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Pumping Test Technical Memorandum
for
Defense Distribution Region Central
Memphis, Tennessee
Contract DACA 87-90-D0030

Prepared for

U.S. Army Corps of Engineers
Huntsville Division

Huntsville, Alabama

November 1992

SL016

ENGINEERING-SCIENCE

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13 November 1992

Commander
U.S. Army Corps of Engineers
Attn: CEHND-PM-AE (Hudgins)
106 Wynn Drive
Huntsville, Alabama 35805-1957

Re: Pump Test Technical Memorandum
Defense Distribution Region Central, Memphis, TN
Contract DACA87-90-D-0030
ES-SL016.22

Gentlemen:

Engineering-Science, Inc. (ES) is pleased to submit four copies of the Pump Test Technical Memorandum for work performed at Defense Distribution Region Central (DDRC) since August 1992 under the above referenced contract.

One pump test well and three new observation wells were installed in Dunn Field during August 1992, followed by execution of a pump test the week of 14 September 1992. This technical memorandum describes the field measurements and subsequent data reduction to derive aquifer parameters, and presents chemical data from soil and water samples collected during this activity,

ES appreciates this opportunity to serve the Huntsville Division. If you have any questions about this work, please give me a call.

Yours truly,

ENGINEERING-SCIENCE, INC.

David E. Mizell

David E. Mizell, P.E.
Project Manager

SL016.22/67592773/213-18

PUMPING TEST TECHNICAL MEMORANDUM FOR DEFENSE DISTRIBUTION REGION CENTRAL MEMPHIS, TENNESSEE

Contract No. DACA 87-90-D0030

PREPARED FOR

U.S. ARMY CORPS OF ENGINEERS

HUNTSVILLE DIVISION

Huntsville, Alabama

SUBMITTED BY

ENGINEERING-SCIENCE, INC.

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November 1992

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DEFENSE DISTRIBUTION REGION CENTRAL
MEMPHIS, TENNESSEE

1.0 INTRODUCTION

1.1 Purpose and Scope

Defense Distribution Region Central (DDRC), is investigating the use of an interim pump-and-treat system to control groundwater contamination in Dunn Field. This contamination was found during a remedial investigation/feasibility study (RI/FS) (Law, 1990). Although the extent of off-post contamination is not fully known, DDRC has decided to install an interim pump-and-treat system to prevent the contaminant plume from further migration. This system, hereafter referred to as the interim remedial measure (IRM), will control groundwater contamination in the area of highest contamination until the full extent of contamination is known and a permanent solution is developed.

Engineering-Science, Inc. (ES), was under contract with the U.S. Army Corps of Engineers (USACE), Huntsville Division, is to perform a pumping test to characterize the shallow groundwater zone, identify and evaluate pump-and-treat alternatives, and develop technical performance specifications for the IRM. A pump test work plan (ES, 1992) was approved by the U.S. Environmental Protection Agency (EPA) Region 6 and the State of Tennessee. ES performed the field work from August 24 to September 18, 1992. This technical memorandum documents the pumping test and the data evaluation. The data from the pumping test will be used in the IRM design. Specific objectives of the pumping test were to:

- Estimate transmissivity
- Estimate specific yield (storativity)
- Estimate radius of influence
- Estimate well specific capacity and efficiency
- Estimate aquifer anisotropy, if any
- Determine optimum pumping rate
- Perform a time-series analysis of volatile organic vapors in headspace of samples from the pump test well
- Determine noncontaminant chemistry pertaining to treatment system design.

1.2 Site Location and Description

DDRC is situated on 642 acres of federal land in the city of Memphis, Shelby County, Tennessee. Figures 1.1 and 1.2 shows the DDRC facility and Dunn Field. The depot lies in the south central section of Memphis, 4 miles southeast of the central business district and 1 mile north of the Memphis International Airport. DDRC is set in a mixed residential, commercial, and industrial area. DDRC consists of two sections: Dunn Field, an open storage area about 60 acres in size, and the main installation, which is intensely developed (Law, 1990).

DDRC warehouses and distributes an extensive inventory of supplies to U.S. military services and federal agencies. These supplies span a broad range of commodities including clothing, food, medical supplies, electronic equipment, petroleum products, and industrial chemicals (Law, 1990).

2.0 GEOLOGY AND HYDROGEOLOGY

2.1 Regional and Site Geology

The Dunn Field area of DDRC is covered by loess deposits, which are underlain by a fluvial deposit, the Jackson/Claiborne Formation, and the Memphis Sand.

2.1.1 Loess

Directly underlying the Dunn Field area is loess, a semicohesive windblown deposit of silt, silty sand, and silty clay. It is about 20 feet thick in the vicinity of Dunn Field and may occasionally reach 30 feet in thickness. Thin, discontinuous fine-grained sand lenses may occur locally within the loess.

2.1.2 Fluvial Deposit

Underlying the loess is the fluvial deposit. This unit consists of a top layer of silty clay, silty sand, or clayey sand; a clean, fine to medium-grained sand; and a basal gravelly sand. While the gravelly sand layer frequently occurs below the fine sand layer, some borings at DDRC exhibit additional fine sand layers below the gravelly sand.

The upper sand layers are orange in color, indicating an oxidizing environment. The lower layers are very clean, tan to white sand. The grain size in the sand layers become coarser with depth, eventually becoming a gravelly sand. Gravel size ranges from pea-size pebbles to cobbles. The thickness of the fluvial deposit in Dunn Field ranges from 50 to 70 feet. The fluvial deposit is the interest of this study.

2.1.3 Jackson Clay and Upper Claiborne Formation

The Jackson Clay and the Upper Claiborne are laterally persistent and fairly uniform in thickness, approximately 80 feet, throughout Dunn Field. The unit thins considerably in the area immediately south of Dunn Field. It is a stiff gray or orange plastic, lean to fat lignitic clay. It forms a regional confining bed separating the fluvial deposits and the underlying Memphis Sand.

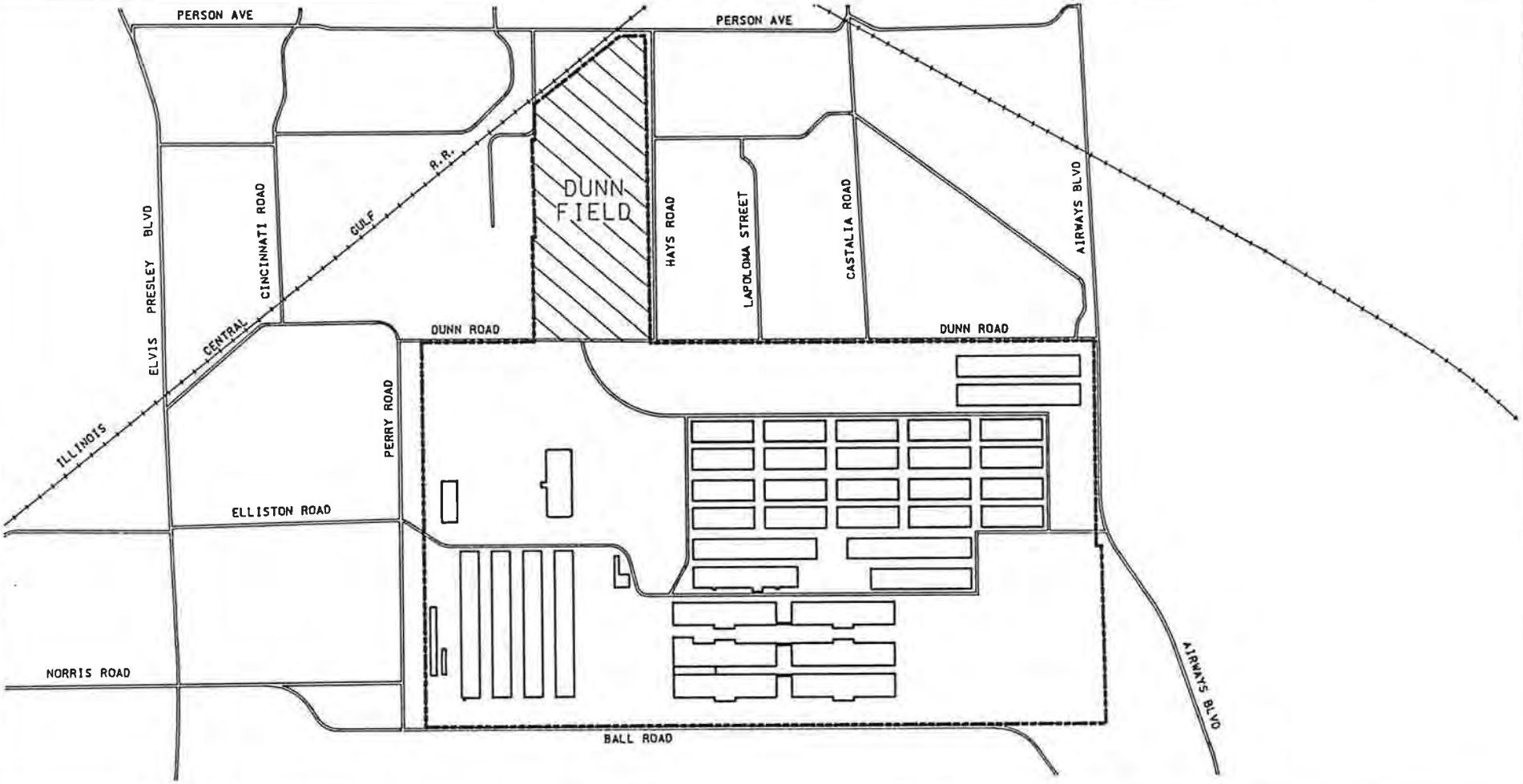

FIGURE 1.1:
DUNN FIELD LOCATION
DEFENSE DISTRIBUTION
REGION CENTRAL

N

115000 7500 0 115000

SCALE IN FEET

DEFENSE DISTRIBUTION
REGION CENTRAL
MEMPHIS, TENNESSEE

DEFENSE LOGISTICS AGENCY

ENGINEERING-SCIENCE
St. Louis, Missouri

ES

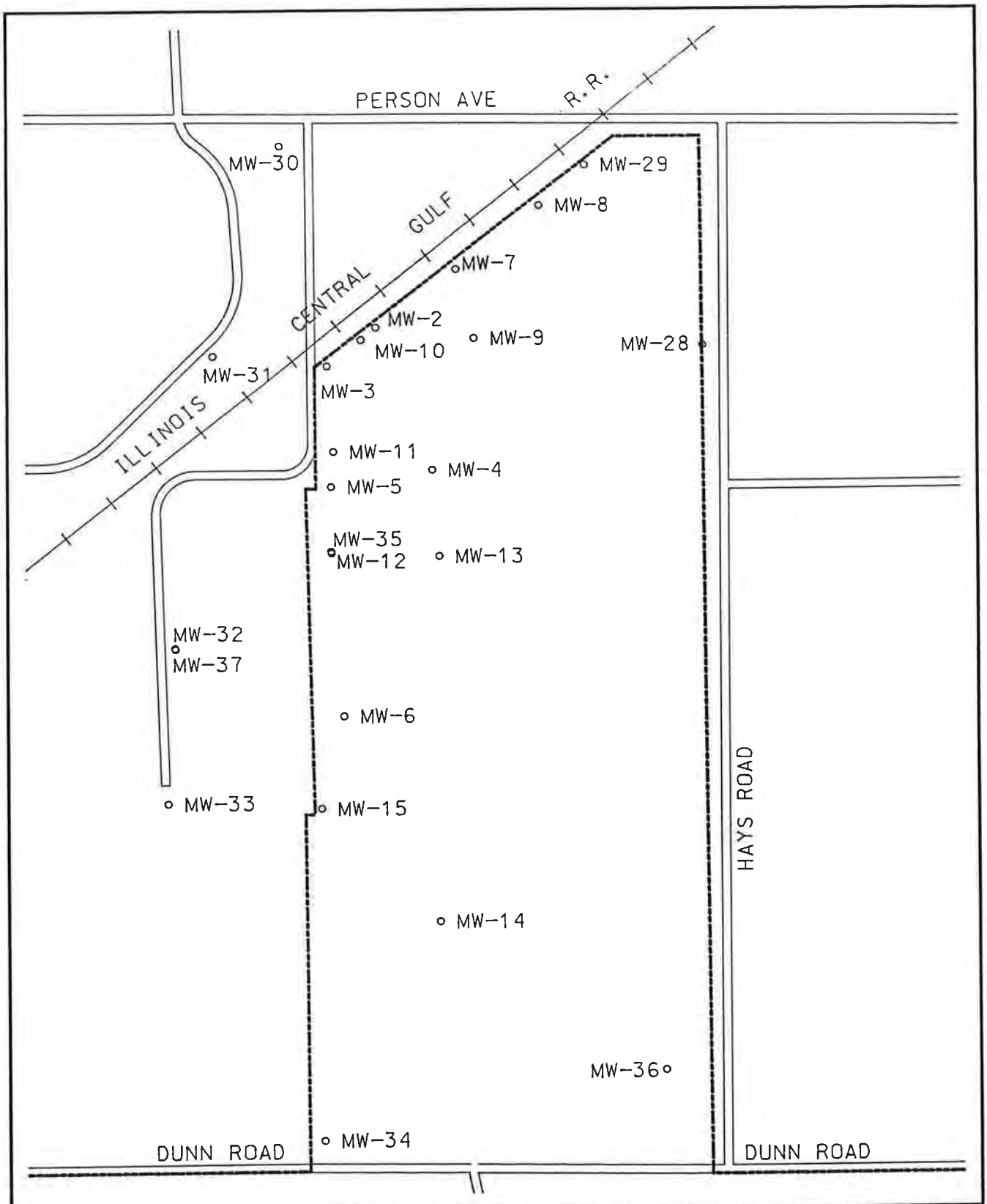

FIGURE 1.2:
EXISTING MONITORING WELLS
DUNN FIELD VICINITY

N

400 200 0 400

SCALE IN FEET

DEFENSE DISTRIBUTION
REGION CENTRAL
MEMPHIS, TENNESSEE

DEFENSE LOGISTICS AGENCY

ENGINEERING-SCIENCE
St. Louis, Missouri

ES

The top of the Claiborne Formation slopes toward the northwest and west beneath most of Dunn Field at a gradient of about 1 percent; however, the top surface slopes southwestward beneath the extreme southern portion of Dunn Field at a rate of about 7 percent.

2.1.4 Memphis Sand

The Memphis Sand is also called the 500-foot sand since its center occurs generally 500 feet below ground level. This formation ranges from 500 to 900 feet in thickness. At Dunn Field, the top of the Memphis Sand is about 180 below ground level along the west property line and at approximately 140 feet along the east property line. The formation is composed of thin bedded, white to brown or gray, very fine-grained to gravelly, partially argillaceous and micaceous sand.

2.2 Regional Hydrogeology

Water supply systems in the Memphis area depend heavily on groundwater resources. The uppermost aquifer beneath Dunn Field is the Fluvial Aquifer. The Fluvial Aquifer is not used for drinking water in the Memphis area because of variable water quality, high hardness, and elevated iron concentrations. Furthermore, because the loess deposits allow infiltration and recharge to the Fluvial Aquifer, this unit is susceptible to contamination from the surface.

Beneath the Fluvial Aquifer lies the Memphis Sand aquifer, which is the shallowest artesian aquifer in the area. The Memphis Sand aquifer is heavily used for municipal water supplies providing about 200 million gallons per day to Memphis and the surrounding unincorporated areas. The Memphis Light, Gas and Water Division operates ten wellfields in Shelby County, Tennessee, extensively using the Memphis Sand Aquifer. The closest of these wellfields to Dunn Field is the Allen wellfield, which is about 1 to 1.5 miles west of DDRC.

2.3 Site Hydrogeology

2.3.1 Loess

Perched groundwater occurs within the loess. Monitoring well MW-2 is constructed in the loess and has water at a depth of approximately 30 feet below ground level. Water levels in the adjacent wells completed in the Fluvial Aquifer are approximately 60 feet below ground level. The extent of this perched zone is not known.

2.3.2 Fluvial Deposit

The fluvial deposit forms the water table aquifer in the Dunn Field vicinity. The Fluvial Aquifer is approximately 15 to 20 feet thick and receives recharge from rainfall infiltration through the overlying loess and lateral groundwater inflow from the east. Discharge is toward the Mississippi River to the west and possibly by leakage into the underlying Memphis Sand through the Jackson/Upper Claiborne confining bed.

2.3.3 Jackson Clay/Upper Claiborne Formation

The Jackson Clay/Upper Claiborne unit is a regional confining bed which separates the Fluvial Aquifer from the Memphis Sand aquifer. Through erosion, this unit is thinned at DDRC immediately south of Dunn Field. It is documented (Smith, and Ishak-Muhamad, 1989) that some areas of the Memphis Sand are directly overlain by the fluvial deposits.

December 1989 measurements of MW-32 (Fluvial Aquifer) and MW-37 (Memphis Sand aquifer) indicated that the water elevation of the Fluvial Aquifer was at 226 feet above mean sea level (MSL), compared to the water level in the Memphis Sand of 143 feet MSL. The hydraulic head difference is about 83 feet.

2.3.4 Memphis Sand

The top of the Memphis Sand is approximately 125 to 150 feet above MSL in the vicinity of DDRC. The base of the unit is about 250 feet below MSL. Groundwater occurs in the Memphis Sand under confined conditions. Recharge to the aquifer occurs from rainfall infiltration on the outcrop located to the east of the site and possibly from leakage from the overlying Fluvial Aquifer. Pumpage for municipal supply from the Allen wellfield, located 1 to 2 miles to the west, is the primary discharge from the aquifer. Water levels in the two Memphis Sand wells installed during the RI/FS (Law, 1990) suggest a gradient toward the west.

2.4 Groundwater Chemistry

During the RI study, volatile organic compounds (VOCs) and heavy metals were found in the groundwater beneath Dunn Field at levels exceeding the federal primary drinking water standards. Groundwater samples were analyzed for the 129 priority pollutants excluding asbestos and cyanide.

Eleven volatile organic chemicals were detected in the Fluvial Aquifer including tetrachloroethene, 1,1,2,2-tetrachloroethane, 1,1-dichloroethene, and trichloroethene. These contaminants were found in monitoring wells located along the west and north boundaries of Dunn Field.

Chromium and lead have also been detected in the groundwater in the Dunn Field area. However, samples collected from upgradient background well MW-16 also contains possible heavy metal contamination, indicating that the concentrations found in the downgradient wells may not be a result of a source in Dunn Field.

The samples collected in the past from DDRC monitoring wells completed in the Memphis Sand did not exhibit VOC contamination (except for acetone, which was not identified in the Fluvial Aquifer) and contained only low levels of metals. Three wells in the center of the Allen wellfield were closed because of VOC contamination. The Memphis Light, Gas and Water Division is investigating the cause of the contamination, but the source has not been identified. Other Allen wellfield wells located between these three wells and DDRC do not exhibit VOC contamination.

3.0 PUMPING TEST DESIGN

The pumping test was designed to characterize the Fluvial Aquifer in the Dunn Field area to aid in the design of a groundwater pump-and-treat system (ES, 1992). These aquifer characteristics and distribution of the contaminant plumes will be used to design a wellfield for the IRM and to assess the IRM's associated potential hydrogeologic impacts, if there are any. Preliminary calculations were made to estimate the Fluvial Aquifer's response to pumping. Based on these calculations, the optimum pumping rate, well design, and location of the pumping well could be estimated. These calculations were made following procedures in *Groundwater and Wells* (Driscoll, 1987).

3.1 Estimation of Pumping Rate

The discharge rate for this pumping test was estimated using hydraulic conductivity measurements compiled during the RI/FS (Law, 1990) and other assumptions about the Fluvial Aquifer (ES, 1992). Calculations were performed using the following assumptions:

- Hydraulic conductivity, $k = 7.6 \times 10^{-3}$ ft/min (based on the average hydraulic conductivity of the Fluvial Aquifer)
- Storage coefficient, $S = 0.26$ (based on the average porosity of the sediments in the Fluvial Aquifer)
- Aquifer thickness, 20 feet.

The modified nonequilibrium equation of Cooper and Jacob (1946) was used to examine distance-drawdown relationships for the Fluvial Aquifer. The Cooper and Jacob method, based on the Theis equation, was developed for confined aquifers. Since the test was to be conducted on an unconfined aquifer, the values obtained using this method were considered only rough estimates. However, for the purpose of determining the optimum pumping rate and resultant radius of influence, the results were adequate.

A discharge rate of 20 gallons per minute (gpm) was selected for initial evaluation by assuming a specific capacity of 1 gpm per foot. Two trial calculations were performed, one using hydraulic conductivities from monitoring wells in the Dunn Field vicinity (trial 1), and the other using hydraulic conductivities from all of the Fluvial Aquifer wells located on DDRC (trial 2). Trial 1 indicated drawdowns 10 feet from the pumping well of about 2.5 feet after 48 hours of pumping, while trial 2 showed drawdowns around 5 feet. The work plan (ES, 1992) specified that the actual pumping rate be determined by a step drawdown test.

3.2 Estimation of Test Duration

Although the scope of work called for a minimum of 36 hours of pumping, ES proposed to extend the pumping period to 48 hours in the event that the drawdown had not stabilized. Since pumping was to be in an unconfined aquifer, a longer period of pumping may be needed to approach equilibrium conditions. At the end of the 48 hours of pumping, it was estimated that drawdown in the pumping well would be 13 feet.

3.3 Placement of Pumping Well and Piezometers

Based on the above assumptions, an estimated radius of influence was calculated following the procedures in *Groundwater and Wells* (Driscoll, 1987). This procedure uses drawdown values calculated from the Cooper and Jacob method; therefore, the values obtained for the radius of influence were also considered approximate. Using the average hydraulic conductivity from all of the Fluvial Aquifer wells and a pumping rate of 20 gpm for 48 hours, a radius of influence of 60 feet was estimated from a distance-drawdown graph.

Using the estimated 60-foot radius of influence, the pumping well was placed 20 feet northeast of MW-3 (Figure 3.1). This location met the following criteria:

- Near several monitoring wells which can be used for observation wells during the test
- Near the downgradient edge of the known VOC contaminant plume
- Close to lead and chromium plumes
- Representative depth and thickness typical of the Fluvial Aquifer in this vicinity
- Suitable for use as a future extraction well.

Three new piezometers, PZ-61, -62, and -63 were constructed southwest and northeast of the pumping well, as shown in Figure 3.1.

PZ-61 was located 10 feet southeast of the pumping well to provide distance drawdown measurements close to the pumping well. The small distance to the pumping well was chosen in order to obtain water level data in the event that the radius of influence was smaller than estimated from the design.

PZ-62 was located 40 feet southeast of the pumping well along the same axis as PZ-61. Data obtained from PZ-61 and -62 would be used to provide time drawdown and distance drawdown relationships along the northwest-southeast axis from the pumping well.

PZ-63 was located 40 feet northeast of the pumping well. Data obtained from PZ-63 and MW-3 would be used to provide time drawdown and distance drawdown relationships along the northeast-southwest axis from the pumping well. These data could then be compared with the data from the PZ-61 and -62 to determine if anisotropic conditions exist at the site.

Existing monitoring wells outside of the estimated radius of influence were also to be used as observation wells during the pumping test. These wells were MW-7, MW-9, MW-10, MW-11, MW-30, and MW-31 (See figures 1-2 and 3-1). Water level measurements were to be made less frequently than in the well and piezometers located within the estimated zone of influence.

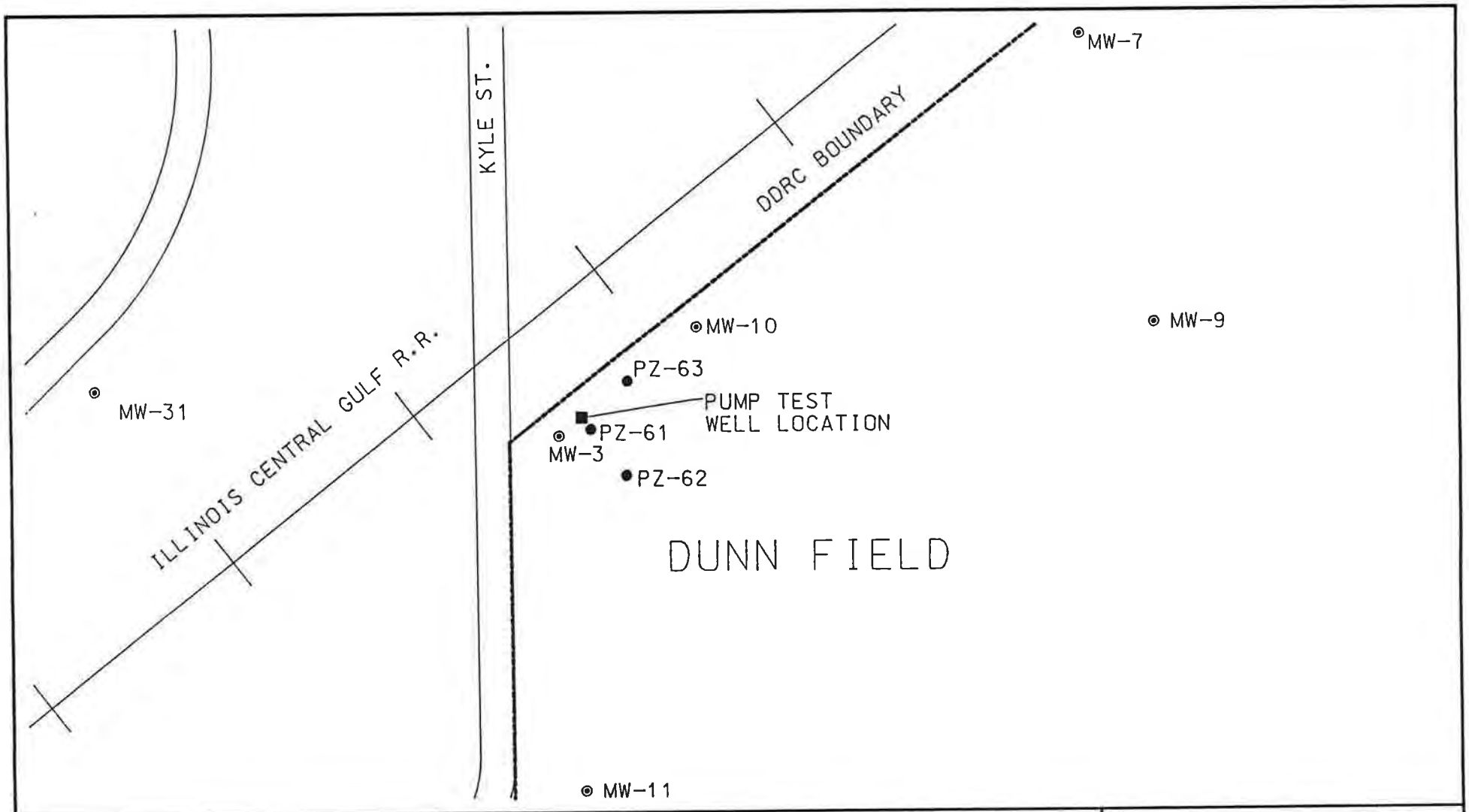

FIGURE 3.1:
PROPOSED PUMP TEST WELL
AND OBSERVATION
WELL LOCATIONS
DUNN FIELD VICINITY

LEGEND

- ■ PUMP TEST WELL
- ⊙ MONITORING WELL
- ● OBSERVATION WELL

N

100 50 0 100

SCALE IN FEET

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REGION CENTRAL
MEMPHIS, TENNESSEE

DEFENSE LOGISTICS AGENCY

ENGINEERING-SCIENCE
St. Louis, Missouri

ES

4.0 PUMPING TEST WELL AND PIEZOMETER CONSTRUCTION

4.1 Decontamination

Drill equipment used to install the pumping test well and piezometers was decontaminated in accordance with section 3.3.1 of the pump test work plan (ES, 1992). In summary, this decontamination consisted of a pressure wash with laboratory-grade, phosphate-free detergent, pressure rinse with tap water, and a deionized water rinse. This procedure applied to the downhole drilling equipment such as auger flights, drill rods, and tremie pipe. Equipment that contacted samples, such as bowls, spatulas, and split spoons, were decontaminated as previously described, followed by two rinses with pesticide-grade isopropanol and an organic-free water rinse. The sampling equipment was air dried and wrapped in foil until use. The well materials arrived on site precleaned by the manufacturer and sealed in individual wrappers.

The overhanging portion of the drill rig was pressure washed and rinsed between holes. A wooden-framed, plastic-lined decontamination basin was constructed and used for all decontamination activities. Water collected in the decontamination basin was placed in 55-gallon drums and stored on site until the activated carbon treatment system was operational. The decontamination water was pumped through the treatment system during the step drawdown test. Sediment from the decontamination settled into the bottom of the liner. The basin liner with sediment and other materials that came into contact with potentially contaminated materials were placed into a 55-gallon drum, sealed, and stored along with the drummed soil cuttings.

4.2 Drilling and Sampling

The pumping test well and piezometers were installed using hollow-stem auger methods. All soil cuttings were collected in 55-gallon drums and stored on site. A pilot hole was drilled for the pumping test well using 3½-inch-ID augers. The pilot hole was drilled to collect the geotechnical sample and the clay confirmation sample and to determine screen placement for the pumping test well. Collection of the clay confirmation sample was hampered by sands surging into the augers. However the sample was successfully collected. The pilot hole was reamed for installation of the pumping test well. The augers used in the reaming were 6¼-inch-ID augers. An inert plug was used to keep sand from entering the augers during the drilling process. During the reaming of the hole, two samples from the auger cuttings were collected for chemical analysis. These samples, and similar samples from the installation of the piezometers, were collected to determine proper disposition of the drummed cuttings. These samples, collected with the augers at depths of 15 and 25 feet, were labeled PTW-SS1-15 and PTW-SS2-25, respectively. The sample collected at 25 feet was split, and a blind duplicate labeled PTW-SS3-35 was submitted to the lab.

The piezometers were installed using 3½-inch-ID augers. An inert plug was installed in the auger during drilling in order to prevent sands from surging into the augers. No split-spoon samples were collected during the installation of the

piezometers. However the cuttings were logged. Two cuttings samples were collected from each piezometer to identify the proper disposition of the cuttings. Analyses were performed for volatile organics, BNAs (including chloroacetophenone), pesticide/PCBs, metals, thiodigycol (HPLC/electrochemical detector method), and agent mustard.

During all drilling, organic vapor concentrations in both the breathing zone and at the cuttings pile were monitored at 5-foot intervals using an HNU capable of detecting carbon tetrachloride and chloroform. The maximum organic vapor concentration at the cuttings pile was 4 parts per million (ppm). No organic vapor concentrations above background were detected in the breathing zone during drilling. An organic vapor concentration of approximately 1 ppm was detected during installation of the annular materials in PZ-61. Draeger tubes for carbon tetrachloride and 1,1,2,2-tetracholorethane had no response. The vapors dissipated while the monitoring was in progress. An explosimeter was used to monitor for explosive atmospheres. Personal monitoring was performed during installation of the pumping test well. The detector badge was analyzed for carbon tetrachloride, 1,1,2,2-tetrachloroethane, and trichloroethene. None of these compounds were detected.

Debris was encountered at shallow depths in each of the boreholes. The debris identified was mostly nails, with some thin rusty metal pieces that resembled food cans. Logs of the pumping test well and the piezometers are in Appendix A. Sandy silts and silty sands were encountered to depths ranging from 33 to 43 feet. These depths are approximate because the logs are based on cuttings rather than split all spoon samples. Below this depth the sediments encountered were dominantly sand, with a trace of silt. Sand with varying amounts of gravel was encountered in each of the boreholes at depths ranging from 43 to 68 feet for the first occurrence. Gravel was more prevalent than the sand in an 8-foot zone in the pumping test well. The gravel continued all the way to the top of the Jackson Clay in the pumping test well.

The top of the Jackson Clay was encountered at a depth of 78 feet in the pumping test well. This depth is determined based on the change in drilling, and subsequently confirmed with a split spoon sample of the clay. Sands that had surged into the augers filled the sampler on the first two attempts at collecting the confirmation sample. The sampler was still within the augers when it hit bottom. The sampler hit bottom within the auger on the third attempt at collecting the confirmation sample, but was closer to the bottom of the augers. This sample, when retrieved, contained approximately 6 inches of laminated silty clay, confirming that the Jackson Clay had been reached.

4.3 Well Construction

The pumping test well was constructed with the bottom of the screen on top of the Jackson Clay. This position was selected to allow the maximum amount of drawdown during the pumping test. A sump was installed below the well screen. The sump was placed within the Jackson Clay to enable the bottom of the screen to be placed at the bottom of the Fluvial Aquifer. The well was constructed using 4-inch, schedule 40 PVC riser pipe. An enhanced slot well screen (Brainard-

Kilman Circumslot) was selected in order to keep entrance velocities low in the event of large drawdowns. This screen, with a slot size of 0.020 inch, has a much larger total open area than comparable mill slot screen. A total of 15 feet of screen was used. Complete construction details are shown on the well construction log in Appendix A.

