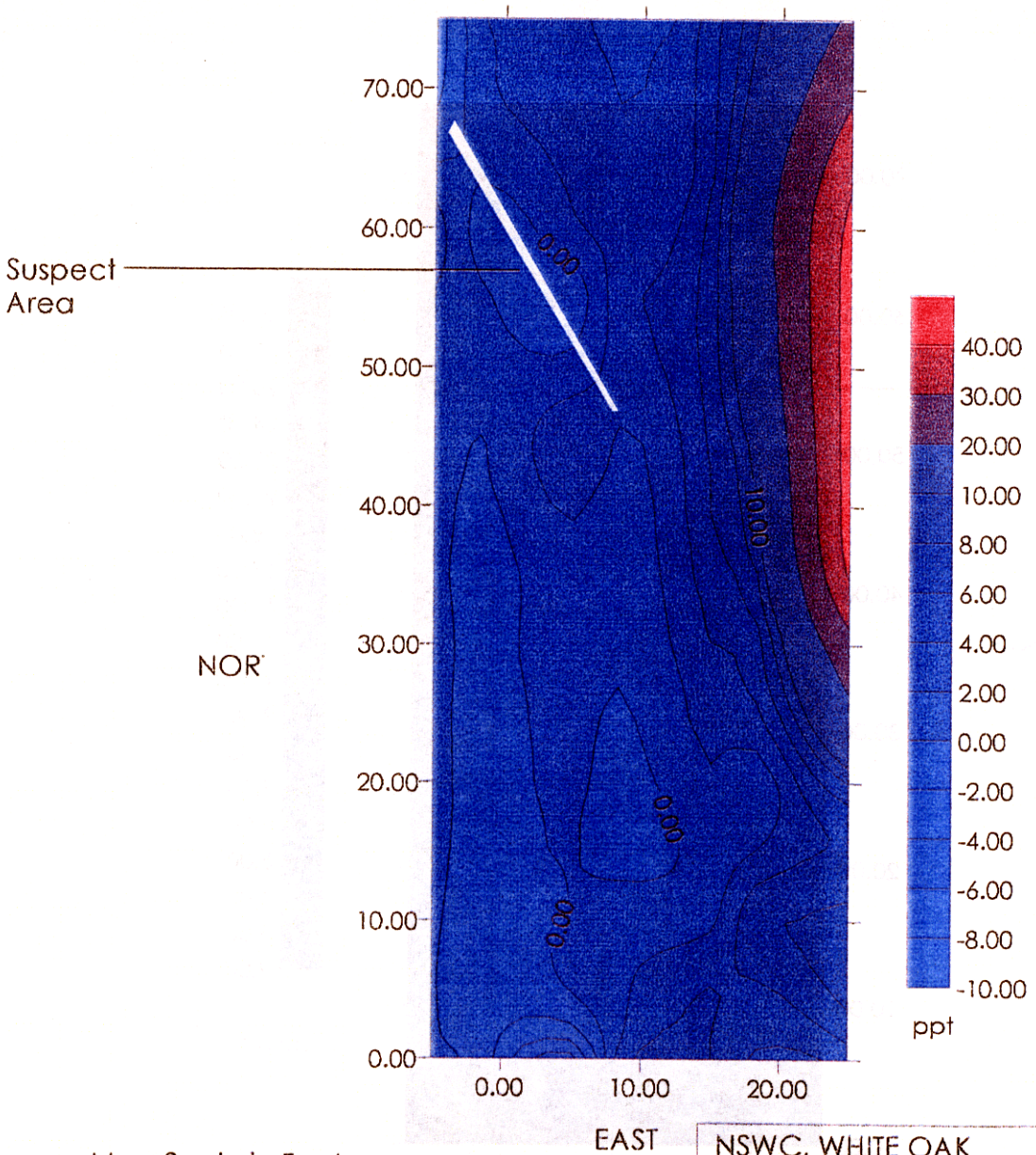
NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 29

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

LW19 - IN-PHASE DATA



Map Scale in Feet
Parts per Thousand = ppt

N

February 1999

NSWC, WHITE OAK
SILVER SPRING, MARYLAND

FIGURE 30

GEOPHYSICAL SURVEYS FOR SITE 9
300 AREA, LEACH FIELD SURVEY

TETRA TECH EM INC.

APPENDIX C

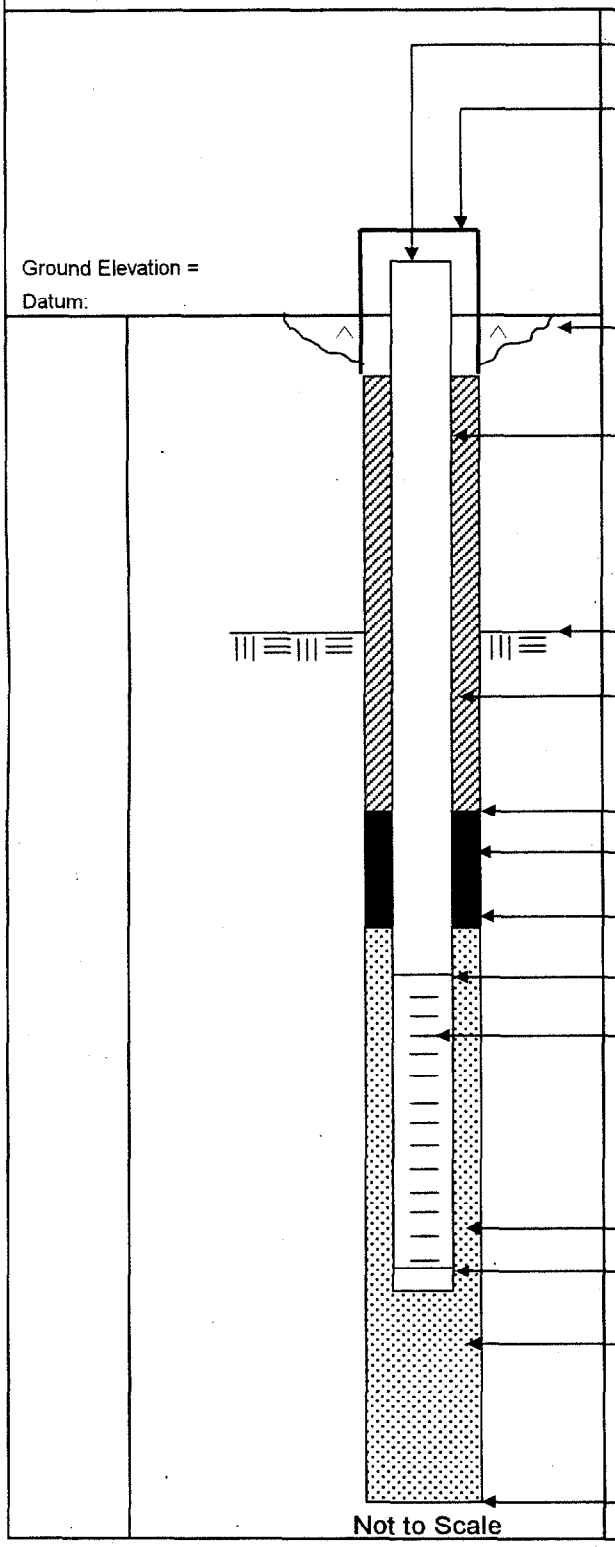
MONITORNG WELL CONSTRUCTION DIAGRAMS

Tetra Tech NUS, Inc.

WELL No.: 2GW100

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	2GW100
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	12/01/98
SITE:	2	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	



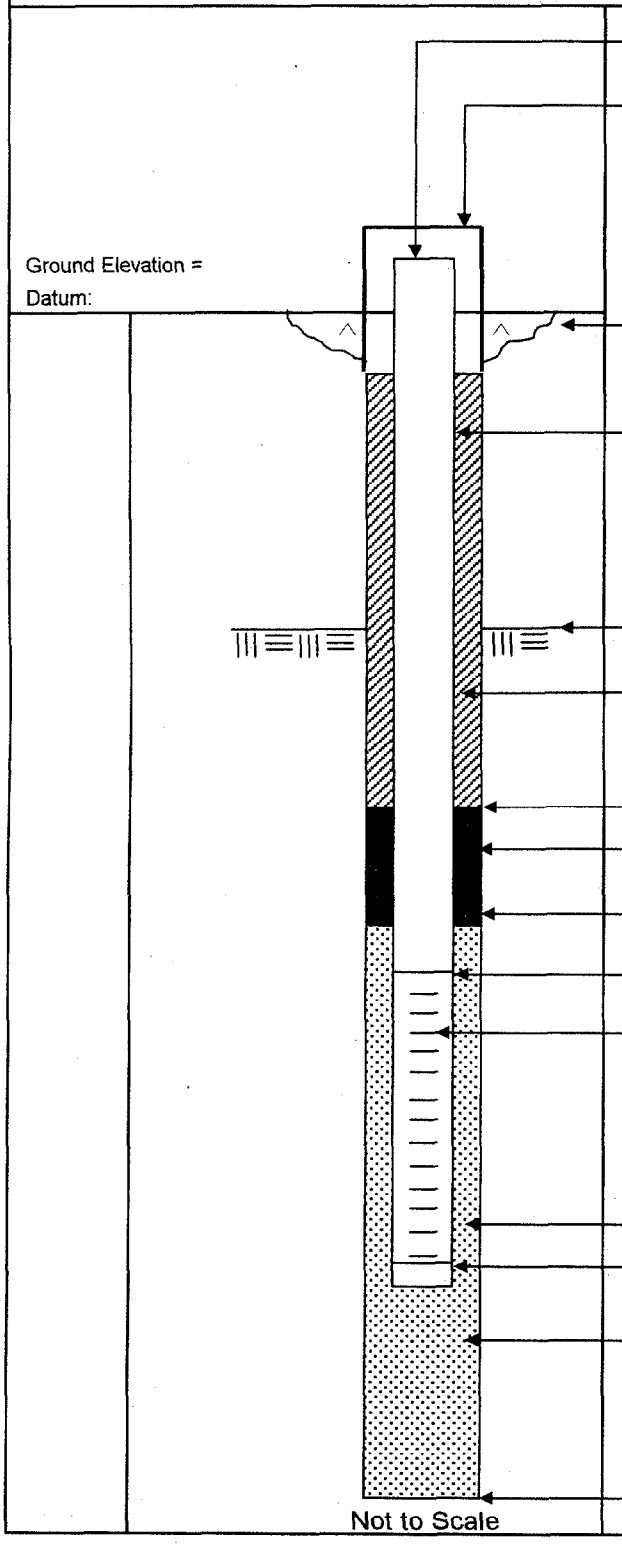
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 32.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 36.0'
Elevation / Depth of Top of Screen:		/ 38.5'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 48.5'
Elevation / Depth of Bottom of Filter Pack:		/ 48.5'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 48.5'

Tetra Tech NUS, Inc.

WELL No.: 2GW101

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	2GW101
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	12/05/98
SITE:	2	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	



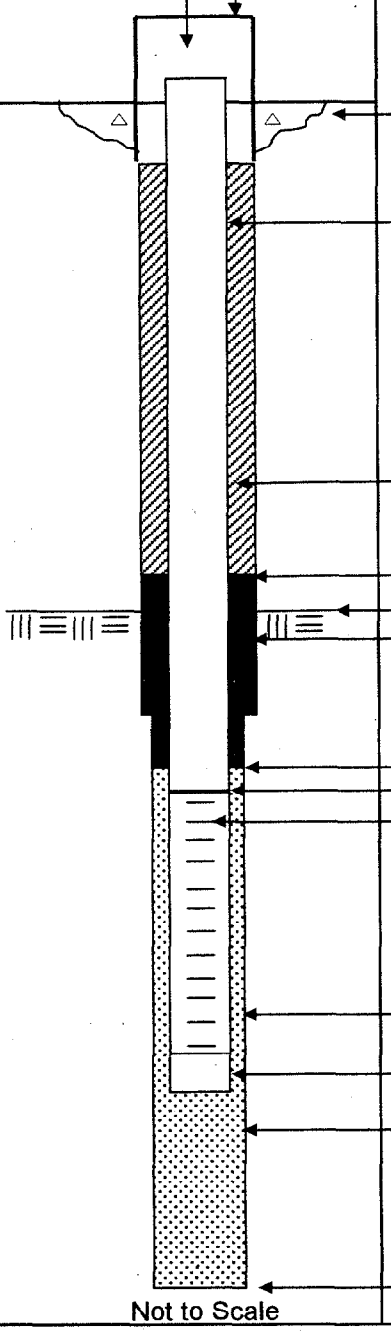
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 9.5'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 12.8'
Elevation / Depth of Top of Screen:		/ 15'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 25'
Elevation / Depth of Bottom of Filter Pack:		/ 25'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 25'

Tetra Tech NUS, Inc.

WELL No.: 2GW102

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	2GW102
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	12/14/98
SITE:	2	DRILLING METHOD:	HSA/Air Rotary	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	



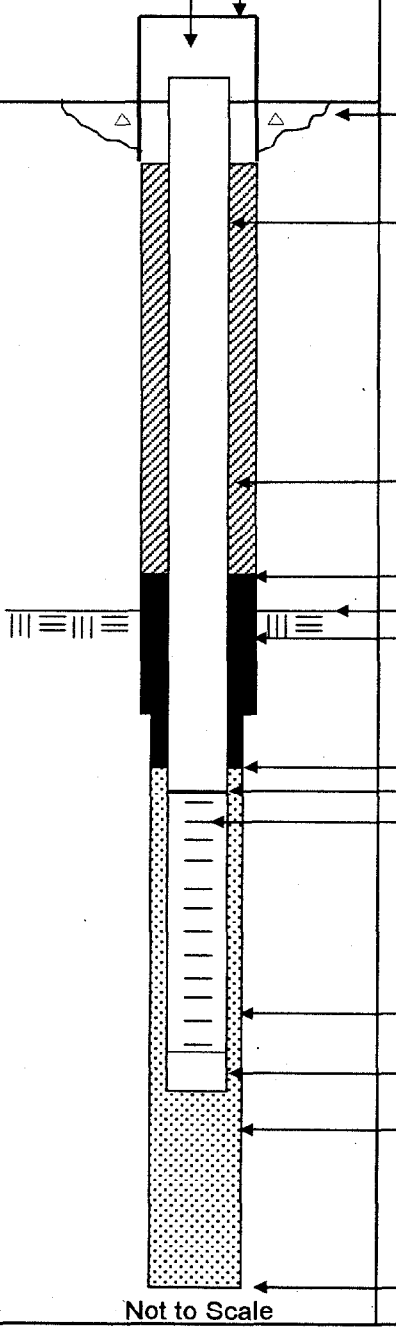
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:	4 inches	
Type of Surface Casing:	steel	
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches (0-10 ft) 5.75 " (10-38 ft)	
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 23.0'
Elevation / Depth Top of Rock:		/ 10.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 26.0'
Elevation / Depth of Top of Screen:		/ 28.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 38.0'
Elevation / Depth of Bottom of Filter Pack:		/ 38.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 38.0'

Tetra Tech NUS, Inc.

WELL No.: 2GW103

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	2GW103
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	12/16/98
SITE:	2	DRILLING METHOD:	HSA/Air Rotary	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	



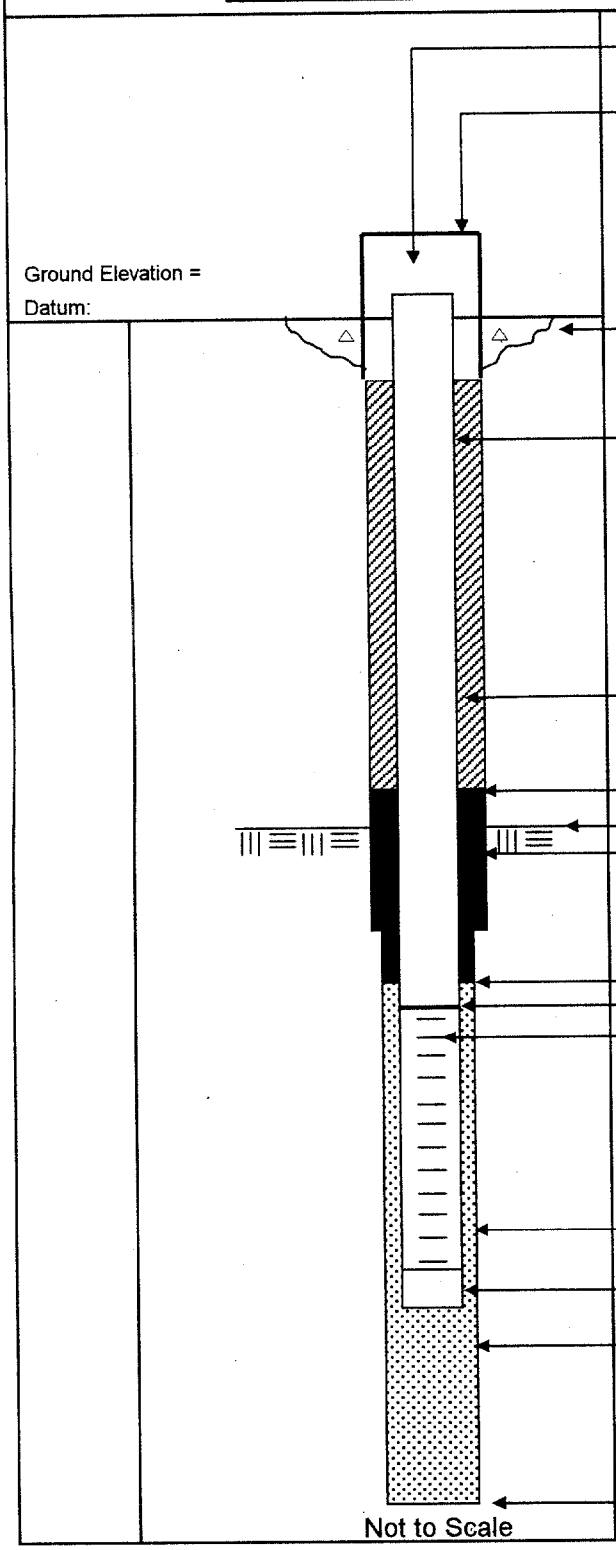
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:	4 inches	
Type of Surface Casing:	steel	
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches (0-10 ft) 5.75 " (10-25 ft)	
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 10.0'
Elevation / Depth Top of Rock:		/ 10.5'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 13.0'
Elevation / Depth of Top of Screen:		/ 15.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 25.0'
Elevation / Depth of Bottom of Filter Pack:		/ 25.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 25.0'

Tetra Tech NUS, Inc.

WELL No.: 2GW104

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	2GW104
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	12/17/98
SITE:	2	DRILLING METHOD:	HSA/Air Rotary	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	



Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:	4 inches	
Type of Surface Casing:	steel	
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches (0-6 ft) 5.75 " (6-22 ft)	
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 20.0'
Elevation / Depth Top of Rock:		/ 6.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 23.0'
Elevation / Depth of Top of Screen:		/ 25.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 35.0'
Elevation / Depth of Bottom of Filter Pack:		/ 35.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 35.0'

Tetra Tech NUS, Inc.

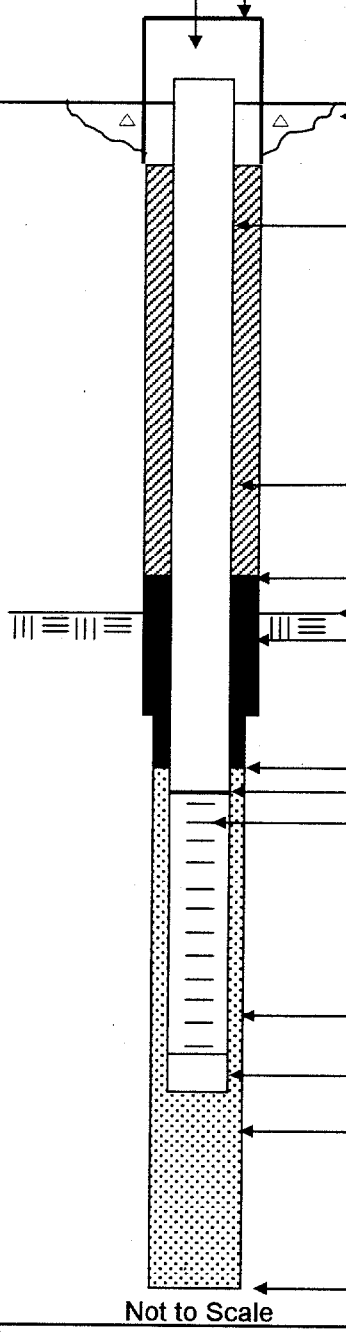
WELL No.: 2GW105

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	2GW105
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	12/16/98
SITE:	2	DRILLING METHOD:	HSA/Air Rotary	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

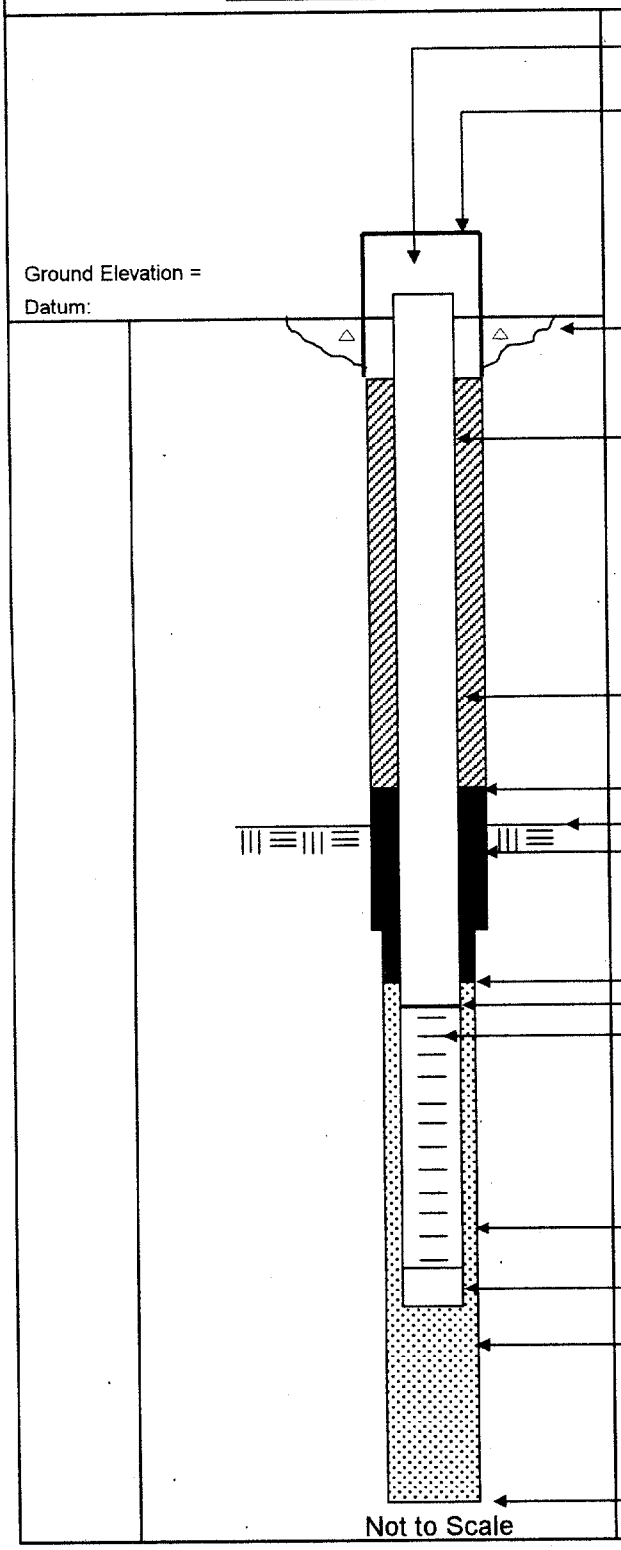
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:	4 inches	
Type of Surface Casing:	steel	
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches (0-20 ft) 5.75 " (20-38 ft)	
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 23.0'
Elevation / Depth Top of Rock:		/ 20.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 25.8'
Elevation / Depth of Top of Screen:		/ 28.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 38.0'
Elevation / Depth of Bottom of Filter Pack:		/ 38.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 38.0'

Tetra Tech NUS, Inc.

WELL No.: 3GW102

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	3GW102
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	12/21/98
SITE:	3	DRILLING METHOD:	HAS/Air Rotary	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	



Elevation / Depth of Top of Riser: /

Elevation / Height of Top of Surface Casing: /

I.D. of Surface Casing: 4 inches

Type of Surface Casing: steel

Type of Surface Seal: Concrete

I.D. of Riser: 2 inches

Type of Riser: PVC

Borehole Diameter: 8 inches (0-9 ft)
5.75 inches (9-42.5 ft)

Type of Backfill: grout: Cement/bentonite

Elevation / Depth of Seal: / 28.0'

Elevation / Depth Top of Rock: / 9.0'

Type of Seal: Bentonite chips

Elevation / Depth of Top of Filter Pack: / 31.0'

Elevation / Depth of Top of Screen: / 32.5

Type of Screen: PVC

Slot Size x Length: 0.10 X 10 feet

I.D. of Screen: 2 inches

Type of Filter Pack: #1 silica

Elevation / Depth of Bottom of Screen: / 42.5'

Elevation / Depth of Bottom of Filter Pack: / 42.5'

Type of Backfill Below Well:

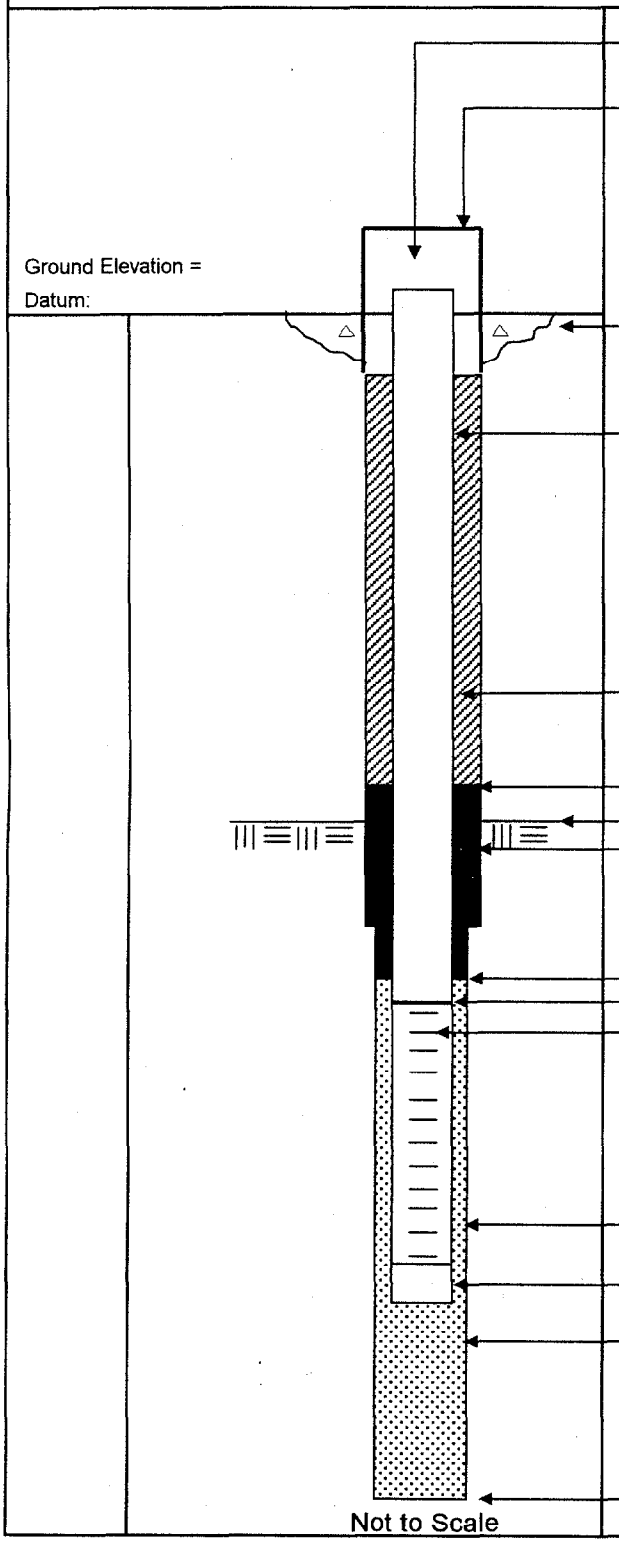
Elevation / Total Depth of Borehole: / 42.5'

Tetra Tech NUS, Inc.

WELL No.: 3GW104

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	3GW104
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	01/04/99
SITE:	3	DRILLING METHOD:	HSA/Air Rotary	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	



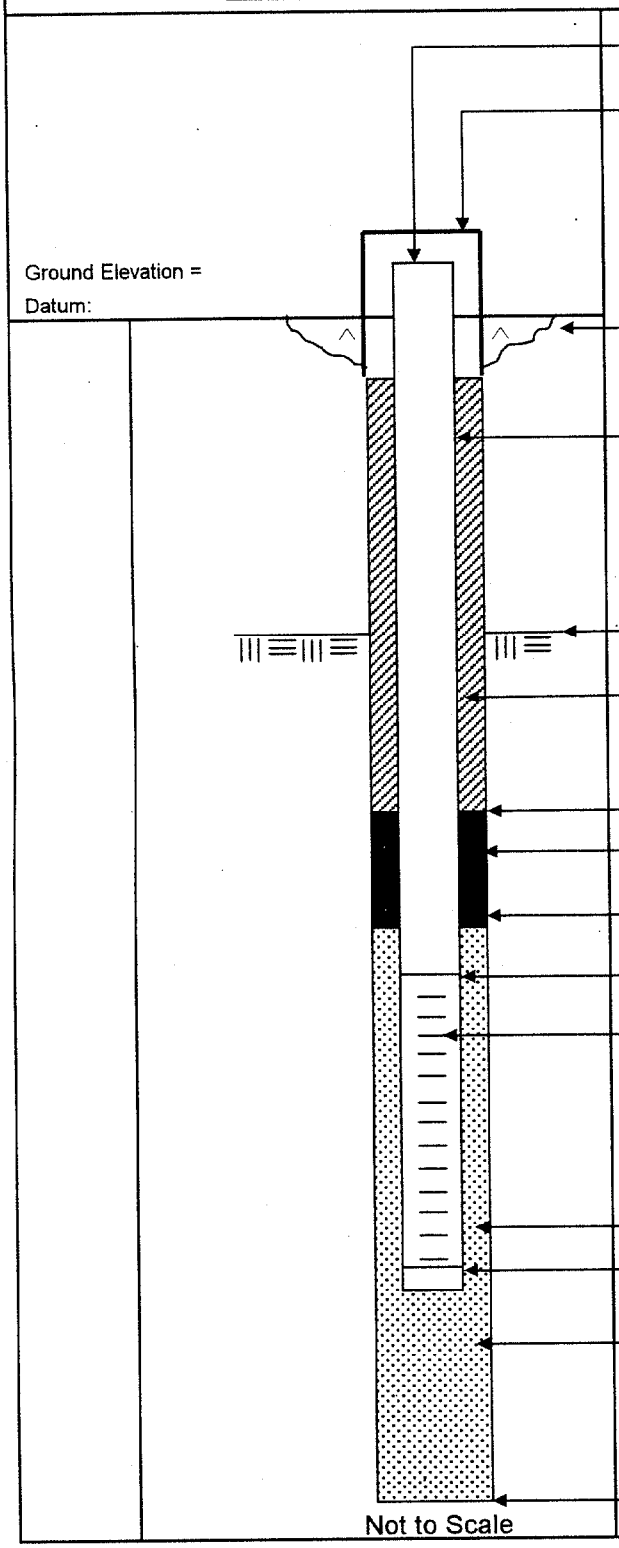
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:	4 inches	
Type of Surface Casing:	steel	
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches (0-14 ft) 5.75 inches (14-40 ft)	
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 25.0'
Elevation / Depth Top of Rock:		/ 14.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 28.0'
Elevation / Depth of Top of Screen:		/ 30.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 40.0'
Elevation / Depth of Bottom of Filter Pack:		/ 40.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 40.0'

Tetra Tech NUS, Inc.

WELL No.: 3GW107

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	3GW107
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	11/30/98
SITE:	3	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	



Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 9.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 11.0'
Elevation / Depth of Top of Screen:		/ 13.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 23.0'
Elevation / Depth of Bottom of Filter Pack:		/ 23.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 23.0'

Tetra Tech NUS, Inc.

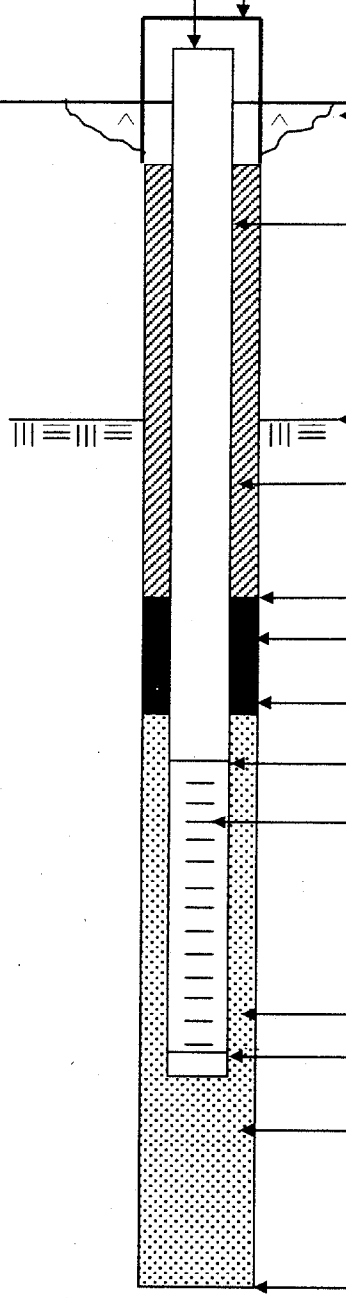
WELL No.: 4GW101

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	4GW101
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	01/05/99
SITE:	4	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 33.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 35.5'
Elevation / Depth of Top of Screen:		/ 38.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 48.0'
Elevation / Depth of Bottom of Filter Pack:		/ 48.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 48.0'

Tetra Tech NUS, Inc.

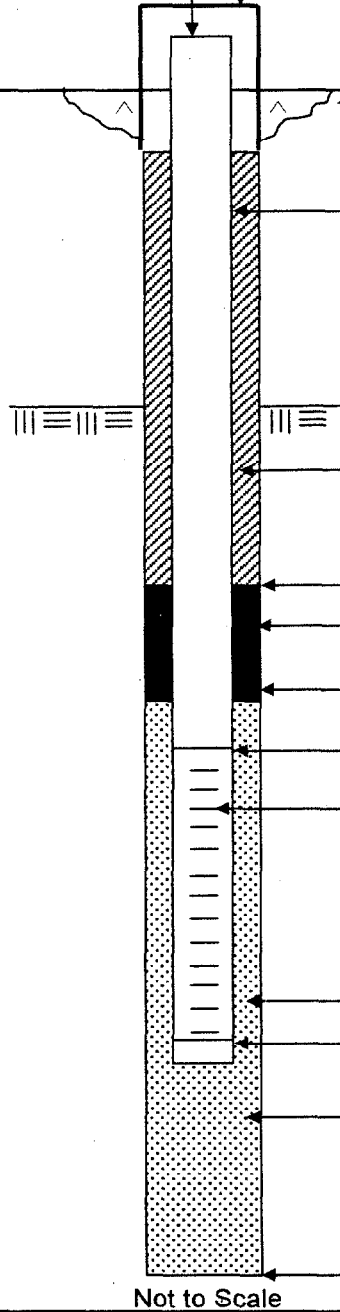
WELL No.: 4GW102

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	4GW102
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	12/03/98
SITE:	4	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 29.4'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 32.2'
Elevation / Depth of Top of Screen:		/ 37.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 47.0'
Elevation / Depth of Bottom of Filter Pack:		/ 47.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 47.0'

Tetra Tech NUS, Inc.

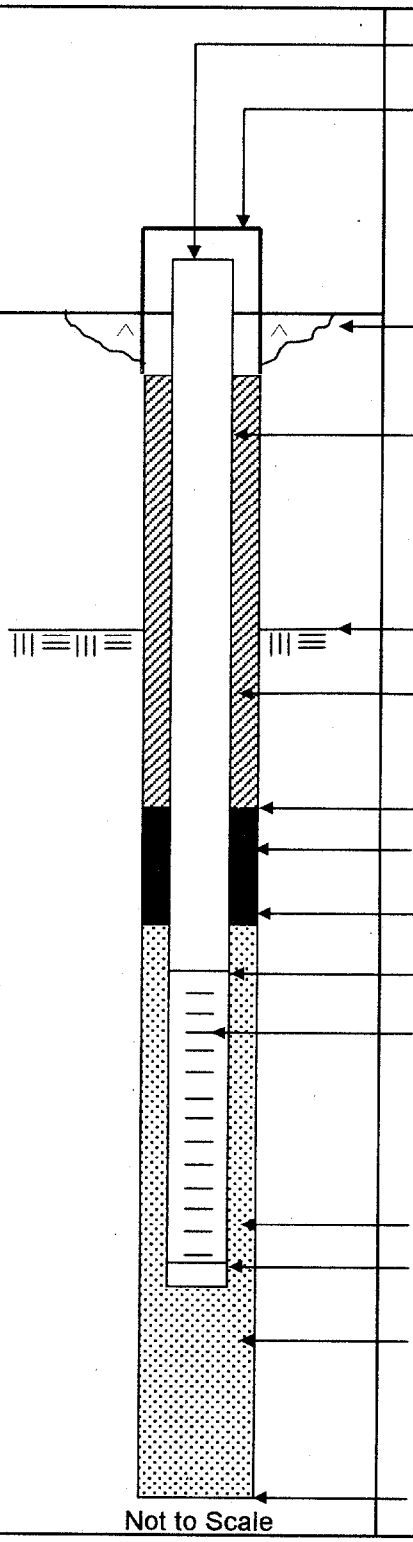
WELL No.: 4GW103

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	4GW103
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	12/04/98
SITE:	4	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 48.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 52.0'
Elevation / Depth of Top of Screen:		/ 54.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 64.0'
Elevation / Depth of Bottom of Filter Pack:		/ 64.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 64.0'

Tetra Tech NUS, Inc.

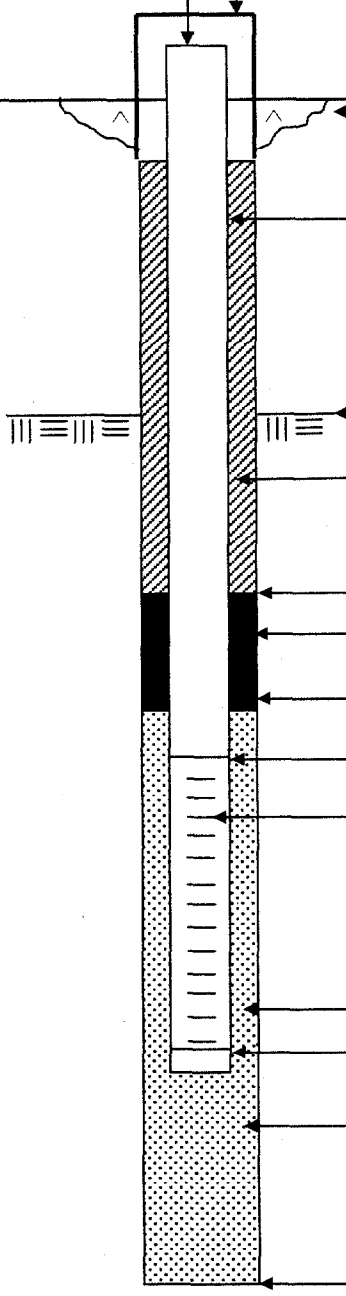
WELL No.: 4GW104

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	4GW104
PROJECT No.:	CTO 298	DRILLER:		DATE COMPLETED:	11/20/98
SITE:	4	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 41.3'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 44.0'
Elevation / Depth of Top of Screen:		/ 45.8'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 55.8'
Elevation / Depth of Bottom of Filter Pack:		/ 55.8'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 55.8'

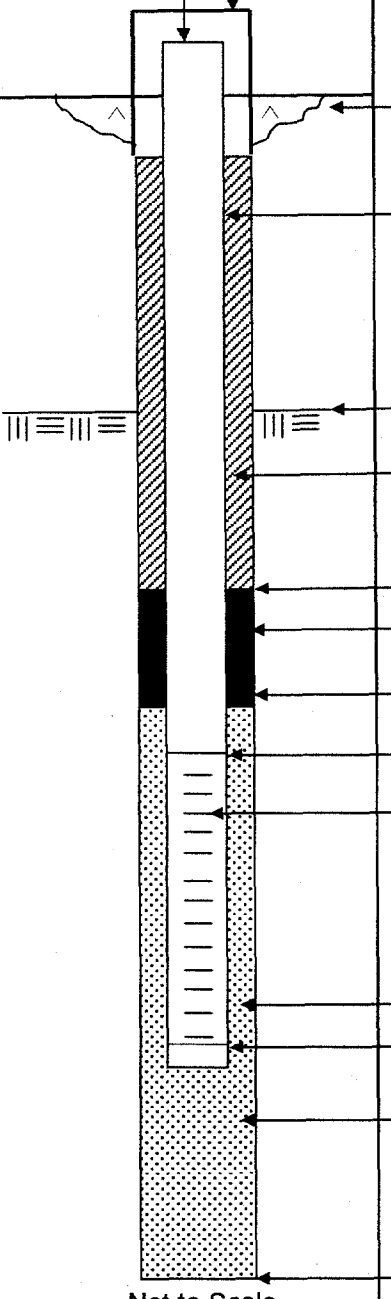
Tetra Tech NUS, Inc.

WELL No.: 4GW105

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	4GW105
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	01/06/99
SITE:	4	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	

Ground Elevation =
Datum:



Not to Scale

Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 70.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 73.0'
Elevation / Depth of Top of Screen:		/ 78.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 85.0'
Elevation / Depth of Bottom of Filter Pack:		/ 85.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 85.0'

Tetra Tech NUS, Inc.

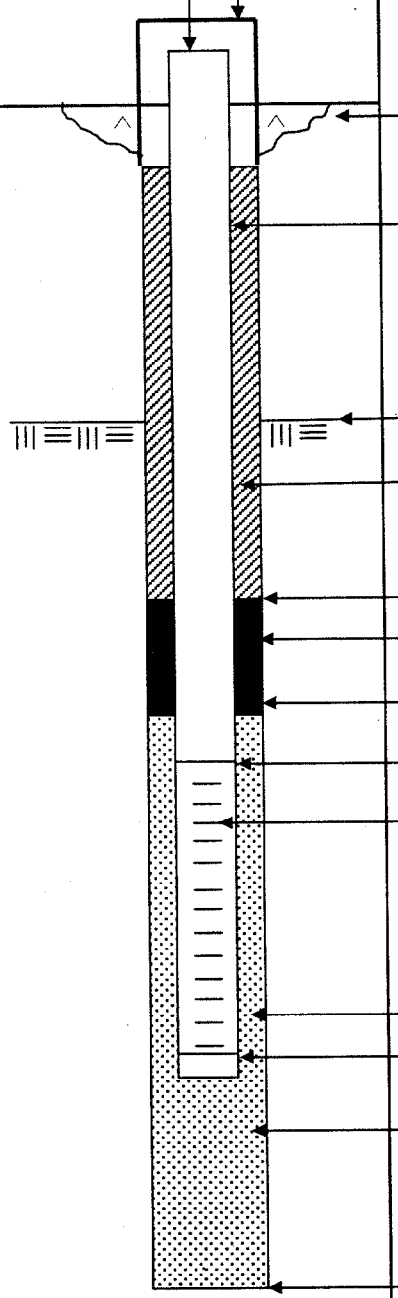
WELL No.: 4GW106

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	4GW106
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	12/19/99
SITE:	4	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 57.2'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 59.7'
Elevation / Depth of Top of Screen:		/ 62.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 72.0'
Elevation / Depth of Bottom of Filter Pack:		/ 72.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 72.0'

Tetra Tech NUS, Inc.

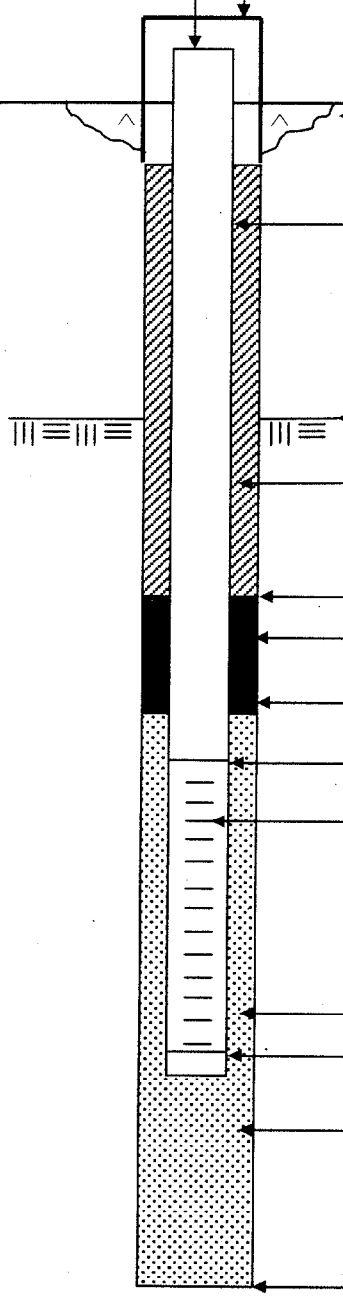
WELL No.: 4GW107

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	4GW107
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	12/19/99
SITE:	4	DRILLING METHOD:	Mud Rotary	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

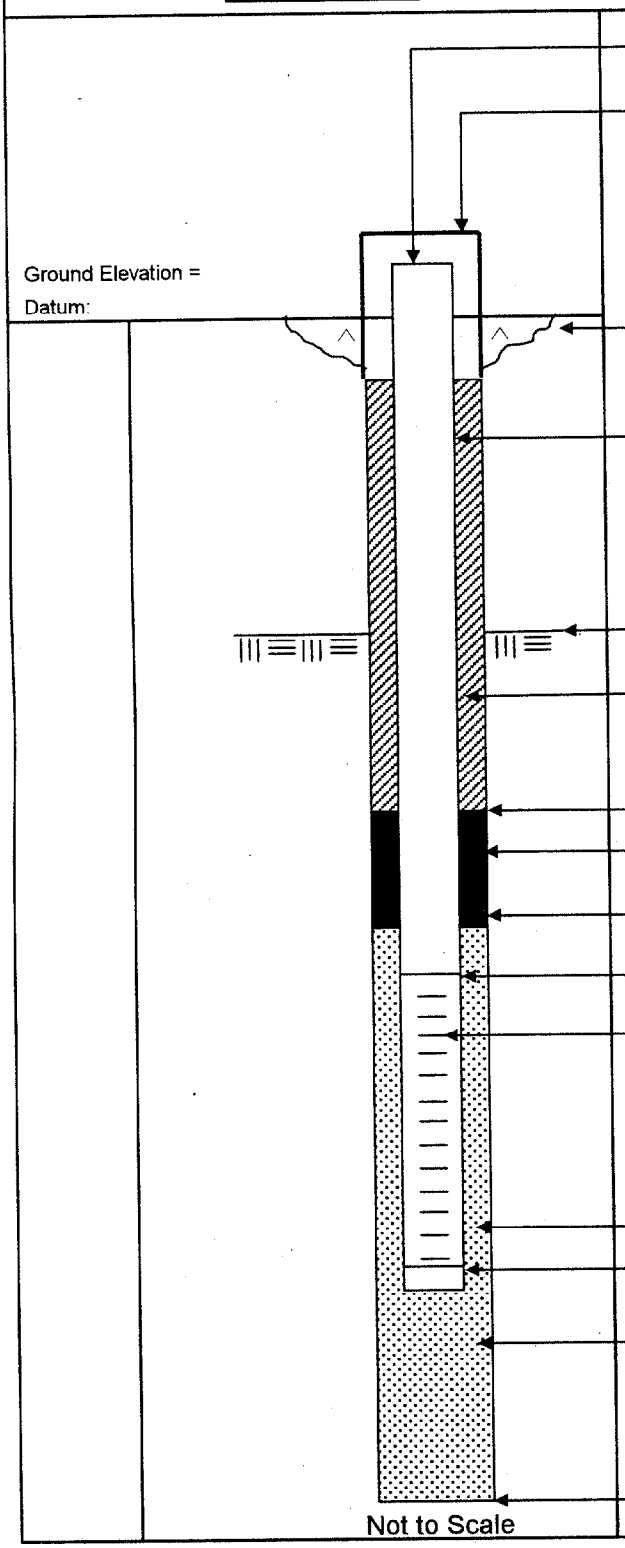
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 65.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 69.5'
Elevation / Depth of Top of Screen:		/ 73.5'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 83.5'
Elevation / Depth of Bottom of Filter Pack:		/ 83.5'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 83.5'

Tetra Tech NUS, Inc.

WELL No.: 4GW108

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	4GW108
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	11/24/98
SITE:	4	DRILLING METHOD:	HS Auger	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	



Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 28.7'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 31.0'
Elevation / Depth of Top of Screen:		/ 33.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 43.0'
Elevation / Depth of Bottom of Filter Pack:		/ 43.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 43.0'

Tetra Tech NUS, Inc.

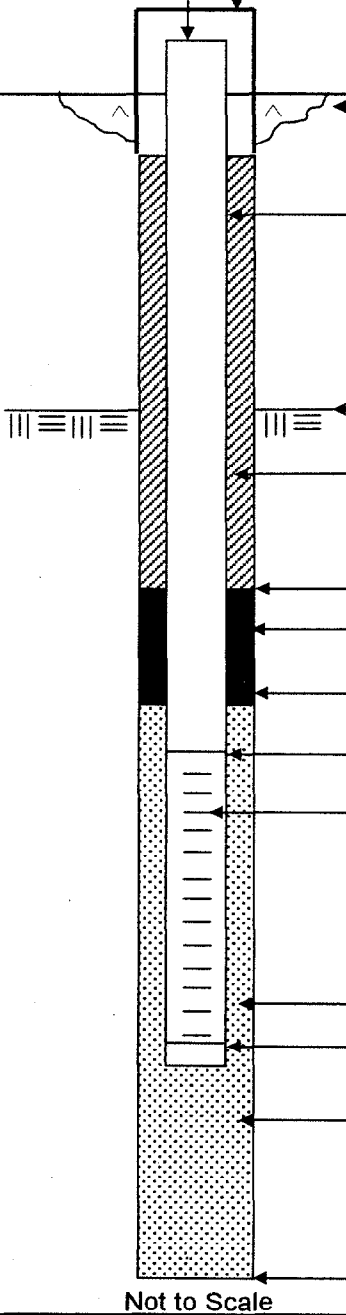
WELL No.: 4GW109

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	4GW109
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	11/21/98
SITE:	4	DRILLING METHOD:	HS Auger	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 5.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 8.0'
Elevation / Depth of Top of Screen:		/ 10.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 20.0'
Elevation / Depth of Bottom of Filter Pack:		/ 20.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 20.0'

Tetra Tech NUS, Inc.

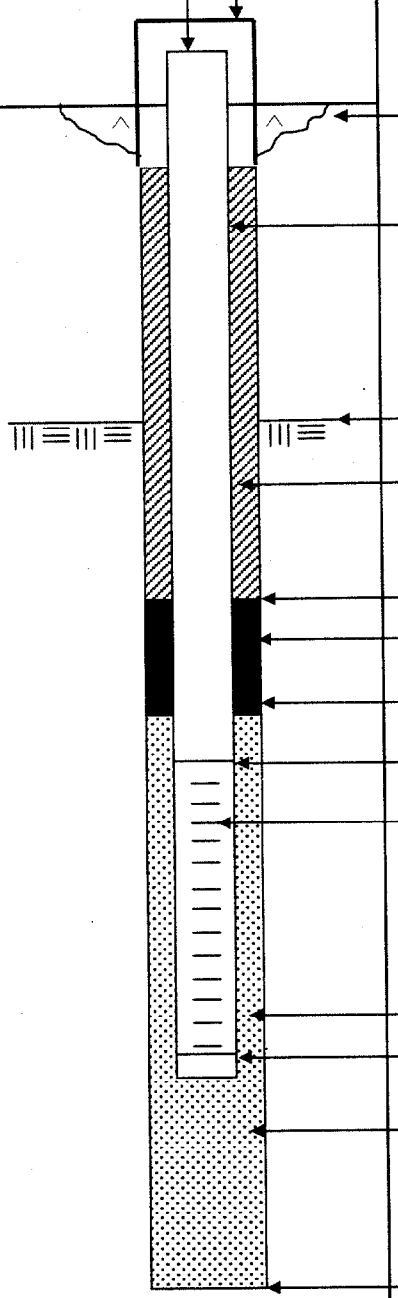
WELL No.: 4GW110

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	4GW110
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	11/23/98
SITE:	4	DRILLING METHOD:	HS Auger	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

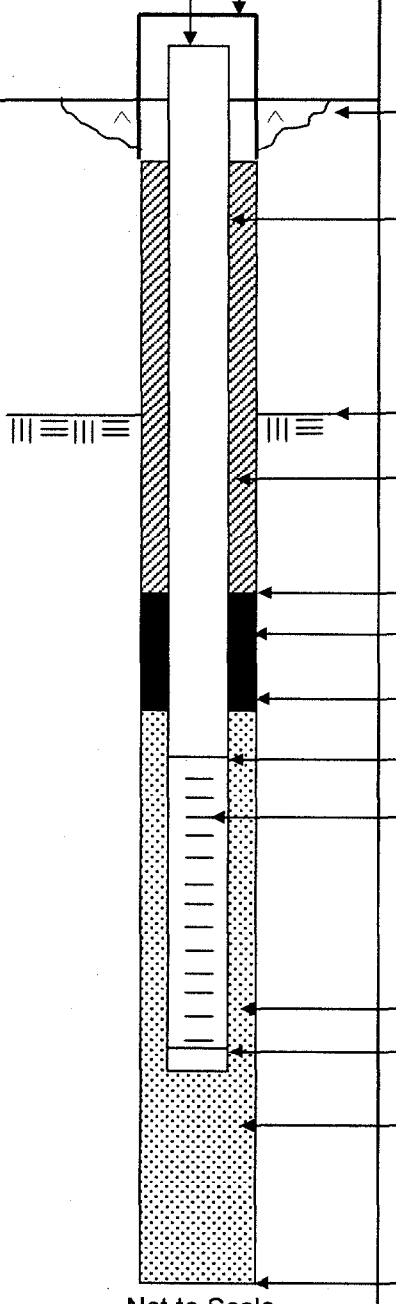
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 10.0'
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 12.0'
Elevation / Depth of Top of Screen:		/ 14.0'
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 24.0'
Elevation / Depth of Bottom of Filter Pack:		/ 24.0'
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 24.0'

Tetra Tech NUS, Inc.

WELL No.: 7GW102

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	7GW102
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	12/15/98
SITE:	7	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	



Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 39.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 42.0
Elevation / Depth of Top of Screen:		/ 44.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 54.0
Elevation / Depth of Bottom of Filter Pack:		/ 54.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 54.0

Tetra Tech NUS, Inc.

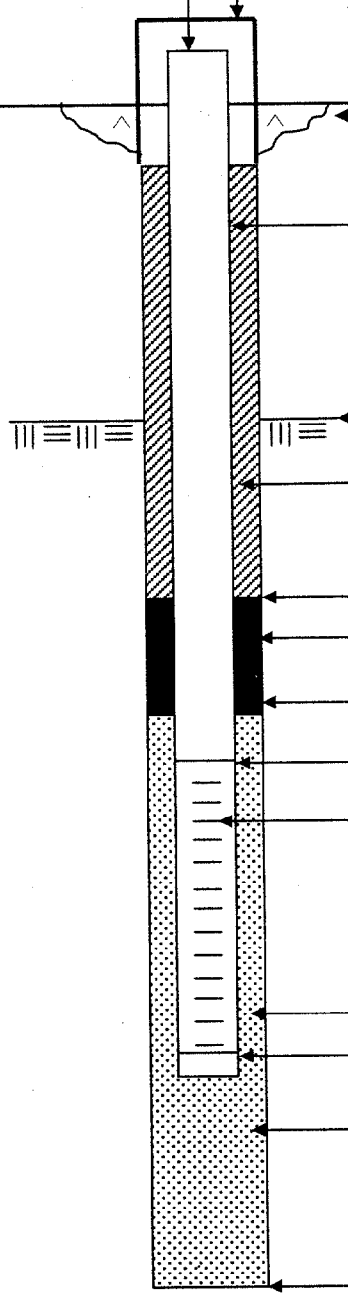
WELL No.: 7GW104

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	7GW104
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	12/02/98
SITE:	7	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

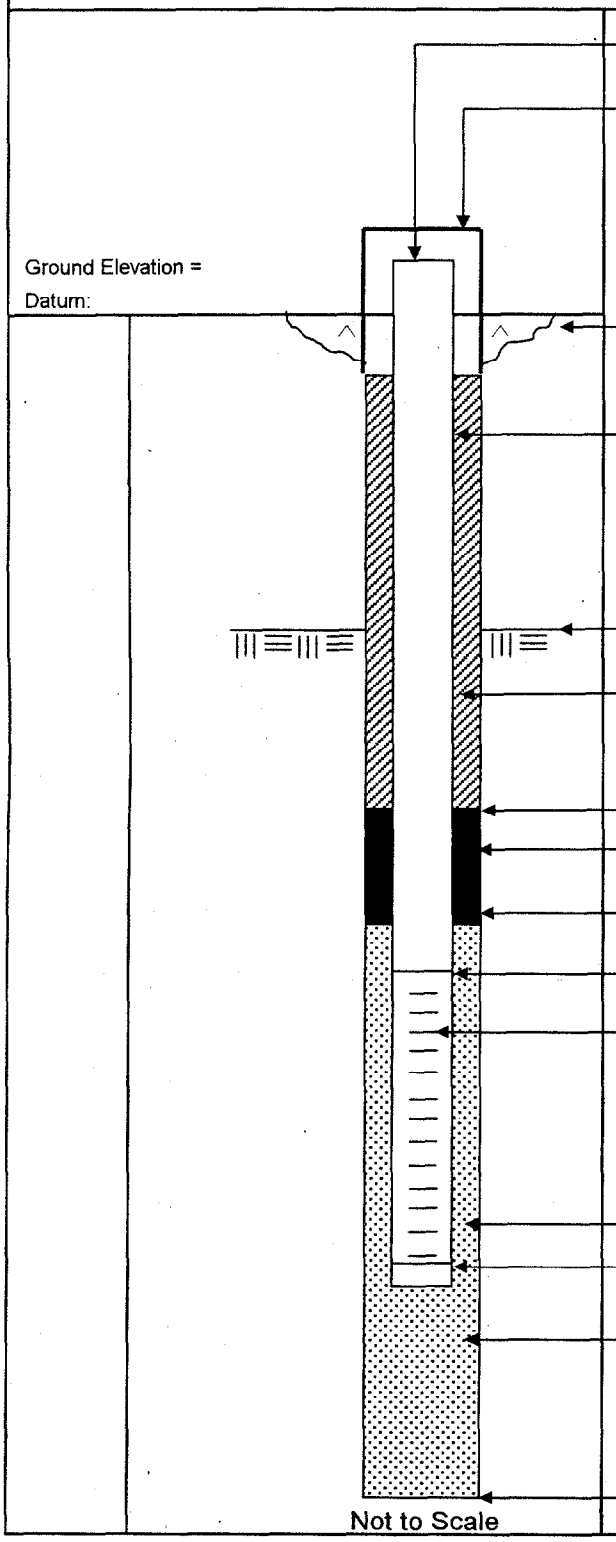
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 22.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 25.5
Elevation / Depth of Top of Screen:		/ 28.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 38.0
Elevation / Depth of Bottom of Filter Pack:		/ 38.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 38.0

Tetra Tech NUS, Inc.

WELL No.: 7GW105

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	7GW105
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	12/04/98
SITE:	7	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	



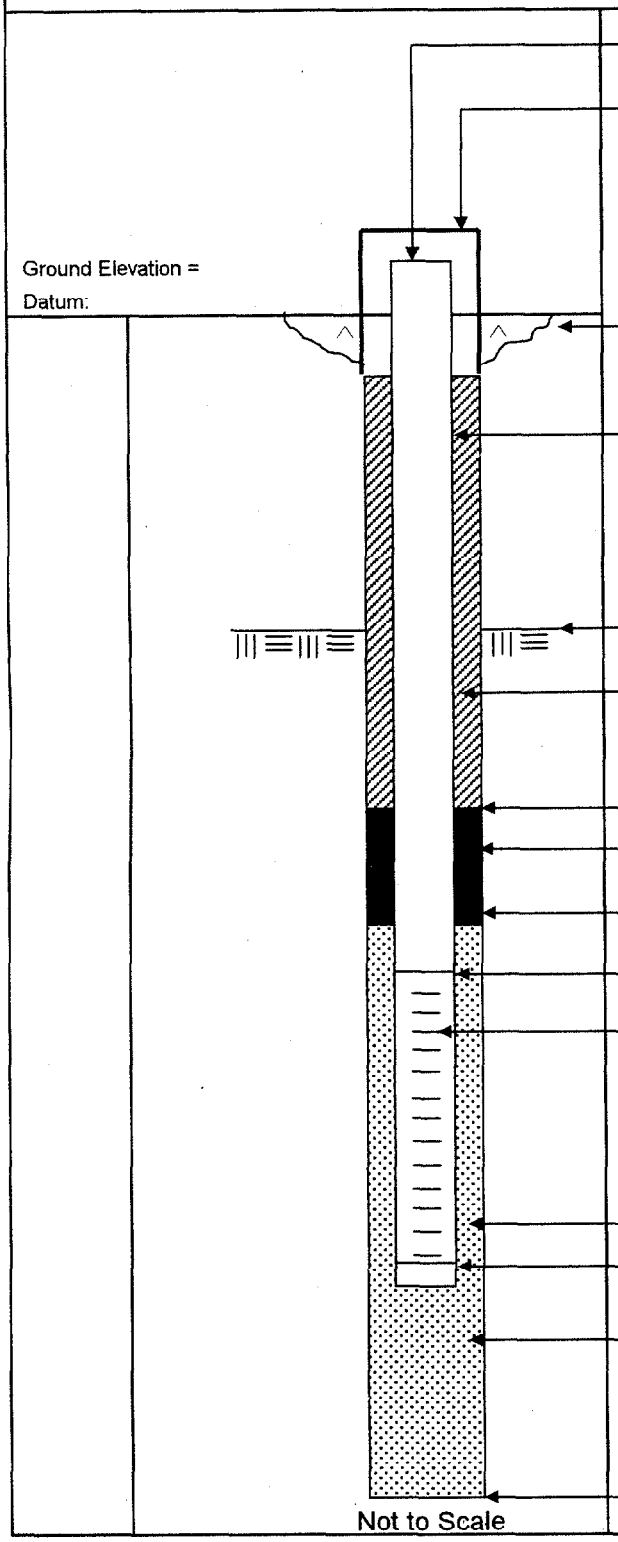
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 37.5
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 40.0
Elevation / Depth of Top of Screen:		/ 42.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 52.0
Elevation / Depth of Bottom of Filter Pack:		/ 52.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 52.0

Tetra Tech NUS, Inc.

WELL No.: 9GW100

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW100
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	01/07/99
SITE:	9	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	B. Balkovec	DEV. METHOD:		EASTING:	



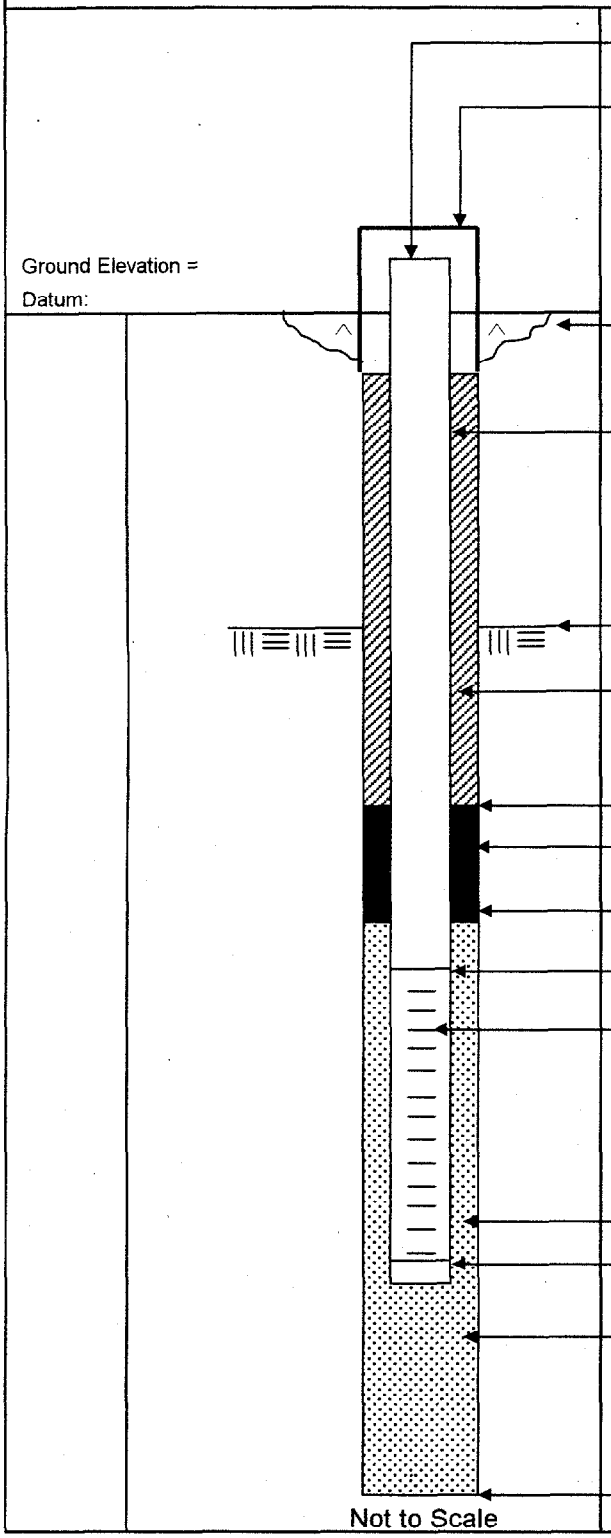
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 1.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 2.0
Elevation / Depth of Top of Screen:		/ 3.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 10.0
Elevation / Depth of Bottom of Filter Pack:		/ 10.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 10.0

Tetra Tech NUS, Inc.

WELL No.: 9GW101

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW101
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	01/08/99
SITE:	9	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	B. Balkovec	DEV. METHOD:		EASTING:	



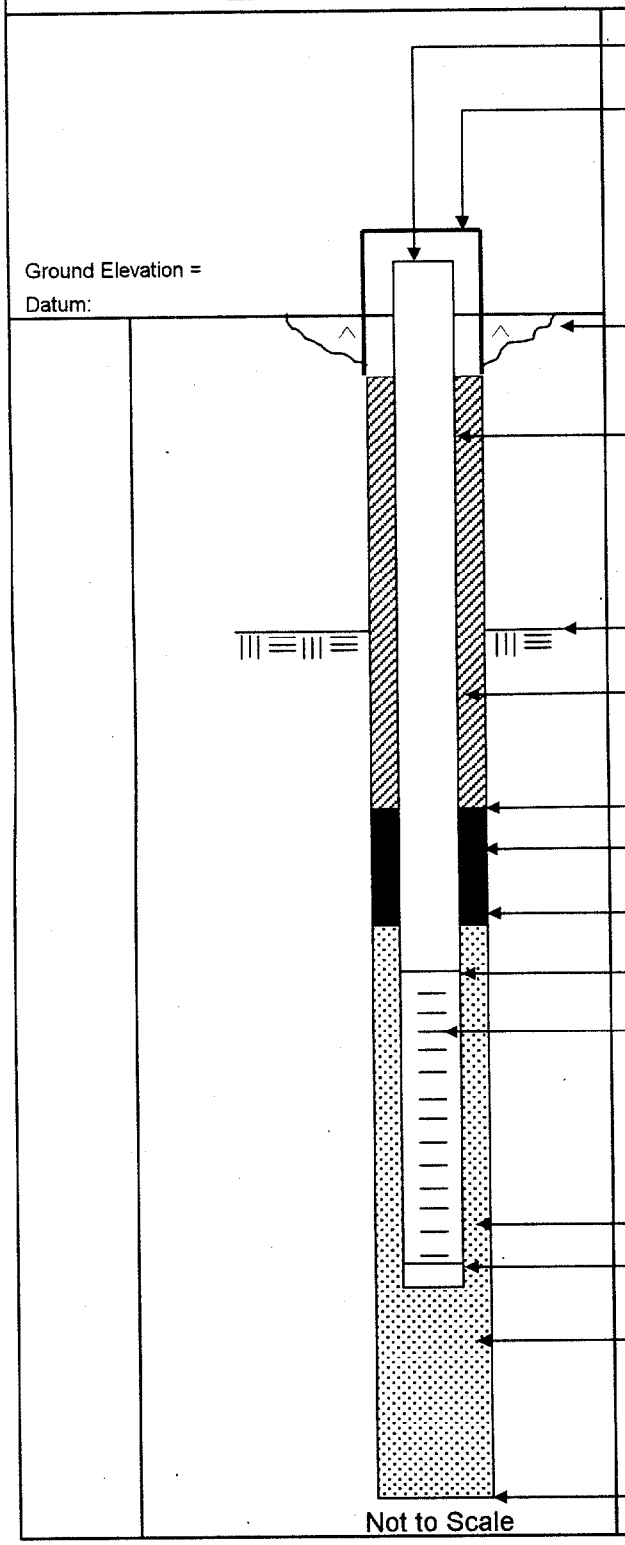
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 1.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 2.0
Elevation / Depth of Top of Screen:		/ 3.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 11.0
Elevation / Depth of Bottom of Filter Pack:		/ 11.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 11.0

Tetra Tech NUS, Inc.

WELL No.: 9GW102

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW102
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	01/26/99
SITE:	9	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	B. Balkovec	DEV. METHOD:		EASTING:	



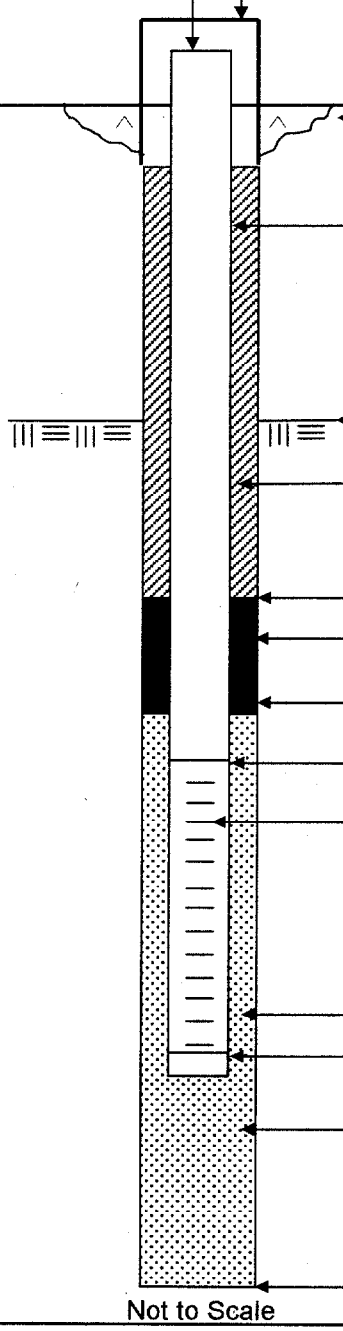
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	4 to 8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 40.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 43.0
Elevation / Depth of Top of Screen:		/ 45.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 55.0
Elevation / Depth of Bottom of Filter Pack:		/ 59.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 59.0

Tetra Tech NUS, Inc.

WELL No.: 9GW103

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW103
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	01/05/99
SITE:	9	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	B. Balkovec	DEV. METHOD:		EASTING:	



Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 3.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 6.0
Elevation / Depth of Top of Screen:		/ 8.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 18.0
Elevation / Depth of Bottom of Filter Pack:		/ 18.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 18.0

Tetra Tech NUS, Inc.

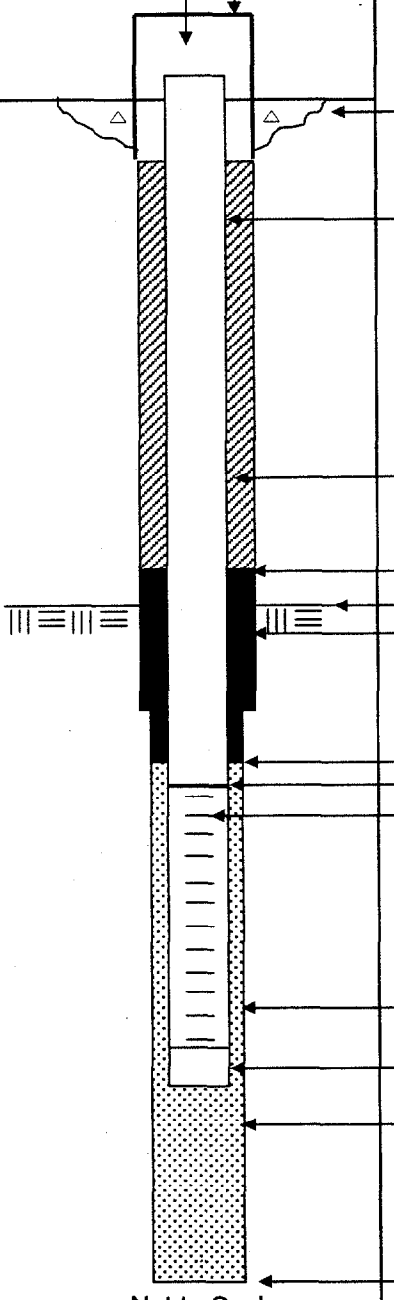
WELL No.: 9GW104

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW104
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	01/10/99
SITE:	9	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	B. Balkovec	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:	4 inches	
Type of Surface Casing:	steel	
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 18.0
Elevation / Depth Top of Rock:		/ 10.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 21.0
Elevation / Depth of Top of Screen:		/ 23.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 33.0
Elevation / Depth of Bottom of Filter Pack:		/ 33.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 33.0

Tetra Tech NUS, Inc.

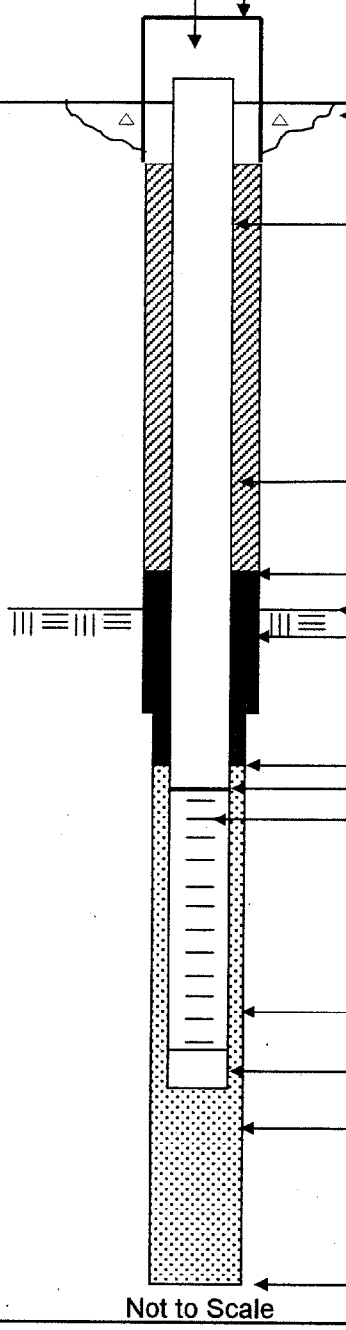
WELL No.: 9GW105

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW105
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	01/10/99
SITE:	9	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	B. Balkovec	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

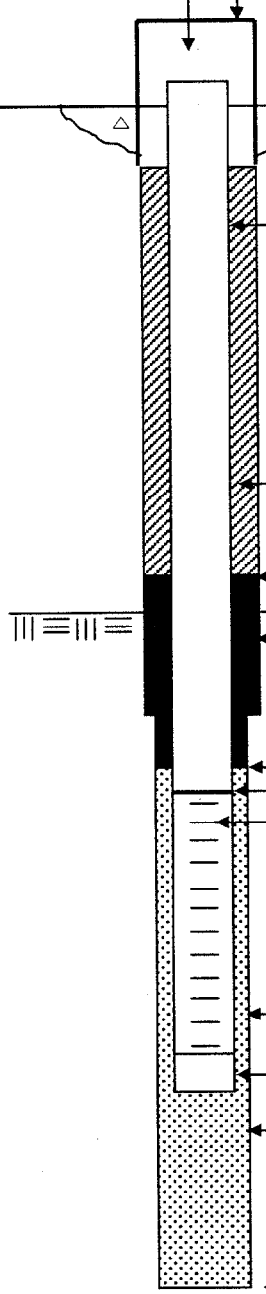
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:	4 inches	
Type of Surface Casing:	steel	
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 21.0
Elevation / Depth Top of Rock:		/ 10.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 24.0
Elevation / Depth of Top of Screen:		/ 26.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 36.0
Elevation / Depth of Bottom of Filter Pack:		/ 36.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 36.0

Tetra Tech NUS, Inc.

WELL No.: 9GW105

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW105
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	01/10/99
SITE:	9	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	B. Balkovec	DEV. METHOD:		EASTING:	



Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:	4 inches	
Type of Surface Casing:	steel	
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 21.0
Elevation / Depth Top of Rock:		/ 10.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 24.0
Elevation / Depth of Top of Screen:		/ 26.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 36.0
Elevation / Depth of Bottom of Filter Pack:		/ 36.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 36.0

Tetra Tech NUS, Inc.