The piezometers were drilled and installed to total depths of 75 to 76 feet. This depth was selected to place the 1-inch-diameter, 10-foot screen of the piezometer approximately midway between the top and bottom of the screen of the pumping test well. The piezometers were constructed of 1-inch, flush-joint PVC riser. The screen used had 0.010-inch mill slots. Sumps were not installed on the piezometers. Construction details are shown on the construction logs in Appendix A.

The filter sand used in the pumping test well and the piezometers was a 10/20 grade silica sand. The filter sand was properly sized for the screen opening and the grain size distribution of the aquifer material. The filter sand was tremied into place as described in section 3.3.4 of the pump test work plan. The depth to the top of the filter pack was confirmed by measuring with a weighted tape.

Bentonite seals were installed above the filter pack in all of the wells. The bentonite seal in the pumping test well was 5.3 feet thick at the time of installation. Seals in the piezometers were a minimum of 2 feet thick. Depth and thickness was measured using a weighted tape. Bentonite pellets were used for the seals. One gallon of distilled water was added to aid in hydration of the pellets. The seals were allowed to hydrate overnight before the borehole was grouted. Grouting of the boreholes was performed as outlined in section 3.3.4 of the pump test work plan. After the wells were grouted, protective posts, locking covers, and a concrete pad were installed at each well. Installation of the protective posts around the pumping test well was delayed until after the test to allow easier installation of the pump.

4.4 Well Development

The pumping test well was developed 3 days after completion of the well. Well development consisted of agitation with a large-diameter bailer, followed by cyclic pumping of the well with a submersible pump. Over 275 gallons of water removed from the well during the well development effort. The water was quite turbid during the early part of the pumping. However, the water had cleared considerably by the time 100 gallons had been pumped from the well. Temperature, conductivity, and pH stabilized midway through the well development process. Water from the well development was stored in 55-gallon drums at the well site until the activated carbon treatment system was installed for the step drawdown test. At that time the development water was processed through the treatment system.

5.0 PUMPING TEST ACTIVITIES

5.1 Water Level Trends Establishment

Water level measurements were collected from all of the observation wells and piezometers before, during, and after the pumping test. The water level measurements from the observation wells located outside the radius of influence

were used primarily for the trend analysis. Hydrographs of observation wells not influenced by the test are in Appendix B.

5.2 Step Drawdown Test

A step drawdown test was performed on September 14, 1992. Each step consisted of at least 1 hour of pumping followed by a 1-hour recovery period. After each step, the flow rate was increased until the last step, when the pump was allowed to pump at its maximum capacity.

The discharge rate was determined using a totalizer flowmeter and a stopwatch. Throughout each step test, the flow through the totalizer was timed and a flow rate in gallons per minute was calculated. Any adjustments to the flow rate were then made by adjusting a gate valve located on the discharge pipe.

Drawdown data were collected from the pumping well and MW-3 using a Hermit data logger. Drawdown data were also collected by hand using a water level indicator in the piezometers. The step drawdown test data are in Appendix C. Flow rates used in the each step were 8.2 gpm, 17.4 gpm, 20.3 gpm, and 25.2 gpm. Relative maximum drawdowns in the pumping well for the steps were 1.10, 2.49, 3.02, and 3.59 feet, respectively. After completing the step drawdown test, it was determined that the optimum pumping rate for the constant discharge pumping test would be approximately 25 gpm, the maximum capacity of the pump.

5.3 Constant-Discharge Pumping Test

5.3.1 Pumping Test

On September 15, 1992, at 12:00 noon, the constant-discharge pumping test was started. Drawdown data were collected from each of the nearby wells and piezometers. An electric water level indicator was used to measure drawdowns in the piezometers and all of the observation wells, with the exception of MW-3. The drawdowns in the pumping well and MW-3 were measured with an automatic water level recorder, a Hermit 1000B. A pressure transducer was placed in both MW-3 and the pumping well and connected to the Hermit 1000B. Some hand readings were collected from MW-3 and the pumping well to check against the data logger's readings during the test. However, because the data logger malfunctioned at the end of the recovery test, all of the data stored in the logger were erased. The few hand measurements were used to calculate transmissivities for these two wells. However, there was sufficient data from the piezometers to calculate the aquifer characteristics.

Hand measurements were collected from the piezometers at a frequency of approximately ten per log cycle of time. The water level measurements from the other nearby wells were collected on a frequency of approximately once every 2 hours. The water level drawdown data sheets are in Appendix D.

The flow rate during the constant-discharge test was determined in the same manner as during the step drawdown test. Although the well was pumped at a constant rate, flow measurements were calculated periodically to check for changes.

The test was terminated at 42 hours when the capacity of the holding tank for the discharge water was reached.5.3.2 Recovery Test

Following the constant-discharge test, a 36-hour recovery test was conducted. Residual drawdown measurements were collected from each of the piezometers, MW-3, and the pumping well. As discussed before, the recovery data for MW-3 and the pumping well were erased along with the drawdown data in an instrument malfunction. However, a few hand measurements were taken for these two wells. The data sheets containing the residual drawdown data are in Appendix D.

5.4 Water Sample Collection

Volatile organic chemicals (total) were measured during the test using headspace methods and an HNU meter. The HNU was calibrated with an isobutylene standard following the manufacturer's specifications. Table 5.1 shows the headspace readings collected during the test. There is no distinguishable change in headspace concentrations.

Three water samples were collected from the discharge of the pump during the constant rate pump test. The samples were collected from a sample port upstream of the flowmeter and discharge control valve. The samples were collected in the first hour of the test, 24 hours into the test, and in the last few minutes (41 hours 30 minutes) of the test. Samples were analyzed for volatile organic compounds, semivolatile organic compounds (including chloroacetophenone), pesticides, PCBs, selected metals, agent mustard, and thiodiglycol. The sample collected at the end of the pumping test was also analyzed for total suspended solids, organic carbon, iron, magnesium, hardness, total dissolved solids, alkalinity, and biological oxygen demand in order to evaluate potential problems in the design of the groundwater treatment system. A duplicate of the final water sample was collected and submitted for laboratory analysis as a blind duplicate. The laboratory data sheets are in Appendix E.

5.5 Water Treatment and Disposal

Water pumped from the pumping test well was treated as described in section 3.5 of the pump test work plan and stored in a 70,000-gallon storage tank. The water was initially pumped into a 2,000-gallon tank that served as a settling basin and flow equalization tank. Two centrifugal pumps were used to pump water from the small tank through granulated activated carbon units and into the large storage tank. A total of four carbon units were connected in parallel to treat the water. The carbon units were sized to allow an average contact time of 6 minutes. In order to prevent sediments from blocking the carbon units, the water was processed through sediment filters immediately prior to entering the carbon units. The piping of the treatment system allowed each of the carbon units to be isolated in the event of a problem. This also allowed the sediment filters to be changed as necessary.

Three water samples plus a duplicate were collected from the tank in which the treated water was stored. The samples were collected after all of the pump test effluent, decontamination water, and well development water had been processed.

Table 5.1 Headspace Readings on Water Samples

Date	Time	HNU Reading (ppm* above background)
9-15	1405	1.2
	1900	2.4
	2315	2.4
9-16	0130	4.0
	0323	2.6
	0521	3.0
	0730	2.6
	1320	3.4
	1530	3.2
	1730	3.0
	1930	3.1
	2316	2.6
9-17	0225	2.0
	0525	2.2

*ppm = parts per million

These samples were collected to confirm that the water treatment system was functioning, and to evaluate whether the water can be discharged to the sanitary sewer. The water samples were collected from different areas of the tank using a bailer. Aliquots were collected from all depths within the tank. The samples were analyzed for the same parameters as the raw water from the pumping test well.

6.0 PUMPING TEST ANALYSIS

6.1 Water Level Trend Analysis

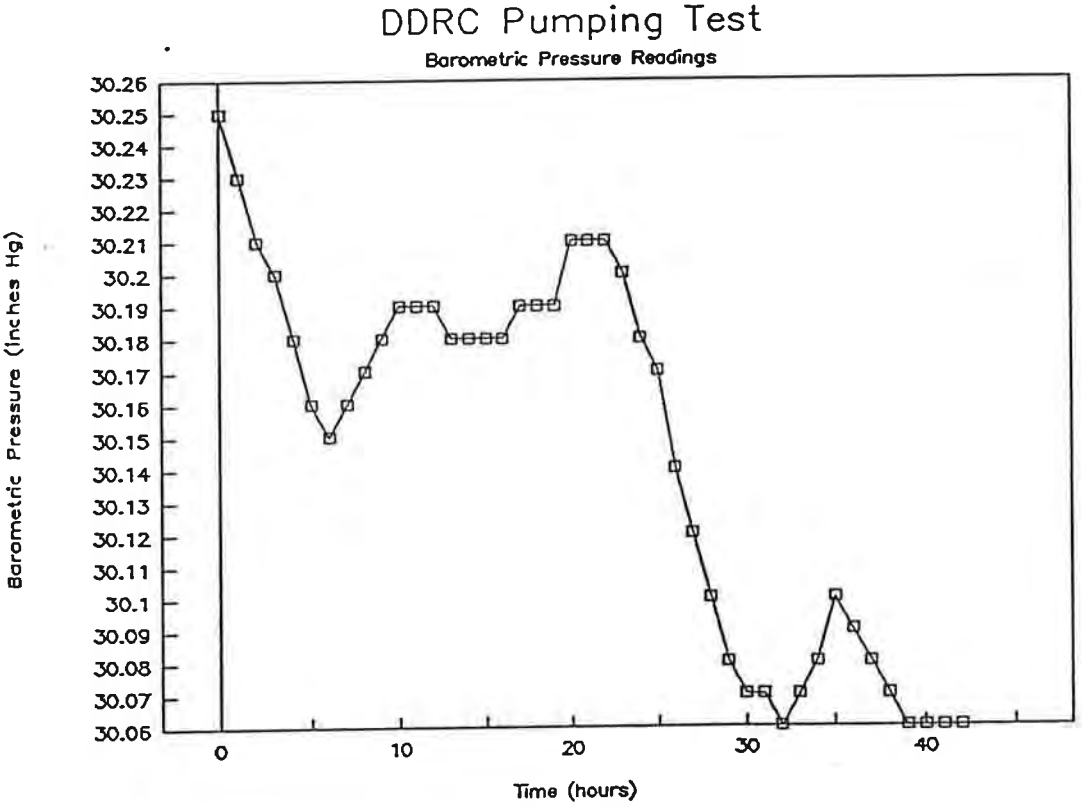
The water levels from the observation wells which were not influenced by the test were used to establish the water level trends. The water level trend analysis indicate that the water level in the Fluvial Aquifer rose slightly during the test. However, there were several fluctuations in the levels as shown in the hydrographs (Appendix B). During the first hour of the test, the levels rose approximately 0.05 foot. The levels dropped about 0.06 foot between about 12 hours and 24 hours after pumping began. Another rise in water levels, of approximately 0.08 foot, was noted 30 hours into the test. During the final 12 hours of the test, the levels generally decreased.

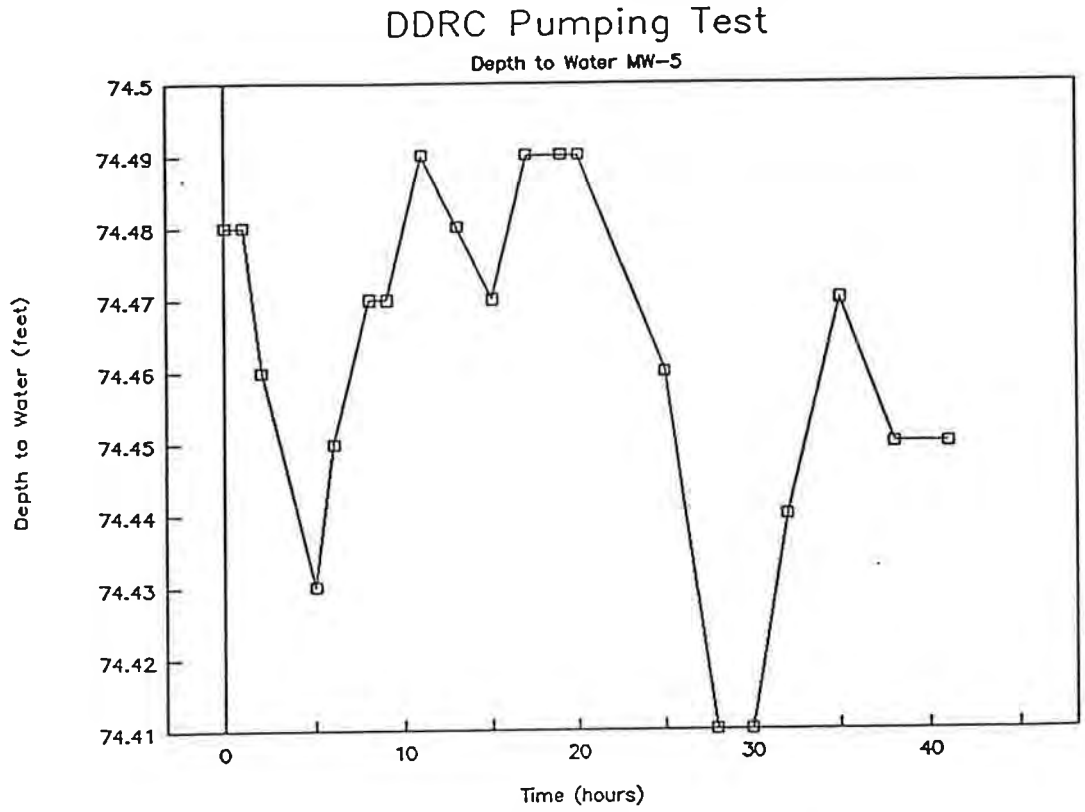
Although the levels in the observation wells show a fluctuating water table throughout the test, it does not appear that these fluctuations had much effect on the drawdowns observed during the pumping test. During the later part of the test as the drawdown was approaching the equilibrium state, there appear to be some fluctuations in the drawdowns in the piezometers (see drawdown graphs in Appendix G). At approximately 1,500 minutes (25 hours) into the test, the drawdowns in PZ-62 and PZ-63 are rising slightly (approximately 0.02 foot). This rise corresponds to the rise in water levels in observation wells. Therefore, it appears that only the late drawdown data were affected by the changes in the water levels in the aquifer, and therefore no correction was made to the drawdown data.

6.2 Barometric Pressure Effects

Barometric pressure readings were obtained from the National Weather Service office located in Memphis, Tennessee. The readings, collected every hour and measured in inches of mercury, are presented in Appendix F. The barometric pressure readings during the pumping test were plotted on graph paper and compared to a hydrograph of one of the observation wells that was not affected by the drawdown from the pumping test (Figure 6.1). Although the Fluvial Aquifer is under water table conditions (Law, 1990 and section 6.4.3 of this memorandum), there appears to be some correlation between the change in water in water levels in the observation wells and the change in barometric pressure. As barometric pressure decreases, water levels rise and vice versa. This phenomenon is usually associated with confined aquifers. However, small fluctuations in the water table in unconfined aquifers as a result of barometric pressure changes can be attributed to the effects of the changed pressures on air bubbles entrapped in the soil-moisture zone (Freeze and Cherry, 1979). Therefore the fluctuations measured on the observation wells in Dunn Field may be attributed to the changes in barometric pressure.

FIGURE 6.1
CORRELATION OF BAROMETRIC PRESSURE CHANGES TO WATER LEVEL CHANGES





Based on the ratio of the changes in water levels in the observation wells to the changes in barometric pressure observed during the test, a barometric efficiency of approximately 70% was calculated for the Fluvial Aquifer. When the barometric efficiency is multiplied times the changes in the barometric pressure in feet of water, a drawdown correction can be made to include the barometric effects. For example, a barometric efficiency of 70 percent would have a water level rise of 0.007 foot for each decrease of 0.01 foot in barometric pressure. This would in general change the water level in the aquifer from approximately 0.007 to 0.021 foot based on a change in barometric pressure of 0.01 to 0.03 foot. The changes are very small and therefore can be ignored.

6.3 Methods of Analysis

6.3.1 Assumptions

A few basic underlying assumptions have been made to facilitate the analysis of the pumping test data:

- The aquifer has a seemingly infinite areal extent.
- The aquifer is homogeneous, isotropic, and of uniform thickness over the area influenced by the test.
- Prior to pumping, the piezometric surface is horizontal over the area that will be influenced by the test
- The aquifer is pumped at a constant discharge rate.
- The well penetrates the entire thickness of the aquifer and thus receives water by horizontal flow.

6.3.2 Theis Method

The Theis equation was used to analyze the data collected from the DDRC pumping test. The Theis equation was developed for confined aquifers with unsteady-state flow. The Theis equation is shown below:

$$s = \frac{Q}{4 \pi T} W(u)$$

where:

$$W(u) = \text{Theis well function} = \int_{u}^{\infty} \frac{e^{-u}}{u} du$$

Q = pumping rate

s = storage coefficient

u = $r^2S/(4Tt)$

s = drawdown

T = transmissivity

t = time since pumping began

r = radius to observation well from pumping well

The solution to the Theis equation is based on a curve-fitting method. A type curve was developed by Theis and is used to determine a value for the well function in the Theis equation so the equation can be easily solved.

In an unconfined aquifer, water levels in piezometers near the well often tend to decline at a slower rate than that described by the Theis equation (Kruseman and DeRidder, 1989). This slower rate can be attributed to delayed drainage caused from the dewatering of the aquifer. The delayed drainage is not apparent during the very early and very late stages of the test. During these early and late stages, the unconfined aquifers response is the same as that of a confined aquifer. Therefore, it follows that the Theis type curve analysis would be valid for these stages of the test.

Although most the basic assumptions for the Theis method apply to an unconfined aquifer, the assumption that the aquifer is of uniform thickness does not apply. Since the aquifer is dewatered during the test, the thickness of the aquifer decreases as the water level drops. A correction in the drawdown data must be applied before analysis by the Theis method. The equation for the corrected drawdown is shown below:

$$s' \text{ (corrected drawdown)} = s-(s^2/2b)$$

where:

s = actual drawdown

b = saturated thickness

6.3.3 Cooper and Jacob Method

The Cooper and Jacob method is based on the Theis equation and is shown below:

$$T = \frac{2.30\,Q}{4\,\pi\,\Delta s}$$

where:

T = transmissivity

Q = pumping rate

Δs = change in drawdown per log cycle of time

Cooper and Jacob determined that, after a sufficiently long pumping time, the well function in the Theis equation would become insignificantly small and therefore could be neglected (Cooper and Jacob, 1946). Therefore, a plot of the time drawdown on a semilog paper yields a straight line and, based on the slope of that line, a solution can be derived.

However, since the Cooper and Jacob method was derived from the Theis equation, it is also applicable only to the very early and late stages of an unconfined aquifer pumping test.

6.3.4 Neuman Method (Modified Boulton)

Boulton (1954) developed a method to characterize the flow to a well in an unconfined aquifer with the effects of delayed yield (drainage). Two sets of type curves were developed by Boulton to take in to account the delayed drainage. However, this method relied upon a semiempirical value known as Boulton's delay index.

Neuman (1975) developed his own method for analyzing delayed drainage which is similar to the Boulton method. The Neuman method does not rely on the semiempirical Boulton delay index.

The Neuman method was used to analyze the DDRC pumping test data in place of the Boulton method as specified in the work plan (ES, 1992). However, the Neuman method should provide an equal or better estimate of the aquifer characteristics than the Boulton method.

6.4 Pumping Test Data Analysis

6.4.1 Transmissivity

The transmissivity values calculated from the test data are presented in Table 6.1. Graphs of the data are in Appendix G. Transmissivity values ranged from 1.197 square feet per minute (ft^2/min) to 1.969 ft^2/min, with a mean of 1.385 ft^2/min. The late drawdown data were used in the Cooper and Jacob and the Theis methods since the delayed yield effects were negligible late in the test. In addition, values for transmissivity calculated using the late data will also provide a better estimate on the effects of the pump-and-treat system on the aquifer since the system may pump for many years.

The Theis recovery method was used to analyze recovery data from each of the wells and piezometers. However, the method was designed for confined aquifers. In an unconfined aquifer, elastic storage of the formation will have an effect on the recovery until late in the recovery period when these effects have dissipated. Plots of recovery data for the DDRC pumping test do not show the characteristic straight line needed to accurately determine transmissivity. Therefore, the values obtained using this method would be less accurate than those obtained from the drawdown methods.

6.4.2 Hydraulic Conductivity

The hydraulic conductivity values calculated from the results of the pumping test are presented in Table 6.1. Hydraulic conductivity values were calculated by dividing the transmissivities by the aquifer thickness of 20 feet. The values range from 6.0×10^{-2} feet per minute (ft/min) to 9.8×10^{-2} ft/min, with a mean of 6.91×10^{-2} ft/min.

6.4.3 Specific Yield

The specific yield (storativity) values calculated from the test data are presented in Table 6.1. These values range from 0.18 to 0.2526, with a mean of 0.19 based only on the Theis and Cooper-Jacob values for PZ-62, PZ-63, and MW-3. The typical range of specific yield in unconfined aquifers is 0.01 to 0.30. The lower

Table 6.1 Calculated Aquifer Characteristics

Well	Analysis Method	Hydraulic Conductivity k (ft/min)	Transmissivity T (ft^2/min)	Specific Yield S
PZ-61	Neuman	0.060	1.204	0.025
	Theis	0.075	1.501	0.065
	Cooper-Jacob	0.070	1.396	0.071
PZ-62	Neuman	0.066	1.328	0.018
	Theis	0.073	1.462	0.182
	Cooper-Jacob	0.067	1.345	0.169
PZ-63	Neuman	0.060	1.197	0.028
	Theis	0.060	1.208	0.252
	Cooper-Jacob	0.066	1.319	0.197
Pumping well	Cooper-Jacob	0.068	1.361	-
MW-3	Cooper-Jacob	0.063	1.27	0.16
PZ-61	Theis recovery	0.062	1.232	-
PZ-62	Theis recovery	0.080	1.605	-
PZ-63	Theis recovery	0.098	1.969	-
Mean		0.0691	1.385	0.19
Standard Deviation		0.0102	0.206	0.037
η		14	14	5

values on Table 6.1 were calculated from the Neuman analysis. However, according to Kruseman and DeRidder (1989), the Neuman curve fitting method can yield unreasonably low values for specific yield. The specific yield values from PZ-61 are lower due to the increased efforts from delayed yield since the well is located close to the pumping well. Specific yield values can not be calculated the recovery data; however, in the Theis recovery method S" (the ratio of the specific yield during pumping to the specific yield during recovery) was calculated. This value is presented on the drawdown graph in Appendix G.

6.4.4 Specific Capacity

The specific capacity of a well is its yield per unit drawdown, usually expressed as gallons of water per minute per foot of drawdown (gpm/ft). The specific capacity of the pumping well is based on the total drawdown of approximately 4.16 feet and the pumping rate of 24.3 gpm. The specific capacity is 5.84 gpm/ft.

6.4.5 Well Efficiency

The well efficiency for the pumping test well was calculated as the ratio of projected drawdown based on the drawdown in the piezometers to actual drawdown in the pumping well. Figure 6.2 shows the projected drawdown of 3.45 feet when the actual drawdown was 4.16. Therefore, well efficiency is 83 percent.

6.4.6 Well Yield

Based on a specific capacity of 5.84 gpm/ft and a assumed maximum allowable drawdown in the pumping well of 13 feet (67 percent of the 20-foot saturated thickness to allow for pump placement), the maximum well yield is approximately 75 gpm.

6.4.7 Radius of Influence

The radius of influence was determined by plotting the drawdowns for each piezometer and MW-3 at the end of the test and their corresponding radial distance from the well. Figure 6.2 is a distance drawdown graph showing the estimated radius of influence of approximately 110 feet while pumping at a rate of 24.3 gpm.

The estimated radius of influence (R) based on a rate of 75 gpm can be calculated from the following steady-state equation;

$$Q = \frac{K (H^2 - h^2)}{1{,}055 \log R/r}$$

Assuming;

Q (well yield) = 75 gpm

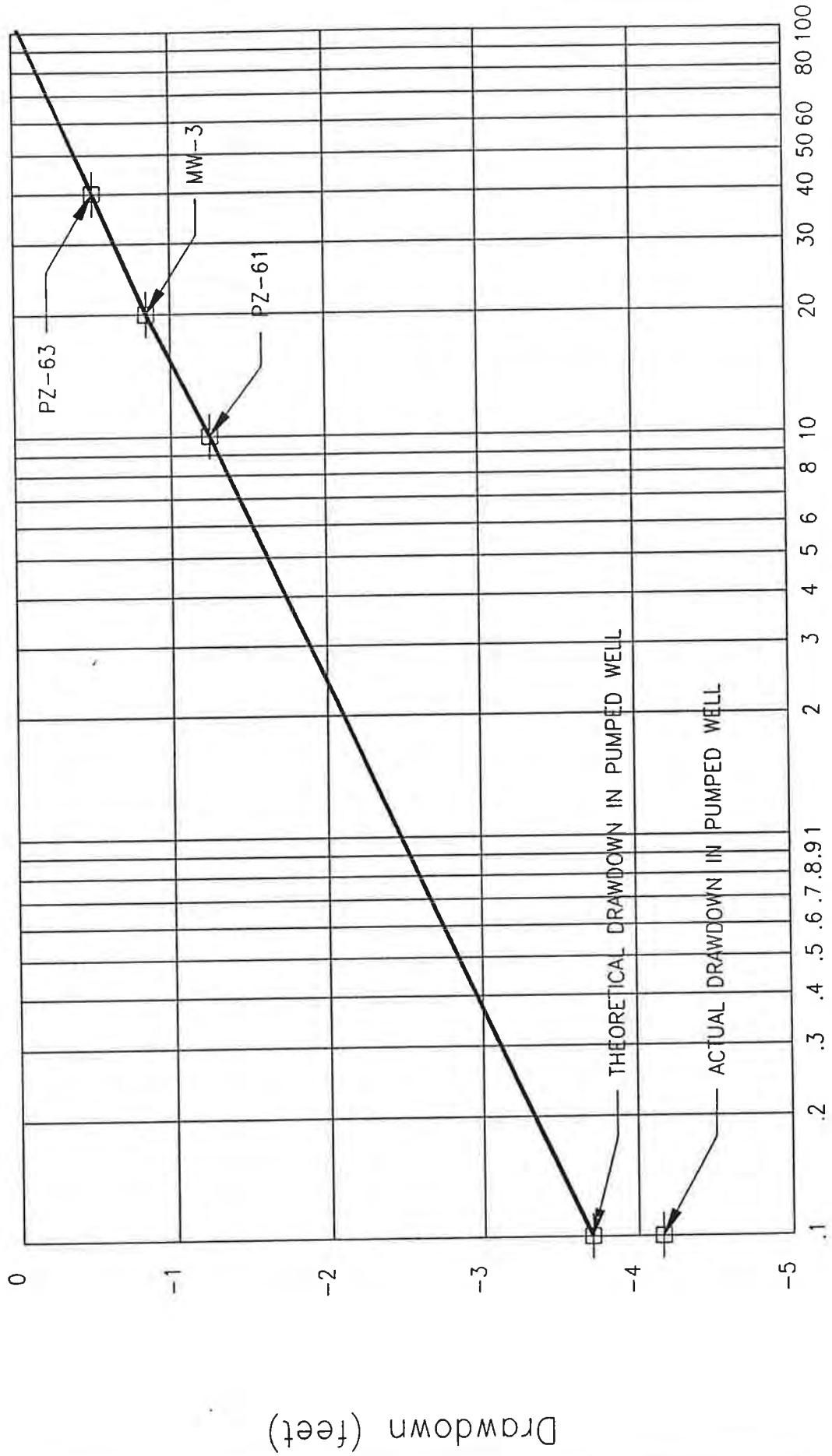
k (average hydraulic conductivity) = 700 gpd/ft2

H (static head) = 20 ft

h (head in the well) = 7 ft

r (radius of the well) = 0.33 ft

FIGURE 6.2
Distance Drawdown Graph Showing Radius of Influence



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The calculated radius of influence is approximately 420 feet. It should be noted that this value does not imply a capture zone for the pump and treat system.

6.4.8 Isotropy

Figure 6.3 shows the distance drawdown graphs in the northeast-southwest direction (MW-3 and PZ-63) and in the northwest-southeast direction (PZ-61 and PZ-62). Both graphs indicate that the Fluvial Aquifer is relatively isotropic in the vicinity of the pumping well.

7.0 RESULTS OF CHEMICAL ANALYSIS

7.1 Soil

A summary of the chemical analysis for the soil samples collected during well and piezometer installation are presented in Table 7.1. The table shows analytes for which constituents were found above detection limits. Laboratory data sheets are in Appendix E.

7.2 Discharge Water

A summary of the chemical analysis on the discharge water samples are presented in Table 7.2. The table shows analytes for which constituents were found above detection limits. Laboratory data sheets are in Appendix E.

All three of the discharge water samples indicate the presence of volatile organics. The concentrations of each of the constituents detected increased throughout the pumping test with the exception of 1,1,2,2-tetrachloroethane, which increased during the first 24 hours but decreased somewhat by the end of the test. This corresponds approximately with the headspace data in Table 5.1. Consequently, a pump-and-treat system could pump for at least 42 hours at 24.3 gpm without reducing the concentrations of VOCs. If, however, after prolonged pumping (i.e., >42 hours), the concentrations decrease, then pulsed pumping may be required.

The analytical results (Table 7.2) also show no organics were detected, with the exception of one acetone hit, in the treated discharge sample collected from the holding tank. Acetone was not found in the raw pump test water and can be attributed to laboratory contamination. These results indicate that the treatment system was effective.

8.0 DISPOSAL OF DISCHARGE WATER

As discussed in section 5.5, all of the water from the test was contained in a 70,000-gallon holding tank after passing through a granular activated carbon unit. Table 7.2 indicates that no VOCs were detected (with the exception of one acetone hit) and it appears that the holding tank water can be released for disposal without impact to human health or the environment with proper permits and regulatory approval.

FIGURE 6.3
Graphs Showing Isotropic Conditions in the Fluvial Aquifer

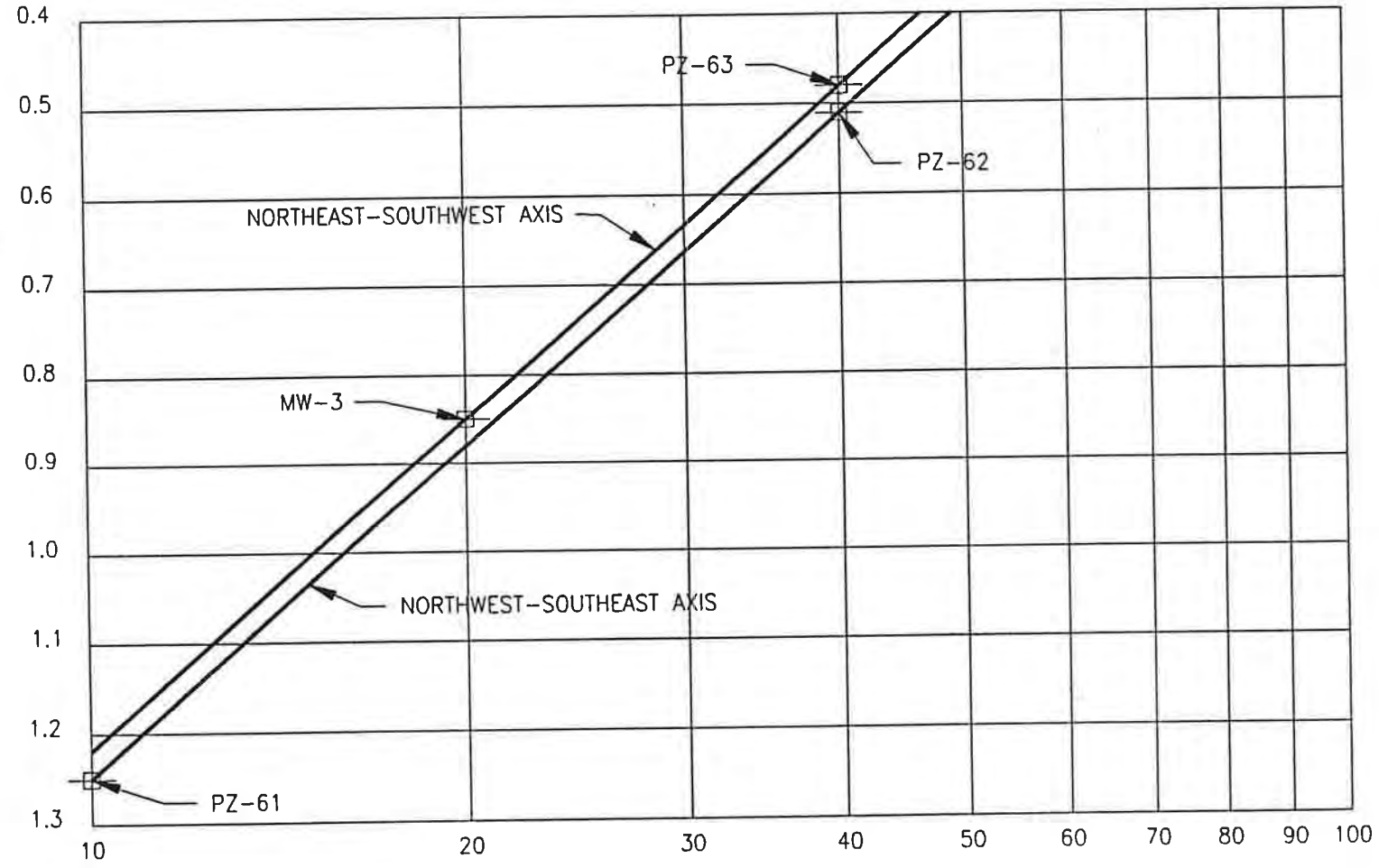

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Table 7.1
Analytes Detected In Soil Cuttings
Defense Distribution Region Central

	SAMPLE ID / SAMPLE DATE							
	PUMP TEST WELL		PZ61		PZ62		PZ63	
	SS1–15	SS2–25	SS1–5	SS2–73	SS1–5	SS2–45	SS1–5	SS2–35
CONSTITUENT	8–26–92	8–26–92	8–27–92	8–27–92	8–29–92	8–29–92	8–29–92	8–29–92
Volatiles (ug/Kg)								
Methylene Chloride	11	6	16	11	ND	7 J	9 J	8 J
Acetone	17	14	ND	ND	ND	22 J	21 J	31 J
1,1 Dichloroethene	ND	ND	ND	ND	ND	ND	68	190
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	23
Trichloroethene	ND	ND	ND	ND	12	ND	ND	5
1,1,2,2 Tetrachloroethane	ND	ND	ND	10	ND	ND	ND	18
Semi–Volatiles (ug/Kg)								
Diethylphthalate	ND	ND	ND	ND	ND	ND	ND	2600
Phenanthracene	ND	ND	ND	ND	3400	ND	ND	ND
Anthracene	ND	ND	ND	ND	1000	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	4100	ND	ND	ND
Pyrene	ND	ND	ND	ND	4800	ND	ND	ND
Benzo(a)Anthracene	ND	ND	ND	ND	2700	ND	ND	ND
Chrysene	ND	ND	ND	ND	2200	ND	ND	ND
Benzo(b)Fluoranthene	ND	ND	ND	ND	2800	ND	ND	ND
Benzo(k)Fluoranthene	ND	ND	ND	ND	970	ND	ND	ND
Benzo(a)Pyrene	ND	ND	ND	ND	2000	ND	ND	ND
Ideno(1,2,3–cd)Pyrene	ND	ND	ND	ND	2100	ND	ND	ND
Benzo(g,h,i)Perylene	ND	ND	ND	ND	1700	ND	ND	ND
Pesticides (ug/Kg)								
4,4'–DDD	ND	ND	ND	ND	1100	4.6	ND	10
4,4'–DDE	ND	ND	ND	ND	370	ND	ND	ND
4,4'–DDT	ND	ND	ND	ND	1100	5.2	ND	ND
Dieldrin	ND	ND	ND	ND	37	ND	9.3	4

Table 7.1
Analytes Detected In Soil Cuttings
Defense Distribution Region Central (Continued)

	SAMPLE ID / SAMPLE DATE							
	PUMP TEST WELL		PZ61		PZ62		PZ63	
	SS1–15	SS2–25	SS1–5	SS2–73	SS1–5	SS2–45	SS1–5	SS2–35
CONSTITUENT	8–26–92	8–26–92	8–27–92	8–27–92	8–29–92	8–29–92	8–29–92	8–29–92
Inorganics (mg/Kg)								
Antimony	ND	ND	ND	ND	7.8	ND	ND	ND
Arsenic	3	3.1	6.3	0.46 B	11.3	2	4.5	2.2
Barium	46.1	48.6	124	ND	323	18.6 B	84.7	31.2
Cadmium	ND	ND	0.36 B	ND	2.2	ND	ND	ND
Chromium	8.5	11	24.2	ND	96	16.1	9.7	19.2
Copper	9.1	7.8	41.6	ND	647	4.8	13.2	7.3
Lead	10.8	7.5	158	ND	545	7.2	9.8	10.1
Mercury	ND	ND	ND	ND	0.04 B	ND	ND	ND
Nickel	7.5	7.6	13.4	ND	29	4.1	11.8	6.7
Selenium	0.15 B	ND	0.12 B	0.15 B	0.17 B	ND	0.20 B	0.12 B
Silver	ND	ND	ND	ND	9.2	ND	ND	ND
Zinc	23.5	22.3	149	3.5	942	13.1	44.3	19.6

B Below reporting value but above detection limit
J Estimated
Target compounds analysed: volatile organics, semi–volatile organics, pesticides, PCB's, agent mustard, thiodiglycol and trace metals
ND None detected, see analyses in Appendix E for detection limits

Table 7.2
Analytes Detected In Discharge Water
Defense Distribution Region Central

	SAMPLE ID / SAMPLE DATE					
	RAW WATER			TREATED WATER		
CONSTITUENT	PTW–RW1 9–15–92	PTW–RW2 9–16–92	PTW–RW3 9–17–92	PTW–TW1 9–17–92	PTW–TW2 9–17–92	PTW–TW3 9–17–92
Volatiles (ug/L)						
Acetone	ND	ND	ND	12	ND	ND
1,1 Dichloroethene	45	ND	50	ND	ND	ND
1,2 Dichloroethene (Total)	47	170	220	ND	ND	ND
Trichloroethene	120	340	360	ND	ND	ND
Tetrachloroethene	74	87	100	ND	ND	ND
1,1,2,2 Tetrachloroethane	320	890	750	ND	ND	ND
Inorganics (ug/L)						
Barium	129 B	114 B	113 B	111 B	126 B	124 B
Copper	4.3 B	5.4 B	ND	ND	ND	ND
Lead	3.1	1.6 B	2.8 B	2.6 B	2.4 B	3.1
Nickel	ND	ND	ND	ND	5.4 B	ND
Zinc	24.1	15.7	11.1 B	47.2	52.7	52.5

B Below reporting value but above detection limit
Target compounds analysed: volatile organics, semi–volatile organics, pesticides, PCB's, agent mustard, thiodiglycol and trace metals
ND None detected, see analyses in Appendix E for detection limit

9.0 CONCLUSIONS

- Calculated transmissivity values obtained from the test range from 1.197 ft^2/min to 1.969 ft^2/min, with a mean of 1.385 ft^2/min.
- Calculated hydraulic conductivity values obtained from the test range from 6.0×10^{-2} ft/min to 9.8×10^{-2}, with a mean of 6.91×10^{-2} ft/min.
- Calculated specific yield values obtained from the test range from 0.018 to 0.25, with a mean of 0.19.
- The specific capacity of the pumping well is 5.84 gpm/ft and the efficiency is 83 percent.
- The Fluvial Aquifer is relatively isotropic in the vicinity of the pumping well.
- Values obtained from the pumping test compare well with hydraulic conductivities from silty sands to clean sands presented by Freeze and Cherry (1979). Sieve analyses from samples collected in the saturated zone of the Fluvial Aquifer during the RI also indicate that the aquifer is composed of primarily silty and clean sands (Law, 1990).
- The pumping well that was installed for the test appears to be capable of sustaining a pumping rate of approximately 75 gpm with a corresponding radius of influence of approximately 420 feet.
- The results of the chemical analysis indicate that pumping at 24.3 gpm for 42 hours did not lower concentrations of organics in the discharge water.

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Appendix A

Well Construction and Boring Logs

BORFORM1

BORING LOG	BORING/WELL NO.: PUMP TEST WELL		Page 1 of 2
INSTALLATION: Defense Distribution Region Central		SITE: Dunn Field	
PROJECT NO.: SL016.21	CLIENT/PROJECT: USACE / DDRC		
CONTRACTOR: Engineering-Science	DRILLING CONTRACTOR: Tri-State	DRILLERS: G. Baker	
DRILLING STARTED: 24 August 1992	DRILLING ENDED: 25 August 1992	BOREHOLE DIA'S	
DRILLING METHOD RIG/TYPE: Hollow Stem Auger			
LOGGED BY: L.L. Gorday	E-LOG ( ) FROM TO	PROTECTION LEVEL: D	

DEPTH (FEET)	SAMPLE	SAMPLE NO	ORGANIC VAPORS bdap (ppm)	RECOVERY	LITHOLOGIC DESCRIPTION	USCS	BLOWS/6in	GRAPH LOG	WELL DATA	REMARKS
0			0		SILT with little SAND, and CLAY, slightly cohesive, moderately sorted damp, reddish brown.	ML				
2			0		SAND and SILT with little CLAY, moderately sorted, non-cohesive, trash including nails and thin rusty metal pieces	SM				
7			0		SILT with little SAND, and CLAY, poorly cohesive, damp, dark reddish brown, no trash	ML				
12	SS1-15		0		SILT with some CLAY, gray, cohesive, damp, moderately plastic	ML				
16			0		SILT with little CLAY, light olive brown, cohesive, slightly plastic, damp	ML				
22	SS2-25		0		SILT with some CLAY, mottled gray and brown, cohesive, slightly plastic, damp	ML				duplicate labeled PTW-SS3-35
27			0		SILT with little CLAY trace SAND, slightly cohesive, very slightly plastic, brown	ML				

U = THIN WALL TUBE
L = LITHOLOGY
S = SPLIT-SPOON (TUBE)
A = ANALYSIS
R = ROCK CORING
O = OTHER

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BORFORM1

BORING LOG

BORING/WELL NO.: PUMP TEST WELL | Page 2 of 2

INSTALLATION: Defense Distribution Region Central | SITE: Dunn Field

PROJECT NO.: SL016.21 | CLIENT/PROJECT: USACE / DDRC

CONTRACTOR: Engineering-Science | DRILLING CONTRACTOR: Tri-State | DRILLERS: G. Baker

DRILLING STARTED: 24 August 1992 | DRILLING ENDED: 25 August 1992 | BOREHOLE DIA'S

DRILLING METHOD RIG/TYPE: Hollow Stem Auger

LOGGED BY: L.L. Gorday | E-LOG ( ) FROM TO | PROTECTION LEVEL: D

DEPTH (FEET)	SAMPLE	SAMPLE NO.	ORGANIC VAPORS bdp (ppm)	RECOVERY	LITHOLOGIC DESCRIPTION	USCS	BLOWS/6in	GRAPH LOG	WELL DATA	REMARKS
33			0		SILT with little SAND and CLAY, trace pebbles, cohesive, slightly plastic, reddish brown	ML				
37			0		SAND with little SILT and CLAY, trace pebbles, well graded, moderately sorted, cohesive, damp, reddish brown	SW				
43			0		SAND with little GRAVEL, trace SILT, moderately sorted and graded, gravel size increasing with depth	SW				
50			0		SAND wit little SILT, trace GRAVEL, damp to moist, reddish yellow	SW				
58			4		GRAVEL and SAND, damp, brown, moderately sorted	GW				
66			3		SAND with little GRAVEL, yellowish brown, wet, well graded and moderately well sorted	SW				
78			0		CLAY with some SILT, plastic, cohesive, light olive brown, some lamination	CH				
80										

U = THIN WALL TUBE
L = LITHOLOGY
S = SPLIT-SPOON (TUBE)
A = ANALYSIS

R = ROCK CORING

O = OTHER

ES ENGINEERING-SCIENCE

BORFORM1

BORING LOG

BORING/WELL NO.: PZ61 | Page 1 of 2

INSTALLATION: Defense Distribution Region Central | SITE: Dunn Field

PROJECT NO.: SL016.21 | CLIENT/PROJECT: USACE / DDRC

CONTRACTOR: Engineering-Science | DRILLING CONTRACTOR: Tri-State | DRILLERS: G. Baker

DRILLING STARTED: 26 August 1992 | DRILLING ENDED: 26 August 1992 | BOREHOLE DIA'S

DRILLING METHOD RIG/TYPE: Hollow Stem Auger

LOGGED BY: L.L. Gorday | E-LOG ( ) FROM TO | PROTECTION LEVEL: D

DEPTH (FEET)	SAMPLE	SAMPLE NO.	ORGANIC VAPORS (ppm)	RECOVERY	LITHOLOGIC DESCRIPTION	USCS	BLOWS/6IN.	GRAPH LOG	WELL DATA	REMARKS
0	SS	1-5	0		SILT with some SAND, brown non-cohesive, well sorted and graded, dry. Some debris, including nails	ML				
6					as above but dark brown, no trash	ML				
8			0		SILT with trace CLAY, non-cohesive, very dark gray, increasing clay with depth	ML				
12			0		SILT with little CLAY, dark yellowish brown, cohesive, very slightly plastic	ML				
22			0		SILT with trace CLAY, non-plastic, slightly cohesive, yellowish brown	ML				
28			0		SILT with trace CLAY, cohesive, very slightly plastic, damp, dark yellowish brown	ML				
34			0		SILT with little CLAY, trace pebbles, cohesive, slightly plastic, dark brown	ML				
39			3		SAND and SILT with little CLAY, grading to SAND with little SILT, damp, reddish brown, non-cohesive	SM				

U = THIN WALL TUBE
L = LITHOLOGY
S = SPLIT-SPOON (TUBE)
A = ANALYSIS

R = ROCK CORING

O = OTHER

ES ENGINEERING-SCIENCE

BORDPM1

BORING LOG

BORING/WELL NO.: PZ61

INSTALLATION: Defense Distribution Region Central | SITE: Dunn Field

PROJECT NO.: SL016.21 | CLIENT/PROJECT: USACE / DDRC

CONTRACTOR: Engineering-Science | DRILLING CONTRACTOR: Tri-State | DRILLERS: G. Baker

DRILLING STARTED: 26 August 1992 | DRILLING ENDED: 26 August 1992 | BOREHOLE DIA'S

DRILLING METHOD RIG/TYPE: Hollow Stem Auger

LOGGED BY: L.L. Gorday | E-LOG ( ) FROM TO | PROTECTION LEVEL: D

DEPTH (FEET)	SAMPLE	SAMPLE NO.	ORGANIC VAPORS bdsp (ppm)	RECOVERY	LITHOLOGIC DESCRIPTION	USCS	BLOWS/6in	GRAPH LOG	WELL DATA	REMARKS
53			2		SAND strong brown, well sorted and graded, moist	SW				
68			1		SAND with some GRAVEL, moderately sorted, well graded, strong brown, moist	SW				
73	SS	2-73			SAND, well sorted, well graded, strong brown, wet	SW				
75										

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ES ENGINEERING-SCIENCE

FORM A-1

BORING LOG

BORING/WELL NO.: PZ62 | Page 1 of 1

INSTALLATION: Defense Distribution Region Central | SITE: Dunn Field

PROJECT NO.: SL016.21 | CLIENT/PROJECT: USACE / DDRC

CONTRACTOR: Engineering-Science | DRILLING CONTRACTOR: Tri-State | DRILLERS: G. Baker

DRILLING STARTED: 28 August 1992 | DRILLING ENDED: 28 August 1992 | BOREHOLE DIA'S

DRILLING METHOD RIG/TYPE: Hollow Stem Auger

LOGGED BY: L.L. Gorday | E-LOG ( ) FROM TO | PROTECTION LEVEL: D

DEPTH (FEET)	SAMPLE	SAMPLE NO.	ORGANIC VAPORS bdsp (ppm)	RECOVERY	LITHOLOGIC DESCRIPTION	USCS	BLOWS/6in	GRAPH LOG	WELL DATA	REMARKS
0			0		SILT with little SAND, well sorted, well graded, cohesive, brown, moist	ML				
3	SS	1-5	0		SILT with trace SAND, dry, some nails, non-cohesive, very dark grayish brown	ML				
7			0		SILT with trace SAND, slightly cohesive, well sorted, moist, olive brown	ML				
18			0		SILT with trace CLAY, cohesive, very slightly plastic, damp, olive gray	ML				
33			0		SILT with little SAND, trace GRAVEL, slightly plastic, dark brown	ML				
43	SS	2-45	0		SAND with some SILT, trace GRAVEL, slightly cohesive, wet, dark brown	SM				
47			0		SAND with little SILT and GRAVEL, moist, poorly sorted, brown	SP				
49			0		SAND with little SILT, moist, moderately to poorly sorted, reddish brown	SP				
52			0		SAND with trace SILT and GRAVEL, well sorted, moist, yellowish brown, becoming wetter with depth	SW				
75										

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ES ENGINEERING-SCIENCE

BORING LOG

BORING/WELL NO.: PZ63 | Page 1 of 2

INSTALLATION: Defense Distribution Region Central | SITE: Dunn Field

PROJECT NO.: SL016.21 | CLIENT/PROJECT: USACE / DDRC

CONTRACTOR: Engineering-Science | DRILLING CONTRACTOR: Tri-State | DRILLERS: G. Baker

DRILLING STARTED: 28 August 1992 | DRILLING ENDED: 28 August 1992 | BOREHOLE DIA'S

DRILLING METHOD RIG/TYPE: Hollow Stem Auger

LOGGED BY: L.L. Gorday | E-LOG ( ) FROM TO | PROTECTION LEVEL: D

DEPTH (FEET)	SAMPLE	SAMPLE NO.	ORGANIC VAPORS bzsp. (ppm)	RECOVERY	LITHOLOGIC DESCRIPTION	USCS	BLOWS/6in	GRAPH LOG	WELL DATA	REMARKS
0			0		SILT with trace SAND, and CLAY, well sorted, damp to moist, cohesive, yellowish red	ML				
4	SS	1-5	0		SILT with some SAND, poorly to moderately sorted, moderately graded, poorly cohesive, few nails near top of interval, reddish brown	ML				
8			0		SILT with trace SAND, and CLAY, slightly cohesive, damp, reddish brown	ML				
15			0		SILT with little CLAY, trace SAND, moderately cohesive, slightly plastic, moist, dark reddish gray	ML				
23			0		Silt with little CLAY, trace SAND, cohesive, slightly plastic, dark yellowish brown	ML				
33	SS	2-35	2		SAND, well sorted, well graded, moist to wet, strong brown	SW				
46			0		SAND, well sorted, well graded, yellowish brown, non-cohesive, moist	SW				
55			0		SAND with little GRAVEL, well graded, well sorted, non-cohesive, moist, yellowish brown	SW				

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ES ENGINEERING-SCIENCE

BORFORM1

BORING LOG	BORING/WELL NO.: PZ63	Page 2 of 2
INSTALLATION: Defense Distribution Region Central		SITE: Dunn Field
PROJECT NO.: SL016.21	CLIENT/PROJECT: USACE / DDRC	
CONTRACTOR: Engineering-Science	DRILLING CONTRACTOR: Tri-State	DRILLERS: G. Baker
DRILLING STARTED: 28 August 1992	DRILLING ENDED: 28 August 1992	BOREHOLE DIA'S
DRILLING METHOD RIG/TYPE: Hollow Stem Auger		
LOGGED BY: L.L. Gorday	E-LOG ( ) FROM TO	PROTECTION LEVEL: D

DEPTH (FEET)	SAMPLE	SAMPLE NO.	ORGANIC VAPORS: bzsp (ppm)	RECOVERY	LITHOLOGIC DESCRIPTION	USCS	BLOWS/6in.	GRAPHIC LOG	WELL DATA	REMARKS
71			0		SAND, well sorted, well graded, wet, yellowish red	SW				
75										

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A = ANALYSIS

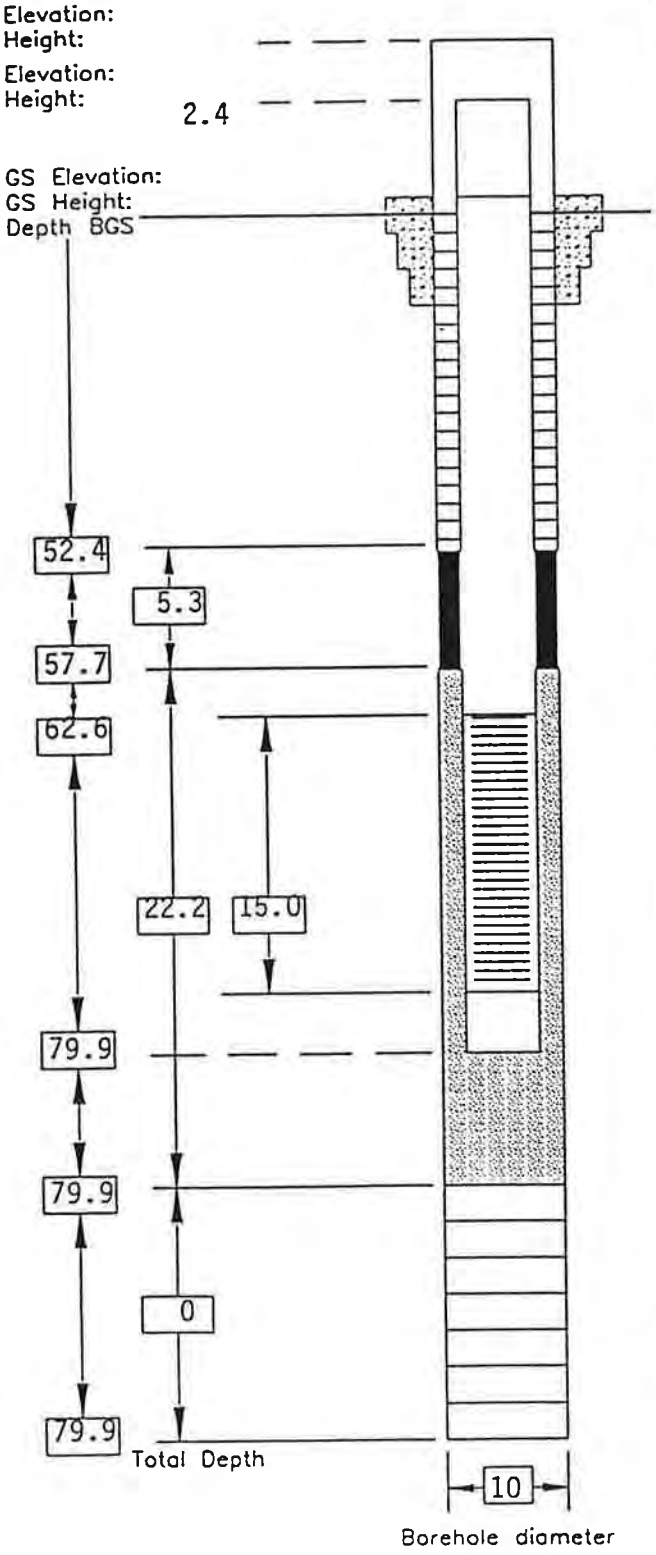
R = ROCK CORING

O = OTHER

ES ENGINEERING-SCIENCE

MONITORING WELL CONSTRUCTION LOG -Standard

WELL NO.: Pump Test W.	INSTALLATION: Defense Distribution Region Central	SITE:
PROJECT NO.: SL016.21	CLIENT/PROJECT: USACE / DDRC	
	DRILLING CONTRACTOR: Tri-State Testing	
COMP. START: 25 August 1992	COMP. END: 29 August 1992	
BUILT BY:	WELL COORD.:	

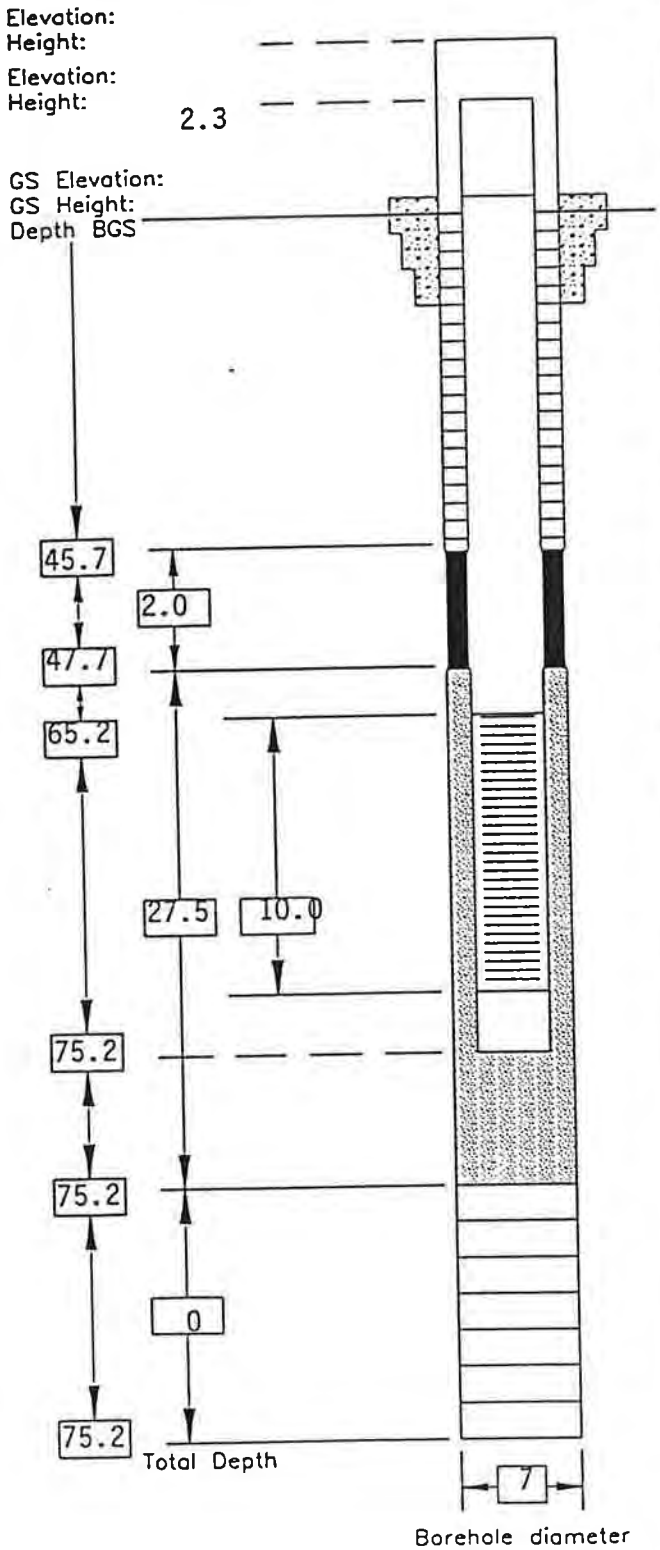


PROTECTIVE CGS Material Type	Steel
Diameter	6" Water Tight Seal( )
Depth BGS	2.5' Weep Hole ( )
GUARD POSTS( ) No.	Type
SURFACE PAD Composition & Site	Concrete 3'x3'x4"
RISER PIPE Type	PVC
Diameter	4 inch
GROUT Composition & Proportions	3-5% Bentonite in Cemet
Interval	0 - 52.4' Tremied (X)
CENTRALIZERS( ) Depth(s)	NA
SEAL Type	¼" Bentonite pellets
Source	Polymer Drilling Systems
Setup/Hydration time	overnite Vol. Fluid Added 1 gallon
Tremied ( )	
FILTER PACK Type	Silica sand
Amount Used	7 bags Tremied (X)
Source	Texas Mining Co.
Gr. Size Dist.	10 / 20
SCREEN Type	PVC
Diameter	4 inch
Slot Size & Type	0.020" Circumslot (Brainard-Kil)
Interval BGS	62.6 - 77.6
SUMP (X) Interval BGS	77.6 - 79.9 Bottom Cap (X)
BACKFILL PLUG Material	NA
Setup/Hydration Time	Tremied ( )
WATER ADDED ( ) Interval	Amount
Interval	Amount

ES ENGINEERING-SCIENCE

MONITORING WELL CONSTRUCTION LOG -Standard

WELL NO.: PZ61	INSTALLATION: Defense Distribution Region Central	SITE:
PROJECT NO.: SL016.21	CLIENT/PROJECT: USACE / DDRC	
	DRILLING CONTRACTOR: Tri-State Testing	
COMP. START: 26 August 1992	COMP. END: 29 August 1992	
BUILT BY:	WELL COORD.:	

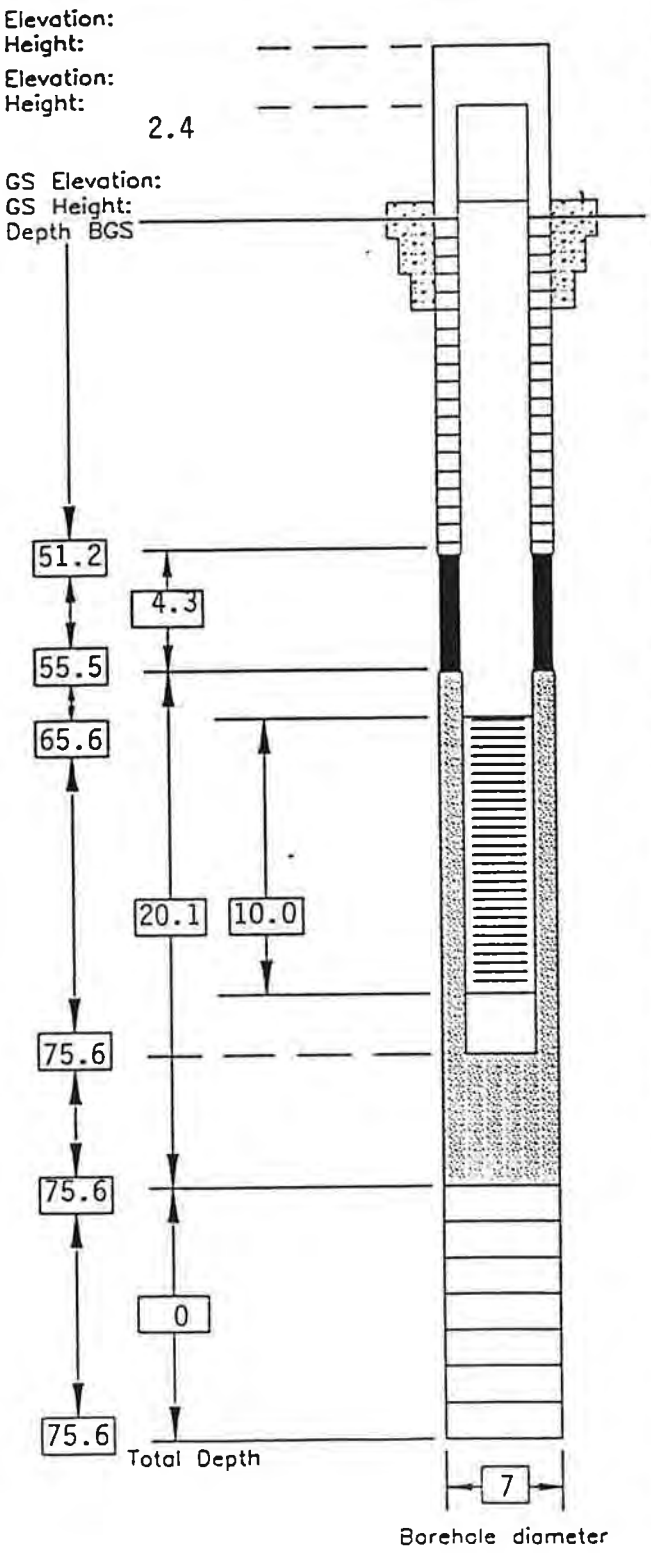


PROTECTIVE CGS Material Type	Steel		
Diameter	4"	Water Tight Seal( )	
Depth BGS	2.5'	Weep Hole ( )	
GUARD POSTS( ) No.	4	Type	Steel
SURFACE PAD Composition & Site	2'x2'x4"		
RISER PIPE Type	PVC		
Diameter	1" flush joint		
GROUT Composition & Proportions	Portland with 3-5% bentonite		
Interval	0 - 45.7'	Tremied (X)	
CENTRALIZERS( ) Depth(s)	NA		
SEAL Type	¼" bentonite pellets		
Source	Polymer Drilling Systems		
Setup/Hydration time	3 days	Vol. Fluid Added	1 gallon
Tremied ( )			
FILTER PACK Type	Silica sand		
Amount Used	3 bags	Tremied (X)	
Source	Texas Mining Co.		
Gr. Size Dist.	10 / 20		
SCREEN Type	PVC		
Diameter	1 inch		
Slot Size & Type	0.010" mill slot		
Interval BGS	65.2 - 75.2'		
SUMP ( ) Interval BGS		Bottom Cap (X)	
BACKFILL PLUG Material	NA		
Setup/Hydration Time		Tremied ( )	
WATER ADDED ( ) Interval		Amount	
Interval		Amount	

ES ENGINEERING-SCIENCE

MONITORING WELL CONSTRUCTION LOG -Standard

WELL NO.: PZ62	INSTALLATION: Defense Distribution Region Central	SITE:
PROJECT NO.: SL016.21	CLIENT/PROJECT: USACE / DDRC	
	DRILLING CONTRACTOR: Tri-State Testing	
COMP. START: 28 August 1992	COMP. END: 29 August 1992	
BUILT BY:	WELL COORD.:	