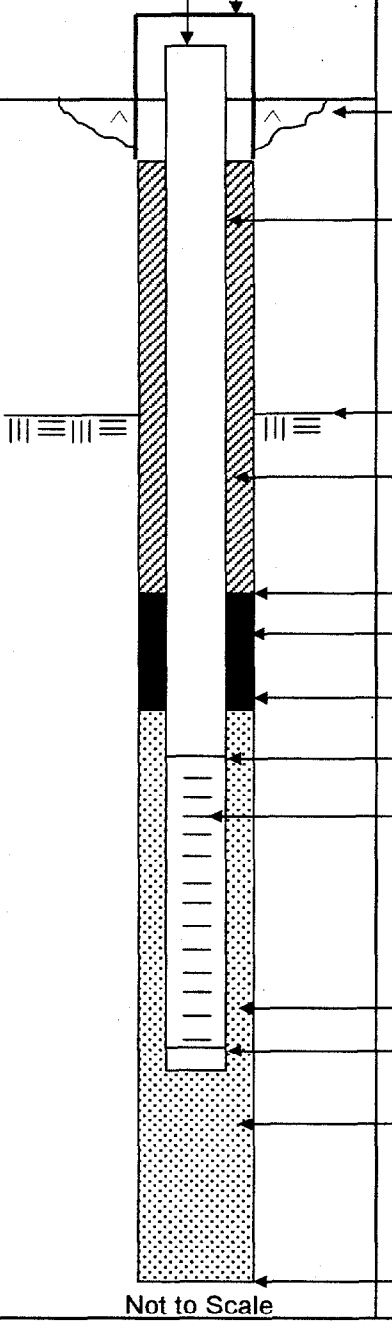
WELL No.: 9GW106

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW106
PROJECT No.:	CTO 298	DRILLER:	L. Peach	DATE COMPLETED:	01/25/99
SITE:	9	DRILLING METHOD:	HSA/Air Rotary	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

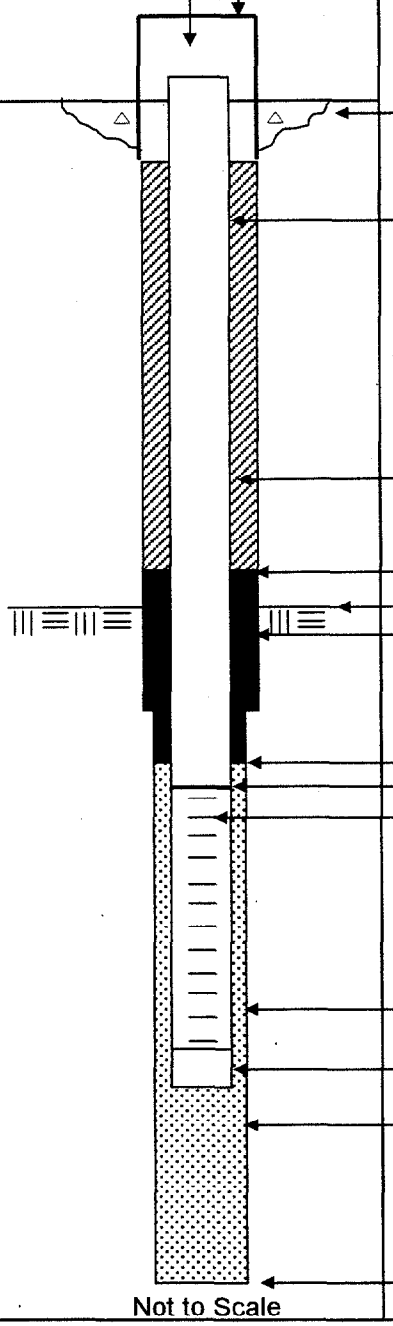
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 42.5
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 45.5
Elevation / Depth of Top of Screen:		/ 48.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 58.0
Elevation / Depth of Bottom of Filter Pack:		/ 58.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 60.0

Tetra Tech NUS, Inc.

WELL No.: 9GW107

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW107
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	01/09/99
SITE:	9	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	B. Balkovec	DEV. METHOD:		EASTING:	



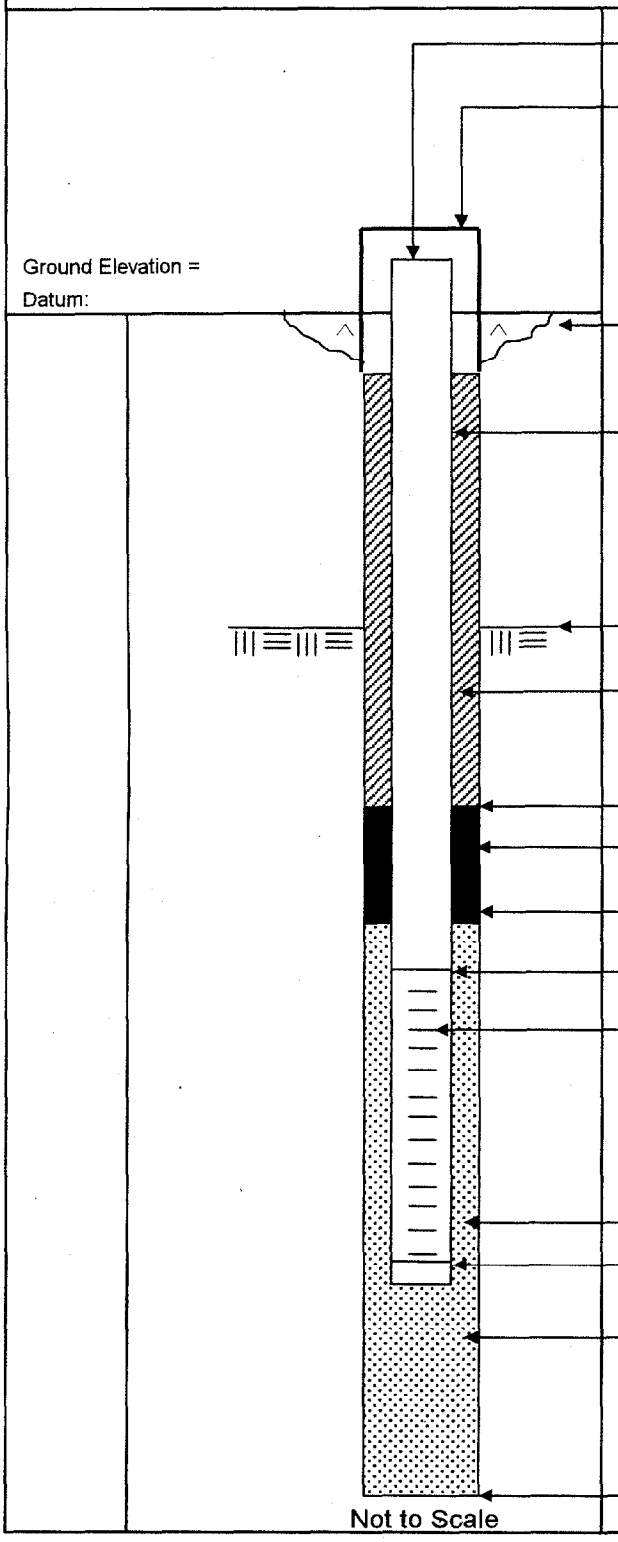
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:	4 inches	
Type of Surface Casing:	steel	
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 42.5
Elevation / Depth Top of Rock:		/ 23.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 45.5
Elevation / Depth of Top of Screen:		/ 47.5
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 57.5
Elevation / Depth of Bottom of Filter Pack:		/ 57.5
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 57.5

Tetra Tech NUS, Inc.

WELL No.: 9GW108

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW108
PROJECT No.:	CTO 298	DRILLER:	L. Peach	DATE COMPLETED:	01/23/99
SITE:	9	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	



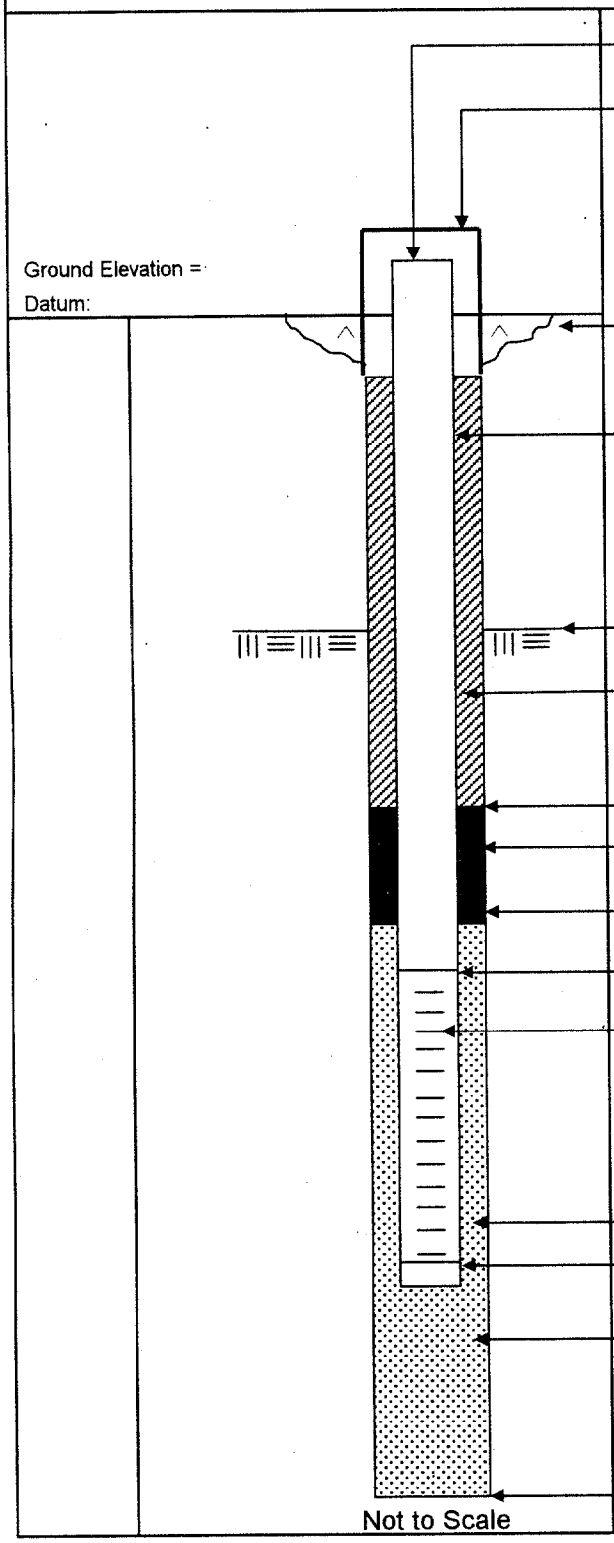
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	4 to 8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 19.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 22.8
Elevation / Depth of Top of Screen:		/ 25.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 35.0
Elevation / Depth of Bottom of Filter Pack:		/ 36.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 36.0

Tetra Tech NUS, Inc.

WELL No.: 9GW109

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW109
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	12/16/98
SITE:	9	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	



Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 16.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 18.0
Elevation / Depth of Top of Screen:		/ 20.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 30.0
Elevation / Depth of Bottom of Filter Pack:		/ 30.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 30.0

Tetra Tech NUS, Inc.

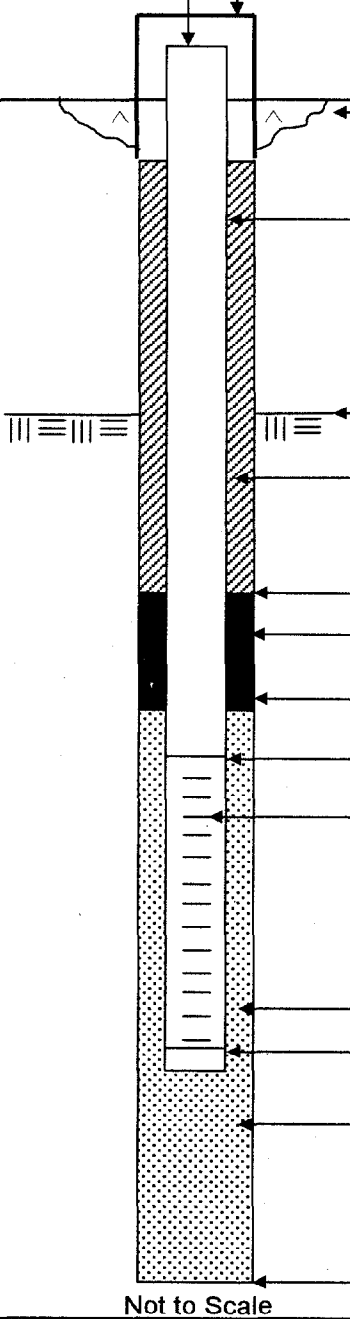
WELL No.: 9GW110

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	9GW110
PROJECT No.:	CTO 298	DRILLER:	R. Bush	DATE COMPLETED:	01/08/99
SITE:	9	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	B. Balkovec	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

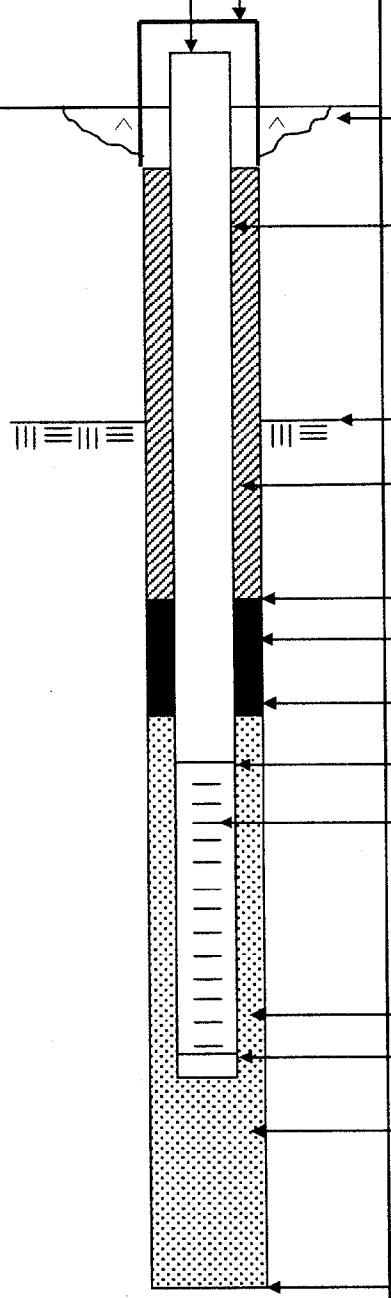
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/ 7.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 8.0
Elevation / Depth of Top of Screen:		/ 10.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 20.0
Elevation / Depth of Bottom of Filter Pack:		/ 20.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 20.0

Tetra Tech NUS, Inc.

WELL No.: 13GW02

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	13GW02
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	11/23/98
SITE:	13	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	



Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 12.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 16.0
Elevation / Depth of Top of Screen:		/ 18.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 28.0
Elevation / Depth of Bottom of Filter Pack:		/ 32.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 32.0

Tetra Tech NUS, Inc.

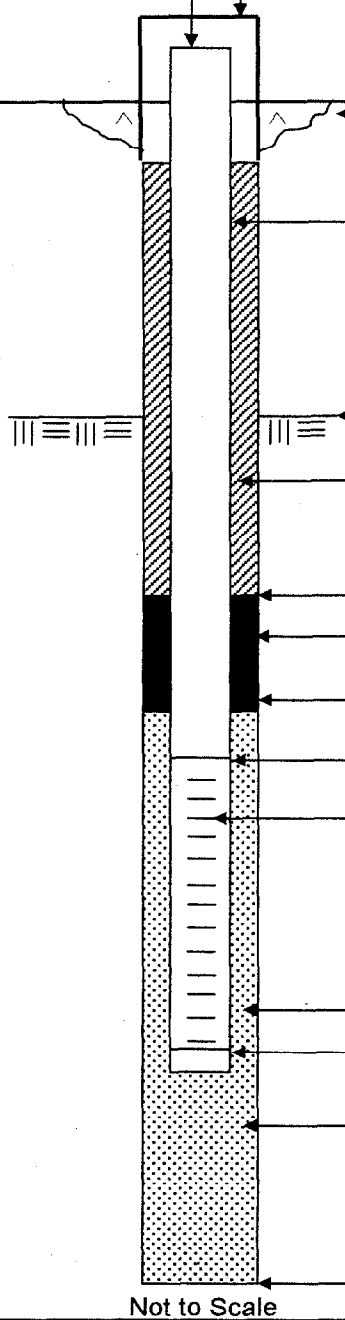
WELL No.: 13GW03

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	13GW03
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	11/23/98
SITE:	13	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Shoemaker	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

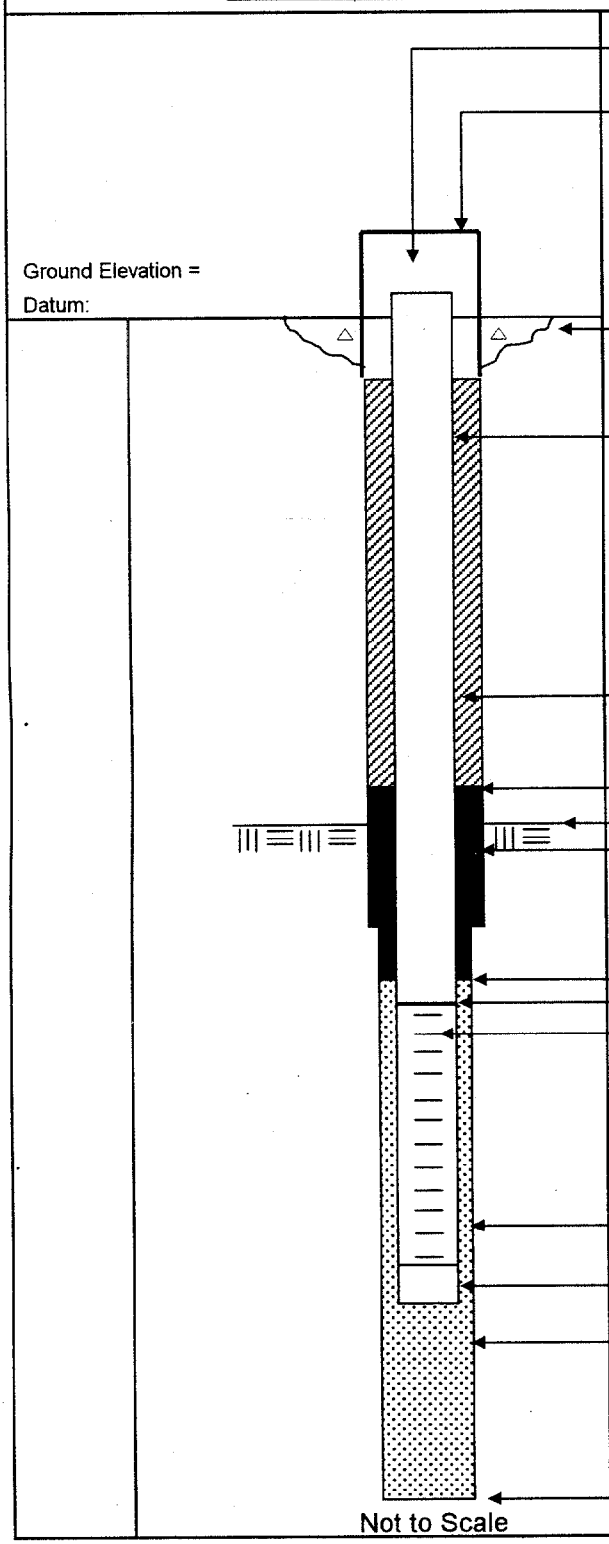
Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Elevation / Depth Top of Rock:		NA/ NA
Type of Backfill:	Cement/bentonite grout	
Elevation / Depth of Seal:		/ 12.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 15.3
Elevation / Depth of Top of Screen:		/ 18.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 28.0
Elevation / Depth of Bottom of Filter Pack:		/ 28.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 28.0

Tetra Tech NUS, Inc.

WELL No.: 13GW04

MONITORING WELL SHEET

PROJECT:	NSWC - WO RFI	DRILLING Co.:	Parratt Wolff	BORING No.:	13GW04
PROJECT No.:	CTO 298	DRILLER:	A. Chapel	DATE COMPLETED:	01/06/99
SITE:	13	DRILLING METHOD:	HAS	NORTHING:	
GEOLOGIST:	C. Laney	DEV. METHOD:		EASTING:	



Elevation / Depth of Top of Riser:		/
Elevation / Height of Top of Surface Casing:		/
I.D. of Surface Casing:		
Type of Surface Casing:		
Type of Surface Seal:	Concrete	
I.D. of Riser:	2 inches	
Type of Riser:	PVC	
Borehole Diameter:	8 inches	
Type of Backfill: grout	Cement/bentonite	
Elevation / Depth of Seal:		/
Elevation / Depth Top of Rock:		/ 30.0
Type of Seal:	Bentonite chips	
Elevation / Depth of Top of Filter Pack:		/ 60.0
Elevation / Depth of Top of Screen:		/ 62.0
Type of Screen:	PVC	
Slot Size x Length:	0.10 X 10 feet	
I.D. of Screen:	2 inches	
Type of Filter Pack:	#1 silica	
Elevation / Depth of Bottom of Screen:		/ 72.0
Elevation / Depth of Bottom of Filter Pack:		/ 72.0
Type of Backfill Below Well:		
Elevation / Total Depth of Borehole:		/ 72.0

APPENDIX D

WELL DEVELOPMENT LOG SHEETS

SITE 2

WELL DEVELOPMENT LOG SHEETS

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: Partly Cloudy, 65°
STATIC WATER LEVEL: 33.24 feet
TOTAL WELL DEPTH: 50.35 (50ft) feet
ONE CASING VOLUME: 12.27 gallons
START TIME: 1615 (12-5-98)
END TIME: 1654 (12-5-98)

SITE/LOCATION: SITE 2
WELL ID.: 02GW100
DATE: 12-5-98
PERSONNEL: D. Schnackenberg
WELL TYPE: (PVC), (S.S.), or OTHER
MEASURING DEVICE: Horiba
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL. [X] MONITORING WELL. [ ] OTHER

METHOD & REMARKS: Waterra Pump

Approximate Volume (Gal)	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salini (%)
Initial	1615	opaque brown	5.40	1.52	999	2.48	15.6	0.0
7.5	1623	opaque brown	5.18	1.57	999	4.59	14.8	0.0
12.5	1625	opaque brown	5.08	1.59	999	4.32	14.6	0.0
17.0	1628	opaque brown	5.12	1.55	999	3.54	14.6	0.0
25.0	1632	opaque brown	5.09	1.58	999	3.89	14.6	0.0
40.0	1641	opaque tan	5.06	1.61	890	3.74	14.6	0.0
50.0	1647	opaque tan	5.08	1.60	703	3.36	14.5	0.0
54.0	1649	opaque tan	5.10	1.61	621	3.46	14.5	0.0
58.0	1652	opaque tan	5.12	1.63	549	3.35	14.4	0.0
62.0	1654	opaque tan	5.06	1.64	506	4.05	14.4	0.0

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: Initial reading taken after high concentration of solids were removed, ≈ 2.5 gallons

End Water Level 37.00 and rising fast

SIGNATURE(S): David J. Schnackenberg

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: Clear Cool / Cloudy 45°F
STATIC WATER LEVEL: 11.5' / 11.74 feet
TOTAL WELL DEPTH: 27.5' / 27.36 feet
ONE CASING VOLUME: ~~IM 15.2 gal~~ / 12.1 gal
START TIME: 1440 / 0840 12-21-98
END TIME: / 1005

SITE/LOCATION: SITE Z
WELL ID.: ZGW101
DATE: 12/7/98 / 12.
PERSONNEL: Adam Notick
WELL TYPE: (PVC), (S.S.), or OTHER
MEASURING DEVICE: Horiba
ADJUSTMENT FACTOR: —

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: Bailing / WATERRA PUMP

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
0	1440	Clear	5.18	0.570	18	1.66	13.5	0.0
15 gal	1510	Light Brown	5.07	0.629	999	1.90	13.1	0.0
	~~1520~~							
30	1600	Development Stops						
12-21-98 35	0900	BROWN	4.98	0.683	999	2.06	12.8	0.02
40	0910	BROWN	5.10	.631	999	1.74	13.1	0.02
50	0930	LT BROWN	5.10	.637	999	1.13	13.0	0.02
60	0955	"	5.16	.646	999	1.52	12.9	0.02
65	1005	"	5.15	.653	999	2.01	13.0	0.0

NOTE: All measurements to nearest 0.01 feet measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: WATER is UGLY! DARK BROWN initially, ~~after~~ 5 gals went to brown @ 65 TOTAL gallons purged

SIGNATURE(s): John Merki

PAGE 1 OF 1

27.36
-11.74
15.62

15.6
.17
1092
156
2.652

12
2.6
72
24
31.2

31.2
-3
9.36

9.4
2.7
12.1

12.1
5
60.5

BUCKETS
IIII-II

60.5 TOTAL NEEDED

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: White Oak
PROJECT NUMBER: 7867-0202
WEATHER: Cloudy, 50°F
STATIC WATER LEVEL: 9.30 feet
TOTAL WELL DEPTH: 39.70 feet
ONE CASING VOLUME: 7.6 gallons
START TIME: 1215 (12-21-98)
END TIME: 0900 (12-22-98)

SITE/LOCATION: Site 2
WELL ID.: 26W102
DATE: 12-21-98
PERSONNEL: Merhi/Schmachenberg
WELL TYPE: (PVC), [S.S.], or OTHER
MEASURING DEVICE: Horiba
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: Initial water gray. Waterra pump.

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
Initial	1225	gray	9.31	.692	999	4.56	12.5	0.02
10 gal	1250	almost clear	7.50	.819	318	3.02	13.0	0.03
20 gal	1320	gray	7.01	.95	880	3.25	12.9	0.04
30 gal	1405	gray tint	6.91	.96	304	2.71	12.7	0.04
40 gal	1505	"	6.84	.93	90	2.26	12.6	0.04
50 gal	1605	"	6.87	.879	47	2.33	12.3	0.03
60 gal	1710	Clear	6.86	.867	17	2.53	12.3	0.03
70 gal	0850	"	5.67	.878	10	2.25	12.7	0.03
73 gal	0900	"	6.45	.855	10	2.58	11.9	0.03

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: Water began to clear after 1st 5 gallons

SIGNATURE(s): [signature]

PAGE 1 OF 1

30.40' water

30.40
× .17
5.17

12.0 × 0.66 × 0.3 = 2.38

5.17 + 2.38 = 7.55

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: cold, overcast, calm ~20°
STATIC WATER LEVEL: 16.26'
TOTAL WELL DEPTH: 27.50'
ONE CASING VOLUME: ~~4.19~~ gal for ~~11.24'~~ 4.1 gallons 0.9.S.
START TIME: 1100 (1-6-99)
END TIME: 1005 (1-10-99)

SITE/LOCATION: SITE 2
WELL ID.: 026W103
DATE: 1-6-99
PERSONNEL: B. Knight
WELL TYPE: 2" (PVC), (S.S.), or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL. [X] MONITORING WELL. [ ] OTHER

METHOD & REMARKS: disposable bailer

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
	initial	1100	gray/cldy	8.19	.996	655	6.00	11.5	0.02
	2.3 gal	1115	gray/opaque	8.02	.966	999	0.52	11.0	0
1-7-99	4.0 gal	0840	gray/opaque	6.66	0.641	999	1.57	12.3	0.02
1-8-99	6.0 gal	1200	cloudy/gray	6.62	0.658	572	1.75	11.1	0.0
1-9-99	9.0 gal	0845	cloudy/gray	5.74	0.623	439	3.34	12.4	0.0
1-10-99	11.0 gal	1005	" "	5.80	0.443	171	6.45	11.5	0.01
	Development complete								

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: Dry after 2.3 gallons - very silty - soft bottom at first. 4.0 total 1-7-99. 6.0 total 1-8-99. 9.0 total 1-9-99. 11.0 total 1-10-99.
Air hammer diameter ≈ 4.0 inches not 8.25. Recalculated Development volume 1-25-99.

SIGNATURE(s): Robert L Knight

PAGE 1 OF 1

11.24
× .66
× .3
2.23

11.24
× .163
1.832

~~2.0~~
~~× .62~~
~~31.2~~
~~× .3~~
~~9.36~~

9.36
+ 1.83
11.19
× 5
55.95

~~NEED 56 gallons~~
Need 20.5 gallons

2.23
+ 1.83
4.06

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: Rainy, Windy 48°
STATIC WATER LEVEL: 7.84
TOTAL WELL DEPTH: 37.0
ONE CASING VOLUME: ~~14.53~~ 7.13 H.O.S.
START TIME: 0915 (12-22-98)
END TIME: 1110 (1-8-99)

SITE/LOCATION: SITE 2
WELL ID.: 026W 104
DATE: 22 Dec 98
PERSONNEL: Kriegn / Schroedtenbe
WELL TYPE: (PVC) S.S.I. or
OTHER
MEASURING DEVICE: Honda
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [✓] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: disposable bailer

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinit (%)
Initial	09.35	Brown	11.43	2.58	124	9.87	12.4	0.12
5	1000	Cloudy	11.49	1.70	268	5.22	11.8	0.0
9	1015	Cloudy tan	11.17	1.25	110	4.86	11.8	0.0
17	1030	cloudy tan	8.43	0.96	90	5.90	11.5	0.0
21	0825	slightly cloudy	5.87	0.837	59	9.07	12.9	0.0
26	1110	slightly cloudy	6.69	1.07	55	2.68	11.4	0.0

5-1-99
1-6-99
1-7-99
1-8-99

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: Dry @ 6 Gals 12-22-98. Dry at 6 gallons 1050 1-5-99, 17 gallons total / Dry @ 5 gallons on 1-6-99 / running total = 17 on 1- running total = 21 on 1-7-99. Running total = 26.0 on 1-8-99. Air hammer diameter = 4" not 8.25" Recalculate development volume 1-25-99.

Need ~~72.64~~ Gals 35.6

SIGNATURE(S): David Schroedtenbe

PAGE 1 OF 1

12.0 × .66 = 7.92 × .3 = 2.38

37.0 − 7.84 = 29.16

29.16 × .163 = 4.75308 − 29.16 = 33.91308

~~12.0 × .6 = 3.12~~

31.2 × 3 = 9.36

~~9.36 + 33.91~~ = 43.27 + 9.36 + 5.168 = 14.528

~~43.27 × 5 = 216.35~~

~~14.528 × 5 = 72.64~~

2.38 + 4.75 = 7.13

35.6 Total

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: Cloudy 50°F
STATIC WATER LEVEL: 25.75 feet
TOTAL WELL DEPTH: 39.80 feet
ONE CASING VOLUME: 4.8 ~~11.7~~ Gallons 2.9.3
START TIME: 12-21-98 1100
END TIME: 12-21-98 1115

SITE/LOCATION: SITE 2
WELL ID.: 2GW105
DATE: 12-21-98
PERSONNEL: Schnackenberg/MERHI
WELL TYPE: (PVC) I.S.S.I. or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL. [✓] MONITORING WELL. [ ] OTHER

METHOD & REMARKS: INITIAL water gray or cement colored. WATERRA PUMP

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salin (%)
2.5 gal	INITIAL	0945	Colorless/clear	5.81	0.492	0	3.34	11.4	0.02
1-[illegible]-99	4.0 gal	1005	opaque/gray	7.01	0.636	499	1.87	11.0	0.0
1-7-99	11.0 gal	0805	opaque/gray	5.12	0.626	757	9.97	12.5	0
1-8-99	14.0 gal	1135	Cloudy/gray	5.14	0.578	137	1.85	11.2	0.02
1-9-99	17.0 gal	0930	slight tint	4.96	0.596	14	0.05	12.7	0.02
	End development								

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: Pumped dry ~~afte~~ 2.5 gallons. 0950 1-4-99 Dry at 2.5 gallons (5.0 ~~total~~), 1-6-99 (3.0 gallons) 9.0 Total. 1-7-99 11.0 ~~total~~, 1-8-99 14.0 gal ~~total~~. Air hammer diameter = 4" not 8.25". Recalculate development volume 1-25-99.

SIGNATURE(s): David Schnackenberg

PAGE 1 OF 1

39.8 − 25.8 = 14.0

14 × .18 = 98 + 14 = 2.38

~~12 × 2.6 = 31.2~~

31.2 × 3 = 9.36

9.36 + 2.38 = 11.74

11.7 × 5 = 58.5

12 × .66 = 7.92 × .3 = 2.38

2.38 + 2.38 = 4.76

~~38~~.5 TOTAL GALLONS NEEDED

24.0 gallons needed

SITE 3

WELL DEVELOPMENT LOG SHEETS

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: clear cold - 30°F max
STATIC WATER LEVEL: 6.35
TOTAL WELL DEPTH: 45.60
ONE CASING VOLUME: ~~15.76 gal~~ 2" (39.25')
START TIME: 1330
END TIME: 1620 9.05 D.J.S.

SITE/LOCATION: SITE 3
WELL ID.: 03GW102
DATE: 1-5-99
PERSONNEL: Knight
WELL TYPE: 2" (PVC) [S.S.]. or OTHER
MEASURING DEVICE: Horiba
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL. [X] MONITORING WELL. [ ] OTHER

METHOD & REMARKS: Waterra

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salin (%)
initial	1332	cloudy	7.95	.315	10 ?	9.70	10.3	0.0
10 g.	1342	cloudy	7.24	.293	10 ?	2.25	10.8	0.0
20 g	1400	clear	7.20	.285	~~[illegible]~~ 45	1.80	9.7	0.0
30 g	1420	clear	6.86	.289	30	1.75	9.9	0.0
40 g	1500	clear	7.51	.290	16	1.74	10.0	0.0
50 g	1520	slightly cloudy clear	7.52	.291	100	1.00	9.9	0.0
60 g	1542	clear	7.52	.290	38	.67	10.3	0.0
70 g	1605	clear	7.48	.285	21	.85	9.8	0.0
80 g	1620	clear	7.22	.286	24	.81	9.7	0.0

NOTE: All measurements to nearest 0.01 feet measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: Development target gallons = ~~98~~ RLK 79
Completed development
Air hammer diameter = 4" not 8.25"
Recalculate development volume 1-25-99.

43
D.J.S.

45.60
-6.35
39.25
x .17
6.67 gallons

SIGNATURE(S): Robert L. Knight

PAGE 1 OF 1

12 x 0.66 x .3 = 2.38

6.67
+2.38
9.05 x 5 = 45.3 gallons

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: clear, cold - 30°, max
STATIC WATER LEVEL: 8.21
TOTAL WELL DEPTH: 42.60
ONE CASING VOLUME: 14.96 (15 g) (34.39 l)
START TIME: 1440 (1-5-99)
END TIME: 1040 (1-10-99)

SITE/LOCATION: SITE 3
WELL ID.: B36W104
DATE: 1-5-99
PERSONNEL: Knight
WELL TYPE: [PVC], [S.S.], or OTHER
MEASURING DEVICE: Horiba
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: disposable bailer

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
	initial	1440	cloudy	10.20	.245	37	3.14	9.7	0.0
	5 gal.	1510	cloudy	9.82	.312	~~819~~ 780	~~4.44~~	10.9	[illegible]
1-5-99	8 gal	1535	gray/opaque	10.67	.330	999	4.0 → 3.92	10.4	0.01
1-6-99	16 gal	0820	gray/opaque	7.98	0.427	999	2.16	11.9	0.01
1-7-99	24 gal	1045	gray/opaque	6.24	0.380	433	0.99	12.3	0.01
1-9-99	31 gal	0955	cloudy/tan	5.66	0.338	279	1.89	11.8	0.01
1-10-99	39 gal	1040	slightly cloudy	6.22	0.213	35	2.41	10.2	0.00
	Development complete								

NOTE: All measurements to nearest 0.01 feet measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: Development target = ~~15~~ 41 gallons D.J.S.
Purged dry after 8 gallons, using disposable bailer. Will return 1-6-99 to purge more. Air hammer diameter = 4" not 8.25". Recalculate development volume 1-25-99

42.60
−8.21
34.39
× .17
5.85

SIGNATURE(S): Robert L. Knight

PAGE 1 OF 1

12 × .66 × 3 = 2.38

5.85
+2.38
8.23
× 5
41 gallons

WELL DEVELOPMENT SHEET

PROJECT SITE NAME:	WHITE OAK	SITE/LOCATION	SITE 3
PROJECT NUMBER:	7867.0202	WELL ID.:	13GW107
WEATHER:	SUNNY WARM	DATE:	12/6/98
STATIC WATER LEVEL:	23.12 feet	PERSONNEL:	RDS / DJS
TOTAL WELL DEPTH:	25.68 feet	WELL TYPE:	(PVC) S.S.I. or OTHER
ONE CASING VOLUME:	2.4 GALLONS		
START TIME:	0930 (12-6-98)	MEASURING DEVICE:	HORIBA
END TIME:	1120 (12-19-98)	ADJUSTMENT FACTOR:	

[ ] DOMESTIC WELL. [X] MONITORING WELL. [ ] OTHER

METHOD & REMARKS: BAILER - disposable

Approximate Volume (Gal)	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
INITIAL	0930	BROWN	5.89	.810	999	4.39	15.8	0.03
2	0958	BROWN	5.67	.693	999	3.64	16.3	0.02
Initial (12-6-98)	1440	Lt. Brown	6.18	.475	302	1.34	14.8	0.01
2 gallons removed								
Initial	1350	slight tan color	5.94	.467	409	1.30	14.5	0.01
1 gallon removed								
Initial	1116	Brown	5.95	0.749	430	10.69	14.5	0.0
1 gallon removed								

Begin on 12/14 @ 1100

12/17 @ 1350

12-19

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: Total of 2.0 gallons removed 12-6-98. Total of 4.0 gallons removed 12-14-98 (2 gal on the 6th, 2 gal on the 14th) 8.0 gallons total removed

SIGNATURE(S): Robert S. [illegible]

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SITE 4

WELL DEVELOPMENT LOG SHEETS

WELL DEVELOPMENT SHEET

PROJECT SITE NAME:	WHITE OAK	SITE/LOCATION	SITE 4
PROJECT NUMBER:	7867.0202	WELL ID.:	04GW101
WEATHER:	cold overcast, 30°	DATE:	1-6-99
STATIC WATER LEVEL:	29.4	PERSONNEL:	Knight
TOTAL WELL DEPTH:	47.9	WELL TYPE: 2"	(PVC), (S.S.), or
ONE CASING VOLUME:	12.38 gal / 18.5'	Flushmount	OTHER
START TIME:	1425	MEASURING DEVICE:	HORIBA
END TIME:	1700	ADJUSTMENT FACTOR:	

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS WATERRA

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
Initial	1430	tan/opaque	6.85	.906	999	8.54	10.4	0.03
~15 gal.	1500	tan/opaque	6.14	.785	999	8.49	11.2	0.03
~30 gal	1530	tan/opaque	6.04	.797	999	9.13	11.1	0.03
~45 gal	1600	tan/opaque	5.93	.794	999	9.40	11.2	0.03
~55 gal	1620	tan/opaque	5.74	.788	999	8.80	11.3	0.03
~70 gal	1700	tan/opaque	5.76	.787	999	8.40	10.6	0.03

NOTE All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS:

SIGNATURE(s): Robert L. Knight

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18.5 × .163 = 3.02

12.0 × 2.6 = 31.2 × .3 = 9.36

9.36 + 3.02 = 12.38 × 5 = ~~369.79~~ 61.9

NEED 62 gallons

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: WARM SUNNY
STATIC WATER LEVEL: 42.45 feet
TOTAL WELL DEPTH: 49.30 feet
ONE CASING VOLUME: ~~4.187~~ 6.5 gallons
START TIME: 1605 12-6-99
END TIME:

SITE/LOCATION: SITE 4
WELL ID.: 046W102
DATE: 12/6/98 | 12-1
PERSONNEL: RS
WELL TYPE: (PVC), (S.S.), or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: BAILER - disposable

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinit (%)
	INITIAL	1605	TAN CLOUDY	6.12	.663	435	0.03	14.5	0.0
12.19.98	1 gal + 4 prev = 5	1115	CLEAR	6.09	.229	231	1.74	12.3	[illegible]
1-5-99	Dry at	2.0 gallons							
1-6-99	11.0	0750	slightly tan	5.35	0.293	81	1.76	12.1	0.01

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: End bailing 1630 on 12-6-98, 4 gallons total
Resumed development 12.19.98 - pulled 2.5 gals before it went dry 6.5 " total est
1-5-99 6.5 + 2.0 = 8.5
1-6-99 8.5 + 2.5 = 11.0 End development

SIGNATURE(S): Robert J. Allen
John Merlin

PAGE 1 OF 1

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: SUNNY WARM
STATIC WATER LEVEL: 43.68 (22.19)
TOTAL WELL DEPTH: 65.87 feet
ONE CASING VOLUME: 13.13 gallons
START TIME: 1537 (12-6-98)
END TIME:

SITE/LOCATION: SITE 4
WELL ID.: 04GW103
DATE: 12/6/98
PERSONNEL: RS
WELL TYPE: (PVC) (S.S.), or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: WATERRA Pump

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
	INITIAL	1537	Brown	6.28	.759	999	5.25	19.3	0.03
	5	1545	Brown	6.27	.806	999	5.11	15.7	0.03
	15	1640	Cloudy	6.71	.617	181	0.13	15.7	0.02
12.19.98	~~20~~ 23	0820	Brown	6.01	.448	999	2.91	10.5	0.01
WENT DRY	~~25~~ 28	0825	Brown	6.21	.465	999	1.99	11.0	0.01
WENT DRY	33	0925	"	5.98	.411	999	2.28	11.0	0.01
NO READING	38	1020	"	6.04	.389	999	1.96	9.8	0.01
WENT DRY	43	1045	"	↓	↓	↓	↓	↓	↓
	48	1325	"	5.57	.406	905	2.85	11.9	0.01
	53	1345	"	5.70	.415	999	2.26	12.5	0.01
	58	1410	"	5.81	.370	860	2.22	12.3	0.01
	63	1455	CLEAR!	5.73	.427	57!	2.58	12.3	0.01

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: TOTAL GALLONS @ 1700 12/6/98 18
48 gallons purged on 12.19.98 TOTAL 66 gallons DEVELOPMENT COMPLETE

SIGNATURE(s): Robert R. [illegible]
John Merli

PAGE 1 OF __

WELL DEVELOPMENT SHEET

PROJECT SITE NAME:	WHITE OAK	SITE/LOCATION	SITE ~~3~~ 4
PROJECT NUMBER:	7867.0202	WELL ID.: 46W104	~~3GW101~~ MW
WEATHER:	CLEAR, SUNNY, 60F	DATE:	11/24/98
STATIC WATER LEVEL:	52.20 feet	PERSONNEL:	SNOEMAKER
TOTAL WELL DEPTH:	58.18 feet	WELL TYPE:	(PVC), S.S.I. or OTHER
ONE CASING VOLUME:	6.00 gal 11-24-98		
START TIME:	0835 11-24-98	MEASURING DEVICE:	HORIBA
END TIME:	1030 11-25-98	ADJUSTMENT FACTOR:	

( ) DOMESTIC WELL, (X) MONITORING WELL, ( ) OTHER

METHOD & REMARKS STAINLESS STEEL SURGE + BAIL

Approximate Volume (Gal)	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
TOTAL								
0	0840	TAN	5.23	0.317	999	10.79	12.4	0.00 ~~12.4~~
6	0900	CLOUDY	5.18	0.401	999	9.72	11.8	0.01
9	0925	CLOUDY	5.33	0.385	999	9.08	11.9	0.
12	1025	CLOUDY	5.52	0.324	999	10.59	12.22	0.00
17	1035	CLOUDY	5.49	.339	168	9.90	12.3	0.01
18	11/25/98 0850	CLOUDY	5.26	.162	999	10.52	11.6	
21	0905	CLOUDY	5.29	.248	999	10.03	11.6	
25	0935	CLEAR	5.10	.272	333	9.40	11.9	0.01
27	1010	TAN	5.29	.247	10	9.92	11.7	0.00
29	1030	TAN	5.22	.266	999	10.30	11.7	0.01

NOTE All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS:

SIGNATURE(s):

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: NSWC WHITE OAK
PROJECT NUMBER: 7687
WEATHER: RAINY
STATIC WATER LEVEL: 62.7
TOTAL WELL DEPTH: 88.2
ONE CASING VOLUME: ~~68.5~~ TOTAL 13.71
START TIME:
END TIME:

SITE/LOCATION: SITE 4
WELL ID.: 4 GW105
DATE: 1/24/99
PERSONNEL:
WELL TYPE: (PVC), [S.S.], or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: WATERRA

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
INITIAL	0830	CLOUDY	6.05	.768	5	6.65	14.0	0.03
	0906		6.25	.540	999	3.80	12.8	0.02
	1000		6.28	.515	999	4.76	13.4	0.02
	1035		6.38	.521	" "	4.80	13.2	0.02
	1100		6.39	.519	" "	5.35	13.5	0.02
300 GAL	1125		6.38	.514	" "	3.85	13.5	0.02

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: WELL DEVELOPMENT COMPLETE. Removed additional water because approximately 200 gallons of water was lost down the hole during installation.

SIGNATURE(s): Robert D. Hall

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88.12
62.7
25.5

33
25.5
117
1785
255
4.335

1
9.36
4.35
13.71

13
13.71
x 5
68.55

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER:
STATIC WATER LEVEL: 54.36
TOTAL WELL DEPTH: 74.20
ONE CASING VOLUME: 12.7 gals
START TIME: 1405
END TIME:

SITE/LOCATION: SITE 4
WELL ID.: 4GW106
DATE: 12·20·98
PERSONNEL: MERHI
WELL TYPE: (PVC), IS.S.I. or OTHER
MEASURING DEVICE: Horiba
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [✓] MONITORING WELL, [ ] OTHER

METHOD & REMARKS

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
~~1415~~ INITIAL	1415	BROWN	6.71	.375	999	2.27	14.1	0.01
5 GALS	1430	"	6.01	.314	999	2.42	13.7	0.01
15 GALS	1500	"	5.74	.294	999	2.19	13.4	0.01
25 GALS	1515	"	5.70	.292	999	2.06	13.1	0.01
35 GALS	1530	LT. "	5.63	.286	999	1.77	12.9	0.0
45 GALS	1545	TAN	5.56	.282	999	1.80	12.8	0.01
55 GALS	1600	"	5.51	.278	999	1.93	12.5	0.0
65 Gals	1612	Tan	5.43	.275	999	1.91	12.5	0.01
70 Gals	1617	Tan	5.36	.270	999	1.90	12.5	0.01

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: CHOCOLATE MILK. WENT TO A "YooHoo" color at about 35 gallons. Clearing, but hardly clear.
WL at 1620 55.0 ft

SIGNATURE(s):

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74.2
54.4
19.8

5
19.8
.17
1386
198
3.366

12
2.6
72
24
31.2

31.2
.3
9.36

9.36
3.36
12.72

12.7
5
63.5

BUCKETS
IIII IIII IIII

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: OVC, WINDY 45F
STATIC WATER LEVEL: 58.74 BTOC
TOTAL WELL DEPTH: 85.82 feet
ONE CASING VOLUME: 14.0 gallons
START TIME: 1358 12-22-98
END TIME: 1657 1-4-99

SITE/LOCATION: SITE 4
WELL ID.: 46W107
DATE: 12/22/98
PERSONNEL: KRIEGER/SNOGM
WELL TYPE: (PVC) (S.S.), or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salin (%)
0	1400	Brown Turbid	7.42	.488	0	5.58	13.2	0.0
25	1430	Cloudy	6.75	.339	998	1.37	11.8	0.0
50	1500	Slightly cloudy	5.96	.319	270	2.81	12.4	0.0
75	1530	Slightly cloudy	6.20	.316	154	2.90	4.7	0.01
100	1600	Cloudy	5.82	.295	459	0.54	11.9	0.0
125	1635	brownish	5.12	.295	684	9.95	11.7	0.0
150	1657	Cloudy	5.09	.262	180	9.05	11.2	0.0

4 Jan 99

NOTE: All measurements to nearest 0.01 feet measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS:

SIGNATURE(S): J Krieger / Robert L. Knight

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85.82 − 58.74 = 27.08

27.08 × .17 = 4.6

12.0 × 2.6 = 31.2

31.2 × .3 = 9.36

9.4 + 4.6 = 14.0

14.0 × 5 = 70

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: RAINY WARM
STATIC WATER LEVEL: 38.58 feet
TOTAL WELL DEPTH: 43.91 feet
ONE CASING VOLUME: 5.064 gallons
START TIME: 0840
END TIME: 1142

SITE/LOCATION: SITE
WELL ID.: 04GW108
DATE: 12/5/98
PERSONNEL: RDS
WELL TYPE: (PVC) (S.S.), or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: BAILER

Approximate Volume (Gal)	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
INITIAL	0845	BROWN ~~5.28~~	5.28	.535	999	2.12	14.7	0.02
2	0850	BROWN	5.11	.521	999	2.72	14.7	0.02
4	0900	BROWN	4.86	.525	999	2.24	14.7	0.02
6	0917	BROWN	4.89	.532	999	3.04	14.8	0.02
8	1030	BROWN	4.87	.539	999	3.50	15.2	0.02
10	1037	BROWN	4.79	.519	999	3.27	15.0	0.02
12	1044	BROWN	4.82	.528	999	3.20	15.1	0.02
14	1054	BROWN	4.83	.528	999	3.32	14.9	0.02
16	1100	BROWN	4.87	.535	999	3.50	15.0	0.02
18	1108	BROWN	4.89	.537	999	3.20	14.9	0.02

NOTE All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS:

SIGNATURE(s): Robert D. Adams

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: CLOUDY WARM
STATIC WATER LEVEL: 38.58 feet
TOTAL WELL DEPTH: 43.91 feet
ONE CASING VOLUME: 5.064 gallons
START TIME: 0840
END TIME: 1142

SITE/LOCATION: SITE 4
WELL ID.: 04GW108
DATE: 12/5/98
PERSONNEL: RDS
WELL TYPE: (PVC) (S.S.), or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: BAILER

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
20	1118	BROWN	4.97	.538	999	3.15	14.9	0.02
22	1128	Light Tan	4.86	0.542	999	2.56	14.9	0.02
25	1141	LIGHT TAN	4.92	.538	999	2.66	15.0	0.02

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS:

SIGNATURE(s): Robert D. Stern

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: SUNNY 60F
STATIC WATER LEVEL: 13.80 feet
TOTAL WELL DEPTH: 22.36 feet
ONE CASING VOLUME: 8.6 gal
START TIME: 0950 (11/24/98)
END TIME: 1015 (12/2/98)

SITE/LOCATION: SITE 4
WELL ID.: 04GW109
DATE: 11/24/98
PERSONNEL: SNOGMAKER
WELL TYPE: (PVC), (S.S.), or OTHER
MEASURING DEVICE: N0218A
ADJUSTMENT FACTOR:

( ) DOMESTIC WELL, (X) MONITORING WELL, ( ) OTHER

METHOD & REMARKS: STAINLESS STEEL SURGE + BAIL

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
0	0955	TAN	5.69	.331	999	8.70	15.0	0.01
3	1010	TAN	6.01	.268	999	8.20	14.8	0.[illegible]
4	11/25/98 0828	TAN	5.20	.309	33	9.22	14.6	
9	0930	LT. TAN	5.62	.131	999	8.91	13.9	0.00
12	1005	Clear	5.48	.121	10	8.60	14.8	0.00

NOTE All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS:

SIGNATURE(s):

WELL DEVELOPMENT SHEET

PROJECT SITE NAME:	WHITE OAK	SITE/LOCATION	SITE 4
PROJECT NUMBER:	7867.0202	WELL ID.:	04GW109
WEATHER:	SUNNY 60F	DATE:	12/1/98
STATIC WATER LEVEL:	13.80 feet	PERSONNEL:	
TOTAL WELL DEPTH:	22.36 feet	WELL TYPE:	[PVC], [S.S.], or OTHER
ONE CASING VOLUME:	8.6 G		
START TIME:	0950 (11/24/98)	MEASURING DEVICE:	HORIBA
END TIME:	1015 (12/2/98	ADJUSTMENT FACTOR:	

[ ] DOMESTIC WELL, [ ] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: RESUME DEVELOPING USING WATERRA PUMP WITH FOOT VALVE

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
12	1248	TAN CLOUDY	5.39	0.182	170	10.43	17.8	0.00
15	1319	CLOUDY	5.33	0.203	165	9.85	18.7	0.00
18	1337	CLOUDY	5.29	0.158	999	10.75	16.2	0.00
20	1347	CLOUDY	5.46	0.145	999	10.03	17.5	0.00
23	1433	NEARLY CLEAR	5.46	0.133	92	11.51	16.1	0.00
25	1440	CLOUDY	5.31	0.136	999	10.40	16.6	0.00
27	1520	CLOUDY	5.18	0.143	999	10.60	15.5	0.00
30	1607	NEARLY CLEAR	5.20	0.131	154	9.71	14.3	0.00
32	1620	CLOUDY	5.31	0.127	137	9.74	15.0	0.00
34	1628	CLOUDY	5.12	0.119	131	9.07	15.0	0.00

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS:

SIGNATURE(s): Robert R. Stone

WELL DEVELOPMENT SHEET

PROJECT SITE NAME:	WHITE OAK	SITE/LOCATION	SITE 4
PROJECT NUMBER:	7867.0202	WELL ID.:	04GW109
WEATHER:	CLEAR COLD	DATE:	12/2/98
STATIC WATER LEVEL:	~~22.36~~ 13.80 feet	PERSONNEL:	RS
TOTAL WELL DEPTH:	~~8.~~ 22.36 feet	WELL TYPE:	(PVC) IS.S.I. or OTHER
ONE CASING VOLUME:	8.6G		
START TIME:	0950 (11/24/98)	MEASURING DEVICE:	HORIBA
END TIME:	1015 (12/2/98)	ADJUSTMENT FACTOR:	

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS WATERRA PUMP / RESUME DEVELOPING

Approximate Volume (Gal)	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
36	0820	TAN	4.37	.231	999	9.82	13.8°	0.00
38	0830	TAN	5.03	.101	120	8.35	13.1°	0.00
40	0835	LIGHT TAN	5.29	.094	149	8.74	12.4°C	0
42	0925	TAN LIGHT	5.06	.092	106	7.74	13.1°C	0.00
44	0935	LIGHT TAN	4.99	.082	80	7.95	13.2°C	0.00
46	0950	CLEAR	5.20	.070	78	8.33	13.6°C	0.00
48	1015	CLEAR	5.18	.039	~~8~~ 10	8.55	14.3	0.00

NOTE All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: TURBIDITY READING SEEMS INACCURATE

SIGNATURE(s): [signature]

WELL DEVELOPMENT SHEET

PROJECT SITE NAME:	WHITE OAK	SITE/LOCATION	SITE 4
PROJECT NUMBER:	7867.0202	WELL ID.:	04BW110
WEATHER:	SUNNY WARM	DATE:	12/3/98
STATIC WATER LEVEL:	23.86 feet	PERSONNEL:	RS
TOTAL WELL DEPTH:	27.00 feet	WELL TYPE:	(PVC), (S.S.), or OTHER
ONE CASING VOLUME:	~~8.46~~ 2.96 gallons		
START TIME:	1400 (12/3/98)	MEASURING DEVICE:	HORIBA
END TIME:	1152 (12/5/98)	ADJUSTMENT FACTOR:	

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS

	Approximate Volume (Gal)	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
	1.5	1400	BROWN	5.54	.684	965	16.64	15.9	0.04
	2.0	1425	BROWN	5.62	.987	999	16.36	15.4	0.04
	3.0	1440	BROWN	5.62	.696	999	14.95	15.5	0.04
END 12/3/98	4.0	1515	BROWN	5.76	.994	999	12.92	14.7	0.04
	6.0	1700	BROWN	6.21	.671	999	11.43	14.1	0.04
START 12/4/98	8.00	1137	TAN	5.60	.997	999	0.57	14.9	0.04
	10.00	1625	TAN CLOUDY	5.73	.675	999	1.13	14.9	0.04
12/5/98	12.00	1152	TAN CLOUDY	5.58	.673	999	0.02	14.9	0.04

NOTE All measurements to nearest 0.01 foot measured from top of well riser side unless otherwise noted

ADDITIONAL COMMENTS:

SIGNATURE(s): Robert D. Stoner

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SITE 7

WELL DEVELOPMENT LOG SHEETS

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
SITE/LOCATION: SITE 7
PROJECT NUMBER: 7867.0202
WELL ID.: 7GW105
WEATHER: 50° Cloudy
DATE: 12-19-98
STATIC WATER LEVEL: 42.95'
PERSONNEL: MERHI
TOTAL WELL DEPTH: 55.10'
WELL TYPE: (PVC) [S.S.], or OTHER
ONE CASING VOLUME: 11.6 Gallons
START TIME: 1530 12-19-98
MEASURING DEVICE: Horiba
END TIME: 0945 12-20-98
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL. [✓] MONITORING WELL. [ ] OTHER

METHOD & REMARKS

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
INITIAL	1535	L. BROWN	6.05	.168	999	4.26	12.8	0.0
10 GALS	1620	"	6.00	.147	999	5.00	11.6	0.00
20 GALS	1700	"	5.65	.139	999	6.10	11.6	0.00
12-20-98 30 GALS	0815	"	5.13	.155	999	5.42	11.6	0.00
40 GALS	0845	"	5.17	.132	999	5.66	11.6	0
50 GALS	0905	"	5.25	.131	999	5.69	11.7	0
59 GALS	0930	"	5.23	.130	999	5.81	12.0	0
65 GALS	0945	"	5.23	.130	999	5.09	11.9	0

NOTE: All measurements to nearest 0.01 feet measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: Looks Like YooHoo! 1550 went dry. Stopped for 5 minutes then restarted

Finished pursing 12/20/98 0945 65 total gals purged

SIGNATURE(S): John M. Merhi

PAGE 1 OF 1

BUCKETS
IIII IIII
1

12.2
2.6
732
244
31.72

31.7
.3
9.51

9.5
2.1
11.6

11.6
5
58.0

55.10
-42.95
12.15

12.2
.17
854
122
2.074

58 TOTAL GALS

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: 50° Cloudy
STATIC WATER LEVEL: 47.53'
TOTAL WELL DEPTH: 55.50'
ONE CASING VOLUME: 7.6 gals
START TIME: 1020
END TIME:

SITE/LOCATION: SITE 7
WELL ID.: 7GW102
DATE: 12·20·98
PERSONNEL: MERHI
WELL TYPE: (PVC), (S.S.), or OTHER
MEASURING DEVICE: Horiba
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL. [X] MONITORING WELL. [ ] OTHER

METHOD & REMARKS

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salin (%)
INITIAL	1030	LT. BROWN	5.78	.276	999	3.56	12.2	0.01
5 GALS	1040	"	5.72	.239	999	3.87	12.6	0.0
10 GALS	1100	"	5.67	.226	999	3.79	12.7	[illegible]
15 GALS	1125	"	5.68	.223	999	3.61	12.7	[illegible]
20 GALS	1145	"	5.62	.220	999	3.55	12.8	0.0
25 GALS	1205	"	5.59	.219	999	3.47	13.1	0.0
30 GALS	1220	"	5.58	.217	999	3.47	13.1	0.0
35 GALS	1235	"	5.51	.216	999	3.35	13.3	0.0
39 GALS	1250	"	5.62	.217	999	4.36	13.6	0.0

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS:

SIGNATURE(s): John Merhi

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55.5
- 47.5
8.0

8.0
.17
560
80
1,360

8.0
2.6
480
160
20.80

20.8
.3
6.24

6.24
1.36
7.60

7.6
5
380

38 TOTAL GALS

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: SUNNY WARM
STATIC WATER LEVEL: 45.1' (8.88' OF H2O)
TOTAL WELL DEPTH: 53.43 feet
ONE CASING VOLUME: 7.88 gallons
START TIME: 1128 (12-6-98)
END TIME:

SITE/LOCATION: SITE 7
WELL ID.: 07GW103
DATE: 12/6/98
PERSONNEL: RDS/DJS
WELL TYPE: (PVC) (S.S.). or OTHER
MEASURING DEVICE: HORIBA PINE
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL. [X] MONITORING WELL. [ ] OTHER

METHOD & REMARKS: BAILER

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
INITIAL	1128	TAN CLOUDY	5.61	.365	999	0.51	14.3	0.00
BEGIN ON 12/16/98 → 5 gallons	1545	TAN CLOUDY	5.67	.227	548	1.24	12.1	0.00
10 gallons	1555	TAN CLOUDY	5.11	.200	999	14.95	11.9	0.00
15 gallons	1605	TAN CLOUDY	4.95	.192	999	10.20	11.8	0.00
20 gallons	1620	TAN CLOUDY	4.88	.191	999	13.64	11.7	0.00
25 gallons	1635	TAN CLOUDY	4.83	.191	999	12.25	11.6	0.00
30 gallons	1650	TAN CLOUDY	4.80	.189	999	11.74	11.5	0.00
35 gallons	1705	TAN CLOUDY	4.81	.192	999	11.30	11.3	0.00
40 gallons	1715	TAN CLOUDY	4.83	.191	999	11.77	11.3	0.00

NOTE All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS: BAILING STOPPED IN FAVOR OF WATERRA PUMP
WATER IN BUCKET @ WELL

SIGNATURE(S): Robert D. Hom

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WELL DEVELOPMENT SHEET

PROJECT SITE NAME:	WHITE OAK	SITE/LOCATION	SITE 47
PROJECT NUMBER:	7867.0202	WELL ID.:	07GW104
WEATHER:	SUNNY, WARM	DATE:	12/6/98
STATIC WATER LEVEL:	37.14 feet	PERSONNEL:	RDS/DJS
TOTAL WELL DEPTH:	40.11 feet	WELL TYPE:	(PVC), IS.S.I. or OTHER
ONE CASING VOLUME:	2.3 gallons		
START TIME:	1037 (12-6-98)	MEASURING DEVICE:	HORIBA
END TIME:	1640 (12-14-98)	ADJUSTMENT FACTOR:	

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: BAILER - disposable

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
INITIAL	1037	TAN/CLOUDY	6.04	.221	999	3.87	14.5	0.0
2	1046	TAN/CLOUDY	5.45	.185	999	5.27	14.3	0.0
5	1306	TAN/CLOUDY	5.46	.130	999	6.94	15.1	0.0
7	1650	LIGHT TAN	6.15	.101	481	5.64	13.6	0.00
9 (Gasin 12/14) →	1115	LIGHT TAN	4.95	.126	110	10.67	12.2	0.00
11	1625	Light tan	5.38	0.076	999	10.71	12.3	0.00
12 (end)	1640	Light tan	5.60	0.069	999	10.29	11.9	0.00

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: 1700 12/6/98 TOTAL GALLONS = 8

SIGNATURE(s): Robert R. Stan

SITE 9

WELL DEVELOPMENT LOG SHEETS

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: rain, 35°
STATIC WATER LEVEL: 6.64 feet
TOTAL WELL DEPTH: 12.51 feet
ONE CASING VOLUME: 5.6 gal / 5.87'
START TIME: 1100 1-9-99
END TIME: 1635 1-12-99

SITE/LOCATION: SITE 9
WELL ID.: 096W100
DATE: 1-9-99
PERSONNEL: Schnackenberg / Knig
WELL TYPE: 2" (PVC), [S.S.], or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: disposable bailer over 4 days — low yield, slow recharging, turbid well

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
1-9	~ 2 gal	1110	brn/opque	5.77	0.347	999	0.66	9.7	0.01
.0	~ 5	1140	" "	5.82	0.243	999	4.96	8.9	0.00
"	~ 7.5	1645	" "	6.04	0.240	999	4.47	8.6	0.00
1-11	~10 gal	1330	" "	6.24	0.406	999	3.57	7.8	0.01
"	~ 12	1510	" "	6.28	0.389	999	3.42	7.9	0.01
1-12	~15	0430	" /cldy	5.92	0.368	443	2.05	9.3	0.01
"	~ 17.5	1635	" /turbid	6.24	0.274	838	5.03	9.0	0.01

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: Slow recharging well — yield 2-2.5 gallons per purge, heavy silt @ bottom. Well development complete per D. Schnackenberg, on 1-12-99

SIGNATURE(s): Robert L. Knight

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12.51 − 6.64 = 5.87

5.87 × .17 = 1.0

7.0 × 2.6 = 18.2; 18.2 × .3 = 5.46

5.46 + 1.00 = 6.46; 6.46 × 5 = 32.3

NEED 32 GAL

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: cold, clear, ~33°
STATIC WATER LEVEL: 4.17'
TOTAL WELL DEPTH: 13.30'
ONE CASING VOLUME: 7.79 gal / 9.13'
START TIME: 1413
END TIME: 1630 on 1-12-99

SITE/LOCATION: SITE 9
WELL ID.: 096W101
DATE: 1-11-99
PERSONNEL: Knight/Schnackenber
WELL TYPE: 2" (PVC), [S.S.], or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: disposable bailer for 2 days

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
1-11-99	Initial	1413	brn/opaque	6.28	0.681	999	3.94	6.5	0.02
	~2.5 gal	1455	" "	DATA NOT TAKEN					
	~5 "	1530	" "	5.85	0.677	999	4.74	7.0	0.02
	~7.5 "	1557	" "	5.94	0.673	999	4.63	7.0	0.02
	~10.0 "	1627	" "	5.74	0.562	999	3.24	8.6	0.02
1-12-99	~12.5 "	0800	" "	5.29	0.636	999	0.94	8.6	0.02
	~20.0 "	0850	" "	5.34	0.597	999	2.45	8.3	0.02
	~25.0 "	0925	" "	5.70	0.610	999	0.74	8.3	0.02
	~30.0 "	1035	" "	6.28	0.771	971	2.78	8.2	0.03
	~39.0 "	1630	"/cldy	6.04	0.499	549	4.81	8.2	0.02

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: Well produces ~2.5 gallons/purge before going dry – starts off clear – heavy silt @ bottom – recharges fairly rapidly

SIGNATURE(s): Robert L. Knight

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9.13
× .17
1.55

8.0
× 2.6
20.8
× .3
6.24

6.24
+ 1.55
7.79
× 5
38.95

NEED 39 GAL

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: NSWC WHITE OAK
PROJECT NUMBER: 7087
WEATHER: COLD CLEAR
STATIC WATER LEVEL: 41.19
TOTAL WELL DEPTH: 57.18
ONE CASING VOLUME: 5.68
START TIME: 0810
END TIME:

SITE/LOCATION: SITE 9
WELL ID.: 9GW102
DATE: 1/27/99
PERSONNEL: RDS BB
WELL TYPE: [PVC], [S.S.], or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: BAILER

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
INITIAL	0810	CLEAR	5.99	.448	47	0.02	13.1	0.00
5	0925	CLOUDY	5.98	.121	999	2.29	13.6	0.00
10	0950	CLOUDY	5.65	.103	201	3.27	13.2	0.00
20 (Begin 2/1/99)	1012	CLOUDY	5.21	.070	692	2.54	12.7	0.00
25 (Begin 2/2/99)	0903	CLOUDY	5.44	.114	999	3.18	13.0	0.00

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: HAS A BAILER STUCK IN IT, Bailed Dry at 25 gallons on 2/2/99

SIGNATURE(s): Robert D. Stern

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~~11 × 2.6 × .3~~ 11 × .66 × .3 = 1 × 2.6 × .3 ~~9.86~~

57.18 − 41.19 = 15.99

2.72 − 2.18 = .78

.78 × 7.3 = 5.68

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867 0202
WEATHER: 35° clear
STATIC WATER LEVEL: 9.56 feet
TOTAL WELL DEPTH: 20.32 feet
ONE CASING VOLUME: 10.37 gal / 10.76'
START TIME: 1125 1-7-99
END TIME: 0920 1-11-99

SITE/LOCATION: SITE 9
WELL ID.: 09GW103
DATE: 1-7-99
PERSONNEL: Knight / Schnackenberg
WELL TYPE: 2" (PVC), [S.S.], or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR: —

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: disposable bailer over 4 days

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
1-7-99	Initial	1125	cldy-tan	5.88	0.247	271	0.53	10.9	0.00
1-7-99	~10 gal	1135	gray/opaque	5.61	0.232	999	2.09	12.0	0.00
1/8/99	~20 "	0915	" "	4.99	0.292	999	8.11	12.3	0.01
1/10/99	~29 "	0915	" "	5.33	0.165	999	4.65	12.4	0.00
1/11/99	~39 "	0840	tan/cldy	5.02	0.221	675	2.53	11.7	0.00
1/11/99	~52 "	0920	" "	6.44	0.229	999	2.17	11.1	0.00

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: 1-10-99 dry @ 9 gal 29 total to date
1-11-99 development complete w/ 52 gallons purged

SIGNATURE(s): Robert L. Knight

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20.32 − 9.56 = 10.76

10.76 × .17 = 1.83

~~28.5~~ 10.76 × 2.6 = 28.5

28.5 × .3 = 8.54

8.54 + 1.83 = 10.37

10.37 × 5 = 51.85 gallons needed

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: NSWC WHITE OAK
PROJECT NUMBER: 7687
WEATHER: COLD CLEAR 33°
STATIC WATER LEVEL: 6.68'
TOTAL WELL DEPTH: 35.78
ONE CASING VOLUME: 7.33
START TIME: 1315
END TIME: 1450 (1/25/99)

SITE/LOCATION: SITE 9
WELL ID.: 09GW104
DATE: 1/11/99
PERSONNEL: KNIGHT / RDS
WELL TYPE: (PVC), [S.S.], or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: WATERRA (ATTEMPT) / SURGE BLOCK - TOTAL ≈ 1.5 HRS

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
1/11/99	INITIAL	1320	WHITE CLOUDY	6.66	0.423	200	0.05	8.8	0.01
1/11	14.3G	—	WELL DRY AFTER ONE CASING VOLUME →						
1/20/99	20.3G	1530	CLEAR CLOUDY						
1/23/99	21.0G	0750	CLEAR CLOUDY	5.44	.350	194	2.36	13.6	0.00
	23	0800	CLEAR CLOUDY	5.83	.253	200	0.90	13.3	0.00
1/24/99	25	0800	CLEAR CLOUDY	6.11	.186	21	3.58	13.8	0.00
	27	0803	CLOUDY	6.27	.181	182	4.92	13.6	0.00
1/25/99	30	1450	CLOUDY	6.07	.189	72	2.27	13.8	0.00
			WELL DEVELOPMENT COMPLETE ON 1/25/99						

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: WELL DRY AFTER ONE CASING VOLUME PURGED - VIRTUALLY NO RECHARGE. USED SURGE BLOCK FOR ≈.5 HRS, THEN TRIED PUMPING W/ RECIRCULATING FLOW INTO WELL FOR ~.5 HRS - NO SIGNIFICANT IMPROVEMENT -

SIGNATURE(s): Robert P. Hamrick

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4.95
2.38
7.33

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
SITE/LOCATION: SITE 9
PROJECT NUMBER: 7867 0202
WELL ID.: 096W105
WEATHER: cold, clear, ~ 38°
DATE: 1-11-99
STATIC WATER LEVEL: 3.70'
PERSONNEL: Knight
TOTAL WELL DEPTH: ~~8.4~~ 38.51'
WELL TYPE: 2" (PVC), [S.S.], or OTHER
ONE CASING VOLUME: 8.3 ~~7.15.28~~ gal / 34.81'
START TIME: 1440 on 1-11-99
MEASURING DEVICE: HORIBA
END TIME: 0900 on 1-12-99
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: WATERRA for ~ 4.5 hrs over 2 days

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
1-11-99	Initial	1445	bra/turbid	6.24	0.311	999	0.04	7.6	0.01
	~ 10 gal	1516	gray/ "	6.01	0.180	652	1.90	10.5	0.00
	~ 20	1531	" /cldy	5.69	0.169	196	1.69	10.4	0.00
	~ 30	1600	white/ "	5.64	0.169	71	2.30	9.9	0.00
	~ 40	1633	" / "	5.63	0.168	50	2.85	9.8	0.00
	~ 50	1655	" / "	5.69	0.169	76	2.53	9.5	0.00
1-12-99	~ 60	0815	" / "	5.00	0.167	285	2.71	10.9	0.00
	~ 70	0835	" / "	5.08	0.169	445	1.60	10.7	0.00
	~ 80	0900	tan / "	5.51	0.169	12	0.28	10.3	0.00

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: Good producing low-flow well
Completed development on 1-12-99 @ 0900.
Air hammer diameter = 4" not 8.25". Recalculate development volume 1-25-99.

38.51
− 3.70
34.91

SIGNATURE(s): Robert L. Knight

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34.91
× .17
5.92

12 × 0.66 × 0.3 = 2.38
+ 5.92
8.3 gallons

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: NSWC WHITE OAK
PROJECT NUMBER: 7087
WEATHER: COLD SUNNY
STATIC WATER LEVEL: 48.36
TOTAL WELL DEPTH: 60.08
ONE CASING VOLUME: ~~11.85~~ 4.37
START TIME:
END TIME:

SITE/LOCATION: SITE 9
WELL ID.: 9GW106
DATE: 1/27/99
PERSONNEL: RDS BB
WELL TYPE: (PVC) [S.S.], or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: BAILER

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
INITIAL	1000	BROWN	9.69	.580	999	2.22	12.7	0.02
5	1035	BROWN	8.53	.177	547	7.48	12.4	0.02
10	1110	BROWN	8.03	.101	999	3.62	12.7	0.00
15	1130	BROWN	7.98	.070	999	4.92	13.1	0.00
21	1400	BROWN	6.06	.066	999	5.53	13.5	0.00

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: WELL DEVELOPMENT COMPLETE

SIGNATURE(s): Robert D. Stamm

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1.99
9.86
11.85

1.99
2.38

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: cold, clear, ~33°
STATIC WATER LEVEL: 6.62'
TOTAL WELL DEPTH: ~~0.99~~ 59.92'
ONE CASING VOLUME: 11.5 ~~18.38~~ / 53.3'
START TIME: 1350
END TIME: 1240 on 1-11-99

SITE/LOCATION: SITE 9
WELL ID.: 096W107
DATE: 1-10-99
PERSONNEL: Knight
WELL TYPE: 2" (PVC), [S.S.], or OTHER
MEASURING DEVICE: HORIBA
ADJUSTMENT FACTOR:

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: WATERRA for ~ 5 hrs over 2 days

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
1/10	Initial	1353	tan/opaque	7.46	0.256	999	1.65	11.2	0.01
	~ 10 gal	1405	"/cldy	8.02	0.243	757	1.25	11.1	0.00
	~ 20 "	1420	" "	8.12	0.238	390	0.85	10.8	0.00
	~ 30 "	1450	" "	7.83	0.237	999	0.93	9.8	0.00
	~ 40 "	1620	" "	7.20	0.217	830	4.20	10.0	0.00
1/11	~ 50 "	0845	" "	6.21	0.302	64	8.74	9.4	0.01
	~ 60 "	0905	" "	6.66	0.300	52	9.35	8.3	0.01
	~ 70 "	0945	" "	6.48	0.343	415	7.40	8.7	0.01
	~ 80 "	1145	" "	5.79	0.304	211	6.74	8.5	0.01
	~ 92 "	1240	" "	5.90	0.302	470	7.51	8.4	0.01

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: Purged dry after ~ 35 gallons @ 1515 on 1-10-99
Recharged to 45.9 @ 1555 on 1-10-99
Completed development on 1-11-99 @ 1240 after ~ 92 gal.
Air hammer diameter = 4" not 8.25". Recalculate development volume 1-25-99.

SIGNATURE(s): Robert L. Knight

PAGE 1 OF 1

53.3 × .17 = 9.1

12.0 × 2.6 = 31.2; 31.2 × .3 = 9.36

9.36 + 9.10 = 18.46

18.46 × 5 = 92.3

NEED 92 GAL

WELL DEVELOPMENT SHEET

PROJECT SITE NAME:	NSWC WHITE OAK	SITE/LOCATION	SITE 9
PROJECT NUMBER:	7687	WELL ID.:	09GW108
WEATHER:	CLOUDY 50°	DATE:	1/25/99
STATIC WATER LEVEL:	5.6'	PERSONNEL:	RDS
TOTAL WELL DEPTH:	37.1'	WELL TYPE:	(PVC), [S.S.], or OTHER
ONE CASING VOLUME:	7.73		
START TIME:	1521	MEASURING DEVICE:	HORIBA
END TIME:		ADJUSTMENT FACTOR:	

[ ] DOMESTIC WELL, [X] MONITORING WELL, [ ] OTHER

METHOD & REMARKS WATERRA PUMP

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
	INITIAL	1536	CLEAR	5.99	.186	40	8.25	7.7	0.00
1/29	10	0750	CLOUDY TAN	5.87	.448	999	11.33	11.6	0.01
	20	0930	CLOUDY	5.87	.251	438	10.00	9.0	0.00
	25	1000	CLOUDY	6.52	.232	6	9.58	11.0	0.00
Begin → 2/1/99	30	0805	CLOUDY	9.19	.392	89	2.43	12.3	0.01
	35	1035	CLOUDY	6.26	.190	999	2.65	12.5	0.00
Begin → 2/2/99	38	0828	GRAY CLOUDY	5.63	.334	999	-5.11	12.9	0.00

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: Well Bailed Dry 2 Times on 2/1. Well completed on 2/2/99

SIGNATURE(s): Robert P. Stam

PAGE 1 OF

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: WHITE OAK
PROJECT NUMBER: 7867.0202
WEATHER: Cloudy, 40°
STATIC WATER LEVEL: 20.80
TOTAL WELL DEPTH: 30.60
ONE CASING VOLUME: 9.3 gal
START TIME: 1400 121698
END TIME:

SITE/LOCATION: SITE 9
WELL ID.: 09TW001
DATE: 121698
PERSONNEL: Ashe Notich
WELL TYPE: (PVC) (S.S.) or OTHER
MEASURING DEVICE: Horiba
ADJUSTMENT FACTOR: —0—

[ ] DOMESTIC WELL. [X] MONITORING WELL. [ ] OTHER

METHOD & REMARKS: Disposable bailer

	Approximate Volume (Gal)	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
	14	1400	Tan	6.3	0.412	421	5.61	15.5	
	8.5	1430	Tan	6.23	0.257	110	10.37	14.9	0.4
121798	8.75	1332	Tan	5.61	0.237	10	5.63	15.3	0
	13.00	1345	Dev.	stops	Well	Dry			
12-19-98	13.25	1100	Tan opaque	5.33	0.382	999	0.33	14.6	0.00
	16.5	1105	Tan opaque	5.42	0.286	999	1.53	14.6	0.01
121998	16.5	1106	Development	stops	Well	Dry			
12-20-98	16.75	1105	Tan opaque	5.25	0.332	999	2.08	15.0	0.00
	21.5	1116	tan opaque	5.50	0.258	999	1.59	15.0	0.01
	21.5	1116	tan opaque	Development	stops	well	Dry		

NOTE: All measurements to nearest 0.01 foot measured from top of well riser unless otherwise noted.