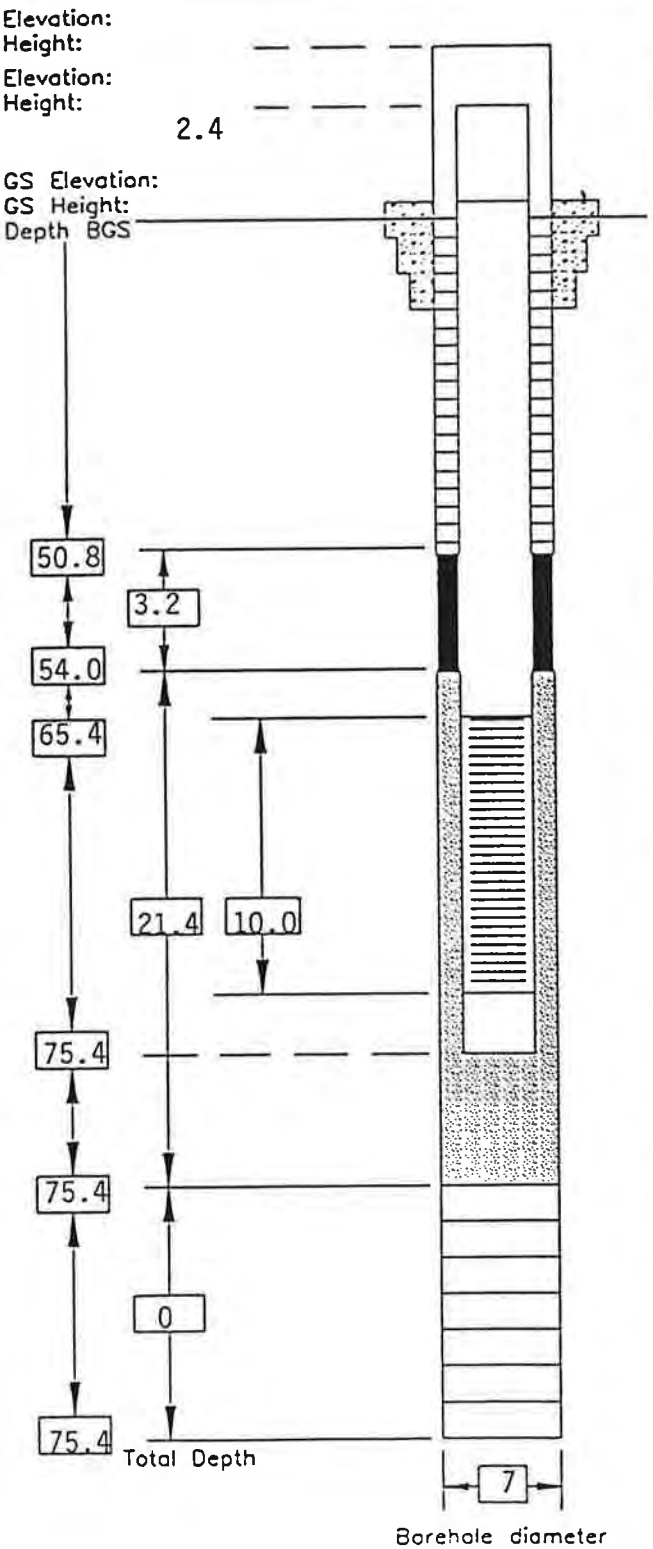


PROTECTIVE CGS Material Type	Steel
Diameter 4 inch	Water Tight Seal( )
Depth BGS 2.5'	Weep Hole ( )
GUARD POSTS( ) No. 4	Type Steel
SURFACE PAD Composition & Site	Concrete 2'x2'x4"
RISER PIPE Type	PVC
Diameter	1" flush joint
GROUT Composition & Proportions	Portland with3-5% bentonite
Interval 0 - 51.2'	Tremied (X)
CENTRALIZERS( ) Depth(s)	NA
SEAL Type	¼" bentonite pellets
Source	Polymer Drilling Systems
Setup/Hydration time overnite	Vol. Fluid Added 1 gallon
Tremied ( )	
FILTER PACK Type	Silica sand
Amount Used 3 bags	Tremied (X)
Source	Texas Mining Co.
Gr. Size Dist.	10 / 20
SCREEN Type	PVC
Diameter	1 inch
Slot Size & Type	0.010" mill slot
Interval BGS	65.6 - 75.6
SUMP ( ) Interval BGS	Bottom Cap (X)
BACKFILL PLUG Material	NA
Setup/Hydration Time	Tremied ( )
WATER ADDED ( ) Interval	Amount
Interval	Amount

ES ENGINEERING-SCIENCE

MONITORING WELL CONSTRUCTION LOG -Standard

WELL NO.: PZ63	INSTALLATION: Defense Distribution Region Central	SITE:
PROJECT NO.: SL016.21	CLIENT/PROJECT: USACE / DDRC	
	DRILLING CONTRACTOR: Tri-State Testing	
COMP. START: 28 August 1992	COMP. END: 29 August 1992	
BUILT BY:	WELL COORD.:	

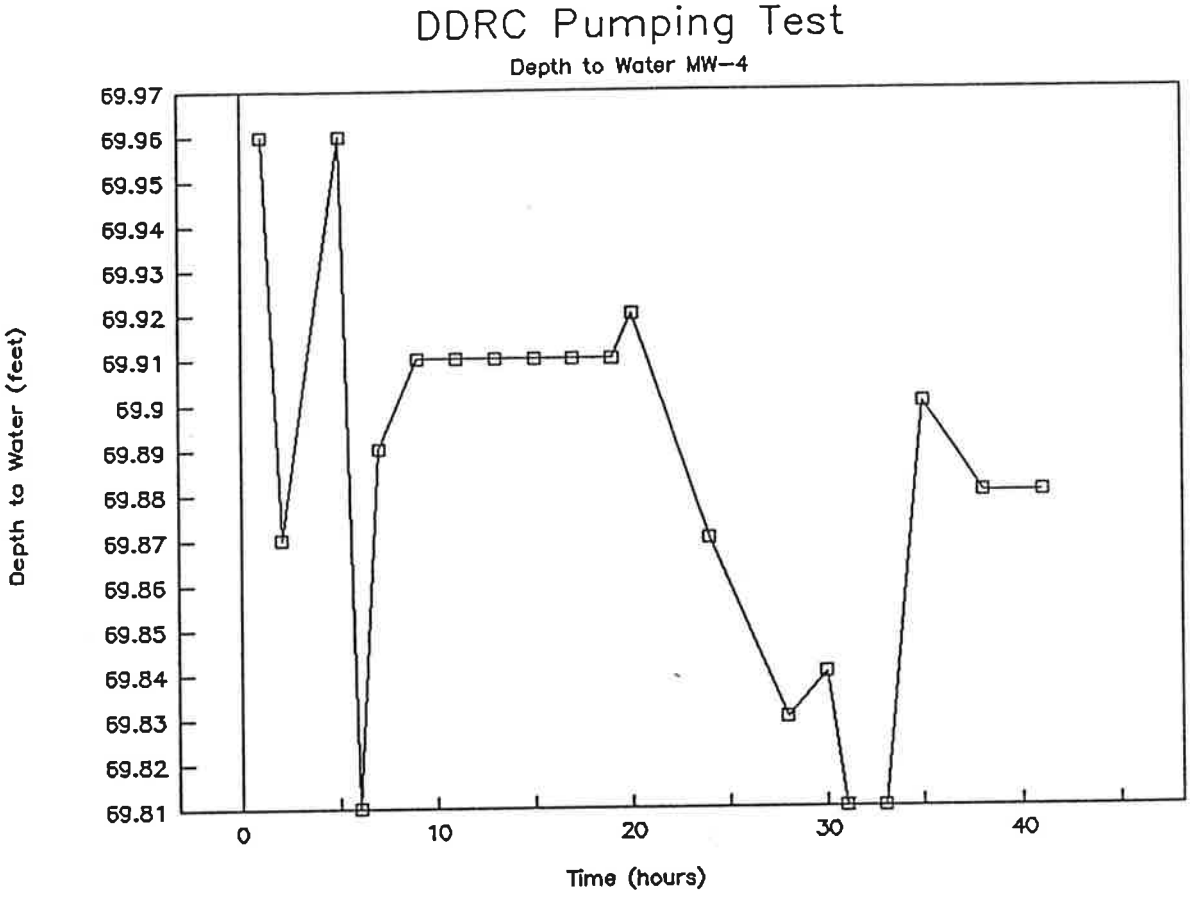


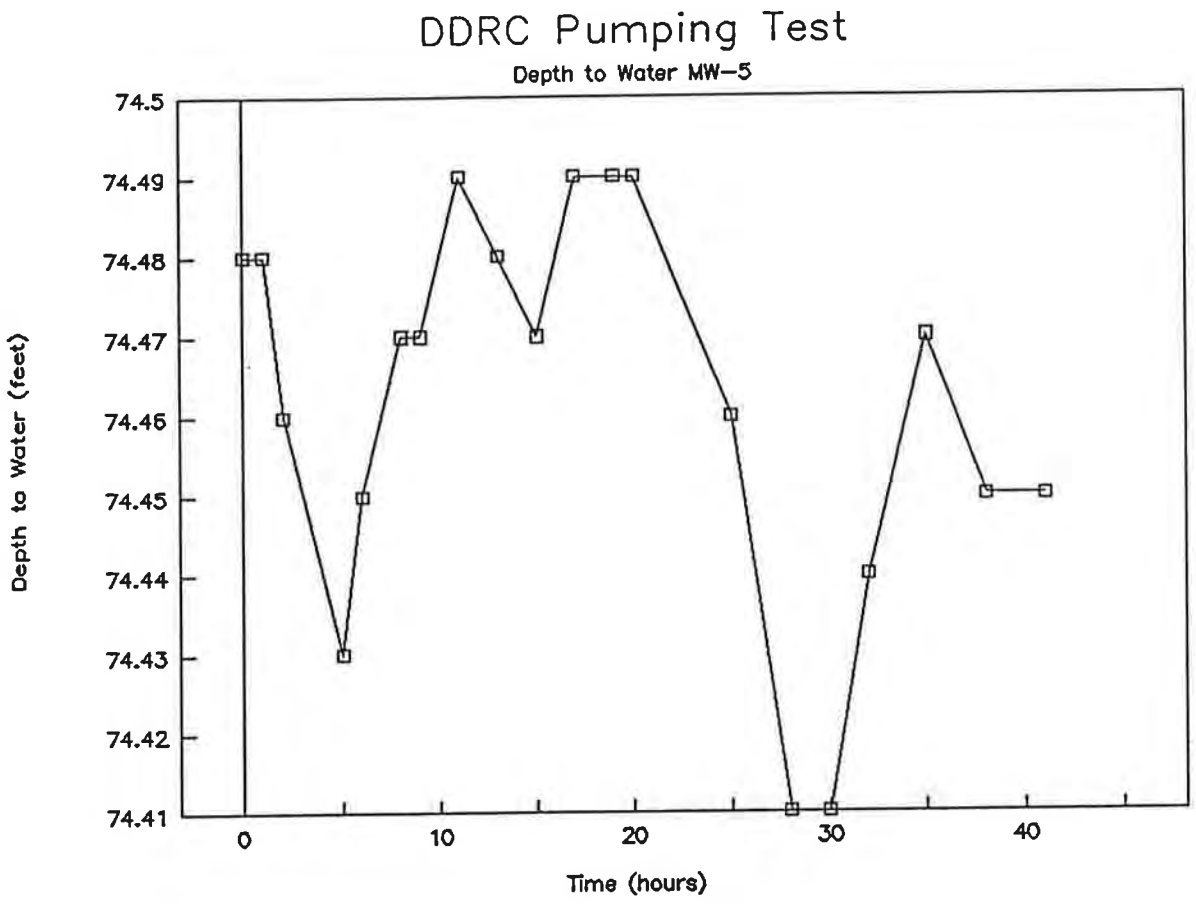
PROTECTIVE CGS Material Type	Steel
Diameter	4" Water Tight Seal( )
Depth BGS	2.5' Weep Hole ( )
GUARD POSTS( ) No.	4 Type Steel
SURFACE PAD Composition & Site	Concrete 2'x2'x4"
RISER PIPE Type	PVC
Diameter	1" flush joint
GROUT Composition & Proportions	Portland with 3-5% bentonite
Interval	0 - 50.8' Tremied (X)
CENTRALIZERS( ) Depth(s)	NA
SEAL Type	¼" bentonite pellets
Source	Polymer Drilling Systems
Setup/Hydration time	overnite Vol. Fluid Added 1 gallon
Tremied ( )	
FILTER PACK Type	Silica sand
Amount Used	3 bags Tremied (X)
Source	Texas Mining Co.
Gr. Size Dist.	10 / 20
SCREEN Type	PVC
Diameter	1 inch
Slot Size & Type	0.010" mill slot
Interval BGS	65.4 - 75.4
SUMP ( ) Interval BGS	Bottom Cap (X)
BACKFILL PLUG Material	NA
Setup/Hydration Time	Tremied ( )
WATER ADDED ( ) Interval	Amount
Interval	Amount

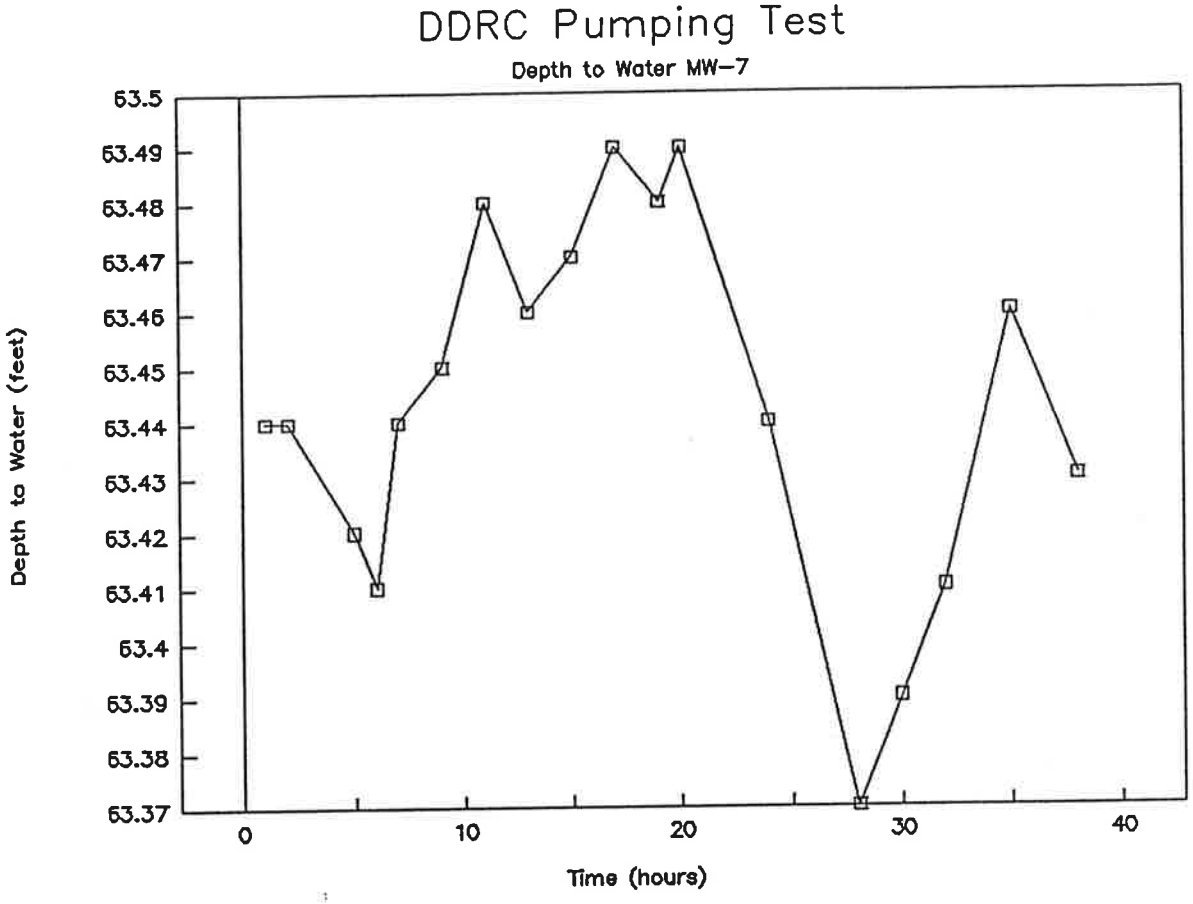
ES ENGINEERING-SCIENCE

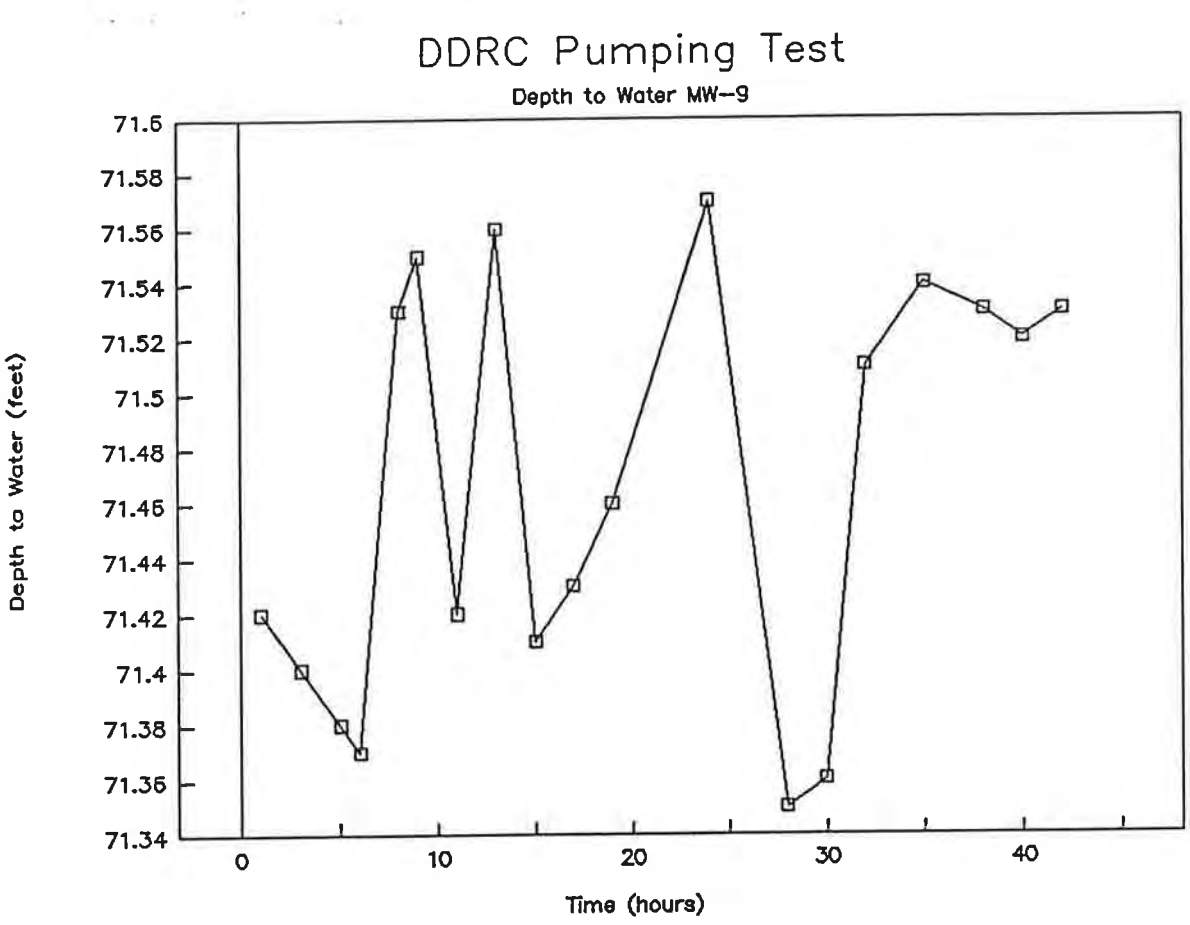
Appendix B

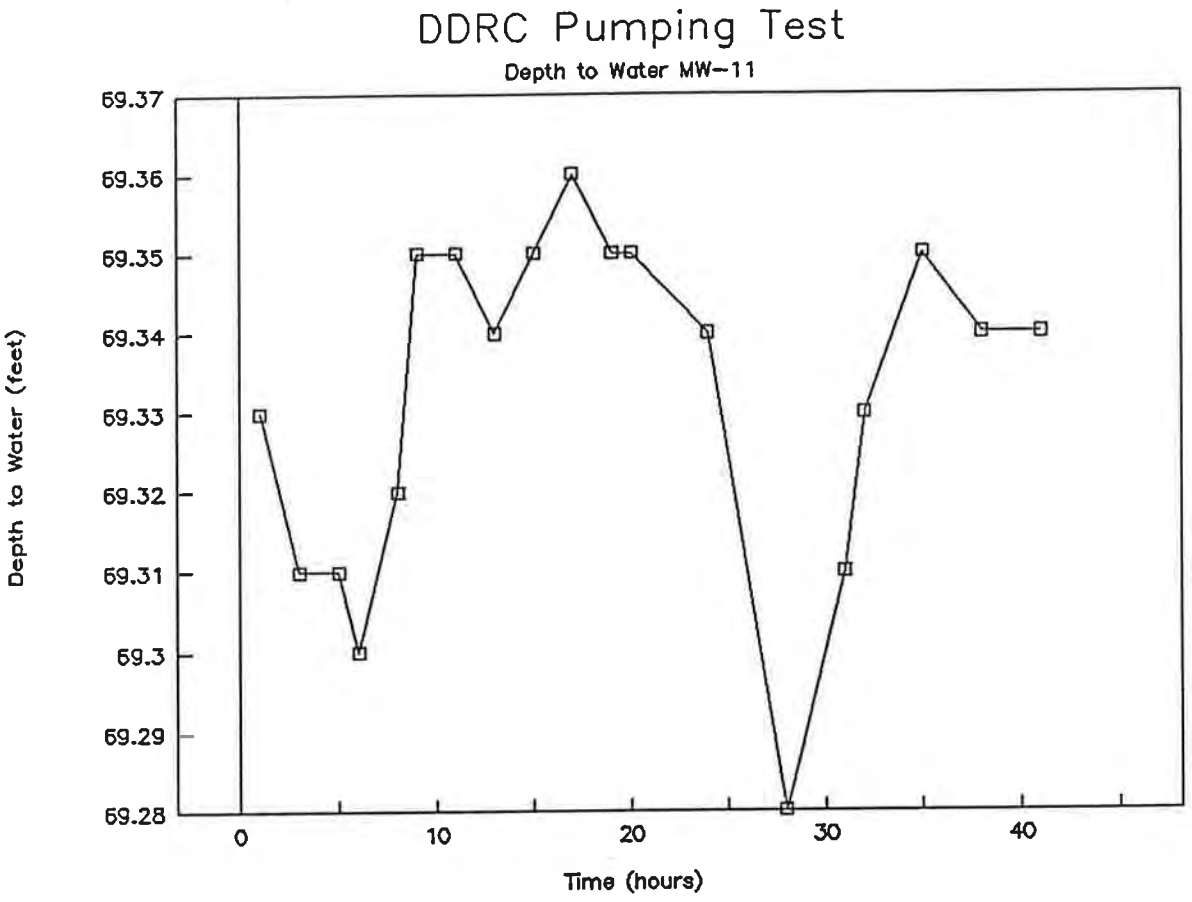
Hydrographs of Observation Wells

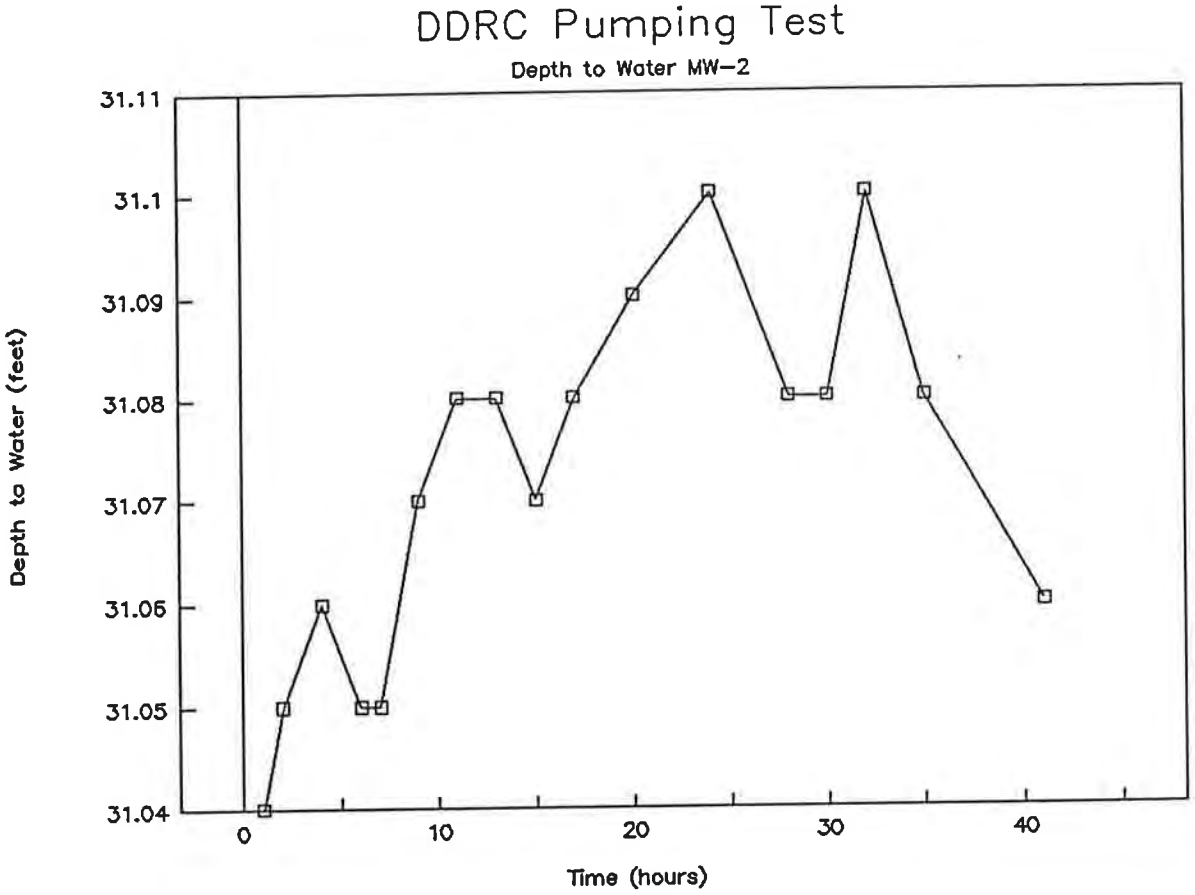

DDRC Pumping Test
Depth to Water MW-4
Depth to Water (feet)
69.97
69.96
69.95
69.94
69.93
69.92
69.91
69.9
69.89
69.88
69.87
69.86
69.85
69.84
69.83
69.82
69.81
0
10
20
30
40
Time (hours)


DDRC Pumping Test
Depth to Water MW-5
Depth to Water (feet)
74.5
74.49
74.48
74.47
74.46
74.45
74.44
74.43
74.42
74.41
0
10
20
30
40
Time (hours)


DDRC Pumping Test
Depth to Water MW-7
Depth to Water (feet)
63.5
63.49
63.48
63.47
63.46
63.45
63.44
63.43
63.42
63.41
63.4
63.39
63.38
63.37
0
10
20
30
40
Time (hours)


DDRC Pumping Test
Depth to Water MW-9
Depth to Water (feet)
71.6
71.58
71.56
71.54
71.52
71.5
71.48
71.46
71.44
71.42
71.4
71.38
71.36
71.34
0
10
20
30
40
Time (hours)


DDRC Pumping Test
Depth to Water MW-11
Depth to Water (feet)
69.37
69.36
69.35
69.34
69.33
69.32
69.31
69.3
69.29
69.28
0
10
20
30
40
Time (hours)


DDRC Pumping Test
Depth to Water MW-2
Depth to Water (feet)
31.11
31.1
31.09
31.08
31.07
31.06
31.05
31.04
0
10
20
30
40
Time (hours)

DDRC Memphis, Tennessee
Pumping Test Water Level Data
MW-5

Date	Time	Water Level Measurement (feet)
9/15/92	1004	74.54
	1241	74.48
	1440	74.46
	1642	74.43
	1817	74.45
	1940	74.47
	2113	74.47
	2322	74.49
9/16/92	0127	74.48
	0315	74.47
	0514	74.49
	0656	74.49
	0825	74.49
	1240	74.46
	1615	74.41
	1830	74.41
	2020	74.44
	2305	74.47
9/17/92	0205	74.45
	0506	74.45
	0702	74.48
	0841	74.46
	1238	74.45
	1635	74.41
	1828	74.43
9/18/92	0844	74.49

DDRC Memphis, Tennessee
Pumping Test Water Level Data
MW-7

Date	Time	Water Level Measurement (feet)
9/15/92	1034	63.53
	1305	63.44
	1433	63.44
	1630	63.42
	1807	63.41
	1931	63.44
	2104	63.45
	2312	63.48
9/16/92	0109	63.46
	0305	63.47
	0505	63.49
	0648	63.48
	0811	63.49
	1200	63.44
	1604	63.37
	1821	63.39
	2012	63.41
	2256	63.46
9/17/92	0157	63.43
	0653	63.45
	0834	63.45
	1231	63.44
	1626	63.38
	1819	63.42
9/18/92	0824	63.49

DDRC Memphis, Tennessee
Pumping Test Water Level Data
MW-9

Date	Time	Water Level Measurement (feet)
9/15/92	1039	71.63
	1308	71.42
	1435	71.40
	1634	71.38
	1810	71.37
	1934	71.53
	2107	71.55
	2316	71.42
9/16/92	0112	71.56
	0308	71.41
	0508	71.43
	0650	71.46
	0815	71.57
	1203	71.57
	1608	71.35
	1823	71.36
	2015	71.51
	2300	71.54
9/17/92	0200	71.53
	0500	71.52
	0655	71.53
	0836	71.41
	1234	71.40
	1628	71.47
9/18/92	0830	71.59
	1634	71.38
	1821	71.51

E5/SL01622/MW-9TBL

DDRC Memphis, Tennessee
Pumping Test Water Level Data
MW-11

Date	Time	Water Level Measurement (feet)
9/15/92	1001	69.40
	1240	69.33
	1443	69.31
	1651	69.31
	1819	69.30
	1943	69.32
	2115	69.35
	2325	69.35
9/16/92	0124	69.34
	0318	69.35
	0516	69.36
	0657	69.35
	0828	69.35
	1212	69.34
	1617	69.28
	1832	69.31
	2025	69.33
	2308	69.35
9/17/92	0208	69.34
	0509	69.34
	0704	69.36
	0842	69.36
	1240	69.35
	1635	69.30
	1830	69.32
9/18/92	0850	69.37

DDRC Memphis, Tennessee
Pumping Test Water Level Data
MW-30

Date	Time	Water Level Measurement (feet)
9/15/92	1032	43.22
9/16/92	1848	43.18
9/17/92	0900	43.13
	1651	43.06
9/18/92	1005	43.12

E5/SL01622/MW-30TBL

DDRC Memphis, Tennessee
Pumping Test Water Level Data
MW-31

Date	Time	Water Level Measurement (feet)
9/15/92	1036	64.17
9/16/92	1845	64.11
9/17/92	0857	64.05
	1648	63.95
9/18/92	1102	64.09

E5/SL01622/MW-31TBL

DDRC Memphis, Tennessee
Pumping Test Water Level Data
MW-2

Date	Time	Water Level Measurement (feet)
9/15/92	1045	31.07
	1234	31.04
	1302	31.05
	1431	31.05
	1626	31.06
	1805	31.05
	1929	31.05
	2102	31.07
	2309	31.08
9/16/92	0108	31.08
	0303	31.07
	0503	31.08
	0808	31.09
	1158	31.10
	1603	31.08
	1820	31.08
	2010	31.10
	2254	31.08
9/17/92	0456	31.06
	0650	31.06
	0832	31.06
	1229	31.04
	1624	31.03
	1817	31.04
9/18/92	0822	30.94

E5/SL01622/MW-2TBL

DDRC Memphis, Tennessee
Pumping Test Water Level Data
MW-4

Date	Time	Water Level Measurement (feet)
9/15/92	1008	69.96
	1243	69.90
	1438	69.87
	1649	69.86
	1841	69.81
	1938	69.89
	2111	69.91
	2320	69.91
9/16/92	0117	69.91
	0312	69.91
	0511	69.91
	0654	69.91
	0820	69.92
	1207	69.87
	1612	69.83
	1827	69.84
	2018	69.81
	2302	69.90
9/17/92	0203	69.88
	0503	69.88
	0658	69.89
	0839	69.88
	1236	69.88
	1631	69.82
	1826	69.86
9/18/92	0840	69.93

ES/SL01622/MW-4TBL

AQUIFER TEST DATA

Owner DDRC Address Airways County Shelby State TN

DUNN FIELD Company performing test ES Measured by ____

Well No MW-J Distance from pumping well ____ Type of test ____ Test No 1

Measuring equipment Slope Indicator Water Level Sounder

Time Data
Pump on: Date ____ Time ____ (t.)
Pump off: Date ____ Time ____ (t')
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous pumping? Yes ____ No ____
Duration ____ End ____