ADDITIONAL COMMENTS: Well development complete at 21.5 gallons well to be sampled at end of this shift to determine if additional temporary wells are needed.

SIGNATURE(s): [illegible]

PAGE 1 OF __

WELL DEVELOPMENT SHEET

PROJECT SITE NAME:	WHITE OAK	SITE/LOCATION	SITE 9
PROJECT NUMBER:	7867.0202	WELL ID.:	09TW002
WEATHER:	35° fog	DATE:	1-9-99
STATIC WATER LEVEL:	10.74	PERSONNEL:	D. Schnackenberg
TOTAL WELL DEPTH:	20.54	WELL TYPE:	(PVC), [S.S.], or OTHER
ONE CASING VOLUME:	9.32		
START TIME:	0955 1-9-99	MEASURING DEVICE:	Horiba
END TIME:	0810 1-11-99	ADJUSTMENT FACTOR:	—

[ ] DOMESTIC WELL. [X] MONITORING WELL. [ ] OTHER

METHOD & REMARKS: disposable bailer

	Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
	Initial	1000	tan, opaque	5.22	0.228	999	1.93	13.6	0.00
1-9-99	8.0 (dry)	1015	tan, opaque	5.19	0.224	999	1.31	14.0	0.00
1-10-99	16.0 (dry)	0900	"	5.23	0.204	999	4.53	14.2	0.00
1-10-99	23.0 (dry)	1115	cloudy, tan	5.51	0.137	570	4.61	12.8	0.00
1-10-99	30.0 (dry)	1530	" "	5.94	0.142	999	4.36	13.3	0.00
1-10-99	37.0 (DRY)	1634	" "	5.36	0.130	999	3.16	12.1	0.00
1-11-99	42.0 (dry)	0755	" "	5.13	0.223	890	3.05	13.5	0.00
1-11-99	47.0 (dry)	0810	" "	4.38	0.191	686	1.85	12.8	0.00

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted

ADDITIONAL COMMENTS:

SIGNATURE(s): David Schnackenberg

PAGE 1 OF 1

20.54
-10.74
9.80

9.8
×2.6
588
1960
2548

25.5
×.3
7.65

9.8
×1.7
686
980
1.666

7.65
1.67
9.32
×5
46.60

47.0 gal total

APPENDIX E

SLUG TEST DATA

Tetra Tech NUS Project No. 7687

TO: Mr. Ronald Kotun
Tetra Tech NUS/Pittsburgh

FROM: Mark Shoemaker
TtNUS/Stone Mountain

Subject: Addendum to Slug Test Report, Former NSWC-White Oak, CTO-298

DATE: May 17, 1999

This Addendum has been prepared to clarify items presented in the previously submitted Slug Test Report.

Three slugs were used to perform the slug tests. All were constructed of 1-inch diameter stainless steel. Lengths were 2-foot, 3-foot, and 4-foot. Choice of slug for each test was based on the length of the water column in a particular well, and the estimated recharge rate. For example, the longer slug was used for wells known to recharge quickly, and the short slug was used for slow recharge wells.

In most cases the thickness of the saturated zone was estimated. The estimates were based on relative elevations of the wells along with correlations to known geologic horizons in nearby wells. For example, assume two adjacent wells, one completed in the surficial aquifer, one in the bedrock aquifer. If bedrock was encountered at 50 feet bgs, and the depth to water is the shallow well was 10 feet, then the assumed saturated thickness for that well is 40 feet.

An accurate estimate of the saturated thickness of the bedrock aquifer could not be determined based on the results of the investigations. Therefore, an estimate of 150 feet was used. To determine the significance of this value in the data, several widely different values were used in the same data set. Results did not show significant impact to the resultant hydraulic conductivity value.

Please feel free to call me at (770) 413-0965 if you have any questions.

TETRA TECH NUS, INC.
2046W. Park Place Blvd. ■ Suite A ■ Stone Mountian, GA 30087
(770) 413-0965 ■ FAX (770) 413-6733 ■ www.tetratech.com

Tetra Tech NUS Project No. 7687

TO: Mr. Ronald Kotun
Tetra Tech NUS/Pittsburgh

FROM: Mark Shoemaker MLS
TtNUS/Stone Mountain

Subject: Slug Test Report, Former NSWC-White Oak, CTO-298

DATE: May 7, 1999

During March 1999, hydraulic conductivity (slug) tests were performed on the 44 newly-installed groundwater monitoring wells at the former NSWC-White Oak facility. This memorandum provides an overview of the effort and summarizes the results of the subsequent analysis.

The slug tests were performed using both InSitu Hermit 1000C and 2000 dataloggers with pressure transducers. A weighted stainless steel slug was used. Data were analyzed using AQTESOLV for Windows by HydroSOLVE, Inc.

Slug-in tests (falling head) and slug-out tests (rising head) were attempted on each well. When the height of the water column in a given well was less than the screen length (i.e., static water level was within the screened interval), slug-in tests were not performed. In this case, the non-saturated annular sandpack would quickly absorb the rising water thus giving an incorrect estimate of the hydraulic conductivity. Additionally, when the water column was less than five feet in length, no slug tests were performed. In such an instance, there is not enough space in the water column to allow the slug and transducer to be completely submerged. Data sets were screened in the field to determine if a rerun of a test in a particular well was necessary.

Results of the slug tests are summarized in the attached table. Individual data sets and plots are also attached. The sand and gravel formation typically yielded a hydraulic conductivity in the range of 10^{-4} to 10^{-5} ft/sec. The saprolite formation typically yielded a hydraulic conductivity in the range of 10^{-6} ft/sec. The bedrock formation typically yielded a hydraulic conductivity in the range of 10^{-6} to 10^{-7} ft/sec. However, depending on the amount of fracturing or connectivity of pore space in the bedrock, hydraulic conductivity ranged from as high as 10^{-4} ft/sec to as low as 10^{-9} ft/sec.

Please feel free to call me at (770) 413-0965 if you have any questions.

NSWC WHITE OAK
CTO-298
SLUG TEST SUMMARY TABLE

Well I.D.	Total Depth (ft btoc)	Depth to Water (ft btoc)	Length of Water Column (ft)	Slug In/Out	Hydraulic Cond. (K value) (ft/sec)	Screened Media	Notes
2GW100	50.02	33.64	16.38	in out	1.100E-04 1.217E-04	Saprolite	
2GW101	27.42	10.41	17.01	in out	9.887E-05 1.148E-04	Saprolite	
2GW102	39.35	5.74	33.61	in out	1.680E-06 2.086E-06	Bedrock	
2GW103	27.65	15.91	11.74	in out	3.026E-07 5.848E-07	Bedrock	
2GW104	36.5	6.4	30.1	in out	6.064E-08 2.267E-08	Bedrock	Poor Data
2GW105	39.69	24.38	15.31	in out out	NA 1.343E-06 1.092E-06	Bedrock	Poor data: thrown out
3GW102	45.59	4.87	40.72	in out	1.452E-05 1.968E-05	Bedrock	
3GW104	42.56	6.09	36.47	in out	3.994E-07 1.924E-07	Bedrock	
3GW107	25.37	20.81	4.56	in out	NA NA	Saprolite	Not enough water Not enough water

NSWC WHITE OAK
CTO-298
SLUG TEST SUMMARY TABLE

Well I.D.	Total Depth (ft btoc)	Depth to Water (ft btoc)	Length of Water Column (ft)	Slug In/Out	Hydraulic Cond. (K value) (ft/sec)	Screened Media	Notes
4GW101	47.89	30.85	17.04	in out	7.305E-05 5.342E-05	Sand and Gravel	
4GW102	48.99	45.31	3.68	in out	NA NA	Sand and Gravel	Not enough water Not enough water
4GW103	66.22	46.26	19.96	in out	2.307E-05 1.506E-05	Sand and Gravel	
4GW104	58.16	54.86	3.3	in out	NA NA	Sand and Gravel	Not enough water Not enough water
4GW105	88.04	63.51	24.53	in out	6.222E-05 6.670E-05	Sand and Gravel	
4GW106	73.7	56.62	17.08	in out	3.056E-04 2.347E-04	Sand and Gravel	
4GW107	85.56	62.22	23.34	in out	4.717E-04 1.919E-04	Sand and Gravel	
4GW108	43.86	41.67	2.19	in out	NA NA	Sand and Gravel	Not enough water Not enough water
4GW109	21.75	11.92	9.83	in out	NA 4.441E-06	Sand and Gravel	Not enough water
4GW110	27.02	25.47	1.55	in out	NA NA	Sand and Gravel	Not enough water Not enough water
7GW102	54.88	49.17	5.71	in out	NA 1.083E-05	Sand and Gravel	Not enough water
7GW103	51.78	45.7	6.08	in out	NA 2.052E-04	Sand and Gravel	Not enough water
7GW104	39.8	38.22	1.58	in out	NA NA	Sand and Gravel	Not enough water Not enough water
7GW105	54.75	44.31	10.44	in out	NA 1.952E-04	Sand and Gravel	Poor data: thrown out

NSWC WHITE OAK
CTO-298
SLUG TEST SUMMARY TABLE

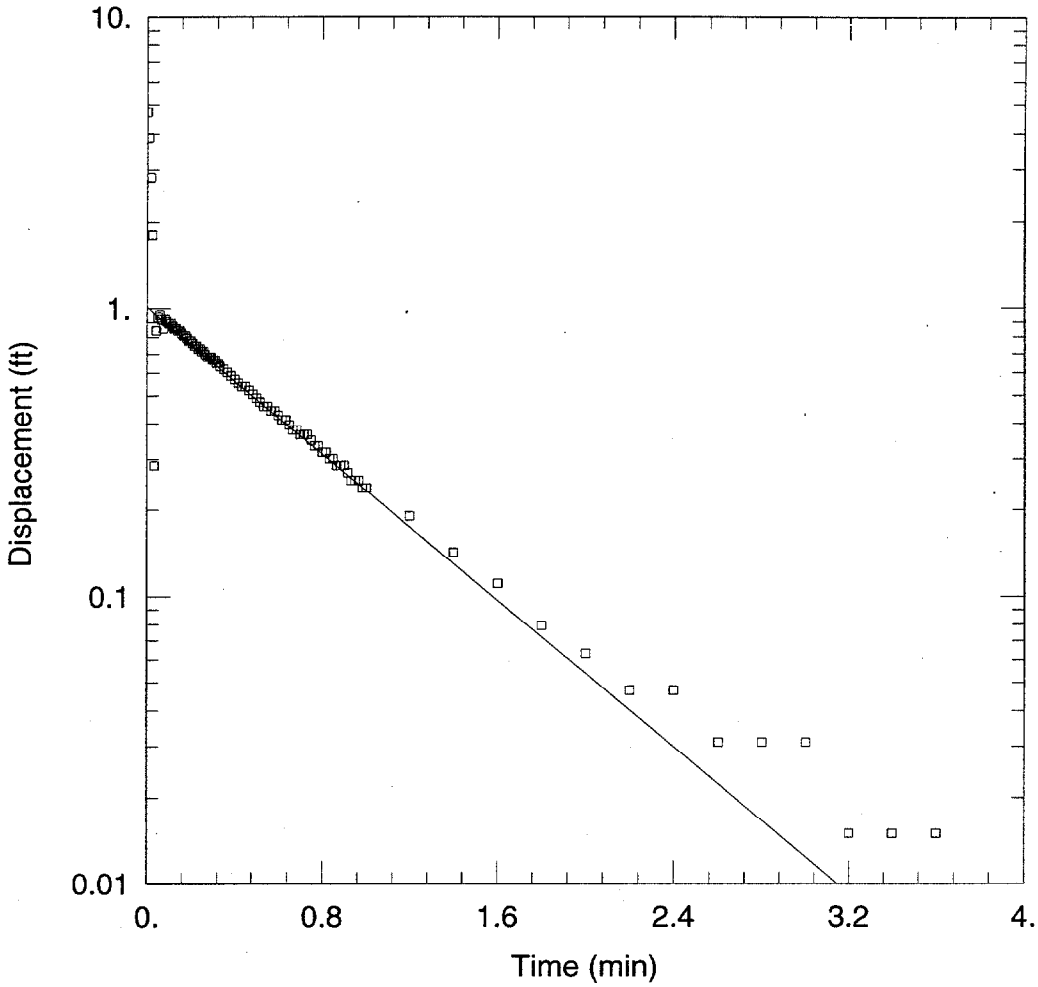
Well I.D.	Total Depth (ft btoc)	Depth to Water (ft btoc)	Length of Water Column (ft)	Slug In/Out	Hydraulic Cond. (K value) (ft/sec)	Screened Media	Notes
9GW100	12.3	6.51	5.79	in out	NA 9.547E-05	Sand and Gravel to Saprolite	Not enough water 7' screen
9GW101	13.4	3.86	9.54	in out	3.061E-05 3.480E-05	Sand and Gravel to Saprolite	8' screen
9GW102	56	41.72	14.28	in out	1.929E-06 1.720E-06	Bedrock	
9GW103	20	8.25	11.75	in out	2.626E-05 2.447E-05	Saprolite	
9GW104	35.6	11.08	24.52	in out	NA 6.523E-09	Bedrock	Poor data: thrown out
9GW105	38.15	3.4	34.75	in out	4.049E-06 1.736E-06	Bedrock	
9GW106	60.2	49.4	10.8	in out	NA 6.839E-05	Sand and Gravel	Poor data: thrown out
9GW107	59.4	3.8	55.6	in out	8.245E-07 6.784E-07	Bedrock	
9GW108	37	7.24	29.76	in out	NA 3.686E-06	Saprolite	Poor data: thrown out
9GW109	31.66	24.42	7.24	in out	NA 7.661E-07	Sand and Gravel	Not enough water
9GW110	20.54	9.7	10.84	in out	1.311E-05 1.362E-05	Saprolite	

NSWC WHITE OAK
CTO-298
SLUG TEST SUMMARY TABLE

Well I.D.	Total Depth (ft btoc)	Depth to Water (ft btoc)	Length of Water Column (ft)	Slug In/Out	Hydraulic Cond. (K value) (ft/sec)	Screened Media	Notes
11GW105	45.99	26.87	19.12	in	2.753E-05	Saprolite	
				out	3.037E-05		
11GW106	80.37	24.45	55.92	in	3.229E-06	Bedrock	
				out	2.701E-06		
11GW107	55.4	18.77	36.63	in	3.651E-05	Bedrock	
				out	3.525E-05		
11GW108	49.23	11.44	37.79	in	4.448E-06	Bedrock	
				out	3.890E-06		
11GW109	55.5	13.45	42.05	in	1.483E-05	Bedrock	
				out	1.912E-05		
11GW110	76.31	25.5	50.81	in	1.635E-06	Bedrock	
				out	1.090E-06		
11GW111	39.95	27.97	11.98	in	1.162E-05	Saprolite	Poor data
				out	4.658E-05		
				out	2.066E-05		
13GW02	30.08	15.62	14.46	in	2.267E-06	Saprolite	
				out	1.516E-06		
13GW03	30.7	17.42	13.28	in	1.268E-06	Saprolite	
				out	6.407E-07		
13GW04	75.05	23.2	51.85	in	3.039E-06	Bedrock	
				out	3.069E-06		

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW100
Slug-In Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-4.731	0.275	-0.682	0.7666	-0.333
0.0083	-3.873	0.2833	-0.682	0.7833	-0.333
0.0166	-2.825	0.2916	-0.682	0.8	-0.317
0.025	-1.793	0.3	-0.666	0.8166	-0.317
0.0333	-0.285	0.3083	-0.666	0.8333	-0.301
0.0416	-0.841	0.3166	-0.65	0.85	-0.301
0.05	-0.936	0.325	-0.65	0.8666	-0.285
0.0583	-0.952	0.3333	-0.634	0.8833	-0.285
0.0666	-0.92	0.35	-0.619	0.9	-0.285
0.075	-0.857	0.3666	-0.603	0.9166	-0.269
0.0833	-0.92	0.3833	-0.587	0.9333	-0.253
0.0916	-0.904	0.4	-0.571	0.95	-0.253
0.1	-0.889	0.4166	-0.555	0.9666	-0.253
0.1083	-0.889	0.4333	-0.539	0.9833	-0.238
0.1166	-0.873	0.45	-0.539	1	-0.238
0.125	-0.857	0.4666	-0.523	1.2	-0.19
0.1333	-0.857	0.4833	-0.507	1.4	-0.142
0.1416	-0.841	0.5	-0.492	1.6	-0.111
0.15	-0.841	0.5166	-0.476	1.8	-0.079
0.1583	-0.825	0.5333	-0.46	2	-0.063
0.1666	-0.809	0.55	-0.46	2.2	-0.047
0.175	-0.809	0.5666	-0.444	2.4	-0.047
0.1833	-0.793	0.5833	-0.444	2.6	-0.031
0.1916	-0.777	0.6	-0.428	2.8	-0.031
0.2	-0.777	0.6166	-0.412	3	-0.031
0.2083	-0.762	0.6333	-0.412	3.2	-0.015
0.2166	-0.746	0.65	-0.396	3.4	-0.015
0.225	-0.746	0.6666	-0.38	3.6	-0.015
0.2333	-0.73	0.6833	-0.38	3.8	0
0.2416	-0.73	0.7	-0.365	4	0
0.25	-0.714	0.7166	-0.365	4.2	0
0.2583	-0.714	0.7333	-0.365	4.4	0
0.2666	-0.698	0.75	-0.349	4.6	0



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE2~1\GRAPHS\100IN.AQT
Date: 05/07/99 Time: 14:55:21

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW100 Slug In Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 36.36 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

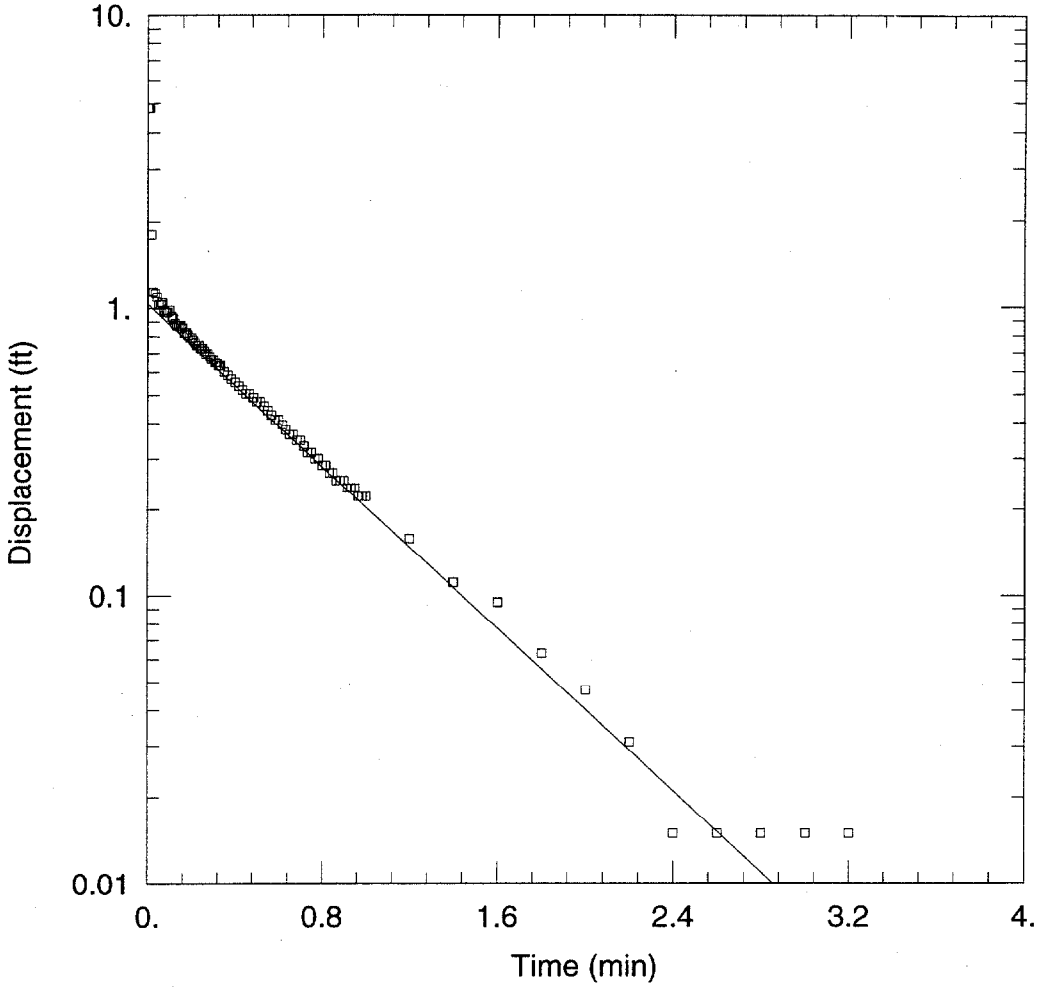
Initial Displacement: 4.731 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 16.38 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.00011 ft/sec
y0 = 1.009 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW100
Slug-Out Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	3.476	0.2666	0.698	0.7333	0.317
0.0083	4.825	0.275	0.698	0.75	0.317
0.0166	1.793	0.2833	0.682	0.7666	0.301
0.025	1.142	0.2916	0.666	0.7833	0.301
0.0333	1.127	0.3	0.666	0.8	0.285
0.0416	1.095	0.3083	0.65	0.8166	0.285
0.05	1.031	0.3166	0.65	0.8333	0.269
0.0583	1.031	0.325	0.634	0.85	0.269
0.0666	1.047	0.3333	0.634	0.8666	0.253
0.075	0.984	0.35	0.603	0.8833	0.253
0.0833	0.968	0.3666	0.587	0.9	0.253
0.0916	0.968	0.3833	0.571	0.9166	0.238
0.1	0.984	0.4	0.555	0.9333	0.238
0.1083	0.936	0.4166	0.539	0.95	0.238
0.1166	0.92	0.4333	0.523	0.9666	0.222
0.125	0.888	0.45	0.507	0.9833	0.222
0.1333	0.873	0.4666	0.507	1	0.222
0.1416	0.873	0.4833	0.492	1.2	0.158
0.15	0.873	0.5	0.476	1.4	0.111
0.1583	0.857	0.5166	0.476	1.6	0.095
0.1666	0.825	0.5333	0.46	1.8	0.063
0.175	0.825	0.55	0.444	2	0.047
0.1833	0.809	0.5666	0.428	2.2	0.031
0.1916	0.793	0.5833	0.412	2.4	0.015
0.2	0.793	0.6	0.412	2.6	0.015
0.2083	0.777	0.6166	0.396	2.8	0.015
0.2166	0.761	0.6333	0.38	3	0.015
0.225	0.746	0.65	0.365	3.2	0.015
0.2333	0.746	0.6666	0.365	3.4	0
0.2416	0.73	0.6833	0.349	3.6	0
0.25	0.73	0.7	0.349	3.8	0
0.2583	0.714	0.7166	0.333	4	0



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE2~1\GRAPHS\100OUT.AQT
Date: 05/07/99 Time: 14:55:36

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW100 Slug Out Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 36.36 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

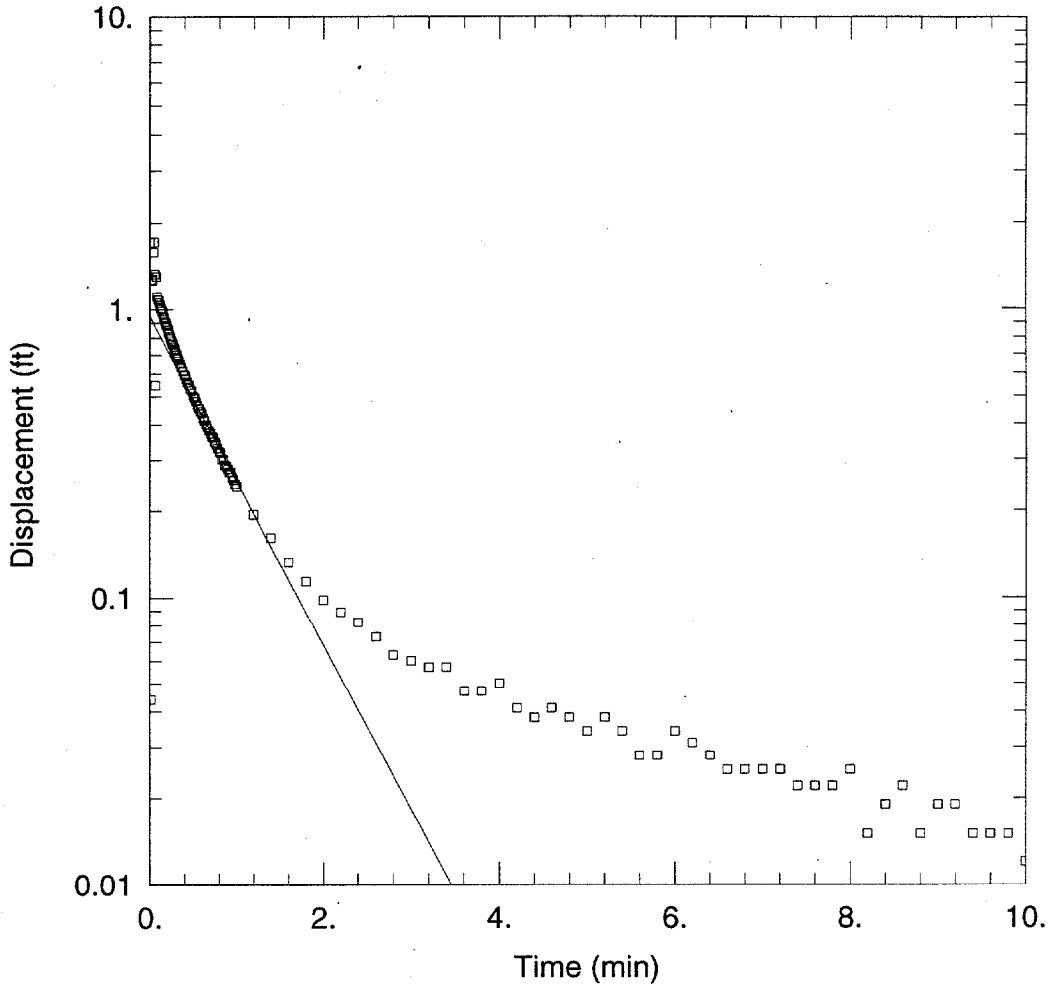
Initial Displacement: 4.825 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 16.38 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001217 ft/sec
y0 = 1.032 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW101
Slug-In Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.025	0.3666	-0.632	1.8	-0.114
0.0083	0.006	0.3833	-0.613	2	-0.098
0.0166	-0.044	0.4	-0.594	2.2	-0.089
0.025	-1.265	0.4166	-0.578	2.4	-0.082
0.0333	-1.272	0.4333	-0.562	2.6	-0.073
0.0416	-1.58	0.45	-0.55	2.8	-0.063
0.05	-1.708	0.4666	-0.534	3	-0.06
0.0583	-1.326	0.4833	-0.524	3.2	-0.057
0.0666	-0.547	0.5	-0.502	3.4	-0.057
0.075	-1.304	0.5166	-0.496	3.6	-0.047
0.0833	-1.11	0.5333	-0.483	3.8	-0.047
0.0916	-1.09	0.55	-0.467	4	-0.05
0.1	-1.075	0.5666	-0.457	4.2	-0.041
0.1083	-1.055	0.5833	-0.445	4.4	-0.038
0.1166	-1.033	0.6	-0.438	4.6	-0.041
0.125	-1.011	0.6166	-0.422	4.8	-0.038
0.1333	-0.998	0.6333	-0.413	5	-0.034
0.1416	-0.985	0.65	-0.4	5.2	-0.038
0.15	-0.966	0.6666	-0.391	5.4	-0.034
0.1583	-0.944	0.6833	-0.381	5.6	-0.028
0.1666	-0.935	0.7	-0.372	5.8	-0.028
0.175	-0.909	0.7166	-0.362	6	-0.034
0.1833	-0.896	0.7333	-0.359	6.2	-0.031
0.1916	-0.884	0.75	-0.346	6.4	-0.028
0.2	-0.865	0.7666	-0.34	6.6	-0.025
0.2083	-0.852	0.7833	-0.33	6.8	-0.025
0.2166	-0.836	0.8	-0.321	7	-0.025
0.225	-0.823	0.8166	-0.318	7.2	-0.025
0.2333	-0.807	0.8333	-0.302	7.4	-0.022
0.2416	-0.795	0.85	-0.302	7.6	-0.022
0.25	-0.782	0.8666	-0.289	7.8	-0.022
0.2583	-0.769	0.8833	-0.286	8	-0.025
0.2666	-0.76	0.9	-0.279	8.2	-0.015
0.275	-0.747	0.9166	-0.273	8.4	-0.019
0.2833	-0.734	0.9333	-0.273	8.6	-0.022
0.2916	-0.725	0.95	-0.263	8.8	-0.015
0.3	-0.712	0.9666	-0.257	9	-0.019
0.3083	-0.702	0.9833	-0.248	9.2	-0.019
0.3166	-0.69	1	-0.244	9.4	-0.015
0.325	-0.68	1.2	-0.194	9.6	-0.015
0.3333	-0.667	1.4	-0.162	9.8	-0.015
0.35	-0.651	1.6	-0.133	10	-0.012



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE2~1\GRAPHS\101IN.AQT
Date: 05/07/99 Time: 14:56:09

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW101 Slug In Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 39.59 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

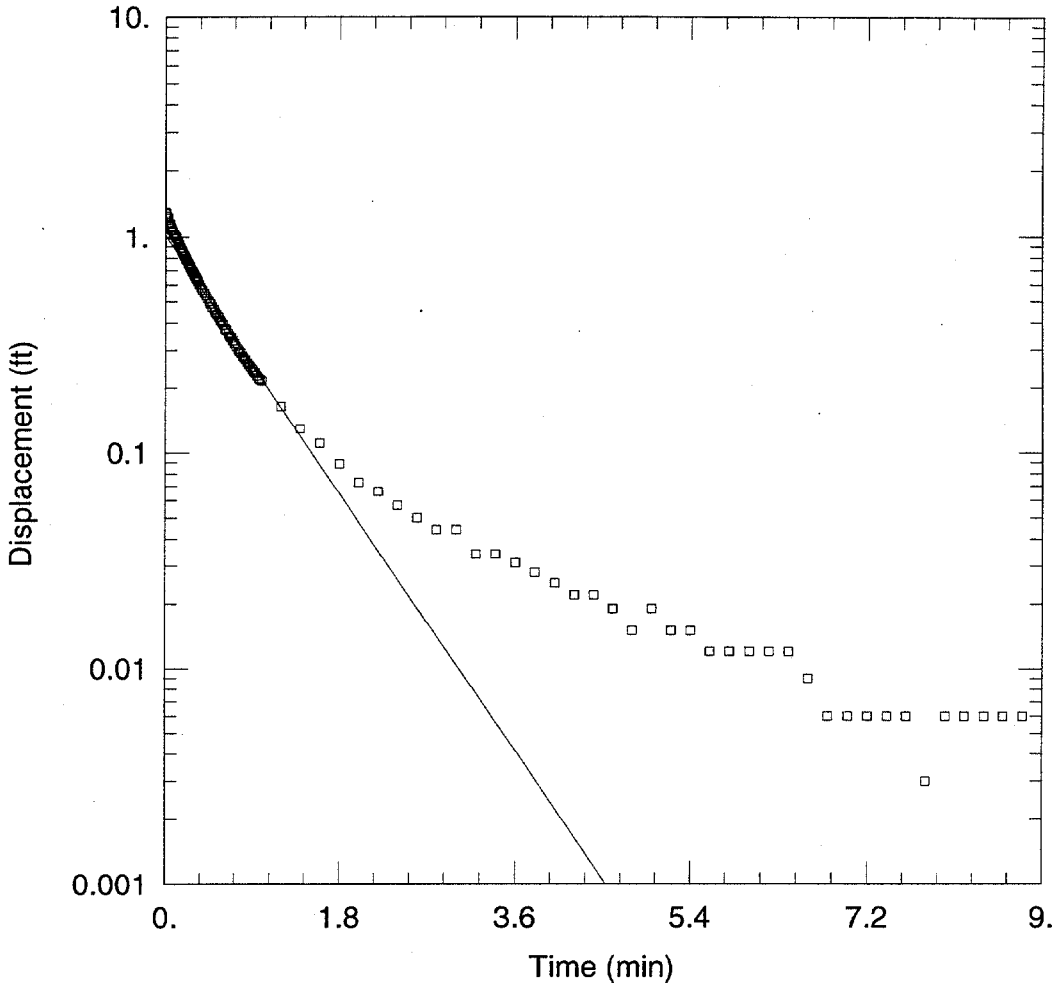
Initial Displacement: 1.708 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 17.01 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 9.887E-05 ft/sec
y0 = 0.9447 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW101
Slug-Out Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.303	0.35	0.604	1.4	0.13
0.0083	1.281	0.3666	0.585	1.6	0.111
0.0166	1.252	0.3833	0.569	1.8	0.089
0.025	1.224	0.4	0.55	2	0.073
0.0333	1.17	0.4166	0.534	2.2	0.066
0.0416	1.154	0.4333	0.518	2.4	0.057
0.05	1.128	0.45	0.502	2.6	0.05
0.0583	1.103	0.4666	0.489	2.8	0.044
0.0666	1.081	0.4833	0.473	3	0.044
0.075	1.068	0.5	0.461	3.2	0.034
0.0833	1.023	0.5166	0.448	3.4	0.034
0.0916	1.03	0.5333	0.438	3.6	0.031
0.1	1.008	0.55	0.426	3.8	0.028
0.1083	0.992	0.5666	0.413	4	0.025
0.1166	0.992	0.5833	0.403	4.2	0.022
0.125	0.957	0.6	0.394	4.4	0.022
0.1333	0.931	0.6166	0.378	4.6	0.019
0.1416	0.922	0.6333	0.372	4.8	0.015
0.15	0.899	0.65	0.359	5	0.019
0.1583	0.887	0.6666	0.349	5.2	0.015
0.1666	0.868	0.6833	0.343	5.4	0.015
0.175	0.852	0.7	0.333	5.6	0.012
0.1833	0.839	0.7166	0.324	5.8	0.012
0.1916	0.823	0.7333	0.314	6	0.012
0.2	0.81	0.75	0.305	6.2	0.012
0.2083	0.798	0.7666	0.298	6.4	0.012
0.2166	0.785	0.7833	0.292	6.6	0.009
0.225	0.772	0.8	0.283	6.8	0.006
0.2333	0.756	0.8166	0.276	7	0.006
0.2416	0.747	0.8333	0.27	7.2	0.006
0.25	0.731	0.85	0.263	7.4	0.006
0.2583	0.721	0.8666	0.257	7.6	0.006
0.2666	0.709	0.8833	0.251	7.8	0.003
0.275	0.696	0.9	0.244	8	0.006
0.2833	0.686	0.9166	0.238	8.2	0.006
0.2916	0.677	0.9333	0.235	8.4	0.006
0.3	0.664	0.95	0.228	8.6	0.006
0.3083	0.655	0.9666	0.222	8.8	0.006
0.3166	0.645	0.9833	0.219		
0.325	0.636	1	0.216		
0.3333	0.626	1.2	0.165		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE2~1\GRAPHS\101OUT.AQT
Date: 05/07/99 Time: 14:56:26

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW101 Slug Out Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 39.59 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.303 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 17.01 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

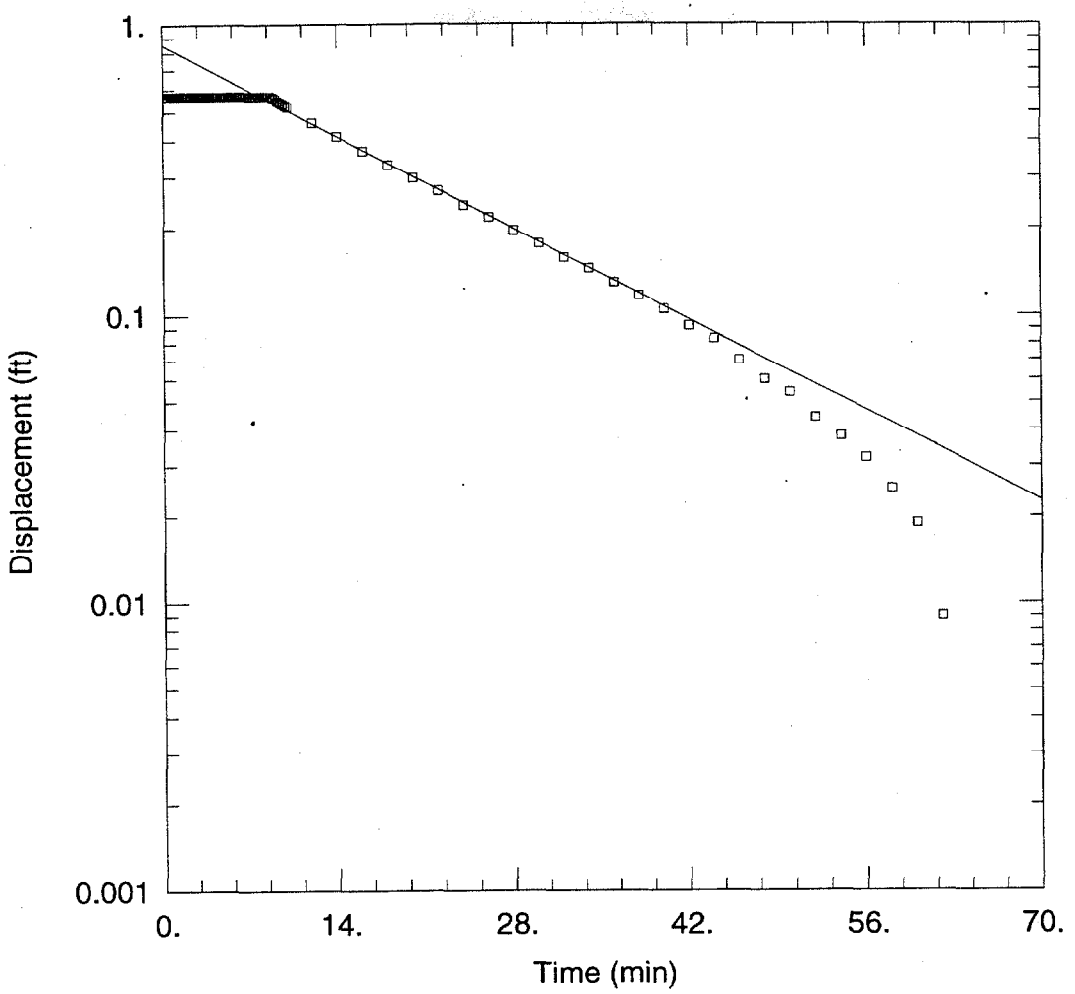
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001148 ft/sec
y0 = 1.011 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW102
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.012	0.1433	-0.569	0.2866	-0.569
0.0033	-0.569	0.1466	-0.569	0.29	-0.569
0.0066	-0.569	0.15	-0.569	0.2933	-0.569
0.01	-0.569	0.1533	-0.569	0.2966	-0.569
0.0133	-0.569	0.1566	-0.569	0.3	-0.569
0.0166	-0.569	0.16	-0.569	0.3033	-0.569
0.02	-0.569	0.1633	-0.569	0.3066	-0.569
0.0233	-0.569	0.1666	-0.569	0.31	-0.569
0.0266	-0.569	0.17	-0.569	0.3133	-0.569
0.03	-0.569	0.1733	-0.569	0.3166	-0.569
0.0333	-0.569	0.1766	-0.569	0.32	-0.569
0.0366	-0.569	0.18	-0.569	0.3233	-0.569
0.04	-0.569	0.1833	-0.569	0.3266	-0.569
0.0433	-0.569	0.1866	-0.569	0.33	-0.569
0.0466	-0.569	0.19	-0.569	0.3333	-0.569
0.05	-0.569	0.1933	-0.569	0.35	-0.569
0.0533	-0.569	0.1966	-0.569	0.3666	-0.569
0.0566	-0.569	0.2	-0.569	0.3833	-0.569
0.06	-0.569	0.2033	-0.569	0.4	-0.569
0.0633	-0.569	0.2066	-0.569	0.4166	-0.569
0.0666	-0.569	0.21	-0.569	0.4333	-0.569
0.07	-0.569	0.2133	-0.569	0.45	-0.569
0.0733	-0.569	0.2166	-0.569	0.4666	-0.569
0.0766	-0.569	0.22	-0.569	0.4833	-0.569
0.08	-0.569	0.2233	-0.569	0.5	-0.569
0.0833	-0.569	0.2266	-0.569	0.5166	-0.569
0.0866	-0.569	0.23	-0.569	0.5333	-0.569
0.09	-0.569	0.2333	-0.569	0.55	-0.569
0.0933	-0.569	0.2366	-0.569	0.5666	-0.569
0.0966	-0.569	0.24	-0.569	0.5833	-0.569
0.1	-0.569	0.2433	-0.569	0.6	-0.569
0.1033	-0.569	0.2466	-0.569	0.6166	-0.569
0.1066	-0.569	0.25	-0.569	0.6333	-0.569
0.11	-0.569	0.2533	-0.569	0.65	-0.569
0.1133	-0.569	0.2566	-0.569	0.6666	-0.569
0.1166	-0.569	0.26	-0.569	0.6833	-0.569
0.12	-0.569	0.2633	-0.569	0.7	-0.569
0.1233	-0.569	0.2666	-0.569	0.7166	-0.569
0.1266	-0.569	0.27	-0.569	0.7333	-0.569
0.13	-0.569	0.2733	-0.569	0.75	-0.569
0.1333	-0.569	0.2766	-0.569	0.7666	-0.569
0.1366	-0.569	0.28	-0.569	0.7833	-0.569
0.14	-0.569	0.2833	-0.569	0.8	-0.569

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 2GW102
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	-0.569	4.4	-0.569	10	-0.521
0.8333	-0.569	4.6	-0.569	12	-0.461
0.85	-0.569	4.8	-0.569	14	-0.413
0.8666	-0.569	5	-0.569	16	-0.369
0.8833	-0.569	5.2	-0.569	18	-0.331
0.9	-0.569	5.4	-0.569	20	-0.299
0.9166	-0.569	5.6	-0.569	22	-0.27
0.9333	-0.569	5.8	-0.569	24	-0.241
0.95	-0.569	6	-0.569	26	-0.219
0.9666	-0.569	6.2	-0.569	28	-0.197
0.9833	-0.569	6.4	-0.569	30	-0.178
1	-0.569	6.6	-0.569	32	-0.159
1.2	-0.569	6.8	-0.569	34	-0.146
1.4	-0.569	7	-0.569	36	-0.13
1.6	-0.569	7.2	-0.569	38	-0.117
1.8	-0.569	7.4	-0.569	40	-0.105
2	-0.569	7.6	-0.569	42	-0.092
2.2	-0.569	7.8	-0.569	44	-0.083
2.4	-0.569	8	-0.569	46	-0.07
2.6	-0.569	8.2	-0.569	48	-0.06
2.8	-0.569	8.4	-0.569	50	-0.054
3	-0.569	8.6	-0.569	52	-0.044
3.2	-0.569	8.8	-0.563	54	-0.038
3.4	-0.569	9	-0.557	56	-0.032
3.6	-0.569	9.2	-0.547	58	-0.025
3.8	-0.569	9.4	-0.541	60	-0.019
4	-0.569	9.6	-0.535	62	-0.009
4.2	-0.569	9.8	-0.528		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE2~1\GRAPHS\102IN.AQT
Date: 05/07/99 Time: 14:58:08

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW102 Slug In Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 144.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 0.569 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 33.61 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

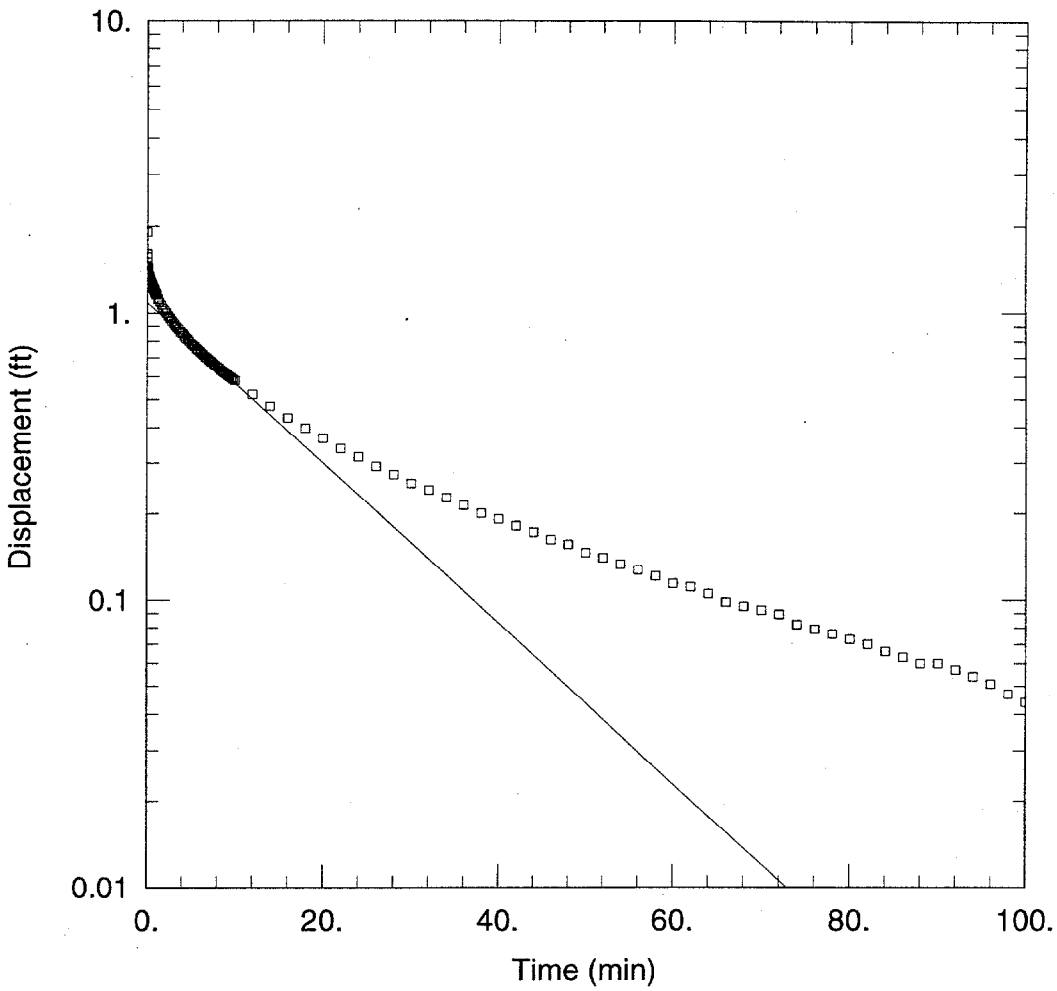
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.68E-06 ft/sec
y0 = 0.8526 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW102
Slug-Out Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	4.935	0.1433	1.362	0.2866	1.32
0.0033	1.909	0.1466	1.362	0.29	1.317
0.0066	1.594	0.15	1.362	0.2933	1.317
0.01	1.556	0.1533	1.359	0.2966	1.317
0.0133	1.445	0.1566	1.359	0.3	1.317
0.0166	1.435	0.16	1.359	0.3033	1.314
0.02	1.429	0.1633	1.355	0.3066	1.314
0.0233	1.451	0.1666	1.355	0.31	1.314
0.0266	1.432	0.17	1.352	0.3133	1.311
0.03	1.435	0.1733	1.352	0.3166	1.311
0.0333	1.422	0.1766	1.352	0.32	1.311
0.0366	1.419	0.18	1.352	0.3233	1.311
0.04	1.425	0.1833	1.349	0.3266	1.308
0.0433	1.416	0.1866	1.349	0.33	1.308
0.0466	1.413	0.19	1.349	0.3333	1.308
0.05	1.406	0.1933	1.346	0.35	1.301
0.0533	1.419	0.1966	1.346	0.3666	1.298
0.0566	1.432	0.2	1.343	0.3833	1.292
0.06	1.4	0.2033	1.343	0.4	1.289
0.0633	1.397	0.2066	1.343	0.4166	1.286
0.0666	1.397	0.21	1.34	0.4333	1.279
0.07	1.397	0.2133	1.34	0.45	1.276
0.0733	1.391	0.2166	1.34	0.4666	1.273
0.0766	1.394	0.22	1.336	0.4833	1.266
0.08	1.391	0.2233	1.336	0.5	1.263
0.0833	1.406	0.2266	1.336	0.5166	1.26
0.0866	1.381	0.23	1.336	0.5333	1.257
0.09	1.391	0.2333	1.333	0.55	1.25
0.0933	1.384	0.2366	1.333	0.5666	1.247
0.0966	1.384	0.24	1.333	0.5833	1.244
0.1	1.378	0.2433	1.333	0.6	1.241
0.1033	1.381	0.2466	1.33	0.6166	1.238
0.1066	1.378	0.25	1.33	0.6333	1.235
0.11	1.378	0.2533	1.33	0.65	1.231
0.1133	1.375	0.2566	1.327	0.6666	1.228
0.1166	1.375	0.26	1.327	0.6833	1.222
0.12	1.371	0.2633	1.327	0.7	1.219
0.1233	1.371	0.2666	1.324	0.7166	1.215
0.1266	1.371	0.27	1.324	0.7333	1.212
0.13	1.368	0.2733	1.324	0.75	1.209
0.1333	1.368	0.2766	1.324	0.7666	1.206
0.1366	1.365	0.28	1.32	0.7833	1.203
0.14	1.365	0.2833	1.32	0.8	1.2

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 2GW102
Slug-Out Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	1.196	5.6	0.754	34	0.226
0.8333	1.193	5.8	0.744	36	0.213
0.85	1.193	6	0.735	38	0.2
0.8666	1.187	6.2	0.726	40	0.191
0.8833	1.184	6.4	0.716	42	0.181
0.9	1.18	6.6	0.706	44	0.172
0.9166	1.177	6.8	0.7	46	0.162
0.9333	1.174	7	0.69	48	0.156
0.95	1.174	7.2	0.681	50	0.146
0.9666	1.171	7.4	0.675	52	0.14
0.9833	1.168	7.6	0.665	54	0.133
1	1.165	7.8	0.658	56	0.127
1.2	1.126	8	0.649	58	0.121
1.4	1.095	8.2	0.643	60	0.114
1.6	1.069	8.4	0.633	62	0.111
1.8	1.044	8.6	0.627	64	0.105
2	1.018	8.8	0.62	66	0.098
2.2	0.999	9	0.614	68	0.095
2.4	0.977	9.2	0.607	70	0.092
2.6	0.958	9.4	0.601	72	0.089
2.8	0.939	9.6	0.595	74	0.082
3	0.922	9.8	0.588	76	0.079
3.2	0.907	10	0.582	78	0.076
3.4	0.891	12	0.522	80	0.073
3.6	0.878	14	0.474	82	0.07
3.8	0.862	16	0.432	84	0.066
4	0.849	18	0.397	86	0.063
4.2	0.834	20	0.366	88	0.06
4.4	0.821	22	0.337	90	0.06
4.6	0.811	24	0.315	92	0.057
4.8	0.799	26	0.292	94	0.054
5	0.786	28	0.273	96	0.051
5.2	0.776	30	0.254	98	0.047
5.4	0.767	32	0.241	100	0.044



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE2~1\RAWDAT~1\102OUT.AQT
Date: 05/05/99 Time: 09:29:22

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW102 Slug Out Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 144.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.909 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 33.61 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

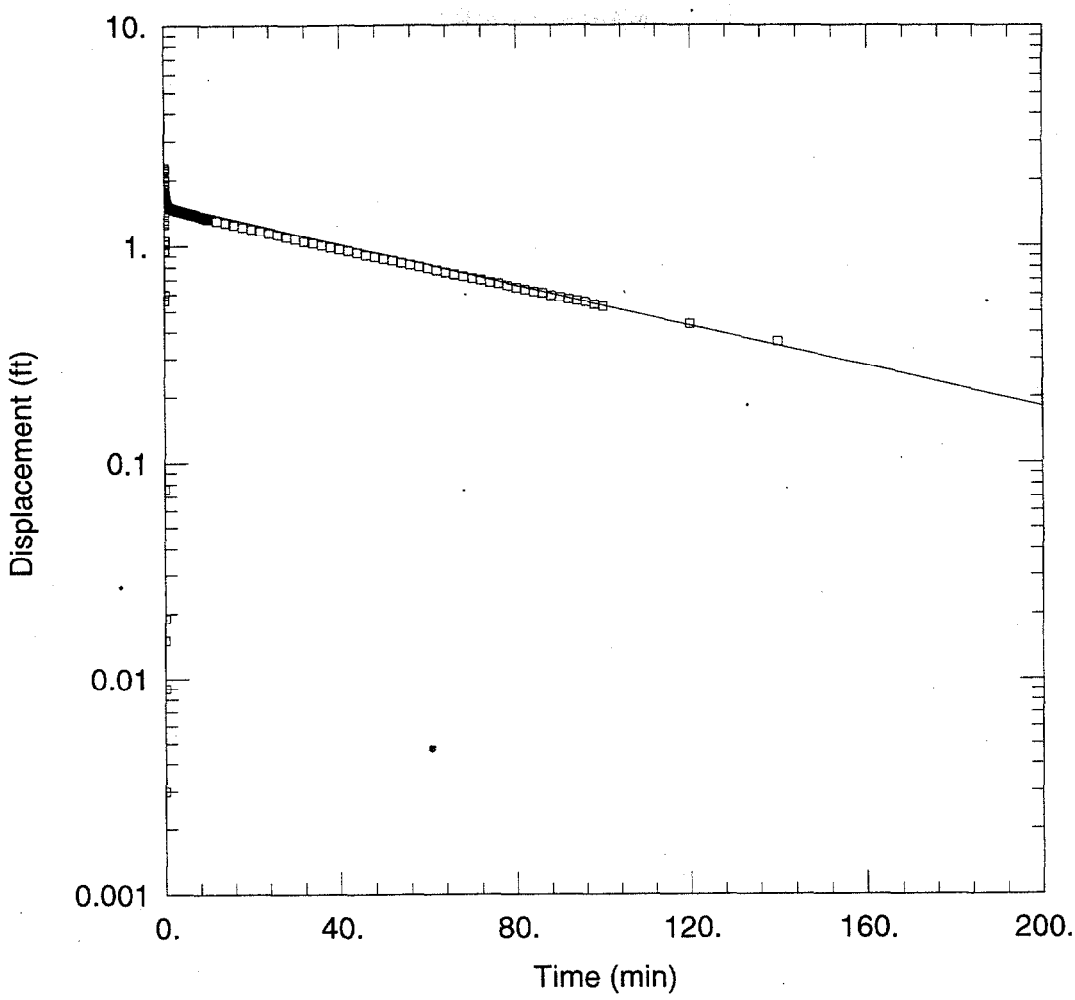
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.086E-06 ft/sec
y0 = 1.086 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW103
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.019	0.1433	-1.621	0.2866	-1.624
0.0033	0.003	0.1466	-1.76	0.29	-1.621
0.0066	-0.003	0.15	-1.665	0.2933	-1.621
0.01	-0.019	0.1533	-1.593	0.2966	-1.621
0.0133	-0.003	0.1566	-1.697	0.3	-1.621
0.0166	-0.009	0.16	-1.71	0.3033	-1.618
0.02	-0.076	0.1633	-1.618	0.3066	-1.618
0.0233	0	0.1666	-1.643	0.31	-1.618
0.0266	-0.015	0.17	-1.703	0.3133	-1.615
0.03	-0.563	0.1733	-1.653	0.3166	-1.615
0.0333	-1.323	0.1766	-1.624	0.32	-1.615
0.0366	-0.953	0.18	-1.675	0.3233	-1.612
0.04	-1.982	0.1833	-1.675	0.3266	-1.612
0.0433	-2.084	0.1866	-1.631	0.33	-1.612
0.0466	-1.669	0.19	-1.65	0.3333	-1.612
0.05	-2.099	0.1933	-1.675	0.35	-1.605
0.0533	-1.26	0.1966	-1.646	0.3666	-1.599
0.0566	-0.946	0.2	-1.637	0.3833	-1.596
0.06	-2.289	0.2033	-1.659	0.4	-1.589
0.0633	-2.175	0.2066	-1.656	0.4166	-1.586
0.0666	-1.285	0.21	-1.637	0.4333	-1.58
0.07	-1.916	0.2133	-1.646	0.45	-1.577
0.0733	-2.226	0.2166	-1.656	0.4666	-1.57
0.0766	-1.532	0.22	-1.64	0.4833	-1.567
0.08	-1.722	0.2233	-1.637	0.5	-1.564
0.0833	-2.242	0.2266	-1.646	0.5166	-1.558
0.0866	-1.767	0.23	-1.643	0.5333	-1.555
0.09	-0.598	0.2333	-1.634	0.55	-1.548
0.0933	-1.057	0.2366	-1.64	0.5666	-1.545
0.0966	-2.942	0.24	-1.643	0.5833	-1.542
0.1	-1.995	0.2433	-1.634	0.6	-1.536
0.1033	-1.019	0.2466	-1.634	0.6166	-1.532
0.1066	-1.444	0.25	-1.637	0.6333	-1.529
0.11	-2.001	0.2533	-1.634	0.65	-1.526
0.1133	-1.821	0.2566	-1.631	0.6666	-1.523
0.1166	-1.529	0.26	-1.634	0.6833	-1.52
0.12	-1.57	0.2633	-1.634	0.7	-1.52
0.1233	-1.878	0.2666	-1.627	0.7166	-1.517
0.1266	-1.684	0.27	-1.627	0.7333	-1.513
0.13	-1.51	0.2733	-1.627	0.75	-1.51
0.1333	-1.729	0.2766	-1.627	0.7666	-1.51
0.1366	-1.776	0.28	-1.624	0.7833	-1.507
0.14	-1.58	0.2833	-1.624	0.8	-1.507

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 2GW103
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	-1.507	5.8	-1.409	38	-0.988
0.8333	-1.504	6	-1.403	40	-0.969
0.85	-1.504	6.2	-1.399	42	-0.95
0.8666	-1.504	6.4	-1.396	44	-0.931
0.8833	-1.504	6.6	-1.393	46	-0.908
0.9	-1.504	6.8	-1.39	48	-0.893
0.9166	-1.504	7	-1.387	50	-0.874
0.9333	-1.501	7.2	-1.384	52	-0.858
0.95	-1.501	7.4	-1.38	54	-0.839
0.9666	-1.501	7.6	-1.377	56	-0.823
0.9833	-1.501	7.8	-1.374	58	-0.804
1	-1.501	8	-1.371	60	-0.788
1.2	-1.494	8.2	-1.368	62	-0.772
1.4	-1.491	8.4	-1.361	64	-0.756
1.6	-1.485	8.6	-1.358	66	-0.741
1.8	-1.482	8.8	-1.355	68	-0.728
2	-1.479	9	-1.352	70	-0.712
2.2	-1.472	9.2	-1.352	72	-0.699
2.4	-1.469	9.4	-1.346	74	-0.684
2.6	-1.466	9.6	-1.342	76	-0.674
2.8	-1.463	9.8	-1.339	78	-0.658
3	-1.46	10	-1.336	80	-0.646
3.2	-1.456	12	-1.308	82	-0.633
3.4	-1.45	14	-1.279	84	-0.62
3.6	-1.447	16	-1.25	86	-0.611
3.8	-1.441	18	-1.222	88	-0.595
4	-1.437	20	-1.197	90	-0.585
4.2	-1.434	22	-1.171	92	-0.573
4.4	-1.431	24	-1.146	94	-0.563
4.6	-1.428	26	-1.124	96	-0.554
4.8	-1.425	28	-1.098	98	-0.541
5	-1.422	30	-1.076	100	-0.528
5.2	-1.418	32	-1.051	120	-0.437
5.4	-1.415	34	-1.032	140	-0.361
5.6	-1.409	36	-1.01		



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 09:38:34

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW103 Slug In Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 134.1 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.289 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 11.74 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

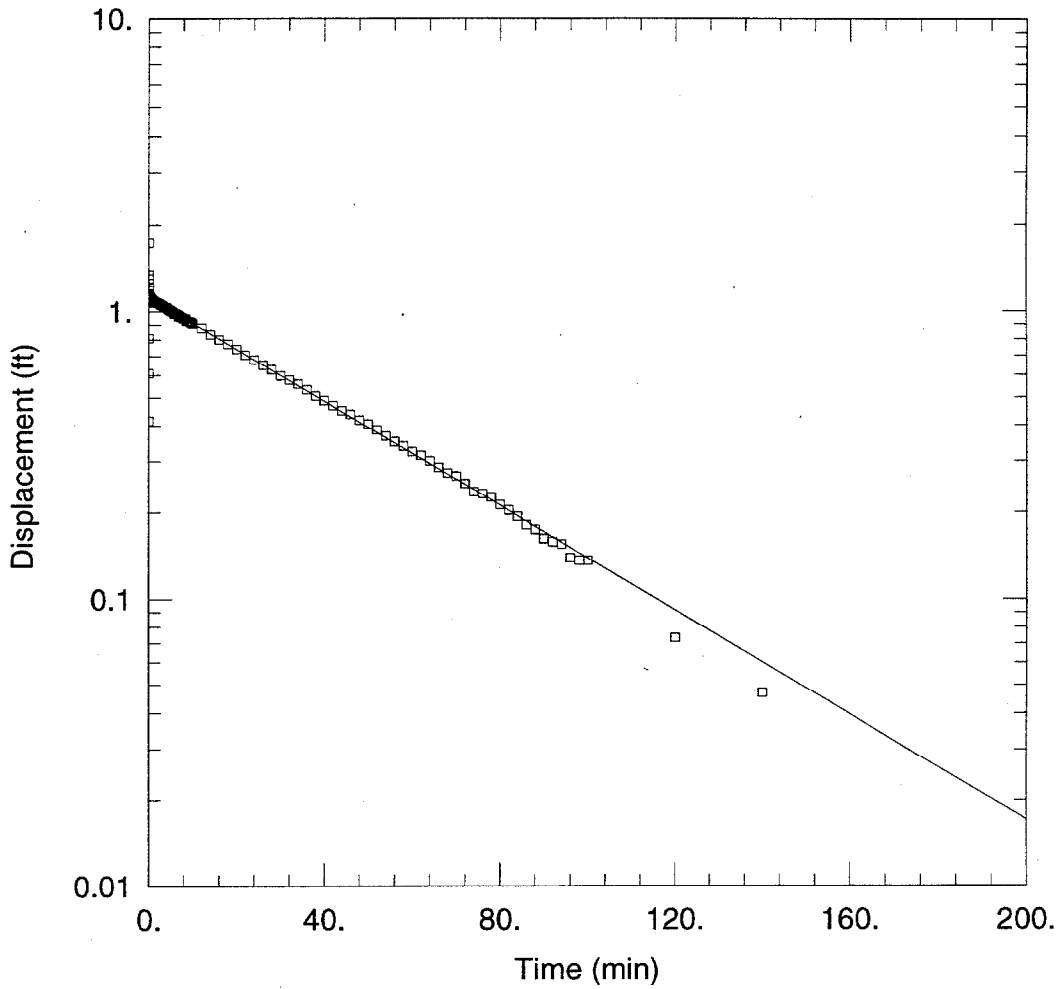
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.026E-07 ft/sec
y0 = 1.573 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW103
Slug-Out Test March 7, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	5.264	0.3833	1.13	2.2	1.073
0.0083	0.416	0.4	1.127	2.4	1.067
0.0166	0.609	0.4166	1.127	2.6	1.057
0.025	1.728	0.4333	1.124	2.8	1.057
0.0333	1.308	0.45	1.124	3	1.051
0.0416	0.81	0.4666	1.124	3.2	1.048
0.05	1.191	0.4833	1.121	3.4	1.041
0.0583	1.343	0.5	1.121	3.6	1.038
0.0666	1.083	0.5166	1.121	3.8	1.035
0.075	1.073	0.5333	1.121	4	1.032
0.0833	1.21	0.55	1.118	4.2	1.026
0.0916	1.159	0.5666	1.118	4.4	1.019
0.1	1.105	0.5833	1.115	4.6	1.013
0.1083	1.143	0.6	1.115	4.8	1.01
0.1166	1.165	0.6166	1.115	5	1.007
0.125	1.134	0.6333	1.111	5.2	1.003
0.1333	1.13	0.65	1.108	5.4	1
0.1416	1.146	0.6666	1.111	5.6	0.994
0.15	1.14	0.6833	1.111	5.8	0.981
0.1583	1.134	0.7	1.108	6	0.987
0.1666	1.137	0.7166	1.108	6.2	0.981
0.175	1.14	0.7333	1.111	6.4	0.981
0.1833	1.134	0.75	1.108	6.6	0.975
0.1916	1.134	0.7666	1.108	6.8	0.962
0.2	1.137	0.7833	1.108	7	0.965
0.2083	1.137	0.8	1.105	7.2	0.959
0.2166	1.134	0.8166	1.102	7.4	0.956
0.225	1.134	0.8333	1.105	7.6	0.953
0.2333	1.134	0.85	1.099	7.8	0.946
0.2416	1.134	0.8666	1.105	8	0.946
0.25	1.134	0.8833	1.105	8.2	0.946
0.2583	1.134	0.9	1.095	8.4	0.943
0.2666	1.134	0.9166	1.102	8.6	0.927
0.275	1.134	0.9333	1.102	8.8	0.927
0.2833	1.134	0.95	1.099	9	0.924
0.2916	1.13	0.9666	1.102	9.2	0.924
0.3	1.13	0.9833	1.095	9.4	0.921
0.3083	1.134	1	1.102	9.6	0.918
0.3166	1.13	1.2	1.092	9.8	0.914
0.325	1.13	1.4	1.089	10	0.908
0.3333	1.13	1.6	1.089	12	0.876
0.35	1.13	1.8	1.083	14	0.832
0.3666	1.127	2	1.08	16	0.8

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 2GW103
Slug-Out Test March 7, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	0.771	48	0.419	78	0.225
20	0.74	50	0.406	80	0.212
22	0.705	52	0.387	82	0.203
24	0.679	54	0.368	84	0.193
26	0.651	56	0.352	86	0.181
28	0.629	58	0.339	88	0.174
30	0.597	60	0.324	90	0.162
32	0.578	62	0.314	92	0.158
34	0.559	64	0.301	94	0.155
36	0.533	66	0.285	96	0.139
38	0.508	68	0.273	98	0.136
40	0.489	70	0.266	100	0.136
42	0.47	72	0.25	120	0.073
44	0.451	74	0.235	140	0.047
46	0.438	76	0.231		



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 09:43:48

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW103 Slug Out Test
Test Date: March 7, 1999

AQUIFER DATA

Saturated Thickness: 134.1 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.728 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 11.74 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

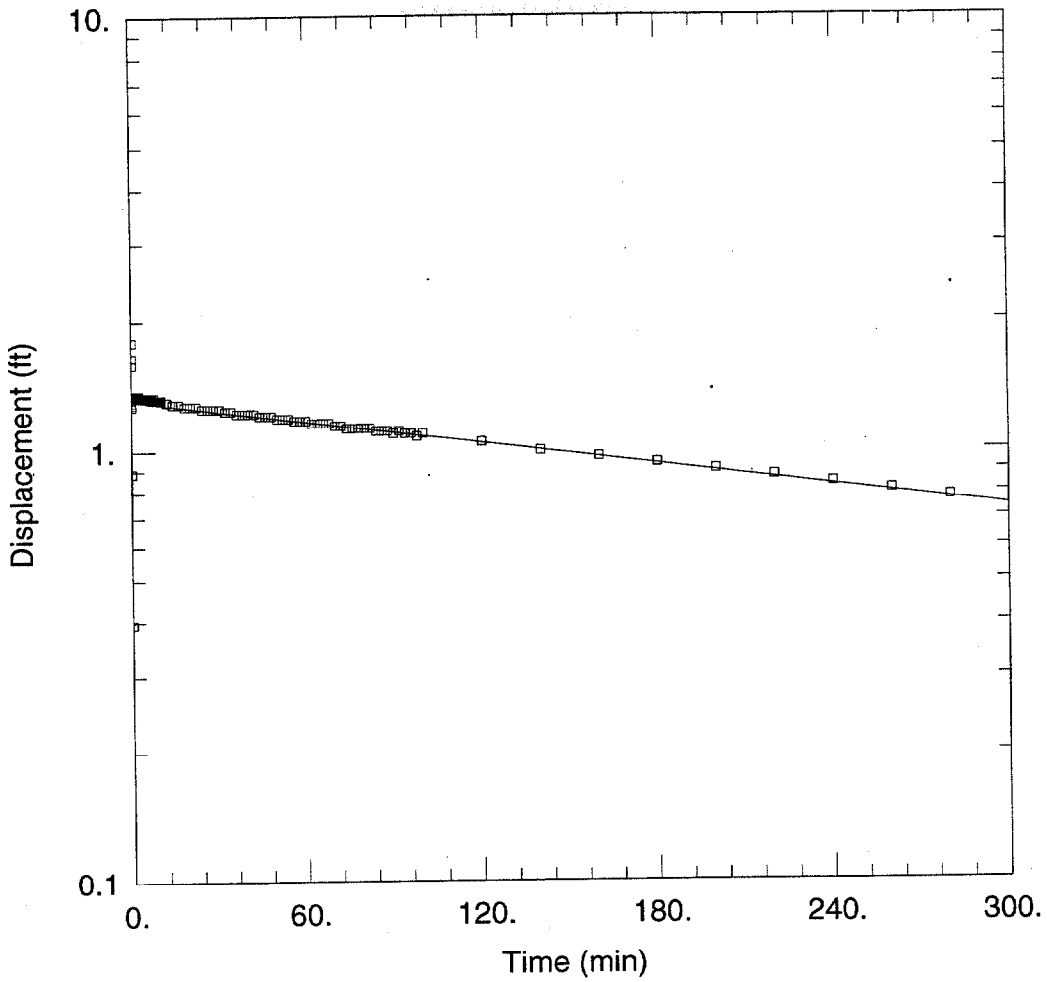
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 5.848E-07 ft/sec
y0 = 1.123 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW104
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.381	0.3833	-1.333	2.2	-1.333
0.0083	-1.587	0.4	-1.333	2.4	-1.349
0.0166	-1.651	0.4166	-1.349	2.6	-1.333
0.025	-1.794	0.4333	-1.349	2.8	-1.333
0.0333	-0.396	0.45	-1.333	3	-1.333
0.0416	-0.889	0.4666	-1.333	3.2	-1.333
0.05	-1.27	0.4833	-1.333	3.4	-1.333
0.0583	-1.285	0.5	-1.349	3.6	-1.333
0.0666	-1.301	0.5166	-1.333	3.8	-1.333
0.075	-1.317	0.5333	-1.349	4	-1.333
0.0833	-1.333	0.55	-1.333	4.2	-1.333
0.0916	-1.333	0.5666	-1.349	4.4	-1.333
0.1	-1.333	0.5833	-1.333	4.6	-1.333
0.1083	-1.349	0.6	-1.349	4.8	-1.333
0.1166	-1.333	0.6166	-1.349	5	-1.333
0.125	-1.349	0.6333	-1.349	5.2	-1.333
0.1333	-1.333	0.65	-1.349	5.4	-1.333
0.1416	-1.333	0.6666	-1.333	5.6	-1.333
0.15	-1.333	0.6833	-1.333	5.8	-1.333
0.1583	-1.349	0.7	-1.349	6	-1.333
0.1666	-1.333	0.7166	-1.349	6.2	-1.333
0.175	-1.333	0.7333	-1.349	6.4	-1.333
0.1833	-1.349	0.75	-1.349	6.6	-1.333
0.1916	-1.333	0.7666	-1.349	6.8	-1.333
0.2	-1.349	0.7833	-1.333	7	-1.317
0.2083	-1.333	0.8	-1.349	7.2	-1.317
0.2166	-1.333	0.8166	-1.349	7.4	-1.317
0.225	-1.349	0.8333	-1.349	7.6	-1.333
0.2333	-1.333	0.85	-1.349	7.8	-1.317
0.2416	-1.333	0.8666	-1.333	8	-1.317
0.25	-1.333	0.8833	-1.333	8.2	-1.317
0.2583	-1.333	0.9	-1.333	8.4	-1.317
0.2666	-1.333	0.9166	-1.349	8.6	-1.317
0.275	-1.333	0.9333	-1.333	8.8	-1.317
0.2833	-1.333	0.95	-1.333	9	-1.317
0.2916	-1.333	0.9666	-1.333	9.2	-1.317
0.3	-1.333	0.9833	-1.349	9.4	-1.317
0.3083	-1.333	1	-1.333	9.6	-1.317
0.3166	-1.333	1.2	-1.333	9.8	-1.317
0.325	-1.333	1.4	-1.349	10	-1.317
0.3333	-1.333	1.6	-1.349	12	-1.301
0.35	-1.333	1.8	-1.349	14	-1.285
0.3666	-1.333	2	-1.349	16	-1.285

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 2GW104
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	-1.27	52	-1.19	86	-1.111
20	-1.27	54	-1.19	88	-1.111
22	-1.27	56	-1.174	90	-1.095
24	-1.254	58	-1.174	92	-1.111
26	-1.254	60	-1.174	94	-1.095
28	-1.254	62	-1.158	96	-1.095
30	-1.254	64	-1.158	98	-1.079
32	-1.238	66	-1.158	100	-1.095
34	-1.238	68	-1.158	120	-1.047
36	-1.222	70	-1.143	140	-1
38	-1.222	72	-1.143	160	-0.968
40	-1.222	74	-1.127	180	-0.936
42	-1.222	76	-1.127	200	-0.904
44	-1.206	78	-1.127	220	-0.873
46	-1.206	80	-1.127	240	-0.841
48	-1.206	82	-1.127	260	-0.809
50	-1.19	84	-1.111	280	-0.777



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE2~1\GRAPHS\104IN.AQT
Date: 05/10/99 Time: 15:08:03

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW104 Slug In Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 143.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.794 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 30.1 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

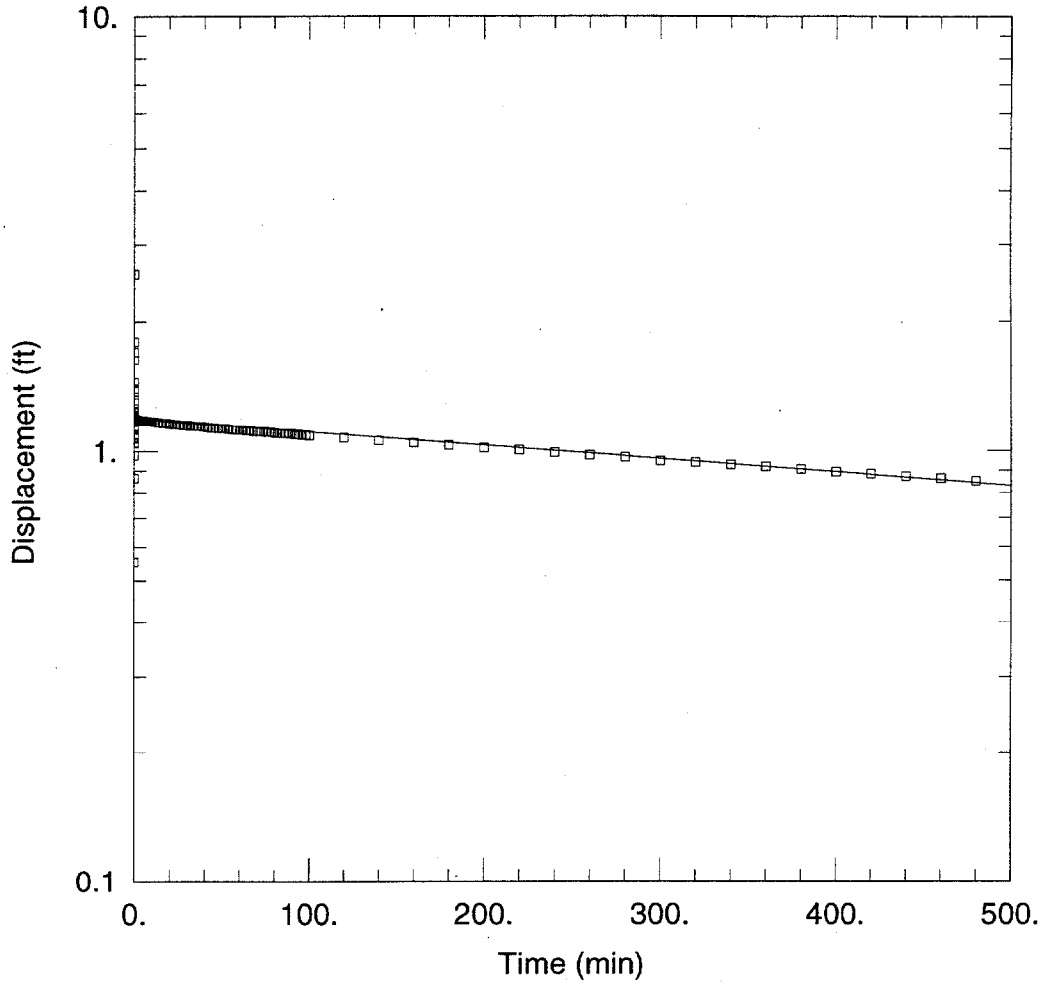
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.064E-08 ft/sec
y0 = 1.307 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW104
Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	2.581	0.1433	1.199	0.2866	1.189
0.0033	4.65	0.1466	1.186	0.29	1.189
0.0066	1.186	0.15	1.193	0.2933	1.189
0.01	1.447	0.1533	1.193	0.2966	1.189
0.0133	1.7	0.1566	1.189	0.3	1.189
0.0166	0.551	0.16	1.196	0.3033	1.189
0.02	1.798	0.1633	1.189	0.3066	1.189
0.0233	1.069	0.1666	1.189	0.31	1.189
0.0266	1.043	0.17	1.193	0.3133	1.186
0.03	1.629	0.1733	1.189	0.3166	1.189
0.0333	0.867	0.1766	1.193	0.32	1.186
0.0366	1.378	0.18	1.189	0.3233	1.186
0.04	1.313	0.1833	1.189	0.3266	1.189
0.0433	0.978	0.1866	1.193	0.33	1.186
0.0466	1.395	0.19	1.189	0.3333	1.186
0.05	1.079	0.1933	1.189	0.35	1.186
0.0533	1.193	0.1966	1.189	0.3666	1.186
0.0566	1.313	0.2	1.189	0.3833	1.186
0.06	1.046	0.2033	1.189	0.4	1.186
0.0633	1.297	0.2066	1.189	0.4166	1.186
0.0666	1.199	0.21	1.189	0.4333	1.186
0.07	1.121	0.2133	1.189	0.45	1.183
0.0733	1.297	0.2166	1.189	0.4666	1.183
0.0766	1.134	0.22	1.189	0.4833	1.183
0.08	1.215	0.2233	1.189	0.5	1.183
0.0833	1.235	0.2266	1.189	0.5166	1.183
0.0866	1.144	0.23	1.189	0.5333	1.183
0.09	1.241	0.2333	1.189	0.55	1.183
0.0933	1.183	0.2366	1.189	0.5666	1.183
0.0966	1.183	0.24	1.189	0.5833	1.183
0.1	1.229	0.2433	1.189	0.6	1.183
0.1033	1.167	0.2466	1.189	0.6166	1.183
0.1066	1.209	0.25	1.189	0.6333	1.183
0.11	1.202	0.2533	1.189	0.65	1.183
0.1133	1.176	0.2566	1.189	0.6666	1.183
0.1166	1.215	0.26	1.189	0.6833	1.183
0.12	1.183	0.2633	1.189	0.7	1.183
0.1233	1.193	0.2666	1.189	0.7166	1.183
0.1266	1.202	0.27	1.189	0.7333	1.183
0.13	1.183	0.2733	1.189	0.75	1.183
0.1333	1.199	0.2766	1.189	0.7666	1.183
0.1366	1.193	0.28	1.189	0.7833	1.183
0.14	1.189	0.2833	1.189	0.8	1.183

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 2GW104
Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	1.183	7.4	1.173	70	1.108
0.8333	1.183	7.6	1.17	72	1.108
0.85	1.183	7.8	1.17	74	1.108
0.8666	1.183	8	1.17	76	1.105
0.8833	1.183	8.2	1.17	78	1.105
0.9	1.183	8.4	1.17	80	1.101
0.9166	1.183	8.6	1.17	82	1.098
0.9333	1.183	8.8	1.17	84	1.098
0.95	1.183	9	1.17	86	1.098
0.9666	1.183	9.2	1.17	88	1.098
0.9833	1.183	9.4	1.17	90	1.095
1	1.183	9.6	1.17	92	1.092
1.2	1.18	9.8	1.17	94	1.092
1.4	1.18	10	1.17	96	1.088
1.6	1.18	12	1.167	98	1.088
1.8	1.18	14	1.163	100	1.085
2	1.176	16	1.16	120	1.072
2.2	1.176	18	1.16	140	1.056
2.4	1.176	20	1.157	160	1.043
2.6	1.176	22	1.153	180	1.03
2.8	1.176	24	1.153	200	1.017
3	1.176	26	1.15	220	1.004
3.2	1.176	28	1.147	240	0.991
3.4	1.176	30	1.147	260	0.978
3.6	1.176	32	1.144	280	0.965
3.8	1.176	34	1.141	300	0.948
4	1.176	36	1.141	320	0.939
4.2	1.176	38	1.141	340	0.929
4.4	1.173	40	1.137	360	0.919
4.6	1.173	42	1.134	380	0.906
4.8	1.173	44	1.131	400	0.893
5	1.176	46	1.131	420	0.883
5.2	1.173	48	1.127	440	0.873
5.4	1.173	50	1.127	460	0.864
5.6	1.173	52	1.127	480	0.851
5.8	1.173	54	1.124		
6	1.173	56	1.121		
6.2	1.173	58	1.121		
6.4	1.173	60	1.118		
6.6	1.173	62	1.118		
6.8	1.173	64	1.114		
7	1.173	66	1.114		
7.2	1.173	68	1.111		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE2~1\GRAPHS\104OUT.AQT
Date: 05/10/99 Time: 15:07:19

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW104 Slug Out Test
Test Date: March 8, 1999

AQUIFER DATA

Saturated Thickness: 143.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.581 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 30.1 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

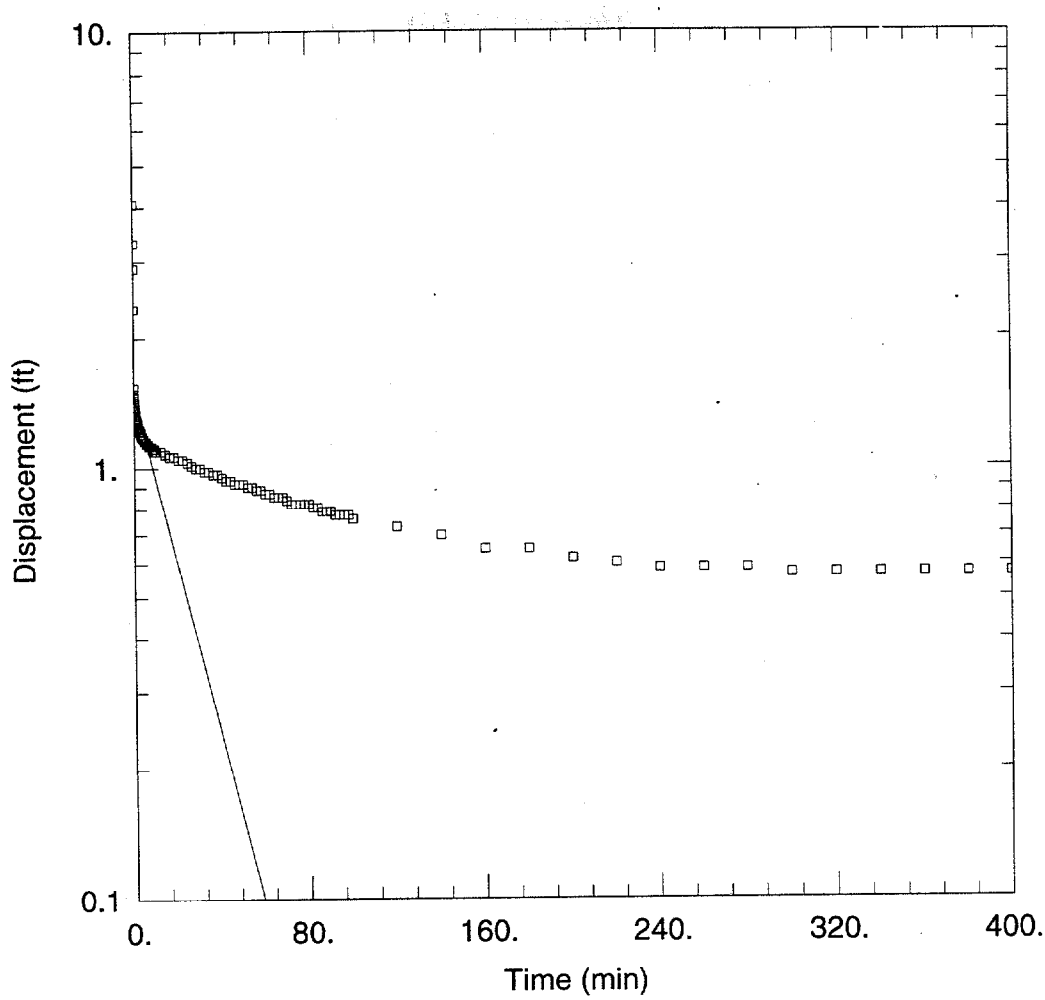
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.267E-08 ft/sec
y0 = 1.187 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW105
Slug Out Test March 7, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	0.332	0.1433	1.424	0.2866	1.392
0.0033	3.307	0.1466	1.424	0.29	1.392
0.0066	4.067	0.15	1.424	0.2933	1.392
0.01	4.067	0.1533	1.424	0.2966	1.392
0.0133	2.896	0.1566	1.408	0.3	1.376
0.0166	2.342	0.16	1.408	0.3033	1.392
0.02	1.361	0.1633	1.408	0.3066	1.392
0.0233	1.487	0.1666	1.408	0.31	1.392
0.0266	1.472	0.17	1.408	0.3133	1.376
0.03	1.361	0.1733	1.408	0.3166	1.376
0.0333	1.535	0.1766	1.408	0.32	1.392
0.0366	1.392	0.18	1.408	0.3233	1.408
0.04	1.487	0.1833	1.408	0.3266	1.392
0.0433	1.424	0.1866	1.408	0.33	1.376
0.0466	1.424	0.19	1.408	0.3333	1.376
0.05	1.44	0.1933	1.408	0.35	1.392
0.0533	1.424	0.1966	1.408	0.3666	1.376
0.0566	1.456	0.2	1.408	0.3833	1.376
0.06	1.424	0.2033	1.408	0.4	1.376
0.0633	1.424	0.2066	1.392	0.4166	1.376
0.0666	1.44	0.21	1.408	0.4333	1.376
0.07	1.424	0.2133	1.408	0.45	1.376
0.0733	1.424	0.2166	1.392	0.4666	1.376
0.0766	1.44	0.22	1.392	0.4833	1.361
0.08	1.424	0.2233	1.392	0.5	1.361
0.0833	1.408	0.2266	1.392	0.5166	1.361
0.0866	1.424	0.23	1.392	0.5333	1.361
0.09	1.424	0.2333	1.392	0.55	1.361
0.0933	1.424	0.2366	1.392	0.5666	1.361
0.0966	1.424	0.24	1.392	0.5833	1.361
0.1	1.424	0.2433	1.392	0.6	1.361
0.1033	1.424	0.2466	1.392	0.6166	1.361
0.1066	1.424	0.25	1.392	0.6333	1.361
0.11	1.424	0.2533	1.392	0.65	1.345
0.1133	1.424	0.2566	1.392	0.6666	1.345
0.1166	1.44	0.26	1.392	0.6833	1.345
0.12	1.424	0.2633	1.392	0.7	1.345
0.1233	1.408	0.2666	1.392	0.7166	1.345
0.1266	1.424	0.27	1.392	0.7333	1.345
0.13	1.424	0.2733	1.392	0.75	1.345
0.1333	1.424	0.2766	1.392	0.7666	1.345
0.1366	1.424	0.28	1.392	0.7833	1.345
0.14	1.424	0.2833	1.392	0.8	1.329

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 2GW105
Slug Out Test March 7, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	1.329	6.8	1.123	58	0.886
0.8333	1.329	7	1.123	60	0.87
0.85	1.329	7.2	1.123	62	0.87
0.8666	1.329	7.4	1.123	64	0.854
0.8833	1.329	7.6	1.123	66	0.854
0.9	1.329	7.8	1.123	68	0.854
0.9166	1.313	8	1.107	70	0.838
0.9333	1.313	8.2	1.107	72	0.823
0.95	1.329	8.4	1.107	74	0.823
0.9666	1.313	8.6	1.107	76	0.823
0.9833	1.313	8.8	1.107	78	0.823
1	1.313	9	1.107	80	0.823
1.2	1.297	9.2	1.107	82	0.807
1.4	1.282	9.4	1.092	84	0.807
1.6	1.282	9.6	1.092	86	0.791
1.8	1.266	9.8	1.092	88	0.791
2	1.25	10	1.092	90	0.791
2.2	1.234	12	1.092	92	0.775
2.4	1.234	14	1.076	94	0.775
2.6	1.218	16	1.06	96	0.775
2.8	1.218	18	1.06	98	0.775
3	1.218	20	1.044	100	0.759
3.2	1.202	22	1.044	120	0.728
3.4	1.187	24	1.028	140	0.696
3.6	1.187	26	1.012	160	0.648
3.8	1.187	28	0.997	180	0.648
4	1.171	30	0.997	200	0.617
4.2	1.171	32	0.981	220	0.601
4.4	1.171	34	0.981	240	0.585
4.6	1.155	36	0.965	260	0.585
4.8	1.155	38	0.965	280	0.585
5	1.155	40	0.949	300	0.569
5.2	1.155	42	0.933	320	0.569
5.4	1.155	44	0.933	340	0.569
5.6	1.139	46	0.918	360	0.569
5.8	1.139	48	0.918	380	0.569
6	1.139	50	0.918	400	0.569
6.2	1.139	52	0.902		
6.4	1.139	54	0.902		
6.6	1.123	56	0.886		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE2~1\GRAPHS\105OUT.AQT
Date: 05/10/99 Time: 15:12:05

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW105 Slug Out Test
Test Date: March 7, 1999

AQUIFER DATA

Saturated Thickness: 125.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 4.067 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 15.31 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

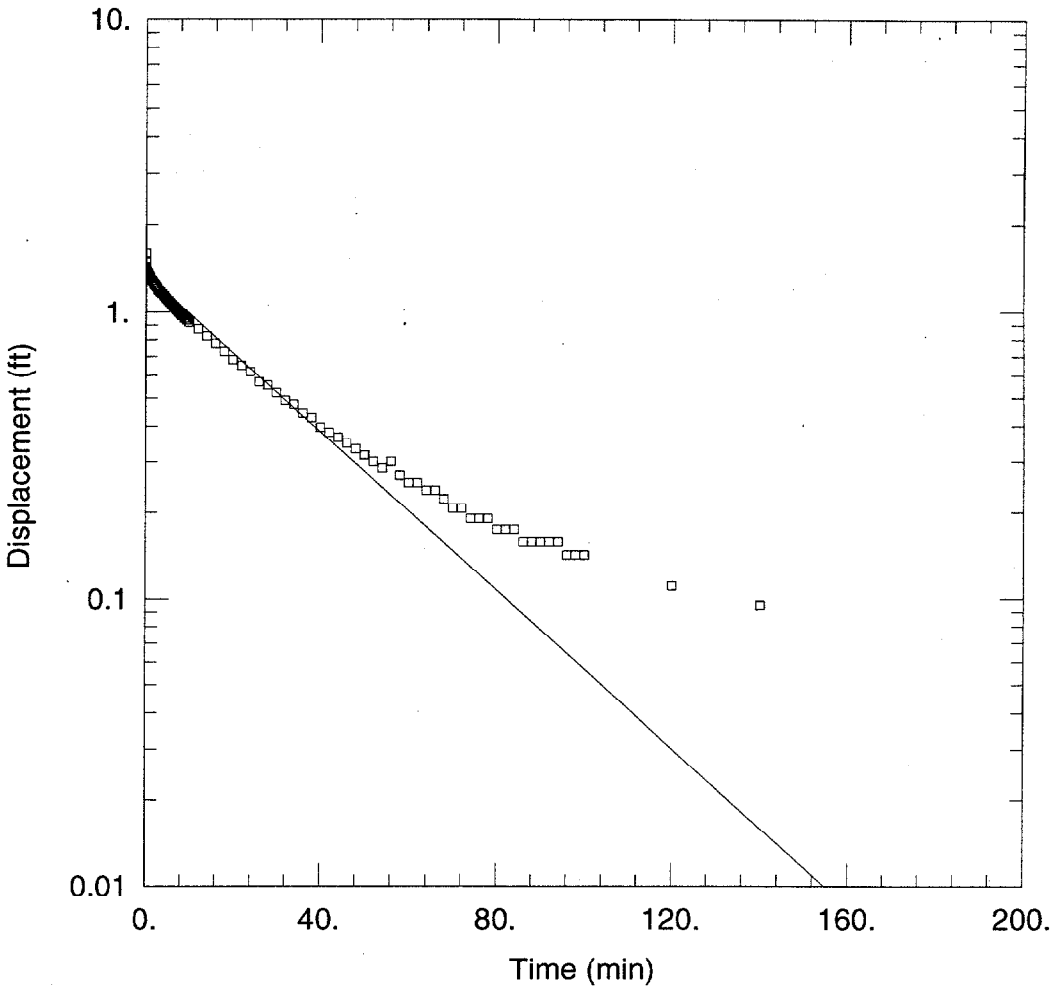
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.343E-06 ft/sec
y0 = 1.468 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 2GW105
Second Slug-Out Test March 9, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.587	0.3833	1.365	2.2	1.238
0.0083	1.587	0.4	1.349	2.4	1.222
0.0166	1.492	0.4166	1.349	2.6	1.206
0.025	1.476	0.4333	1.349	2.8	1.19
0.0333	1.412	0.45	1.349	3	1.19
0.0416	1.428	0.4666	1.349	3.2	1.174
0.05	1.38	0.4833	1.349	3.4	1.174
0.0583	1.38	0.5	1.349	3.6	1.158
0.0666	1.349	0.5166	1.349	3.8	1.158
0.075	1.428	0.5333	1.349	4	1.142
0.0833	1.396	0.55	1.349	4.2	1.142
0.0916	1.396	0.5666	1.349	4.4	1.126
0.1	1.396	0.5833	1.333	4.6	1.111
0.1083	1.396	0.6	1.333	4.8	1.111
0.1166	1.396	0.6166	1.333	5	1.095
0.125	1.396	0.6333	1.333	5.2	1.095
0.1333	1.396	0.65	1.333	5.4	1.079
0.1416	1.38	0.6666	1.333	5.6	1.079
0.15	1.38	0.6833	1.333	5.8	1.063
0.1583	1.38	0.7	1.333	6	1.063
0.1666	1.38	0.7166	1.333	6.2	1.047
0.175	1.38	0.7333	1.333	6.4	1.047
0.1833	1.38	0.75	1.333	6.6	1.031
0.1916	1.38	0.7666	1.333	6.8	1.031
0.2	1.38	0.7833	1.333	7	1.015
0.2083	1.38	0.8	1.317	7.2	1.015
0.2166	1.38	0.8166	1.317	7.4	1
0.225	1.38	0.8333	1.317	7.6	1
0.2333	1.38	0.85	1.317	7.8	0.984
0.2416	1.38	0.8666	1.317	8	0.984
0.25	1.365	0.8833	1.317	8.2	0.968
0.2583	1.38	0.9	1.317	8.4	0.968
0.2666	1.365	0.9166	1.317	8.6	0.968
0.275	1.365	0.9333	1.317	8.8	0.952
0.2833	1.365	0.95	1.317	9	0.952
0.2916	1.365	0.9666	1.317	9.2	0.952
0.3	1.365	0.9833	1.317	9.4	0.936
0.3083	1.365	1	1.317	9.6	0.936
0.3166	1.365	1.2	1.285	9.8	0.92
0.325	1.365	1.4	1.285	10	0.92
0.3333	1.365	1.6	1.269	12	0.873
0.35	1.365	1.8	1.253	14	0.825
0.3666	1.365	2	1.238	16	0.777

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 2GW105
Second Slug-Out Test March 9, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	0.73	48	0.333	78	0.19
20	0.682	50	0.317	80	0.174
22	0.65	52	0.301	82	0.174
24	0.619	54	0.285	84	0.174
26	0.571	56	0.301	86	0.158
28	0.555	58	0.269	88	0.158
30	0.523	60	0.253	90	0.158
32	0.492	62	0.253	92	0.158
34	0.476	64	0.238	94	0.158
36	0.444	66	0.238	96	0.142
38	0.428	68	0.222	98	0.142
40	0.396	70	0.206	100	0.142
42	0.38	72	0.206	120	0.111
44	0.365	74	0.19	140	0.095
46	0.349	76	0.19		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE2~1\RAWDAT~1\105OUTA.AQT
Date: 05/05/99 Time: 10:44:13

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 2GW105 Second Slug Out Test
Test Date: March 9, 1999

AQUIFER DATA

Saturated Thickness: 125.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

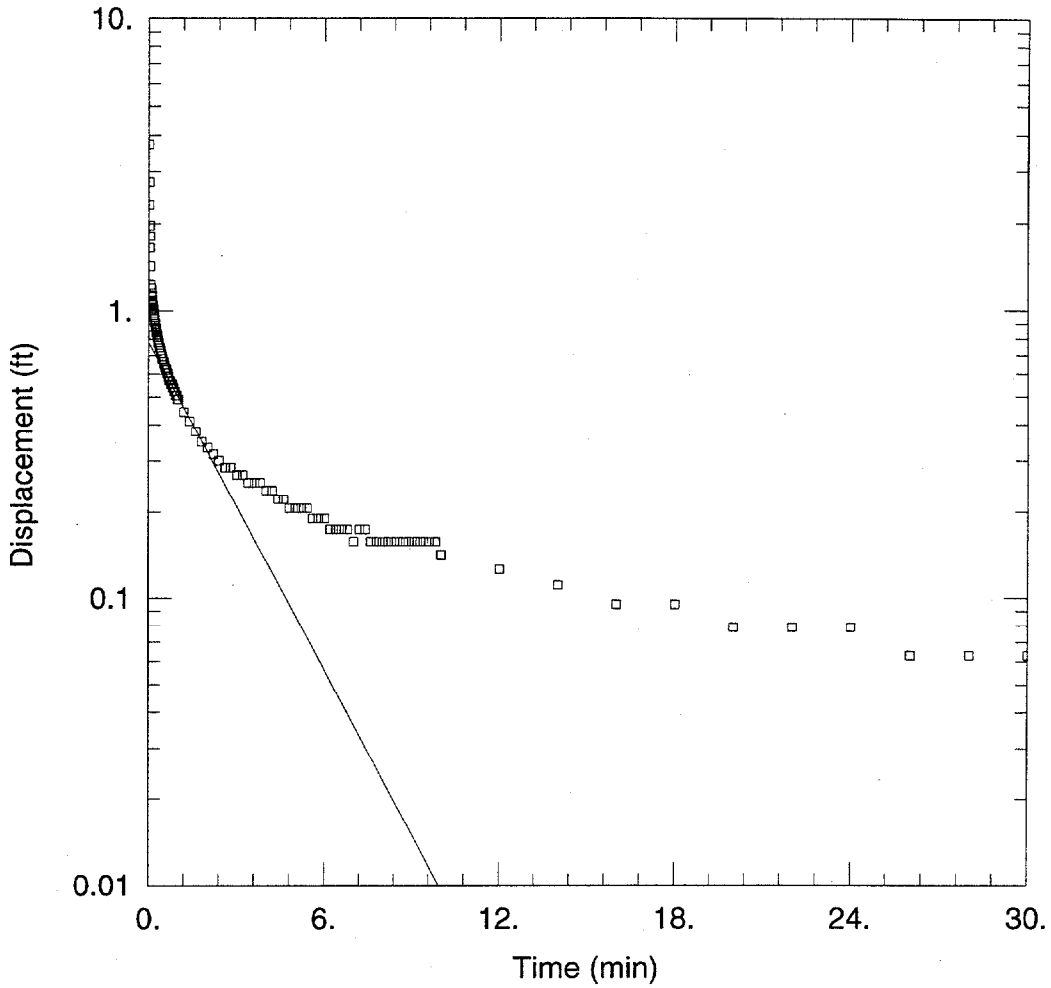
Initial Displacement: 1.587 ft
Casing Radius: 0.1 ft
Screen Length: 10. ft
Water Column Height: 15.31 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.092E-06 ft/sec
y0 = 1.357 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 3GW102
Slug-In Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-3.73	0.4333	-0.714	3.4	-0.253
0.0083	-2.317	0.45	-0.698	3.6	-0.253
0.0166	-2.762	0.4666	-0.682	3.8	-0.253
0.025	-1.968	0.4833	-0.682	4	-0.238
0.0333	-1.651	0.5	-0.666	4.2	-0.238
0.0416	-1.809	0.5166	-0.666	4.4	-0.222
0.05	-1.428	0.5333	-0.65	4.6	-0.222
0.0583	-0.825	0.55	-0.634	4.8	-0.206
0.0666	-1.238	0.5666	-0.634	5	-0.206
0.075	-1.142	0.5833	-0.634	5.2	-0.206
0.0833	-1.206	0.6	-0.619	5.4	-0.206
0.0916	-1.158	0.6166	-0.619	5.6	-0.19
0.1	-1.142	0.6333	-0.603	5.8	-0.19
0.1083	-1.127	0.65	-0.603	6	-0.19
0.1166	-1.095	0.6666	-0.587	6.2	-0.174
0.125	-1.079	0.6833	-0.587	6.4	-0.174
0.1333	-1.063	0.7	-0.571	6.6	-0.174
0.1416	-1.047	0.7166	-0.571	6.8	-0.174
0.15	-1.031	0.7333	-0.571	7	-0.158
0.1583	-1.015	0.75	-0.555	7.2	-0.174
0.1666	-1	0.7666	-0.555	7.4	-0.174
0.175	-0.984	0.7833	-0.555	7.6	-0.158
0.1833	-0.968	0.8	-0.555	7.8	-0.158
0.1916	-0.952	0.8166	-0.539	8	-0.158
0.2	-0.936	0.8333	-0.539	8.2	-0.158
0.2083	-0.92	0.85	-0.539	8.4	-0.158
0.2166	-0.904	0.8666	-0.523	8.6	-0.158
0.225	-0.904	0.8833	-0.523	8.8	-0.158
0.2333	-0.888	0.9	-0.523	9	-0.158
0.2416	-0.873	0.9166	-0.507	9.2	-0.158
0.25	-0.873	0.9333	-0.507	9.4	-0.158
0.2583	-0.857	0.95	-0.507	9.6	-0.158
0.2666	-0.841	0.9666	-0.507	9.8	-0.158
0.275	-0.841	0.9833	-0.492	10	-0.142
0.2833	-0.825	1	-0.492	12	-0.126
0.2916	-0.825	1.2	-0.444	14	-0.111
0.3	-0.809	1.4	-0.412	16	-0.095
0.3083	-0.793	1.6	-0.38	18	-0.095
0.3166	-0.793	1.8	-0.349	20	-0.079
0.325	-0.793	2	-0.333	22	-0.079
0.3333	-0.777	2.2	-0.317	24	-0.079
0.35	-0.761	2.4	-0.301	26	-0.063
0.3666	-0.746	2.6	-0.285	28	-0.063
0.3833	-0.746	2.8	-0.285	30	-0.063
0.4	-0.73	3	-0.269		
0.4166	-0.714	3.2	-0.269		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE3~1\GRAPHS\102IN.AQT
Date: 05/10/99 Time: 14:57:53

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 3GW102 Slug In Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 145.1 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

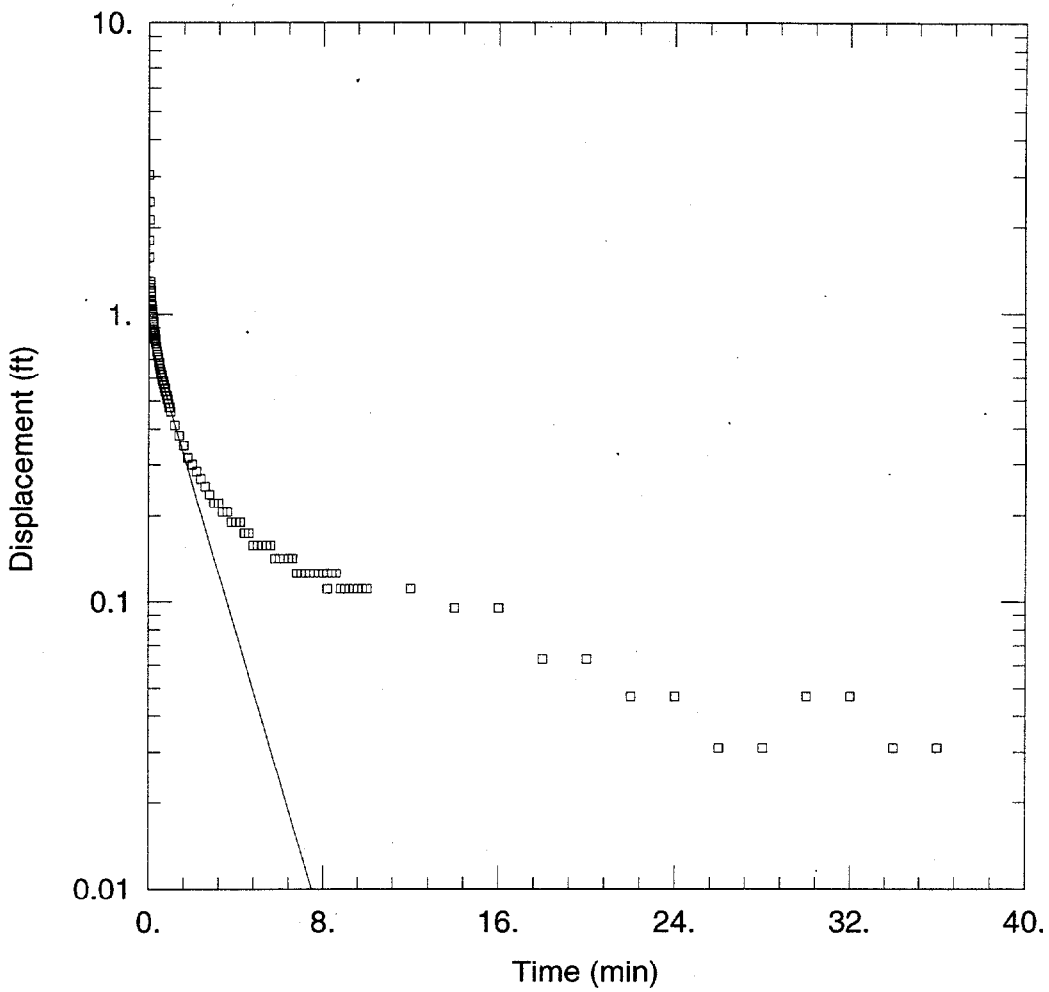
Initial Displacement: 3.73 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 40.72 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.452E-05 ft/sec
y0 = 0.7733 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 3GW102
Slug-Out Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	3.016	0.45	0.698	3.8	0.19
0.0083	3.047	0.4666	0.682	4	0.19
0.0166	1.571	0.4833	0.682	4.2	0.19
0.025	1.809	0.5	0.666	4.4	0.174
0.0333	2.127	0.5166	0.65	4.6	0.174
0.0416	2.444	0.5333	0.65	4.8	0.158
0.05	1.269	0.55	0.634	5	0.158
0.0583	1.301	0.5666	0.619	5.2	0.158
0.0666	1.301	0.5833	0.619	5.4	0.158
0.075	1.269	0.6	0.619	5.6	0.158
0.0833	1.238	0.6166	0.603	5.8	0.142
0.0916	1.206	0.6333	0.587	6	0.142
0.1	1.19	0.65	0.587	6.2	0.142
0.1083	1.158	0.6666	0.587	6.4	0.142
0.1166	1.127	0.6833	0.571	6.6	0.142
0.125	1.111	0.7	0.571	6.8	0.126
0.1333	1.095	0.7166	0.555	7	0.126
0.1416	1.079	0.7333	0.555	7.2	0.126
0.15	1.047	0.75	0.555	7.4	0.126
0.1583	1.031	0.7666	0.539	7.6	0.126
0.1666	1.015	0.7833	0.539	7.8	0.126
0.175	1	0.8	0.523	8	0.126
0.1833	0.984	0.8166	0.523	8.2	0.111
0.1916	0.984	0.8333	0.523	8.4	0.126
0.2	0.952	0.85	0.507	8.6	0.126
0.2083	0.936	0.8666	0.507	8.8	0.111
0.2166	0.936	0.8833	0.507	9	0.111
0.225	0.92	0.9	0.492	9.2	0.111
0.2333	0.904	0.9166	0.492	9.4	0.111
0.2416	0.904	0.9333	0.476	9.6	0.111
0.25	0.888	0.95	0.476	9.8	0.111
0.2583	0.873	0.9666	0.476	10	0.111
0.2666	0.873	0.9833	0.476	12	0.111
0.275	0.857	1	0.46	14	0.095
0.2833	0.841	1.2	0.412	16	0.095
0.2916	0.841	1.4	0.38	18	0.063
0.3	0.825	1.6	0.349	20	0.063
0.3083	0.825	1.8	0.317	22	0.047
0.3166	0.809	2	0.301	24	0.047
0.325	0.793	2.2	0.285	26	0.031
0.3333	0.793	2.4	0.269	28	0.031
0.35	0.777	2.6	0.253	30	0.047
0.3666	0.761	2.8	0.238	32	0.047
0.3833	0.746	3	0.222	34	0.031
0.4	0.73	3.2	0.222	36	0.031
0.4166	0.714	3.4	0.206		
0.4333	0.714	3.6	0.206		



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 10:55:13

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 3GW102 Slug Out Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 145.1 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 3.047 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 40.72 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

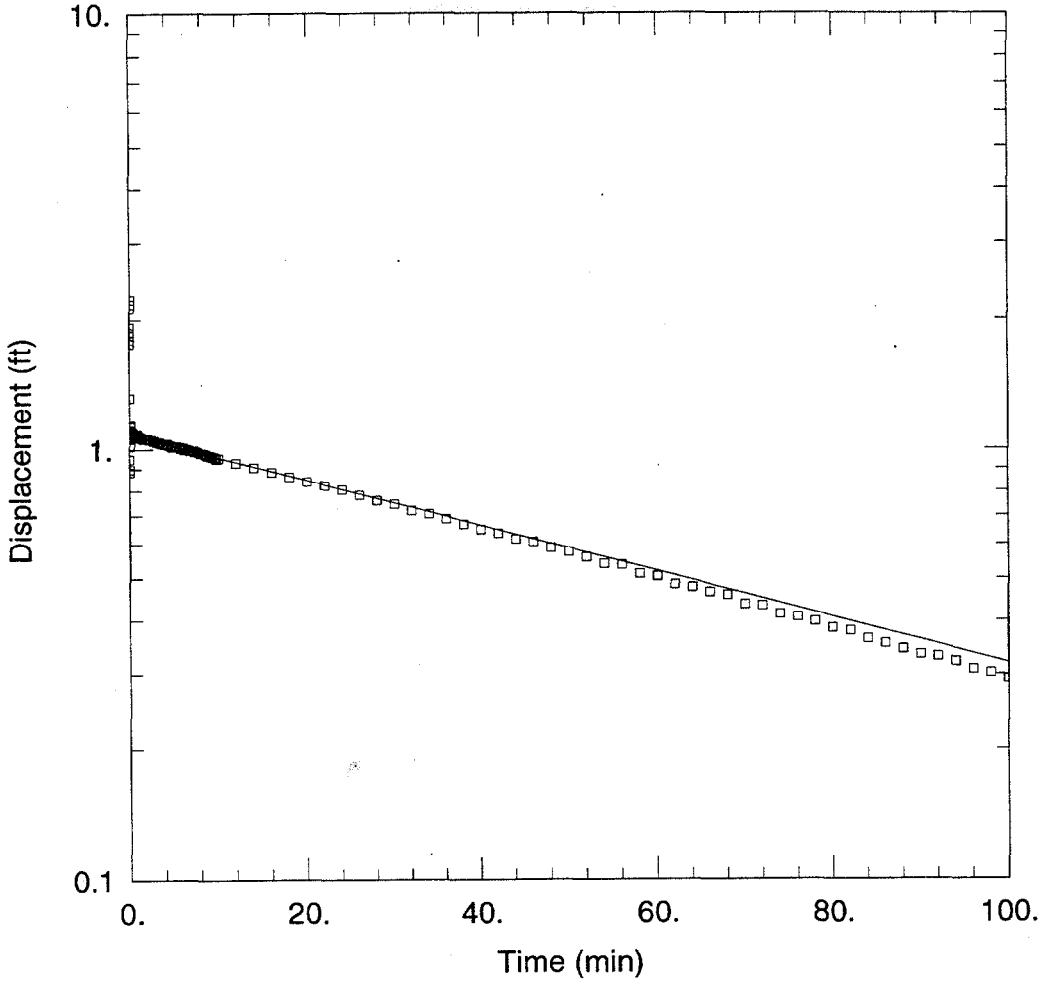
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.968E-05 ft/sec
y0 = 0.8392 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 3GW104
Slug-In Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.003	0.1433	-1.1	0.2866	-1.087
0.0033	-1.068	0.1466	-1.097	0.29	-1.087
0.0066	-1.764	0.15	-1.097	0.2933	-1.087
0.01	-2.168	0.1533	-1.097	0.2966	-1.087
0.0133	-2.222	0.1566	-1.097	0.3	-1.087
0.0166	-1.869	0.16	-1.097	0.3033	-1.087
0.02	-1.923	0.1633	-1.097	0.3066	-1.09
0.0233	-2.127	0.1666	-1.097	0.31	-1.087
0.0266	-1.85	0.17	-1.097	0.3133	-1.084
0.03	-1.799	0.1733	-1.097	0.3166	-1.087
0.0333	-1.316	0.1766	-1.097	0.32	-1.087
0.0366	-0.95	0.18	-1.097	0.3233	-1.084
0.04	-0.887	0.1833	-1.093	0.3266	-1.087
0.0433	-0.899	0.1866	-1.093	0.33	-1.087
0.0466	-1.135	0.19	-1.093	0.3333	-1.084
0.05	-1.055	0.1933	-1.093	0.35	-1.087
0.0533	-1.017	0.1966	-1.093	0.3666	-1.084
0.0566	-1.125	0.2	-1.093	0.3833	-1.084
0.06	-1.074	0.2033	-1.093	0.4	-1.084
0.0633	-1.058	0.2066	-1.093	0.4166	-1.081
0.0666	-1.106	0.21	-1.093	0.4333	-1.081
0.07	-1.103	0.2133	-1.093	0.45	-1.081
0.0733	-1.103	0.2166	-1.093	0.4666	-1.081
0.0766	-1.074	0.22	-1.093	0.4833	-1.081
0.08	-1.023	0.2233	-1.093	0.5	-1.081
0.0833	-1.062	0.2266	-1.09	0.5166	-1.081
0.0866	-1.135	0.23	-1.09	0.5333	-1.081
0.09	-1.09	0.2333	-1.09	0.55	-1.081
0.0933	-1.077	0.2366	-1.09	0.5666	-1.077
0.0966	-1.1	0.24	-1.09	0.5833	-1.077
0.1	-1.097	0.2433	-1.09	0.6	-1.077
0.1033	-1.106	0.2466	-1.09	0.6166	-1.077
0.1066	-1.103	0.25	-1.09	0.6333	-1.077
0.11	-1.103	0.2533	-1.09	0.65	-1.074
0.1133	-1.093	0.2566	-1.09	0.6666	-1.074
0.1166	-1.106	0.26	-1.09	0.6833	-1.074
0.12	-1.1	0.2633	-1.087	0.7	-1.074
0.1233	-1.097	0.2666	-1.09	0.7166	-1.074
0.1266	-1.103	0.27	-1.09	0.7333	-1.074
0.13	-1.1	0.2733	-1.09	0.75	-1.074
0.1333	-1.1	0.2766	-1.087	0.7666	-1.071
0.1366	-1.1	0.28	-1.087	0.7833	-1.071
0.14	-1.097	0.2833	-1.087	0.8	-1.071

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 3GW104
Slug-In Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	-1.071	5.8	-1.004	38	-0.667
0.8333	-1.071	6	-1.008	40	-0.648
0.85	-1.081	6.2	-0.998	42	-0.635
0.8666	-1.071	6.4	-1.001	44	-0.616
0.8833	-1.071	6.6	-0.998	46	-0.607
0.9	-1.071	6.8	-0.992	48	-0.588
0.9166	-1.071	7	-0.992	50	-0.575
0.9333	-1.071	7.2	-0.992	52	-0.559
0.95	-1.068	7.4	-0.985	54	-0.54
0.9666	-1.068	7.6	-0.988	56	-0.537
0.9833	-1.068	7.8	-0.982	58	-0.512
1	-1.068	8	-0.976	60	-0.505
1.2	-1.062	8.2	-0.979	62	-0.483
1.4	-1.058	8.4	-0.976	64	-0.476
1.6	-1.055	8.6	-0.972	66	-0.464
1.8	-1.055	8.8	-0.966	68	-0.457
2	-1.055	9	-0.966	70	-0.435
2.2	-1.052	9.2	-0.963	72	-0.432
2.4	-1.052	9.4	-0.96	74	-0.413
2.6	-1.046	9.6	-0.957	76	-0.407
2.8	-1.046	9.8	-0.95	78	-0.397
3	-1.039	10	-0.953	80	-0.384
3.2	-1.039	12	-0.928	82	-0.378
3.4	-1.036	14	-0.906	84	-0.362
3.6	-1.03	16	-0.884	86	-0.353
3.8	-1.03	18	-0.861	88	-0.343
4	-1.027	20	-0.839	90	-0.333
4.2	-1.03	22	-0.823	92	-0.33
4.4	-1.023	24	-0.804	94	-0.321
4.6	-1.02	26	-0.782	96	-0.308
4.8	-1.011	28	-0.759	98	-0.302
5	-1.017	30	-0.744	100	-0.292
5.2	-1.017	32	-0.718		
5.4	-1.014	34	-0.705		
5.6	-1.011	36	-0.686		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE3~1\GRAPHS\104IN.AQT
Date: 05/10/99 Time: 14:59:21

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 3GW104 Slug In Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 143.9 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.222 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 36.47 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

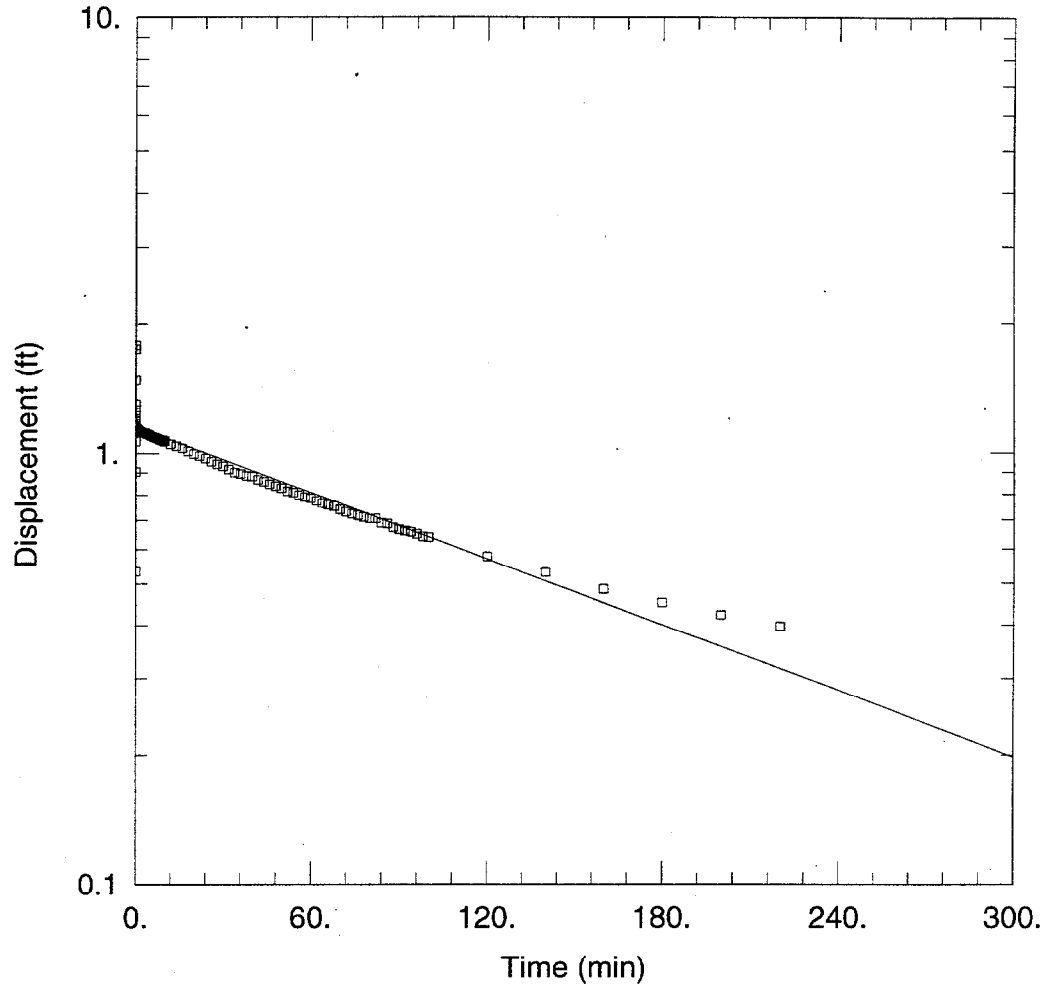
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.994E-07 ft/sec
y0 = 1.081 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 3GW104
Slug-Out Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	2.969	0.1433	1.15	0.2866	1.144
0.0033	-0.359	0.1466	1.147	0.29	1.144
0.0066	1.748	0.15	1.147	0.2933	1.144
0.01	1.786	0.1533	1.147	0.2966	1.144
0.0133	0.534	0.1566	1.147	0.3	1.144
0.0166	1.303	0.16	1.147	0.3033	1.141
0.02	1.478	0.1633	1.147	0.3066	1.141
0.0233	0.906	0.1666	1.147	0.31	1.141
0.0266	1.23	0.17	1.147	0.3133	1.141
0.03	1.262	0.1733	1.147	0.3166	1.141
0.0333	1.065	0.1766	1.147	0.32	1.141
0.0366	1.195	0.18	1.147	0.3233	1.141
0.04	1.211	0.1833	1.147	0.3266	1.141
0.0433	1.119	0.1866	1.147	0.33	1.144
0.0466	1.179	0.19	1.144	0.3333	1.141
0.05	1.192	0.1933	1.147	0.35	1.141
0.0533	1.144	0.1966	1.147	0.3666	1.144
0.0566	1.166	0.2	1.144	0.3833	1.144
0.06	1.166	0.2033	1.144	0.4	1.144
0.0633	1.15	0.2066	1.147	0.4166	1.144
0.0666	1.16	0.21	1.144	0.4333	1.144
0.07	1.16	0.2133	1.144	0.45	1.144
0.0733	1.154	0.2166	1.144	0.4666	1.144
0.0766	1.157	0.22	1.144	0.4833	1.144
0.08	1.157	0.2233	1.144	0.5	1.144
0.0833	1.154	0.2266	1.144	0.5166	1.144
0.0866	1.154	0.23	1.144	0.5333	1.147
0.09	1.154	0.2333	1.144	0.55	1.144
0.0933	1.154	0.2366	1.144	0.5666	1.144
0.0966	1.154	0.24	1.144	0.5833	1.144
0.1	1.154	0.2433	1.144	0.6	1.144
0.1033	1.15	0.2466	1.144	0.6166	1.144
0.1066	1.15	0.25	1.144	0.6333	1.144
0.11	1.15	0.2533	1.144	0.65	1.141
0.1133	1.15	0.2566	1.144	0.6666	1.138
0.1166	1.15	0.26	1.144	0.6833	1.135
0.12	1.15	0.2633	1.144	0.7	1.135
0.1233	1.15	0.2666	1.144	0.7166	1.135
0.1266	1.15	0.27	1.144	0.7333	1.135
0.13	1.15	0.2733	1.144	0.75	1.135
0.1333	1.15	0.2766	1.144	0.7666	1.135
0.1366	1.15	0.28	1.144	0.7833	1.135
0.14	1.15	0.2833	1.144	0.8	1.135

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 3GW104
Slug-Out Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	1.135	6	1.09	42	0.867
0.8333	1.135	6.2	1.093	44	0.858
0.85	1.135	6.4	1.093	46	0.848
0.8666	1.135	6.6	1.093	48	0.839
0.8833	1.138	6.8	1.087	50	0.829
0.9	1.138	7	1.09	52	0.817
0.9166	1.138	7.2	1.087	54	0.81
0.9333	1.138	7.4	1.087	56	0.801
0.95	1.138	7.6	1.084	58	0.791
0.9666	1.138	7.8	1.08	60	0.785
0.9833	1.138	8	1.08	62	0.775
1	1.138	8.2	1.077	64	0.766
1.2	1.135	8.4	1.074	66	0.759
1.4	1.128	8.6	1.074	68	0.753
1.6	1.128	8.8	1.074	70	0.74
1.8	1.125	9	1.074	72	0.731
2	1.125	9.2	1.071	74	0.724
2.2	1.119	9.4	1.071	76	0.718
2.4	1.122	9.6	1.068	78	0.712
2.6	1.119	9.8	1.065	80	0.705
2.8	1.115	10	1.068	82	0.705
3	1.122	12	1.049	84	0.689
3.2	1.122	14	1.039	86	0.686
3.4	1.112	16	1.026	88	0.674
3.6	1.112	18	1.011	90	0.667
3.8	1.109	20	0.995	92	0.661
4	1.106	22	0.985	94	0.658
4.2	1.115	24	0.972	96	0.651
4.4	1.109	26	0.957	98	0.642
4.6	1.106	28	0.944	100	0.639
4.8	1.106	30	0.934	120	0.578
5	1.1	32	0.918	140	0.531
5.2	1.1	34	0.903	160	0.486
5.4	1.1	36	0.896	180	0.451
5.6	1.096	38	0.887	200	0.422
5.8	1.096	40	0.883	220	0.397



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 11:03:29

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 3GW104 Slug Out Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 143.9 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

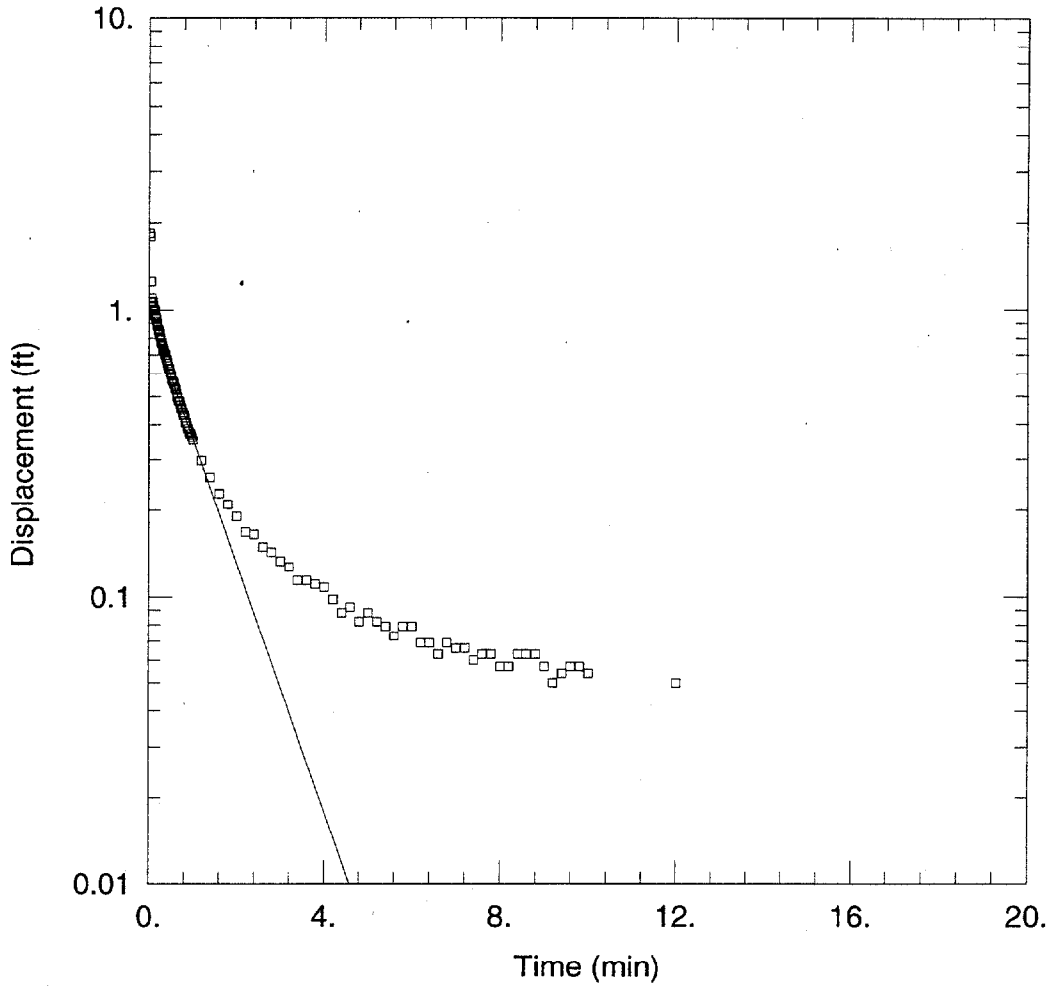
Initial Displacement: 1.786 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 36.47 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.924E-07 ft/sec
y0 = 1.153 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 4GW101
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.546	0.3833	-0.686	2.2	-0.168
0.0083	-1.843	0.4	-0.673	2.4	-0.165
0.0166	-1.799	0.4166	-0.657	2.6	-0.149
0.025	-1.799	0.4333	-0.642	2.8	-0.143
0.0333	-1.068	0.45	-0.629	3	-0.133
0.0416	-1.258	0.4666	-0.623	3.2	-0.127
0.05	-1.074	0.4833	-0.607	3.4	-0.114
0.0583	-1.106	0.5	-0.597	3.6	-0.114
0.0666	-1.068	0.5166	-0.578	3.8	-0.111
0.075	-1.077	0.5333	-0.568	4	-0.108
0.0833	-1.033	0.55	-0.562	4.2	-0.098
0.0916	-1.042	0.5666	-0.553	4.4	-0.088
0.1	-1.033	0.5833	-0.54	4.6	-0.092
0.1083	-1.014	0.6	-0.534	4.8	-0.082
0.1166	-1.004	0.6166	-0.527	5	-0.088
0.125	-0.994	0.6333	-0.511	5.2	-0.082
0.1333	-1.004	0.65	-0.495	5.4	-0.079
0.1416	-0.959	0.6666	-0.483	5.6	-0.073
0.15	-0.947	0.6833	-0.483	5.8	-0.079
0.1583	-0.937	0.7	-0.479	6	-0.079
0.1666	-0.915	0.7166	-0.467	6.2	-0.069
0.175	-0.905	0.7333	-0.457	6.4	-0.069
0.1833	-0.89	0.75	-0.451	6.6	-0.063
0.1916	-0.883	0.7666	-0.441	6.8	-0.069
0.2	-0.855	0.7833	-0.432	7	-0.066
0.2083	-0.858	0.8	-0.432	7.2	-0.066
0.2166	-0.851	0.8166	-0.422	7.4	-0.06
0.225	-0.842	0.8333	-0.406	7.6	-0.063
0.2333	-0.829	0.85	-0.406	7.8	-0.063
0.2416	-0.82	0.8666	-0.397	8	-0.057
0.25	-0.81	0.8833	-0.387	8.2	-0.057
0.2583	-0.801	0.9	-0.387	8.4	-0.063
0.2666	-0.788	0.9166	-0.378	8.6	-0.063
0.275	-0.772	0.9333	-0.371	8.8	-0.063
0.2833	-0.772	0.95	-0.371	9	-0.057
0.2916	-0.766	0.9666	-0.365	9.2	-0.05
0.3	-0.753	0.9833	-0.359	9.4	-0.054
0.3083	-0.74	1	-0.352	9.6	-0.057
0.3166	-0.734	1.2	-0.298	9.8	-0.057
0.325	-0.727	1.4	-0.26	10	-0.054
0.3333	-0.724	1.6	-0.228	12	-0.05
0.35	-0.712	1.8	-0.209		
0.3666	-0.699	2	-0.19		



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 11:21:30

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 4GW101 Slug In Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 69.15 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

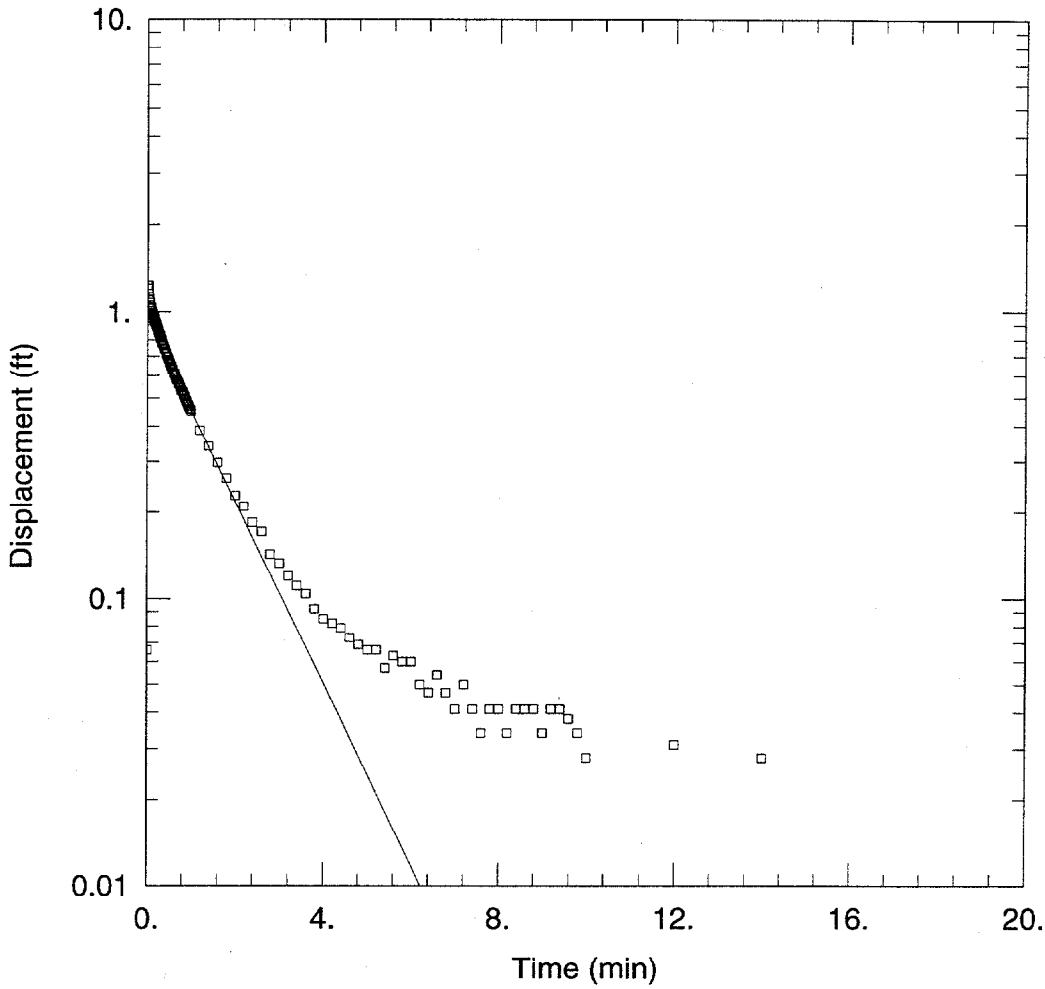
Initial Displacement: 1.843 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 17.04 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 7.305E-05 ft/sec
y0 = 0.9582 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 4GW101
Slug-Out Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	6.816	0.3833	0.746	2.2	0.209
0.0083	0.066	0.4	0.74	2.4	0.184
0.0166	1.207	0.4166	0.724	2.6	0.171
0.025	1.236	0.4333	0.715	2.8	0.143
0.0333	1.156	0.45	0.702	3	0.133
0.0416	1.112	0.4666	0.692	3.2	0.12
0.05	1.102	0.4833	0.683	3.4	0.111
0.0583	1.083	0.5	0.67	3.6	0.104
0.0666	1.061	0.5166	0.661	3.8	0.092
0.075	1.048	0.5333	0.648	4	0.085
0.0833	1.042	0.55	0.645	4.2	0.082
0.0916	1.032	0.5666	0.632	4.4	0.079
0.1	1.017	0.5833	0.629	4.6	0.073
0.1083	1.001	0.6	0.613	4.8	0.069
0.1166	0.997	0.6166	0.61	5	0.066
0.125	0.985	0.6333	0.6	5.2	0.066
0.1333	0.972	0.65	0.591	5.4	0.057
0.1416	0.969	0.6666	0.581	5.6	0.063
0.15	0.956	0.6833	0.578	5.8	0.06
0.1583	0.943	0.7	0.568	6	0.06
0.1666	0.934	0.7166	0.562	6.2	0.05
0.175	0.928	0.7333	0.556	6.4	0.047
0.1833	0.918	0.75	0.546	6.6	0.054
0.1916	0.908	0.7666	0.533	6.8	0.047
0.2	0.902	0.7833	0.533	7	0.041
0.2083	0.893	0.8	0.527	7.2	0.05
0.2166	0.886	0.8166	0.518	7.4	0.041
0.225	0.877	0.8333	0.514	7.6	0.034
0.2333	0.87	0.85	0.508	7.8	0.041
0.2416	0.861	0.8666	0.498	8	0.041
0.25	0.854	0.8833	0.492	8.2	0.034
0.2583	0.848	0.9	0.486	8.4	0.041
0.2666	0.839	0.9166	0.479	8.6	0.041
0.275	0.832	0.9333	0.473	8.8	0.041
0.2833	0.826	0.95	0.467	9	0.034
0.2916	0.816	0.9666	0.46	9.2	0.041
0.3	0.81	0.9833	0.457	9.4	0.041
0.3083	0.81	1	0.451	9.6	0.038
0.3166	0.8	1.2	0.387	9.8	0.034
0.325	0.794	1.4	0.34	10	0.028
0.3333	0.781	1.6	0.298	12	0.031
0.35	0.772	1.8	0.263	14	0.028
0.3666	0.762	2	0.228		



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 11:29:13

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 4GW101 Slug Out Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 69.15 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

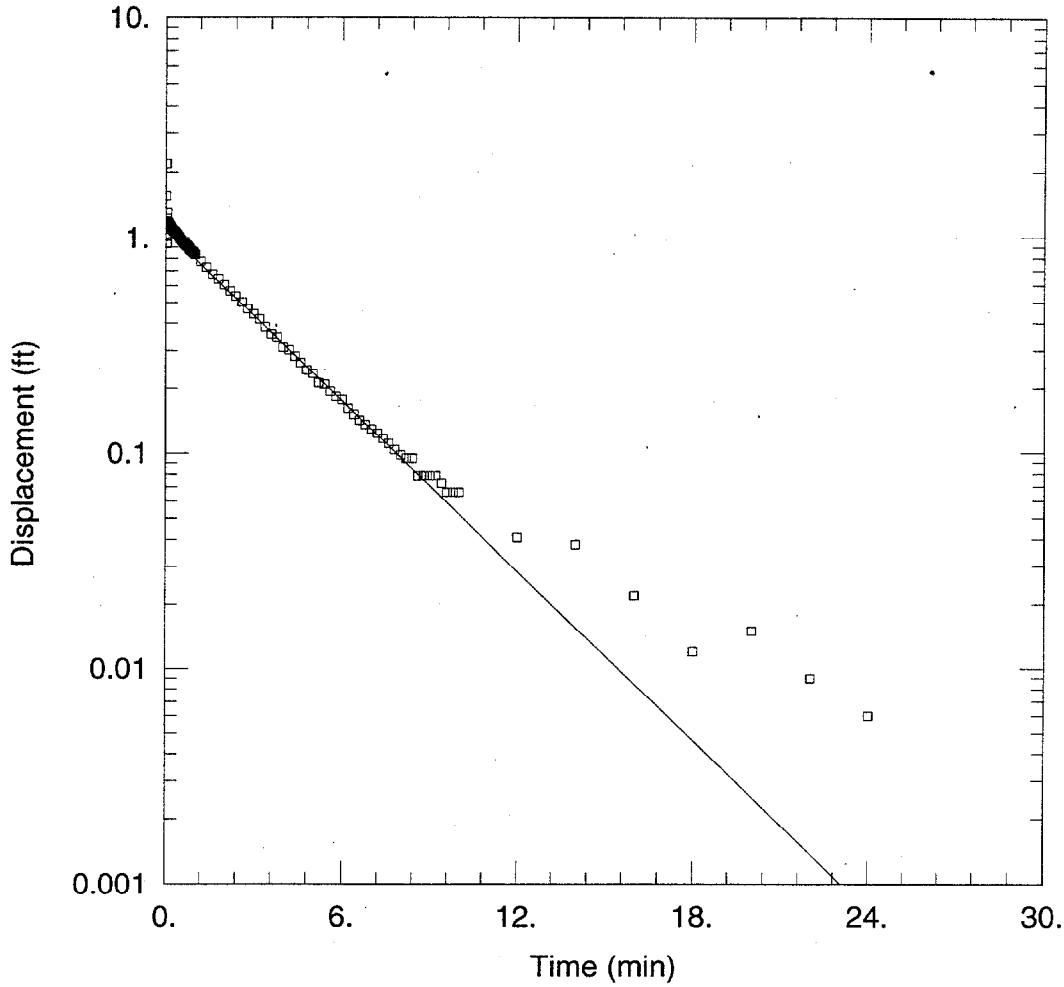
Initial Displacement: 1.236 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 17.04 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 5.342E-05 ft/sec
y0 = 0.9341 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 4GW103
Slug-In Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-1.208	0.4166	-1.021	3	-0.442
0.0083	-1.555	0.4333	-1.024	3.2	-0.419
0.0166	-2.923	0.45	-1.011	3.4	-0.384
0.025	-2.185	0.4666	-1.005	3.6	-0.356
0.0333	-1.011	0.4833	-0.986	3.8	-0.346
0.0416	-0.938	0.5	-0.989	4	-0.311
0.05	-1.231	0.5166	-0.976	4.2	-0.302
0.0583	-1.097	0.5333	-0.976	4.4	-0.283
0.0666	-1.307	0.55	-0.967	4.6	-0.264
0.075	-1.129	0.5666	-0.957	4.8	-0.244
0.0833	-1.183	0.5833	-0.957	5	-0.235
0.0916	-1.173	0.6	-0.947	5.2	-0.213
0.1	-1.167	0.6166	-0.935	5.4	-0.209
0.1083	-1.164	0.6333	-0.932	5.6	-0.194
0.1166	-1.157	0.65	-0.928	5.8	-0.184
0.125	-1.151	0.6666	-0.932	6	-0.178
0.1333	-1.151	0.6833	-0.919	6.2	-0.162
0.1416	-1.142	0.7	-0.922	6.4	-0.152
0.15	-1.145	0.7166	-0.916	6.6	-0.143
0.1583	-1.135	0.7333	-0.909	6.8	-0.136
0.1666	-1.122	0.75	-0.916	7	-0.13
0.175	-1.122	0.7666	-0.906	7.2	-0.124
0.1833	-1.119	0.7833	-0.897	7.4	-0.117
0.1916	-1.11	0.8	-0.89	7.6	-0.111
0.2	-1.1	0.8166	-0.884	7.8	-0.104
0.2083	-1.103	0.8333	-0.874	8	-0.098
0.2166	-1.097	0.85	-0.871	8.2	-0.095
0.225	-1.094	0.8666	-0.874	8.4	-0.095
0.2333	-1.094	0.8833	-0.865	8.6	-0.079
0.2416	-1.084	0.9	-0.862	8.8	-0.079
0.25	-1.084	0.9166	-0.855	9	-0.079
0.2583	-1.081	0.9333	-0.855	9.2	-0.079
0.2666	-1.075	0.95	-0.855	9.4	-0.073
0.275	-1.072	0.9666	-0.842	9.6	-0.066
0.2833	-1.072	0.9833	-0.842	9.8	-0.066
0.2916	-1.072	1	-0.833	10	-0.066
0.3	-1.068	1.2	-0.776	12	-0.041
0.3083	-1.072	1.4	-0.728	14	-0.038
0.3166	-1.059	1.6	-0.677	16	-0.022
0.325	-1.065	1.8	-0.645	18	-0.012
0.3333	-1.056	2	-0.604	20	-0.015
0.35	-1.052	2.2	-0.566	22	-0.009
0.3666	-1.046	2.4	-0.534	24	-0.006
0.3833	-1.04	2.6	-0.502		
0.4	-1.033	2.8	-0.467		



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 11:33:17

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 4GW103 Slug In Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 53.74 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

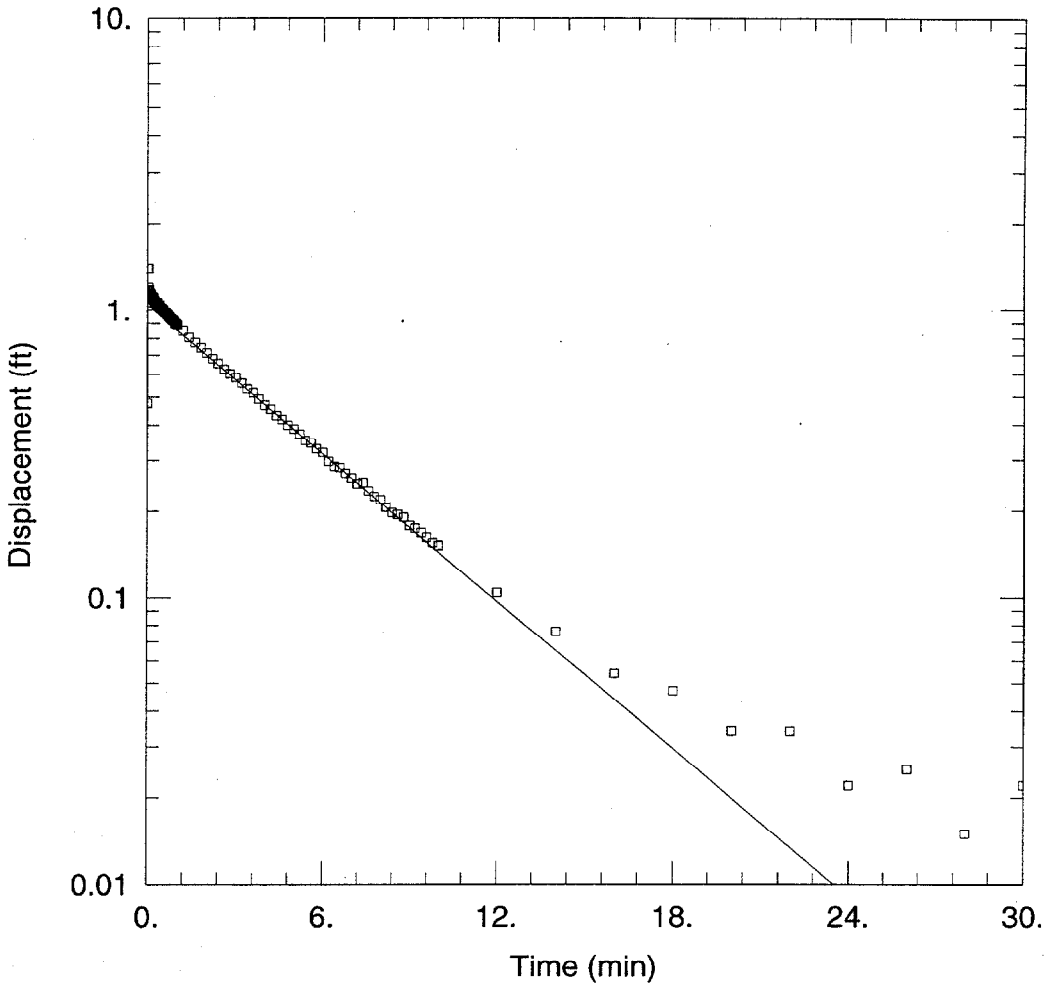
Initial Displacement: 2.185 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 19.96 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.307E-05 ft/sec
y0 = 1.078 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 4GW103
Slug-Out Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	4.95	0.4333	1.02	3.4	0.534
0.0083	0.477	0.45	1.017	3.6	0.518
0.0166	1.205	0.4666	1.014	3.8	0.493
0.025	1.396	0.4833	1.014	4	0.47
0.0333	1.205	0.5	1.008	4.2	0.454
0.0416	1.164	0.5166	1.001	4.4	0.432
0.05	1.183	0.5333	0.998	4.6	0.419
0.0583	1.17	0.55	0.992	4.8	0.4
0.0666	1.151	0.5666	0.985	5	0.388
0.075	1.151	0.5833	0.985	5.2	0.372
0.0833	1.148	0.6	0.982	5.4	0.353
0.0916	1.141	0.6166	0.979	5.6	0.346
0.1	1.135	0.6333	0.973	5.8	0.33
0.1083	1.141	0.65	0.966	6	0.321
0.1166	1.122	0.6666	0.966	6.2	0.298
0.125	1.125	0.6833	0.96	6.4	0.286
0.1333	1.116	0.7	0.954	6.6	0.283
0.1416	1.113	0.7166	0.95	6.8	0.27
0.15	1.116	0.7333	0.95	7	0.26
0.1583	1.109	0.75	0.941	7.2	0.248
0.1666	1.106	0.7666	0.938	7.4	0.251
0.175	1.1	0.7833	0.938	7.6	0.235
0.1833	1.1	0.8	0.931	7.8	0.225
0.1916	1.113	0.8166	0.928	8	0.219
0.2	1.097	0.8333	0.928	8.2	0.206
0.2083	1.081	0.85	0.922	8.4	0.197
0.2166	1.081	0.8666	0.922	8.6	0.194
0.225	1.075	0.8833	0.919	8.8	0.19
0.2333	1.087	0.9	0.912	9	0.178
0.2416	1.068	0.9166	0.903	9.2	0.174
0.25	1.071	0.9333	0.9	9.4	0.168
0.2583	1.071	0.95	0.896	9.6	0.162
0.2666	1.065	0.9666	0.896	9.8	0.155
0.275	1.068	0.9833	0.893	10	0.152
0.2833	1.065	1	0.887	12	0.104
0.2916	1.055	1.2	0.849	14	0.076
0.3	1.062	1.4	0.807	16	0.054
0.3083	1.065	1.6	0.776	18	0.047
0.3166	1.065	1.8	0.744	20	0.034
0.325	1.065	2	0.712	22	0.034
0.3333	1.052	2.2	0.68	24	0.022
0.35	1.04	2.4	0.655	26	0.025
0.3666	1.04	2.6	0.626	28	0.015
0.3833	1.043	2.8	0.604	30	0.022
0.4	1.04	3	0.585		
0.4166	1.024	3.2	0.559		



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 13:12:49

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 4GW103 Slug Out Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 53.74 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

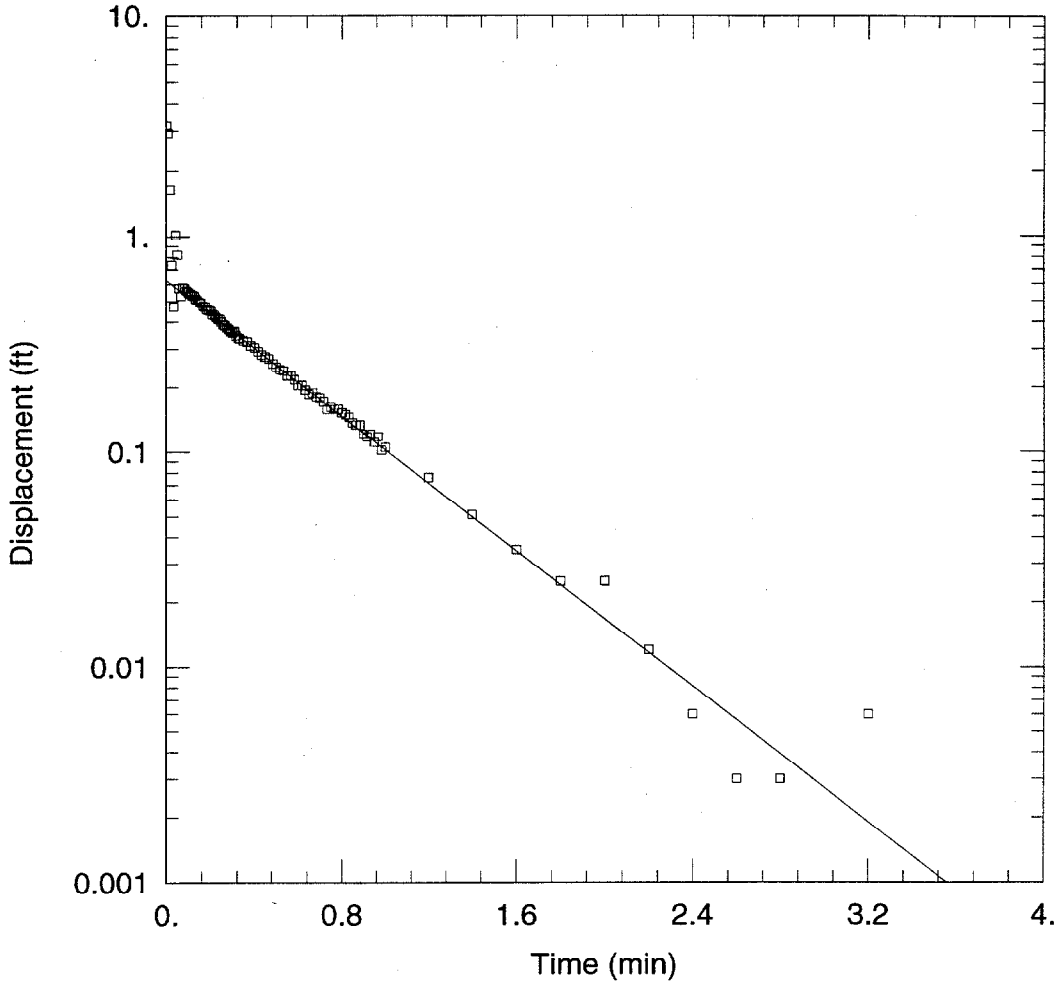
Initial Displacement: 1.396 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 19.96 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.506E-05 ft/sec
y0 = 1.036 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 4GW105
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-3.166	0.2666	-0.386	0.7333	-0.159
0.0083	-2.93	0.275	-0.376	0.75	-0.162
0.0166	-1.631	0.2833	-0.37	0.7666	-0.159
0.025	-0.737	0.2916	-0.363	0.7833	-0.159
0.0333	-0.472	0.3	-0.357	0.8	-0.153
0.0416	-1.014	0.3083	-0.363	0.8166	-0.15
0.05	-0.823	0.3166	-0.347	0.8333	-0.146
0.0583	-0.577	0.325	-0.338	0.85	-0.137
0.0666	-0.529	0.3333	-0.335	0.8666	-0.134
0.075	-0.58	0.35	-0.328	0.8833	-0.134
0.0833	-0.574	0.3666	-0.325	0.9	-0.121
0.0916	-0.561	0.3833	-0.312	0.9166	-0.118
0.1	-0.552	0.4	-0.306	0.9333	-0.121
0.1083	-0.542	0.4166	-0.293	0.95	-0.111
0.1166	-0.533	0.4333	-0.284	0.9666	-0.118
0.125	-0.529	0.45	-0.277	0.9833	-0.102
0.1333	-0.513	0.4666	-0.271	1	-0.105
0.1416	-0.504	0.4833	-0.258	1.2	-0.076
0.15	-0.494	0.5	-0.248	1.4	-0.051
0.1583	-0.491	0.5166	-0.242	1.6	-0.035
0.1666	-0.475	0.5333	-0.239	1.8	-0.025
0.175	-0.472	0.55	-0.226	2	-0.025
0.1833	-0.459	0.5666	-0.226	2.2	-0.012
0.1916	-0.453	0.5833	-0.217	2.4	-0.006
0.2	-0.45	0.6	-0.204	2.6	-0.003
0.2083	-0.434	0.6166	-0.204	2.8	-0.003
0.2166	-0.43	0.6333	-0.194	3	0
0.225	-0.421	0.65	-0.185	3.2	-0.006
0.2333	-0.414	0.6666	-0.188	3.4	0
0.2416	-0.411	0.6833	-0.181	3.6	0.003
0.25	-0.402	0.7	-0.178	3.8	0.003
0.2583	-0.389	0.7166	-0.172		