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		Comments on factors affecting test data
9-15	2400X					74.54					24 +gpm			
	1200	0												starts @ 12 pm
	1241	41				74.48								
	1440					74.46								
	1642					74.43								
	1817					74.45								
SS	1948	1940				74.47								
	1~~9~~ 2113					74.47								
	2322					74.49								
9-16	0127					74.48								
	0315					74.47								
	0514					74.49								
	0656					74.49								
	0525					74.49								
	010					74.46								
	1615					74.41								
	1830					74.41								
	2020					74.44								
	2305					74.47								
9-17	0205					74.45								
	0506					74.45								Q = 24.58 gpm
	0600													pump off
	0702					74.46								
	0841					74.46								
	1233					74.45								raining
	1635					74.41								
	1828					74.43								
9-18	0844					74.49								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No MW-4 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		Comments on factors affecting test data
5/8/92	1000					69.96								
	1200	0												start pump
	1243	43				69.90								
	1438					69.87								
	1649					69.86								
	1814					69.81								
	1938					69.89								
	2111					69.91								
	2326					69.91								
9-14	0117					69.91								
	0312					69.91								
	0511					69.91								
	0654					69.91								
	0836					69.92								
	1207					69.87								Joe/John
	1612					69.83								
	1827					69.84								
	2018					69.81								
	2302					69.90								
9-17	0203					69.88								Q = 24.38 GPM
	0503					69.88								
	0600													pump off
	0653					69.89								
	0839					69.88								
	1234					69.88								raining
	1631					69.82								
	1826					69.86								
9-18	0840					69.93								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No MW-7 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t.)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
9-15	1074					63.53								
	1305					63.44								
	1437	153				63.44								
	1630					63.42								
	1807					63.41								
	1931					63.44								
	2104					63.45								
	2317					63.48								
9-16	0109					63.46								
	0305					63.47								
	0505					63.49								
	0648					63.48								
	084					63.49								
	1200					63.44								gpm/gal
	1604					63.37								
	1821					63.39								
	2012					63.41								
	2256					63.46								
9-17	0157					63.43								
	0458					63.43								Q = 24.38 gpm
	0600													pump off
	0653					63.43								
	0834					63.45								
	1231					63.44								
	1426					63.38								
	1819					63.42								
9-17	0824					63.43								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No MW-9 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t..)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
9-15	1039					71.63								
	1200	0												Pump start
	1358	68				71.42								
	1435	155				71.40								
	1634					71.38								
	1810					71.37								
	1934					71.53								
	2107					71.55								
	2316					71.42								
9-16	0112					71.56								
	0308					71.41								
	0508					71.43								
	0650					~~71.36~~	JB 46							
	0815					71.57	71.57							
	1203					~~71.44~~	71.51							Joe/Jeb
	1608					71.35								
	1823					71.36								
	2015					71.51								
	2300					71.54								
9-17	0200					71.53								
	0500					71.52								Q = 24.38 gpm
	0600													→ pump off
	0655					71.53								
	0836					71.41								
	1234					71.40								
	1628					71.47								
9-18	0836					71.57								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No MW-9 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t.)
Pump off: Date _____ Time _____ (t'.)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
	1634					71.38								
	~~1821~~					~~71.51~~ 71.41								
	1821					71.51								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No MW-11 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (*t*)
Pump off: Date _____ Time _____ (*t'*)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started *t*	Time since pump stopped *t'*	*t*/*t'*		Water level measurement	Correction or Conversion	Water level	Water level change *s* or *s'*		Discharge measurement	Rate		
9/15/24	1001					69.40'								
	1200													Start pump
	1240					69.33								
	1443					69.31								
	1651					69.31								
	1819					69.30								
	1943					69.32								
	2115					69.35								
	2325					69.31								
9-16	1324	0124				69.34								
	0318					69.35								
	0516					69.36								
	0657					69.35								
	0828					69.31								
	1212					69.34								
	1617					69.28								
	1832					69.31								
	2025					69.33								
	2308					69.35								
9-17	0208					69.34								Q = 24.38 gpm
	0509					69.34								
	0600													Pump off
	0704					69.36								
	0842					69.36								
	1240					69.35								
	1636					69.30								
	1838					69.32								
9-18	0850					69.37								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No MW-30 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t_i)
Pump off: Date _____ Time _____ (t'_i)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
5/9/92	1032					43.22								
6/9/92	0848					43.18								
7/1/92	0900					43.13								
	1651					43.06								
8/18/92	1005					43.12								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No MW-3 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t.)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
5/9/92	1636					64.17								
6/9/92	0845					64.11								
7/17/92	0737					64.05								
	1648					63.95								
7/18/92	1102					64.09								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No MW-2 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
	1[illegible]							31.05						SWL
9-15	1045					31.07								TD 31.68
	1234	34				31.04								
	1301	[illegible]				31.05								
	1321	151				31.05								
	1626					31.06								
	1805	365				31.05								
	1929					31.05								
	2102					31.07								
	2301	1.08				31.08								
9-16	0308	0108				31.08								
	0303					31.07								
	0503					31.08								
	0703					31.09								
	1153					31.10								
	1603					31.08								
	1820					31.08								
	2014					31.10								
	2254					31.08								
9-17	0456					31.06								Q = 24.38 gpm
	0600													pump off
	0650					31.06								
	0852					31.06								
	1224					31.04								
	1624					31.03								
	1817					31.04								
9-18	0852					30.94								

Appendix C

Step-test Drawdown Data

SE1000B
Environmental Logger
09/15 09:08

Unit# 00223 Test# 0

INPUT 1: Level (F) 10C

Reference	62.17
Scale factor	20.06
Offset	- 0.14

Step# 0 09/14 13:49

Elapsed Time	Value
0.0000	62.13
0.0033	62.13
0.0066	62.14
0.0099	62.13
0.0133	62.13
0.0166	62.13
0.0200	62.14
0.0233	62.13
0.0266	62.14
0.0300	62.13
0.0333	62.13
0.0500	62.15
0.0666	62.13
0.0833	62.14
0.1000	62.15
0.1166	62.14
0.1333	62.13
0.1500	62.15
0.1666	62.14
0.1833	62.14
0.2000	62.14
0.2166	62.14
0.2333	62.13
0.2500	62.13
0.2666	62.13
0.2833	62.13
0.3000	62.14
0.3166	62.13
0.3333	62.13
0.4167	62.13
0.5000	62.13
0.5833	62.13
0.6667	62.13
0.7500	62.13
0.8333	62.13
0.9167	62.13
1.0000	62.13
1.0833	62.13
1.1667	62.13
1.2500	62.14
1.3333	62.13
1.4166	62.14
1.5000	62.14
1.5833	62.14
1.6667	62.14
1.7500	62.13
1.8333	62.14

2.5000	62.13
3.0000	62.15
3.5000	62.13
4.0000	62.13
4.5000	62.14
5.0000	62.13
5.5000	62.12
6.0000	62.13
6.5000	62.14
7.0000	62.13
7.5000	62.13
8.0000	62.13
8.5000	62.13
9.0000	62.13
9.5000	62.13
10.0000	62.12

END

SE1000B
Environmental Logger
09/15 09:11

Unit# 00223 Test# 0

INPUT 2: Level (F) 10C

Reference	62.30
Scale factor	19.93
Offset	0.12

Step# 0 09/14 13:49

Elapsed Time	Value
0.0000	62.30
0.0033	62.31
0.0066	62.30
0.0099	62.30
0.0133	62.30
0.0166	62.30
0.0200	62.30
0.0233	62.30
0.0266	62.30
0.0300	62.30
0.0333	62.29
0.0500	62.28
0.0666	62.30
0.0833	62.30
0.1000	62.30
0.1166	62.30
0.1333	62.30
0.1500	62.30
0.1666	62.30
0.1833	62.30
0.2000	62.30
0.2166	62.30
0.2333	62.30
0.2500	62.29
0.2666	62.30
0.2833	62.30
0.3000	62.29
0.3166	62.28
0.3333	62.29
0.4167	62.30
0.5000	62.30
0.5833	62.30
0.6667	62.30
0.7500	62.29
0.8333	62.30
0.9167	62.30
1.0000	62.29
1.0833	62.28
1.1667	62.29
1.2500	62.31
1.3333	62.29
1.4166	62.31
1.5000	62.29
1.5833	62.29
1.6667	62.30
1.7500	62.30
1.8333	62.30

2.5000	62.30
3.0000	62.30
3.5000	62.29
4.0000	62.29
4.5000	62.29
5.0000	62.30
5.5000	62.30
6.0000	62.28
6.5000	62.30
7.0000	62.29
7.5000	62.29
8.0000	62.30
8.5000	62.30
9.0000	62.30
9.5000	62.30
10.0000	62.28

END

SE1000B
Environmental Logger
09/15 09:15

Unit# 00223 Test# 1

INPUT 1: Level (F) TOC

Reference	62.17
Scale factor	20.06
Offset	- 0.14

Step# 0 09/14 14:02

Elapsed Time	Value
0.0000	62.13
0.0033	62.13
0.0066	62.13
0.0099	62.13
0.0133	62.13
0.0166	62.14
0.0200	62.13
0.0233	62.14
0.0266	62.13
0.0300	62.32
0.0333	63.31
0.0500	62.98
0.0666	63.62
0.0833	64.10
0.1000	64.43
0.1166	64.54
0.1333	64.65
0.1500	64.74
0.1666	64.81
0.1833	64.89
0.2000	64.94
0.2166	64.99
0.2333	65.02
0.2500	65.05
0.2666	65.07
0.2833	65.10
0.3000	65.11
0.3166	65.13
0.3333	65.14
0.4167	65.17
0.5000	65.18
0.5833	65.18
0.6667	65.16
0.7500	65.15
0.8333	65.10
0.9167	65.07
1.0000	65.07
1.0833	65.06
1.1667	65.00
1.2500	64.97
1.3333	64.96
1.4166	64.95
1.5000	64.96
1.5833	64.95
1.6667	64.97
1.7500	64.97
1.8333	64.98

2.5000	64.88
3.0000	64.85
3.5000	64.83
4.0000	64.72
4.5000	64.67
5.0000	64.67
5.5000	64.65
6.0000	64.55
6.5000	64.55
7.0000	64.55
7.5000	64.56
8.0000	64.56
8.5000	64.55
9.0000	64.56
9.5000	64.57
10.0000	64.57
12.0000	64.55
14.0000	64.57
16.0000	64.58
18.0000	64.57
20.0000	64.59
22.0000	64.59
24.0000	64.57
26.0000	64.59
28.0000	64.58
30.0000	64.59
32.0000	64.59
34.0000	64.60
36.0000	64.59
38.0000	64.60
40.0000	64.61
42.0000	64.62
44.0000	64.62
46.0000	64.62
48.0000	64.62
50.0000	64.62
52.0000	64.62
54.0000	64.62
56.0000	64.62
58.0000	64.62
60.0000	64.62

END

SE1000B
Environmental Logger
09/15 09:16

Unit# 00223 Test# 1

INPUT 1: Level (F) FOC

Reference	62.17
Scale factor	20.06
Offset	- 0.14

Step# 1 09/14 15:02

Elapsed Time	Value
0.0000	64.63
0.0033	64.63
0.0066	64.63
0.0099	64.64
0.0133	64.64
0.0166	63.93
0.0200	64.33
0.0233	64.35
0.0266	64.26
0.0300	64.13
0.0333	64.02
0.0500	63.50
0.0666	63.08
0.0833	62.79
0.1000	62.56
0.1166	62.39
0.1333	62.24
0.1500	62.13
0.1666	62.04
0.1833	62.00
0.2000	61.96
0.2166	61.93
0.2333	61.91
0.2500	61.91
0.2666	61.92
0.2833	61.91
0.3000	61.92
0.3166	61.94
0.3333	61.96
0.4167	62.08
0.5000	62.21
0.5833	62.28
0.6667	62.31
0.7500	62.32
0.8333	62.32
0.9167	62.32
1.0000	62.34
1.0833	62.32
1.1667	62.32
1.2500	62.32
1.3333	62.32
1.4166	62.32
1.5000	62.31
1.5833	62.31
1.6667	62.30
1.7500	62.30
1.8333	62.30

2.5000	62.29
3.0000	62.28
3.5000	62.27
4.0000	62.27
4.5000	62.26
5.0000	62.26
5.5000	62.26
6.0000	62.25
6.5000	62.25
7.0000	62.24
7.5000	62.24
8.0000	62.25
8.5000	62.24
9.0000	62.23
9.5000	62.24
10.0000	62.23
12.0000	62.22
14.0000	62.22
16.0000	62.22
18.0000	62.20
20.0000	62.20
22.0000	62.20
24.0000	62.19
26.0000	62.18
28.0000	62.17
30.0000	62.17
32.0000	62.17
34.0000	62.17
36.0000	62.16
38.0000	62.17
40.0000	62.17
42.0000	62.15
44.0000	62.15
46.0000	62.15
48.0000	62.15
50.0000	62.14
52.0000	62.15
54.0000	62.15
56.0000	62.15

END

SE1000B
Environmental Logger
09/15 09:18

Unit# 00223 Test# 1

INPUT 2: Level (F) TOC

Reference	62.30
Scale factor	19.93
Offset	0.12

Step# 0 09/14 14:02

Elapsed Time	Value
0.0000	62.30
0.0033	62.29
0.0066	62.30
0.0099	62.30
0.0133	62.29
0.0166	62.30
0.0200	62.30
0.0233	62.30
0.0266	62.30
0.0300	62.30
0.0333	62.30
0.0500	62.30
0.0666	62.31
0.0833	62.31
0.1000	62.33
0.1166	62.33
0.1333	62.35
0.1500	62.36
0.1666	62.36
0.1833	62.36
0.2000	62.38
0.2166	62.38
0.2333	62.39
0.2500	62.39
0.2666	62.40
0.2833	62.40
0.3000	62.40
0.3166	62.40
0.3333	62.41
0.4167	62.41
0.5000	62.41
0.5833	62.43
0.6667	62.42
0.7500	62.42
0.8333	62.42
0.9167	62.42
1.0000	62.43
1.0833	62.43
1.1667	62.43
1.2500	62.43
1.3333	62.43
1.4166	62.43
1.5000	62.44
1.5833	62.44
1.6667	62.44
1.7500	62.45
1.8333	62.45

2.5000	62.45
3.0000	62.45
3.5000	62.45
4.0000	62.45
4.5000	62.44
5.0000	62.45
5.5000	62.45
6.0000	62.45
6.5000	62.45
7.0000	62.46
7.5000	62.46
8.0000	62.47
8.5000	62.47
9.0000	62.47
9.5000	62.47
10.0000	62.46
12.0000	62.47
14.0000	62.47
16.0000	62.48
18.0000	62.47
20.0000	62.48
22.0000	62.48
24.0000	62.49
26.0000	62.49
28.0000	62.49
30.0000	62.50
32.0000	62.50
34.0000	62.50
36.0000	62.50
38.0000	62.52
40.0000	62.52
42.0000	62.51
44.0000	62.52
46.0000	62.52
48.0000	62.52
50.0000	62.53
52.0000	62.53
54.0000	62.52
56.0000	62.52
58.0000	62.53
60.0000	62.52

END

SE1000B
Environmental Logger
09/15 09:19

Unit# 00223 Test# 1

INPUT 2: Level (F) TOC

Reference	62.30
Scale factor	19.93
Offset	0.12

Step# 1 09/14 15:02

Elapsed Time	Value
0.0000	62.53
0.0033	62.53
0.0066	62.53
0.0099	62.53
0.0133	62.52
0.0166	62.53
0.0200	62.53
0.0233	62.53
0.0266	62.53
0.0300	62.53
0.0333	62.53
0.0500	62.53
0.0666	62.52
0.0833	62.51
0.1000	62.50
0.1166	62.48
0.1333	62.48
0.1500	62.48
0.1666	62.47
0.1833	62.46
0.2000	62.46
0.2166	62.45
0.2333	62.45
0.2500	62.44
0.2666	62.44
0.2833	62.44
0.3000	62.43
0.3166	62.43
0.3333	62.43
0.4167	62.43
0.5000	62.43
0.5833	62.43
0.6667	62.43
0.7500	62.43
0.8333	62.43
0.9167	62.43
1.0000	62.43
1.0833	62.43
1.1667	62.41
1.2500	62.43
1.3333	62.42
1.4166	62.41
1.5000	62.42
1.5833	62.41
1.6667	62.41
1.7500	62.41
1.8333	62.41

2.5000	62.40
3.0000	62.40
3.5000	62.40
4.0000	62.40
4.5000	62.39
5.0000	62.39
5.5000	62.38
6.0000	62.38
6.5000	62.38
7.0000	62.38
7.5000	62.38
8.0000	62.38
8.5000	62.37
9.0000	62.37
9.5000	62.38
10.0000	62.38
12.0000	62.37
14.0000	62.36
16.0000	62.35
18.0000	62.36
20.0000	62.35
22.0000	62.33
24.0000	62.34
26.0000	62.33
28.0000	62.33
30.0000	62.32
32.0000	62.32
34.0000	62.32
36.0000	62.31
38.0000	62.32
40.0000	62.32
42.0000	62.31
44.0000	62.31
46.0000	62.31
48.0000	62.31
50.0000	62.31
52.0000	62.31
54.0000	62.31
56.0000	62.31

END

SE1000B
Environmental Logger
09/15 09:21

Unit# 00223 Test# 2

INPUT 1: Level (F) TOC

Reference	62.17
Scale factor	20.06
Offset	- 0.14

Step# 0 09/14 16:00

Elapsed Time	Value
0.0000	62.13
0.0033	62.14
0.0066	62.13
0.0099	62.13
0.0133	62.14
0.0166	62.14
0.0200	62.14
0.0233	62.14
0.0266	62.17
0.0300	63.27
0.0333	62.53
0.0500	63.08
0.0666	63.71
0.0833	64.17
0.1000	64.35
0.1166	64.31
0.1333	64.29
0.1500	64.29
0.1666	64.28
0.1833	64.27
0.2000	64.27
0.2166	64.26
0.2333	64.26
0.2500	64.26
0.2666	64.26
0.2833	64.26
0.3000	64.26
0.3166	64.26
0.3333	64.26
0.4167	64.26
0.5000	64.26
0.5833	64.26
0.6667	64.26
0.7500	64.26
0.8333	64.26
0.9167	64.26
1.0000	64.27
1.0833	64.27
1.1667	64.27
1.2500	64.28
1.3333	64.28
1.4166	64.28
1.5000	64.28
1.5833	64.29
1.6667	64.29
1.7500	64.29
1.8333	64.41
1.9167	64.69

3.0000	64.92
3.5000	64.93
4.0000	64.94
4.5000	64.95
5.0000	64.95
5.5000	64.97
6.0000	64.99
6.5000	65.00
7.0000	65.00
7.5000	65.01
8.0000	65.01
8.5000	65.02
9.0000	65.02
9.5000	65.02
10.0000	65.02
12.0000	65.05
14.0000	65.06
16.0000	65.06
18.0000	65.07
20.0000	65.07
22.0000	65.08
24.0000	65.09
26.0000	65.09
28.0000	65.10
30.0000	65.09
32.0000	65.12
34.0000	65.12
36.0000	65.11
38.0000	65.13
40.0000	65.12
42.0000	65.14
44.0000	65.13
46.0000	65.14
48.0000	65.14
50.0000	65.14
52.0000	65.14
54.0000	65.14
56.0000	65.16
58.0000	65.16
60.0000	65.15

END

SE1000B
Environmental Logger
09/15 09:25

Unit# 00223 Test# 3

INPUT 1: Level (F) TOC

Reference	62.17
Scale factor	20.06
Offset	- 0.14

Step# 0 09/14 17:01

Elapsed Time	Value
0.0000	62.40
0.0033	62.39
0.0066	62.40
0.0099	62.39
0.0133	62.40
0.0166	62.40
0.0200	62.39
0.0233	62.40
0.0266	62.40
0.0300	62.40
0.0333	62.40
0.0500	62.41
0.0666	62.40
0.0833	62.40
0.1000	62.40
0.1166	62.39
0.1333	62.39
0.1500	62.39
0.1666	62.39
0.1833	62.39
0.2000	62.39
0.2166	62.39
0.2333	62.39
0.2500	62.39
0.2666	62.39
0.2833	62.39
0.3000	62.39
0.3166	62.38
0.3333	62.39
0.4167	62.38
0.5000	62.39
0.5833	62.37
0.6667	62.38
0.7500	62.38
0.8333	62.37
0.9167	62.37
1.0000	62.37
1.0833	62.37
1.1667	62.37
1.2500	62.36
1.3333	62.36
1.4166	62.36
1.5000	62.36
1.5833	62.36
1.6667	62.36
1.7500	62.36
1.8333	62.35
1.9167	62.35

3.0000	62.32
3.5000	62.32
4.0000	62.32
4.5000	62.31
5.0000	62.30
5.5000	62.30
6.0000	62.30
6.5000	62.29
7.0000	62.29
7.5000	62.29
8.0000	62.29
8.5000	62.29
9.0000	62.28
9.5000	62.29
10.0000	62.27
12.0000	62.27
14.0000	62.26
16.0000	62.25
18.0000	62.25
20.0000	62.24
22.0000	62.23
24.0000	62.23
26.0000	62.22
28.0000	62.22
30.0000	62.22
32.0000	62.21
34.0000	62.21
36.0000	62.21
38.0000	62.20
40.0000	62.20
42.0000	62.20
44.0000	62.20
46.0000	62.19
48.0000	62.18
50.0000	62.18
52.0000	62.18
54.0000	62.18

END

SE1000B
Environmental Logger
09/15 09:23

Unit# 00223 Test# 2

INPUT 2: Level (F) TOC

Reference	62.30
Scale factor	19.93
Offset	0.12

Step# 0 09/14 16:00

Elapsed Time	Value
0.0000	62.30
0.0033	62.30
0.0066	62.30
0.0099	62.31
0.0133	62.30
0.0166	62.30
0.0200	62.30
0.0233	62.30
0.0266	62.30
0.0300	62.31
0.0333	62.31
0.0500	62.30
0.0666	62.31
0.0833	62.32
0.1000	62.33
0.1166	62.35
0.1333	62.35
0.1500	62.36
0.1666	62.36
0.1833	62.37
0.2000	62.38
0.2166	62.38
0.2333	62.38
0.2500	62.37
0.2666	62.38
0.2833	62.38
0.3000	62.38
0.3166	62.38
0.3333	62.37
0.4167	62.38
0.5000	62.38
0.5833	62.39
0.6667	62.39
0.7500	62.38
0.8333	62.38
0.9167	62.40
1.0000	62.39
1.0833	62.39
1.1667	62.39
1.2500	62.40
1.3333	62.39
1.4166	62.38
1.5000	62.40
1.5833	62.39
1.6667	62.40
1.7500	62.39
1.8333	62.40
1.9167	62.40

3.0000	62.45
3.5000	62.45
4.0000	62.46
4.5000	62.47
5.0000	62.48
5.5000	62.48
6.0000	62.50
6.5000	62.51
7.0000	62.51
7.5000	62.52
8.0000	62.52
8.5000	62.52
9.0000	62.52
9.5000	62.52
10.0000	62.52
12.0000	62.53
14.0000	62.54
16.0000	62.55
18.0000	62.55
20.0000	62.57
22.0000	62.55
24.0000	62.57
26.0000	62.57
28.0000	62.57
30.0000	62.57
32.0000	62.58
34.0000	62.58
36.0000	62.57
38.0000	62.58
40.0000	62.58
42.0000	62.59
44.0000	62.60
46.0000	62.59
48.0000	62.60
50.0000	62.59
52.0000	62.60
54.0000	62.60
56.0000	62.61
58.0000	62.62
60.0000	62.62

END

SE1000B
Environmental Logger
09/15 09:27

Unit# 00223 Test# 3

INPUT 2: Level (F) 10C

Reference	62.30
Scale factor	19.93
Offset	0.12

Step# 0 09/14 17:01

Elapsed Time	Value
0.0000	62.49
0.0033	62.48
0.0066	62.48
0.0099	62.49
0.0133	62.48
0.0166	62.48
0.0200	62.49
0.0233	62.49
0.0266	62.48
0.0300	62.48
0.0333	62.48
0.0500	62.48
0.0666	62.48
0.0833	62.48
0.1000	62.48
0.1166	62.48
0.1333	62.48
0.1500	62.48
0.1666	62.48
0.1833	62.49
0.2000	62.48
0.2166	62.49
0.2333	62.49
0.2500	62.48
0.2666	62.48
0.2833	62.48
0.3000	62.48
0.3166	62.48
0.3333	62.48
0.4167	62.48
0.5000	62.48
0.5833	62.48
0.6667	62.47
0.7500	62.47
0.8333	62.48
0.9167	62.47
1.0000	62.47
1.0833	62.46
1.1667	62.47
1.2500	62.46
1.3333	62.47
1.4166	62.46
1.5000	62.47
1.5833	62.46
1.6667	62.47
1.7500	62.47
1.8333	62.46
1.9167	62.46

3.0000	62.45
3.5000	62.45
4.0000	62.44
4.5000	62.43
5.0000	62.43
5.5000	62.43
6.0000	62.43
6.5000	62.42
7.0000	62.42
7.5000	62.41
8.0000	62.41
8.5000	62.41
9.0000	62.41
9.5000	62.40
10.0000	62.41
12.0000	62.40
14.0000	62.40
16.0000	62.40
18.0000	62.38
20.0000	62.38
22.0000	62.38
24.0000	62.38
26.0000	62.37
28.0000	62.36
30.0000	62.36
32.0000	62.37
34.0000	62.37
36.0000	62.36
38.0000	62.36
40.0000	62.36
42.0000	62.36
44.0000	62.35
46.0000	62.35
48.0000	62.35
50.0000	62.35
52.0000	62.34
54.0000	62.34

END

SE1000B
Environmental Logger
09/15 09:28

Unit# 00223 Test# 4

INPUT 1: Level (F) TOC

Reference	62.17
Scale factor	20.06
Offset	- 0.14

Step# 0 09/14 18:00

Elapsed Time	Value
0.0000	49.60
0.0033	49.60
0.0066	49.60
0.0099	49.60
0.0133	49.61
0.0166	49.60
0.0200	49.61
0.0233	49.60
0.0266	49.60
0.0300	49.60
0.0333	49.60
0.0500	50.18
0.0666	50.89
0.0833	51.42
0.1000	51.77
0.1166	52.00
0.1333	52.13
0.1500	52.24
0.1666	52.35
0.1833	52.43
0.2000	52.49
0.2166	52.54
0.2333	52.59
0.2500	52.62
0.2666	52.65
0.2833	52.67
0.3000	52.69
0.3166	52.70
0.3333	52.72
0.4167	52.76
0.5000	52.78
0.5833	52.78
0.6667	52.80
0.7500	52.80
0.8333	52.81
0.9167	52.82
1.0000	52.82
1.0833	52.83
1.1667	52.83
1.2500	52.84
1.3333	52.83
1.4166	52.84
1.5000	52.85
1.5833	52.85
1.6667	52.86
1.7500	52.87
1.8333	52.87
1.9167	52.87

2.5000	52.89
3.0000	52.91
3.5000	52.92
4.0000	52.94
4.5000	52.94
5.0000	52.95
5.5000	52.96
6.0000	52.97
6.5000	52.97
7.0000	52.98
7.5000	53.00
8.0000	53.01
8.5000	53.01
9.0000	53.02
9.5000	53.01
10.0000	53.02
12.0000	53.04
14.0000	53.06
16.0000	53.08
18.0000	53.09
20.0000	53.10
22.0000	53.09
24.0000	53.11
26.0000	53.13
28.0000	53.13
30.0000	53.14
32.0000	53.13
34.0000	53.14
36.0000	53.14
38.0000	53.14
40.0000	53.16
42.0000	53.15
44.0000	53.16
46.0000	53.17
48.0000	53.17
50.0000	53.18
52.0000	53.18
54.0000	53.18
56.0000	53.19
58.0000	53.19
60.0000	53.19

END

2.5000	49.88
3.0000	49.87
3.5000	49.86
4.0000	49.85
4.5000	49.85
5.0000	49.84
5.5000	49.83
6.0000	49.83
6.5000	49.82
7.0000	49.82
7.5000	49.82
8.0000	49.82
8.5000	49.81
9.0000	49.80
9.5000	49.80
10.0000	49.80

END

SE1000B
Environmental Logger
09/15 09:31

Unit# 00223 Test# 4

INPUT 1: Level (F) TOC

Reference	62.17
Scale factor	20.06
Offset	- 0.14

Step# 1 09/14 19:00

Elapsed Time	Value
0.0000	52.58
0.0033	52.40
0.0066	52.24
0.0099	52.10
0.0133	51.97
0.0166	51.84
0.0200	51.71
0.0233	51.60
0.0266	51.49
0.0300	51.39
0.0333	51.29
0.0500	50.88
0.0666	50.55
0.0833	50.30
0.1000	50.11
0.1166	49.96
0.1333	49.86
0.1500	49.76
0.1666	49.72
0.1833	49.66
0.2000	49.64
0.2166	49.63
0.2333	49.62
0.2500	49.61
0.2666	49.63
0.2833	49.63
0.3000	49.65
0.3166	49.66
0.3333	49.69
0.4167	49.80
0.5000	49.89
0.5833	49.92
0.6667	49.94
0.7500	49.94
0.8333	49.94
0.9167	49.95
1.0000	49.94
1.0833	49.94
1.1667	49.93
1.2500	49.92
1.3333	49.92
1.4166	49.92
1.5000	49.92
1.5833	49.91
1.6667	49.91
1.7500	49.91
1.8333	49.90
1.9167	49.90

SE1000B
Environmental Logger
09/15 09:30

Unit# 00223 Test# 4

INPUT 2: Level (F) TOC

Reference	62.30
Scale factor	19.93
Offset	0.12

Step# 0 09/14 18:00

Elapsed Time	Value
0.0000	62.34
0.0033	62.34
0.0066	62.35
0.0099	62.34
0.0133	62.34
0.0166	62.33
0.0200	62.35
0.0233	62.35
0.0266	62.35
0.0300	62.34
0.0333	62.34
0.0500	62.33
0.0666	62.35
0.0833	62.36
0.1000	62.37
0.1166	62.37
0.1333	62.39
0.1500	62.40
0.1666	62.41
0.1833	62.41
0.2000	62.42
0.2166	62.43
0.2333	62.43
0.2500	62.43
0.2666	62.43
0.2833	62.44
0.3000	62.44
0.3166	62.45
0.3333	62.45
0.4167	62.45
0.5000	62.46
0.5833	62.47
0.6667	62.47
0.7500	62.47
0.8333	62.47
0.9167	62.48
1.0000	62.48
1.0833	62.48
1.1667	62.48
1.2500	62.48
1.3333	62.48
1.4166	62.48
1.5000	62.49
1.5833	62.49
1.6667	62.49
1.7500	62.50
1.8333	62.50
1.9167	62.50

2.5000	62.52
3.0000	62.52
3.5000	62.53
4.0000	62.53
4.5000	62.54
5.0000	62.55
5.5000	62.56
6.0000	62.56
6.5000	62.57
7.0000	62.57
7.5000	62.58
8.0000	62.58
8.5000	62.60
9.0000	62.60
9.5000	62.60
10.0000	62.61
12.0000	62.62
14.0000	62.64
16.0000	62.64
18.0000	62.65
20.0000	62.66
22.0000	62.66
24.0000	62.67
26.0000	62.68
28.0000	62.67
30.0000	62.68
32.0000	62.69
34.0000	62.69
36.0000	62.69
38.0000	62.70
40.0000	62.69
42.0000	62.69
44.0000	62.70
46.0000	62.70
48.0000	62.70
50.0000	62.72
52.0000	62.72
54.0000	62.72
56.0000	62.72
58.0000	62.73
60.0000	62.73

END

SE1000B
Environmental Logger
09/15 09:32

Unit# 00223 Test# 4

INPUT 2: Level (F) TOC

Reference	62.30
Scale factor	19.93
Offset	0.12

Step# 1 09/14 19:00

Elapsed Time	Value
0.0000	62.73
0.0033	62.72
0.0066	62.72
0.0099	62.72
0.0133	62.72
0.0166	62.71
0.0200	62.71
0.0233	62.72
0.0266	62.71
0.0300	62.70
0.0333	62.70
0.0500	62.70
0.0666	62.69
0.0833	62.67
0.1000	62.65
0.1166	62.65
0.1333	62.64
0.1500	62.64
0.1666	62.62
0.1833	62.62
0.2000	62.62
0.2166	62.62
0.2333	62.60
0.2500	62.61
0.2666	62.60
0.2833	62.60
0.3000	62.60
0.3166	62.60
0.3333	62.60
0.4167	62.60
0.5000	62.60
0.5833	62.59
0.6667	62.58
0.7500	62.59
0.8333	62.59
0.9167	62.58
1.0000	62.58
1.0833	62.58
1.1667	62.58
1.2500	62.57
1.3333	62.57
1.4166	62.57
1.5000	62.57
1.5833	62.57
1.6667	62.56
1.7500	62.56
1.8333	62.56
1.9167	62.55

3.0000	62.54
3.5000	62.54
4.0000	62.53
4.5000	62.53
5.0000	62.52
5.5000	62.52
6.0000	62.51
6.5000	62.52
7.0000	62.52
7.5000	62.51
8.0000	62.50
8.5000	62.50
9.0000	62.50
9.5000	62.50
10.0000	62.49