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 13:27:51

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 4GW105 Slug In Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 26.49 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

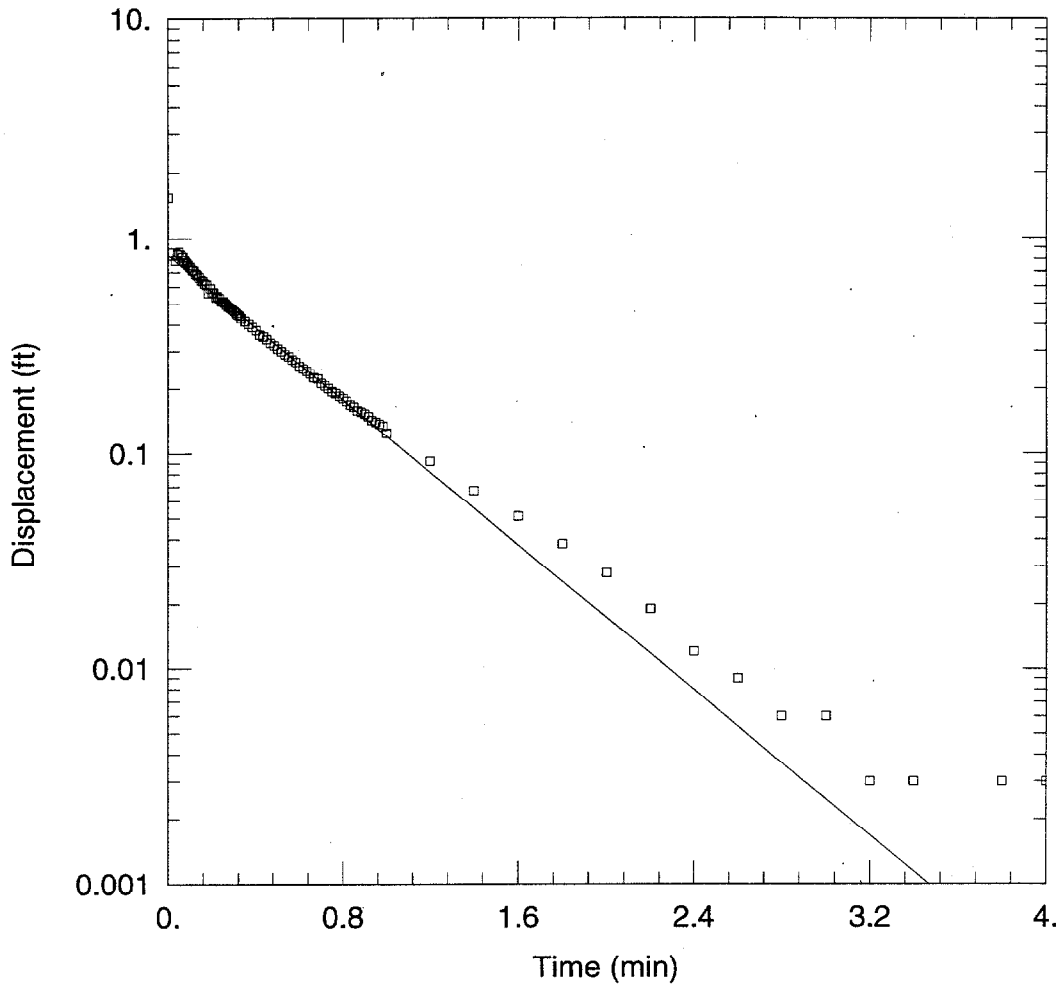
Initial Displacement: 3.166 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 24.53 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.222E-05 ft/sec
y0 = 0.6253 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 4GW105
Slug-Out Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.541	0.3	0.462	0.8666	0.159
0.0083	3.806	0.3083	0.453	0.8833	0.156
0.0166	2.712	0.3166	0.443	0.9	0.153
0.025	2.297	0.325	0.437	0.9166	0.149
0.0333	0.791	0.3333	0.427	0.9333	0.143
0.0416	0.848	0.35	0.414	0.95	0.14
0.05	0.864	0.3666	0.402	0.9666	0.137
0.0583	0.839	0.3833	0.389	0.9833	0.134
0.0666	0.82	0.4	0.376	1	0.124
0.075	0.791	0.4166	0.357	1.2	0.092
0.0833	0.775	0.4333	0.351	1.4	0.067
0.0916	0.756	0.45	0.341	1.6	0.051
0.1	0.74	0.4666	0.328	1.8	0.038
0.1083	0.718	0.4833	0.319	2	0.028
0.1166	0.711	0.5	0.309	2.2	0.019
0.125	0.689	0.5166	0.299	2.4	0.012
0.1333	0.679	0.5333	0.29	2.6	0.009
0.1416	0.663	0.55	0.284	2.8	0.006
0.15	0.644	0.5666	0.274	3	0.006
0.1583	0.638	0.5833	0.268	3.2	0.003
0.1666	0.622	0.6	0.255	3.4	0.003
0.175	0.612	0.6166	0.248	3.6	0
0.1833	0.561	0.6333	0.242	3.8	0.003
0.1916	0.59	0.65	0.236	4	0.003
0.2	0.564	0.6666	0.226	4.2	0
0.2083	0.564	0.6833	0.223	4.4	0
0.2166	0.536	0.7	0.213	4.6	0
0.225	0.542	0.7166	0.207	4.8	0
0.2333	0.532	0.7333	0.201	5	0
0.2416	0.513	0.75	0.194	5.2	0
0.25	0.513	0.7666	0.191	5.4	-0.003
0.2583	0.504	0.7833	0.185	5.6	-0.003
0.2666	0.494	0.8	0.181	5.8	-0.003
0.275	0.485	0.8166	0.175	6	-0.003
0.2833	0.478	0.8333	0.169	6.2	0
0.2916	0.469	0.85	0.165	6.4	-0.003



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 13:34:16

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 4GW105 Slug Out Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 26.49 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

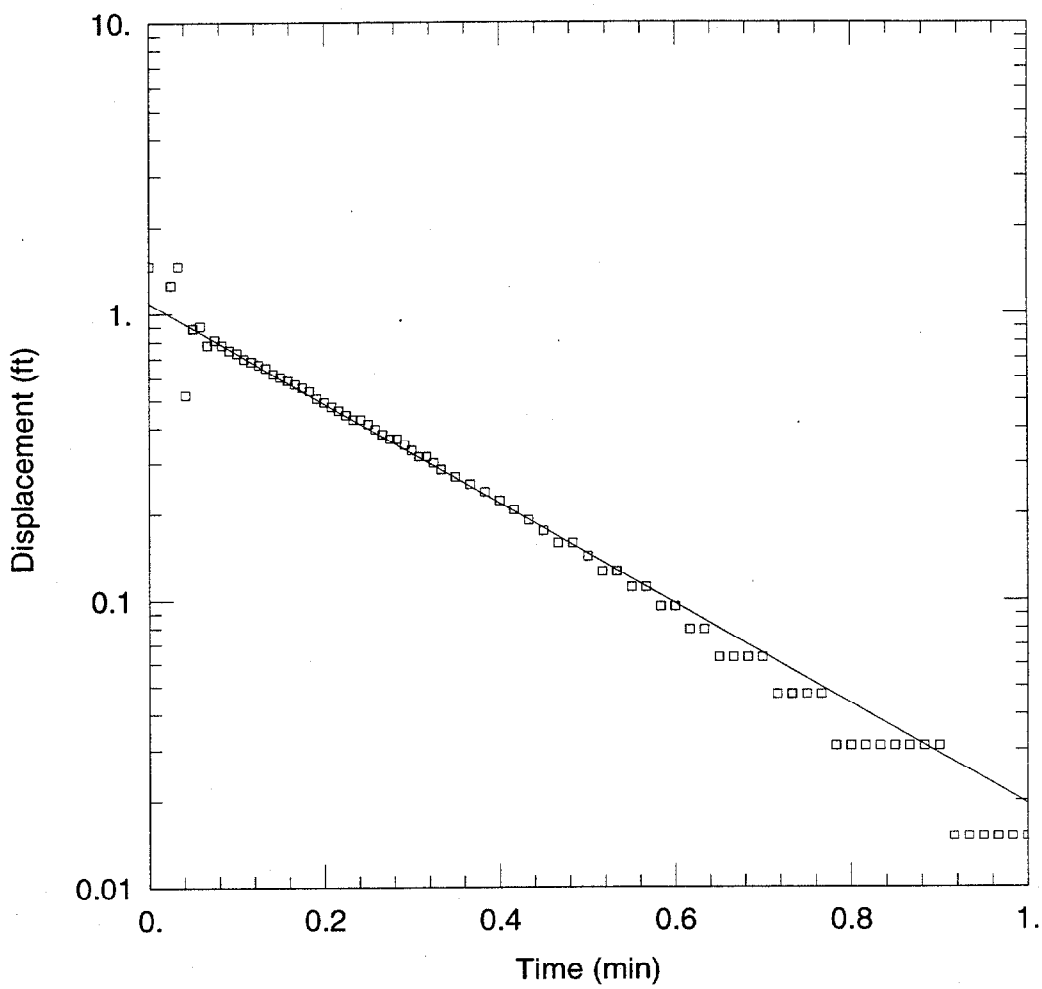
Initial Displacement: 1.541 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 24.53 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.67E-05 ft/sec
y0 = 0.8385 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 4GW106
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.317	0.2666	-0.38	0.7333	-0.047
0.0083	-2.174	0.275	-0.365	0.75	-0.047
0.0166	-2.27	0.2833	-0.365	0.7666	-0.047
0.025	-1.254	0.2916	-0.349	0.7833	-0.031
0.0333	-1.46	0.3	-0.333	0.8	-0.031
0.0416	-0.523	0.3083	-0.317	0.8166	-0.031
0.05	-0.888	0.3166	-0.317	0.8333	-0.031
0.0583	-0.904	0.325	-0.301	0.85	-0.031
0.0666	-0.777	0.3333	-0.285	0.8666	-0.031
0.075	-0.809	0.35	-0.269	0.8833	-0.031
0.0833	-0.777	0.3666	-0.253	0.9	-0.031
0.0916	-0.746	0.3833	-0.238	0.9166	-0.015
0.1	-0.73	0.4	-0.222	0.9333	-0.015
0.1083	-0.698	0.4166	-0.206	0.95	-0.015
0.1166	-0.682	0.4333	-0.19	0.9666	-0.015
0.125	-0.666	0.45	-0.174	0.9833	-0.015
0.1333	-0.65	0.4666	-0.158	1	-0.015
0.1416	-0.619	0.4833	-0.158	1.2	0
0.15	-0.603	0.5	-0.142	1.4	0
0.1583	-0.587	0.5166	-0.126	1.6	0
0.1666	-0.571	0.5333	-0.126	1.8	0
0.175	-0.555	0.55	-0.111	2	0
0.1833	-0.539	0.5666	-0.111	2.2	0
0.1916	-0.507	0.5833	-0.095	2.4	0
0.2	-0.492	0.6	-0.095	2.6	0
0.2083	-0.476	0.6166	-0.079	2.8	0
0.2166	-0.46	0.6333	-0.079	3	0
0.225	-0.444	0.65	-0.063	3.2	0
0.2333	-0.428	0.6666	-0.063	3.4	0
0.2416	-0.428	0.6833	-0.063	3.6	0
0.25	-0.412	0.7	-0.063	3.8	0
0.2583	-0.396	0.7166	-0.047	4	0



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 13:38:21

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 4GW106 Slug In Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 33.38 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

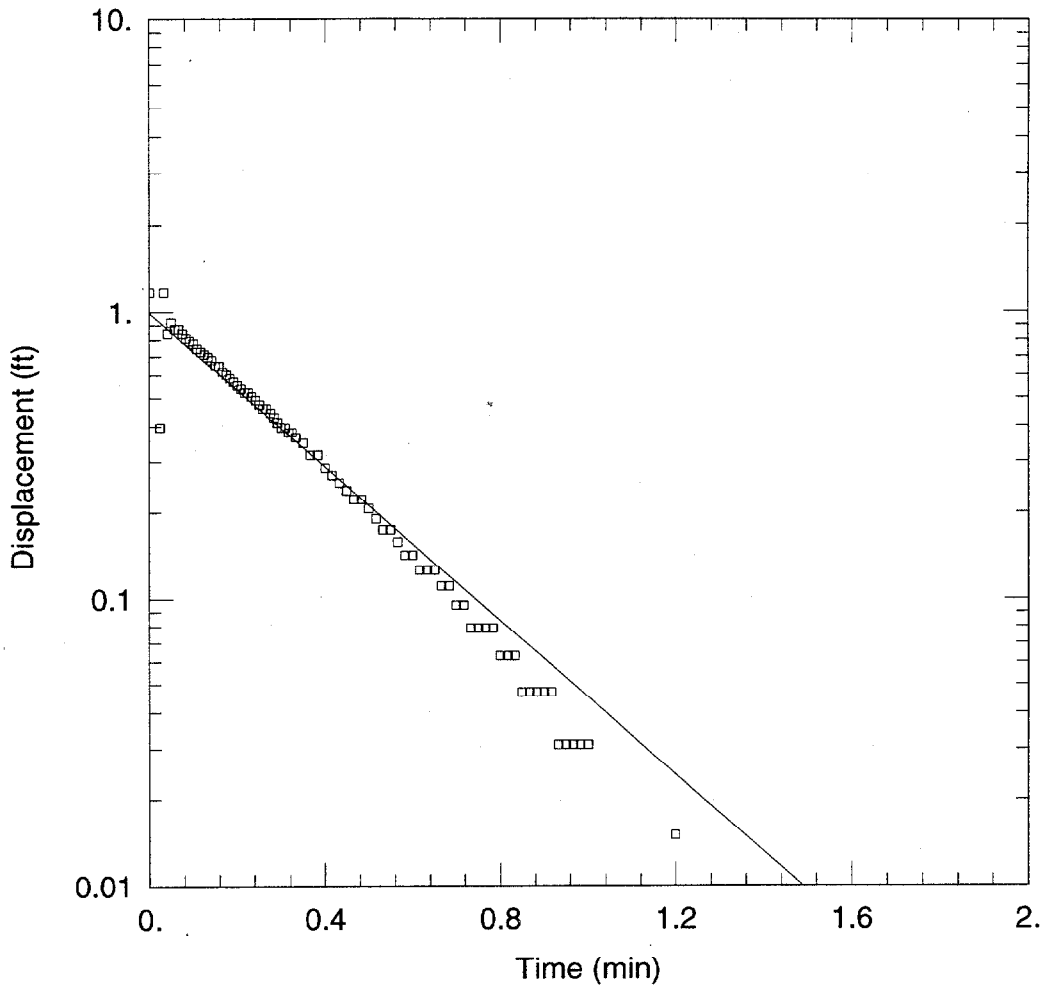
Initial Displacement: 1.46 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 17.08 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0003056 ft/sec
y0 = 1.086 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 4GW106
Slug-Out Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	0.142	0.2333	0.507	0.6	0.142
0.0083	3.952	0.2416	0.492	0.6166	0.126
0.0166	2.127	0.25	0.476	0.6333	0.126
0.025	0.396	0.2583	0.46	0.65	0.126
0.0333	1.174	0.2666	0.46	0.6666	0.111
0.0416	0.841	0.275	0.444	0.6833	0.111
0.05	0.92	0.2833	0.428	0.7	0.095
0.0583	0.873	0.2916	0.412	0.7166	0.095
0.0666	0.873	0.3	0.396	0.7333	0.079
0.075	0.841	0.3083	0.396	0.75	0.079
0.0833	0.809	0.3166	0.38	0.7666	0.079
0.0916	0.793	0.325	0.38	0.7833	0.079
0.1	0.777	0.3333	0.365	0.8	0.063
0.1083	0.746	0.35	0.349	0.8166	0.063
0.1166	0.73	0.3666	0.317	0.8333	0.063
0.125	0.714	0.3833	0.317	0.85	0.047
0.1333	0.698	0.4	0.285	0.8666	0.047
0.1416	0.682	0.4166	0.269	0.8833	0.047
0.15	0.65	0.4333	0.253	0.9	0.047
0.1583	0.65	0.45	0.238	0.9166	0.047
0.1666	0.619	0.4666	0.222	0.9333	0.031
0.175	0.603	0.4833	0.222	0.95	0.031
0.1833	0.587	0.5	0.206	0.9666	0.031
0.1916	0.571	0.5166	0.19	0.9833	0.031
0.2	0.555	0.5333	0.174	1	0.031
0.2083	0.539	0.55	0.174	1.2	0.015
0.2166	0.523	0.5666	0.158	1.4	0
0.225	0.523	0.5833	0.142	1.6	0



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 13:43:42

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 4GW106 Slug Out Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 33.38 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

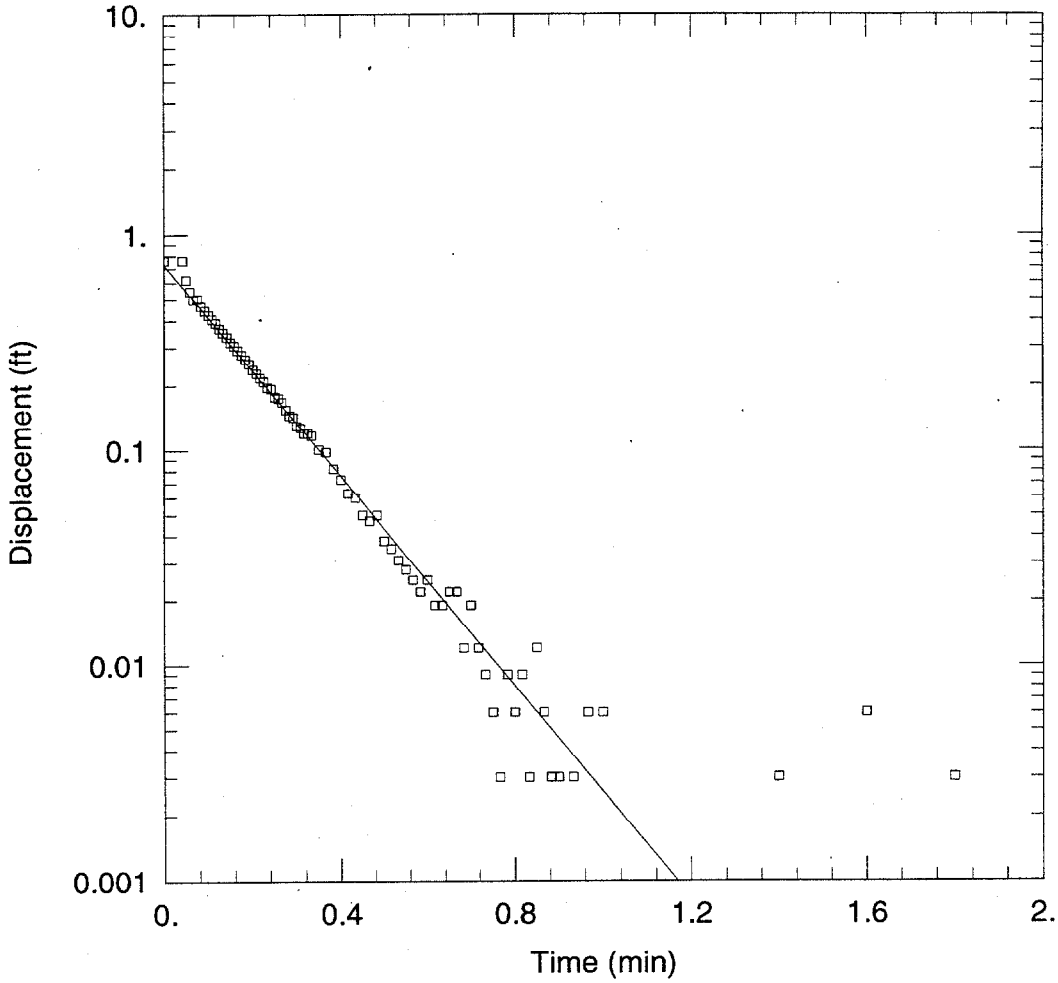
Initial Displacement: 1.174 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 17.08 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0002347 ft/sec
y0 = 0.9907 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 4GW107
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-5.616	0.2333	-0.197	0.6	-0.025
0.0083	-4.606	0.2416	-0.194	0.6166	-0.019
0.0166	-3.95	0.25	-0.178	0.6333	-0.019
0.025	-2.527	0.2583	-0.175	0.65	-0.022
0.0333	0.035	0.2666	-0.168	0.6666	-0.022
0.0416	-0.76	0.275	-0.155	0.6833	-0.012
0.05	-0.62	0.2833	-0.146	0.7	-0.019
0.0583	-0.547	0.2916	-0.143	0.7166	-0.012
0.0666	-0.499	0.3	-0.13	0.7333	-0.009
0.075	-0.505	0.3083	-0.127	0.75	-0.006
0.0833	-0.467	0.3166	-0.12	0.7666	-0.003
0.0916	-0.445	0.325	-0.12	0.7833	-0.009
0.1	-0.426	0.3333	-0.117	0.8	-0.006
0.1083	-0.407	0.35	-0.101	0.8166	-0.009
0.1166	-0.391	0.3666	-0.098	0.8333	-0.003
0.125	-0.369	0.3833	-0.082	0.85	-0.012
0.1333	-0.353	0.4	-0.073	0.8666	-0.006
0.1416	-0.337	0.4166	-0.063	0.8833	-0.003
0.15	-0.318	0.4333	-0.06	0.9	-0.003
0.1583	-0.308	0.45	-0.05	0.9166	0
0.1666	-0.292	0.4666	-0.047	0.9333	-0.003
0.175	-0.28	0.4833	-0.05	0.95	0
0.1833	-0.267	0.5	-0.038	0.9666	-0.006
0.1916	-0.254	0.5166	-0.035	0.9833	0
0.2	-0.238	0.5333	-0.031	1	-0.006
0.2083	-0.229	0.55	-0.028	1.2	0
0.2166	-0.219	0.5666	-0.025	1.4	-0.003
0.225	-0.21	0.5833	-0.022	1.6	-0.006



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 14:09:22

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 4GW107 Slug In Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 27.78 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

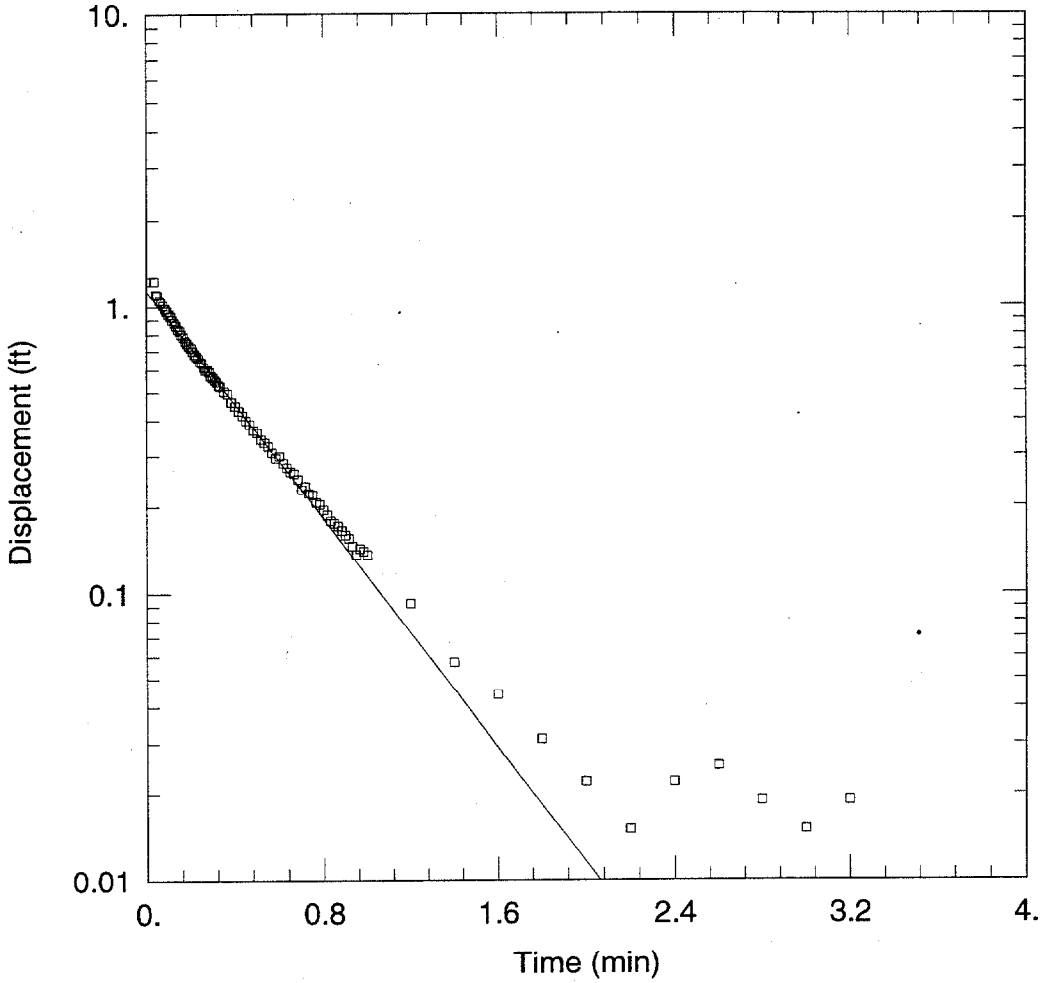
Initial Displacement: 0.76 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 23.34 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0004717 ft/sec
y0 = 0.7257 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 4GW107
Slug-Out Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	4.202	0.2583	0.614	0.7	0.229
0.0083	4.818	0.2666	0.598	0.7166	0.235
0.0166	3.27	0.275	0.601	0.7333	0.222
0.025	2.166	0.2833	0.591	0.75	0.219
0.0333	1.228	0.2916	0.572	0.7666	0.206
0.0416	1.107	0.3	0.563	0.7833	0.203
0.05	1.097	0.3083	0.553	0.8	0.194
0.0583	1.053	0.3166	0.544	0.8166	0.187
0.0666	1.037	0.325	0.531	0.8333	0.178
0.075	1.011	0.3333	0.525	0.85	0.175
0.0833	0.983	0.35	0.505	0.8666	0.171
0.0916	0.964	0.3666	0.496	0.8833	0.165
0.1	0.941	0.3833	0.464	0.9	0.159
0.1083	0.925	0.4	0.448	0.9166	0.155
0.1166	0.9	0.4166	0.432	0.9333	0.146
0.125	0.878	0.4333	0.416	0.95	0.136
0.1333	0.859	0.45	0.4	0.9666	0.143
0.1416	0.836	0.4666	0.388	0.9833	0.14
0.15	0.824	0.4833	0.369	1	0.136
0.1583	0.801	0.5	0.362	1.2	0.092
0.1666	0.785	0.5166	0.343	1.4	0.057
0.175	0.76	0.5333	0.334	1.6	0.044
0.1833	0.747	0.55	0.324	1.8	0.031
0.1916	0.731	0.5666	0.308	2	0.022
0.2	0.719	0.5833	0.295	2.2	0.015
0.2083	0.7	0.6	0.299	2.4	0.022
0.2166	0.684	0.6166	0.283	2.6	0.025
0.225	0.671	0.6333	0.273	2.8	0.019
0.2333	0.661	0.65	0.264	3	0.015
0.2416	0.642	0.6666	0.26	3.2	0.019
0.25	0.636	0.6833	0.248		



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 14:14:43

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 4GW107 Slug Out Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 27.78 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.228 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 23.34 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

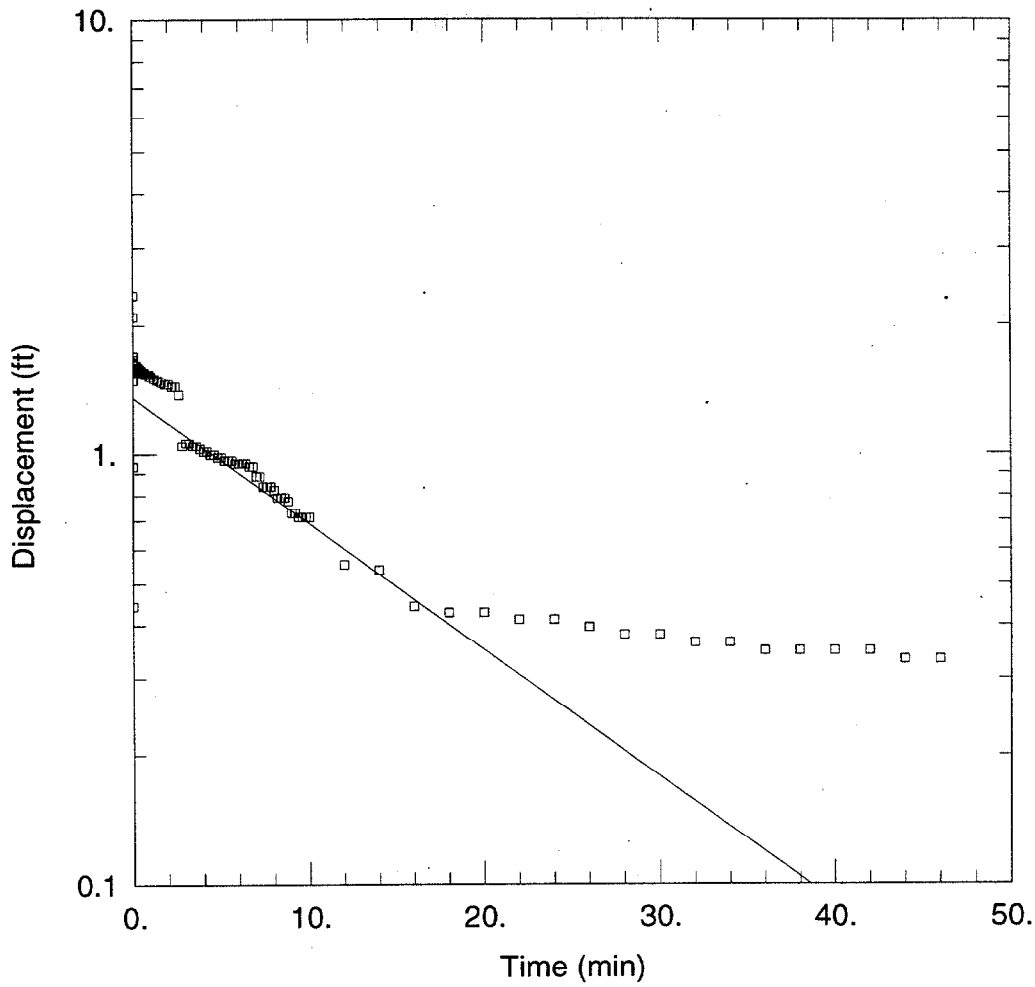
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001919 ft/sec
y0 = 1.135 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 4GW109
Slug-Out Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	3.566	0.1433	1.616	0.2866	1.585
0.0033	1.489	0.1466	1.616	0.29	1.585
0.0066	0.443	0.15	1.616	0.2933	1.585
0.01	2.345	0.1533	1.616	0.2966	1.585
0.0133	2.092	0.1566	1.616	0.3	1.585
0.0166	0.935	0.16	1.616	0.3033	1.585
0.02	1.489	0.1633	1.616	0.3066	1.585
0.0233	1.696	0.1666	1.616	0.31	1.585
0.0266	1.569	0.17	1.616	0.3133	1.585
0.03	1.648	0.1733	1.616	0.3166	1.585
0.0333	1.664	0.1766	1.616	0.32	1.585
0.0366	1.585	0.18	1.616	0.3233	1.585
0.04	1.6	0.1833	1.616	0.3266	1.585
0.0433	1.648	0.1866	1.616	0.33	1.585
0.0466	1.6	0.19	1.616	0.3333	1.585
0.05	1.6	0.1933	1.616	0.35	1.585
0.0533	1.632	0.1966	1.616	0.3666	1.585
0.0566	1.616	0.2	1.616	0.3833	1.569
0.06	1.616	0.2033	1.6	0.4	1.569
0.0633	1.616	0.2066	1.6	0.4166	1.569
0.0666	1.632	0.21	1.6	0.4333	1.569
0.07	1.616	0.2133	1.6	0.45	1.569
0.0733	1.616	0.2166	1.6	0.4666	1.569
0.0766	1.616	0.22	1.6	0.4833	1.553
0.08	1.616	0.2233	1.6	0.5	1.553
0.0833	1.616	0.2266	1.6	0.5166	1.553
0.0866	1.616	0.23	1.6	0.5333	1.553
0.09	1.616	0.2333	1.6	0.55	1.553
0.0933	1.616	0.2366	1.6	0.5666	1.553
0.0966	1.616	0.24	1.6	0.5833	1.553
0.1	1.616	0.2433	1.6	0.6	1.553
0.1033	1.616	0.2466	1.6	0.6166	1.553
0.1066	1.616	0.25	1.6	0.6333	1.553
0.11	1.616	0.2533	1.6	0.65	1.553
0.1133	1.616	0.2566	1.6	0.6666	1.553
0.1166	1.616	0.26	1.585	0.6833	1.537
0.12	1.616	0.2633	1.6	0.7	1.537
0.1233	1.616	0.2666	1.6	0.7166	1.537
0.1266	1.616	0.27	1.585	0.7333	1.537
0.13	1.616	0.2733	1.585	0.75	1.537
0.1333	1.616	0.2766	1.585	0.7666	1.537
0.1366	1.616	0.28	1.585	0.7833	1.537
0.14	1.616	0.2833	1.585	0.8	1.537

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 4GW109
Slug-Out Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	1.537	3.8	1.03	8.8	0.776
0.8333	1.537	4	1.014	9	0.729
0.85	1.537	4.2	1.014	9.2	0.729
0.8666	1.537	4.4	0.998	9.4	0.713
0.8833	1.537	4.6	0.998	9.6	0.713
0.9	1.537	4.8	0.982	9.8	0.713
0.9166	1.537	5	0.982	10	0.713
0.9333	1.521	5.2	0.966	12	0.554
0.95	1.521	5.4	0.966	14	0.538
0.9666	1.521	5.6	0.966	16	0.443
0.9833	1.521	5.8	0.951	18	0.428
1	1.521	6	0.951	20	0.428
1.2	1.505	6.2	0.951	22	0.412
1.4	1.489	6.4	0.951	24	0.412
1.6	1.474	6.6	0.935	26	0.396
1.8	1.458	6.8	0.935	28	0.38
2	1.458	7	0.887	30	0.38
2.2	1.442	7.2	0.887	32	0.364
2.4	1.442	7.4	0.84	34	0.364
2.6	1.379	7.6	0.84	36	0.348
2.8	1.046	7.8	0.84	38	0.348
3	1.062	8	0.824	40	0.348
3.2	1.062	8.2	0.792	42	0.348
3.4	1.046	8.4	0.792	44	0.332
3.6	1.046	8.6	0.792	46	0.332



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 14:19:31

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 4GW109 Slug Out Test
Test Date: March 3, 1999

AQUIFER DATA

Saturated Thickness: 78.08 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

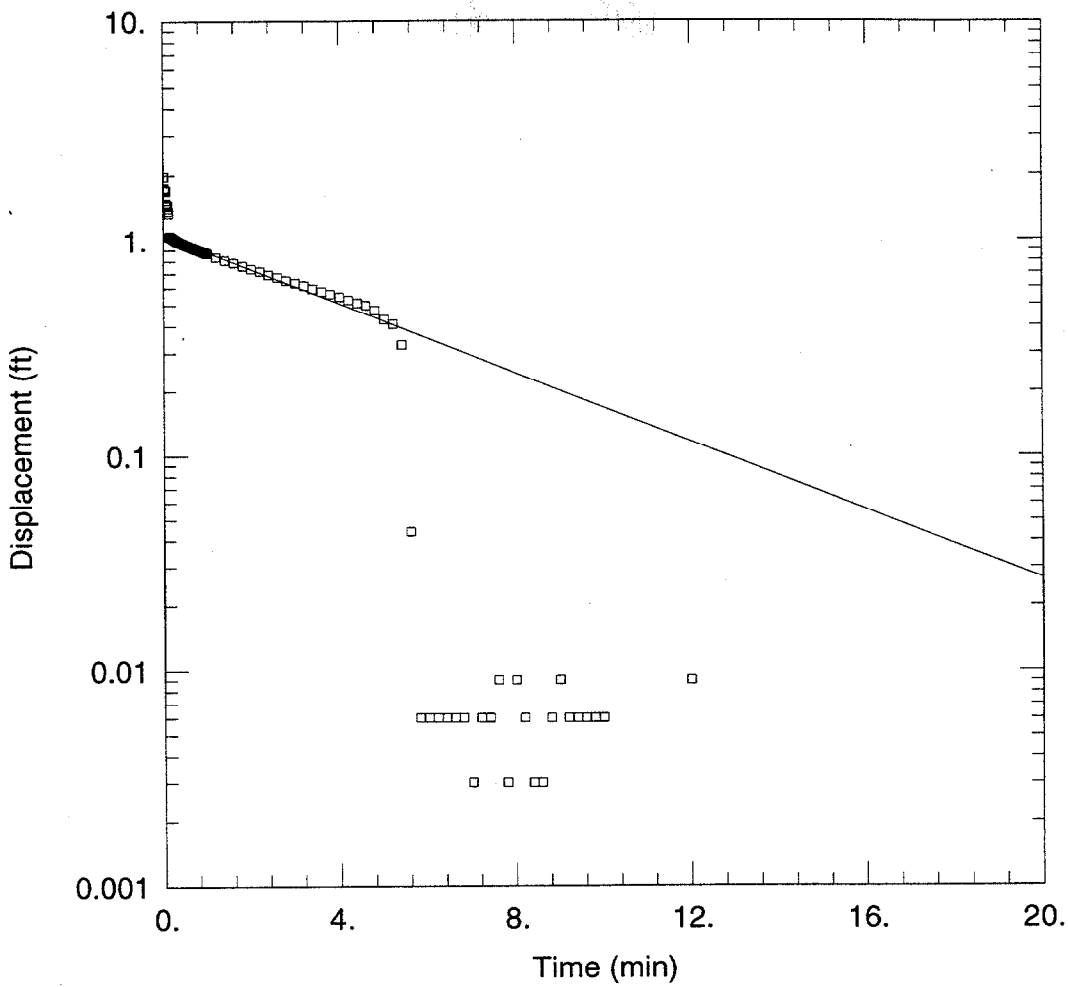
Initial Displacement: 2.345 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 9.83 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.441E-06 ft/sec
y0 = 1.354 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 7GW102
Slug-Out Test March 1, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.97	0.3833	0.977	2.2	0.716
0.0083	1.976	0.4	0.974	2.4	0.69
0.0166	1.738	0.4166	0.97	2.6	0.671
0.025	1.709	0.4333	0.967	2.8	0.649
0.0333	1.703	0.45	0.964	3	0.633
0.0416	1.693	0.4666	0.961	3.2	0.614
0.05	1.683	0.4833	0.958	3.4	0.595
0.0583	1.483	0.5	0.955	3.6	0.576
0.0666	1.467	0.5166	0.951	3.8	0.56
0.075	1.464	0.5333	0.948	4	0.544
0.0833	1.454	0.55	0.945	4.2	0.528
0.0916	1.448	0.5666	0.942	4.4	0.509
0.1	1.438	0.5833	0.939	4.6	0.496
0.1083	1.403	0.6	0.935	4.8	0.471
0.1166	1.368	0.6166	0.935	5	0.429
0.125	1.333	0.6333	0.932	5.2	0.407
0.1333	1.044	0.65	0.929	5.4	0.327
0.1416	1.047	0.6666	0.926	5.6	0.044
0.15	1.044	0.6833	0.923	5.8	0.006
0.1583	1.04	0.7	0.92	6	0.006
0.1666	1.037	0.7166	0.916	6.2	0.006
0.175	1.034	0.7333	0.913	6.4	0.006
0.1833	1.031	0.75	0.91	6.6	0.006
0.1916	1.028	0.7666	0.907	6.8	0.006
0.2	1.028	0.7833	0.904	7	0.003
0.2083	1.025	0.8	0.904	7.2	0.006
0.2166	1.021	0.8166	0.9	7.4	0.006
0.225	1.021	0.8333	0.897	7.6	0.009
0.2333	1.018	0.85	0.894	7.8	0.003
0.2416	1.015	0.8666	0.891	8	0.009
0.25	1.012	0.8833	0.888	8.2	0.006
0.2583	1.012	0.9	0.885	8.4	0.003
0.2666	1.009	0.9166	0.881	8.6	0.003
0.275	1.005	0.9333	0.881	8.8	0.006
0.2833	1.002	0.95	0.878	9	0.009
0.2916	0.999	0.9666	0.875	9.2	0.006
0.3	0.999	0.9833	0.872	9.4	0.006
0.3083	0.996	1	0.869	9.6	0.006
0.3166	0.993	1.2	0.837	9.8	0.006
0.325	0.99	1.4	0.808	10	0.006
0.3333	0.99	1.6	0.786	12	0.009
0.35	0.986	1.8	0.76		
0.3666	0.98	2	0.738		



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 14:27:00

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 7GW102 Slug Out Test
Test Date: March 1, 1999

AQUIFER DATA

Saturated Thickness: 50.83 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

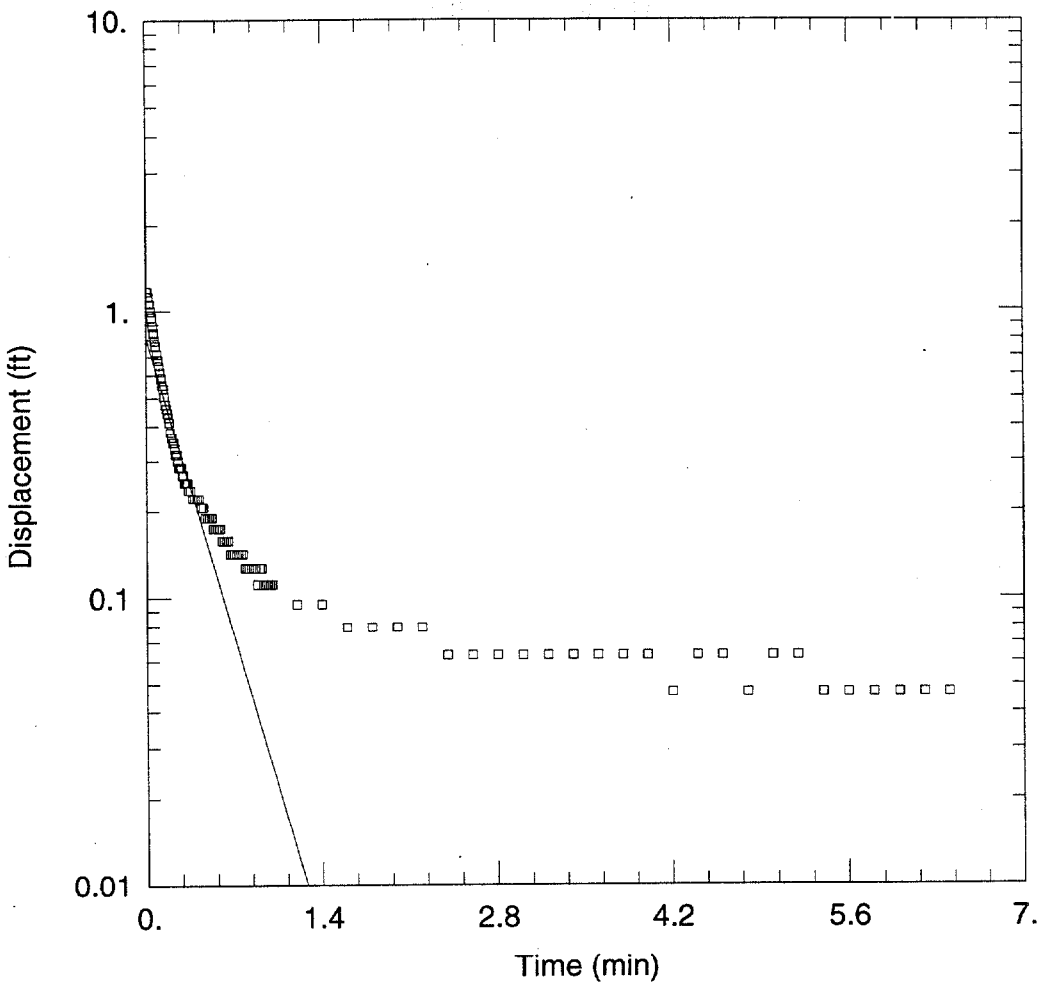
Initial Displacement: 1.976 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 5.71 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.083E-05 ft/sec
y0 = 1.058 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 7GW103
Second Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.793	0.2916	0.269	0.8333	0.126
0.0083	1.174	0.3	0.253	0.85	0.126
0.0166	1.126	0.3083	0.253	0.8666	0.126
0.025	1.063	0.3166	0.253	0.8833	0.111
0.0333	0.999	0.325	0.253	0.9	0.126
0.0416	0.952	0.3333	0.238	0.9166	0.126
0.05	0.888	0.35	0.238	0.9333	0.111
0.0583	0.841	0.3666	0.222	0.95	0.111
0.0666	0.793	0.3833	0.222	0.9666	0.111
0.075	0.761	0.4	0.222	0.9833	0.111
0.0833	0.714	0.4166	0.222	1	0.111
0.0916	0.682	0.4333	0.206	1.2	0.095
0.1	0.65	0.45	0.206	1.4	0.095
0.1083	0.618	0.4666	0.19	1.6	0.079
0.1166	0.587	0.4833	0.19	1.8	0.079
0.125	0.555	0.5	0.19	2	0.079
0.1333	0.539	0.5166	0.19	2.2	0.079
0.1416	0.507	0.5333	0.174	2.4	0.063
0.15	0.476	0.55	0.174	2.6	0.063
0.1583	0.46	0.5666	0.174	2.8	0.063
0.1666	0.444	0.5833	0.174	3	0.063
0.175	0.428	0.6	0.158	3.2	0.063
0.1833	0.412	0.6166	0.158	3.4	0.063
0.1916	0.38	0.6333	0.158	3.6	0.063
0.2	0.364	0.65	0.158	3.8	0.063
0.2083	0.349	0.6666	0.142	4	0.063
0.2166	0.349	0.6833	0.142	4.2	0.047
0.225	0.333	0.7	0.142	4.4	0.063
0.2333	0.317	0.7166	0.142	4.6	0.063
0.2416	0.317	0.7333	0.142	4.8	0.047
0.25	0.301	0.75	0.142	5	0.063
0.2583	0.285	0.7666	0.142	5.2	0.063
0.2666	0.285	0.7833	0.126	5.4	0.047
0.275	0.285	0.8	0.126	5.6	0.047
0.2833	0.269	0.8166	0.126	5.8	0.047



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE7~1\GRAPHS\103OUTA.AQT
Date: 05/10/99 Time: 15:16:24

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 7GW103 Second Slug Out Test
Test Date: March 8, 1999

AQUIFER DATA

Saturated Thickness: 54.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

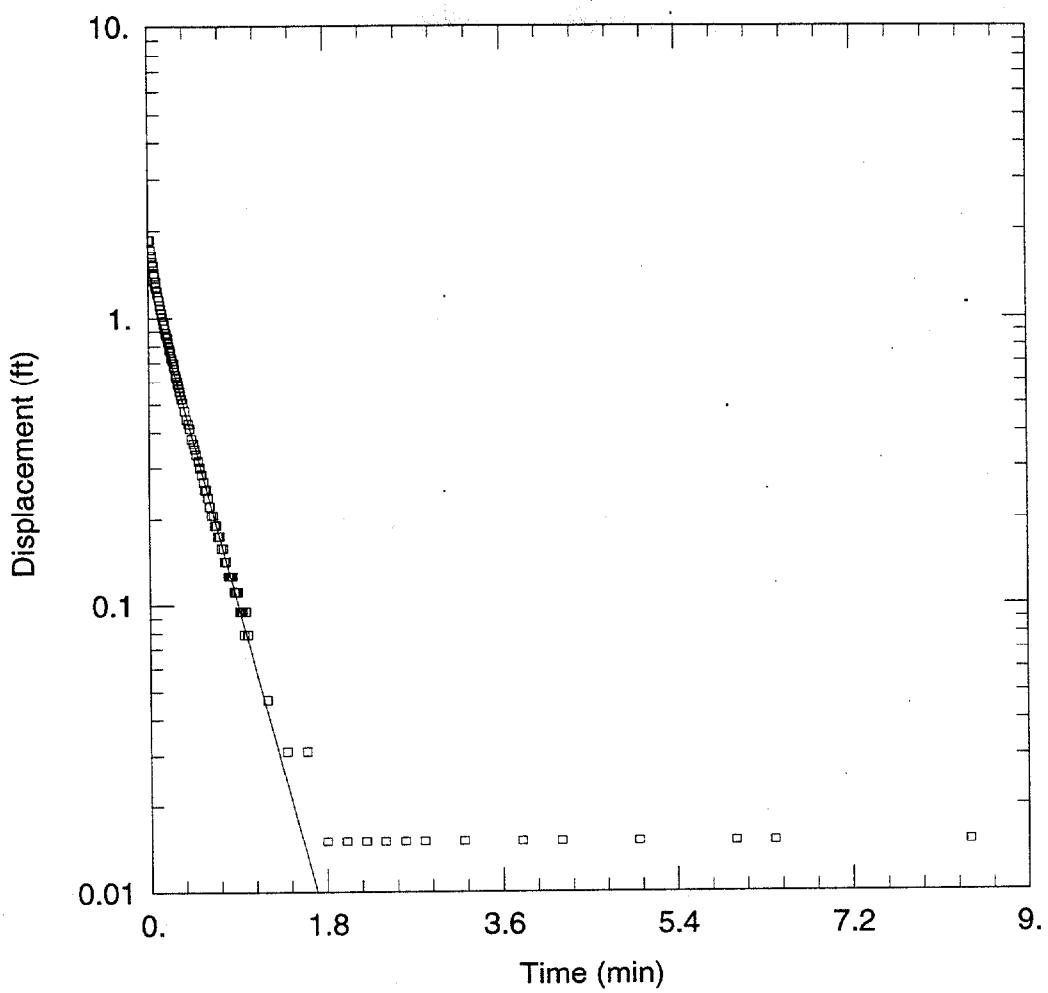
Initial Displacement: 1.174 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 6.08 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0002052 ft/sec
y0 = 0.8018 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 7GW105
Slug-Out Test March 1, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	4.221	0.2583	0.682	0.7	0.174
0.0083	4.38	0.2666	0.666	0.7166	0.174
0.0166	1.856	0.275	0.634	0.7333	0.158
0.025	1.714	0.2833	0.619	0.75	0.158
0.0333	1.634	0.2916	0.603	0.7666	0.142
0.0416	1.555	0.3	0.587	0.7833	0.142
0.05	1.507	0.3083	0.571	0.8	0.126
0.0583	1.428	0.3166	0.555	0.8166	0.126
0.0666	1.396	0.325	0.539	0.8333	0.126
0.075	1.333	0.3333	0.523	0.85	0.126
0.0833	1.285	0.35	0.507	0.8666	0.111
0.0916	1.237	0.3666	0.476	0.8833	0.111
0.1	1.19	0.3833	0.444	0.9	0.111
0.1083	1.158	0.4	0.428	0.9166	0.095
0.1166	1.111	0.4166	0.412	0.9333	0.095
0.125	1.079	0.4333	0.38	0.95	0.095
0.1333	1.047	0.45	0.365	0.9666	0.079
0.1416	1.015	0.4666	0.349	0.9833	0.095
0.15	0.984	0.4833	0.333	1	0.079
0.1583	0.952	0.5	0.317	1.2	0.047
0.1666	0.92	0.5166	0.301	1.4	0.031
0.175	0.888	0.5333	0.285	1.6	0.031
0.1833	0.872	0.55	0.269	1.8	0.015
0.1916	0.857	0.5666	0.253	2	0.015
0.2	0.825	0.5833	0.253	2.2	0.015
0.2083	0.793	0.6	0.238	2.4	0.015
0.2166	0.777	0.6166	0.222	2.6	0.015
0.225	0.761	0.6333	0.206	2.8	0.015
0.2333	0.73	0.65	0.206	3	0
0.2416	0.714	0.6666	0.19	3.2	0.015
0.25	0.698	0.6833	0.19	3.4	0



WELL TEST ANALYSIS

Data Set:
Date: 05/05/99 Time: 15:50:39

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 7GW105 Slug Out Test
Test Date: March 1, 1999

AQUIFER DATA

Saturated Thickness: 55.69 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

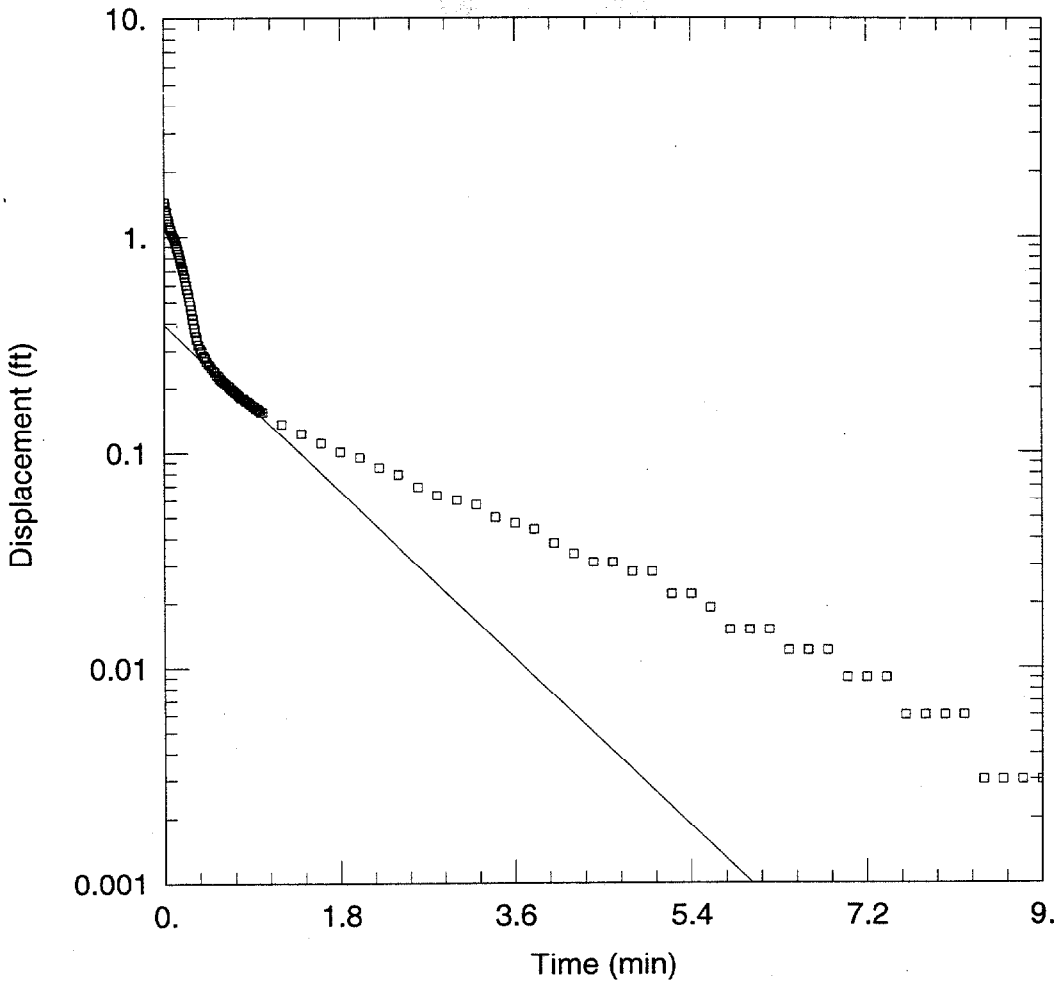
Initial Displacement: 1.856 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 10.44 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001952 ft/sec
y0 = 1.365 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW100
Slug-Out Test March 2, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.443	0.3833	0.298	2.2	0.085
0.0083	1.39	0.4	0.285	2.4	0.079
0.0166	1.342	0.4166	0.279	2.6	0.069
0.025	1.307	0.4333	0.269	2.8	0.063
0.0333	1.234	0.45	0.26	3	0.06
0.0416	1.202	0.4666	0.257	3.2	0.057
0.05	1.158	0.4833	0.25	3.4	0.05
0.0583	1.12	0.5	0.244	3.6	0.047
0.0666	1.088	0.5166	0.238	3.8	0.044
0.075	1.06	0.5333	0.231	4	0.038
0.0833	1.034	0.55	0.228	4.2	0.034
0.0916	1.009	0.5666	0.222	4.4	0.031
0.1	0.987	0.5833	0.219	4.6	0.031
0.1083	0.961	0.6	0.215	4.8	0.028
0.1166	0.939	0.6166	0.212	5	0.028
0.125	0.914	0.6333	0.209	5.2	0.022
0.1333	0.888	0.65	0.206	5.4	0.022
0.1416	0.863	0.6666	0.203	5.6	0.019
0.15	0.837	0.6833	0.199	5.8	0.015
0.1583	0.809	0.7	0.196	6	0.015
0.1666	0.783	0.7166	0.193	6.2	0.015
0.175	0.758	0.7333	0.19	6.4	0.012
0.1833	0.729	0.75	0.187	6.6	0.012
0.1916	0.704	0.7666	0.184	6.8	0.012
0.2	0.679	0.7833	0.18	7	0.009
0.2083	0.653	0.8	0.18	7.2	0.009
0.2166	0.628	0.8166	0.177	7.4	0.009
0.225	0.603	0.8333	0.174	7.6	0.006
0.2333	0.577	0.85	0.174	7.8	0.006
0.2416	0.555	0.8666	0.171	8	0.006
0.25	0.533	0.8833	0.168	8.2	0.006
0.2583	0.507	0.9	0.165	8.4	0.003
0.2666	0.485	0.9166	0.165	8.6	0.003
0.275	0.463	0.9333	0.161	8.8	0.003
0.2833	0.441	0.95	0.161	9	0.003
0.2916	0.418	0.9666	0.158	9.2	0
0.3	0.399	0.9833	0.155	9.4	0
0.3083	0.38	1	0.155	9.6	0
0.3166	0.365	1.2	0.136	9.8	0
0.325	0.349	1.4	0.123	10	0
0.3333	0.339	1.6	0.111	12	0
0.35	0.32	1.8	0.101		
0.3666	0.307	2	0.095		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE9~1\GRAPHS\100OUT.AQT
Date: 05/10/99 Time: 15:19:32

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW100 Slug Out Test
Test Date: March 2, 1999

AQUIFER DATA

Saturated Thickness: 5.79 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

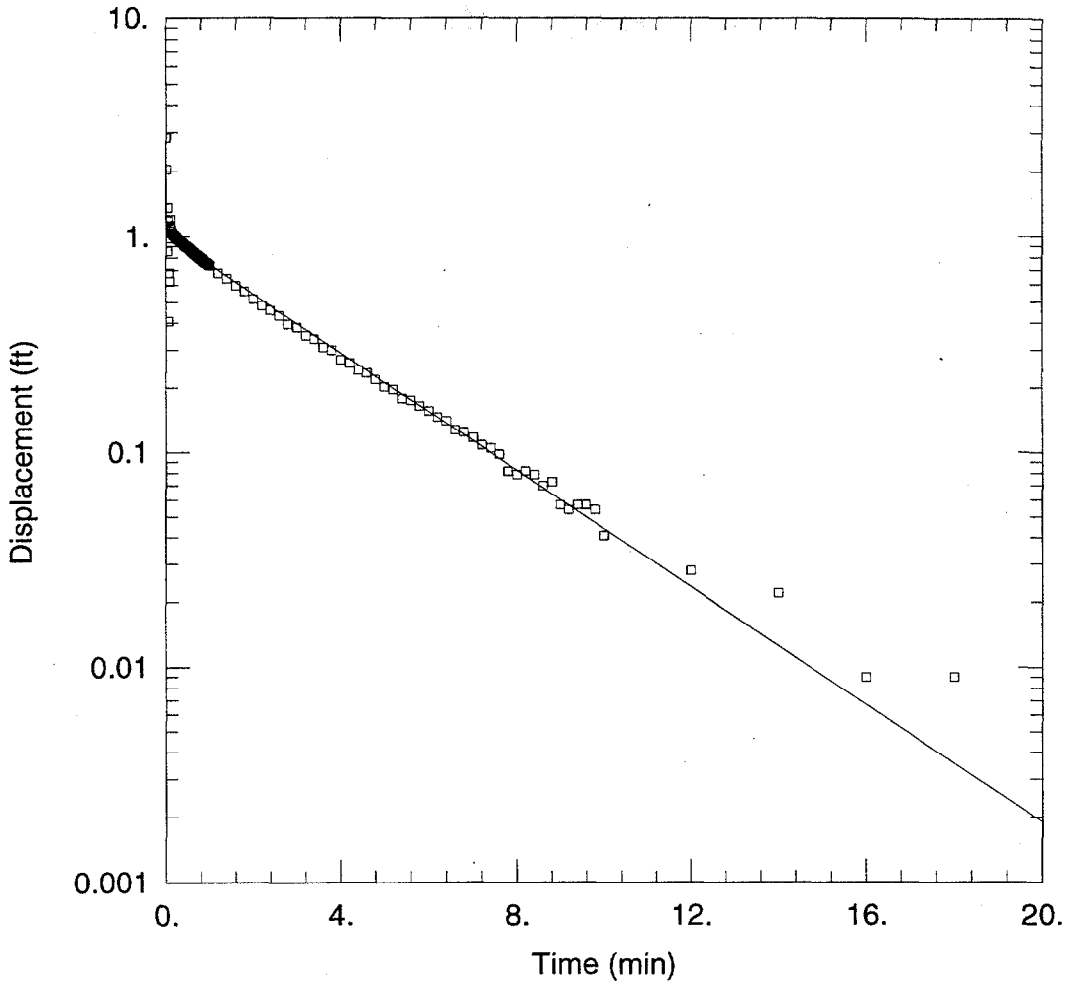
Initial Displacement: 1.443 ft
Casing Radius: 0.083 ft
Screen Length: 7. ft
Water Column Height: 5.79 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 9.547E-05 ft/sec
y0 = 0.3938 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW101
Slug-In Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-2.986	0.4	-0.92	2.6	-0.433
0.0083	-5.553	0.4166	-0.908	2.8	-0.395
0.0166	-2.846	0.4333	-0.908	3	-0.382
0.025	-2.042	0.45	-0.904	3.2	-0.35
0.0333	-0.857	0.4666	-0.898	3.4	-0.337
0.0416	-0.981	0.4833	-0.892	3.6	-0.309
0.05	-1.363	0.5	-0.889	3.8	-0.299
0.0583	-1.182	0.5166	-0.882	4	-0.27
0.0666	-0.407	0.5333	-0.876	4.2	-0.261
0.075	-0.681	0.55	-0.869	4.4	-0.242
0.0833	-0.624	0.5666	-0.866	4.6	-0.235
0.0916	-1.128	0.5833	-0.86	4.8	-0.219
0.1	-1.201	0.6	-0.853	5	-0.203
0.1083	-1.115	0.6166	-0.847	5.2	-0.197
0.1166	-1.064	0.6333	-0.844	5.4	-0.178
0.125	-1.048	0.65	-0.834	5.6	-0.175
0.1333	-1.038	0.6666	-0.831	5.8	-0.165
0.1416	-1.032	0.6833	-0.828	6	-0.156
0.15	-1.029	0.7	-0.818	6.2	-0.146
0.1583	-1.022	0.7166	-0.818	6.4	-0.14
0.1666	-1.019	0.7333	-0.812	6.6	-0.127
0.175	-1.016	0.75	-0.809	6.8	-0.124
0.1833	-1.013	0.7666	-0.799	7	-0.117
0.1916	-1.01	0.7833	-0.796	7.2	-0.108
0.2	-1.003	0.8	-0.79	7.4	-0.105
0.2083	-1	0.8166	-0.787	7.6	-0.098
0.2166	-0.997	0.8333	-0.783	7.8	-0.082
0.225	-0.994	0.85	-0.777	8	-0.079
0.2333	-0.987	0.8666	-0.771	8.2	-0.082
0.2416	-0.984	0.8833	-0.767	8.4	-0.079
0.25	-0.981	0.9	-0.761	8.6	-0.07
0.2583	-0.978	0.9166	-0.758	8.8	-0.073
0.2666	-0.975	0.9333	-0.755	9	-0.057
0.275	-0.971	0.95	-0.752	9.2	-0.054
0.2833	-0.968	0.9666	-0.742	9.4	-0.057
0.2916	-0.965	0.9833	-0.742	9.6	-0.057
0.3	-0.959	1	-0.736	9.8	-0.054
0.3083	-0.959	1.2	-0.678	10	-0.041
0.3166	-0.955	1.4	-0.64	12	-0.028
0.325	-0.949	1.6	-0.595	14	-0.022
0.3333	-0.946	1.8	-0.56	16	-0.009
0.35	-0.94	2	-0.516	18	-0.009
0.3666	-0.936	2.2	-0.481	20	0.003
0.3833	-0.93	2.4	-0.458		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 07:53:36

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW101 Slug In Test
Test Date: March 3, 1999

AQUIFER DATA

Saturated Thickness: 9.54 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

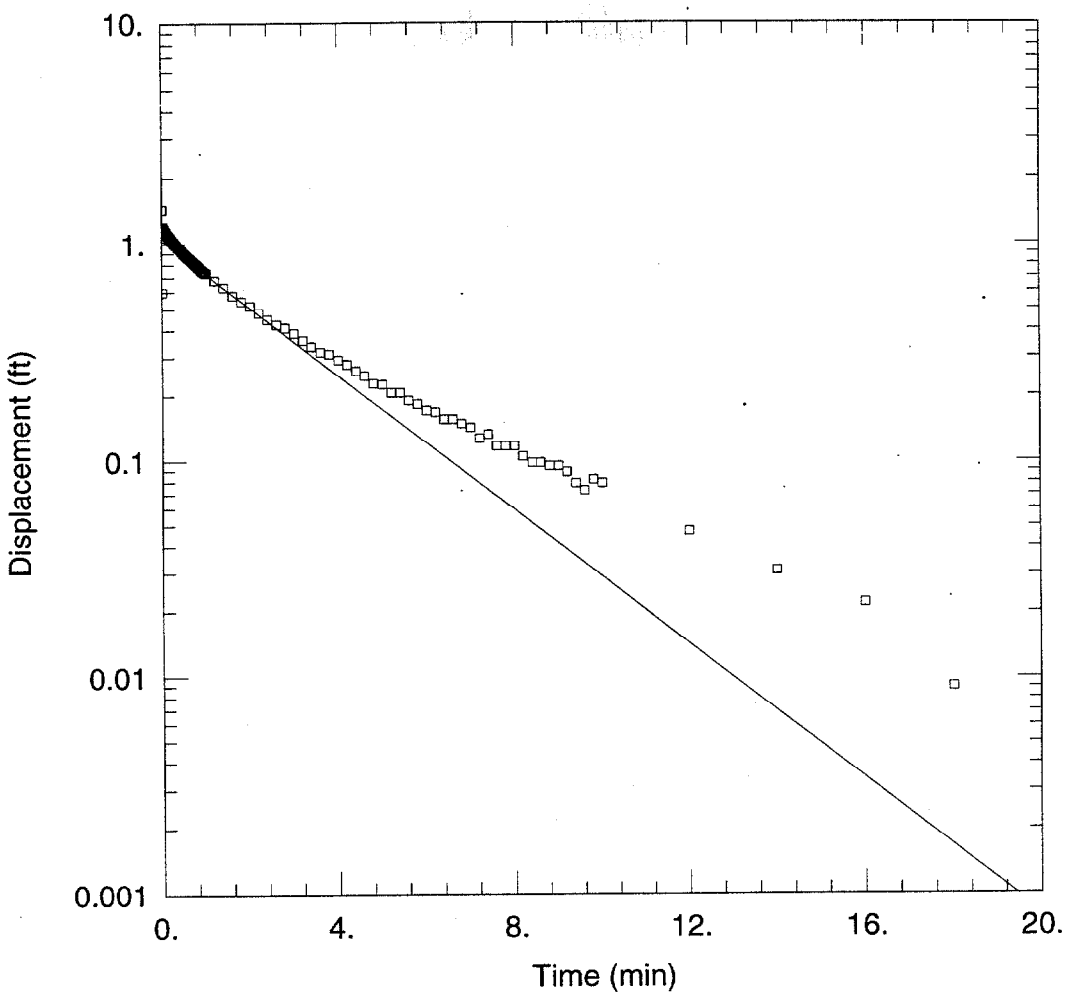
Initial Displacement: 2.846 ft
Casing Radius: 0.083 ft
Screen Length: 8. ft
Water Column Height: 9.54 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.061E-05 ft/sec
y0 = 1.02 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW101
Slug-Out Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	5.757	0.4	0.949	2.6	0.426
0.0083	0.598	0.4166	0.943	2.8	0.411
0.0166	1.433	0.4333	0.936	3	0.388
0.025	1.162	0.45	0.927	3.2	0.36
0.0333	1.201	0.4666	0.92	3.4	0.337
0.0416	1.181	0.4833	0.904	3.6	0.318
0.05	1.166	0.5	0.901	3.8	0.312
0.0583	1.162	0.5166	0.898	4	0.293
0.0666	1.156	0.5333	0.892	4.2	0.28
0.075	1.15	0.55	0.879	4.4	0.261
0.0833	1.131	0.5666	0.876	4.6	0.248
0.0916	1.124	0.5833	0.869	4.8	0.229
0.1	1.127	0.6	0.863	5	0.226
0.1083	1.118	0.6166	0.857	5.2	0.207
0.1166	1.111	0.6333	0.853	5.4	0.207
0.125	1.108	0.65	0.847	5.6	0.191
0.1333	1.099	0.6666	0.841	5.8	0.184
0.1416	1.092	0.6833	0.834	6	0.172
0.15	1.086	0.7	0.828	6.2	0.168
0.1583	1.083	0.7166	0.822	6.4	0.156
0.1666	1.073	0.7333	0.815	6.6	0.156
0.175	1.07	0.75	0.809	6.8	0.149
0.1833	1.067	0.7666	0.806	7	0.143
0.1916	1.064	0.7833	0.799	7.2	0.127
0.2	1.06	0.8	0.793	7.4	0.133
0.2083	1.048	0.8166	0.786	7.6	0.117
0.2166	1.048	0.8333	0.78	7.8	0.117
0.225	1.041	0.85	0.777	8	0.117
0.2333	1.029	0.8666	0.774	8.2	0.105
0.2416	1.025	0.8833	0.758	8.4	0.098
0.25	1.025	0.9	0.758	8.6	0.098
0.2583	1.016	0.9166	0.755	8.8	0.095
0.2666	1.019	0.9333	0.745	9	0.095
0.275	1.006	0.95	0.745	9.2	0.089
0.2833	1.009	0.9666	0.735	9.4	0.079
0.2916	0.997	0.9833	0.735	9.6	0.073
0.3	0.994	1	0.732	9.8	0.082
0.3083	0.994	1.2	0.678	10	0.079
0.3166	0.987	1.4	0.63	12	0.047
0.325	0.984	1.6	0.579	14	0.031
0.3333	0.984	1.8	0.544	16	0.022
0.35	0.974	2	0.519	18	0.009
0.3666	0.958	2.2	0.481	20	0
0.3833	0.958	2.4	0.449		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 08:00:17

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW101 Slug Out Test
Test Date: March 3, 1999

AQUIFER DATA

Saturated Thickness: 9.54 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.433 ft
Casing Radius: 0.083 ft
Screen Length: 8. ft
Water Column Height: 9.54 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

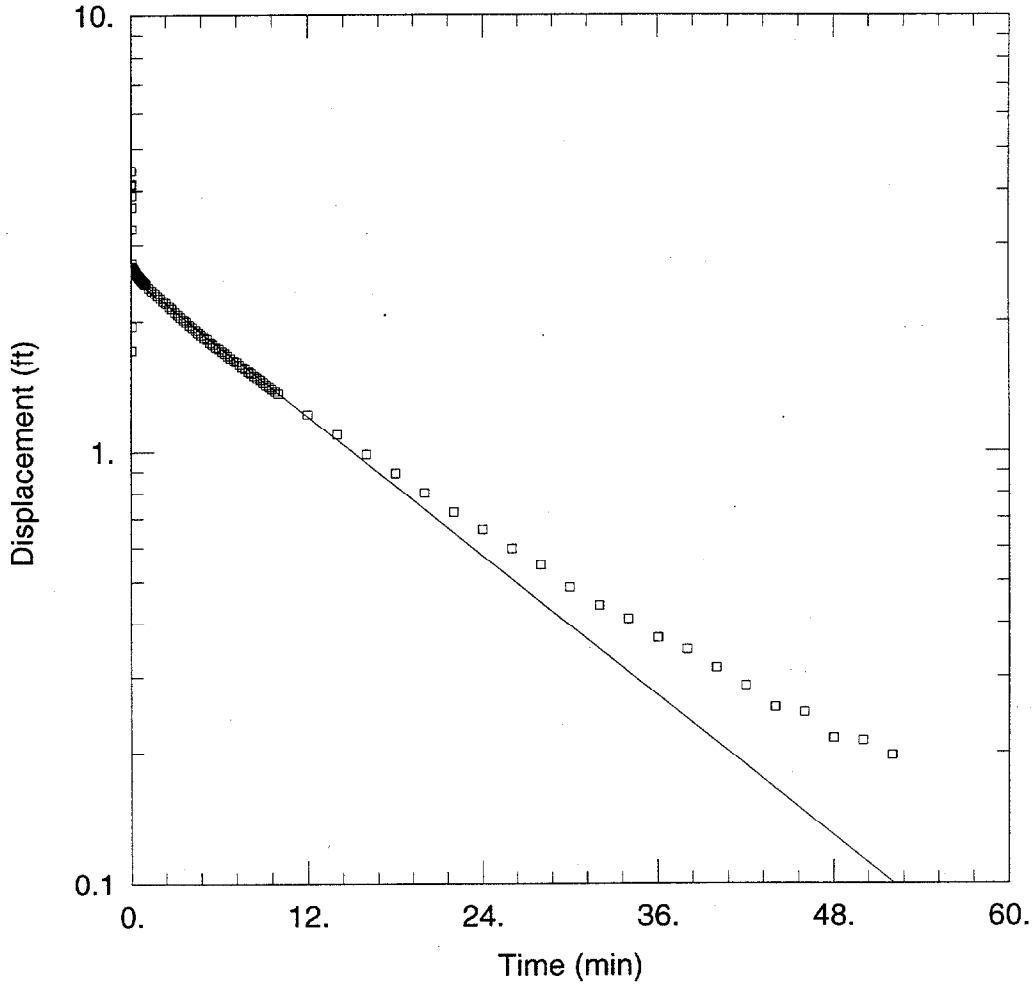
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.48E-05 ft/sec
y0 = 1.035 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW102
Slug-In Test March 2, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-4.445	0.3833	-2.569	2.2	-2.225
0.0083	-4.11	0.4	-2.566	2.4	-2.199
0.0166	-4.145	0.4166	-2.563	2.6	-2.164
0.025	-3.673	0.4333	-2.56	2.8	-2.139
0.0333	-3.899	0.45	-2.557	3	-2.097
0.0416	-1.718	0.4666	-2.553	3.2	-2.069
0.05	-3.271	0.4833	-2.55	3.4	-2.04
0.0583	-1.951	0.5	-2.544	3.6	-2.014
0.0666	-2.726	0.5166	-2.55	3.8	-1.992
0.075	-2.684	0.5333	-2.537	4	-1.96
0.0833	-2.671	0.55	-2.531	4.2	-1.935
0.0916	-2.668	0.5666	-2.531	4.4	-1.909
0.1	-2.668	0.5833	-2.525	4.6	-1.884
0.1083	-2.662	0.6	-2.518	4.8	-1.861
0.1166	-2.655	0.6166	-2.515	5	-1.836
0.125	-2.655	0.6333	-2.512	5.2	-1.823
0.1333	-2.649	0.65	-2.509	5.4	-1.791
0.1416	-2.649	0.6666	-2.505	5.6	-1.772
0.15	-2.646	0.6833	-2.499	5.8	-1.747
0.1583	-2.633	0.7	-2.496	6	-1.734
0.1666	-2.643	0.7166	-2.496	6.2	-1.711
0.175	-2.636	0.7333	-2.49	6.4	-1.689
0.1833	-2.636	0.75	-2.486	6.6	-1.67
0.1916	-2.636	0.7666	-2.483	6.8	-1.648
0.2	-2.623	0.7833	-2.48	7	-1.625
0.2083	-2.627	0.8	-2.477	7.2	-1.613
0.2166	-2.63	0.8166	-2.47	7.4	-1.59
0.225	-2.627	0.8333	-2.47	7.6	-1.568
0.2333	-2.62	0.85	-2.464	7.8	-1.555
0.2416	-2.617	0.8666	-2.461	8	-1.53
0.25	-2.617	0.8833	-2.458	8.2	-1.517
0.2583	-2.611	0.9	-2.454	8.4	-1.495
0.2666	-2.608	0.9166	-2.451	8.6	-1.479
0.275	-2.608	0.9333	-2.448	8.8	-1.463
0.2833	-2.601	0.95	-2.445	9	-1.444
0.2916	-2.598	0.9666	-2.442	9.2	-1.428
0.3	-2.604	0.9833	-2.442	9.4	-1.412
0.3083	-2.598	1	-2.439	9.6	-1.396
0.3166	-2.598	1.2	-2.394	9.8	-1.38
0.325	-2.598	1.4	-2.356	10	-1.364
0.3333	-2.595	1.6	-2.324	12	-1.22
0.35	-2.579	1.8	-2.292	14	-1.096
0.3666	-2.572	2	-2.26	16	-0.985