END

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No [illegible] Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
2/14														1016 Start transducer
	1024					62.17								set reference at 62.17
	1218					62.17								
	1232					62.16								start step test
		30s				63.24								
		1m				63.23								
	1234	2m				63.23						8 gpm		
	1235	3				63.24								
	1236	4				63.24								
	1237	5				63.24								
	1238	6				63.25						8.2 gpm		
	1239	7				63.25								
	1240	8				63.25								
	1241	9				63.25								
	1242	10				63.26								
	1244	12				63.30								
	1246	14				63.33								63.37 Hermit 20 min
	1254	22				63.35						[illegible]		
	1256	24				63.37								
	1304	30				63.38								Hermit reading
	1306											8.4		
	1308					63.37								
	1315					63.31						8.4		[illegible] Hermit
	1317					63.30								
	1327	50				63.32								63.39 Hermit
	1331													[illegible] recovery
	[illegible]					62.35								
	[illegible]					62.34								
	[illegible]					62.33								

AQUIFER TEST DATA

Owner ____ Address ____ County ____ State ____

____ Company performing test ____ Measured by ____

Well No Fuma #11 Distance from pumping well ____ Type of test ____ Test No ____

Measuring equipment ____

Time Data
Pump on: Date ____ Time ____ (t.)
Pump off: Date ____ Time ____ (t'.)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous pumping? Yes ____ No ____
Duration ____ End ____

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		Comments on factors affecting test data
6.11	1337					62.22								Step test recov. start.
	1339					62.20								
	1343					62.19								
	1401					62.17								End Recovery Step test 1
	1415					62.16								
	1417					62.16								t=0 Step 2 pumping
	1417	30"				65.73								
	1418	1				65.05								
	1419	2				65.04								
	1420	3				64.91								
	1421					64.75						19gpm		
	1422					64.74								
	1423					64.61								
	1424					64.61								
	1425					64.62						17.4 gpm		
	1426					64.62								
	1427					64.62								
	1429					64.62								
	1430											17.4 gpm		
	1431					64.63								
	1434					64.63								
	1437					64.60								
	1442					64.63								
		26				64.64								64.55 Hermit
	1448	31				64.64								64.59 Hermit
	1452					64.56								
	1455											17.3		
	1457					64.56								
	1502					64.55								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No _____ Distance from pumping well _____ Type of test _____ Test No. _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (*t*)
Pump off: Date _____ Time _____ (*t'*)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ___ No ___
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started *t*	Time since pump stopped *t'*	*t*/*t'*		Water level measurement	Correction or Conversion	Water level	Water level change *s* or *s'*		Discharge measurement	Rate		
9-14	1508					64.55								
	1512					64.67								
	1516					64.55/6.7								
	1517													stop pump step test 2 rec
	1518		1			62.36								
	1519		2			62.34								
	1520		3			62.32								
	1521		4			62.31								
	1524		7			62.27								
	1526		9			62.26								
	1527		10			62.26								
	1540		23			62.21								
	1545					62.20								
	1557					62.18								
	[illegible]					62.17								
		15s				64.30								
		30s				64.30								
		1m				64.32						16.2 gpm		
	1617	2m				64.40								
	1618					64.98						20.7		
	1619					65.00								
	1620					65.02						20.3		
	1622					65.05								
	1623					65.07								
	1624					65.08								
	1625					65.09								
	1627					65.10								
	1630					65.12								
	1635					65.13						20.5		

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No. PTW Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t.)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ___ No ___
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	Comments
9-14	1640	25			65.15						
	1650	35			65.17						
	1658	43			65.18						
	1701									20.5	
	1705	50			65.19						
	1711	56			65.21						
	1715	60	9 sec		62.60						shut off pump
	1716		1		62.44						
	1717		2		62.41						
	1718		3		62.38						
	1719		4		62.36						
	1720		5		62.35						
	1721		6		62.34						
	1723		8		62.33						
	1725		10		SB 62.35	62.35					
	1727		12		SB 62.30	62.30					
	1730		15		62.30						
	1735		20		62.28						
	1740		25		62.27						
	1750		35		62.24						
	1755		40		62.23						
	1800				62.24						
	1815										start pump step test (+ks+4)
	1816				65.47					25	
	1817				65.53						
	1818				65.56						
	1819				65.58						
	1820				65.60					24.5	
	182				65.62						

AQUIFER TEST DATA

Owner ____ Address ____ County ____ State ____

____ Company performing test ____ Measured by ____

Well No. Pump Well Distance from pumping well ____ Type of test ____ Test No ____

Measuring equipment ____

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (t')
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate		Comments
9-14	1823				65.65							
	1824				65.67							
	1825				65.68							
	1826				65.68							
	1827				65.70							
	1828				65.71							
	1834				65.74							
	1838				65.76							
	1844				65.78							
	1848				65.78							
	1852				65.80					25.2 gpm		
	1905				65.81					24.8 gpm		
	1910				65.82							
	1915											stop pump test 4
	1916				62.58							
	1917				62.50							
	1918				62.46							
	1919				62.46							
	1920				62.45							
	1923				62.47							

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No P2 (P-1)-(a) Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t.)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ___ No ___
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	totalizer	
9-14	1030				62.32							Drill
9-15	1240				62.48							start step test 12:31
	245				62.48							start rate pump
	247				62.48							
	257				62.49							
	301				62.49							
	317				62.50							
	323				62.51							
	331				6237							pump off 13:30 pm
	333				6235							
	347				6232							
	351				6237							train pump by
	342				6230							train passed
	310				6230							
	411											
	419				62.53							
	421									19.8 gpm		
	425									17.4		
→	1451				62.64							
	428				62.67							
	435				6268							
	443				6270							
	447				6271							
	455									17.3		Train passing by
	1504				62.78							
	415				62.75						15 62.8	
→	417										15 63.2	Shut off
	418				#8 62.46							
	423				62.40							

AQUIFER TEST DATA

Owner DPRC Address Airway Dr. Memphis County Shelby State TN

Company performing test EES Measured by _____

Well No PZ-61 Distance from pumping well 10' Type of test 3rd step, step drawdown Test No 3

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t.)
Pump off: Date _____ Time _____ (t'.)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		Comments on factors affecting test data
7/9/92	1619					62.72					20.4 gpm			
	1624					62.77					21.3 gpm			
	1629					62.80								
	1636					62.82								
	1650					62.84								
	1701										20.5			
	1714					62.88					pump off			
	1716					62.59								
	1721					62.47								
	1726					62.43								
	1740					62.38								
	1800					62.35								
	1812					62.32								
	1815													4th step; fully open
	1821					62.85								
	1822					62.87								
	1844					63.00					25.2			20.2 gpm
	1852					63.02								
	1904					63.05								
	1910					63.05								
	1915					63.05								pump off

AQUIFER TEST DATA

Owner ______ Address ______ County ______ State ______

______ Company performing test ______ Measured by ______

Well No OW-12 Distance from pumping well ______ Type of test ______ Test No ______

Measuring equipment ______

Time Data	Water Level Data	Discharge Data	Comments on factors affecting test data
Pump on: Date ______ Time ______ (t_o) Pump off: Date ______ Time ______ (t') Duration of aquifer test: Pumping ______ Recovery ______	Static water level ______ Measuring point ______ Elevation of measuring point ______	How Q measured ______ Depth of pump/air line ______ Previous pumping? Yes ____ No ____ Duration ______ End ______	

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
2-9						63.70								SWL

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No _____ Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t_p)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		Comments on factors affecting test data
9/12						61.41								5:12
	1621	6				61.45						20.3		
	1626	11				61.45								
	1630	15				61.47								
	1635	20				61.47								
	1640	25				61.47								
	1647	32				61.48								
	1659	44				61.49								
	1705	50				61.50								
	1712				1R	~~61.45~~ 61.50								
	716					61.47								1715 5:00 : 1:00
	1723					61.46								
	1727					61.46								
	1735					61.45								
	1740					61.44								
	1748					61.42								
	1756					61.44								
	1800					61.43								
	1812					61.42								18:15 4th step @ 24.5
	1822					61.50								
	1830					61.53								
	1835					61.53								
	1845					61.54								
	1855					61.55								
	1905					61.56								
	1911					61.57								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No. MW-3 Distance from pumping well _____ Type of test _____ Test No. _____

Measuring equipment E-line / data logger

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ___ No ___
Duration _____ End _____

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		Comments on factors affecting test data
3-11	0850					66.39								
	1220					62.30								
	1216					62.30								
	1232					62.30						5.0 gpm		Start stepdrs
	1245	10				62.35								Hold
	1255											5.0 gpm		
	1306											5.0 gpm		
		3100				65.57								
	1411													Stop step test 1
	1417													Start step test 2 (10)
	1517													Stop pump recovery test
	1614													Stop recovery
	1615	0												Start [illegible]
	1617	2				62.52								[illegible]
	1637	22				62.55								[illegible]
	1716													Start WL (test 3)
														Pump stopped at 1715
														[illegible]
														[illegible]
	1810													Stop recovery (test 3)
	1915													Start pump (test 4)
	1915													Stop pump. (test 4)

Appendix D

Constant Discharge Test Drawdown Data

DDRC Memphis, Tennessee
P2-61 Pumping Test Drawdown Data

Date	Time	Water Level Measurement (feet)	Drawdown (feet)
9/15/92	1200 (start pumping)	62.34	0
	1201	62.73	0.39
	1202	62.77	0.43
	1203	62.80	0.46
	1204	62.82	0.48
	1205	62.83	0.49
	1206	62.85	0.51
	1207	62.86	0.52
	1208	62.88	0.54
	1209	62.89	0.55
	1210	62.90	0.56
	1213	62.92	0.58
	1215	62.95	0.61
	1217	62.95	0.61
	1219	62.97	0.63
	1223	62.99	0.65
	1227	63.01	0.67
	1236	63.05	0.71
	1247	63.08	0.74
	1258	63.11	0.77
	1310	63.12	0.78
	1321	63.14	0.80
	1330	63.15	0.81
	1340	63.16	0.82
	1408	63.17	0.83
	1421	63.19	0.85
	1540	63.23	0.89
	1620	63.25	0.91
	1718	63.28	0.94
	1801	63.30	0.96
	1859	63.34	1.00
	2008	63.38	1.04
	2101	63.41	1.07
	2143	63.44	1.10
	2250	63.45	1.11
9/16/92	0000	63.48	1.14
	0100	63.48	1.14
	0200	63.48	1.14
	0258	63.51	1.17
	0401	63.52	1.18
	0457	63.54	1.20
	0610	63.55	1.21
	0642	63.56	1.22
	0800	63.59	1.25
	1151	63.59	1.25
	1551	63.56	1.22
	1654	63.56	1.22
	1814	63.57	1.23
	2003	63.60	1.26
	2215	63.66	1.32
	2314	63.68	1.34

Pumping Test Drawdown Data (continued)

Date	Time	Water Level Measurement (feet)	Drawdown (feet)
9/17/92	0028	63.67	1.33
	0148	63.67	1.33
	0328	63.67	1.33
	0450	63.67	1.33
	0555	63.69	1.35
	0600 (stop pumping)	63.69	1.35
	0601	63.65	0.99
	0603	63.23	0.89
	0604	63.21	0.87
	0605	63.19	0.85
	0606	63.18	0.84
	0607	63.16	0.82
	0608	63.15	0.81
	0610	63.13	0.79
	0615	63.10	0.77
	0620	63.06	0.72
	0630	63.01	0.67
	0636	62.99	0.65
	0654	62.93	0.59
	0703	62.90	0.56
	0724	62.86	0.52
	0743	62.82	0.48
	0758	62.79	0.45
	0818	62.76	0.42
	0827	62.74	0.40
	0955	62.67	0.33
	1106	62.62	0.28
	1212	62.57	0.23
	1326	62.51	0.17
	1618	62.41	0.07

DDRC Memphis, Tennessee
P2-62 Pumping Test Drawdown Data

Date	Time	Water Level Measurement (feet)	Drawdown (feet)
9/15/92	1200 (start pumping)	63.77	0.00
	1201	63.77	0.00
	1202	63.78	0.01
	1203	63.79	0.02
	1204	63.80	0.03
	1205	63.80	0.03
	1206	63.81	0.04
	1207	63.82	0.05
	1208	63.82	0.05
	1209	63.83	0.06
	1210	63.83	0.06
	1214	63.85	0.08
	1215	63.85	0.08
	1217	63.86	0.09
	1219	63.87	0.10
	1223	63.88	0.11
	1228	63.89	0.12
	1237	63.92	0.15
	1247	63.92	0.15
	1255	63.92	0.15
	1312	63.93	0.16
	1322	63.93	0.16
	1332	63.94	0.17
	1342	63.94	0.17
	1408	63.95	0.18
	1426	63.95	0.18
	1538	63.97	0.20
	1719	64.01	0.24
	1757	64.02	0.25
	1859	64.06	0.29
	2006	64.10	0.33
	2056	64.11	0.34
	2300	64.17	0.40
9/16/92	0002	64.18	0.41
	0100	64.18	0.41
	0202	64.18	0.41
	0300	64.21	0.44
	0402	64.22	0.45
	0458	64.24	0.47
	0611	64.25	0.48
	0643	64.26	0.49
	1152	64.28	0.51
	1557	64.24	0.47
	1655	64.24	0.47
	2026	64.30	0.53
	2216	64.35	0.58
	2312	64.36	0.59
9/17/92	0029	64.35	0.58
	0150	64.36	0.59
	0330	64.35	0.58
	0451	64.36	0.59

Pumping Test Drawdown Data (continued)

Date	Time	Water Level Measurement (feet)	Drawdown (feet)
	0559	64.37	0.60
	0600 (stop pumping)	64.37	0.60
	0601	64.35	0.58
	0602	64.33	0.56
	0603	64.33	0.56
	0604	64.31	0.54
	0605	64.30	0.53
	0606	64.30	0.53
	0607	64.29	0.52
	0608	64.29	0.52
	0609	64.28	0.51
	0610	64.28	0.51
	0612	64.27	0.50
	0614	64.26	0.49
	0617	64.25	0.48
	0620	64.24	0.47
	0623	64.23	0.46
	0626	64.22	0.45
	0630	64.21	0.44
	0633	64.21	0.44
	0639	64.20	0.43
	0645	64.19	0.42
	0653	64.17	0.40
	0703	64.16	0.39
	0709	64.15	0.38
	0715	64.14	0.37
	0723	64.14	0.37
	0742	64.11	0.34
	0758	64.10	0.33
	0818	64.07	0.30
	0828	64.06	0.29
	0956	64.01	0.24
	1107	63.97	0.20
	1213	63.93	0.16
	1328	63.87	0.10
	1458	63.81	0.04
	1619	63.79	0.02

DDRC Memphis, Tennessee
P2-63 Pumping Test Drawdown Data

Date	Time	Water Level Measurement (feet)	Drawdown (feet)
9/15/92	1200 (start pumping)	61.52	0.00
	1201	61.52	0.00
	1202	61.52	0.00
	1203	61.52	0.00
	1204	61.52	0.00
	1205	61.52	0.00
	1206	61.53	0.01
	1207	61.53	0.01
	1208	61.54	0.02
	1209	61.54	0.02
	1210	61.54	0.02
	1213	61.55	0.03
	1215	61.58	0.06
	1217	61.59	0.07
	1219	61.58	0.06
	1224	61.58	0.06
	1229	61.59	0.07
	1235	61.61	0.09
	1246	61.61	0.09
	1248	61.63	0.11
	1315	61.63	0.11
	1322	61.64	0.12
	1331	61.64	0.12
	1343	61.65	0.13
	1410	61.66	0.14
	1428	61.67	0.15
	1544	61.67	0.15
	1621	61.69	0.17
	1719	61.72	0.20
	1759	61.74	0.22
	1901	61.77	0.25
	1936	61.79	0.27
	2007	61.82	0.30
	2057	61.85	0.33
	2301	61.90	0.38
9/16/92	0004	61.90	0.38
	0101	61.90	0.38
	0200	61.92	0.40
	0258	61.92	0.40
	0402	61.95	0.43
	0457	61.96	0.44
	0612	61.98	0.46
	0643	61.98	0.46
	0802	62.02	0.50
	1154	62.00	0.48
	1558	61.95	0.43
	1657	61.96	0.44
	1816	61.98	0.46
	2005	62.01	0.49
	2218	62.07	0.55
	2310	62.09	0.57

Pumping Test Drawdown Data (continued)

Date	Time	Water Level Measurement (feet)	Drawdown (feet)
9/17/92	0030	62.08	0.56
	0151	62.08	0.56
	0331	62.08	0.56
	0415	62.08	0.56
	0452	62.08	0.56
	0600 (stop pumping)	62.08	0.56
	0601	62.08	0.56
	0602	62.07	0.55
	0603	62.06	0.54
	0604	62.05	0.53
	0605	62.04	0.52
	0606	62.04	0.52
	0607	62.03	0.51
	0608	62.03	0.51
	0609	62.03	0.51
	0610	62.02	0.50
	0614	62.01	0.49
	0617	61.99	0.47
	0619	61.99	0.47
	0623	61.98	0.46
	0625	61.97	0.45
	0629	61.96	0.44
	0635	61.95	0.43
	0640	61.94	0.42
	0646	61.93	0.41
	0656	61.91	0.39
	0710	61.89	0.37
	0725	61.87	0.35
	0744	61.85	0.33
	0759	61.83	0.31
	0820	61.81	0.29
	0827	61.80	0.28
	0958	61.74	0.22
	1104	61.71	0.19
	1210	61.67	0.15
	1331	61.59	0.07
	1459	61.53	0.01

DDRC Memphis, Tennessee
Pumping Test Drawdown Data
Pumping Well

Date	Time	Water Level Measurement (feet)	Drawdown (feet)
9/15/92	1200 (start pumping)	62.20	0.00
	1256	65.80	3.60
	2015	66.10	3.90
9/16/92	0834	66.37	4.17
	1216	66.36	4.16
	1350	66.36	4.16
9/17/92	0600 (stop pumping)	66.36	4.16
	0622	62.89	0.69
	0658	62.78	0.58
	0846	62.50	0.30
	1115	62.47	0.27
	1334	62.35	0.15
	1629	62.25	0.05
9/18/92	1806	62.26	0.06

DDRC Memphis, Tennessee
Pumping Test Drawdown Data
MW-3

Date	Time	Water Level Measurement (feet)	Drawdown (feet)
9/15/92	1200 (start pumping)	62.35	0.00
	1650	62.88	0.53
9/16/92	0831	63.21	0.86
	1218	63.20	0.85
9/17/92	0600 (stop pumping)	-	-
	0627	62.94	0.59
	0845	62.71	0.36
	1117	62.59	0.24
	1337	62.48	0.13
	1638	62.40	0.05
9/18/92	1810	62.42	0.07

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No PZ-61 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t_p)
Pump off: Date _____ Time _____ (t'_p)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ___ No ___
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
9-15	9:53					62.38								
	9:59					62.36								
		30s				62.71		TOC	0.00	0.37				↑ Start at 12:00
	12:01	1				62.73			0.02	0.39				
		1 30				62.74			0.03	0.40				
		2				62.77			0.06	0.43				
		2 30				62.78			0.07	0.44				
		3				62.80			0.09	0.46				
		3 30				62.81			0.10	0.47				
		4				62.82			0.11	0.48				
		5				62.83			0.12	0.49				
	12:06	6				62.85			0.14	0.51				
		7				62.86			0.15	0.52				
		8				62.88			0.17	0.54				
		9				62.89			0.18	0.55				
		10				62.90			0.19	0.56				
	12:13	13				62.92			0.21	0.58				
	12:15	15				62.95			0.24	0.61				
	12:17	17				62.95			0.24	0.61				
	12:19	19				62.97			0.26	0.63				
	12:23	23				62.99			0.28	0.65				
	12:27	27				63.01			0.30	0.67				
	[illegible]	[illegible]				[illegible]			[illegible]	[illegible]				
	[illegible]	[illegible]				[illegible]			[illegible]	[illegible]				
	12:58	58				63.11			0.40	0.77				
	13:10	70				63.12			[illegible]	[illegible]				
	13:21	81				63.14			[illegible]	[illegible]				
	13:30	90				63.15			0.44	[illegible]				
	13:40	100				63.16			0.45	[illegible]				

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No P2-61 Distance from pumping well 5ft Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date 9-15-92 Time 12:50 (t)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level 62.71
Measuring point TOC
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
9-15-92	1408	108				63.17			0.46	0.43				
	1421	121				63.19			0.48	0.45				
	1540	140				63.23			0.52	0.49				
	1620	260				62.25	63.25		0.54	0.51				
	1718	318				63.28			0.57	0.54				
	1801	361				63.30			0.59	0.56				
	1859	419				63.34			0.63	1.00				
	2008	488				63.38			0.67	1.04				
	2101	541				63.41			0.70	1.07				
	2143	583				63.44			0.73	1.10				
	2250	650				63.45			0.74	1.11				
9-16	0000	720				63.48			0.77	1.14				
	0100	780				63.48			0.77	1.14				
	0200	840				63.48			0.77	1.14				
	0258	898				63.51			0.80	1.17				
	0401	961				63.52			0.81	1.18				
	0457	1017				63.54			0.83	1.20				
	0610	1090				63.55			0.84	1.21				
	0722	1122				63.56			0.85	1.22				
	0800	1200				63.59			0.88	1.25				
	1151	1431				63.59			0.88	1.25				
	1557	1662				63.56			0.85	1.22				
	1654	1719				63.56			0.85	1.22				
	1814	1779				63.57			0.86	1.23				
	2005	1908				63.60			0.89	1.26				
	2215	2020				63.66			0.95	1.32				
	2314	2119				63.68			0.98	1.34				
9-17	0028	2153				63.67			0.97	1.33				
	0148	2333				63.67			0.97	1.33				

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No PZ61 Distance from pumping well 10' Type of test _____ Test No. _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t.)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		Comments on factors affecting test data
9-17	0328	2333			63.67			0.97	1.33				
	0450	2421			63.67			0.97	1.33				Q = 24.38 gpm
~~9-18~~	~~0855~~	3515			63.69			0.99	1.35				
	0600	2520			63.69			0.99	1.35				pump off
	1' (		1		63.67			0.95	1.31				65669.7 gallons pumped
	0601				63.73			0.62	0.99				(24 hrs + 12 hrs + 6 hrs) =
	0602		2	1261	63.73			0.62	0.99				42 hrs
	0602				63.70			0.59	0.96				
	0603		3	841	63.73			0.53	0.89				
	0604		4	631	63.71			0.51	0.87				
	0605		5	505	63.69			0.49	0.85				
	0606		6	421	63.68			0.48	0.84				
	0607		7	361	63.66			0.46	0.82				
	0608		8	316	63.65			0.45	0.81				
	0610		10	253	63.63			0.43	0.79				
0615	0620		15	169	63.60			0.40	0.77				
	0620		20	127	63.06			0.36					
	0630		30	85	63.01			0.31					
	0634			11	62.99			0.29	4.65				
	0636				62.96			0.26					
	0654			17	62.93			0.23					
	0703			11	62.90			0.20					
	0724				62.86			0.16					
	0743				62.82			0.12					
	0755				62.79			0.09					
	0818				62.76			0.06					
	0837				62.74			0.04					
	0955				62.67			-0.07					passed initial SWL
	1106				6262								over 100% recovery

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No. PZ61 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
9-17	1326	2966	4416	6.66		62.51	0		0.17					
	1618	3052	1614	4.9		62.41			0.07					
9-18	1501					62.31								
	1726					62.30								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No PZ-62 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
15/9/92	0953					63.78								
	1200	0												step pump test
	1201	1				63.77			0					
	1202	2				63.78			0.01					
	1203	3				63.79			0.02					
	1204	4				63.80			0.03					
	1205	5				63.80			0.03					
	1206	6				63.81			0.04					
	1207	7				63.82			0.05					
	1208	8				63.82			0.05					
	1209	9				63.83			0.06					
	1210	10				63.83			0.06					
	1214	14				63.85			0.08					
	1215	15				63.85			0.08					
	1217	17				63.86			0.09					
	1219	19				63.87			0.10					
	1223	23				63.88			0.11					
	1228	28				63.89			0.12					
	1237	37				63.92			0.15					
	1247	47				63.92			0.15					
	1255	55				63.95			0.15					
	1302	72				63.93			0.16					
	1322	82				63.93			0.16					
	1332	92				63.94			0.17					
	1342	102				63.94			0.17					
	1403	123	15			63.95			0.18					
	1413	133				63.95			0.18					
	1538	218				63.97			0.20					
	1719	379				64.01			0.24					

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No FZ-CC Distance from pumping well _____ Type of test _____ Test No. _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
9-15	1757	357				64.02			0.25					
	1859	419				64.06			0.29					
	2006	~~484~~	486			64.10			0.33					
	~~2056~~	~~534~~	536			64.11			0.34					
	~~2300~~	~~650~~	660			64.17			0.40					
9-16	0002	~~712~~	702			64.18			0.41					
	0120	~~770~~	780			64.18			0.41					
	~~0202~~	~~832~~	842			64.18			0.41					
	0300	890	900			64.21			0.44					
	0402	952	962			64.22			0.45					
	0458	1008	1,018			64.24			0.47		Correct 40 GPM 61 = 20 3.01			
	0611	1077	1,088			64.25			0.48					
	0643	1109	1,123			64.26			0.49					
	1152	~~1389~~	1435			64.28			0.51					
	1557	1613	1677			64.24			0.47					
	1655	1765	[illegible]			64.24			0.47					
	~~2026~~	1936				~~64.30~~			0.53					
	2216	[illegible]				64.35			0.58					
	2312	2112				64.36			0.59					
9-17	0029	2189				64.35			~~0.600~~ 0.58					
	0150	[illegible]				64.36			0.59					
	0330	[illegible]				64.35			0.58					
	0451					64.36			0.59					
	0554	[illegible]				64.37			0.60					
			30s.			64.35			0.58					
	0601		1			64.35			0.58					
			1.30			64.34			0.57					
	0602		2			64.33			0.56					
	0603		3			64.33			0.56					

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No ~~MW-3~~ PZ62 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t.)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ___ No ___
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate		
9-17	0604		4			64.31			0.54				
	0605		5			64.30			0.53				
	0606		6			64.30			0.53				
	0607		7			64.29			0.52				
	0608		8			64.29			0.52				
	0609		9			64.28			0.51				
	0610		10			64.28			0.51				
	0612		12			64.27			0.50				
	0614		14			64.26			0.49				
	0617		17			64.25			0.48				
	0620		20			64.24			0.47				
	0623		23			64.23			0.46				
	0626		26			64.22			0.45				
	0630		30			64.21			0.44				
	0633		33			64.21			0.44				
	0639		39			64.20			0.43				
	0645		45			64.19			0.42				
	0653		53			64.17			0.40				
	0703		63			64.16			0.39				
	0709		69			64.15			0.38				
	0715		75			64.14			0.37				
	0723		83			64.14			0.37				
	0742		102			64.11			0.34				
	0758		118			64.10			0.33				
	0818		138			64.07			0.30				
	0828		148			64.06			0.29				
	0956					64.01			0.24				60% recovery
	1107					63.97			0.20				
	1213					63.93			0.16				>3%

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No. PZ-62 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t.)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		
9-17	1328		[illegible]			63.87			0.10					83%
9-17	1458		[illegible]			63.81			0.04					
	1619		1.9			63.79			0.02					
9-18	1502					63.20								
	1722					63.69								

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No P2-63 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t.)
Pump off: Date _____ Time _____ (t')
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate	
9-15	951				61.54							
	1004	1			61.55			0.00				
	1202	2			61.52			0.00				
	1203	3			61.52			0.00				
	1204	4			61.52			0.00				
	5	5			61.52			0.00				
	6	6			61.53			0.01				
	7	7			61.53			0.01				
	8	8			61.54			0.02				
	9	9			61.54			0.02				
	1210	10			61.54			0.02				
	1213	13			61.55			0.03				
	1215	15			61.58			0.06				
	1217	17			61.59			0.07				
	1219	19			61.58			0.06				
	1221	21			61.58			0.06				
	1229	29			61.59			0.07				
	1235	35			61.61			0.09				
	1246	46			61.61			0.09				
	1248	48			61.63			0.11				
	1315	75			61.63			0.11				
	1322	82			61.64			0.12				
	1331	91			61.64			0.12				
	1343	103			61.65			0.13	0.10			
	1410	130			61.66			0.14	0.11			
	1428	148			61.67			0.15	0.12			
	1546	4			61.67			0.15	0.12			
	1621	261			61.69			0.17	0.14			
	1719	319			61.72			0.20	0.17			

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No P263 Distance from pumping well _____ Type of test _____ Test No _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (t..)
Pump off: Date _____ Time _____ (t'.)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate	
9-15	1759	359				61.74			0.29	0.32			
	1901	421				61.77			0.32	0.25			
	1956	456				61.79			0.34	0.27			
	2107	467				61.82			0.37	0.30			
	2251	537				61.85			0.40	0.33			
	2301	661				61.90			0.45	0.38			
9-16	0004	724				61.90			0.35	0.38			
	0101	781				61.90			0.35	0.38			
	0200	840				61.92			0.37	0.40			
	0258	898				61.92			0.37	0.40			
	0402	962				61.95			0.40	0.43			
	0457	1017				61.96			0.41	0.44			
	0612	1102				61.98			0.43	0.46			
	0643	1133				61.98			0.43	0.46			
	0802	1252				62.02			0.47	0.50			
	1154	1424				62.00			0.45	0.48			
	1550	1678				61.95			0.40	0.43			
	1657	1751				61.96			0.41	0.44			
	1816	1915				61.98			0.43	0.46			
	2005	2105				62.01			0.46	0.49			
	2218	2338				62.07			0.52	0.55			
	2310	2410				62.09			0.54	0.57			
9-17	0030					62.08			0.53	0.56			
	0151					62.08			0.53	0.56			
	0337					62.08			0.53	0.56			
	0417					62.08			0.53	0.56			
	0452					62.05			0.50	0.53			

AQUIFER TEST DATA

Owner ____ Address ____ County ____ State ____

____ Company performing test ____ Measured by ____

Well No P263 Distance from pumping well ____ Type of test ____ Test No ____

Measuring equipment ____

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (t')
Duration of aquifer test
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		Comments
9-17	0600	[illegible]	0										stop test pump sta
	0601	[illegible]	1	[illegible]	62.08			0.53	0.56				recovery
	0602	[illegible]	2	[illegible]	62.07			0.52	0.55				
	0603	[illegible]	3	[illegible]	62.06			0.51	0.54				
	0604	[illegible]	4	[illegible]	62.05			0.50	0.53				
	0605	[illegible]	~~5~~	505	62.04			0.49	0.52				
	0606	[illegible]	6	451	62.04			0.49	0.52				
	0607	[illegible]	7	[illegible]	62.03			0.48	0.51				
	0608	[illegible]	8	[illegible]	62.03			0.48	0.51				
	0609	[illegible]	9	[illegible]	62.03			0.48	0.51				
	0610	[illegible]	10	[illegible]	62.02			0.47	0.50				
	0614	[illegible]	14	191	62.01			0.46	0.49				
	0617	[illegible]	17	149	61.99			0.44	0.47				
	0619	[illegible]	19	[illegible]	61.99			0.44	0.47				
0623	0623	[illegible]	23	[illegible]	61.98			0.43	0.46				
	0625	0545	25	101	61.97			0.42	0.45				
	0629	[illegible]	29	87	61.96			0.41	0.44				
	0635	[illegible]	35	[illegible]	61.95			0.40	[illegible]				
JB	~~0636~~	0640	40	64	61.94			0.39	[illegible]				
	0646	0566	46	55	61.93			0.38	[illegible]				
	0656	[illegible]	56	46	61.91			0.36	[illegible]				
	0710	[illegible]	70	37	61.89			0.34	[illegible]				
	0725	[illegible]	85	[illegible]	~~61.88~~		61.87	0.33	0.32	0.25			
	0744	[illegible]	104	[illegible]	61.85			0.30	[illegible]				
	0759	[illegible]	119	[illegible]	61.83			0.28	[illegible]				
	0820	[illegible]	~~140~~ 170	[illegible]	61.81			0.26	[illegible]				
	0827	[illegible]	147	[illegible]	61.80			0.25	[illegible]				
	0958	[illegible]	[illegible]	11	61.74			0.19	[illegible]				64% recovery
	1104	[illegible]	[illegible]	1	61.71			0.16	0.19				

AQUIFER TEST DATA

Owner _____ Address _____ County _____ State _____

_____ Company performing test _____ Measured by _____

Well No. P263 Distance from pumping well _____ Type of test _____ Test No. _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (*t'*)
Pump off: Date _____ Time _____ (*t''*)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started *t*	Time since pump stopped *t'*	*t/t'*		Water level measurement	Correction or Conversion	Water level	Water level change *s* or *s'*		Discharge measurement	Rate		
9-17	1210	[illegible]10	370	7.8		61.67			0.12	0.15				77% full
	1331	2971	451	6.5		61.59			0.04	0.07				92%
	1459	3059	539	5.6		61.53				0.01				
	1620	3140	620	5.0		61.52				0.01				
9-18	1304	3660	144	3.1		61.42				0.10				
	1731	4140	1620	2.5		61.43				0.09				

AQUIFER TEST DATA

Owner DDRC Address 2159 Airways County ____ State TN

Date 15 Sep 92 Company performing test E-S Measured by Bauer / YU

Well No. MW-3 Distance from pumping well ____ Type of test Constant discharge Test No 1