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 9GW102
Slug-In Test March 2, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	-0.889	30	-0.484	42	-0.286
20	-0.8	32	-0.439	44	-0.255
22	-0.723	34	-0.408	46	-0.248
24	-0.659	36	-0.369	48	-0.216
26	-0.596	38	-0.347	50	-0.213
28	-0.545	40	-0.315	52	-0.197



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 08:04:32

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW102 Slug In Test
Test Date: March 2, 1999

AQUIFER DATA

Saturated Thickness: 58.28 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 4.445 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 14.28 ft
Wellbore Radius: 0.167 ft
Gravel Pack Porosity: 0.3

SOLUTION

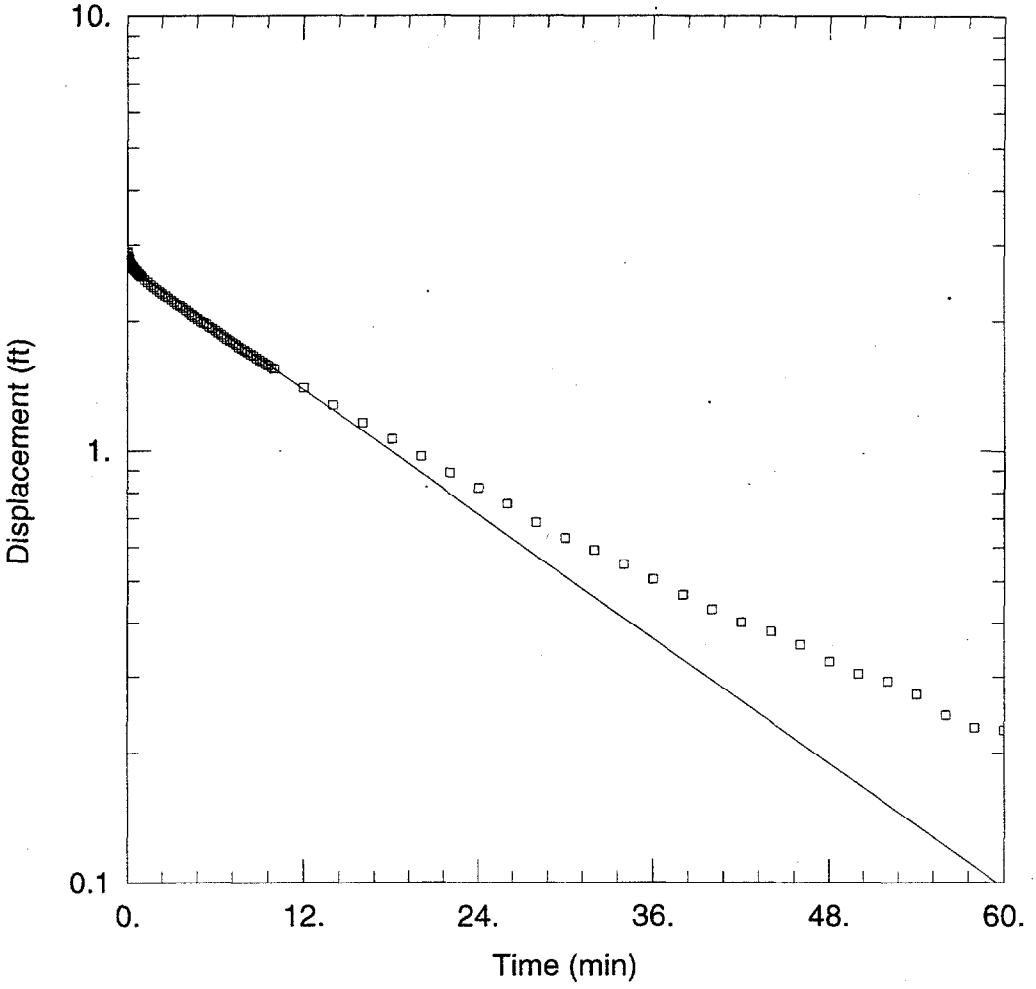
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.929E-06 ft/sec
y0 = 2.539 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW102
Slug-Out Test March 2, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	2.829	0.3833	2.676	2.2	2.345
0.0083	2.896	0.4	2.657	2.4	2.32
0.0166	2.871	0.4166	2.654	2.6	2.291
0.025	2.832	0.4333	2.651	2.8	2.265
0.0333	2.839	0.45	2.657	3	2.24
0.0416	2.817	0.4666	2.644	3.2	2.211
0.05	2.813	0.4833	2.644	3.4	2.186
0.0583	2.778	0.5	2.635	3.6	2.167
0.0666	2.791	0.5166	2.638	3.8	2.144
0.075	2.797	0.5333	2.629	4	2.116
0.0833	2.778	0.55	2.625	4.2	2.09
0.0916	2.781	0.5666	2.625	4.4	2.068
0.1	2.756	0.5833	2.616	4.6	2.046
0.1083	2.766	0.6	2.613	4.8	2.02
0.1166	2.753	0.6166	2.613	5	1.998
0.125	2.75	0.6333	2.613	5.2	1.979
0.1333	2.75	0.65	2.613	5.4	1.966
0.1416	2.756	0.6666	2.6	5.6	1.94
0.15	2.772	0.6833	2.594	5.8	1.924
0.1583	2.756	0.7	2.59	6	1.899
0.1666	2.731	0.7166	2.59	6.2	1.877
0.175	2.74	0.7333	2.59	6.4	1.858
0.1833	2.734	0.75	2.584	6.6	1.838
0.1916	2.715	0.7666	2.581	6.8	1.816
0.2	2.727	0.7833	2.574	7	1.8
0.2083	2.711	0.8	2.574	7.2	1.781
0.2166	2.721	0.8166	2.568	7.4	1.762
0.225	2.711	0.8333	2.571	7.6	1.743
0.2333	2.664	0.85	2.565	7.8	1.727
0.2416	2.705	0.8666	2.558	8	1.711
0.25	2.695	0.8833	2.555	8.2	1.695
0.2583	2.695	0.9	2.558	8.4	1.676
0.2666	2.702	0.9166	2.552	8.6	1.663
0.275	2.689	0.9333	2.549	8.8	1.641
0.2833	2.699	0.95	2.543	9	1.625
0.2916	2.699	0.9666	2.543	9.2	1.609
0.3	2.689	0.9833	2.546	9.4	1.593
0.3083	2.683	1	2.539	9.6	1.58
0.3166	2.673	1.2	2.498	9.8	1.561
0.325	2.686	1.4	2.466	10	1.552
0.3333	2.673	1.6	2.431	12	1.402
0.35	2.676	1.8	2.402	14	1.278
0.3666	2.676	2	2.374	16	1.163

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 9GW102
Slug-Out Test March 2, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	1.064	34	0.548	50	0.305
20	0.972	36	0.506	52	0.293
22	0.892	38	0.465	54	0.274
24	0.822	40	0.43	56	0.245
26	0.755	42	0.401	58	0.229
28	0.685	44	0.382	60	0.226
30	0.631	46	0.356		
32	0.592	48	0.325		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 08:08:53

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW102 Slug Out Test
Test Date: March 2, 1999

AQUIFER DATA

Saturated Thickness: 58.28 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

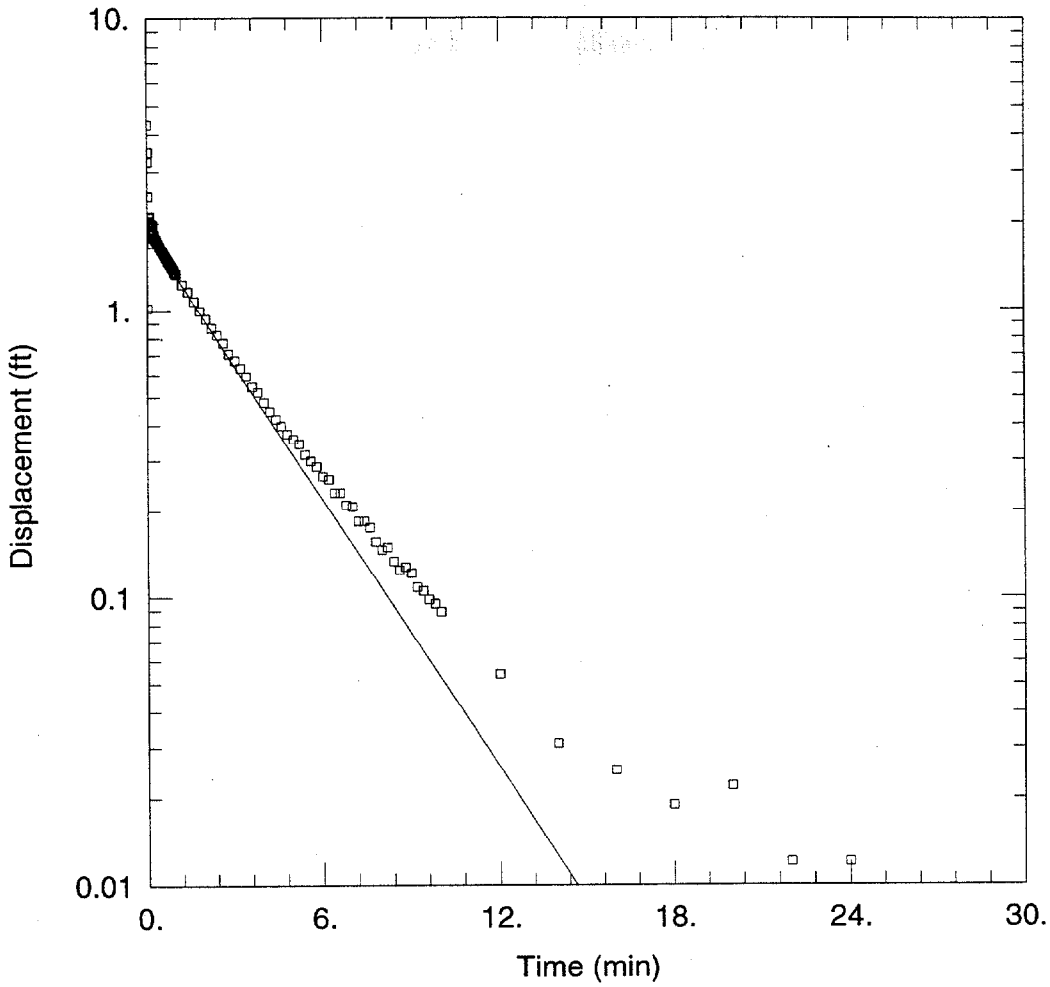
Initial Displacement: 2.896 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 14.28 ft
Wellbore Radius: 0.167 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.72E-06 ft/sec
y0 = 2.699 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW103
Slug-In Test March 2, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-3.756	0.4166	-1.66	3	-0.672
0.0083	-4.301	0.4333	-1.651	3.2	-0.634
0.0166	-3.242	0.45	-1.638	3.4	-0.592
0.025	-3.488	0.4666	-1.629	3.6	-0.545
0.0333	-1.013	0.4833	-1.616	3.8	-0.522
0.0416	-2.461	0.5	-1.609	4	-0.481
0.05	-1.973	0.5166	-1.6	4.2	-0.446
0.0583	-2.037	0.5333	-1.587	4.4	-0.42
0.0666	-2.084	0.55	-1.574	4.6	-0.398
0.075	-2.021	0.5666	-1.562	4.8	-0.372
0.0833	-2.011	0.5833	-1.555	5	-0.357
0.0916	-2.005	0.6	-1.542	5.2	-0.344
0.1	-1.864	0.6166	-1.536	5.4	-0.315
0.1083	-2.107	0.6333	-1.52	5.6	-0.299
0.1166	-1.963	0.65	-1.517	5.8	-0.286
0.125	-1.903	0.6666	-1.504	6	-0.264
0.1333	-1.992	0.6833	-1.498	6.2	-0.258
0.1416	-1.951	0.7	-1.479	6.4	-0.232
0.15	-1.801	0.7166	-1.472	6.6	-0.232
0.1583	-1.849	0.7333	-1.463	6.8	-0.21
0.1666	-1.852	0.75	-1.46	7	-0.207
0.175	-1.951	0.7666	-1.444	7.2	-0.184
0.1833	-1.699	0.7833	-1.437	7.4	-0.184
0.1916	-1.979	0.8	-1.428	7.6	-0.175
0.2	-1.788	0.8166	-1.415	7.8	-0.156
0.2083	-1.842	0.8333	-1.409	8	-0.146
0.2166	-1.833	0.85	-1.399	8.2	-0.149
0.225	-1.794	0.8666	-1.396	8.4	-0.133
0.2333	-1.82	0.8833	-1.389	8.6	-0.124
0.2416	-1.791	0.9	-1.377	8.8	-0.127
0.25	-1.794	0.9166	-1.361	9	-0.121
0.2583	-1.775	0.9333	-1.351	9.2	-0.108
0.2666	-1.778	0.95	-1.345	9.4	-0.105
0.275	-1.766	0.9666	-1.335	9.6	-0.098
0.2833	-1.756	0.9833	-1.332	9.8	-0.095
0.2916	-1.756	1	-1.326	10	-0.089
0.3	-1.75	1.2	-1.227	12	-0.054
0.3083	-1.743	1.4	-1.157	14	-0.031
0.3166	-1.734	1.6	-1.074	16	-0.025
0.325	-1.731	1.8	-0.994	18	-0.019
0.3333	-1.721	2	-0.933	20	-0.022
0.35	-1.715	2.2	-0.867	22	-0.012
0.3666	-1.695	2.4	-0.822	24	-0.012
0.3833	-1.686	2.6	-0.771		
0.4	-1.673	2.8	-0.707		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 08:18:30

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW103 Slug In Test
Test Date: March 2, 1999

AQUIFER DATA

Saturated Thickness: 16.75 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

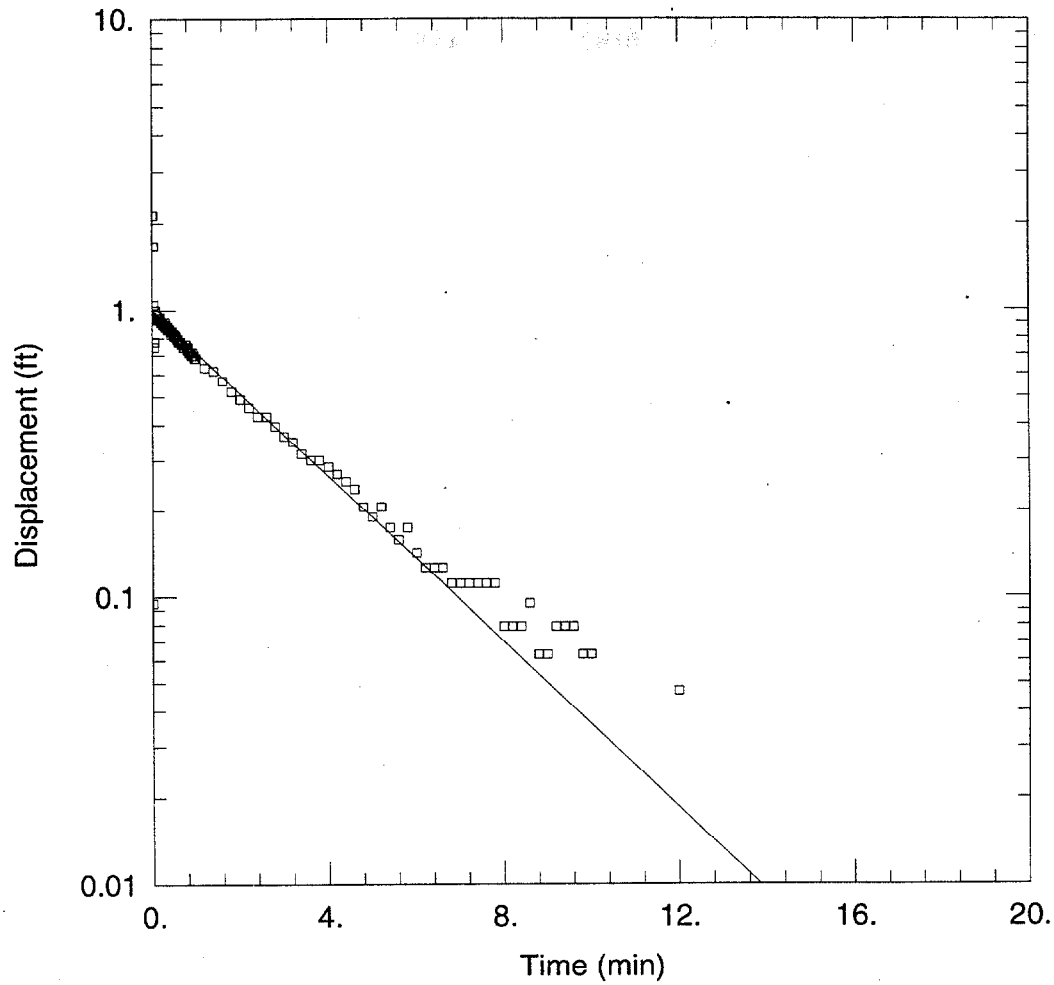
Initial Displacement: 4.301 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 11.75 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.626E-05 ft/sec
y0 = 1.859 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW103
Second Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	8.553	0.3833	0.857	2.2	0.46
0.0083	0.095	0.4	0.857	2.4	0.428
0.0166	0.936	0.4166	0.841	2.6	0.428
0.025	2.126	0.4333	0.825	2.8	0.396
0.0333	1.666	0.45	0.841	3	0.365
0.0416	1.047	0.4666	0.841	3.2	0.349
0.05	0.745	0.4833	0.825	3.4	0.317
0.0583	0.777	0.5	0.809	3.6	0.301
0.0666	0.92	0.5166	0.825	3.8	0.301
0.075	0.999	0.5333	0.809	4	0.285
0.0833	0.999	0.55	0.809	4.2	0.269
0.0916	0.968	0.5666	0.793	4.4	0.253
0.1	0.952	0.5833	0.793	4.6	0.238
0.1083	0.936	0.6	0.777	4.8	0.206
0.1166	0.936	0.6166	0.777	5	0.19
0.125	0.952	0.6333	0.777	5.2	0.206
0.1333	0.936	0.65	0.777	5.4	0.174
0.1416	0.936	0.6666	0.761	5.6	0.158
0.15	0.936	0.6833	0.761	5.8	0.174
0.1583	0.92	0.7	0.761	6	0.142
0.1666	0.92	0.7166	0.745	6.2	0.126
0.175	0.92	0.7333	0.745	6.4	0.126
0.1833	0.92	0.75	0.761	6.6	0.126
0.1916	0.936	0.7666	0.761	6.8	0.111
0.2	0.904	0.7833	0.745	7	0.111
0.2083	0.904	0.8	0.73	7.2	0.111
0.2166	0.904	0.8166	0.745	7.4	0.111
0.225	0.904	0.8333	0.714	7.6	0.111
0.2333	0.904	0.85	0.714	7.8	0.111
0.2416	0.904	0.8666	0.714	8	0.079
0.25	0.888	0.8833	0.714	8.2	0.079
0.2583	0.888	0.9	0.698	8.4	0.079
0.2666	0.888	0.9166	0.698	8.6	0.095
0.275	0.888	0.9333	0.714	8.8	0.063
0.2833	0.888	0.95	0.698	9	0.063
0.2916	0.904	0.9666	0.682	9.2	0.079
0.3	0.872	0.9833	0.682	9.4	0.079
0.3083	0.872	1	0.682	9.6	0.079
0.3166	0.872	1.2	0.634	9.8	0.063
0.325	0.888	1.4	0.618	10	0.063
0.3333	0.872	1.6	0.571	12	0.047
0.35	0.857	1.8	0.523		
0.3666	0.872	2	0.491		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 08:14:45

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW103 Slug Out Test
Test Date: March 8, 1999

AQUIFER DATA

Saturated Thickness: 16.75 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.126 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 11.75 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

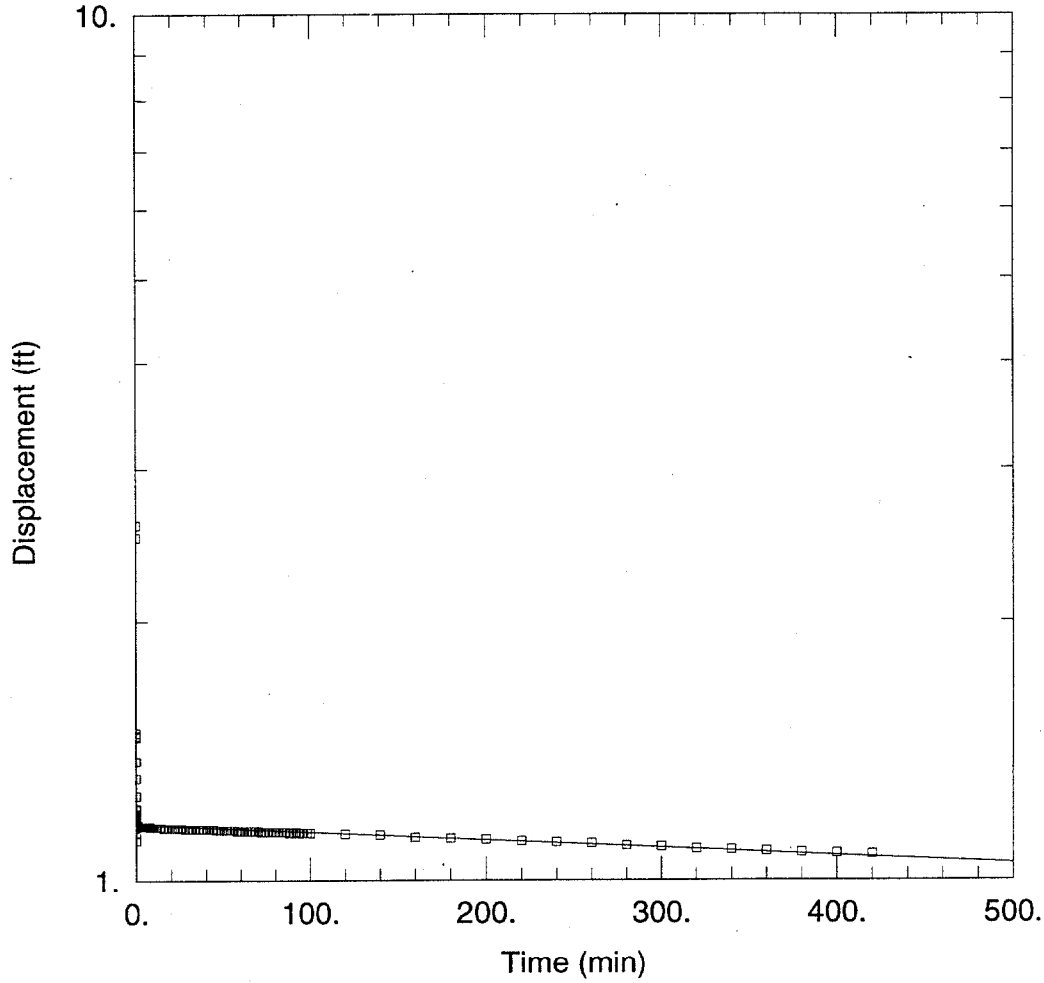
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.447E-05 ft/sec
y0 = 0.9986 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW104
Slug-Out Data March 9, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.258	0.1433	1.169	0.2866	1.166
0.0033	1.473	0.1466	1.169	0.29	1.163
0.0066	1.483	0.15	1.169	0.2933	1.166
0.01	2.582	0.1533	1.169	0.2966	1.163
0.0133	2.503	0.1566	1.169	0.3	1.166
0.0166	1.467	0.16	1.169	0.3033	1.163
0.02	1.378	0.1633	1.169	0.3066	1.163
0.0233	1.15	0.1666	1.169	0.31	1.163
0.0266	1.112	0.17	1.169	0.3133	1.163
0.03	1.315	0.1733	1.169	0.3166	1.163
0.0333	1.134	0.1766	1.166	0.32	1.163
0.0366	1.163	0.18	1.166	0.3233	1.163
0.04	1.255	0.1833	1.166	0.3266	1.163
0.0433	1.134	0.1866	1.166	0.33	1.163
0.0466	1.179	0.19	1.169	0.3333	1.163
0.05	1.213	0.1933	1.166	0.35	1.163
0.0533	1.15	0.1966	1.166	0.3666	1.163
0.0566	1.188	0.2	1.166	0.3833	1.163
0.06	1.21	0.2033	1.166	0.4	1.163
0.0633	1.153	0.2066	1.166	0.4166	1.163
0.0666	1.194	0.21	1.166	0.4333	1.163
0.07	1.185	0.2133	1.166	0.45	1.16
0.0733	1.166	0.2166	1.166	0.4666	1.16
0.0766	1.191	0.22	1.166	0.4833	1.16
0.08	1.21	0.2233	1.166	0.5	1.16
0.0833	1.163	0.2266	1.166	0.5166	1.16
0.0866	1.198	0.23	1.166	0.5333	1.16
0.09	1.175	0.2333	1.166	0.55	1.16
0.0933	1.166	0.2366	1.166	0.5666	1.16
0.0966	1.188	0.24	1.166	0.5833	1.16
0.1	1.169	0.2433	1.166	0.6	1.16
0.1033	1.169	0.2466	1.166	0.6166	1.16
0.1066	1.182	0.25	1.166	0.6333	1.16
0.11	1.169	0.2533	1.166	0.65	1.16
0.1133	1.172	0.2566	1.166	0.6666	1.16
0.1166	1.175	0.26	1.166	0.6833	1.16
0.12	1.166	0.2633	1.166	0.7	1.16
0.1233	1.172	0.2666	1.166	0.7166	1.16
0.1266	1.172	0.27	1.166	0.7333	1.16
0.13	1.166	0.2733	1.166	0.75	1.16
0.1333	1.172	0.2766	1.166	0.7666	1.16
0.1366	1.169	0.28	1.166	0.7833	1.16
0.14	1.169	0.2833	1.166	0.8	1.16

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW104
Slug-Out Data March 9, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	1.16	6.8	1.156	56	1.144
0.8333	1.16	7	1.156	58	1.14
0.85	1.16	7.2	1.156	60	1.14
0.8666	1.16	7.4	1.156	62	1.14
0.8833	1.16	7.6	1.156	64	1.14
0.9	1.16	7.8	1.156	66	1.14
0.9166	1.16	8	1.153	68	1.14
0.9333	1.16	8.2	1.153	70	1.14
0.95	1.16	8.4	1.153	72	1.137
0.9666	1.16	8.6	1.153	74	1.137
0.9833	1.156	8.8	1.153	76	1.137
1	1.156	9	1.153	78	1.137
1.2	1.156	9.2	1.153	80	1.137
1.4	1.156	9.4	1.153	82	1.137
1.6	1.156	9.6	1.153	84	1.137
1.8	1.156	9.8	1.153	86	1.137
2	1.156	10	1.153	88	1.134
2.2	1.156	12	1.153	90	1.134
2.4	1.156	14	1.153	92	1.137
2.6	1.156	16	1.15	94	1.134
2.8	1.156	18	1.15	96	1.134
3	1.156	20	1.15	98	1.134
3.2	1.156	22	1.15	100	1.134
3.4	1.156	24	1.15	120	1.131
3.6	1.156	26	1.15	140	1.128
3.8	1.156	28	1.147	160	1.121
4	1.156	30	1.147	180	1.118
4.2	1.156	32	1.147	200	1.115
4.4	1.156	34	1.147	220	1.109
4.6	1.156	36	1.147	240	1.106
4.8	1.156	38	1.147	260	1.103
5	1.156	40	1.147	280	1.096
5.2	1.156	42	1.147	300	1.093
5.4	1.156	44	1.147	320	1.087
5.6	1.156	46	1.144	340	1.084
5.8	1.156	48	1.144	360	1.08
6	1.156	50	1.144	380	1.077
6.2	1.156	52	1.144	400	1.074
6.4	1.156	54	1.144	420	1.071
6.6	1.156				



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 09:47:55

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW104 Slug Out Test
Test Date: March 9, 1999

AQUIFER DATA

Saturated Thickness: 138.9 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

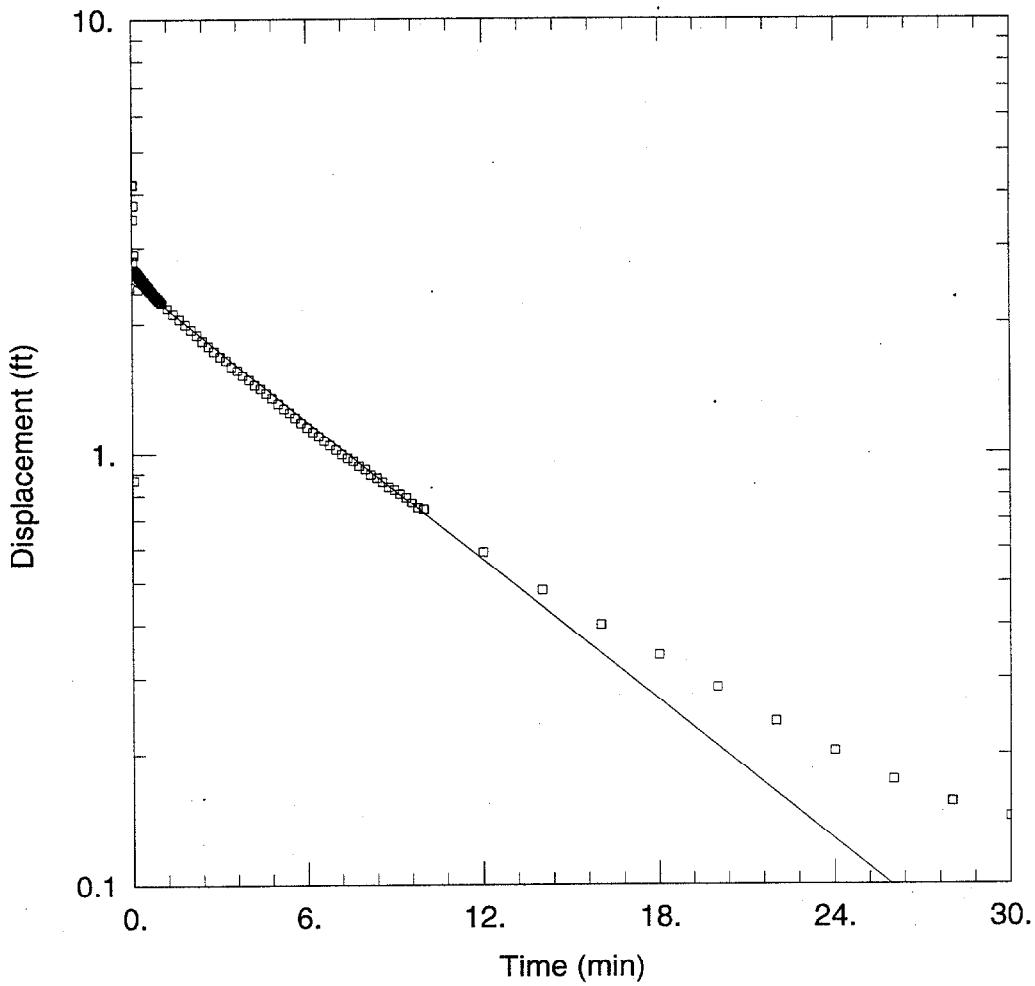
Initial Displacement: 2.582 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 24.52 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.523E-09 ft/sec
y0 = 1.161 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW105
Slug-In Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-4.069	0.4333	-2.478	3.4	-1.6
0.0083	-4.203	0.45	-2.478	3.6	-1.568
0.0166	-3.506	0.4666	-2.468	3.8	-1.527
0.025	-4.19	0.4833	-2.449	4	-1.492
0.0333	-2.799	0.5	-2.449	4.2	-1.45
0.0416	-3.764	0.5166	-2.446	4.4	-1.422
0.05	-0.868	0.5333	-2.44	4.6	-1.387
0.0583	-2.895	0.55	-2.414	4.8	-1.352
0.0666	-2.669	0.5666	-2.433	5	-1.31
0.075	-2.666	0.5833	-2.402	5.2	-1.275
0.0833	-2.659	0.6	-2.405	5.4	-1.25
0.0916	-2.65	0.6166	-2.379	5.6	-1.215
0.1	-2.65	0.6333	-2.395	5.8	-1.183
0.1083	-2.647	0.65	-2.379	6	-1.154
0.1166	-2.634	0.6666	-2.379	6.2	-1.126
0.125	-2.644	0.6833	-2.37	6.4	-1.1
0.1333	-2.621	0.7	-2.36	6.6	-1.072
0.1416	-2.602	0.7166	-2.348	6.8	-1.046
0.15	-2.618	0.7333	-2.338	7	-1.021
0.1583	-2.628	0.75	-2.338	7.2	-0.995
0.1666	-2.624	0.7666	-2.328	7.4	-0.976
0.175	-2.615	0.7833	-2.319	7.6	-0.96
0.1833	-2.621	0.8	-2.319	7.8	-0.935
0.1916	-2.615	0.8166	-2.306	8	-0.919
0.2	-2.414	0.8333	-2.306	8.2	-0.893
0.2083	-2.596	0.85	-2.297	8.4	-0.878
0.2166	-2.599	0.8666	-2.29	8.6	-0.858
0.225	-2.593	0.8833	-2.287	8.8	-0.836
0.2333	-2.589	0.9	-2.268	9	-0.823
0.2416	-2.567	0.9166	-2.265	9.2	-0.804
0.25	-2.567	0.9333	-2.262	9.4	-0.788
0.2583	-2.58	0.95	-2.258	9.6	-0.766
0.2666	-2.57	0.9666	-2.249	9.8	-0.744
0.275	-2.558	0.9833	-2.239	10	-0.738
0.2833	-2.558	1	-2.23	12	-0.588
0.2916	-2.558	1.2	-2.176	14	-0.48
0.3	-2.545	1.4	-2.109	16	-0.4
0.3083	-2.545	1.6	-2.052	18	-0.34
0.3166	-2.545	1.8	-1.994	20	-0.286
0.325	-2.529	2	-1.94	22	-0.238
0.3333	-2.526	2.2	-1.889	24	-0.203
0.35	-2.516	2.4	-1.832	26	-0.174
0.3666	-2.507	2.6	-1.781	28	-0.155
0.3833	-2.513	2.8	-1.737	30	-0.143
0.4	-2.5	3	-1.686		
0.4166	-2.491	3.2	-1.654		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 09:43:18

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW105 Slug In Test
Test Date: March 3, 1999

AQUIFER DATA

Saturated Thickness: 146.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 4.203 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 34.75 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

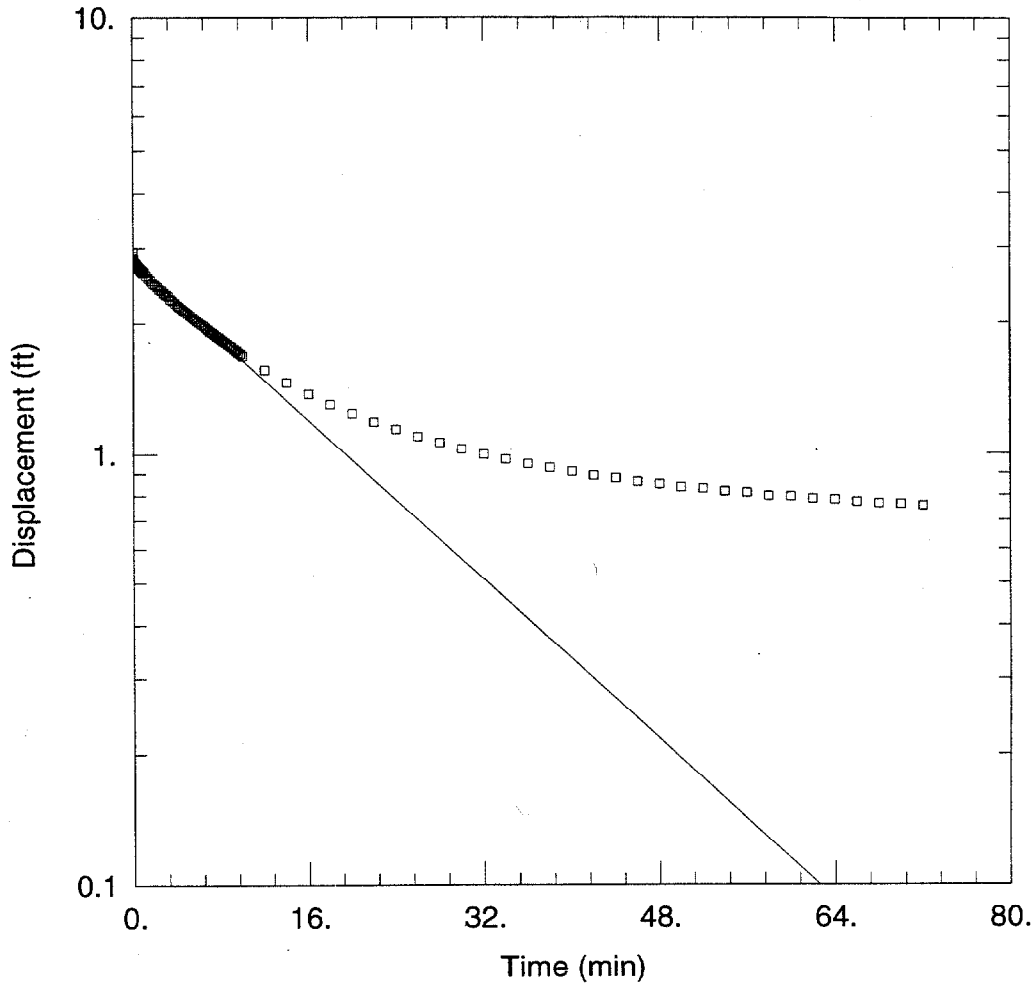
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.049E-06 ft/sec
y0 = 2.509 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW105
Slug-Out Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	8.851	0.3833	2.722	2.2	2.436
0.0083	2.941	0.4	2.715	2.4	2.407
0.0166	2.938	0.4166	2.712	2.6	2.391
0.025	2.874	0.4333	2.709	2.8	2.362
0.0333	2.823	0.45	2.709	3	2.337
0.0416	2.833	0.4666	2.703	3.2	2.315
0.05	2.823	0.4833	2.703	3.4	2.283
0.0583	2.817	0.5	2.699	3.6	2.261
0.0666	2.811	0.5166	2.693	3.8	2.235
0.075	2.808	0.5333	2.69	4	2.21
0.0833	2.801	0.55	2.687	4.2	2.188
0.0916	2.798	0.5666	2.687	4.4	2.168
0.1	2.792	0.5833	2.687	4.6	2.149
0.1083	2.788	0.6	2.684	4.8	2.127
0.1166	2.785	0.6166	2.68	5	2.108
0.125	2.782	0.6333	2.674	5.2	2.086
0.1333	2.779	0.65	2.677	5.4	2.067
0.1416	2.779	0.6666	2.674	5.6	2.048
0.15	2.773	0.6833	2.664	5.8	2.029
0.1583	2.769	0.7	2.661	6	2.009
0.1666	2.769	0.7166	2.661	6.2	1.99
0.175	2.769	0.7333	2.658	6.4	1.975
0.1833	2.763	0.75	2.658	6.6	1.955
0.1916	2.763	0.7666	2.649	6.8	1.936
0.2	2.76	0.7833	2.649	7	1.917
0.2083	2.76	0.8	2.652	7.2	1.905
0.2166	2.754	0.8166	2.642	7.4	1.889
0.225	2.757	0.8333	2.639	7.6	1.87
0.2333	2.754	0.85	2.636	7.8	1.857
0.2416	2.75	0.8666	2.642	8	1.841
0.25	2.747	0.8833	2.636	8.2	1.825
0.2583	2.75	0.9	2.633	8.4	1.809
0.2666	2.747	0.9166	2.626	8.6	1.793
0.275	2.741	0.9333	2.623	8.8	1.777
0.2833	2.741	0.95	2.63	9	1.765
0.2916	2.75	0.9666	2.63	9.2	1.749
0.3	2.738	0.9833	2.626	9.4	1.733
0.3083	2.734	1	2.623	9.6	1.717
0.3166	2.731	1.2	2.582	9.8	1.704
0.325	2.738	1.4	2.547	10	1.688
0.3333	2.738	1.6	2.518	12	1.567
0.35	2.725	1.8	2.486	14	1.466
0.3666	2.722	2	2.464	16	1.38

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 9GW105
Slug-Out Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	1.304	38	0.928	58	0.798
20	1.243	40	0.909	60	0.795
22	1.186	42	0.89	62	0.785
24	1.141	44	0.877	64	0.782
26	1.097	46	0.861	66	0.772
28	1.062	48	0.849	68	0.766
30	1.027	50	0.836	70	0.763
32	0.998	52	0.83	72	0.757
34	0.973	54	0.817		
36	0.947	56	0.811		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 10:05:19

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW105 Slug Out Test
Test Date: March 3, 1999

AQUIFER DATA

Saturated Thickness: 146.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.941 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 34.75 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

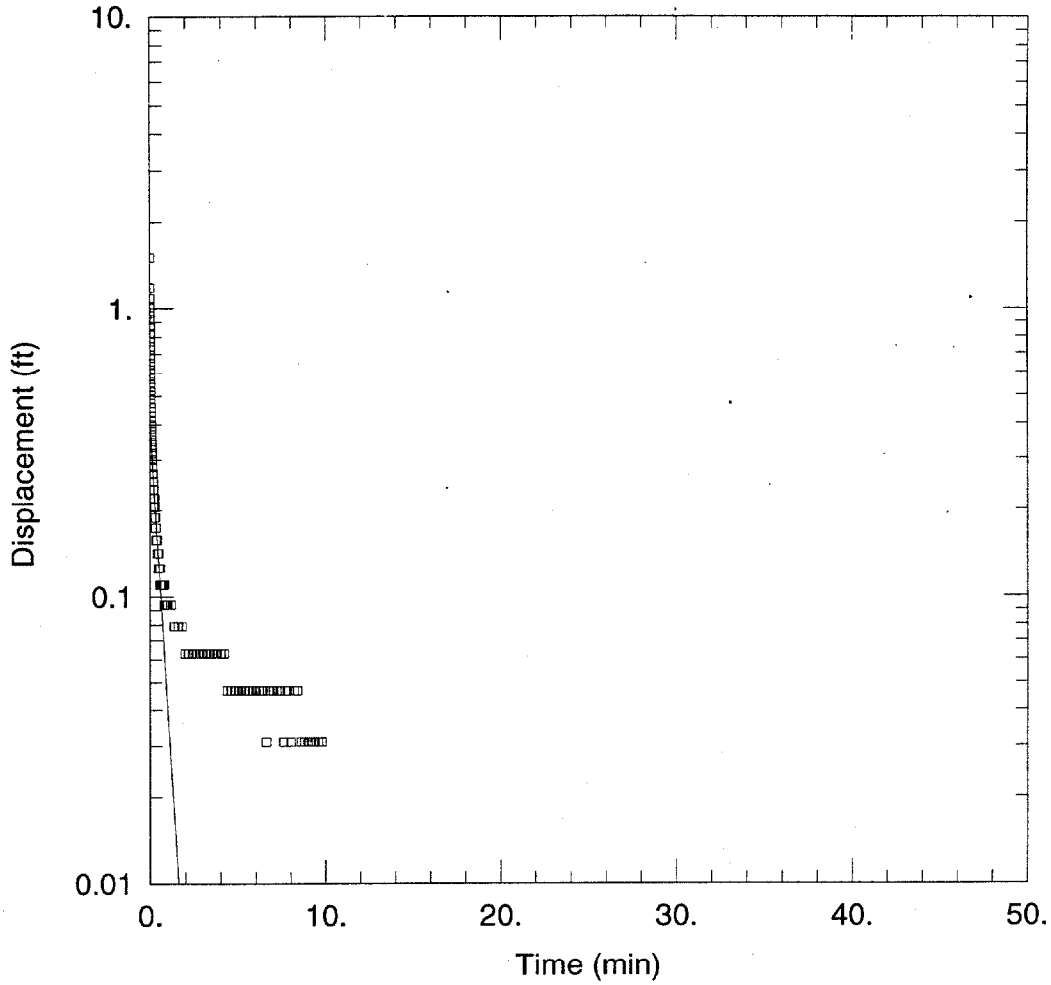
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.736E-06 ft/sec
y0 = 2.808 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW106
Second Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.503	0.1433	0.316	0.2866	0.205
0.0033	1.946	0.1466	0.316	0.29	0.189
0.0066	1.186	0.15	0.316	0.2933	0.189
0.01	1.186	0.1533	0.316	0.2966	0.189
0.0133	2.436	0.1566	0.316	0.3	0.189
0.0166	2.357	0.16	0.3	0.3033	0.189
0.02	1.803	0.1633	0.3	0.3066	0.189
0.0233	1.091	0.1666	0.3	0.31	0.189
0.0266	1.012	0.17	0.284	0.3133	0.189
0.03	1.012	0.1733	0.284	0.3166	0.189
0.0333	0.965	0.1766	0.284	0.32	0.189
0.0366	0.917	0.18	0.269	0.3233	0.189
0.04	0.87	0.1833	0.269	0.3266	0.189
0.0433	0.822	0.1866	0.269	0.33	0.174
0.0466	0.775	0.19	0.253	0.3333	0.174
0.05	0.743	0.1933	0.269	0.35	0.174
0.0533	0.696	0.1966	0.253	0.3666	0.158
0.0566	0.68	0.2	0.269	0.3833	0.158
0.06	0.648	0.2033	0.253	0.4	0.158
0.0633	0.617	0.2066	0.253	0.4166	0.158
0.0666	0.601	0.21	0.237	0.4333	0.142
0.07	0.585	0.2133	0.237	0.45	0.142
0.0733	0.553	0.2166	0.253	0.4666	0.142
0.0766	0.538	0.22	0.237	0.4833	0.142
0.08	0.522	0.2233	0.237	0.5	0.142
0.0833	0.506	0.2266	0.221	0.5166	0.126
0.0866	0.49	0.23	0.221	0.5333	0.126
0.09	0.474	0.2333	0.221	0.55	0.126
0.0933	0.458	0.2366	0.205	0.5666	0.126
0.0966	0.458	0.24	0.221	0.5833	0.126
0.1	0.443	0.2433	0.221	0.6	0.11
0.1033	0.427	0.2466	0.205	0.6166	0.11
0.1066	0.411	0.25	0.221	0.6333	0.11
0.11	0.411	0.2533	0.221	0.65	0.11
0.1133	0.395	0.2566	0.205	0.6666	0.11
0.1166	0.379	0.26	0.221	0.6833	0.11
0.12	0.379	0.2633	0.205	0.7	0.11
0.1233	0.363	0.2666	0.205	0.7166	0.11
0.1266	0.363	0.27	0.205	0.7333	0.11
0.13	0.348	0.2733	0.205	0.75	0.11
0.1333	0.348	0.2766	0.189	0.7666	0.11
0.1366	0.332	0.28	0.189	0.7833	0.11
0.14	0.332	0.2833	0.189	0.8	0.11

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW106
Second Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	0.11	4	0.063	9.2	0.031
0.8333	0.094	4.2	0.063	9.4	0.031
0.85	0.11	4.4	0.047	9.6	0.031
0.8666	0.094	4.6	0.047	9.8	0.031
0.8833	0.094	4.8	0.047	10	0.031
0.9	0.094	5	0.047	12	0.047
0.9166	0.094	5.2	0.047	14	0.047
0.9333	0.094	5.4	0.047	16	0.031
0.95	0.094	5.6	0.047	18	0.047
0.9666	0.094	5.8	0.047	20	0.031
0.9833	0.094	6	0.047	22	0.047
1	0.094	6.2	0.047	24	0.031
1.2	0.094	6.4	0.047	26	0.031
1.4	0.079	6.6	0.031	28	0.031
1.6	0.079	6.8	0.047	30	0.031
1.8	0.079	7	0.047	32	0.031
2	0.063	7.2	0.047	34	0.031
2.2	0.063	7.4	0.047	36	0.031
2.4	0.063	7.6	0.031	38	0.047
2.6	0.063	7.8	0.047	40	0.031
2.8	0.063	8	0.031	42	0.031
3	0.063	8.2	0.047	44	0.031
3.2	0.063	8.4	0.047	46	0.031
3.4	0.063	8.6	0.031	48	0.015
3.6	0.063	8.8	0.031		
3.8	0.063	9	0.031		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 10:18:41

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW106 Slug Out Test
Test Date: March 8, 1998

AQUIFER DATA

Saturated Thickness: 50.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

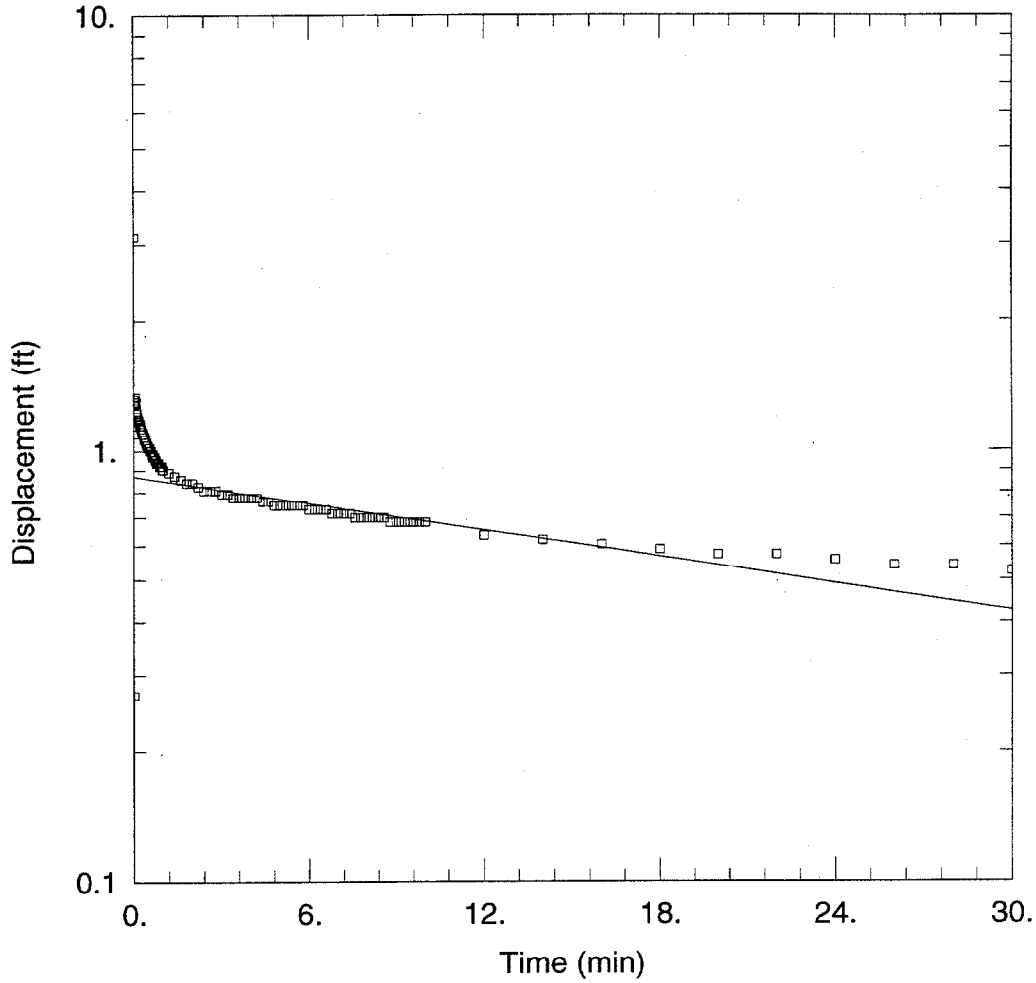
Initial Displacement: 1.503 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 10.8 ft
Wellbore Radius: 0.167 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.839E-05 ft/sec
y0 = 0.4058 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW107
Slug-In Test March 2, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-4.985	0.4333	-1.047	3.4	-0.777
0.0083	-3.127	0.45	-1.031	3.6	-0.777
0.0166	-0.269	0.4666	-1.031	3.8	-0.777
0.025	-1.285	0.4833	-1.031	4	-0.777
0.0333	-1.317	0.5	-1.016	4.2	-0.777
0.0416	-1.143	0.5166	-1.016	4.4	-0.762
0.05	-1.095	0.5333	-1.016	4.6	-0.762
0.0583	-1.301	0.55	-1.016	4.8	-0.746
0.0666	-1.333	0.5666	-1	5	-0.746
0.075	-1.143	0.5833	-1	5.2	-0.746
0.0833	-1.301	0.6	-1	5.4	-0.746
0.0916	-1.238	0.6166	-0.984	5.6	-0.746
0.1	-1.222	0.6333	-0.984	5.8	-0.746
0.1083	-1.222	0.65	-0.968	6	-0.73
0.1166	-1.222	0.6666	-0.984	6.2	-0.73
0.125	-1.222	0.6833	-0.968	6.4	-0.73
0.1333	-1.206	0.7	-0.968	6.6	-0.73
0.1416	-1.206	0.7166	-0.968	6.8	-0.714
0.15	-1.19	0.7333	-0.952	7	-0.714
0.1583	-1.19	0.75	-0.952	7.2	-0.714
0.1666	-1.19	0.7666	-0.952	7.4	-0.714
0.175	-1.174	0.7833	-0.936	7.6	-0.698
0.1833	-1.174	0.8	-0.936	7.8	-0.698
0.1916	-1.174	0.8166	-0.936	8	-0.698
0.2	-1.158	0.8333	-0.936	8.2	-0.698
0.2083	-1.158	0.85	-0.936	8.4	-0.698
0.2166	-1.158	0.8666	-0.936	8.6	-0.698
0.225	-1.158	0.8833	-0.92	8.8	-0.682
0.2333	-1.143	0.9	-0.92	9	-0.682
0.2416	-1.143	0.9166	-0.92	9.2	-0.682
0.25	-1.127	0.9333	-0.92	9.4	-0.682
0.2583	-1.127	0.95	-0.92	9.6	-0.682
0.2666	-1.127	0.9666	-0.92	9.8	-0.682
0.275	-1.111	0.9833	-0.904	10	-0.682
0.2833	-1.111	1	-0.904	12	-0.635
0.2916	-1.111	1.2	-0.889	14	-0.619
0.3	-1.111	1.4	-0.873	16	-0.603
0.3083	-1.095	1.6	-0.857	18	-0.587
0.3166	-1.095	1.8	-0.841	20	-0.571
0.325	-1.095	2	-0.841	22	-0.571
0.3333	-1.095	2.2	-0.825	24	-0.555
0.35	-1.079	2.4	-0.809	26	-0.539
0.3666	-1.079	2.6	-0.809	28	-0.539
0.3833	-1.063	2.8	-0.809	30	-0.523
0.4	-1.063	3	-0.793		
0.4166	-1.047	3.2	-0.793		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 10:30:54

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW107 Slug In Test
Test Date: March 2, 1999

AQUIFER DATA

Saturated Thickness: 146.2 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 3.127 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 55.6 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

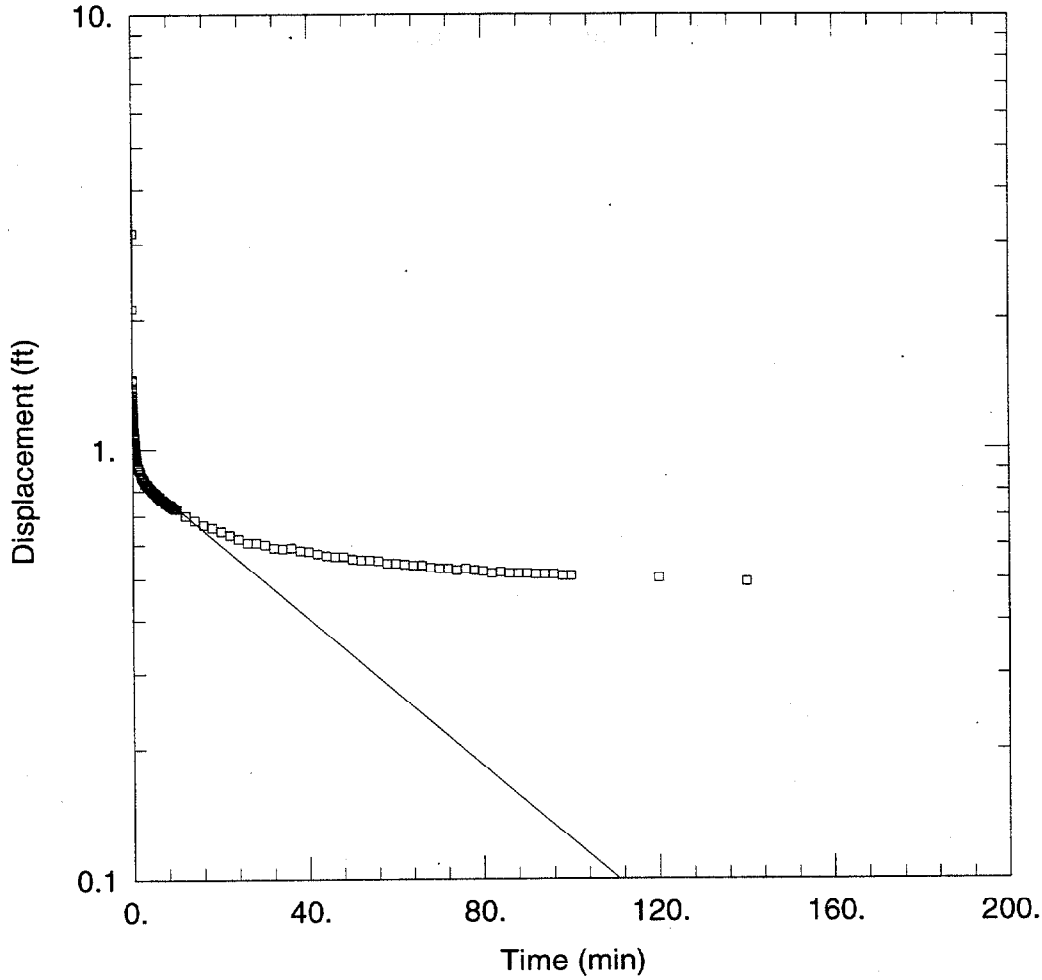
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 8.245E-07 ft/sec
y0 = 0.8712 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW107
Second Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	2.583	0.3833	1.108	2.2	0.859
0.0083	3.18	0.4	1.098	2.4	0.852
0.0166	2.12	0.4166	1.092	2.6	0.846
0.025	1.453	0.4333	1.085	2.8	0.833
0.0333	1.443	0.45	1.076	3	0.833
0.0416	1.366	0.4666	1.073	3.2	0.83
0.05	1.379	0.4833	1.066	3.4	0.824
0.0583	1.366	0.5	1.06	3.6	0.82
0.0666	1.341	0.5166	1.05	3.8	0.814
0.075	1.331	0.5333	1.047	4	0.811
0.0833	1.319	0.55	1.041	4.2	0.808
0.0916	1.312	0.5666	1.034	4.4	0.801
0.1	1.303	0.5833	1.031	4.6	0.798
0.1083	1.293	0.6	1.028	4.8	0.795
0.1166	1.287	0.6166	1.022	5	0.792
0.125	1.277	0.6333	1.015	5.2	0.788
0.1333	1.271	0.65	1.012	5.4	0.785
0.1416	1.261	0.6666	1.009	5.6	0.779
0.15	1.255	0.6833	1.002	5.8	0.776
0.1583	1.248	0.7	0.999	6	0.776
0.1666	1.242	0.7166	0.996	6.2	0.769
0.175	1.232	0.7333	0.99	6.4	0.763
0.1833	1.229	0.75	0.99	6.6	0.763
0.1916	1.22	0.7666	0.983	6.8	0.763
0.2	1.216	0.7833	0.98	7	0.76
0.2083	1.21	0.8	0.977	7.2	0.756
0.2166	1.204	0.8166	0.974	7.4	0.75
0.225	1.197	0.8333	0.97	7.6	0.75
0.2333	1.191	0.85	0.97	7.8	0.747
0.2416	1.188	0.8666	0.964	8	0.747
0.25	1.178	0.8833	0.964	8.2	0.744
0.2583	1.175	0.9	0.961	8.4	0.737
0.2666	1.168	0.9166	0.954	8.6	0.741
0.275	1.165	0.9333	0.954	8.8	0.737
0.2833	1.159	0.95	0.951	9	0.731
0.2916	1.156	0.9666	0.948	9.2	0.731
0.3	1.149	0.9833	0.948	9.4	0.728
0.3083	1.146	1	0.942	9.6	0.725
0.3166	1.14	1.2	0.919	9.8	0.725
0.325	1.137	1.4	0.907	10	0.725
0.3333	1.133	1.6	0.891	12	0.699
0.35	1.124	1.8	0.878	14	0.683
0.3666	1.117	2	0.865	16	0.667

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW107
Second Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	0.657	48	0.562	78	0.523
20	0.645	50	0.555	80	0.52
22	0.632	52	0.552	82	0.514
24	0.619	54	0.552	84	0.517
26	0.606	56	0.549	86	0.514
28	0.606	58	0.542	88	0.514
30	0.6	60	0.542	90	0.514
32	0.59	62	0.539	92	0.511
34	0.587	64	0.536	94	0.511
36	0.59	66	0.536	96	0.511
38	0.581	68	0.53	98	0.507
40	0.578	70	0.527	100	0.507
42	0.571	72	0.527	120	0.501
44	0.565	74	0.523	140	0.491
46	0.562	76	0.527		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 10:25:04

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW107 Slug Out Test
Test Date: March 8, 1999

AQUIFER DATA

Saturated Thickness: 146.2 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 3.18 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 55.6 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

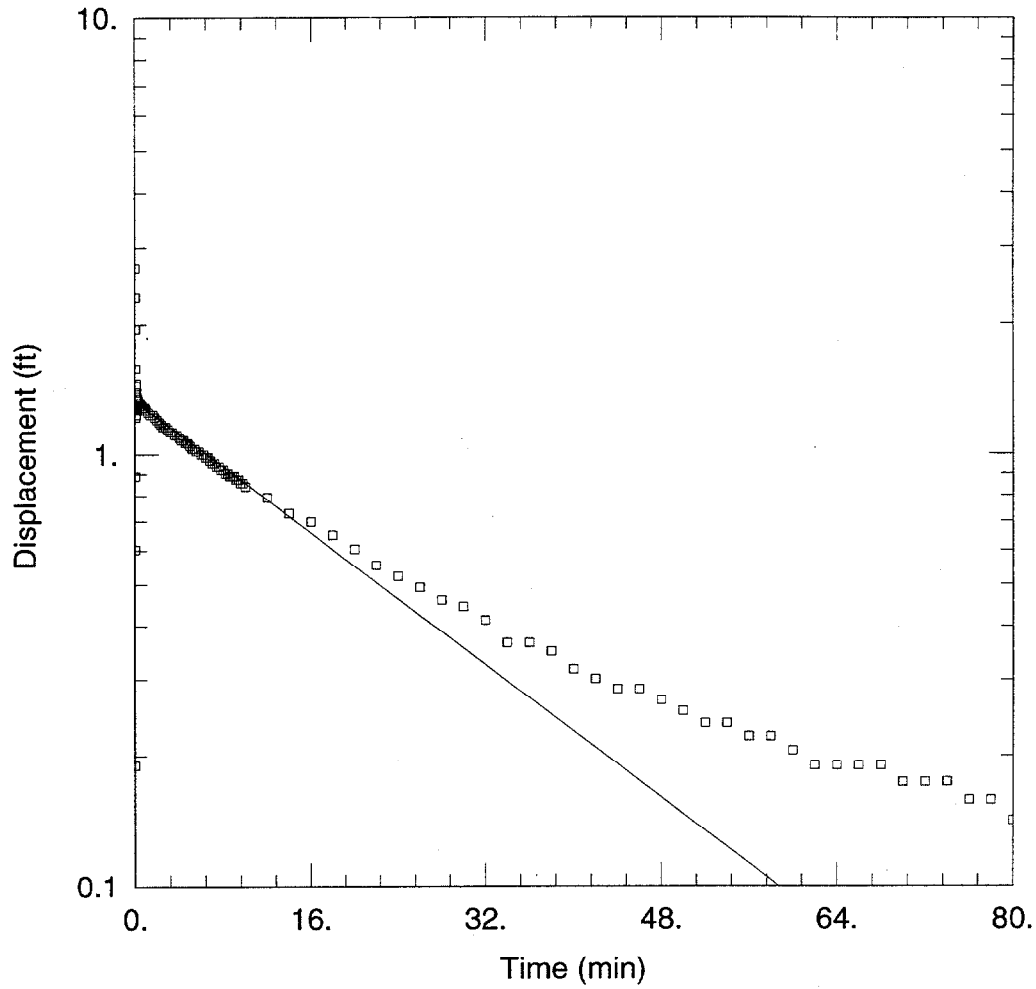
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.784E-07 ft/sec
y0 = 0.888 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW108
Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	3.968	0.3833	1.317	2.2	1.19
0.0083	-0.063	0.4	1.317	2.4	1.174
0.0166	2.698	0.4166	1.317	2.6	1.158
0.025	0.19	0.4333	1.317	2.8	1.158
0.0333	2.317	0.45	1.317	3	1.143
0.0416	0.603	0.4666	1.301	3.2	1.127
0.05	1.952	0.4833	1.317	3.4	1.127
0.0583	0.889	0.5	1.301	3.6	1.111
0.0666	1.587	0.5166	1.301	3.8	1.111
0.075	1.222	0.5333	1.301	4	1.095
0.0833	1.397	0.55	1.301	4.2	1.079
0.0916	1.365	0.5666	1.301	4.4	1.079
0.1	1.285	0.5833	1.301	4.6	1.063
0.1083	1.444	0.6	1.301	4.8	1.063
0.1166	1.238	0.6166	1.301	5	1.047
0.125	1.46	0.6333	1.301	5.2	1.031
0.1333	1.238	0.65	1.301	5.4	1.031
0.1416	1.444	0.6666	1.301	5.6	1.016
0.15	1.27	0.6833	1.285	5.8	1.016
0.1583	1.397	0.7	1.285	6	1
0.1666	1.301	0.7166	1.285	6.2	1
0.175	1.349	0.7333	1.285	6.4	0.984
0.1833	1.333	0.75	1.285	6.6	0.984
0.1916	1.333	0.7666	1.285	6.8	0.968
0.2	1.349	0.7833	1.285	7	0.952
0.2083	1.317	0.8	1.285	7.2	0.952
0.2166	1.349	0.8166	1.285	7.4	0.936
0.225	1.317	0.8333	1.285	7.6	0.936
0.2333	1.349	0.85	1.285	7.8	0.92
0.2416	1.317	0.8666	1.285	8	0.92
0.25	1.333	0.8833	1.285	8.2	0.904
0.2583	1.333	0.9	1.285	8.4	0.904
0.2666	1.333	0.9166	1.27	8.6	0.889
0.275	1.333	0.9333	1.27	8.8	0.889
0.2833	1.333	0.95	1.27	9	0.889
0.2916	1.333	0.9666	1.27	9.2	0.873
0.3	1.317	0.9833	1.27	9.4	0.873
0.3083	1.333	1	1.27	9.6	0.857
0.3166	1.317	1.2	1.254	9.8	0.857
0.325	1.317	1.4	1.238	10	0.841
0.3333	1.317	1.6	1.238	12	0.793
0.35	1.317	1.8	1.222	14	0.73
0.3666	1.317	2	1.206	16	0.698

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW108
Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	0.65	40	0.317	62	0.19
20	0.603	42	0.301	64	0.19
22	0.555	44	0.285	66	0.19
24	0.523	46	0.285	68	0.19
26	0.492	48	0.269	70	0.174
28	0.46	50	0.254	72	0.174
30	0.444	52	0.238	74	0.174
32	0.412	54	0.238	76	0.158
34	0.365	56	0.222	78	0.158
36	0.365	58	0.222	80	0.142
38	0.349	60	0.206		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 10:37:51

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW108 Slug Out Test
Test Date: March 8, 1999

AQUIFER DATA

Saturated Thickness: 42.76 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.698 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 29.76 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

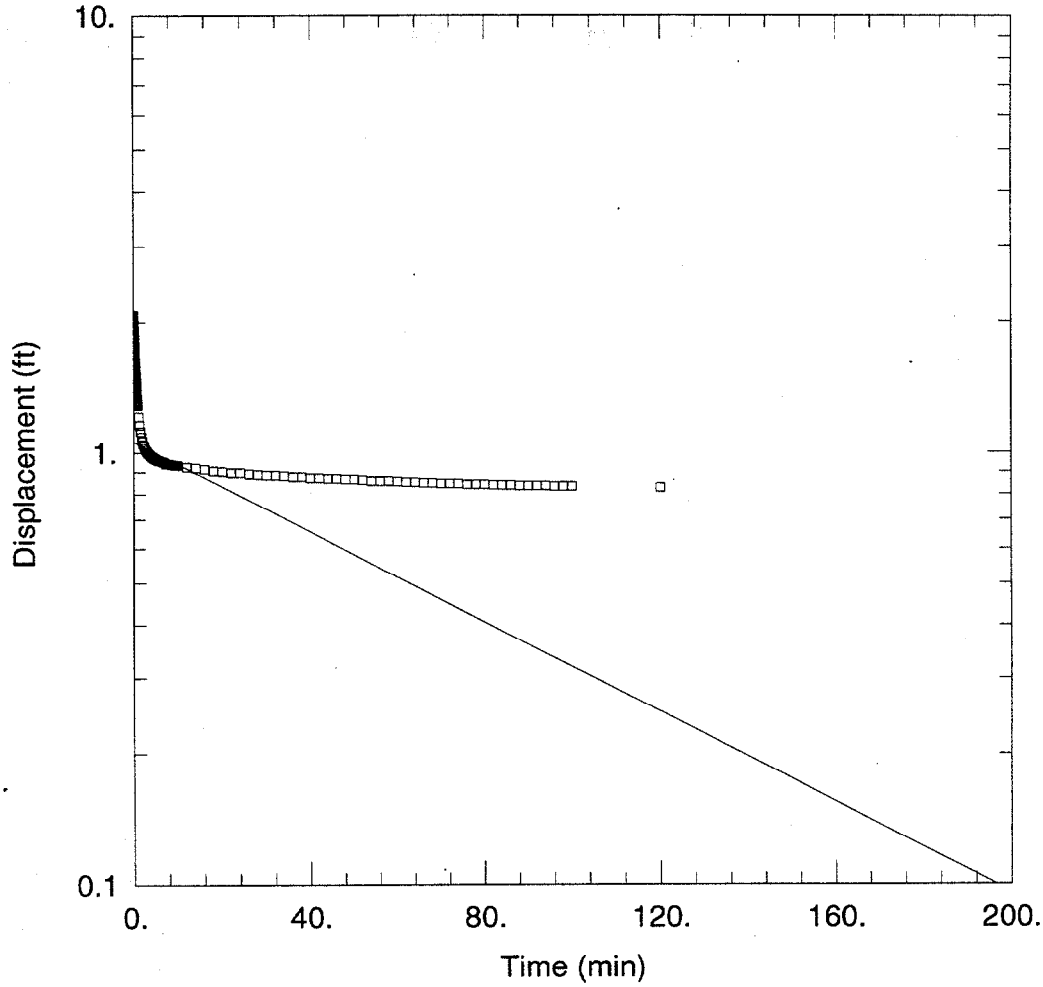
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.686E-06 ft/sec
y0 = 1.331 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW109
Second Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	0.84	0.3833	1.678	2.2	1.047
0.0083	3.295	0.4	1.662	2.4	1.035
0.0166	2.852	0.4166	1.649	2.6	1.025
0.025	2.088	0.4333	1.636	2.8	1.015
0.0333	2.082	0.45	1.624	3	1.006
0.0416	2.069	0.4666	1.608	3.2	0.999
0.05	2.057	0.4833	1.595	3.4	0.996
0.0583	2.044	0.5	1.585	3.6	0.99
0.0666	2.031	0.5166	1.573	3.8	0.984
0.075	2.018	0.5333	1.56	4	0.98
0.0833	2.006	0.55	1.547	4.2	0.977
0.0916	1.996	0.5666	1.534	4.4	0.971
0.1	1.983	0.5833	1.522	4.6	0.971
0.1083	1.971	0.6	1.512	4.8	0.968
0.1166	1.961	0.6166	1.499	5	0.964
0.125	1.948	0.6333	1.487	5.2	0.964
0.1333	1.939	0.65	1.477	5.4	0.961
0.1416	1.926	0.6666	1.468	5.6	0.958
0.15	1.916	0.6833	1.455	5.8	0.958
0.1583	1.907	0.7	1.445	6	0.955
0.1666	1.894	0.7166	1.436	6.2	0.955
0.175	1.885	0.7333	1.426	6.4	0.952
0.1833	1.875	0.75	1.417	6.6	0.952
0.1916	1.866	0.7666	1.407	6.8	0.949
0.2	1.856	0.7833	1.398	7	0.949
0.2083	1.846	0.8	1.388	7.2	0.945
0.2166	1.837	0.8166	1.378	7.4	0.942
0.225	1.827	0.8333	1.372	7.6	0.942
0.2333	1.818	0.85	1.362	7.8	0.942
0.2416	1.808	0.8666	1.353	8	0.939
0.25	1.802	0.8833	1.347	8.2	0.939
0.2583	1.792	0.9	1.337	8.4	0.939
0.2666	1.783	0.9166	1.327	8.6	0.936
0.275	1.776	0.9333	1.321	8.8	0.936
0.2833	1.767	0.95	1.312	9	0.936
0.2916	1.76	0.9666	1.305	9.2	0.936
0.3	1.751	0.9833	1.299	9.4	0.933
0.3083	1.745	1	1.289	9.6	0.933
0.3166	1.735	1.2	1.213	9.8	0.933
0.325	1.729	1.4	1.159	10	0.933
0.3333	1.719	1.6	1.12	12	0.926
0.35	1.706	1.8	1.089	14	0.92
0.3666	1.69	2	1.063	16	0.914

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 9GW109
Second Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	0.907	48	0.866	78	0.843
20	0.904	50	0.866	80	0.843
22	0.898	52	0.863	82	0.84
24	0.898	54	0.859	84	0.84
26	0.891	56	0.859	86	0.84
28	0.888	58	0.859	88	0.837
30	0.885	60	0.856	90	0.837
32	0.885	62	0.853	92	0.837
34	0.882	64	0.853	94	0.837
36	0.878	66	0.85	96	0.834
38	0.878	68	0.85	98	0.834
40	0.872	70	0.847	100	0.834
42	0.872	72	0.847	120	0.828
44	0.869	74	0.847		
46	0.869	76	0.843		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 10:44:28

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW109 Slug Out Test
Test Date: March 8, 1999

AQUIFER DATA

Saturated Thickness: 25.58 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

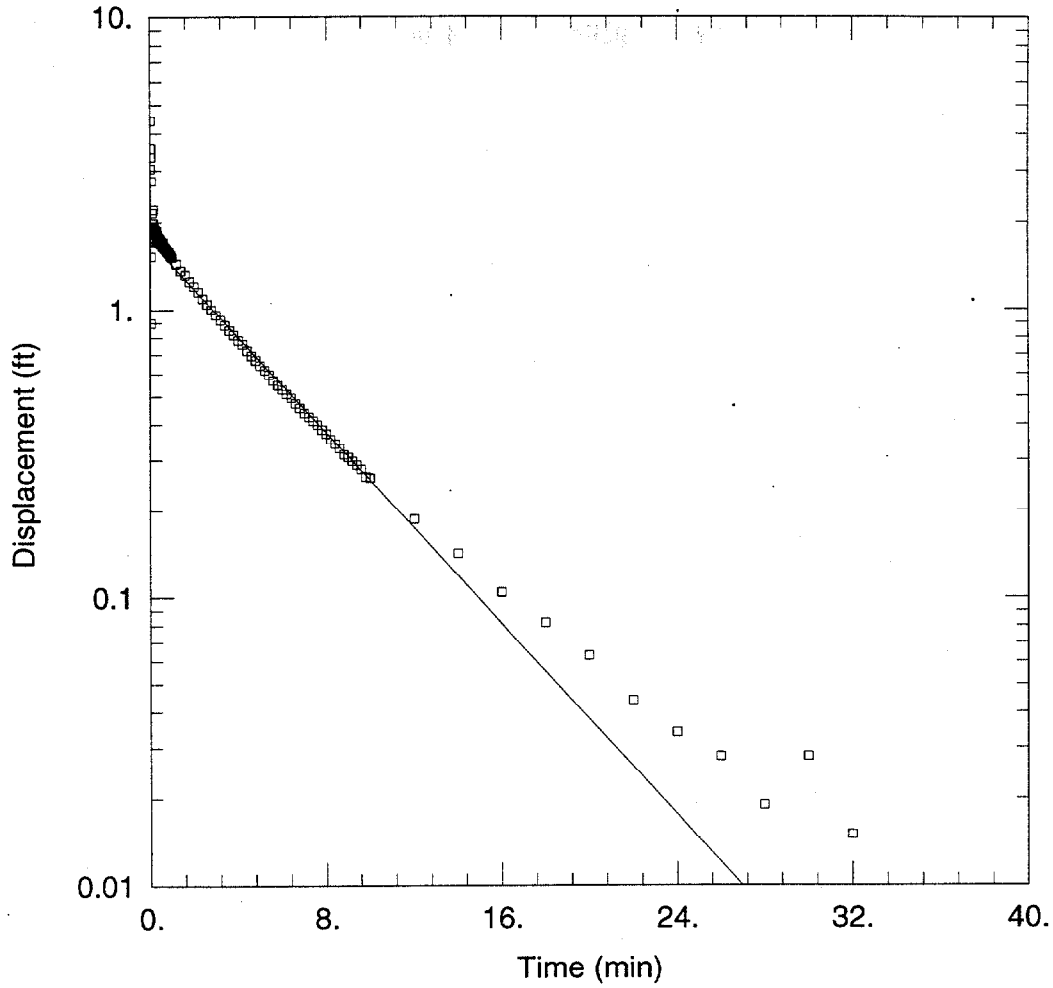
Initial Displacement: 2.088 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 7.24 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 7.661E-07 ft/sec
y0 = 1.06 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW110
Slug-In Test March 2, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-3.158	0.4333	-1.756	3.4	-0.883
0.0083	-1.775	0.45	-1.747	3.6	-0.848
0.0166	-4.42	0.4666	-1.731	3.8	-0.819
0.025	-3.05	0.4833	-1.731	4	-0.784
0.0333	-3.561	0.5	-1.718	4.2	-0.759
0.0416	-3.329	0.5166	-1.709	4.4	-0.724
0.05	-0.898	0.5333	-1.699	4.6	-0.695
0.0583	-1.524	0.55	-1.693	4.8	-0.67
0.0666	-2.764	0.5666	-1.699	5	-0.644
0.075	-1.737	0.5833	-1.699	5.2	-0.619
0.0833	-1.864	0.6	-1.709	5.4	-0.597
0.0916	-2.15	0.6166	-1.664	5.6	-0.571
0.1	-1.899	0.6333	-1.658	5.8	-0.549
0.1083	-1.937	0.65	-1.648	6	-0.53
0.1166	-1.979	0.6666	-1.645	6.2	-0.511
0.125	-1.931	0.6833	-1.632	6.4	-0.495
0.1333	-1.937	0.7	-1.636	6.6	-0.473
0.1416	-1.982	0.7166	-1.629	6.8	-0.457
0.15	-2.208	0.7333	-1.616	7	-0.438
0.1583	-1.718	0.75	-1.61	7.2	-0.425
0.1666	-1.982	0.7666	-1.604	7.4	-0.412
0.175	-1.925	0.7833	-1.588	7.6	-0.4
0.1833	-1.861	0.8	-1.591	7.8	-0.384
0.1916	-1.922	0.8166	-1.585	8	-0.371
0.2	-1.893	0.8333	-1.578	8.2	-0.355
0.2083	-1.883	0.85	-1.572	8.4	-0.343
0.2166	-1.88	0.8666	-1.569	8.6	-0.33
0.225	-1.868	0.8833	-1.562	8.8	-0.314
0.2333	-1.864	0.9	-1.553	9	-0.308
0.2416	-1.855	0.9166	-1.547	9.2	-0.298
0.25	-1.855	0.9333	-1.531	9.4	-0.289
0.2583	-1.845	0.95	-1.534	9.6	-0.279
0.2666	-1.842	0.9666	-1.518	9.8	-0.263
0.275	-1.833	0.9833	-1.512	10	-0.26
0.2833	-1.826	1	-1.515	12	-0.187
0.2916	-1.823	1.2	-1.435	14	-0.142
0.3	-1.756	1.4	-1.362	16	-0.104
0.3083	-1.845	1.6	-1.315	18	-0.082
0.3166	-1.874	1.8	-1.251	20	-0.063
0.325	-1.801	2	-1.203	22	-0.044
0.3333	-1.791	2.2	-1.153	24	-0.034
0.35	-1.807	2.4	-1.092	26	-0.028
0.3666	-1.775	2.6	-1.045	28	-0.019
0.3833	-1.779	2.8	-1	30	-0.028
0.4	-1.766	3	-0.959	32	-0.015
0.4166	-1.744	3.2	-0.921		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 11:06:33

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW110 Slug In Test
Test Date: March 2, 1999

AQUIFER DATA

Saturated Thickness: 40.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

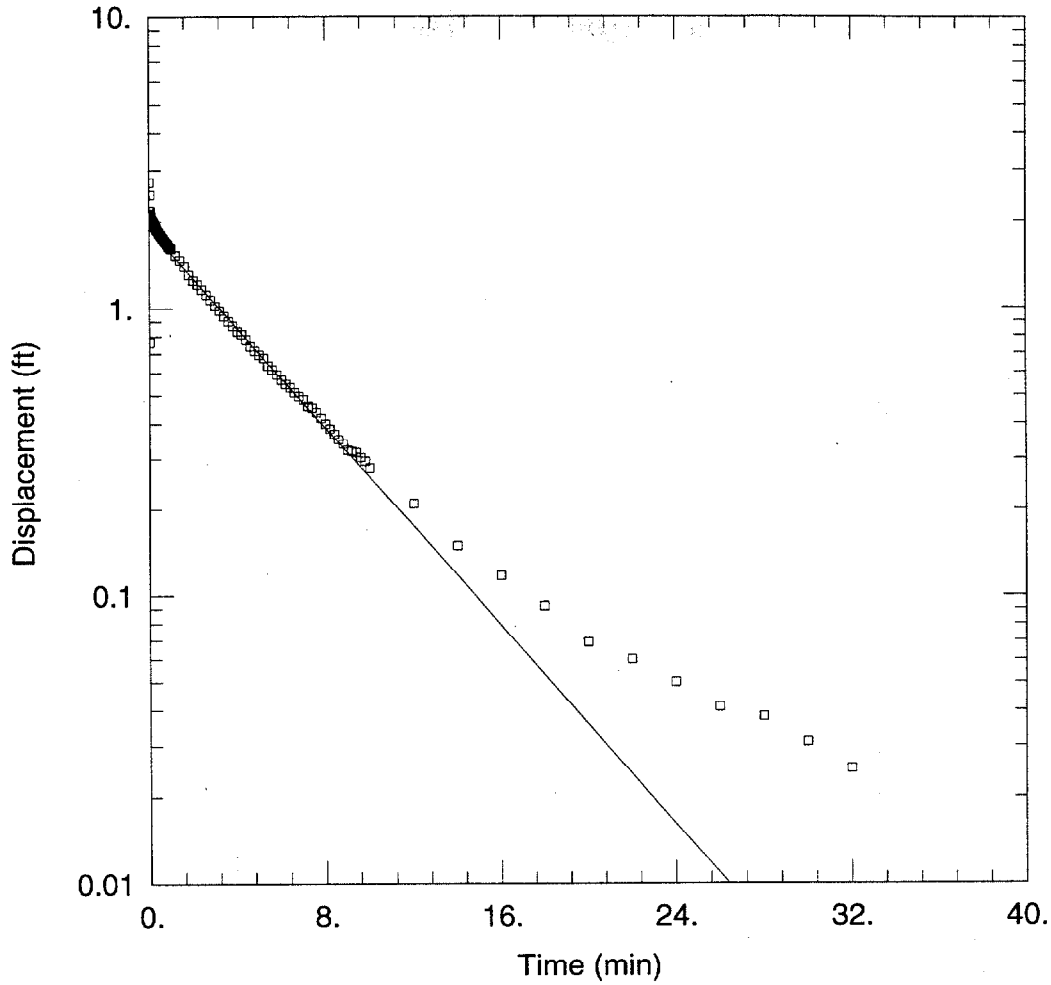
Initial Displacement: 4.42 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 10.84 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.311E-05 ft/sec
y0 = 1.725 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 9GW110
Slug-Out Test March 2, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	7.049	0.4333	1.832	3.4	0.94
0.0083	2.172	0.45	1.829	3.6	0.902
0.0166	0.765	0.4666	1.822	3.8	0.87
0.025	2.724	0.4833	1.81	4	0.832
0.0333	2.47	0.5	1.807	4.2	0.813
0.0416	1.949	0.5166	1.797	4.4	0.781
0.05	2.102	0.5333	1.794	4.6	0.743
0.0583	2.175	0.55	1.781	4.8	0.717
0.0666	2.13	0.5666	1.772	5	0.692
0.075	2.089	0.5833	1.765	5.2	0.676
0.0833	2.083	0.6	1.756	5.4	0.635
0.0916	2.076	0.6166	1.749	5.6	0.616
0.1	2.064	0.6333	1.743	5.8	0.593
0.1083	2.048	0.65	1.737	6	0.568
0.1166	2.041	0.6666	1.727	6.2	0.549
0.125	2.032	0.6833	1.718	6.4	0.533
0.1333	2.022	0.7	1.714	6.6	0.514
0.1416	2.019	0.7166	1.714	6.8	0.498
0.15	2.01	0.7333	1.699	7	0.485
0.1583	2.007	0.75	1.689	7.2	0.46
0.1666	1.991	0.7666	1.692	7.4	0.454
0.175	1.981	0.7833	1.686	7.6	0.438
0.1833	1.978	0.8	1.676	7.8	0.419
0.1916	1.972	0.8166	1.667	8	0.4
0.2	1.972	0.8333	1.667	8.2	0.384
0.2083	1.975	0.85	1.664	8.4	0.368
0.2166	1.975	0.8666	1.648	8.6	0.352
0.225	1.975	0.8833	1.641	8.8	0.339
0.2333	1.972	0.9	1.635	9	0.323
0.2416	1.959	0.9166	1.629	9.2	0.32
0.25	1.956	0.9333	1.629	9.4	0.317
0.2583	1.943	0.95	1.619	9.6	0.304
0.2666	1.93	0.9666	1.616	9.8	0.295
0.275	1.921	0.9833	1.606	10	0.279
0.2833	1.924	1	1.603	12	0.209
0.2916	1.918	1.2	1.524	14	0.149
0.3	1.911	1.4	1.467	16	0.117
0.3083	1.905	1.6	1.4	18	0.092
0.3166	1.902	1.8	1.311	20	0.069
0.325	1.892	2	1.251	22	0.06
0.3333	1.886	2.2	1.21	24	0.05
0.35	1.88	2.4	1.162	26	0.041
0.3666	1.87	2.6	1.114	28	0.038
0.3833	1.861	2.8	1.07	30	0.031
0.4	1.851	3	1.019	32	0.025
0.4166	1.845	3.2	0.981		



WELL TEST ANALYSIS

Data Set:
Date: 05/06/99 Time: 11:13:20

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 9GW110 Slug Out Test
Test Date: March 2, 1999

AQUIFER DATA

Saturated Thickness: 40.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

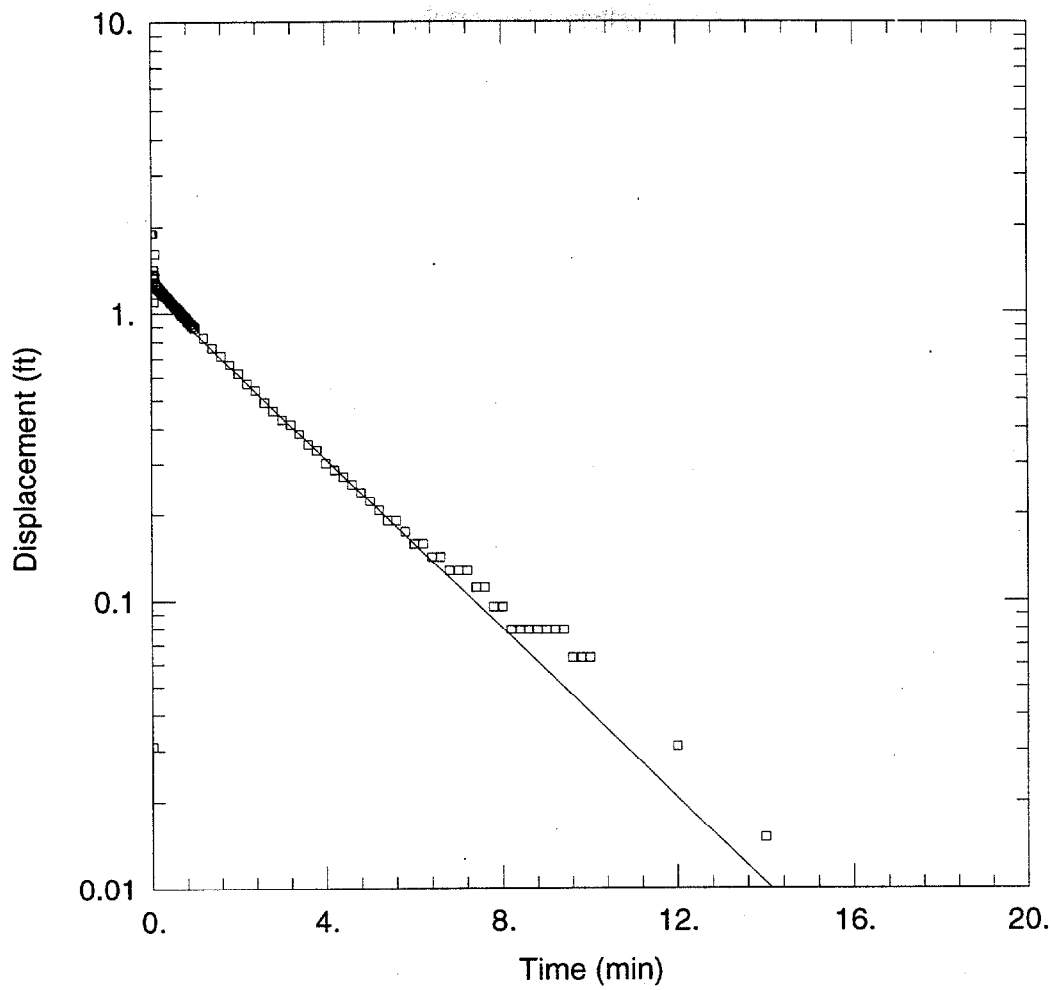
Initial Displacement: 2.724 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 10.84 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.362E-05 ft/sec
y0 = 1.885 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW105
Slug-In Test March 6, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.015	0.4	-1.111	2.6	-0.492
0.0083	-0.031	0.4166	-1.111	2.8	-0.46
0.0166	0.555	0.4333	-1.096	3	-0.428
0.025	-1.286	0.45	-1.096	3.2	-0.412
0.0333	-1.89	0.4666	-1.08	3.4	-0.381
0.0416	-1.366	0.4833	-1.08	3.6	-0.349
0.05	-1.413	0.5	-1.08	3.8	-0.333
0.0583	-1.096	0.5166	-1.064	4	-0.301
0.0666	-1.35	0.5333	-1.048	4.2	-0.285
0.075	-1.604	0.55	-1.048	4.4	-0.27
0.0833	-1.334	0.5666	-1.048	4.6	-0.254
0.0916	-1.27	0.5833	-1.032	4.8	-0.238
0.1	-1.254	0.6	-1.032	5	-0.222
0.1083	-1.254	0.6166	-1.032	5.2	-0.206
0.1166	-1.239	0.6333	-1.016	5.4	-0.19
0.125	-1.239	0.65	-1.016	5.6	-0.19
0.1333	-1.239	0.6666	-1	5.8	-0.174
0.1416	-1.239	0.6833	-1	6	-0.158
0.15	-1.223	0.7	-0.984	6.2	-0.158
0.1583	-1.223	0.7166	-0.984	6.4	-0.142
0.1666	-1.223	0.7333	-0.984	6.6	-0.142
0.175	-1.223	0.75	-0.968	6.8	-0.127
0.1833	-1.223	0.7666	-0.968	7	-0.127
0.1916	-1.207	0.7833	-0.968	7.2	-0.127
0.2	-1.207	0.8	-0.953	7.4	-0.111
0.2083	-1.207	0.8166	-0.953	7.6	-0.111
0.2166	-1.207	0.8333	-0.937	7.8	-0.095
0.225	-1.191	0.85	-0.937	8	-0.095
0.2333	-1.191	0.8666	-0.937	8.2	-0.079
0.2416	-1.175	0.8833	-0.921	8.4	-0.079
0.25	-1.175	0.9	-0.921	8.6	-0.079
0.2583	-1.175	0.9166	-0.921	8.8	-0.079
0.2666	-1.175	0.9333	-0.905	9	-0.079
0.275	-1.175	0.95	-0.905	9.2	-0.079
0.2833	-1.159	0.9666	-0.905	9.4	-0.079
0.2916	-1.159	0.9833	-0.889	9.6	-0.063
0.3	-1.159	1	-0.889	9.8	-0.063
0.3083	-1.159	1.2	-0.825	10	-0.063
0.3166	-1.143	1.4	-0.762	12	-0.031
0.325	-1.143	1.6	-0.714	14	-0.015
0.3333	-1.143	1.8	-0.667		
0.35	-1.143	2	-0.619		
0.3666	-1.127	2.2	-0.571		
0.3833	-1.127	2.4	-0.54		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\105IN.AQT
Date: 05/07/99 Time: 13:09:59

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW105 Slug In Test
Test Date: March 6, 1999

AQUIFER DATA

Saturated Thickness: 23.13 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

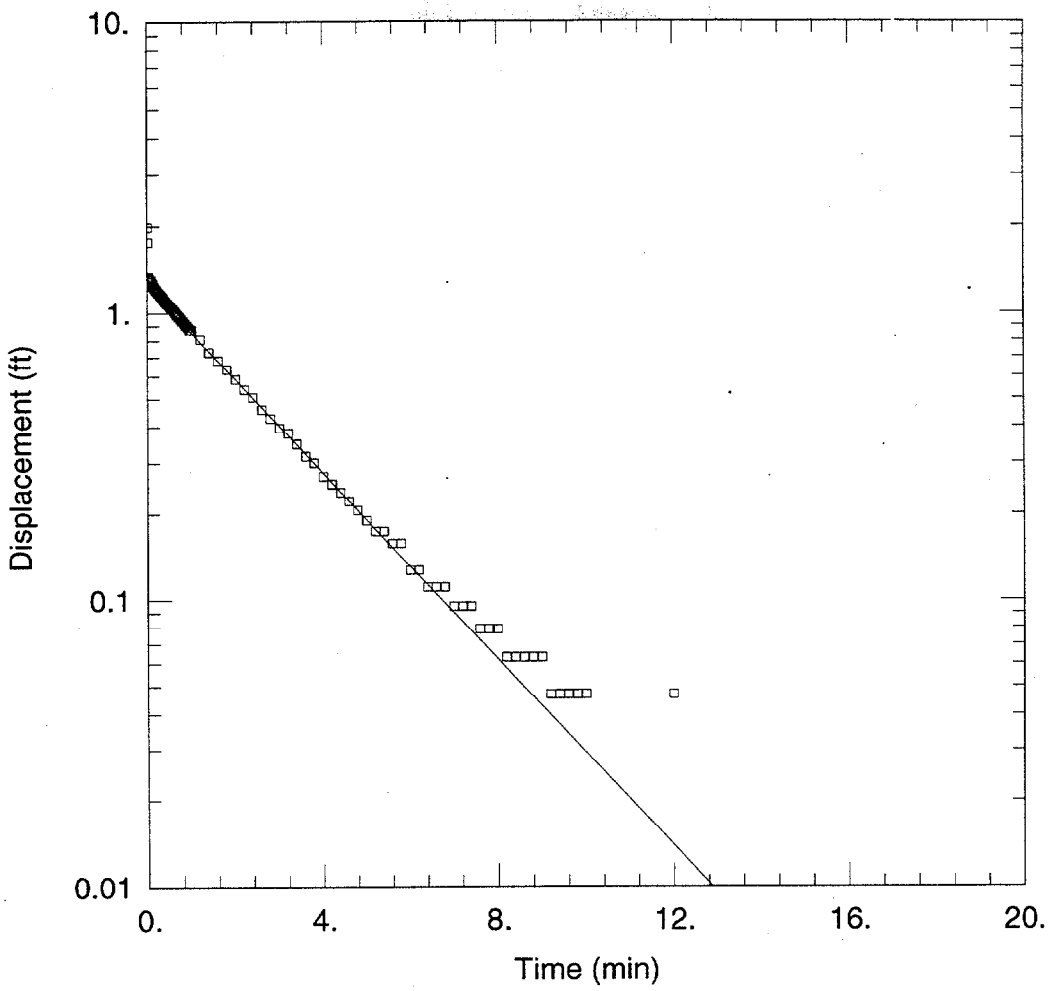
Initial Displacement: 1.89 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 19.12 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.753E-05 ft/sec
y0 = 1.203 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW105
Slug-Out Test March 6, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.985	0.3833	1.111	2.2	0.54
0.0083	1.747	0.4	1.095	2.4	0.508
0.0166	1.318	0.4166	1.095	2.6	0.46
0.025	1.334	0.4333	1.08	2.8	0.428
0.0333	1.318	0.45	1.08	3	0.397
0.0416	1.302	0.4666	1.08	3.2	0.381
0.05	1.302	0.4833	1.064	3.4	0.349
0.0583	1.302	0.5	1.064	3.6	0.317
0.0666	1.302	0.5166	1.048	3.8	0.301
0.075	1.302	0.5333	1.048	4	0.27
0.0833	1.286	0.55	1.032	4.2	0.254
0.0916	1.27	0.5666	1.032	4.4	0.238
0.1	1.254	0.5833	1.032	4.6	0.222
0.1083	1.27	0.6	1.016	4.8	0.206
0.1166	1.27	0.6166	1.016	5	0.19
0.125	1.254	0.6333	1	5.2	0.174
0.1333	1.238	0.65	1	5.4	0.174
0.1416	1.238	0.6666	0.984	5.6	0.158
0.15	1.238	0.6833	0.984	5.8	0.158
0.1583	1.222	0.7	0.968	6	0.127
0.1666	1.222	0.7166	0.968	6.2	0.127
0.175	1.222	0.7333	0.968	6.4	0.111
0.1833	1.207	0.75	0.952	6.6	0.111
0.1916	1.207	0.7666	0.952	6.8	0.111
0.2	1.207	0.7833	0.937	7	0.095
0.2083	1.191	0.8	0.937	7.2	0.095
0.2166	1.191	0.8166	0.937	7.4	0.095
0.225	1.191	0.8333	0.921	7.6	0.079
0.2333	1.175	0.85	0.921	7.8	0.079
0.2416	1.175	0.8666	0.905	8	0.079
0.25	1.175	0.8833	0.905	8.2	0.063
0.2583	1.175	0.9	0.905	8.4	0.063
0.2666	1.175	0.9166	0.889	8.6	0.063
0.275	1.159	0.9333	0.889	8.8	0.063
0.2833	1.159	0.95	0.873	9	0.063
0.2916	1.159	0.9666	0.873	9.2	0.047
0.3	1.159	0.9833	0.873	9.4	0.047
0.3083	1.143	1	0.873	9.6	0.047
0.3166	1.143	1.2	0.81	9.8	0.047
0.325	1.143	1.4	0.73	10	0.047
0.3333	1.143	1.6	0.682	12	0.047
0.35	1.127	1.8	0.635		
0.3666	1.111	2	0.587		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\105OUT.AQT
Date: 05/07/99 Time: 13:11:35

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW105 Slug Out Test
Test Date: March 6, 1999

AQUIFER DATA

Saturated Thickness: 23.13 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.985 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 19.12 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

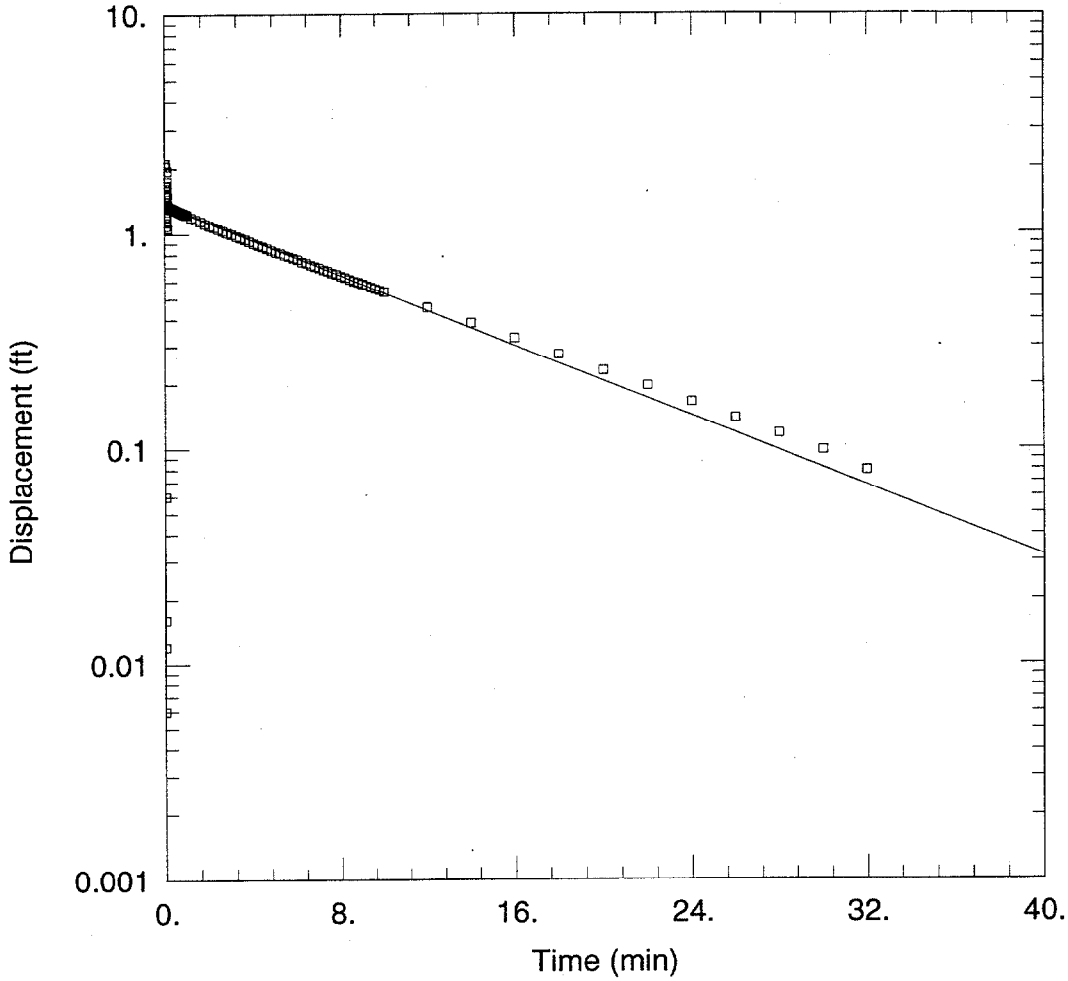
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.037E-05 ft/sec
y0 = 1.237 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW106
Slug-In Test March 6, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.009	0.1433	-1.351	0.2866	-1.322
0.0033	-0.006	0.1466	-1.341	0.29	-1.322
0.0066	-0.012	0.15	-1.341	0.2933	-1.319
0.01	-0.006	0.1533	-1.341	0.2966	-1.319
0.0133	-0.006	0.1566	-1.341	0.3	-1.319
0.0166	0	0.16	-1.338	0.3033	-1.319
0.02	-0.016	0.1633	-1.338	0.3066	-1.319
0.0233	-0.006	0.1666	-1.338	0.31	-1.319
0.0266	0.028	0.17	-1.338	0.3133	-1.319
0.03	-0.012	0.1733	-1.338	0.3166	-1.315
0.0333	-1.544	0.1766	-1.338	0.32	-1.315
0.0366	-0.06	0.18	-1.338	0.3233	-1.315
0.04	-2.117	0.1833	-1.335	0.3266	-1.315
0.0433	-1.513	0.1866	-1.335	0.33	-1.315
0.0466	-1.42	0.19	-1.335	0.3333	-1.315
0.05	-2.05	0.1933	-1.335	0.35	-1.312
0.0533	-1.586	0.1966	-1.335	0.3666	-1.309
0.0566	-1.376	0.2	-1.335	0.3833	-1.306
0.06	-1.195	0.2033	-1.335	0.4	-1.306
0.0633	-1.411	0.2066	-1.331	0.4166	-1.303
0.0666	-1.668	0.21	-1.331	0.4333	-1.3
0.07	-1.09	0.2133	-1.331	0.45	-1.296
0.0733	-1.169	0.2166	-1.331	0.4666	-1.296
0.0766	-1.497	0.22	-1.331	0.4833	-1.293
0.08	-1.424	0.2233	-1.328	0.5	-1.29
0.0833	-1.306	0.2266	-1.328	0.5166	-1.287
0.0866	-1.214	0.23	-1.328	0.5333	-1.287
0.09	-1.414	0.2333	-1.328	0.55	-1.284
0.0933	-1.557	0.2366	-1.328	0.5666	-1.281
0.0966	-1.627	0.24	-1.328	0.5833	-1.277
0.1	-1.131	0.2433	-1.328	0.6	-1.277
0.1033	-1.319	0.2466	-1.328	0.6166	-1.274
0.1066	-1.554	0.25	-1.325	0.6333	-1.271
0.11	-1.675	0.2533	-1.325	0.65	-1.268
0.1133	-1.955	0.2566	-1.325	0.6666	-1.268
0.1166	-1.745	0.26	-1.325	0.6833	-1.265
0.12	-1.052	0.2633	-1.325	0.7	-1.261
0.1233	-1.068	0.2666	-1.325	0.7166	-1.258
0.1266	-1.49	0.27	-1.325	0.7333	-1.258
0.13	-1.319	0.2733	-1.322	0.75	-1.255
0.1333	-1.347	0.2766	-1.322	0.7666	-1.252
0.1366	-1.344	0.28	-1.322	0.7833	-1.252
0.14	-1.351	0.2833	-1.322	0.8	-1.249

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 11GW106
Slug-In Test March 6, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	-1.246	3.4	-0.96	8	-0.635
0.8333	-1.246	3.6	-0.944	8.2	-0.626
0.85	-1.242	3.8	-0.925	8.4	-0.613
0.8666	-1.239	4	-0.905	8.6	-0.603
0.8833	-1.239	4.2	-0.89	8.8	-0.594
0.9	-1.236	4.4	-0.874	9	-0.584
0.9166	-1.233	4.6	-0.858	9.2	-0.575
0.9333	-1.233	4.8	-0.842	9.4	-0.565
0.95	-1.23	5	-0.826	9.6	-0.556
0.9666	-1.227	5.2	-0.813	9.8	-0.546
0.9833	-1.223	5.4	-0.797	10	-0.537
1	-1.223	5.6	-0.785	12	-0.454
1.2	-1.192	5.8	-0.772	14	-0.384
1.4	-1.166	6	-0.759	16	-0.327
1.6	-1.144	6.2	-0.743	18	-0.276
1.8	-1.118	6.4	-0.731	20	-0.232
2	-1.096	6.6	-0.718	22	-0.197
2.2	-1.077	6.8	-0.705	24	-0.165
2.4	-1.055	7	-0.693	26	-0.139
2.6	-1.036	7.2	-0.68	28	-0.117
2.8	-1.017	7.4	-0.67	30	-0.098
3	-0.998	7.6	-0.657	32	-0.079
3.2	-0.979	7.8	-0.648		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\106IN.AQT
Date: 05/07/99 Time: 13:12:05

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW106 Slug In Test
Test Date: March 6, 1999

AQUIFER DATA

Saturated Thickness: 125.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.117 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 55.92 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

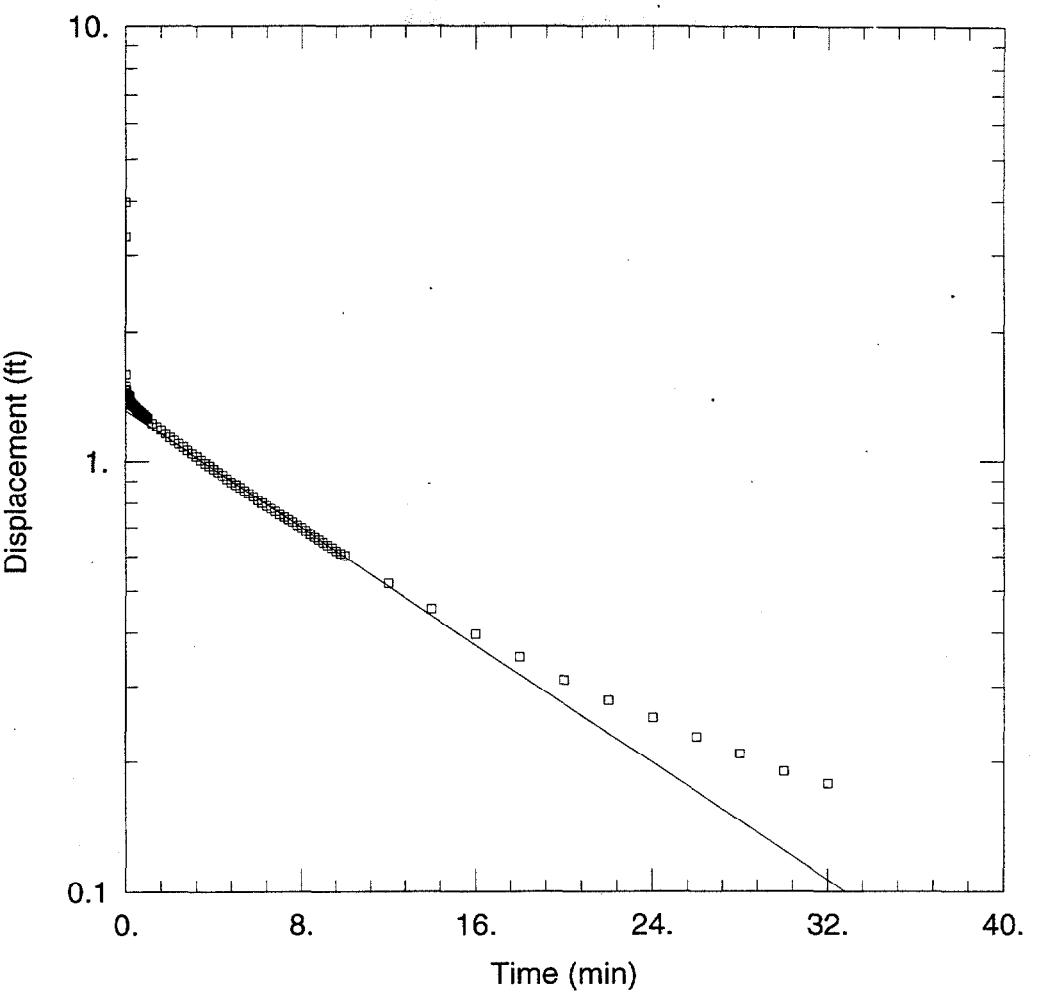
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.229E-06 ft/sec
y0 = 1.354 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW106
Slug-Out Test March 6, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	2.44	0.1433	1.395	0.2866	1.363
0.0033	3.981	0.1466	1.404	0.29	1.363
0.0066	3.314	0.15	1.385	0.2933	1.36
0.01	1.595	0.1533	1.376	0.2966	1.36
0.0133	1.5	0.1566	1.398	0.3	1.36
0.0166	1.446	0.16	1.385	0.3033	1.36
0.02	1.471	0.1633	1.388	0.3066	1.36
0.0233	1.449	0.1666	1.376	0.31	1.36
0.0266	1.439	0.17	1.424	0.3133	1.36
0.03	1.465	0.1733	1.398	0.3166	1.357
0.0333	1.439	0.1766	1.357	0.32	1.357
0.0366	1.427	0.18	1.382	0.3233	1.357
0.04	1.414	0.1833	1.385	0.3266	1.357
0.0433	1.427	0.1866	1.382	0.33	1.357
0.0466	1.436	0.19	1.373	0.3333	1.357
0.05	1.414	0.1933	1.385	0.35	1.353
0.0533	1.42	0.1966	1.379	0.3666	1.35
0.0566	1.436	0.2	1.369	0.3833	1.347
0.06	1.427	0.2033	1.379	0.4	1.344
0.0633	1.417	0.2066	1.382	0.4166	1.341
0.0666	1.411	0.21	1.363	0.4333	1.338
0.07	1.414	0.2133	1.373	0.45	1.334
0.0733	1.411	0.2166	1.382	0.4666	1.334
0.0766	1.408	0.22	1.382	0.4833	1.331
0.08	1.382	0.2233	1.373	0.5	1.328
0.0833	1.408	0.2266	1.369	0.5166	1.325
0.0866	1.395	0.23	1.369	0.5333	1.322
0.09	1.408	0.2333	1.369	0.55	1.319
0.0933	1.411	0.2366	1.366	0.5666	1.319
0.0966	1.395	0.24	1.366	0.5833	1.315
0.1	1.398	0.2433	1.369	0.6	1.312
0.1033	1.408	0.2466	1.366	0.6166	1.309
0.1066	1.411	0.25	1.366	0.6333	1.306
0.11	1.401	0.2533	1.366	0.65	1.306
0.1133	1.424	0.2566	1.366	0.6666	1.303
0.1166	1.404	0.26	1.366	0.6833	1.299
0.12	1.411	0.2633	1.366	0.7	1.299
0.1233	1.401	0.2666	1.366	0.7166	1.296
0.1266	1.408	0.27	1.366	0.7333	1.293
0.13	1.392	0.2733	1.363	0.75	1.29
0.1333	1.385	0.2766	1.363	0.7666	1.29
0.1366	1.388	0.28	1.363	0.7833	1.287
0.14	1.382	0.2833	1.363	0.8	1.287

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 11GW106
Slug-Out Test March 6, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	1.284	3.4	1.007	8	0.699
0.8333	1.28	3.6	0.991	8.2	0.689
0.85	1.277	3.8	0.975	8.4	0.677
0.8666	1.277	4	0.959	8.6	0.667
0.8833	1.274	4.2	0.944	8.8	0.658
0.9	1.271	4.4	0.928	9	0.648
0.9166	1.271	4.6	0.912	9.2	0.638
0.9333	1.268	4.8	0.896	9.4	0.629
0.95	1.265	5	0.883	9.6	0.619
0.9666	1.265	5.2	0.87	9.8	0.61
0.9833	1.261	5.4	0.855	10	0.603
1	1.258	5.6	0.842	12	0.521
1.2	1.226	5.8	0.829	14	0.454
1.4	1.204	6	0.813	16	0.397
1.6	1.182	6.2	0.801	18	0.352
1.8	1.16	6.4	0.788	20	0.311
2	1.137	6.6	0.778	22	0.279
2.2	1.118	6.8	0.766	24	0.254
2.4	1.099	7	0.753	26	0.229
2.6	1.08	7.2	0.743	28	0.209
2.8	1.061	7.4	0.731	30	0.19
3	1.042	7.6	0.721	32	0.178
3.2	1.026	7.8	0.709		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\106OUT.AQT
Date: 05/07/99 Time: 13:12:15

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW106 Slug Out Test
Test Date: March 6, 1999

AQUIFER DATA

Saturated Thickness: 125.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

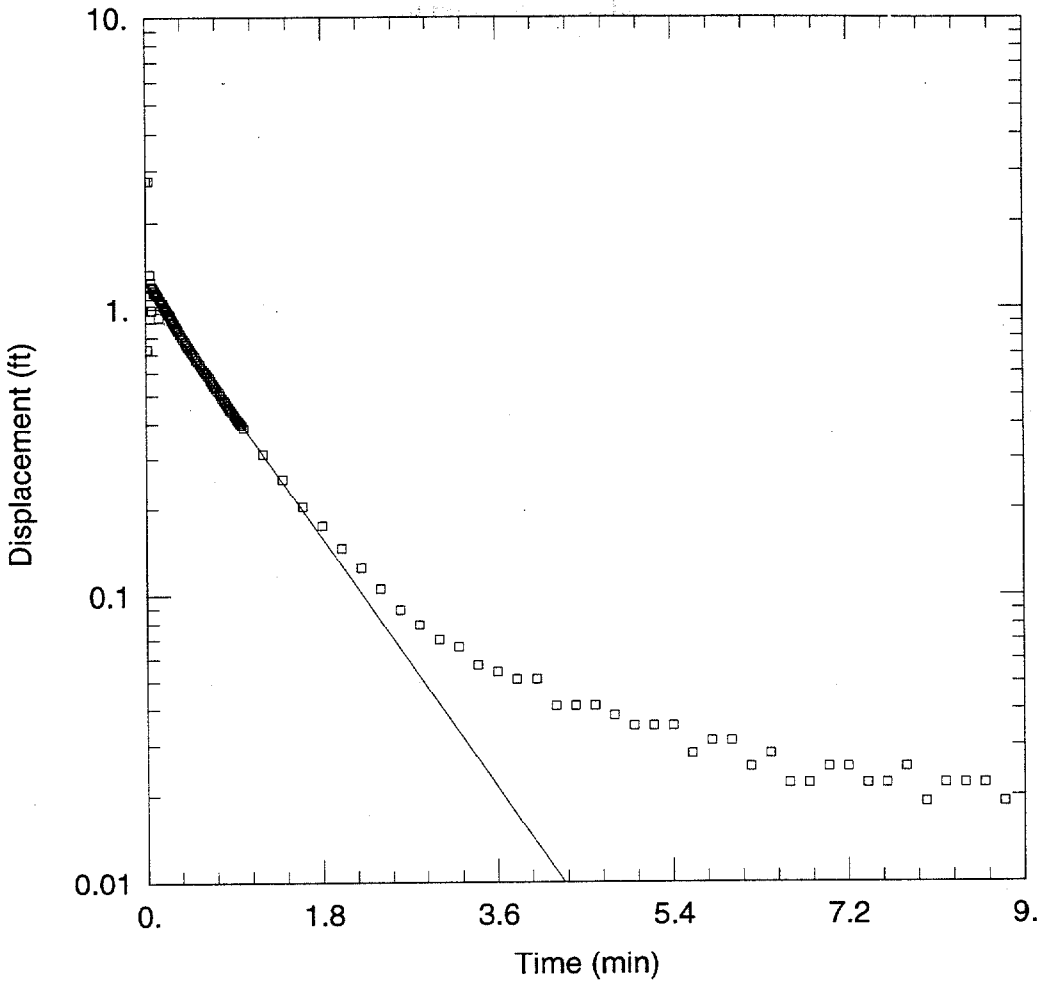
Initial Displacement: 3.981 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 55.92 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.701E-06 ft/sec
y0 = 1.314 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW107
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	0.025	0.3833	-0.79	2.2	-0.124
0.0083	0.006	0.4	-0.774	2.4	-0.105
0.0166	-0.73	0.4166	-0.758	2.6	-0.089
0.025	-1.115	0.4333	-0.742	2.8	-0.079
0.0333	-2.767	0.45	-0.73	3	-0.07
0.0416	-1.319	0.4666	-0.714	3.2	-0.066
0.05	-1.24	0.4833	-0.701	3.4	-0.057
0.0583	-0.988	0.5	-0.688	3.6	-0.054
0.0666	-1.198	0.5166	-0.672	3.8	-0.051
0.075	-1.182	0.5333	-0.659	4	-0.051
0.0833	-1.138	0.55	-0.647	4.2	-0.041
0.0916	-1.16	0.5666	-0.634	4.4	-0.041
0.1	-1.144	0.5833	-0.621	4.6	-0.041
0.1083	-1.128	0.6	-0.608	4.8	-0.038
0.1166	-1.122	0.6166	-0.599	5	-0.035
0.125	-1.106	0.6333	-0.586	5.2	-0.035
0.1333	-0.934	0.65	-0.577	5.4	-0.035
0.1416	-1.08	0.6666	-0.564	5.6	-0.028
0.15	-1.071	0.6833	-0.551	5.8	-0.031
0.1583	-1.055	0.7	-0.541	6	-0.031
0.1666	-1.048	0.7166	-0.532	6.2	-0.025
0.175	-1.045	0.7333	-0.522	6.4	-0.028
0.1833	-1.02	0.75	-0.513	6.6	-0.022
0.1916	-1.013	0.7666	-0.503	6.8	-0.022
0.2	-0.997	0.7833	-0.49	7	-0.025
0.2083	-0.991	0.8	-0.481	7.2	-0.025
0.2166	-0.981	0.8166	-0.474	7.4	-0.022
0.225	-0.965	0.8333	-0.465	7.6	-0.022
0.2333	-0.959	0.85	-0.455	7.8	-0.025
0.2416	-0.953	0.8666	-0.446	8	-0.019
0.25	-0.94	0.8833	-0.439	8.2	-0.022
0.2583	-0.924	0.9	-0.43	8.4	-0.022
0.2666	-0.918	0.9166	-0.423	8.6	-0.022
0.275	-0.905	0.9333	-0.414	8.8	-0.019
0.2833	-0.899	0.95	-0.408		
0.2916	-0.889	0.9666	-0.401		
0.3	-0.879	0.9833	-0.395		
0.3083	-0.867	1	-0.385		
0.3166	-0.86	1.2	-0.312		
0.325	-0.851	1.4	-0.255		
0.3333	-0.841	1.6	-0.204		
0.35	-0.822	1.8	-0.175		
0.3666	-0.806	2	-0.146		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\107IN.AQT
Date: 05/07/99 Time: 13:13:56

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW107 Slug In Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 131.2 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

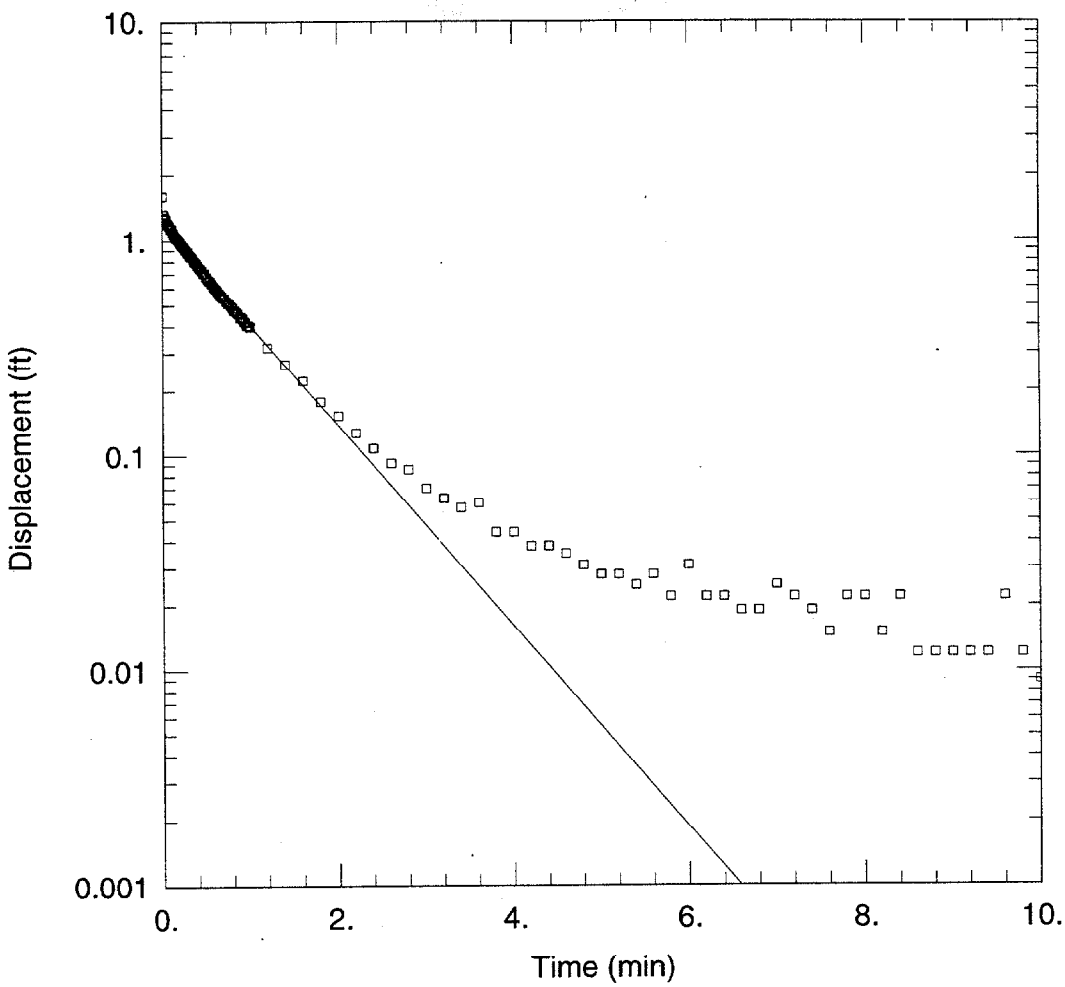
Initial Displacement: 2.767 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 36.63 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.651E-05 ft/sec
y0 = 1.177 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW107
Slug-Out Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.603	0.3833	0.79	2.2	0.127
0.0083	1.329	0.4	0.768	2.4	0.108
0.0166	1.322	0.4166	0.752	2.6	0.092
0.025	1.278	0.4333	0.742	2.8	0.086
0.0333	1.29	0.45	0.726	3	0.07
0.0416	1.262	0.4666	0.707	3.2	0.063
0.05	1.233	0.4833	0.704	3.4	0.057
0.0583	1.214	0.5	0.678	3.6	0.06
0.0666	1.198	0.5166	0.666	3.8	0.044
0.075	1.182	0.5333	0.653	4	0.044
0.0833	1.169	0.55	0.647	4.2	0.038
0.0916	1.144	0.5666	0.631	4.4	0.038
0.1	1.131	0.5833	0.615	4.6	0.035
0.1083	1.141	0.6	0.602	4.8	0.031
0.1166	1.102	0.6166	0.596	5	0.028
0.125	1.086	0.6333	0.583	5.2	0.028
0.1333	1.064	0.65	0.57	5.4	0.025
0.1416	1.058	0.6666	0.561	5.6	0.028
0.15	1.042	0.6833	0.554	5.8	0.022
0.1583	1.029	0.7	0.541	6	0.031
0.1666	1.035	0.7166	0.541	6.2	0.022
0.175	1.023	0.7333	0.522	6.4	0.022
0.1833	1.007	0.75	0.51	6.6	0.019
0.1916	0.994	0.7666	0.513	6.8	0.019
0.2	0.984	0.7833	0.5	7	0.025
0.2083	0.968	0.8	0.487	7.2	0.022
0.2166	0.962	0.8166	0.474	7.4	0.019
0.225	0.949	0.8333	0.474	7.6	0.015
0.2333	0.943	0.85	0.465	7.8	0.022
0.2416	0.937	0.8666	0.459	8	0.022
0.25	0.927	0.8833	0.439	8.2	0.015
0.2583	0.914	0.9	0.443	8.4	0.022
0.2666	0.908	0.9166	0.436	8.6	0.012
0.275	0.898	0.9333	0.423	8.8	0.012
0.2833	0.882	0.95	0.417	9	0.012
0.2916	0.886	0.9666	0.404	9.2	0.012
0.3	0.873	0.9833	0.404	9.4	0.012
0.3083	0.86	1	0.398	9.6	0.022
0.3166	0.851	1.2	0.318	9.8	0.012
0.325	0.844	1.4	0.267	10	0.009
0.3333	0.841	1.6	0.223		
0.35	0.825	1.8	0.178		
0.3666	0.8	2	0.153		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\107OUT.AQT
Date: 05/07/99 Time: 13:14:11

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White oak
Project: CTO-298
Test Well: 11GW107. Slug Out Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 131.2 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

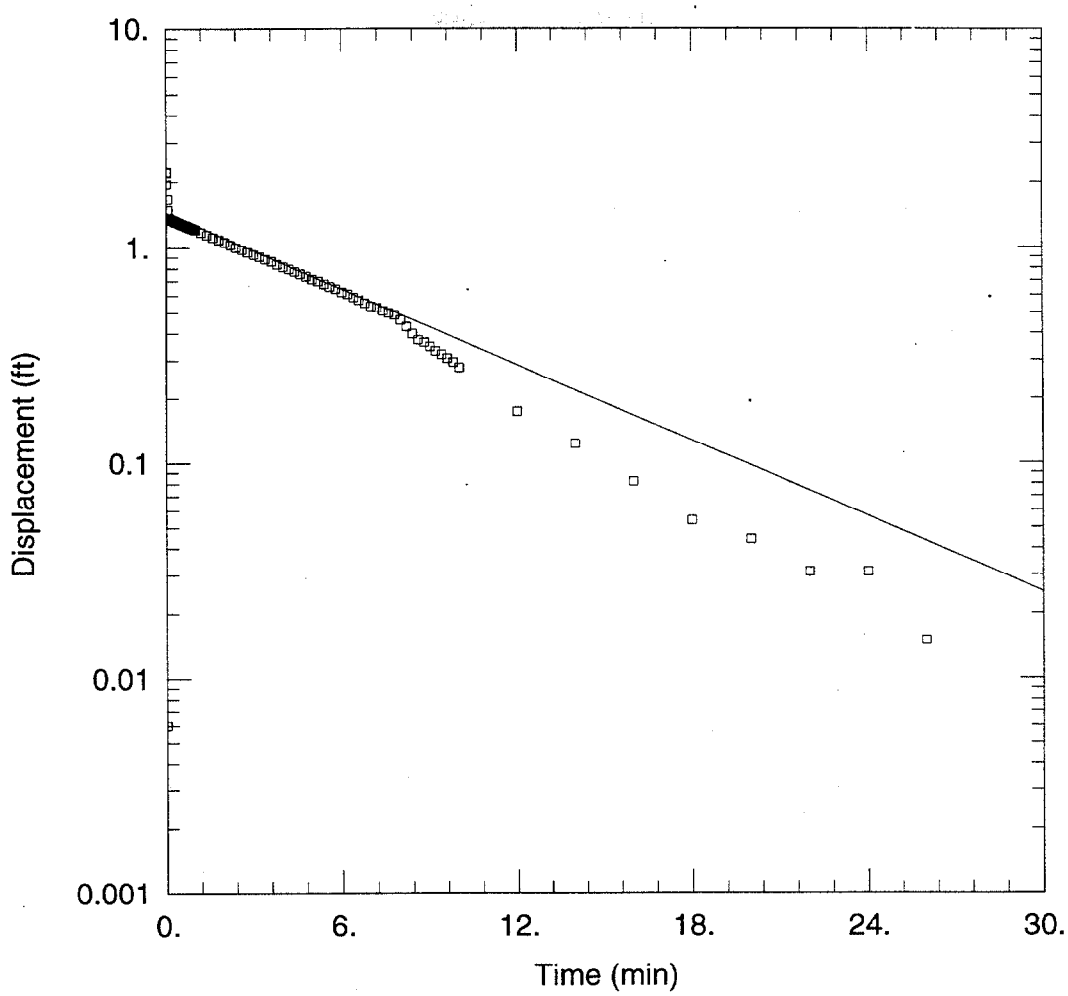
Initial Displacement: 1.603 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 36.63 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.525E-05 ft/sec
y0 = 1.186 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW108
Slug-in Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	0	0.4166	-1.303	3	-0.928
0.0083	-0.006	0.4333	-1.3	3.2	-0.909
0.0166	-1.955	0.45	-1.297	3.4	-0.887
0.025	-2.216	0.4666	-1.293	3.6	-0.864
0.0333	-2.222	0.4833	-1.29	3.8	-0.839
0.0416	-1.348	0.5	-1.29	4	-0.817
0.05	-1.666	0.5166	-1.284	4.2	-0.797
0.0583	-1.487	0.5333	-1.284	4.4	-0.775
0.0666	-1.373	0.55	-1.281	4.6	-0.756
0.075	-1.367	0.5666	-1.278	4.8	-0.737
0.0833	-1.363	0.5833	-1.274	5	-0.715
0.0916	-1.363	0.6	-1.271	5.2	-0.699
0.1	-1.36	0.6166	-1.268	5.4	-0.68
0.1083	-1.357	0.6333	-1.268	5.6	-0.661
0.1166	-1.357	0.65	-1.265	5.8	-0.645
0.125	-1.354	0.6666	-1.262	6	-0.623
0.1333	-1.354	0.6833	-1.259	6.2	-0.61
0.1416	-1.354	0.7	-1.255	6.4	-0.591
0.15	-1.351	0.7166	-1.255	6.6	-0.572
0.1583	-1.348	0.7333	-1.249	6.8	-0.556
0.1666	-1.348	0.75	-1.249	7	-0.537
0.175	-1.348	0.7666	-1.246	7.2	-0.527
0.1833	-1.344	0.7833	-1.243	7.4	-0.511
0.1916	-1.344	0.8	-1.239	7.6	-0.499
0.2	-1.341	0.8166	-1.236	7.8	-0.489
0.2083	-1.338	0.8333	-1.233	8	-0.464
0.2166	-1.338	0.85	-1.233	8.2	-0.432
0.225	-1.335	0.8666	-1.23	8.4	-0.4
0.2333	-1.335	0.8833	-1.227	8.6	-0.375
0.2416	-1.335	0.9	-1.224	8.8	-0.365
0.25	-1.332	0.9166	-1.22	9	-0.349
0.2583	-1.332	0.9333	-1.22	9.2	-0.333
0.2666	-1.328	0.95	-1.217	9.4	-0.321
0.275	-1.325	0.9666	-1.214	9.6	-0.308
0.2833	-1.325	0.9833	-1.211	9.8	-0.295
0.2916	-1.325	1	-1.208	10	-0.279
0.3	-1.322	1.2	-1.176	12	-0.174
0.3083	-1.322	1.4	-1.144	14	-0.123
0.3166	-1.322	1.6	-1.115	16	-0.082
0.325	-1.319	1.8	-1.087	18	-0.054
0.3333	-1.316	2	-1.058	20	-0.044
0.35	-1.313	2.2	-1.03	22	-0.031
0.3666	-1.313	2.4	-1.001	24	-0.031
0.3833	-1.309	2.6	-0.979	26	-0.015
0.4	-1.306	2.8	-0.953		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\108IN.AQT
Date: 05/07/99 Time: 13:14:24

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW108 Slug In Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 138.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

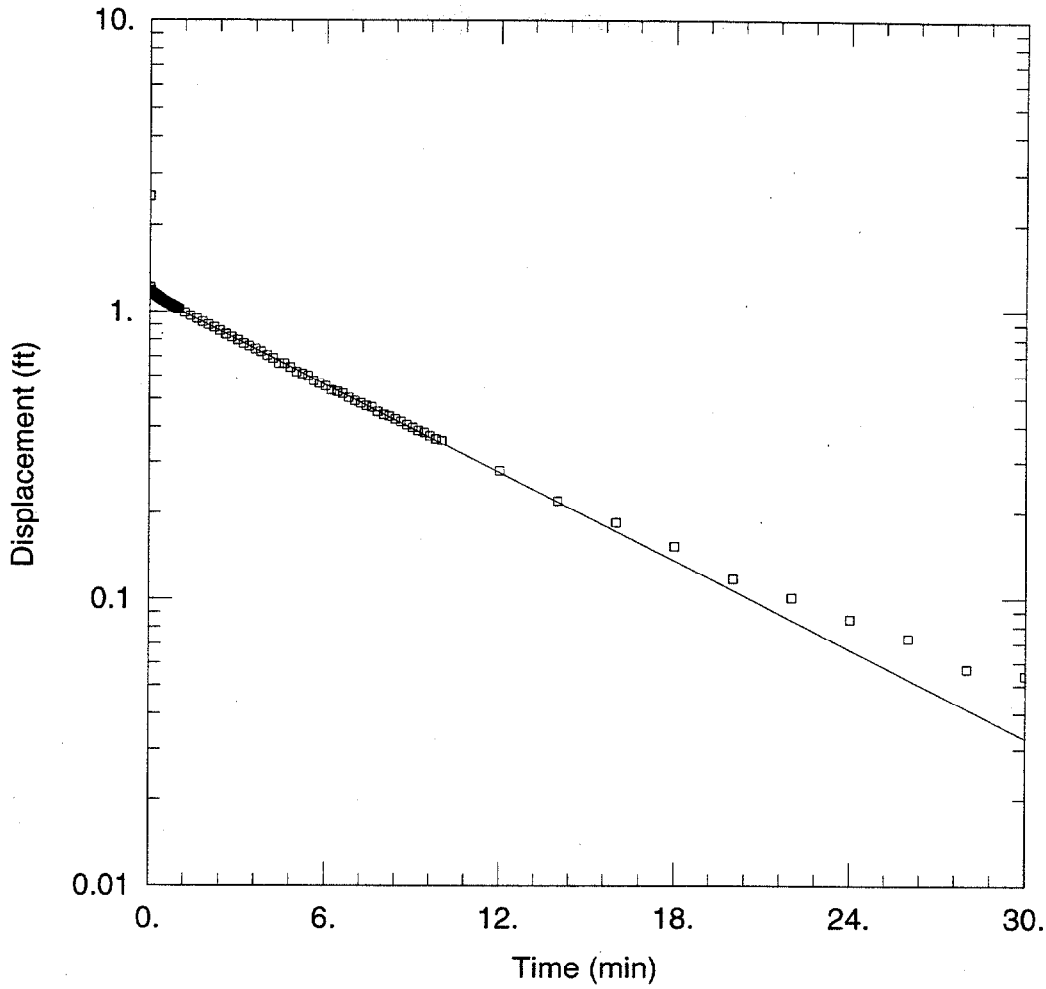
Initial Displacement: 2.222 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 37.79 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.448E-06 ft/sec
y0 = 1.45 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW108
Slug-Out Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	2.504	0.4333	1.096	3.4	0.759
0.0083	1.217	0.45	1.09	3.6	0.743
0.0166	1.172	0.4666	1.09	3.8	0.727
0.025	1.207	0.4833	1.087	4	0.705
0.0333	1.16	0.5	1.083	4.2	0.689
0.0416	1.153	0.5166	1.08	4.4	0.664
0.05	1.185	0.5333	1.08	4.6	0.661
0.0583	1.163	0.55	1.077	4.8	0.642
0.0666	1.147	0.5666	1.074	5	0.619
0.075	1.16	0.5833	1.074	5.2	0.61
0.0833	1.153	0.6	1.071	5.4	0.6
0.0916	1.157	0.6166	1.068	5.6	0.578
0.1	1.157	0.6333	1.064	5.8	0.565
0.1083	1.153	0.65	1.064	6	0.553
0.1166	1.153	0.6666	1.061	6.2	0.537
0.125	1.15	0.6833	1.061	6.4	0.53
0.1333	1.153	0.7	1.058	6.6	0.521
0.1416	1.15	0.7166	1.055	6.8	0.505
0.15	1.15	0.7333	1.052	7	0.492
0.1583	1.147	0.75	1.048	7.2	0.483
0.1666	1.144	0.7666	1.048	7.4	0.473
0.175	1.144	0.7833	1.045	7.6	0.467
0.1833	1.141	0.8	1.045	7.8	0.451
0.1916	1.137	0.8166	1.042	8	0.441
0.2	1.137	0.8333	1.039	8.2	0.435
0.2083	1.137	0.85	1.036	8.4	0.425
0.2166	1.134	0.8666	1.036	8.6	0.416
0.225	1.134	0.8833	1.033	8.8	0.406
0.2333	1.131	0.9	1.029	9	0.397
0.2416	1.131	0.9166	1.029	9.2	0.387
0.25	1.125	0.9333	1.026	9.4	0.381
0.2583	1.125	0.95	1.023	9.6	0.371
0.2666	1.125	0.9666	1.02	9.8	0.362
0.275	1.122	0.9833	1.02	10	0.356
0.2833	1.122	1	1.02	12	0.279
0.2916	1.118	1.2	0.991	14	0.219
0.3	1.118	1.4	0.966	16	0.184
0.3083	1.115	1.6	0.944	18	0.152
0.3166	1.118	1.8	0.921	20	0.117
0.325	1.115	2	0.899	22	0.101
0.3333	1.112	2.2	0.88	24	0.085
0.35	1.109	2.4	0.858	26	0.073
0.3666	1.106	2.6	0.836	28	0.057
0.3833	1.102	2.8	0.816	30	0.054
0.4	1.102	3	0.797		
0.4166	1.096	3.2	0.775		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\108OUT.AQT
Date: 05/07/99 Time: 13:29:19

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW108 Slug Out Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 138.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.504 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 37.79 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

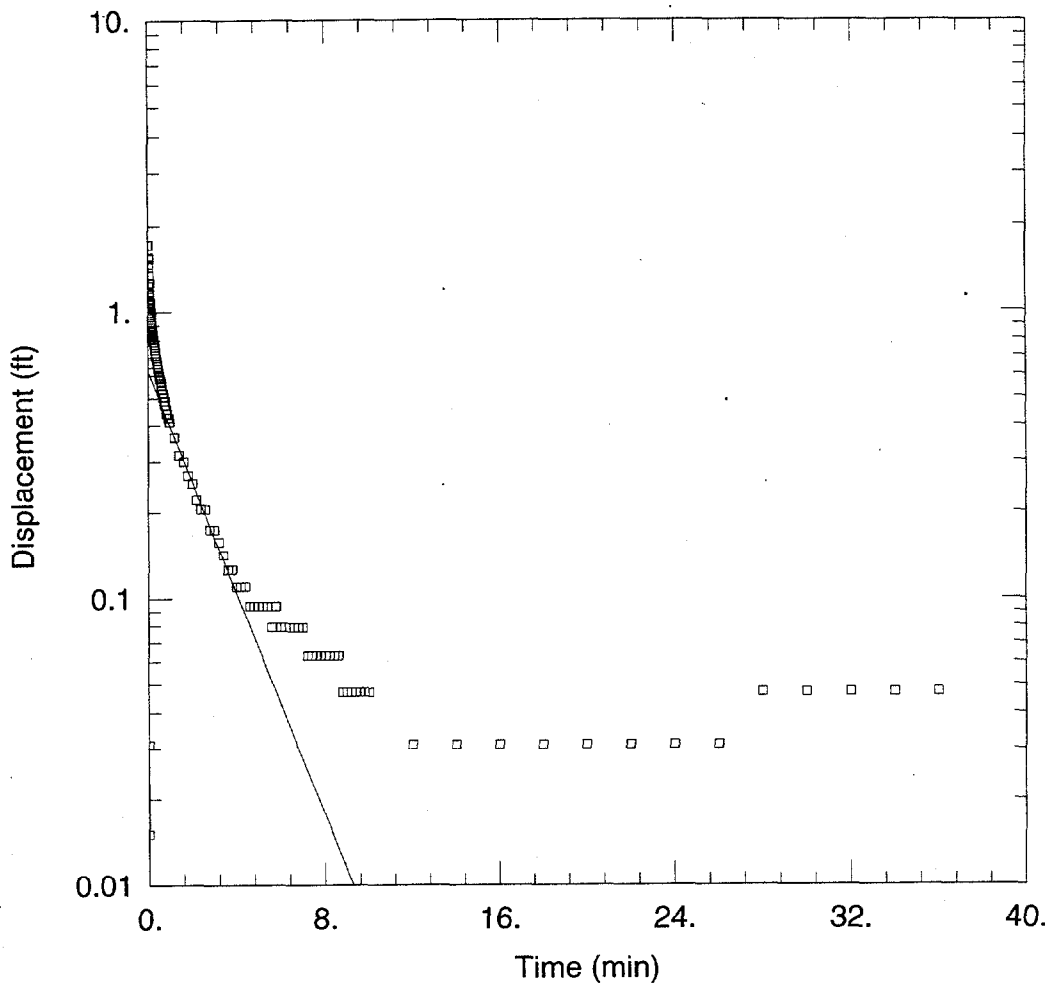
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.89E-06 ft/sec
y0 = 1.137 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW109
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	0	0.1433	-0.965	0.2866	-0.775
0.0033	-0.015	0.1466	-0.965	0.29	-0.775
0.0066	-0.015	0.15	-0.965	0.2933	-0.775
0.01	-0.015	0.1533	-0.949	0.2966	-0.775
0.0133	-0.031	0.1566	-0.933	0.3	-0.759
0.0166	0	0.16	-0.87	0.3033	-0.759
0.02	-0.015	0.1633	-0.965	0.3066	-0.759
0.0233	-0.015	0.1666	-0.933	0.31	-0.759
0.0266	-1.234	0.17	-0.918	0.3133	-0.759
0.03	-0.664	0.1733	-0.918	0.3166	-0.743
0.0333	-1.44	0.1766	-0.918	0.32	-0.743
0.0366	-1.709	0.18	-0.902	0.3233	-0.743
0.04	-1.471	0.1833	-0.902	0.3266	-0.743
0.0433	-1.551	0.1866	-0.902	0.33	-0.743
0.0466	-1.345	0.19	-0.902	0.3333	-0.743
0.05	-1.171	0.1933	-0.886	0.35	-0.712
0.0533	-1.139	0.1966	-0.886	0.3666	-0.696
0.0566	-1.107	0.2	-0.886	0.3833	-0.696
0.06	-1.535	0.2033	-0.87	0.4	-0.68
0.0633	-0.838	0.2066	-0.87	0.4166	-0.664
0.0666	-1.171	0.21	-0.87	0.4333	-0.648
0.07	-0.997	0.2133	-0.854	0.45	-0.633
0.0733	-1.155	0.2166	-0.854	0.4666	-0.633
0.0766	-1.06	0.22	-0.854	0.4833	-0.617
0.08	-1.266	0.2233	-0.854	0.5	-0.601
0.0833	-1.076	0.2266	-0.838	0.5166	-0.601
0.0866	-1.076	0.23	-0.838	0.5333	-0.585
0.09	-1.06	0.2333	-0.838	0.55	-0.585
0.0933	-1.076	0.2366	-0.838	0.5666	-0.569
0.0966	-1.044	0.24	-0.838	0.5833	-0.569
0.1	-0.965	0.2433	-0.823	0.6	-0.554
0.1033	-1.076	0.2466	-0.823	0.6166	-0.538
0.1066	-1.06	0.25	-0.823	0.6333	-0.538
0.11	-0.981	0.2533	-0.807	0.65	-0.522
0.1133	-1.028	0.2566	-0.807	0.6666	-0.522
0.1166	-1.013	0.26	-0.807	0.6833	-0.506
0.12	-1.013	0.2633	-0.807	0.7	-0.506
0.1233	-1.013	0.2666	-0.791	0.7166	-0.506
0.1266	-0.997	0.27	-0.791	0.7333	-0.49
0.13	-0.997	0.2733	-0.791	0.75	-0.49
0.1333	-0.981	0.2766	-0.791	0.7666	-0.49
0.1366	-0.997	0.28	-0.791	0.7833	-0.474
0.14	-0.981	0.2833	-0.775	0.8	-0.474

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 11GW109
Slug-In Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	-0.459	3.6	-0.126	8.4	-0.063
0.8333	-0.459	3.8	-0.126	8.6	-0.063
0.85	-0.443	4	-0.11	8.8	-0.047
0.8666	-0.443	4.2	-0.11	9	-0.047
0.8833	-0.443	4.4	-0.11	9.2	-0.047
0.9	-0.443	4.6	-0.094	9.4	-0.047
0.9166	-0.427	4.8	-0.094	9.6	-0.047
0.9333	-0.427	5	-0.094	9.8	-0.047
0.95	-0.427	5.2	-0.094	10	-0.047
0.9666	-0.411	5.4	-0.094	12	-0.031
0.9833	-0.411	5.6	-0.079	14	-0.031
1	-0.411	5.8	-0.094	16	-0.031
1.2	-0.364	6	-0.079	18	-0.031
1.4	-0.316	6.2	-0.079	20	-0.031
1.6	-0.3	6.4	-0.079	22	-0.031
1.8	-0.269	6.6	-0.079	24	-0.031
2	-0.253	6.8	-0.079	26	-0.031
2.2	-0.221	7	-0.079	28	-0.047
2.4	-0.205	7.2	-0.063	30	-0.047
2.6	-0.205	7.4	-0.063	32	-0.047
2.8	-0.174	7.6	-0.063	34	-0.047
3	-0.174	7.8	-0.063	36	-0.047
3.2	-0.158	8	-0.063		
3.4	-0.142	8.2	-0.063		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\109IN.AQT
Date: 05/07/99 Time: 13:30:54

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW109 Slug In Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 136.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.709 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 42.05 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

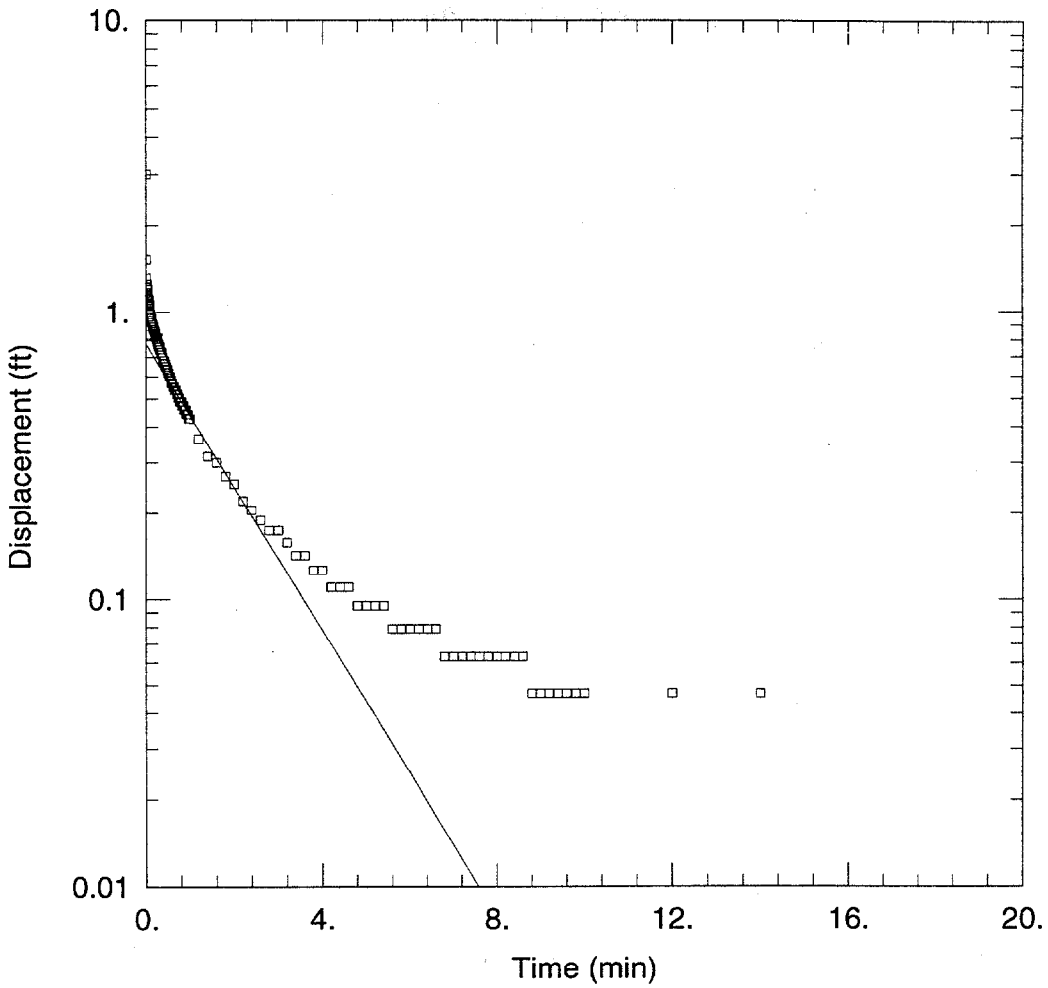
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.483E-05 ft/sec
y0 = 0.6176 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW109
Slug-Out Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	3.007	0.1433	0.918	0.2866	0.759
0.0033	1.519	0.1466	0.918	0.29	0.759
0.0066	1.313	0.15	0.902	0.2933	0.759
0.01	1.25	0.1533	0.902	0.2966	0.759
0.0133	1.218	0.1566	0.902	0.3	0.759
0.0166	1.25	0.16	0.886	0.3033	0.759
0.02	1.171	0.1633	0.886	0.3066	0.759
0.0233	1.218	0.1666	0.886	0.31	0.744
0.0266	1.218	0.17	0.886	0.3133	0.744
0.03	1.171	0.1733	0.886	0.3166	0.744
0.0333	1.155	0.1766	0.87	0.32	0.744
0.0366	1.202	0.18	0.87	0.3233	0.744
0.04	1.202	0.1833	0.87	0.3266	0.728
0.0433	1.139	0.1866	0.87	0.33	0.728
0.0466	1.139	0.19	0.854	0.3333	0.728
0.05	1.123	0.1933	0.854	0.35	0.728
0.0533	1.06	0.1966	0.854	0.3666	0.712
0.0566	1.076	0.2	0.854	0.3833	0.696
0.06	0.838	0.2033	0.838	0.4	0.68
0.0633	0.965	0.2066	0.838	0.4166	0.68
0.0666	1.108	0.21	0.838	0.4333	0.664
0.07	1.076	0.2133	0.838	0.45	0.649
0.0733	1.028	0.2166	0.823	0.4666	0.649
0.0766	1.06	0.22	0.823	0.4833	0.633
0.08	1.013	0.2233	0.823	0.5	0.617
0.0833	1.013	0.2266	0.823	0.5166	0.617
0.0866	1.013	0.23	0.823	0.5333	0.601
0.09	1.013	0.2333	0.807	0.55	0.601
0.0933	0.997	0.2366	0.807	0.5666	0.585
0.0966	0.981	0.24	0.807	0.5833	0.569
0.1	0.981	0.2433	0.807	0.6	0.569
0.1033	0.981	0.2466	0.807	0.6166	0.553
0.1066	0.965	0.25	0.807	0.6333	0.553
0.11	0.965	0.2533	0.791	0.65	0.538
0.1133	0.965	0.2566	0.791	0.6666	0.538
0.1166	0.949	0.26	0.791	0.6833	0.538
0.12	0.949	0.2633	0.791	0.7	0.522
0.1233	0.933	0.2666	0.791	0.7166	0.522
0.1266	0.933	0.27	0.775	0.7333	0.506
0.13	0.933	0.2733	0.775	0.75	0.506
0.1333	0.933	0.2766	0.775	0.7666	0.49
0.1366	0.918	0.28	0.775	0.7833	0.49
0.14	0.918	0.2833	0.775	0.8	0.49