Measuring equipment ____

Time Data
Pump on: Date 15/9 Time 12:00 (t.)
Pump off: Date 17/9 Time 0600 (t')
Duration of aquifer test:
Pumping 42 Recovery ____

Water Level Data
Static water level 62,35
Measuring point TOC
Elevation of measuring point ____

Discharge Data
How Q measured flow meter
Depth of pump/air line ____
Previous pumping? Yes ____ No ✓
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		Comments
15/9	0952					62.37						24.3 gpm		
	1208	0				62,35								pump on
	1650	298				62,88			0.53					
16/9/92	0831	1231				63.24			0.89					
	1218	1458				63,20			0.85					
17/9/92	0604	2520	0											pump off
	0627	2547	27	94.33	0.07	62.94			0					
	0845	2685	165	16.27		62.71			0.23					
	1117	2837 3002	317	8.95		62.59			0.35					
	1337	2977 3142	457	6.51		62.48			0.46					
	1638	3158 3323	638	4.95		62.40			0.54					
18/9/92	0810	4040 4205	1570	2.60		62.42			0.52					

AQUIFER TEST DATA

Owner ______ Address ______ County ______ State ______

______ Company performing test ______ Measured by ______

Well No Pumping Well Distance from pumping well ______ Type of test ______ Test No. ______

Measuring equipment ______

Time Data	Water Level Data	Discharge Data	Comments on factors affecting test data
Pump on: Date ______ Time ______ (t)	Static water level ______	How Q measured ______	
Pump off: Date ______ Time ______ (t')	Measuring point ______	Depth of pump/air line ______	
Duration of aquifer test:	Elevation of measuring point ______	Previous pumping? Yes ______ No ______	
Pumping ______ Recovery ______		Duration ______ End ______	

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	Rate		Comments on factors affecting test data
15/9/92	0950					62.24								
	1050					[illegible]2.22								[illegible] set reference [illegible] Test reset reference [illegible]
	1146					62.20								
	1200											24 gpm		Start pump [illegible]
	[illegible]	[illegible]				[illegible]			3.60					
	2015	490				66.10			3.90					
	[illegible]													
	0834	[illegible]				66.37			4.17					[illegible]
	1214	[illegible]				66.36			4.16					
	1350					66.36			4.17	4.16				pump off
7/17	0600		[illegible]						[illegible]					[illegible] reading
	0627		[illegible]			62.89								65669.7 @ off
	0658		[illegible]			62.78								−4223 step draw[illegible] reading
	~~0745~~ JB					~~62.71~~ JB								61,446.7 gals
	0846		[illegible]			62.50								÷ 42 hrs
	1115		[illegible]			62.47								÷ 60 min
	1334		[illegible]			62.35								Q = 24.38 gpm
	1639		[illegible]			62.25								
18/9/92	0806		[illegible]		62.26	~~62.[illegible]~~								
	1500		1986			62.17								
	1739		[illegible]			62.15								

Appendix E

Laboratory Data

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ES-ENGINEERING SCIENCE, INC. OCT 2 8 1992 600 Bancroft Way Berkeley, CA. 94710

ES-ST LOUIS

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 4355 Date Analyzed: 09/21/92

Laboratory ID: 4355-01 Matrix: WATER

Client ID: PTW-RW1 Level:LOW Dilution Fact: 2.5

Compound	Analytical Results ug/L	Reporting Limit
Chloromethane	ND	25
Bromomethane	ND	25
Vinyl Chloride	ND	25
Chloroethane	ND	25
Methylene Chloride	ND	13
Acetone	ND	25
Carbon Disulfide	ND	25
Trichlorofluoromethane	ND	25
1,1-Dichloroethene	45	13
1,1-Dichloroethane	ND	13
1,2-Dichloroethene (Total)	47	13
Chloroform	ND	13
1,2-Dichloroethane	ND	13
2-Butanone	ND	25
1,1,1-Trichloroethane	ND	13
Carbon Tetrachloride	ND	13
Vinyl Acetate	ND	25
Bromodichloromethane	ND	13
1,2-Dichloropropane	ND	13
cis-1,3-Dichloropropene	ND	13
Trichloroethene	120	13
Benzene	ND	13
Dibromochloromethane	ND	13
1,1,2-Trichloroethane	ND	13
trans-1,3-Dichloropropene	ND	13
2-Chloroethylvinylether	ND	25
Bromoform	ND	13
2-Hexanone	ND	25
4-Methyl-2-pentanone	ND	25
Tetrachloroethene	74	13
1,1,2,2-Tetrachloroethane	320	13
Toluene	ND	13
Chlorobenzene	ND	13
Ethylbenzene	ND	13
Styrene	ND	13
Total Xylenes	ND	13
1,3-Dichlorobenzene	ND	13
1,4-Dichlorobenzene	ND	13
1,2-Dichlorobenzene	ND	13

Analyst: S-C

Group Leader:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4355
Laboratory ID: 4355-01
Client ID: PTW-RW1
Matrix: WATER
Level:LOW

Date Extracted: 09/19/92
Date Analyzed: 09/24/92
Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
N-Nitroso-Dimethylamine	ND	10
Phenol	ND	10
bis(2-Chloroethyl)ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	ND	10
2,4-Dimethylphenol	ND	10
bis(2-Chloroethoxy)methane	ND	10
2,4-Dichlorophenol	ND	10
Benzoic Acid	ND	25
1,2,4-Trichlorobenzene	ND	10
Naphthalene	ND	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	25
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	25
Dimethylphthalate	ND	10
Acenaphthylene	ND	10
2,6-Dinitrotoluene	ND	10
3-Nitroaniline	ND	25
Acenaphthene	ND	10
2,4-Dinitrophenol	ND	25
Dibenzofuran	ND	10
4-Nitrophenol	ND	25

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4355

Laboratory ID: 4355-01

Client ID: PTW-RW1

Matrix: WATER

Level:LOW

Date Extracted: 09/19/92

Date Analyzed: 09/24/92

Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
2,4-Dinitrotoluene	ND	10
Fluorene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
4-Nitroaniline	ND	25
4,6-Dinitro-2-Methylphenol	ND	25
N-Nitrosodiphenylamine	ND	10
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	25
Phenanthrene	ND	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
Benzo(a)Anthracene	ND	10
3,3'-Dichlorobenzidine	ND	20
Chrysene	ND	10
bis(2-Ethylhexyl)Phthalate	ND	10
Di-n-octylphthalate	ND	10
Benzo(b)Fluoranthene	ND	10
Benzo(k)Fluoranthene	ND	10
Benzo(a)Pyrene	ND	10
Indeno(1,2,3-cd)Pyrene	ND	10
Dibenz(a,h)Anthracene	ND	10
Benzo(g,h,i)Perylene	ND	10
Chloroacetophenone	ND	10

Analyst: Melissa Puchlinski

Group Leader:

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OCT 2 8 1992
ES-ST. LOUIS

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
PESTICIDE EPA 8080

Work Order NO.	:4355	ML SAMPLE	: 1000
Client ID	:PTW-RW1	Date Extracted	: 09/22/92
Laboratory ID	:4355-01	Date Analyzed	: 10/08/92
QC Batch Number	:W92QCB038PES	Date Confirmed	: 10/08/92
Matrix	:WATER	Dilution Factor:	1
Unit	:ug/L		

Compound	Result	Reporting Limit
Aldrin	ND	0.04
Alpha-BHC	ND	0.03
Beta-BHC	ND	0.06
Delta-BHC	ND	0.09
Gamma-BHC	ND	0.04
Chlordane	ND	0.14
4,4'-DDD	ND	0.11
4,4-DDE	ND	0.04
4,4-DDT	ND	0.12
Dieldrin	ND	0.02
Endosulfan I	ND	0.14
Endosulfan II	ND	0.04
Endosulfan Sulfate	ND	0.66
Endrin	ND	0.06
Heptachlor	ND	0.03
Heptachlor Epoxide	ND	0.83
Endrin aldehyde	ND	0.23
Methoxychlor	ND	1.8
Toxaphene	ND	2.4
PCB_1016	ND	0.1
PCB-1221	ND	0.4
PCB-1232	ND	0.3
PCB-1242	ND	0.2
PCB-1248	ND	0.2
PCB-1254	ND	0.2
PCB-1260	ND	0.2

ND-Not Detected
NA-Not Applicable

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

PTWRW1

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4355W SAS No.: _____ SDG No.: PTWRW1

Matrix (soil/water): WATER

Lab Sample ID: 4355.01___

Level (low/med): LOW__

Date Sampled : 09/15/92

% Solids: __0.0

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Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony_	17.0	U		P_
7440-38-2	Arsenic__	2.0	U		F_
7440-39-3	Barium___	129	B		P_
7440-43-9	Cadmium__	2.0	U		P_
7440-47-3	Chromium_	3.0	U		P_
7440-50-8	Copper___	4.3	B		P_
7439-92-1	Lead_____	3.1	_		F_
7439-97-6	Mercury__	0.05	U		CV
7440-02-0	Nickel___	4.0	U		P_
7782-49-2	Selenium_	1.0	U		F_
7440-22-4	Silver___	4.0	U		P_
7440-66-6	Zinc_____	24.1	_		P_

Comments:

FORM I - IN

3/90

OCT 2 8 1992

ES-ENGINEERING SCIENCE, INC.

ES-ST. LOUIS

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 4355

Date Analyzed: 09/21/92

Laboratory ID: 4355-02

Matrix: WATER

Client ID: PTW-RW2

Level:LOW

Dilution Fact: 10.0

Compound	Analytical Results ug/L	Reporting Limit
Chloromethane	ND	100
Bromomethane	ND	100
Vinyl Chloride	ND	100
Chloroethane	ND	100
Methylene Chloride	ND	50
Acetone	ND	100
Carbon Disulfide	ND	100
Trichlorofluoromethane	ND	100
1,1-Dichloroethene	ND	50
1,1-Dichloroethane	ND	50
1,2-Dichloroethene (Total)	170	50
Chloroform	ND	50
1,2-Dichloroethane	ND	50
2-Butanone	ND	100
1,1,1-Trichloroethane	ND	50
Carbon Tetrachloride	ND	50
Vinyl Acetate	ND	100
Bromodichloromethane	ND	50
1,2-Dichloropropane	ND	50
cis-1,3-Dichloropropene	ND	50
Trichloroethene	340	50
Benzene	ND	50
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	50
trans-1,3-Dichloropropene	ND	50
2-Chloroethylvinylether	ND	100
Bromoform	ND	50
2-Hexanone	ND	100
4-Methyl-2-pentanone	ND	100
Tetrachloroethene	87	50
1,1,2,2-Tetrachloroethane	890	50
Toluene	ND	50
Chlorobenzene	ND	50
Ethylbenzene	ND	50
Styrene	ND	50
Total Xylenes	ND	50
1,3-Dichlorobenzene	ND	50
1,4-Dichlorobenzene	ND	50
1,2-Dichlorobenzene	ND	50

Analyst: J.C

Group Leader:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4355
Laboratory ID: 4355-02
Client ID: PTW-RW2
Matrix: WATER Level:LOW

Date Extracted: 09/19/92
Date Analyzed: 09/24/92
Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
N-Nitroso-Dimethylamine	ND	10
Phenol	ND	10
bis(2-Chloroethyl)ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	ND	10
2,4-Dimethylphenol	ND	10
bis(2-Chloroethoxy)methane	ND	10
2,4-Dichlorophenol	ND	10
Benzoic Acid	ND	25
1,2,4-Trichlorobenzene	ND	10
Naphthalene	ND	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	25
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	25
Dimethylphthalate	ND	10
Acenaphthylene	ND	10
2,6-Dinitrotoluene	ND	10
3-Nitroaniline	ND	25
Acenaphthene	ND	10
2,4-Dinitrophenol	ND	25
Dibenzofuran	ND	10
4-Nitrophenol	ND	25

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4355

Laboratory ID: 4355-02

Client ID: PTW-RW2

Matrix: WATER

Level:LOW

Date Extracted: 09/19/92

Date Analyzed: 09/24/92

Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
2,4-Dinitrotoluene	ND	10
Fluorene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
4-Nitroaniline	ND	25
4,6-Dinitro-2-Methylphenol	ND	25
N-Nitrosodiphenylamine	ND	10
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	25
Phenanthrene	ND	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
Benzo(a)Anthracene	ND	10
3,3'-Dichlorobenzidine	ND	20
Chrysene	ND	10
bis(2-Ethylhexyl)Phthalate	ND	10
Di-n-octylphthalate	ND	10
Benzo(b)Fluoranthene	ND	10
Benzo(k)Fluoranthene	ND	10
Benzo(a)Pyrene	ND	10
Indeno(1,2,3-cd)Pyrene	ND	10
Dibenz(a,h)Anthracene	ND	10
Benzo(g,h,i)Perylene	ND	10
Chloroacetophenone	ND	10

Analyst: Melissa Kachlinski

Group Leader:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
PESTICIDE EPA 8080

Work Order NO. :4355
Client ID :PTW-RW2
Laboratory ID :4355-02
QC Batch Number:W92QCB038PES
Matrix :WATER
Unit :ug/L

ML SAMPLE : 1000
Date Extracted : 09/22/92
Date Analyzed : 10/08/92
Date Confirmed : 10/08/92
Dilution Factor: 1

Compound	Result	Reporting Limit
Aldrin	ND	0.04
Alpha-BHC	ND	0.03
Beta-BHC	ND	0.06
Delta-BHC	ND	0.09
Gamma-BHC	ND	0.04
Chlordane	ND	0.14
4,4'-DDD	ND	0.11
4,4-DDE	ND	0.04
4,4-DDT	ND	0.12
Dieldrin	ND	0.02
Endosulfan I	ND	0.14
Endosulfan II	ND	0.04
Endosulfan Sulfate	ND	0.66
Endrin	ND	0.06
Heptachlor	ND	0.03
Heptachlor Epoxide	ND	0.83
Endrin aldehyde	ND	0.23
Methoxychlor	ND	1.8
Toxaphene	ND	2.4
PCB_1016	ND	0.1
PCB-1221	ND	0.4
PCB-1232	ND	0.3
PCB-1242	ND	0.2
PCB-1248	ND	0.2
PCB-1254	ND	0.2
PCB-1260	ND	0.2

ND-Not Detected
NA-Not Applicable

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID: PTWRW2

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4355W SAS No.: _____ SDG No.: PTWRW1

Matrix (soil/water): WATER

Lab Sample ID: 4355.02___

Level (low/med): LOW__

Date Sampled : 09/16/92

% Solids: __0.0

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Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	17.0	U		P
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	114	B		P
7440-43-9	Cadmium	2.0	U		P
7440-47-3	Chromium	3.0	U		P
7440-50-8	Copper	5.4	B		P
7439-92-1	Lead	1.6	B		F
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	4.0	U		P
7782-49-2	Selenium	1.0	U		F
7440-22-4	Silver	4.0	U		P
7440-66-6	Zinc	15.7	B		P

Comments:

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ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 9471

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 4368

Date Analyzed: 09/21/92

Laboratory ID: 4368-01

Matrix: WATER

Client ID: PTW-RW3

Level: LOW

Dilution Fact: 5.0

Compound	Analytical Results ug/L	Reporting Limit
Chloromethane	ND	50
Bromomethane	ND	50
Vinyl Chloride	ND	50
Chloroethane	ND	50
Methylene Chloride	ND	25
Acetone	ND	50
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	50
1,1-Dichloroethene	50	25
1,1-Dichloroethane	ND	25
1,2-Dichloroethene (Total)	220	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	ND	50
1,1,1-Trichloroethane	ND	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	ND	50
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
cis-1,3-Dichloropropene	ND	25
Trichloroethene	360	25
Benzene	ND	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
trans-1,3-Dichloropropene	ND	25
2-Chloroethylvinylether	ND	50
Bromoform	ND	25
2-Hexanone	ND	50
4-Methyl-2-pentanone	ND	50
Tetrachloroethene	100	25
1,1,2,2-Tetrachloroethane	750	25
Toluene	ND	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25
Styrene	ND	25
Total Xylenes	ND	25
1,3-Dichlorobenzene	ND	25
1,4-Dichlorobenzene	ND	25
1,2-Dichlorobenzene	ND	25

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4368
Laboratory ID: 4368-01
Client ID: PTW-RW3
Matrix: WATER
Level:LOW

Date Extracted: 09/19/92
Date Analyzed: 09/25/92
Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
N-Nitroso-Dimethylamine	ND	10
Phenol	ND	10
bis(2-Chloroethyl)ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	ND	10
2,4-Dimethylphenol	ND	10
bis(2-Chloroethoxy)methane	ND	10
2,4-Dichlorophenol	ND	10
Benzoic Acid	ND	25
1,2,4-Trichlorobenzene	ND	10
Naphthalene	ND	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	25
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	25
Dimethylphthalate	ND	10
Acenaphthylene	ND	10
2,6-Dinitrotoluene	ND	10
3-Nitroaniline	ND	25
Acenaphthene	ND	10
2,4-Dinitrophenol	ND	25
Dibenzofuran	ND	10
4-Nitrophenol	ND	25

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4368
Laboratory ID: 4368-01
Client ID: PTW-RW3
Matrix: WATER Level:LOW

Date Extracted: 09/19/92
Date Analyzed: 09/25/92
Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
2,4-Dinitrotoluene	ND	10
Fluorene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
4-Nitroaniline	ND	25
4,6-Dinitro-2-Methylphenol	ND	25
N-Nitrosodiphenylamine	ND	10
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	25
Phenanthrene	ND	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
Benzo(a)Anthracene	ND	10
3,3'-Dichlorobenzidine	ND	20
Chrysene	ND	10
bis(2-Ethylhexyl)Phthalate	ND	10
Di-n-octylphthalate	ND	10
Benzo(b)Fluoranthene	ND	10
Benzo(k)Fluoranthene	ND	10
Benzo(a)Pyrene	ND	10
Indeno(1,2,3-cd)Pyrene	ND	10
Dibenz(a,h)Anthracene	ND	10
Benzo(g,h,i)Perylene	ND	10
Chloroacetophenone	ND	10

Analyst: Melissa Rochlenski
Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
PESTICIDE EPA 8080

Work Order NO. :4368
Client ID :PTW-RW3
Laboratory ID :4368-01
QC Batch Number:W92QCB039PES
Matrix :WATER
Unit :ug/L

ML SAMPLE : 1000
Date Extracted : 09/24/92
Date Analyzed : 10/08/92
Date Confirmed : 10/08/92
Dilution Factor: 1

Compound	Result	Reporting Limit
Aldrin	ND	0.050
Alpha-BHC	ND	0.050
Beta-BHC	ND	0.050
Delta-BHC	ND	0.050
Gamma-BHC	ND	0.050
Chlordane	ND	0.050
4,4'-DDD	ND	0.10
4,4-DDE	ND	0.10
4,4-DDT	ND	0.10
Dieldrin	ND	0.10
Endosulfan I	ND	0.050
Endosulfan II	ND	0.10
Endosulfan Sulfate	ND	0.10
Endrin	ND	0.10
Heptachlor	ND	0.050
Heptachlor Epoxide	ND	0.050
Endrin aldehyde	ND	0.10
Methoxychlor	ND	0.30
Toxaphene	ND	5.0
PCB_1016	ND	1.0
PCB-1221	ND	2.0
PCB-1232	ND	1.0
PCB-1242	ND	1.0
PCB-1248	ND	1.0
PCB-1254	ND	1.0
PCB-1260	ND	1.0

ND-Not Detected
NA-Not Applicable

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

PTWRW3

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4355W SAS No.: _____ SDG No.: PTWRW1

Matrix (soil/water): WATER Lab Sample ID: 4368.01___

Level (low/med): LOW__ Date Sampled : 09/17/92

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	17.0	U		P
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	113	B		P
7440-43-9	Cadmium	2.0	U		P
7440-47-3	Chromium	3.0	U		P
7440-50-8	Copper	3.0	U		P
7439-92-1	Lead	2.8	B		F
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	4.0	U		P
7782-49-2	Selenium	1.0	U		F
7440-22-4	Silver	4.0	U		P
7440-66-6	Zinc	11.1	B		P

Comments:

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

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Work Order No: 4368

Laboratory ID: 4368-05

Client ID: PTW-TW1

Level:LOW

Date Analyzed: 09/24/92

Matrix: WATER

Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	5
Acetone	12	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND	10
1,1-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethene (Total)	ND	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Vinyl Acetate	ND	10
Bromodichloromethane	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
Trichloroethene	ND	5
Benzene	ND	5
Dibromochloromethane	ND	5
1,1,2-Trichloroethane	ND	5
trans-1,3-Dichloropropene	ND	5
2-Chloroethylvinylether	ND	10
Bromoform	ND	5
2-Hexanone	ND	10
4-Methyl-2-pentanone	ND	10
Tetrachloroethene	ND	5
1,1,2,2-Tetrachloroethane	ND	5
Toluene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Styrene	ND	5
Total Xylenes	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

Analyst: S.C

Group Leader:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4368
Laboratory ID: 4368-05
Client ID: PTW-TW1
Matrix: WATER
Level:LOW

Date Extracted: 09/19/92
Date Analyzed: 09/25/92
Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
N-Nitroso-Dimethylamine	ND	10
Phenol	ND	10
bis(2-Chloroethyl)ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	ND	10
2,4-Dimethylphenol	ND	10
bis(2-Chloroethoxy)methane	ND	10
2,4-Dichlorophenol	ND	10
Benzoic Acid	ND	25
1,2,4-Trichlorobenzene	ND	10
Naphthalene	ND	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	25
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	25
Dimethylphthalate	ND	10
Acenaphthylene	ND	10
2,6-Dinitrotoluene	ND	10
3-Nitroaniline	ND	25
Acenaphthene	ND	10
2,4-Dinitrophenol	ND	25
Dibenzofuran	ND	10
4-Nitrophenol	ND	25

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4368
Laboratory ID: 4368-05
Client ID: PTW-TW1
Matrix: WATER
Level: LOW

Date Extracted: 09/19/92
Date Analyzed: 09/25/92
Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
2,4-Dinitrotoluene	ND	10
Fluorene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
4-Nitroaniline	ND	25
4,6-Dinitro-2-Methylphenol	ND	25
N-Nitrosodiphenylamine	ND	10
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	25
Phenanthrene	ND	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
Benzo(a)Anthracene	ND	10
3,3'-Dichlorobenzidine	ND	20
Chrysene	ND	10
bis(2-Ethylhexyl)Phthalate	ND	10
Di-n-octylphthalate	ND	10
Benzo(b)Fluoranthene	ND	10
Benzo(k)Fluoranthene	ND	10
Benzo(a)Pyrene	ND	10
Indeno(1,2,3-cd)Pyrene	ND	10
Dibenz(a,h)Anthracene	ND	10
Benzo(g,h,i)Perylene	ND	10
Chloroacetophenone	ND	10

Analyst: Melissa Rachlinski
Group Leader:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley,CA 94710
ES-ST. LOUIS

GC ANALYTICAL REPORT
PESTICIDE EPA 8080

Work Order NO. :4368
Client ID :PTW-TW1
Laboratory ID :4368-05
QC Batch Number:W92QCB039PES
Matrix :WATER
Unit :ug/L

ML SAMPLE : 1000
Date Extracted : 09/24/92
Date Analyzed : 10/08/92
Date Confirmed : 10/08/92
Dilution Factor: 1

Compound	Result	Reporting Limit
Aldrin	ND	0.050
Alpha-BHC	ND	0.050
Beta-BHC	ND	0.050
Delta-BHC	ND	0.050
Gamma-BHC	ND	0.050
Chlordane	ND	0.050
4,4'-DDD	ND	0.10
4,4-DDE	ND	0.10
4,4-DDT	ND	0.10
Dieldrin	ND	0.10
Endosulfan I	ND	0.050
Endosulfan II	ND	0.10
Endosulfan Sulfate	ND	0.10
Endrin	ND	0.10
Heptachlor	ND	0.050
Heptachlor Epoxide	ND	0.050
Endrin aldehyde	ND	0.10
Methoxychlor	ND	0.30
Toxaphene	ND	5.0
PCB_1016	ND	1.0
PCB-1221	ND	2.0
PCB-1232	ND	1.0
PCB-1242	ND	1.0
PCB-1248	ND	1.0
PCB-1254	ND	1.0
PCB-1260	ND	1.0

ND-Not Detected
NA-Not Applicable

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID: PTWTW1

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4355W SAS No.: _____ SDG No.: PTWRW1

Matrix (soil/water): WATER Lab Sample ID: 4368.05___

Level (low/med): LOW__ Date Sampled : 09/17/92

% Solids: __0.0

RECEIVED
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ES-ST. LOUIS

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	17.0	U		P
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	111	B		P
7440-43-9	Cadmium	2.0	U		P
7440-47-3	Chromium	3.0	U		P
7440-50-8	Copper	3.0	U		P
7439-92-1	Lead	2.6	B		F
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	4.0	U		P
7782-49-2	Selenium	1.0	U		F
7440-22-4	Silver	4.0	U		P
7440-66-6	Zinc	47.2			P

Comments:

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ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 4368

Date Analyzed: 09/24/92

Laboratory ID: 4368-06

Matrix: WATER

Client ID: PTW-TW2

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	5
Acetone	ND	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND	10
1,1-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethene (Total)	ND	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Vinyl Acetate	ND	10
Bromodichloromethane	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
Trichloroethene	ND	5
Benzene	ND	5
Dibromochloromethane	ND	5
1,1,2-Trichloroethane	ND	5
trans-1,3-Dichloropropene	ND	5
2-Chloroethylvinylether	ND	10
Bromoform	ND	5
2-Hexanone	ND	10
4-Methyl-2-pentanone	ND	10
Tetrachloroethene	ND	5
1,1,2,2-Tetrachloroethane	ND	5
Toluene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Styrene	ND	5
Total Xylenes	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

Analyst: JC

Group Leader:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4368
Laboratory ID: 4368-06
Client ID: PTW-TW2
Matrix: WATER
Level:LOW

Date Extracted: 09/19/92
Date Analyzed: 09/25/92
Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
N-Nitroso-Dimethylamine	ND	10
Phenol	ND	10
bis(2-Chloroethyl)ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	ND	10
2,4-Dimethylphenol	ND	10
bis(2-Chloroethoxy)methane	ND	10
2,4-Dichlorophenol	ND	10
Benzoic Acid	ND	25
1,2,4-Trichlorobenzene	ND	10
Naphthalene	ND	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	25
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	25
Dimethylphthalate	ND	10
Acenaphthylene	ND	10
2,6-Dinitrotoluene	ND	10
3-Nitroaniline	ND	25
Acenaphthene	ND	10
2,4-Dinitrophenol	ND	25
Dibenzofuran	ND	10
4-Nitrophenol	ND	25

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4368

Laboratory ID: 4368-06

Client ID: PTW-TW2

Matrix: WATER Level:LOW

Date Extracted: 09/19/92

Date Analyzed: 09/25/92

Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
2,4-Dinitrotoluene	ND	10
Fluorene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
4-Nitroaniline	ND	25
4,6-Dinitro-2-Methylphenol	ND	25
N-Nitrosodiphenylamine	ND	10
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	25
Phenanthrene	ND	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
Benzo(a)Anthracene	ND	10
3,3'-Dichlorobenzidine	ND	20
Chrysene	ND	10
bis(2-Ethylhexyl)Phthalate	ND	10
Di-n-octylphthalate	ND	10
Benzo(b)Fluoranthene	ND	10
Benzo(k)Fluoranthene	ND	10
Benzo(a)Pyrene	ND	10
Indeno(1,2,3-cd)Pyrene	ND	10
Dibenz(a,h)Anthracene	ND	10
Benzo(g,h,i)Perylene	ND	10
Chloroacetophenone	ND	10

Analyst: Melissa Kucklinski

Group Leader:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
PESTICIDE EPA 8080

Work Order NO.	:4368	ML SAMPLE	: 1000
Client ID	:PTW-TW2	Date Extracted	: 09/24/92
Laboratory ID	:4368-06	Date Analyzed	: 10/08/92
QC Batch Number	:W92QCB039PES	Date Confirmed	: 10/08/92
Matrix	:WATER	Dilution Factor:	1
Unit	:ug/L		

Compound	Result	Reporting Limit
Aldrin	ND	0.050
Alpha-BHC	ND	0.050
Beta-BHC	ND	0.050
Delta-BHC	ND	0.050
Gamma-BHC	ND	0.050
Chlordane	ND	0.050
4,4'-DDD	ND	0.10
4,4-DDE	ND	0.10
4,4-DDT	ND	0.10
Dieldrin	ND	0.10
Endosulfan I	ND	0.050
Endosulfan II	ND	0.10
Endosulfan Sulfate	ND	0.10
Endrin	ND	0.10
Heptachlor	ND	0.050
Heptachlor Epoxide	ND	0.050
Endrin aldehyde	ND	0.10
Methoxychlor	ND	0.30
Toxaphene	ND	5.0
PCB_1016	ND	1.0
PCB-1221	ND	2.0
PCB-1232	ND	1.0
PCB-1242	ND	1.0
PCB-1248	ND	1.0
PCB-1254	ND	1.0
PCB-1260	ND	1.0

ND-Not Detected
NA-Not Applicable

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

PTWTW2

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4355W SAS No.: _____ SDG No.: PTWRW1

Matrix (soil/water): WATER Lab Sample ID: 4368.06___

Level (low/med): LOW__ Date Sampled : 09/17/92

% Solids: __0.0

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Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony_	17.0	U		P_
7440-38-2	Arsenic__	2.0	U		F_
7440-39-3	Barium___	126	B		P_
7440-43-9	Cadmium__	2.0	U		P_
7440-47-3	Chromium_	3.0	U		P_
7440-50-8	Copper___	3.0	U		P_
7439-92-1	Lead_____	2.4	B		F_
7439-97-6	Mercury__	0.05	U		CV
7440-02-0	Nickel___	5.8	B		P_
7782-49-2	Selenium_	1.0	U		F_
7440-22-4	Silver___	4.0	U		P_
7440-66-6	Zinc_____	52.7			P_

Comments:

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ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

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Work Order No: 4368

Date Analyzed: 09/24/92

Laboratory ID: 4368-03

Matrix: WATER

Client ID: PTW-TW3

Level:LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	5
Acetone	ND	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND	10
1,1-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethene (Total)	ND	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Vinyl Acetate	ND	10
Bromodichloromethane	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
Trichloroethene	ND	5
Benzene	ND	5
Dibromochloromethane	ND	5
1,1,2-Trichloroethane	ND	5
trans-1,3-Dichloropropene	ND	5
2-Chloroethylvinylether	ND	10
Bromoform	ND	5
2-Hexanone	ND	10
4-Methyl-2-pentanone	ND	10
Tetrachloroethene	ND	5
1,1,2,2-Tetrachloroethane	ND	5
Toluene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Styrene	ND	5
Total Xylenes	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

Analyst: S-C.