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 11GW109
Slug-Out Test March 5, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0.8166	0.474	2.8	0.174	6.8	0.063
0.8333	0.474	3	0.174	7	0.063
0.85	0.474	3.2	0.158	7.2	0.063
0.8666	0.459	3.4	0.142	7.4	0.063
0.8833	0.459	3.6	0.142	7.6	0.063
0.9	0.459	3.8	0.126	7.8	0.063
0.9166	0.443	4	0.126	8	0.063
0.9333	0.443	4.2	0.11	8.2	0.063
0.95	0.443	4.4	0.11	8.4	0.063
0.9666	0.427	4.6	0.11	8.6	0.063
0.9833	0.427	4.8	0.095	8.8	0.047
1	0.427	5	0.095	9	0.047
1.2	0.364	5.2	0.095	9.2	0.047
1.4	0.316	5.4	0.095	9.4	0.047
1.6	0.3	5.6	0.079	9.6	0.047
1.8	0.269	5.8	0.079	9.8	0.047
2	0.253	6	0.079	10	0.047
2.2	0.221	6.2	0.079	12	0.047
2.4	0.205	6.4	0.079	14	0.047
2.6	0.189	6.6	0.079		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\109OUT.AQT
Date: 05/07/99 Time: 13:31:18

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW109 Slug Out Test
Test Date: March 5, 1999

AQUIFER DATA

Saturated Thickness: 136.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 3.007 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 42.05 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

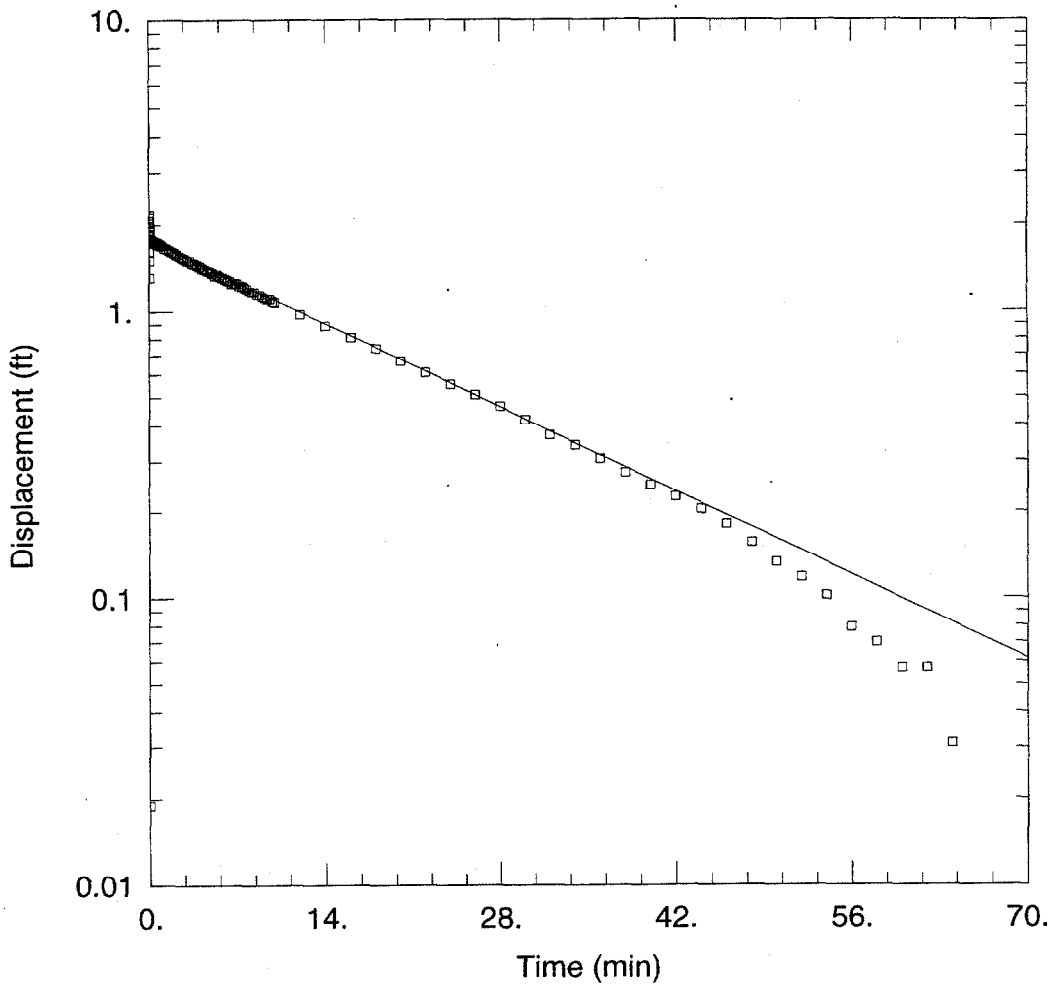
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.912E-05 ft/sec
y0 = 0.7738 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW110
Slug-In Test March 7, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.003	0.3833	-1.732	2.2	-1.566
0.0083	-0.019	0.4	-1.732	2.4	-1.547
0.0166	-2.156	0.4166	-1.729	2.6	-1.531
0.025	-1.837	0.4333	-1.732	2.8	-1.518
0.0333	-1.314	0.45	-1.735	3	-1.499
0.0416	-1.614	0.4666	-1.732	3.2	-1.496
0.05	-2.121	0.4833	-1.732	3.4	-1.474
0.0583	-2.022	0.5	-1.722	3.6	-1.461
0.0666	-1.499	0.5166	-1.726	3.8	-1.451
0.075	-1.818	0.5333	-1.729	4	-1.432
0.0833	-1.866	0.55	-1.726	4.2	-1.413
0.0916	-1.754	0.5666	-1.726	4.4	-1.4
0.1	-2.061	0.5833	-1.719	4.6	-1.384
0.1083	-1.844	0.6	-1.719	4.8	-1.378
0.1166	-1.959	0.6166	-1.716	5	-1.362
0.125	-1.78	0.6333	-1.716	5.2	-1.333
0.1333	-1.908	0.65	-1.713	5.4	-1.343
0.1416	-1.789	0.6666	-1.706	5.6	-1.327
0.15	-1.754	0.6833	-1.713	5.8	-1.314
0.1583	-1.758	0.7	-1.71	6	-1.301
0.1666	-1.754	0.7166	-1.713	6.2	-1.288
0.175	-1.761	0.7333	-1.706	6.4	-1.276
0.1833	-1.751	0.75	-1.703	6.6	-1.25
0.1916	-1.754	0.7666	-1.703	6.8	-1.257
0.2	-1.754	0.7833	-1.703	7	-1.247
0.2083	-1.751	0.8	-1.697	7.2	-1.228
0.2166	-1.751	0.8166	-1.703	7.4	-1.221
0.225	-1.748	0.8333	-1.697	7.6	-1.209
0.2333	-1.758	0.85	-1.697	7.8	-1.199
0.2416	-1.758	0.8666	-1.697	8	-1.177
0.25	-1.758	0.8833	-1.691	8.2	-1.167
0.2583	-1.754	0.9	-1.691	8.4	-1.17
0.2666	-1.754	0.9166	-1.691	8.6	-1.148
0.275	-1.751	0.9333	-1.681	8.8	-1.145
0.2833	-1.751	0.95	-1.687	9	-1.126
0.2916	-1.751	0.9666	-1.681	9.2	-1.116
0.3	-1.748	0.9833	-1.684	9.4	-1.1
0.3083	-1.745	1	-1.681	9.6	-1.103
0.3166	-1.748	1.2	-1.655	9.8	-1.084
0.325	-1.748	1.4	-1.643	10	-1.075
0.3333	-1.735	1.6	-1.624	12	-0.976
0.35	-1.735	1.8	-1.604	14	-0.89
0.3666	-1.732	2	-1.585	16	-0.81

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 11GW110
Slug-In Test March 7, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	-0.74	34	-0.341	50	-0.133
20	-0.669	36	-0.306	52	-0.118
22	-0.609	38	-0.274	54	-0.102
24	-0.555	40	-0.248	56	-0.079
26	-0.51	42	-0.226	58	-0.07
28	-0.465	44	-0.204	60	-0.057
30	-0.417	46	-0.181	62	-0.057
32	-0.37	48	-0.156	64	-0.031



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\110IN.AQT
Date: 05/07/99 Time: 13:31:55

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW110 Slug In Test
Test Date: March 7, 1999

AQUIFER DATA

Saturated Thickness: 124.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.156 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 50.81 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

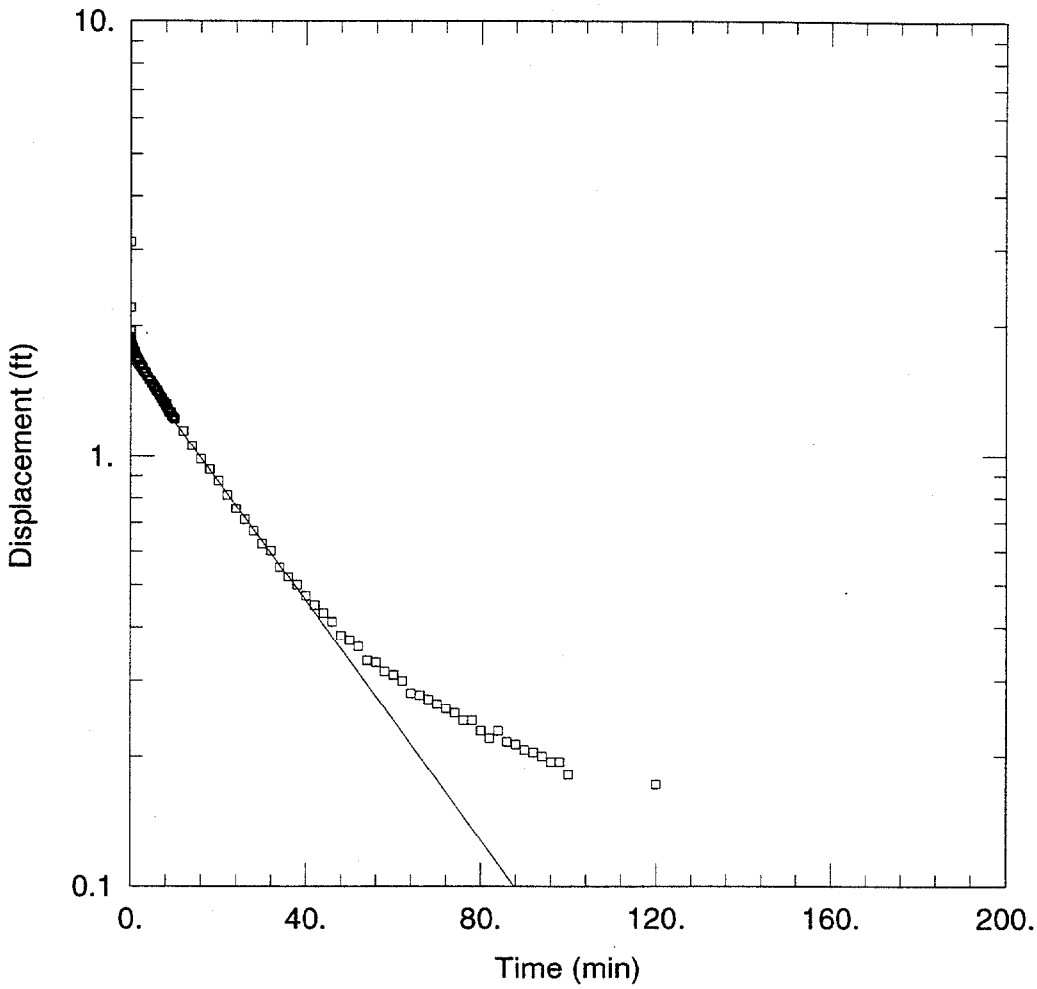
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.635E-06 ft/sec
y0 = 1.776 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW110
Slug-Out Test March 7, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	3.144	0.3833	1.792	2.2	1.636
0.0083	2.216	0.4	1.792	2.4	1.626
0.0166	1.869	0.4166	1.786	2.6	1.61
0.025	1.888	0.4333	1.789	2.8	1.61
0.0333	1.859	0.45	1.789	3	1.582
0.0416	1.945	0.4666	1.779	3.2	1.575
0.05	1.878	0.4833	1.776	3.4	1.569
0.0583	1.849	0.5	1.776	3.6	1.566
0.0666	1.837	0.5166	1.776	3.8	1.534
0.075	1.856	0.5333	1.77	4	1.527
0.0833	1.821	0.55	1.773	4.2	1.508
0.0916	1.853	0.5666	1.763	4.4	1.508
0.1	1.814	0.5833	1.767	4.6	1.499
0.1083	1.83	0.6	1.763	4.8	1.476
0.1166	1.824	0.6166	1.776	5	1.476
0.125	1.843	0.6333	1.76	5.2	1.457
0.1333	1.821	0.65	1.77	5.4	1.451
0.1416	1.827	0.6666	1.767	5.6	1.441
0.15	1.811	0.6833	1.77	5.8	1.419
0.1583	1.818	0.7	1.77	6	1.425
0.1666	1.792	0.7166	1.76	6.2	1.413
0.175	1.818	0.7333	1.757	6.4	1.4
0.1833	1.824	0.75	1.754	6.6	1.387
0.1916	1.824	0.7666	1.751	6.8	1.377
0.2	1.814	0.7833	1.754	7	1.365
0.2083	1.811	0.8	1.754	7.2	1.355
0.2166	1.808	0.8166	1.744	7.4	1.342
0.225	1.808	0.8333	1.741	7.6	1.336
0.2333	1.811	0.85	1.744	7.8	1.326
0.2416	1.805	0.8666	1.744	8	1.31
0.25	1.805	0.8833	1.738	8.2	1.323
0.2583	1.805	0.9	1.735	8.4	1.291
0.2666	1.802	0.9166	1.751	8.6	1.275
0.275	1.798	0.9333	1.741	8.8	1.266
0.2833	1.808	0.95	1.744	9	1.263
0.2916	1.802	0.9666	1.744	9.2	1.266
0.3	1.808	0.9833	1.744	9.4	1.243
0.3083	1.805	1	1.728	9.6	1.234
0.3166	1.802	1.2	1.709	9.8	1.231
0.325	1.805	1.4	1.696	10	1.221
0.3333	1.808	1.6	1.677	12	1.145
0.35	1.808	1.8	1.671	14	1.059
0.3666	1.798	2	1.652	16	0.985

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 11GW110
Slug-Out Test March 7, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	0.934	48	0.382	78	0.242
20	0.877	50	0.373	80	0.229
22	0.813	52	0.36	82	0.22
24	0.755	54	0.334	84	0.229
26	0.711	56	0.331	86	0.216
28	0.669	58	0.315	88	0.213
30	0.625	60	0.309	90	0.207
32	0.602	62	0.299	92	0.204
34	0.551	64	0.28	94	0.2
36	0.523	66	0.277	96	0.194
38	0.5	68	0.271	98	0.194
40	0.472	70	0.264	100	0.181
42	0.449	72	0.258	120	0.172
44	0.43	74	0.252		
46	0.411	76	0.242		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\110OUT.AQT
Date: 05/07/99 Time: 13:32:26

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW110 Slug Out Test
Test Date: March 7, 1999

AQUIFER DATA

Saturated Thickness: 124.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 3.144 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 50.81 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

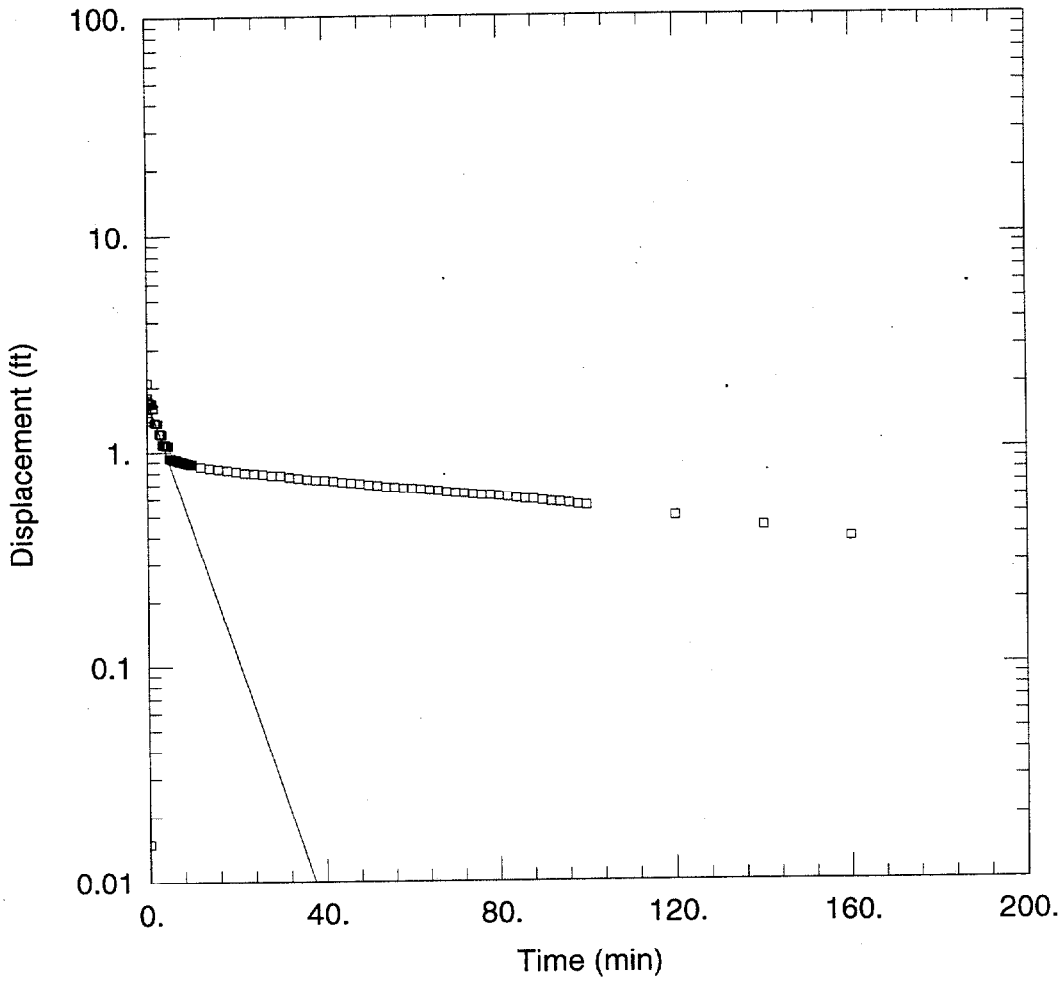
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.09E-06 ft/sec
y0 = 1.654 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW111
Slug-In Test March 7, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.015	0.3833	-1.692	2.2	-1.36
0.0083	0	0.4	-1.701	2.4	-1.363
0.0166	-0.015	0.4166	-1.695	2.6	-1.22
0.025	-15.451	0.4333	-1.698	2.8	-1.217
0.0333	-1.418	0.45	-1.698	3	-1.214
0.0416	-1.465	0.4666	-1.695	3.2	-1.21
0.05	-2.1	0.4833	-1.698	3.4	-1.086
0.0583	-1.759	0.5	-1.695	3.6	-1.083
0.0666	-1.8	0.5166	-1.695	3.8	-1.08
0.075	-1.727	0.5333	-1.689	4	-1.086
0.0833	-1.717	0.55	-1.695	4.2	-1.077
0.0916	-1.717	0.5666	-1.695	4.4	-1.073
0.1	-1.72	0.5833	-1.695	4.6	-1.07
0.1083	-1.717	0.6	-1.695	4.8	-1.07
0.1166	-1.714	0.6166	-1.692	5	-0.936
0.125	-1.714	0.6333	-1.695	5.2	-0.936
0.1333	-1.714	0.65	-1.695	5.4	-0.936
0.1416	-1.714	0.6666	-1.695	5.6	-0.927
0.15	-1.714	0.6833	-1.695	5.8	-0.924
0.1583	-1.711	0.7	-1.695	6	-0.927
0.1666	-1.714	0.7166	-1.685	6.2	-0.92
0.175	-1.711	0.7333	-1.692	6.4	-0.927
0.1833	-1.711	0.75	-1.692	6.6	-0.917
0.1916	-1.705	0.7666	-1.692	6.8	-0.917
0.2	-1.708	0.7833	-1.692	7	-0.908
0.2083	-1.711	0.8	-1.692	7.2	-0.908
0.2166	-1.708	0.8166	-1.692	7.4	-0.901
0.225	-1.698	0.8333	-1.689	7.6	-0.901
0.2333	-1.705	0.85	-1.692	7.8	-0.905
0.2416	-1.708	0.8666	-1.689	8	-0.898
0.25	-1.708	0.8833	-1.689	8.2	-0.895
0.2583	-1.705	0.9	-1.689	8.4	-0.895
0.2666	-1.701	0.9166	-1.689	8.6	-0.889
0.275	-1.705	0.9333	-1.685	8.8	-0.889
0.2833	-1.698	0.95	-1.682	9	-0.885
0.2916	-1.705	0.9666	-1.685	9.2	-0.882
0.3	-1.705	0.9833	-1.689	9.4	-0.879
0.3083	-1.705	1	-1.685	9.6	-0.879
0.3166	-1.701	1.2	-1.618	9.8	-0.873
0.325	-1.701	1.4	-1.603	10	-0.879
0.3333	-1.701	1.6	-1.373	12	-0.854
0.35	-1.692	1.8	-1.376	14	-0.838
0.3666	-1.692	2	-1.36	16	-0.831

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 11GW111
Slug-In Test March 7, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	-0.818	48	-0.701	78	-0.615
20	-0.809	50	-0.691	80	-0.608
22	-0.793	52	-0.685	82	-0.602
24	-0.79	54	-0.675	84	-0.595
26	-0.783	56	-0.672	86	-0.589
28	-0.774	58	-0.666	88	-0.586
30	-0.771	60	-0.662	90	-0.579
32	-0.758	62	-0.656	92	-0.57
34	-0.748	64	-0.65	94	-0.567
36	-0.739	66	-0.646	96	-0.56
38	-0.732	68	-0.637	98	-0.551
40	-0.729	70	-0.63	100	-0.548
42	-0.723	72	-0.627	120	-0.49
44	-0.713	74	-0.621	140	-0.439
46	-0.707	76	-0.615	160	-0.388



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\111IN.AQT
Date: 05/10/99 Time: 15:02:50

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW111 Slug In Test
Test Date: March 7, 1999

AQUIFER DATA

Saturated Thickness: 11.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.1 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 11.98 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.162E-05 ft/sec
y0 = 1.756 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW111
Slug-Out Test March 8, 1999

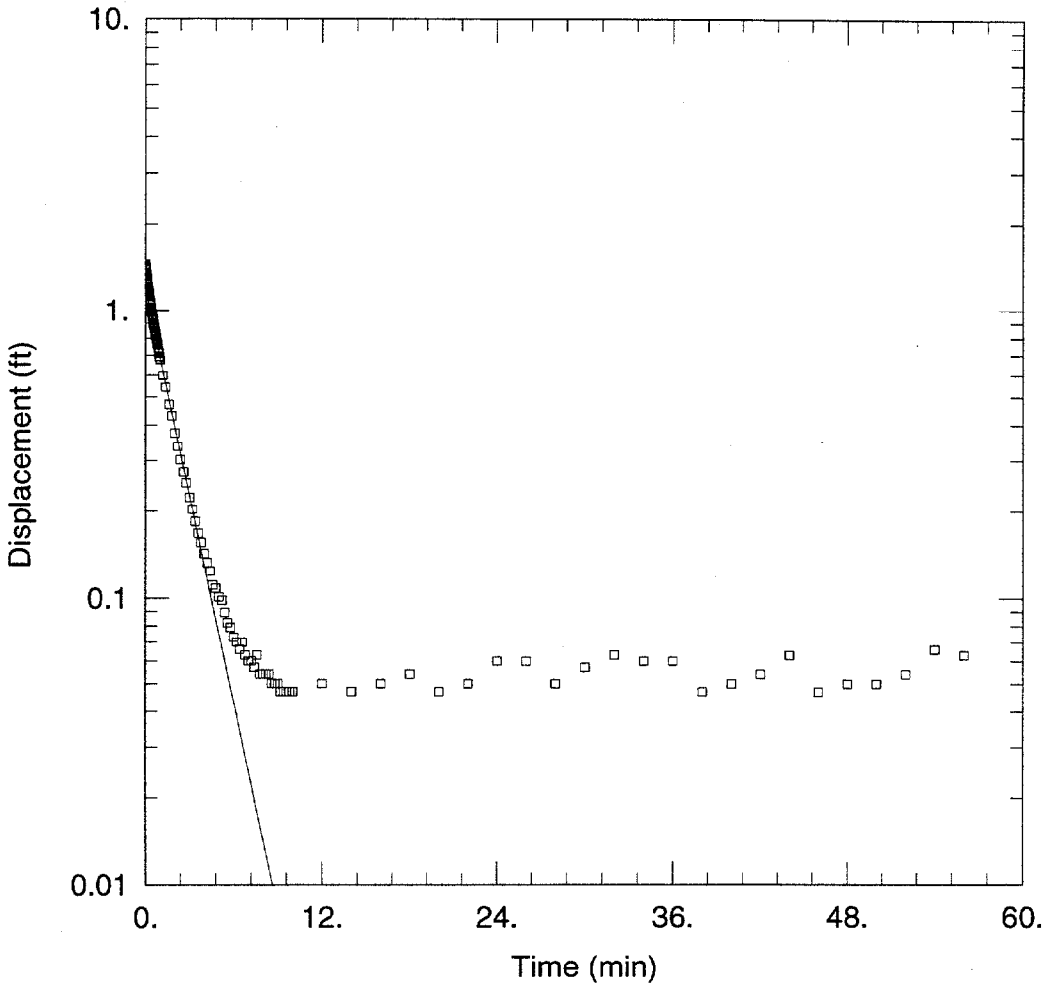
Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.446	0.3833	1.006	2.2	0.337
0.0083	1.43	0.4	0.997	2.4	0.302
0.0166	1.42	0.4166	0.984	2.6	0.274
0.025	1.411	0.4333	0.981	2.8	0.251
0.0333	1.395	0.45	0.968	3	0.223
0.0416	1.379	0.4666	0.959	3.2	0.203
0.05	1.357	0.4833	0.946	3.4	0.184
0.0583	1.35	0.5	0.933	3.6	0.168
0.0666	1.334	0.5166	0.923	3.8	0.156
0.075	1.328	0.5333	0.917	4	0.143
0.0833	1.309	0.55	0.898	4.2	0.133
0.0916	1.293	0.5666	0.888	4.4	0.124
0.1	1.287	0.5833	0.882	4.6	0.111
0.1083	1.277	0.6	0.866	4.8	0.108
0.1166	1.264	0.6166	0.866	5	0.101
0.125	1.255	0.6333	0.847	5.2	0.098
0.1333	1.248	0.65	0.841	5.4	0.089
0.1416	1.242	0.6666	0.831	5.6	0.082
0.15	1.233	0.6833	0.831	5.8	0.079
0.1583	1.21	0.7	0.815	6	0.073
0.1666	1.201	0.7166	0.809	6.2	0.07
0.175	1.191	0.7333	0.796	6.4	0.066
0.1833	1.191	0.75	0.799	6.6	0.07
0.1916	1.182	0.7666	0.78	6.8	0.063
0.2	1.166	0.7833	0.771	7	0.06
0.2083	1.166	0.8	0.767	7.2	0.06
0.2166	1.156	0.8166	0.767	7.4	0.057
0.225	1.15	0.8333	0.758	7.6	0.063
0.2333	1.14	0.85	0.745	7.8	0.054
0.2416	1.134	0.8666	0.742	8	0.054
0.25	1.124	0.8833	0.736	8.2	0.054
0.2583	1.115	0.9	0.716	8.4	0.054
0.2666	1.115	0.9166	0.71	8.6	0.05
0.275	1.096	0.9333	0.713	8.8	0.05
0.2833	1.099	0.95	0.694	9	0.05
0.2916	1.089	0.9666	0.691	9.2	0.047
0.3	1.083	0.9833	0.681	9.4	0.047
0.3083	1.076	1	0.675	9.6	0.047
0.3166	1.07	1.2	0.595	9.8	0.047
0.325	1.057	1.4	0.541	10	0.047
0.3333	1.048	1.6	0.471	12	0.05
0.35	1.045	1.8	0.43	14	0.047
0.3666	1.019	2	0.375	16	0.05

SLUG TEST DATA CONT

NSWC White Oak Monitoring Well 11GW111

Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	0.054	32	0.063	46	0.047
20	0.047	34	0.06	48	0.05
22	0.05	36	0.06	50	0.05
24	0.06	38	0.047	52	0.054
26	0.06	40	0.05	54	0.066
28	0.05	42	0.054	56	0.063
30	0.057	44	0.063		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\111OUT.AQT
Date: 05/07/99 Time: 13:48:08

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW111 Slug Out Test
Test Date: March 8, 1999

AQUIFER DATA

Saturated Thickness: 11.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.446 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 11.98 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

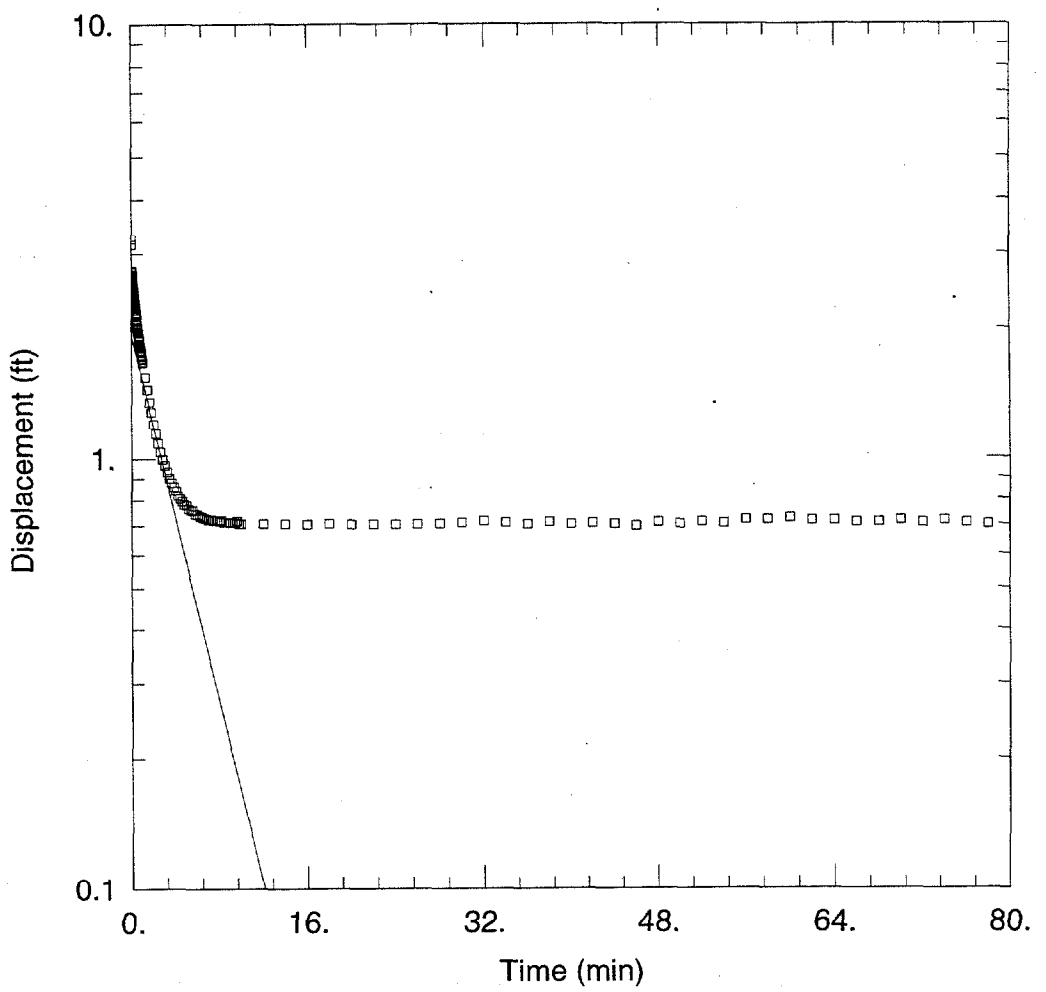
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.658E-05 ft/sec
y0 = 1.19 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 11GW111
Second Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.303	0.3833	2.192	2.2	1.143
0.0083	3.157	0.4	2.179	2.4	1.086
0.0166	3.259	0.4166	2.157	2.6	1.038
0.025	2.743	0.4333	2.144	2.8	0.997
0.0333	2.739	0.45	2.118	3	0.965
0.0416	2.724	0.4666	2.099	3.2	0.933
0.05	2.698	0.4833	2.09	3.4	0.904
0.0583	2.685	0.5	2.074	3.6	0.882
0.0666	2.669	0.5166	2.051	3.8	0.863
0.075	2.653	0.5333	2.032	4	0.844
0.0833	2.638	0.55	2.026	4.2	0.822
0.0916	2.622	0.5666	2.01	4.4	0.809
0.1	2.599	0.5833	1.985	4.6	0.796
0.1083	2.587	0.6	1.981	4.8	0.783
0.1166	2.571	0.6166	1.965	5	0.78
0.125	2.558	0.6333	1.94	5.2	0.764
0.1333	2.539	0.65	1.937	5.4	0.758
0.1416	2.526	0.6666	1.921	5.6	0.761
0.15	2.516	0.6833	1.908	5.8	0.745
0.1583	2.501	0.7	1.895	6	0.742
0.1666	2.491	0.7166	1.883	6.2	0.736
0.175	2.475	0.7333	1.863	6.4	0.732
0.1833	2.466	0.75	1.857	6.6	0.729
0.1916	2.446	0.7666	1.841	6.8	0.726
0.2	2.44	0.7833	1.832	7	0.723
0.2083	2.418	0.8	1.819	7.2	0.723
0.2166	2.408	0.8166	1.8	7.4	0.72
0.225	2.402	0.8333	1.793	7.6	0.72
0.2333	2.392	0.85	1.781	7.8	0.72
0.2416	2.373	0.8666	1.771	8	0.716
0.25	2.367	0.8833	1.749	8.2	0.72
0.2583	2.357	0.9	1.746	8.4	0.713
0.2666	2.344	0.9166	1.736	8.6	0.713
0.275	2.335	0.9333	1.723	8.8	0.713
0.2833	2.319	0.95	1.711	9	0.71
0.2916	2.309	0.9666	1.698	9.2	0.71
0.3	2.303	0.9833	1.682	9.4	0.71
0.3083	2.281	1	1.672	9.6	0.716
0.3166	2.281	1.2	1.548	9.8	0.707
0.325	2.265	1.4	1.449	10	0.707
0.3333	2.258	1.6	1.357	12	0.707
0.35	2.236	1.8	1.284	14	0.707
0.3666	2.217	2	1.204	16	0.704

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 11GW111
Second Slug-Out Test March 8, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	0.707	40	0.704	62	0.716
20	0.704	42	0.707	64	0.716
22	0.704	44	0.704	66	0.71
24	0.704	46	0.697	68	0.71
26	0.704	48	0.71	70	0.716
28	0.707	50	0.704	72	0.707
30	0.71	52	0.713	74	0.716
32	0.716	54	0.707	76	0.707
34	0.71	56	0.72	78	0.701
36	0.704	58	0.72		
38	0.713	60	0.726		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE11~1\GRAPHS\111A.AQT
Date: 05/07/99 Time: 13:36:04

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 11GW111 Second Slug Out Test
Test Date: March 8, 1999

AQUIFER DATA

Saturated Thickness: 11.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 3.259 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 11.98 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

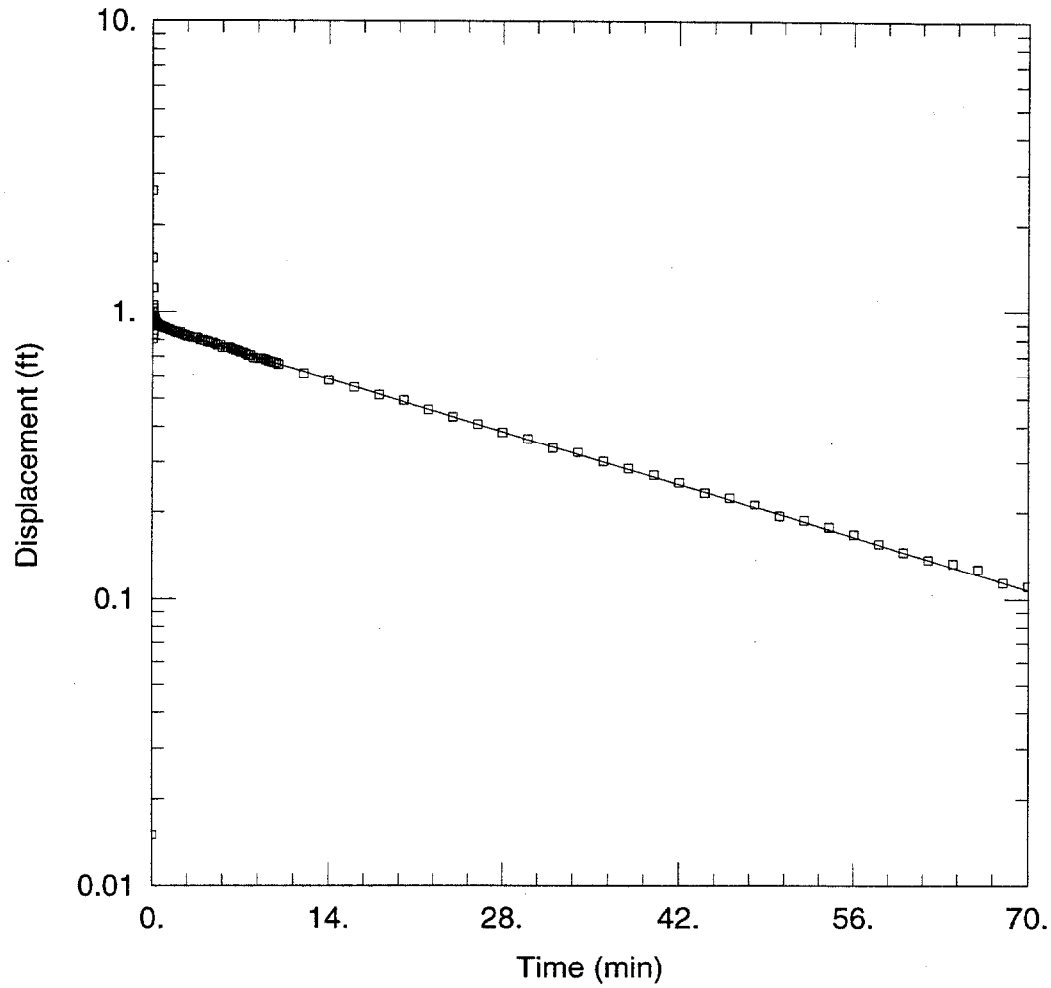
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.066E-05 ft/sec
y0 = 1.928 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 13GW02
Slug-In Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.009	0.3833	-0.905	2.2	-0.848
0.0083	-0.015	0.4	-0.902	2.4	-0.835
0.0166	-1.53	0.4166	-0.899	2.6	-0.828
0.025	-2.614	0.4333	-0.899	2.8	-0.822
0.0333	-1.055	0.45	-0.899	3	-0.819
0.0416	-1.208	0.4666	-0.899	3.2	-0.813
0.05	-0.806	0.4833	-0.895	3.4	-0.813
0.0583	-1.001	0.5	-0.895	3.6	-0.809
0.0666	-1.208	0.5166	-0.895	3.8	-0.797
0.075	-0.832	0.5333	-0.892	4	-0.797
0.0833	-0.972	0.55	-0.892	4.2	-0.793
0.0916	-1.026	0.5666	-0.892	4.4	-0.787
0.1	-0.931	0.5833	-0.892	4.6	-0.781
0.1083	-0.943	0.6	-0.892	4.8	-0.781
0.1166	-0.934	0.6166	-0.892	5	-0.774
0.125	-0.959	0.6333	-0.889	5.2	-0.765
0.1333	-0.921	0.65	-0.889	5.4	-0.765
0.1416	-0.969	0.6666	-0.889	5.6	-0.752
0.15	-0.94	0.6833	-0.886	5.8	-0.752
0.1583	-0.927	0.7	-0.886	6	-0.752
0.1666	-0.946	0.7166	-0.886	6.2	-0.749
0.175	-0.931	0.7333	-0.886	6.4	-0.742
0.1833	-0.927	0.75	-0.886	6.6	-0.736
0.1916	-0.934	0.7666	-0.883	6.8	-0.733
0.2	-0.924	0.7833	-0.883	7	-0.726
0.2083	-0.924	0.8	-0.88	7.2	-0.723
0.2166	-0.924	0.8166	-0.88	7.4	-0.717
0.225	-0.921	0.8333	-0.883	7.6	-0.707
0.2333	-0.918	0.85	-0.88	7.8	-0.707
0.2416	-0.918	0.8666	-0.883	8	-0.695
0.25	-0.918	0.8833	-0.88	8.2	-0.691
0.2583	-0.915	0.9	-0.88	8.4	-0.691
0.2666	-0.911	0.9166	-0.88	8.6	-0.691
0.275	-0.915	0.9333	-0.88	8.8	-0.688
0.2833	-0.911	0.95	-0.88	9	-0.682
0.2916	-0.911	0.9666	-0.876	9.2	-0.675
0.3	-0.911	0.9833	-0.876	9.4	-0.672
0.3083	-0.908	1	-0.876	9.6	-0.669
0.3166	-0.908	1.2	-0.87	9.8	-0.666
0.325	-0.908	1.4	-0.864	10	-0.659
0.3333	-0.908	1.6	-0.857	12	-0.612
0.35	-0.908	1.8	-0.851	14	-0.58
0.3666	-0.905	2	-0.844	16	-0.548

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 13GW02
Slug-In Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	-0.516	36	-0.302	54	-0.178
20	-0.494	38	-0.286	56	-0.168
22	-0.459	40	-0.271	58	-0.156
24	-0.433	42	-0.255	60	-0.146
26	-0.408	44	-0.235	62	-0.137
28	-0.382	46	-0.226	64	-0.133
30	-0.363	48	-0.213	66	-0.127
32	-0.337	50	-0.194	68	-0.114
34	-0.325	52	-0.188	70	-0.111



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE13~1\GRAPHS\02IN.AQT
Date: 05/07/99 Time: 13:49:44

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 13GW02 Slug In Test
Test Date: March 3, 1999

AQUIFER DATA

Saturated Thickness: 24.38 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.614 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 14.46 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

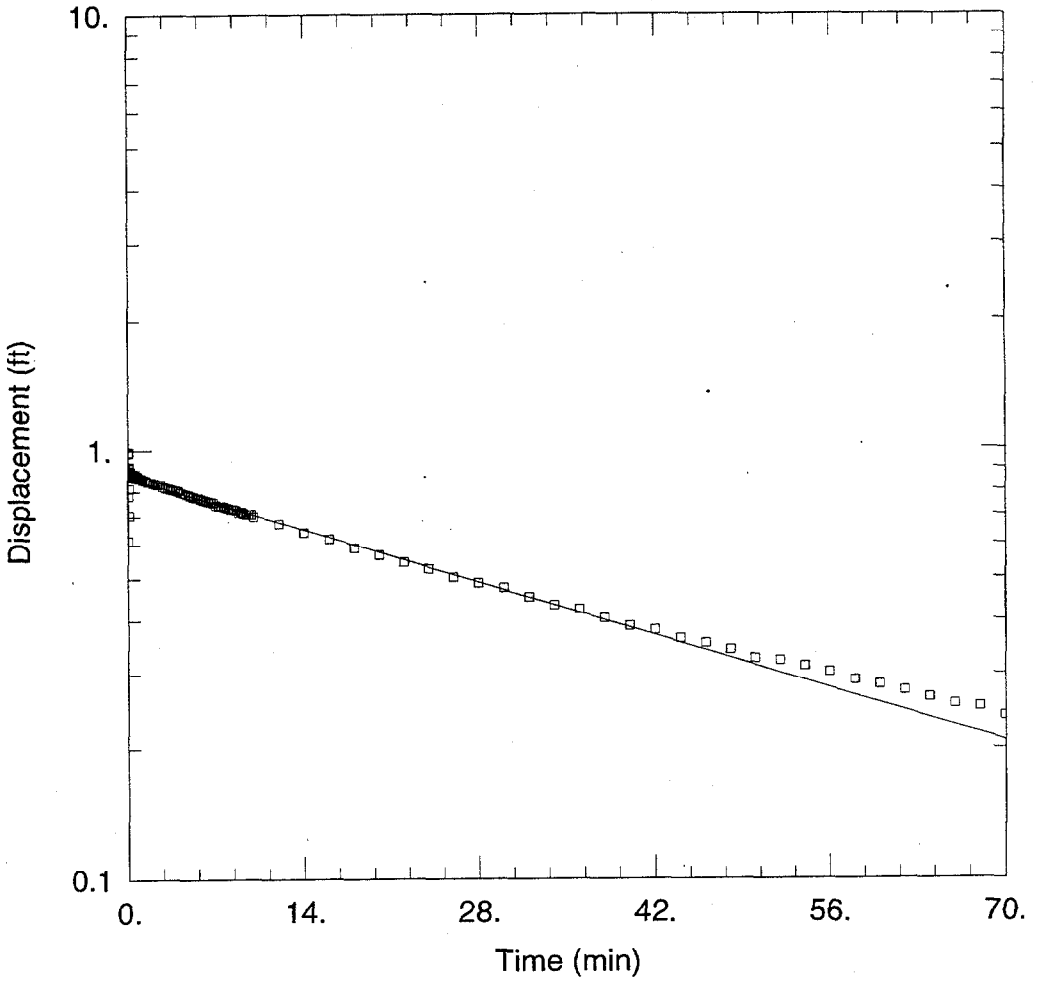
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.267E-06 ft/sec
y0 = 0.8937 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 13GW02
Slug-Out Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	4.875	0.3833	0.873	2.2	0.835
0.0083	0.985	0.4	0.873	2.4	0.832
0.0166	0.615	0.4166	0.87	2.6	0.832
0.025	2.237	0.4333	0.873	2.8	0.822
0.0333	-0.264	0.45	0.87	3	0.819
0.0416	1.354	0.4666	0.876	3.2	0.816
0.05	0.991	0.4833	0.87	3.4	0.812
0.0583	0.908	0.5	0.873	3.6	0.809
0.0666	0.899	0.5166	0.873	3.8	0.806
0.075	0.781	0.5333	0.87	4	0.803
0.0833	0.911	0.55	0.867	4.2	0.797
0.0916	0.704	0.5666	0.873	4.4	0.793
0.1	0.918	0.5833	0.867	4.6	0.79
0.1083	0.816	0.6	0.87	4.8	0.787
0.1166	0.895	0.6166	0.863	5	0.781
0.125	0.889	0.6333	0.873	5.2	0.777
0.1333	0.87	0.65	0.867	5.4	0.774
0.1416	0.895	0.6666	0.863	5.6	0.774
0.15	0.87	0.6833	0.867	5.8	0.768
0.1583	0.892	0.7	0.867	6	0.765
0.1666	0.879	0.7166	0.863	6.2	0.761
0.175	0.886	0.7333	0.87	6.4	0.758
0.1833	0.883	0.75	0.863	6.6	0.755
0.1916	0.879	0.7666	0.863	6.8	0.752
0.2	0.883	0.7833	0.863	7	0.742
0.2083	0.879	0.8	0.863	7.2	0.739
0.2166	0.883	0.8166	0.863	7.4	0.739
0.225	0.876	0.8333	0.863	7.6	0.736
0.2333	0.879	0.85	0.863	7.8	0.733
0.2416	0.879	0.8666	0.863	8	0.73
0.25	0.876	0.8833	0.863	8.2	0.726
0.2583	0.879	0.9	0.86	8.4	0.726
0.2666	0.876	0.9166	0.86	8.6	0.723
0.275	0.879	0.9333	0.86	8.8	0.714
0.2833	0.876	0.95	0.86	9	0.717
0.2916	0.876	0.9666	0.86	9.2	0.71
0.3	0.876	0.9833	0.86	9.4	0.707
0.3083	0.873	1	0.86	9.6	0.707
0.3166	0.876	1.2	0.854	9.8	0.707
0.325	0.876	1.4	0.851	10	0.698
0.3333	0.876	1.6	0.844	12	0.672
0.35	0.876	1.8	0.844	14	0.64
0.3666	0.883	2	0.838	16	0.618

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 13GW02
Slug-Out Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	0.589	36	0.424	54	0.312
20	0.567	38	0.404	56	0.302
22	0.545	40	0.388	58	0.29
24	0.526	42	0.379	60	0.283
26	0.503	44	0.363	62	0.274
28	0.487	46	0.353	64	0.264
30	0.475	48	0.341	66	0.255
32	0.452	50	0.325	68	0.251
34	0.433	52	0.322	70	0.239



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE13~1\GRAPHS\02OUT.AQT
Date: 05/07/99 Time: 13:49:55

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 13GW02 Slug Out Test
Test Date: March 3, 1999

AQUIFER DATA

Saturated Thickness: 24.38 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 0.991 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 14.46 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

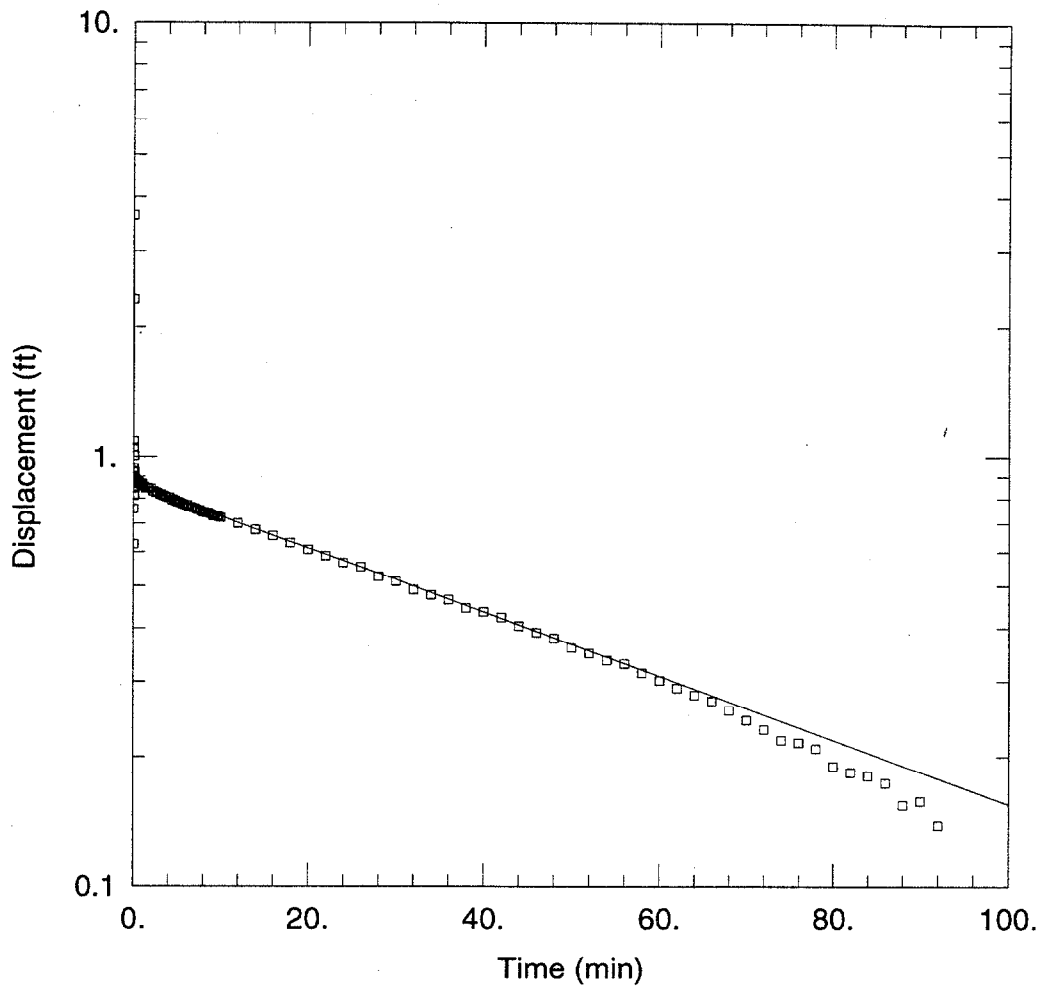
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.516E-06 ft/sec
y0 = 0.8627 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 13GW03
Slug-In Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-2.689	0.3833	-0.87	2.2	-0.832
0.0083	-3.636	0.4	-0.874	2.4	-0.832
0.0166	-2.323	0.4166	-0.877	2.6	-0.826
0.025	-0.756	0.4333	-0.87	2.8	-0.826
0.0333	-0.928	0.45	-0.874	3	-0.819
0.0416	-0.94	0.4666	-0.877	3.2	-0.819
0.05	-1.093	0.4833	-0.87	3.4	-0.813
0.0583	-0.626	0.5	-0.867	3.6	-0.81
0.0666	-1.055	0.5166	-0.867	3.8	-0.807
0.075	-0.883	0.5333	-0.874	4	-0.804
0.0833	-0.813	0.55	-0.87	4.2	-0.804
0.0916	-1.004	0.5666	-0.87	4.4	-0.794
0.1	-0.819	0.5833	-0.87	4.6	-0.797
0.1083	-0.905	0.6	-0.867	4.8	-0.791
0.1166	-0.921	0.6166	-0.867	5	-0.785
0.125	-0.845	0.6333	-0.87	5.2	-0.785
0.1333	-0.924	0.65	-0.874	5.4	-0.781
0.1416	-0.88	0.6666	-0.87	5.6	-0.778
0.15	-0.883	0.6833	-0.87	5.8	-0.775
0.1583	-0.905	0.7	-0.87	6	-0.772
0.1666	-0.874	0.7166	-0.864	6.2	-0.772
0.175	-0.896	0.7333	-0.87	6.4	-0.765
0.1833	-0.886	0.75	-0.864	6.6	-0.765
0.1916	-0.88	0.7666	-0.867	6.8	-0.762
0.2	-0.889	0.7833	-0.867	7	-0.759
0.2083	-0.877	0.8	-0.867	7.2	-0.756
0.2166	-0.886	0.8166	-0.867	7.4	-0.753
0.225	-0.886	0.8333	-0.867	7.6	-0.753
0.2333	-0.88	0.85	-0.867	7.8	-0.746
0.2416	-0.883	0.8666	-0.867	8	-0.743
0.25	-0.883	0.8833	-0.867	8.2	-0.743
0.2583	-0.883	0.9	-0.867	8.4	-0.74
0.2666	-0.886	0.9166	-0.864	8.6	-0.74
0.275	-0.88	0.9333	-0.858	8.8	-0.737
0.2833	-0.88	0.95	-0.864	9	-0.734
0.2916	-0.88	0.9666	-0.864	9.2	-0.727
0.3	-0.88	0.9833	-0.864	9.4	-0.727
0.3083	-0.88	1	-0.867	9.6	-0.727
0.3166	-0.88	1.2	-0.854	9.8	-0.724
0.325	-0.88	1.4	-0.845	10	-0.721
0.3333	-0.877	1.6	-0.848	12	-0.699
0.35	-0.874	1.8	-0.845	14	-0.676
0.3666	-0.87	2	-0.845	16	-0.654

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 13GW03
Slug-In Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	-0.629	44	-0.403	70	-0.244
20	-0.607	46	-0.39	72	-0.232
22	-0.587	48	-0.378	74	-0.219
24	-0.565	50	-0.359	76	-0.216
26	-0.553	52	-0.349	78	-0.209
28	-0.524	54	-0.336	80	-0.19
30	-0.511	56	-0.33	82	-0.184
32	-0.489	58	-0.314	84	-0.181
34	-0.476	60	-0.301	86	-0.174
36	-0.464	62	-0.289	88	-0.155
38	-0.444	64	-0.279	90	-0.158
40	-0.435	66	-0.27	92	-0.139
42	-0.422	68	-0.257		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE13~1\GRAPHS\03IN.AQT
Date: 05/07/99 Time: 13:50:09

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 13GW03 Slug In Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 22.58 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 3.636 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 13.28 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

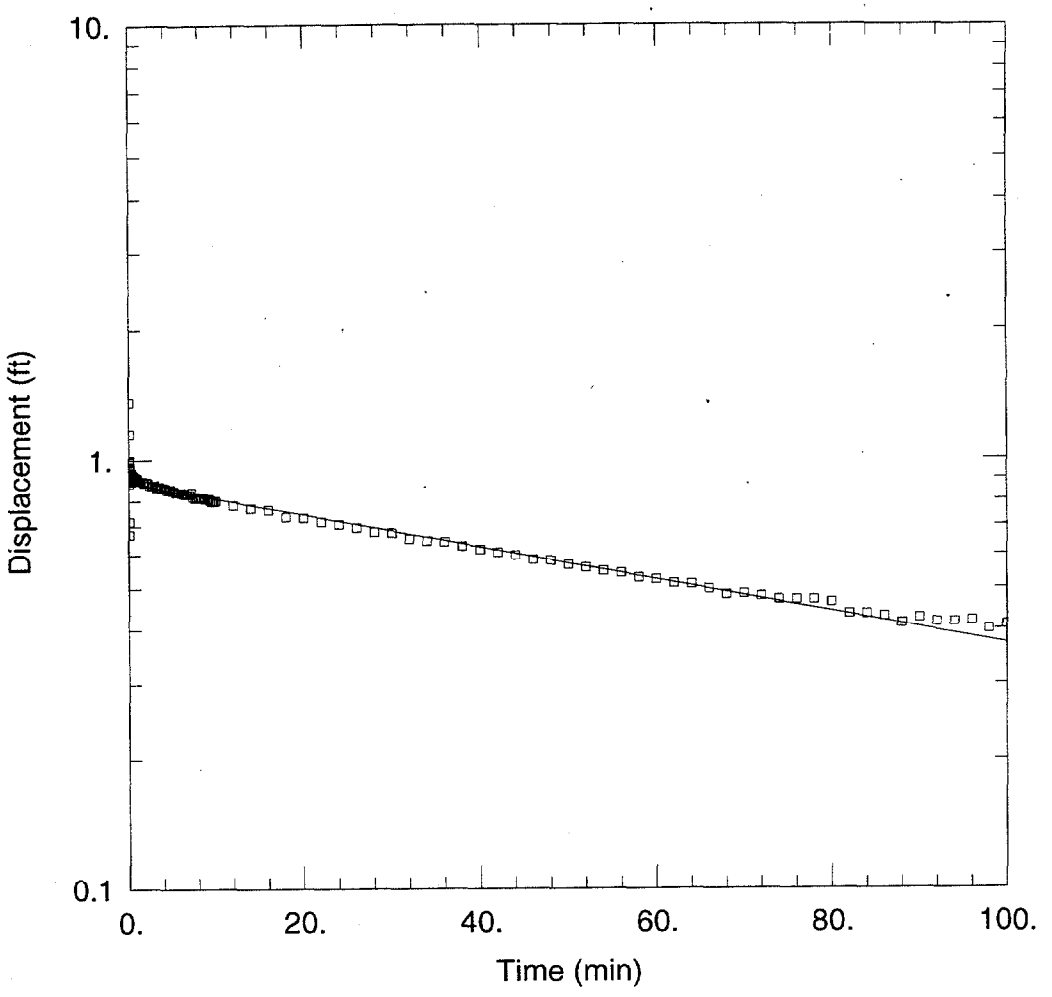
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.268E-06 ft/sec
y0 = 0.8631 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 13GW03
Slug-Out Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.175	0.3833	0.921	2.2	0.883
0.0083	4.326	0.4	0.915	2.4	0.873
0.0166	3.996	0.4166	0.912	2.6	0.87
0.025	0.67	0.4333	0.915	2.8	0.87
0.0333	1.363	0.45	0.921	3	0.873
0.0416	0.718	0.4666	0.915	3.2	0.861
0.05	1.15	0.4833	0.908	3.4	0.864
0.0583	0.88	0.5	0.902	3.6	0.864
0.0666	0.997	0.5166	0.902	3.8	0.858
0.075	0.966	0.5333	0.908	4	0.861
0.0833	0.927	0.55	0.899	4.2	0.858
0.0916	0.988	0.5666	0.896	4.4	0.848
0.1	0.902	0.5833	0.892	4.6	0.851
0.1083	0.991	0.6	0.902	4.8	0.854
0.1166	0.889	0.6166	0.899	5	0.845
0.125	0.962	0.6333	0.892	5.2	0.845
0.1333	0.896	0.65	0.902	5.4	0.838
0.1416	0.959	0.6666	0.915	5.6	0.838
0.15	0.892	0.6833	0.912	5.8	0.838
0.1583	0.95	0.7	0.902	6	0.838
0.1666	0.896	0.7166	0.908	6.2	0.835
0.175	0.937	0.7333	0.899	6.4	0.832
0.1833	0.902	0.75	0.899	6.6	0.829
0.1916	0.927	0.7666	0.899	6.8	0.829
0.2	0.905	0.7833	0.896	7	0.829
0.2083	0.921	0.8	0.896	7.2	0.838
0.2166	0.908	0.8166	0.892	7.4	0.819
0.225	0.918	0.8333	0.896	7.6	0.813
0.2333	0.918	0.85	0.896	7.8	0.819
0.2416	0.912	0.8666	0.899	8	0.816
0.25	0.912	0.8833	0.899	8.2	0.816
0.2583	0.908	0.9	0.899	8.4	0.813
0.2666	0.912	0.9166	0.899	8.6	0.813
0.275	0.908	0.9333	0.896	8.8	0.81
0.2833	0.931	0.95	0.908	9	0.81
0.2916	0.934	0.9666	0.896	9.2	0.81
0.3	0.931	0.9833	0.896	9.4	0.803
0.3083	0.918	1	0.902	9.6	0.797
0.3166	0.921	1.2	0.892	9.8	0.797
0.325	0.905	1.4	0.892	10	0.8
0.3333	0.931	1.6	0.889	12	0.781
0.35	0.931	1.8	0.883	14	0.769
0.3666	0.921	2	0.886	16	0.762

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 13GW03
Slug-Out Test March 4, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	0.734	46	0.584	74	0.47
20	0.73	48	0.581	76	0.47
22	0.715	50	0.568	78	0.47
24	0.705	52	0.559	80	0.463
26	0.692	54	0.549	82	0.435
28	0.676	56	0.543	84	0.435
30	0.673	58	0.53	86	0.429
32	0.651	60	0.524	88	0.413
34	0.645	62	0.514	90	0.425
36	0.641	64	0.511	92	0.416
38	0.626	66	0.498	94	0.416
40	0.616	68	0.483	96	0.419
42	0.606	70	0.486	98	0.4
44	0.597	72	0.479	100	0.409



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE13~1\GRAPHS\03OUT.AQT
Date: 05/07/99 Time: 13:50:18

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 13GW03 Slug Out Test
Test Date: March 4, 1999

AQUIFER DATA

Saturated Thickness: 22.58 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

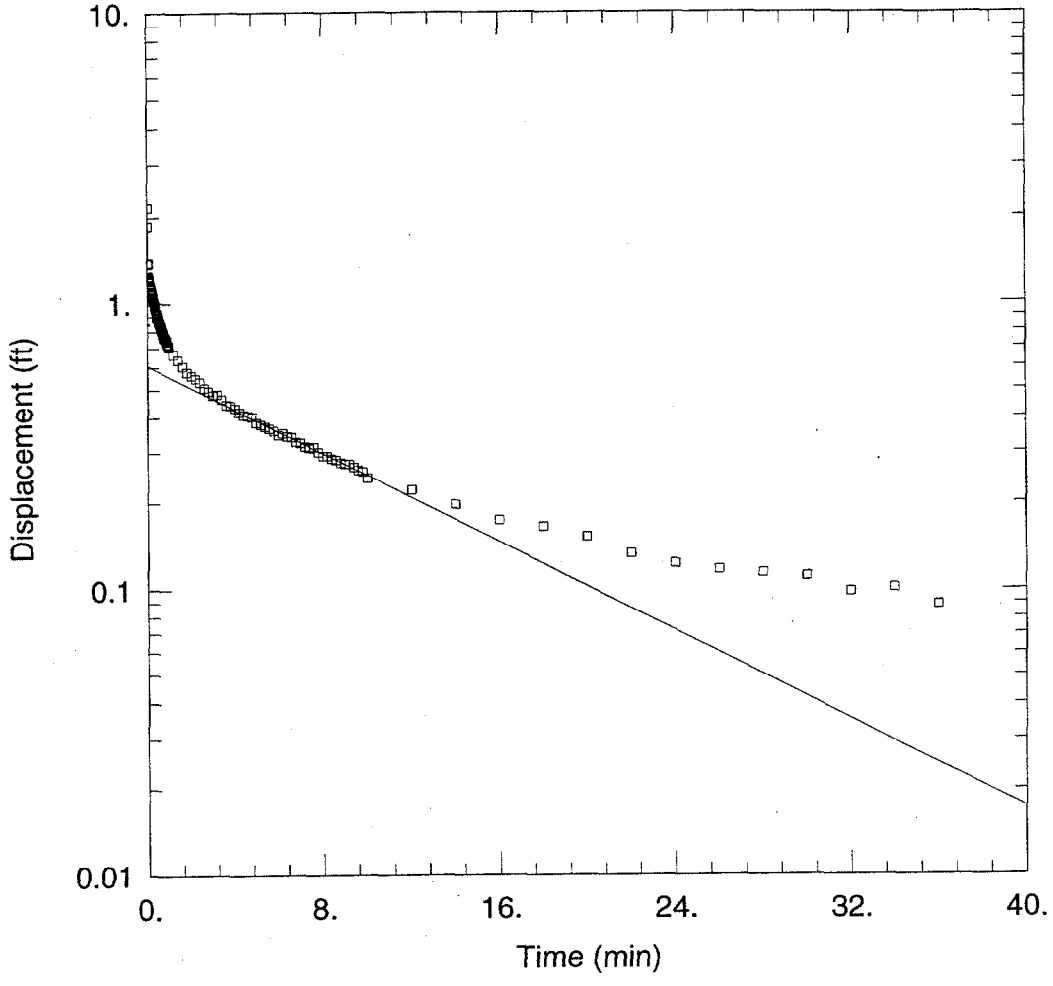
Initial Displacement: 1.363 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 13.28 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.407E-07 ft/sec
y0 = 0.883 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 13GW04
Slug-In Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	-0.019	0.45	-0.899	3.8	-0.441
0.0083	-1.849	0.4666	-0.893	4	-0.432
0.0166	-2.158	0.4833	-0.886	4.2	-0.419
0.025	-1.388	0.5	-0.877	4.4	-0.409
0.0333	-1.016	0.5166	-0.867	4.6	-0.406
0.0416	-1.252	0.5333	-0.861	4.8	-0.403
0.05	-1.245	0.55	-0.854	5	-0.384
0.0583	-1.245	0.5666	-0.845	5.2	-0.378
0.0666	-1.376	0.5833	-0.842	5.4	-0.371
0.075	-1.233	0.6	-0.832	5.6	-0.365
0.0833	-1.223	0.6166	-0.823	5.8	-0.359
0.0916	-1.214	0.6333	-0.816	6	-0.346
0.1	-1.201	0.65	-0.81	6.2	-0.352
0.1083	-1.194	0.6666	-0.804	6.4	-0.343
0.1166	-1.188	0.6833	-0.797	6.6	-0.34
0.125	-1.166	0.7	-0.791	6.8	-0.327
0.1333	-1.156	0.7166	-0.784	7	-0.324
0.1416	-1.159	0.7333	-0.778	7.2	-0.314
0.15	-1.147	0.75	-0.772	7.4	-0.311
0.1583	-1.144	0.7666	-0.769	7.6	-0.314
0.1666	-1.125	0.7833	-0.762	7.8	-0.301
0.175	-1.115	0.8	-0.756	8	-0.292
0.1833	-1.115	0.8166	-0.753	8.2	-0.292
0.1916	-1.112	0.8333	-0.749	8.4	-0.285
0.2	-1.099	0.85	-0.743	8.6	-0.282
0.2083	-1.09	0.8666	-0.74	8.8	-0.276
0.2166	-1.086	0.8833	-0.743	9	-0.273
0.225	-1.077	0.9	-0.727	9.2	-0.273
0.2333	-1.074	0.9166	-0.724	9.4	-0.266
0.2416	-1.067	0.9333	-0.724	9.6	-0.26
0.25	-1.055	0.95	-0.718	9.8	-0.257
0.2583	-1.051	0.9666	-0.715	10	-0.244
0.2666	-1.045	0.9833	-0.708	12	-0.222
0.275	-1.039	1	-0.705	14	-0.197
0.2833	-1.032	1.2	-0.667	16	-0.174
0.2916	-1.026	1.4	-0.638	18	-0.165
0.3	-1.02	1.6	-0.606	20	-0.152
0.3083	-1.013	1.8	-0.578	22	-0.133
0.3166	-1.001	2	-0.562	24	-0.123
0.325	-1.001	2.2	-0.549	26	-0.117
0.3333	-0.994	2.4	-0.533	28	-0.114
0.35	-0.975	2.6	-0.508	30	-0.111
0.3666	-0.962	2.8	-0.495	32	-0.098
0.3833	-0.947	3	-0.479	34	-0.101
0.4	-0.899	3.2	-0.483	36	-0.088
0.4166	-0.921	3.4	-0.463		
0.4333	-0.908	3.6	-0.444		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE13~1\GRAPHS\04IN.AQT
Date: 05/07/99 Time: 13:50:29

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 13GW04 Slug In Test
Test Date: March 3, 1999

AQUIFER DATA

Saturated Thickness: 126.8 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.158 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 51.85 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

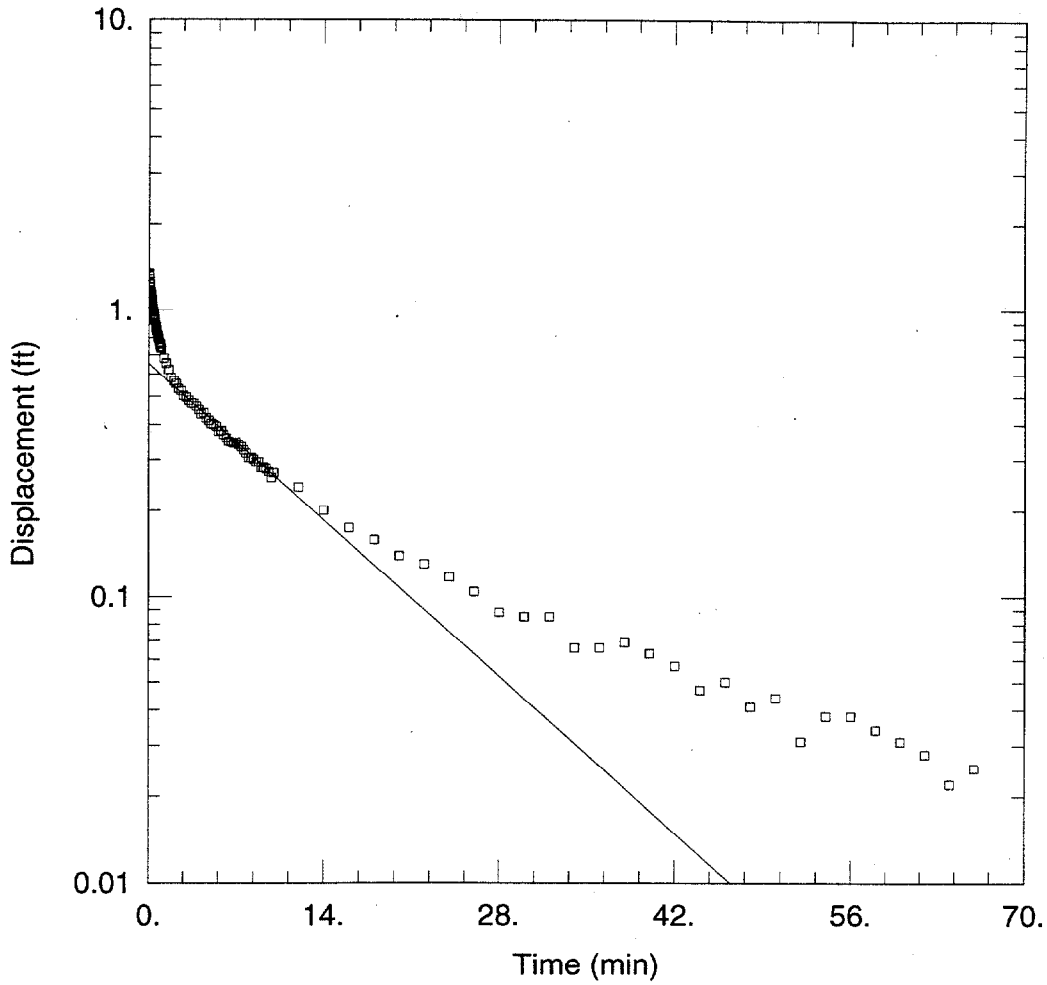
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.039E-06 ft/sec
y0 = 0.6079 ft

SLUG TEST DATA
NSWC White Oak Monitoring Well 13GW04
Slug-Out Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
0	1.344	0.3833	0.965	2.2	0.556
0.0083	1.328	0.4	0.959	2.4	0.533
0.0166	1.331	0.4166	0.95	2.6	0.524
0.025	1.309	0.4333	0.94	2.8	0.505
0.0333	1.283	0.45	0.93	3	0.498
0.0416	1.242	0.4666	0.921	3.2	0.486
0.05	1.255	0.4833	0.915	3.4	0.476
0.0583	1.229	0.5	0.905	3.6	0.473
0.0666	1.226	0.5166	0.896	3.8	0.463
0.075	1.232	0.5333	0.883	4	0.451
0.0833	1.207	0.55	0.88	4.2	0.435
0.0916	1.204	0.5666	0.873	4.4	0.441
0.1	1.201	0.5833	0.861	4.6	0.422
0.1083	1.201	0.6	0.848	4.8	0.413
0.1166	1.166	0.6166	0.851	5	0.403
0.125	1.178	0.6333	0.845	5.2	0.4
0.1333	1.137	0.65	0.838	5.4	0.394
0.1416	1.159	0.6666	0.832	5.6	0.378
0.15	1.156	0.6833	0.819	5.8	0.381
0.1583	1.14	0.7	0.819	6	0.368
0.1666	1.131	0.7166	0.816	6.2	0.359
0.175	1.124	0.7333	0.81	6.4	0.349
0.1833	1.118	0.75	0.803	6.6	0.346
0.1916	1.108	0.7666	0.797	6.8	0.343
0.2	1.102	0.7833	0.791	7	0.346
0.2083	1.096	0.8	0.788	7.2	0.34
0.2166	1.086	0.8166	0.775	7.4	0.333
0.225	1.08	0.8333	0.775	7.6	0.324
0.2333	1.073	0.85	0.772	7.8	0.317
0.2416	1.067	0.8666	0.765	8	0.305
0.25	1.061	0.8833	0.765	8.2	0.305
0.2583	1.054	0.9	0.759	8.4	0.301
0.2666	1.048	0.9166	0.759	8.6	0.295
0.275	1.042	0.9333	0.749	8.8	0.295
0.2833	1.032	0.95	0.74	9	0.282
0.2916	1.029	0.9666	0.746	9.2	0.282
0.3	1.023	0.9833	0.737	9.4	0.279
0.3083	1.016	1	0.737	9.6	0.273
0.3166	1.01	1.2	0.683	9.8	0.26
0.325	1.004	1.4	0.654	10	0.27
0.3333	1	1.6	0.622	12	0.241
0.35	0.988	1.8	0.584	14	0.2
0.3666	0.981	2	0.568	16	0.174

SLUG TEST DATA (continued)
NSWC White Oak Monitoring Well 13GW04
Slug-Out Test March 3, 1999

Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)	Elapsed Time (min)	Displacement (feet)
18	0.158	36	0.066	54	0.038
20	0.139	38	0.069	56	0.038
22	0.13	40	0.063	58	0.034
24	0.117	42	0.057	60	0.031
26	0.104	44	0.047	62	0.028
28	0.088	46	0.05	64	0.022
30	0.085	48	0.041	66	0.025
32	0.085	50	0.044		
34	0.066	52	0.031		



WELL TEST ANALYSIS

Data Set: C:\WHITEO~1\SITE13~1\GRAPHS\04OUT.AQT
Date: 05/07/99 Time: 13:50:47

PROJECT INFORMATION

Company: Tetra Tech NUS
Client: NSWC White Oak
Project: CTO-298
Test Well: 13GW04 Slug Out Test
Test Date: March 3, 1999

AQUIFER DATA

Saturated Thickness: 126.8 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.344 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 51.85 ft
Wellbore Radius: 0.156 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.069E-06 ft/sec
y0 = 0.6512 ft