Group Leader:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4368
Laboratory ID: 4368-03
Client ID: PTW-TW3
Matrix: WATER
Level:LOW

Date Extracted: 09/19/92
Date Analyzed: 09/25/92
Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
N-Nitroso-Dimethylamine	ND	10
Phenol	ND	10
bis(2-Chloroethyl)ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	ND	10
2,4-Dimethylphenol	ND	10
bis(2-Chloroethoxy)methane	ND	10
2,4-Dichlorophenol	ND	10
Benzoic Acid	ND	25
1,2,4-Trichlorobenzene	ND	10
Naphthalene	ND	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	25
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	25
Dimethylphthalate	ND	10
Acenaphthylene	ND	10
2,6-Dinitrotoluene	ND	10
3-Nitroaniline	ND	25
Acenaphthene	ND	10
2,4-Dinitrophenol	ND	25
Dibenzofuran	ND	10
4-Nitrophenol	ND	25

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4368
Laboratory ID: 4368-03
Client ID: PTW-TW3
Matrix: WATER Level:LOW

Date Extracted: 09/19/92
Date Analyzed: 09/25/92
Dilution Fact: 1.0

Compound	Analytical Results ug/L	Reporting Limit
2,4-Dinitrotoluene	ND	10
Fluorene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
4-Nitroaniline	ND	25
4,6-Dinitro-2-Methylphenol	ND	25
N-Nitrosodiphenylamine	ND	10
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	25
Phenanthrene	ND	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
Benzo(a)Anthracene	ND	10
3,3'-Dichlorobenzidine	ND	20
Chrysene	ND	10
bis(2-Ethylhexyl)Phthalate	ND	10
Di-n-octylphthalate	ND	10
Benzo(b)Fluoranthene	ND	10
Benzo(k)Fluoranthene	ND	10
Benzo(a)Pyrene	ND	10
Indeno(1,2,3-cd)Pyrene	ND	10
Dibenz(a,h)Anthracene	ND	10
Benzo(g,h,i)Perylene	ND	10
Chloroacetophenone	ND	10

Analyst: Melissa Rachlinski
Group Leader:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
PESTICIDE EPA 8080

Work Order NO. :4368
Client ID :PTW-TW3
Laboratory ID :4368-03
QC Batch Number:W92QCB039PES
Matrix :WATER
Unit :ug/L

ML SAMPLE : 1000
Date Extracted : 09/24/92
Date Analyzed : 10/08/92
Date Confirmed : 10/08/92
Dilution Factor: 1

Compound	Result	Reporting Limit
Aldrin	ND	0.050
Alpha-BHC	ND	0.050
Beta-BHC	ND	0.050
Delta-BHC	ND	0.050
Gamma-BHC	ND	0.050
Chlordane	ND	0.050
4,4'-DDD	ND	0.10
4,4-DDE	ND	0.10
4,4-DDT	ND	0.10
Dieldrin	ND	0.10
Endosulfan I	ND	0.050
Endosulfan II	ND	0.10
Endosulfan Sulfate	ND	0.10
Endrin	ND	0.10
Heptachlor	ND	0.050
Heptachlor Epoxide	ND	0.050
Endrin aldehyde	ND	0.10
Methoxychlor	ND	0.30
Toxaphene	ND	5.0
PCB_1016	ND	1.0
PCB-1221	ND	2.0
PCB-1232	ND	1.0
PCB-1242	ND	1.0
PCB-1248	ND	1.0
PCB-1254	ND	1.0
PCB-1260	ND	1.0

ND-Not Detected
NA-Not Applicable

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID: PTWTW3

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4355W SAS No.: _____ SDG No.: PTWRW1

Matrix (soil/water): WATER Lab Sample ID: 4368.03___

Level (low/med): LOW__ Date Sampled : 09/17/92

% Solids: __0.0

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OCT 28 1992
ES-ST. LOUIS

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony_	17.0	U		P_
7440-38-2	Arsenic__	2.0	U		F_
7440-39-3	Barium___	124	B		P_
7440-43-9	Cadmium__	2.0	U		P_
7440-47-3	Chromium_	3.0	U		P_
7440-50-8	Copper___	3.0	U		P_
7439-92-1	Lead_____	3.1	_		F_
7439-97-6	Mercury__	0.05	U		CV
7440-02-0	Nickel___	4.0	U		P_
7782-49-2	Selenium_	1.0	U		F_
7440-22-4	Silver___	4.0	U		P_
7440-66-6	Zinc_____	52.5	_		P_

Comments:

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GEOMET TECHNOLOGIES, INC.
Phone: 301/428-9898
Fax: 301/428-9482
20251 Century Boulevard, Germantown, Maryland 20874

November 6, 1992

Mr. David E. Mizell, P.E.
Engineering-Science
425 Woods Mill Road South
Suite 150
Chesterfield, MO. 63017

Reference: Soil and Water Testing Under Purchase Order Number DEM-91192.

Dear Mr. Mizell,

GEOMET Technologies, Inc., Laboratory Division, has completed the testing of samples received to date under the above referenced Purchase Order and provides the attached test results.

Nine (9) water samples and eight (8) soil samples have been tested using EPA Method 8140 and CRDEC's Internal Operating Procedures (IOPs) Numbers 003.10 and 004.10 respectively.

Please feel free to call us at (301) 417-9605, if you have any questions about the attached test results.

Sincerely,

Frank W. Kelly
Laboratory Director

FWK/mbc
encl.

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 9471

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

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ES-ST. LOUIS

Work Order No: 4274

Laboratory ID: 4274-01

Client ID: PT1-SS1-15

Level:LOW

Date Analyzed: 08/27/92

Matrix: SOIL

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	11	5
Acetone	17	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND J-	10
1,1-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethene (Total)	ND J-	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Vinyl Acetate	ND R	10
Bromodichloromethane	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
Trichloroethene	ND	5
Benzene	ND	5
Dibromochloromethane	ND	5
1,1,2-Trichloroethane	ND	5
trans-1,3-Dichloropropene	ND	5
2-Chloroethylvinylether	ND J-	10
Bromoform	ND	5
2-Hexanone	ND	10
4-Methyl-2-pentanone	ND	10
Tetrachloroethene	ND	5
1,1,2,2-Tetrachloroethane	ND	5
Toluene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Styrene	ND	5
Total Xylenes	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

Analyst: [signature]

Group Leader: [signature]

ES-ENGINEERING-SCIENCE, INC.
600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4274
Date Extracted: 09/01/92

Laboratory ID: 4274-01
Date Analyzed: 09/04/92

Client ID: PT1-SS1-15
Dilution Fact: 1.0

Matrix: SOIL
Level:LOW

Compound	Analytical Results ug/Kg	Reporting Limit
N-Nitroso-Dimethylamine	ND	330
Phenol	ND	330
bis(2-Chloroethyl)ether	ND	330
2-Chlorophenol	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
Benzyl Alcohol	ND	330
1,2-Dichlorobenzene	ND	330
2-Methylphenol	ND	330
bis(2-chloroisopropyl)Ether	ND	330
4-Methylphenol	ND	330
N-Nitroso-Di-n-Propylamine	ND	330
Hexachloroethane	ND	330
Nitrobenzene	ND	330
Isophorone	ND	330
2-Nitrophenol	ND	330
2,4-Dimethylphenol	ND	330
bis(2-Chloroethoxy)methane	ND	330
2,4-Dichlorophenol	ND J	330
Benzoic Acid	ND	830
1,2,4-Trichlorobenzene	ND	330
Naphthalene	ND	330
4-Chloroaniline	ND	330
Hexachlorobutadiene	ND	330
4-Chloro-3-Methylphenol	ND	330
2-Methylnaphthalene	ND	330
Hexachlorocyclopentadiene	ND J	330
2,4,6-Trichlorophenol	ND	330
2,4,5-Trichlorophenol	ND	830
2-Chloronaphthalene	ND	330
2-Nitroaniline	ND	830
Dimethylphthalate	ND	330
Acenaphthylene	ND	330
2,6-Dinitrotoluene	ND	330
3-Nitroaniline	ND	830
Acenaphthene	ND	330
2,4-Dinitrophenol	ND	830
Dibenzofuran	ND	330
4-Nitrophenol	ND	830

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4274 Date Extracted: 09/01/92

Laboratory ID: 4274-01 Date Analyzed: 09/04/92

Client ID: PT1-SS1-15 Dilution Fact: 1.0

Matrix: SOIL Level:LOW

Compound	Analytical Results ug/Kg	Reporting Limit
2,4-Dinitrotoluene	ND	330
Fluorene	ND	330
Diethylphthalate	ND	330
4-Chlorophenyl-phenylether	ND	330
4-Nitroaniline	ND	830
4,6-Dinitro-2-Methylphenol	ND	830
N-Nitrosodiphenylamine	ND	330
4-Bromophenyl-phenylether	ND	330
Hexachlorobenzene	ND	330
Pentachlorophenol	ND	830
Phenanthrene	ND	330
Anthracene	ND	330
Di-n-Butylphthalate	ND	330
Fluoranthene	ND	330
Pyrene	ND	330
Butylbenzylphthalate	ND	330
Benzo(a)Anthracene	ND	330
3,3'-Dichlorobenzidine	ND	660
Chrysene	ND	330
bis(2-Ethylhexyl)Phthalate	ND	330
Di-n-octylphthalate	ND	330
Benzo(b)Fluoranthene	ND	330
Benzo(k)Fluoranthene	ND	330
Benzo(a)Pyrene	ND	330
Indeno(1,2,3-cd)Pyrene	ND	330
Dibenz(a,h)Anthracene	ND	330
Benzo(g,h,i)Perylene	ND	330
Chloracetophenone	ND	330

Analyst: M. Kachmarik

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

ANALYTICAL REPORT
EPA 8080

Work Order No.:4274

Client ID:PT1-SS1-15
% Moisture: 0.00
Laboratory ID:4274-01
QC Batch No:S92QCB022PES
Matrix:SOIL(LOW)

Grams Sample Used: 30.00
Quantitation Units:ug/Kg
Date Extracted:08/28/92
Date Analyzed :09/16/92

Dilution Factor: 10.00

Compound	Result	Reporting Limit
Aldrin	ND	16.7
Alpha-BHC	ND	16.7
Beta-BHC	ND	16.7
Delta-BHC	ND	16.7
Gamma-BHC	ND	16.7
Chlordane	ND	16.7
4,4'-DDD	ND	33.3
4,4'-DDE	ND	33.3
4,4'-DDT	ND	33.3
Dieldrin	ND	33.3
Endosulfan I	ND	16.7
Endosulfan II	ND	33.3
Endosulfan Sulfate	ND	33
Endrin	ND	33.3
Endrin Aldehyde	ND	33.3
Heptachlor	ND	16.7
Heptachlor Epoxide	ND	17
Methoxychlor	ND	600
Toxaphene	ND	1667
PCB-1016	ND	333.3
PCB-1221	ND	667
PCB-1232	ND	333
PCB-1242	ND	333.3
PCB-1248	ND	333.3
PCB-1254	ND	333.3
PCB-1260	ND	333.3

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID: SS1-15

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4274S SAS No.: _____ SDG No.: SS1-15

Matrix (soil/water): SOIL_ Lab Sample ID: 4274.01___

Level (low/med): LOW__ Date Received: 08/26/92

% Solids: 81.8

Concentration Units (ug/L or mg/kg as received): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.6	U		P
7440-38-2	Arsenic	3.0			F
7440-39-3	Barium	46.1			P
7440-43-9	Cadmium	0.19	U		P
7440-47-3	Chromium	8.5			P
7440-50-8	Copper	9.1			P
7439-92-1	Lead	10.8			F
7439-97-6	Mercury	0.02	U		CV
7440-02-0	Nickel	7.5			P
7782-49-2	Selenium	0.15	B		F
7440-22-4	Silver	0.38	U		P
7440-66-6	Zinc	23.5			P

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Comments:

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ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 9471

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 4274

Date Analyzed: 08/27/92

Laboratory ID: 4274-02

Matrix: SOIL

Client ID: PT1-SS2-25

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	6	5
Acetone	14	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND J-	10
1,1-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethene (Total)	ND	5
Chloroform	ND	5
1,2-Dichloroethane	ND J-	5
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Vinyl Acetate	ND J-	10
Bromodichloromethane	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
Trichloroethene	ND	5
Benzene	ND	5
Dibromochloromethane	ND	5
1,1,2-Trichloroethane	ND	5
trans-1,3-Dichloropropene	ND	5
2-Chloroethylvinylether	ND J-	10
Bromoform	ND	5
2-Hexanone	ND	10
4-Methyl-2-pentanone	ND	10
Tetrachloroethene	ND	5
1,1,2,2-Tetrachloroethane	ND	5
Toluene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Styrene	ND	5
Total Xylenes	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

Analyst: [signature]

Group Leader: [signature]

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4274

Laboratory ID: 4274-02

Client ID: PT1-SS2-25

Matrix: SOIL

Level:LOW

Date Extracted: 09/01/92

Date Analyzed: 09/04/92

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg	Reporting Limit
N-Nitroso-Dimethylamine	ND	330
Phenol	ND	330
bis(2-Chloroethyl)ether	ND	330
2-Chlorophenol	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
Benzyl Alcohol	ND	330
1,2-Dichlorobenzene	ND	330
2-Methylphenol	ND	330
bis(2-chloroisopropyl)Ether	ND	330
4-Methylphenol	ND	330
N-Nitroso-Di-n-Propylamine	ND	330
Hexachloroethane	ND	330
Nitrobenzene	ND	330
Isophorone	ND	330
2-Nitrophenol	ND	330
2,4-Dimethylphenol	ND	330
bis(2-Chloroethoxy)methane	ND	330
2,4-Dichlorophenol	ND J	330
Benzoic Acid	ND	830
1,2,4-Trichlorobenzene	ND	330
Naphthalene	ND	330
4-Chloroaniline	ND	330
Hexachlorobutadiene	ND	330
4-Chloro-3-Methylphenol	ND	330
2-Methylnaphthalene	ND	330
Hexachlorocyclopentadiene	ND J	330
2,4,6-Trichlorophenol	ND	330
2,4,5-Trichlorophenol	ND	830
2-Chloronaphthalene	ND	330
2-Nitroaniline	ND	830
Dimethylphthalate	ND	330
Acenaphthylene	ND	330
2,6-Dinitrotoluene	ND	330
3-Nitroaniline	ND	830
Acenaphthene	ND	330
2,4-Dinitrophenol	ND	830
Dibenzofuran	ND	330
4-Nitrophenol	ND	830

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4274

Date Extracted: 09/01/92

Laboratory ID: 4274-02

Date Analyzed: 09/04/92

Client ID: PT1-SS2-25

Dilution Fact: 1.0

Matrix: SOIL

Level:LOW

Compound	Analytical Results ug/Kg	Reporting Limit
2,4-Dinitrotoluene	ND	330
Fluorene	ND	330
Diethylphthalate	ND	330
4-Chlorophenyl-phenylether	ND	330
4-Nitroaniline	ND	830
4,6-Dinitro-2-Methylphenol	ND	830
N-Nitrosodiphenylamine	ND	330
4-Bromophenyl-phenylether	ND	330
Hexachlorobenzene	ND	330
Pentachlorophenol	ND	830
Phenanthrene	ND	330
Anthracene	ND	330
Di-n-Butylphthalate	ND	330
Fluoranthene	ND	330
Pyrene	ND	330
Butylbenzylphthalate	ND	330
Benzo(a)Anthracene	ND	330
3,3'-Dichlorobenzidine	ND	660
Chrysene	ND	330
bis(2-Ethylhexyl)Phthalate	ND	330
Di-n-octylphthalate	ND	330
Benzo(b)Fluoranthene	ND	330
Benzo(k)Fluoranthene	ND	330
Benzo(a)Pyrene	ND	330
Indeno(1,2,3-cd)Pyrene	ND	330
Dibenz(a,h)Anthracene	ND	330
Benzo(g,h,i)Perylene	ND	330
Chloracetophenone	ND	330

Analyst: M. Rachlinski

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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ANALYTICAL REPORT
EPA 8080

Work Order No.:4274

Client ID:PT1-SS2-25
% Moisture: 0.00
Laboratory ID:4274-02
QC Batch No:S92QCB022PES
Matrix:SOIL(LOW)

Grams Sample Used: 30.00
Quantitation Units:ug/Kg
Date Extracted:08/28/92
Date Analyzed :09/16/92

Dilution Factor: 10.00

Compound	Result	Reporting Limit
Aldrin	ND	16.7
Alpha-BHC	ND	16.7
Beta-BHC	ND	16.7
Delta-BHC	ND	16.7
Gamma-BHC	ND	16.7
Chlordane	ND	16.7
4,4'-DDD	ND	33.3
4,4'-DDE	ND	33.3
4,4'-DDT	ND	33.3
Dieldrin	ND	33.3
Endosulfan I	ND	16.7
Endosulfan II	ND	33.3
Endosulfan Sulfate	ND	33
Endrin	ND	33.3
Endrin Aldehyde	ND	33.3
Heptachlor	ND	16.7
Heptachlor Epoxide	ND	17
Methoxychlor	ND	600
Toxaphene	ND	1667
PCB-1016	ND	333.3
PCB-1221	ND	667
PCB-1232	ND	333
PCB-1242	ND	333.3
PCB-1248	ND	333.3
PCB-1254	ND	333.3
PCB-1260	ND	333.3

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID: SS2-25

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4274S SAS No.: _____ SDG No.: SS1-15

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Matrix (soil/water): SOIL_ Lab Sample ID: 4274.02___

Level (low/med): LOW__ Date Received: 08/26/92

% Solids: 81.8

Concentration Units (ug/L or mg/kg as received): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.6	U		P
7440-38-2	Arsenic	3.1			F
7440-39-3	Barium	48.6			P
7440-43-9	Cadmium	0.19	U		P
7440-47-3	Chromium	11.0			P
7440-50-8	Copper	7.8			P
7439-92-1	Lead	7.5			F
7439-97-6	Mercury	0.02	U		CV
7440-02-0	Nickel	7.6			P
7782-49-2	Selenium	0.10	U		F
7440-22-4	Silver	0.38	U		P
7440-66-6	Zinc	22.3			P

Comments:

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ES-ENGINEERING SCIENCE, INC.
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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4278
Laboratory ID: 4278-01
Client ID: PZ61-SS1-5
Matrix: SOIL
Level:LOW

Date Extracted: 09/01/92
Date Analyzed: 09/09/92
Dilution Fact: 1.0

Compound	Analytical Results ug/Kg	Reporting Limit
2,4-Dinitrotoluene	ND	330
Fluorene	ND	330
Diethylphthalate	ND	330
4-Chlorophenyl-phenylether	ND	330
4-Nitroaniline	ND	830
4,6-Dinitro-2-Methylphenol	ND	830
N-Nitrosodiphenylamine	ND	330
4-Bromophenyl-phenylether	ND	330
Hexachlorobenzene	ND	330
Pentachlorophenol	ND	830
Phenanthrene	ND	330
Anthracene	ND	330
Di-n-Butylphthalate	ND	330
Fluoranthene	ND	330
Pyrene	ND	330
Butylbenzylphthalate	ND	330
Benzo(a)Anthracene	ND	330
3,3'-Dichlorobenzidine	ND	660
Chrysene	ND	330
bis(2-Ethylhexyl)Phthalate	ND	330
Di-n-octylphthalate	ND	330
Benzo(b)Fluoranthene	ND	330
Benzo(k)Fluoranthene	ND	330
Benzo(a)Pyrene	ND	330
Indeno(1,2,3-cd)Pyrene	ND	330
Dibenz(a,h)Anthracene	ND	330
Benzo(g,h,i)Perylene	ND	330
Chloroacetophenone	ND	330

Analyst: Melissa Rachbrock
Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4278 Date Extracted: 09/01/92

Laboratory ID: 4278-01 Date Analyzed: 09/09/92

Client ID: PZ61-SS1-5 Dilution Fact: 1.0

Matrix: SOIL Level:LOW

Compound	Analytical Results ug/Kg	Reporting Limit
N-Nitroso-Dimethylamine	ND	330
Phenol	ND	330
bis(2-Chloroethyl)ether	ND	330
2-Chlorophenol	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
Benzyl Alcohol	ND	330
1,2-Dichlorobenzene	ND	330
2-Methylphenol	ND	330
bis(2-chloroisopropyl)Ether	ND	330
4-Methylphenol	ND	330
N-Nitroso-Di-n-Propylamine	ND	330
Hexachloroethane	ND	330
Nitrobenzene	ND	330
Isophorone	ND	330
2-Nitrophenol	ND	330
2,4-Dimethylphenol	ND	330
bis(2-Chloroethoxy)methane	ND	330
2,4-Dichlorophenol	ND	330
Benzoic Acid	ND	830
1,2,4-Trichlorobenzene	ND	330
Naphthalene	ND	330
4-Chloroaniline	ND	330
Hexachlorobutadiene	ND	330
4-Chloro-3-Methylphenol	ND	330
2-Methylnaphthalene	ND	330
Hexachlorocyclopentadiene	ND	330
2,4,6-Trichlorophenol	ND	330
2,4,5-Trichlorophenol	ND	830
2-Chloronaphthalene	ND	330
2-Nitroaniline	ND	830
Dimethylphthalate	ND	330
Acenaphthylene	ND	330
2,6-Dinitrotoluene	ND	330
3-Nitroaniline	ND	830
Acenaphthene	ND	330
2,4-Dinitrophenol	ND	830
Dibenzofuran	ND	330
4-Nitrophenol	ND	830

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 4278

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Date Analyzed: 08/27/92

Laboratory ID: 4278-01

Matrix: SOIL

Client ID: PZ61-SS1-5

OCT 13 1992

Level:LOW

Dilution Fact: 1.0

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Compound	Analytical Results ug/Kg	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	16	5
Acetone	ND	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND	10
1,1-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethene (Total)	ND	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Vinyl Acetate	ND	10
Bromodichloromethane	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
Trichloroethene	ND	5
Benzene	ND	5
Dibromochloromethane	ND	5
1,1,2-Trichloroethane	ND	5
trans-1,3-Dichloropropene	ND	5
2-Chloroethylvinylether	ND	10
Bromoform	ND	5
2-Hexanone	ND	10
4-Methyl-2-pentanone	ND	10
Tetrachloroethene	ND	5
1,1,2,2-Tetrachloroethane	ND	5
Toluene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Styrene	ND	5
Total Xylenes	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

Analyst: [signature]

Group Leader: [signature]

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ANALYTICAL REPORT
EPA 8080

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ES-ST. LOUIS

Work Order No.:4278

Client ID:PZ61-SS1-5
% Moisture: 0.00
Laboratory ID:4278-01
QC Batch No:S92QCB022PES
Matrix:SOIL(LOW)

Grams Sample Used: 30.00
Quantitation Units:ug/Kg
Date Extracted:08/28/92
Date Analyzed :09/15/92

Dilution Factor: 1.00

Compound	Result	Reporting Limit
Aldrin	ND	1.7
Alpha-BHC	ND	1.7
Beta-BHC	ND	1.7
Delta-BHC	ND	1.7
Gamma-BHC	ND	1.7
Chlordane	ND	1.7
4,4'-DDD	ND	3.3
4,4'-DDE	ND	3.3
4,4'-DDT	ND	3.3
Dieldrin	ND	3.3
Endosulfan I	ND	1.7
Endosulfan II	ND	3.3
Endosulfan Sulfate	ND	3
Endrin	ND	3.3
Endrin Aldehyde	ND	3.3
Heptachlor	ND	1.7
Heptachlor Epoxide	ND	2
Methoxychlor	ND	60
Toxaphene	ND	167
PCB-1016	ND	33.3
PCB-1221	ND	67
PCB-1232	ND	33
PCB-1242	ND	33.3
PCB-1248	ND	33.3
PCB-1254	ND	33.3
PCB-1260	ND	33.3

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID: SS1-5

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4274S SAS No.: _____ SDG No.: SS1-15

Matrix (soil/water): SOIL_ Lab Sample ID: 4278.01___

Level (low/med): LOW__ Date Received: 08/27/92

% Solids: 88.6

Concentration Units (ug/L or mg/kg as received): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.6	U		P
7440-38-2	Arsenic	6.3			F
7440-39-3	Barium	124			P
7440-43-9	Cadmium	0.36	B		P
7440-47-3	Chromium	24.2			P
7440-50-8	Copper	41.6			P
7439-92-1	Lead	158			F
7439-97-6	Mercury	0.02	U		CV
7440-02-0	Nickel	13.4			P
7782-49-2	Selenium	0.12	B		F
7440-22-4	Silver	0.38	U		P
7440-66-6	Zinc	149			P

Comments:

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

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Work Order No: 4278

Laboratory ID: 4278-02

Client ID: PZ61-SS2-73

Level: LOW

Date Analyzed: 08/27/92

Matrix: SOIL

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	11	5
Acetone	ND	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND	10
1,1-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethene (Total)	ND	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Vinyl Acetate	ND	10
Bromodichloromethane	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
Trichloroethene	ND	5
Benzene	ND	5
Dibromochloromethane	ND	5
1,1,2-Trichloroethane	ND	5
trans-1,3-Dichloropropene	ND	5
2-Chloroethylvinylether	ND	10
Bromoform	ND	5
2-Hexanone	ND	10
4-Methyl-2-pentanone	ND	10
Tetrachloroethene	ND	5
1,1,2,2-Tetrachloroethane	10	5
Toluene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Styrene	ND	5
Total Xylenes	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

Analyst: J.C

Group Leader:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4278
Date Extracted: 09/01/92

Laboratory ID: 4278-02
Date Analyzed: 09/04/92

Client ID: PZ61-SS2-73
Dilution Fact: 1.0

Matrix: SOIL
Level:LOW

Compound	Analytical Results ug/Kg	Reporting Limit
N-Nitroso-Dimethylamine	ND	330
Phenol	ND	330
bis(2-Chloroethyl)ether	ND	330
2-Chlorophenol	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
Benzyl Alcohol	ND	330
1,2-Dichlorobenzene	ND	330
2-Methylphenol	ND	330
bis(2-chloroisopropyl)Ether	ND	330
4-Methylphenol	ND	330
N-Nitroso-Di-n-Propylamine	ND	330
Hexachloroethane	ND	330
Nitrobenzene	ND	330
Isophorone	ND	330
2-Nitrophenol	ND	330
2,4-Dimethylphenol	ND	330
bis(2-Chloroethoxy)methane	ND	330
2,4-Dichlorophenol	ND	330
Benzoic Acid	ND	830
1,2,4-Trichlorobenzene	ND	330
Naphthalene	ND	330
4-Chloroaniline	ND	330
Hexachlorobutadiene	ND	330
4-Chloro-3-Methylphenol	ND	330
2-Methylnaphthalene	ND	330
Hexachlorocyclopentadiene	ND	330
2,4,6-Trichlorophenol	ND	330
2,4,5-Trichlorophenol	ND	830
2-Chloronaphthalene	ND	330
2-Nitroaniline	ND	830
Dimethylphthalate	ND	330
Acenaphthylene	ND	330
2,6-Dinitrotoluene	ND	330
3-Nitroaniline	ND	830
Acenaphthene	ND	330
2,4-Dinitrophenol	ND	830
Dibenzofuran	ND	330
4-Nitrophenol	ND	830

ES-ENGINEERING SCIENCE, INC.
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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4278
Date Extracted: 09/01/92

Laboratory ID: 4278-02
Date Analyzed: 09/04/92

Client ID: PZ61-SS2-73
Dilution Fact: 1.0

Matrix: SOIL
Level:LOW

Compound	Analytical Results ug/Kg	Reporting Limit
2,4-Dinitrotoluene	ND	330
Fluorene	ND	330
Diethylphthalate	ND	330
4-Chlorophenyl-phenylether	ND	330
4-Nitroaniline	ND	830
4,6-Dinitro-2-Methylphenol	ND	830
N-Nitrosodiphenylamine	ND	330
4-Bromophenyl-phenylether	ND	330
Hexachlorobenzene	ND	330
Pentachlorophenol	ND	830
Phenanthrene	ND	330
Anthracene	ND	330
Di-n-Butylphthalate	ND	330
Fluoranthene	ND	330
Pyrene	ND	330
Butylbenzylphthalate	ND	330
Benzo(a)Anthracene	ND	330
3,3'-Dichlorobenzidine	NDJ-	660
Chrysene	ND	330
bis(2-Ethylhexyl)Phthalate	ND	330
Di-n-octylphthalate	ND	330
Benzo(b)Fluoranthene	ND	330
Benzo(k)Fluoranthene	ND	330
Benzo(a)Pyrene	ND	330
Indeno(1,2,3-cd)Pyrene	ND	330
Dibenz(a,h)Anthracene	ND	330
Benzo(g,h,i)Perylene	ND	330
Chloroacetophenone	ND	330

Analyst: Mehrdad Kachlouei
Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

ANALYTICAL REPORT
EPA 8080

Work Order No.:4278

Client ID:PZ61-SS2-73
% Moisture: 0.00
Laboratory ID:4278-02
QC Batch No:S92QCB022PES
Matrix:SOIL(LOW)

Grams Sample Used: 30.00
Quantitation Units:ug/Kg
Date Extracted:08/28/92
Date Analyzed :09/15/92

Dilution Factor: 1.00

Compound	Result	Reporting Limit
Aldrin	ND	1.7
Alpha-BHC	ND	1.7
Beta-BHC	ND	1.7
Delta-BHC	ND	1.7
Gamma-BHC	ND	1.7
Chlordane	ND	1.7
4,4'-DDD	ND	3.3
4,4'-DDE	ND	3.3
4,4'-DDT	ND	3.3
Dieldrin	ND	3.3
Endosulfan I	ND	1.7
Endosulfan II	ND	3.3
Endosulfan Sulfate	ND	3
Endrin	ND	3.3
Endrin Aldehyde	ND	3.3
Heptachlor	ND	1.7
Heptachlor Epoxide	ND	2
Methoxychlor	ND	60
Toxaphene	ND	167
PCB-1016	ND	33.3
PCB-1221	ND	67
PCB-1232	ND	33
PCB-1242	ND	33.3
PCB-1248	ND	33.3
PCB-1254	ND	33.3
PCB-1260	ND	33.3

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST:

GROUP LEADER:

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Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

SS2-73

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4274S SAS No.: _____ SDG No.: SS1-15

Matrix (soil/water): SOIL_ Lab Sample ID: 4278.02___

Level (low/med): LOW__ Date Received: 08/27/92

% Solids: 94.4

Concentration Units (ug/L or mg/kg as received): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.6	U		P
7440-38-2	Arsenic	0.46	B		F
7440-39-3	Barium	2.4	B	U	P
7440-43-9	Cadmium	0.19	U		P
7440-47-3	Chromium	5.5			P
7440-50-8	Copper	1.5	B	U	P
7439-92-1	Lead	1.0			F
7439-97-6	Mercury	0.02	U		CV
7440-02-0	Nickel	1.5	B	U	P
7782-49-2	Selenium	0.15	B		F
7440-22-4	Silver	0.38	U		P
7440-66-6	Zinc	3.5			P

CRQL ? Detection @ CRQL(2) @ CRQL (2)

Comments:

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 4290 Date Analyzed: 09/01/92

Laboratory ID: 4290-03 Matrix: SOIL

Client ID: PZ62-SS1-5 Level:LOW Dilution Fact: 1.0

Compound	Analytical Results ug/Kg	Reporting Limit
Chloromethane	ND J	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND J	5
Acetone	ND J	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND J	10
1,1-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethene (Total)	ND	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
2-Butanone	ND R	10
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Vinyl Acetate	ND J	10
Bromodichloromethane	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
Trichloroethene	12	5
Benzene	ND	5
Dibromochloromethane	ND	5
1,1,2-Trichloroethane	ND	5
trans-1,3-Dichloropropene	ND	5
2-Chloroethylvinylether	ND R	10
Bromoform	ND	5
2-Hexanone	ND J	10
4-Methyl-2-pentanone	ND	10
Tetrachloroethene	ND	5
1,1,2,2-Tetrachloroethane	ND	5
Toluene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Styrene	ND	5
Total Xylenes	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

Analyst: Group Leader:

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4290

Laboratory ID: 4290-03

Client ID: PZ62-SS1-5

Matrix: SOIL

Level:LOW

Date Extracted: 09/11/92

Date Analyzed: 09/17/92

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg	Reporting Limit
N-Nitroso-Dimethylamine	ND	660
Phenol	ND	660
bis(2-Chloroethyl)ether	ND	660
2-Chlorophenol	ND	660
1,3-Dichlorobenzene	ND	660
1,4-Dichlorobenzene	ND	660
Benzyl Alcohol	ND J	660
1,2-Dichlorobenzene	ND	660
2-Methylphenol	ND	660
bis(2-chloroisopropyl)Ether	ND	660
4-Methylphenol	ND	660
N-Nitroso-Di-n-Propylamine	ND	660
Hexachloroethane	ND	660
Nitrobenzene	ND	660
Isophorone	ND	660
2-Nitrophenol	ND	660
2,4-Dimethylphenol	ND	660
bis(2-Chloroethoxy)methane	ND	660
2,4-Dichlorophenol	ND	660
Benzoic Acid	ND	1700
1,2,4-Trichlorobenzene	ND	660
Naphthalene	ND	660
4-Chloroaniline	ND	660
Hexachlorobutadiene	ND	660
4-Chloro-3-Methylphenol	ND	660
2-Methylnaphthalene	ND	660
Hexachlorocyclopentadiene	ND J	660
2,4,6-Trichlorophenol	ND	660
2,4,5-Trichlorophenol	ND	1700
2-Chloronaphthalene	ND	660
2-Nitroaniline	ND	1700
Dimethylphthalate	ND	660
Acenaphthylene	ND	660
2,6-Dinitrotoluene	ND	660
3-Nitroaniline	ND	1700
Acenaphthene	ND	660
2,4-Dinitrophenol	ND	1700
Dibenzofuran	ND	660
4-Nitrophenol	ND	1700

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4290
Date Extracted: 09/11/92

Laboratory ID: 4290-03
Date Analyzed: 09/17/92

Client ID: PZ62-SS1-5
Dilution Fact: 2.0

Matrix: SOIL
Level: LOW

Compound	Analytical Results ug/Kg	Reporting Limit
2,4-Dinitrotoluene	ND	660
Fluorene	ND	660
Diethylphthalate	ND J	660
4-Chlorophenyl-phenylether	ND	660
4-Nitroaniline	ND	1700
4,6-Dinitro-2-Methylphenol	ND	1700
N-Nitrosodiphenylamine	ND	660
4-Bromophenyl-phenylether	ND	660
Hexachlorobenzene	ND	660
Pentachlorophenol	ND	1700
Phenanthrene	3400	660
Anthracene	1000	660
Di-n-Butylphthalate	ND	660
Fluoranthene	4100	660
Pyrene	4800	660
Butylbenzylphthalate	ND	660
Benzo(a)Anthracene	2700	660
3,3'-Dichlorobenzidine	ND	1300
Chrysene	2200	660
bis(2-Ethylhexyl)Phthalate	ND	660
Di-n-octylphthalate	ND	660
Benzo(b)Fluoranthene	2800	660
Benzo(k)Fluoranthene	970	660
Benzo(a)Pyrene	2000	660
Indeno(1,2,3-cd)Pyrene	2100	660
Dibenz(a,h)Anthracene	ND	660
Benzo(g,h,i)Perylene	1700	660
Chloroacetophenone	ND	660

Analyst: Melissa Rachlewicz
Group Leader:

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ANALYTICAL REPORT
EPA 8080

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Work Order No.:4290

Client ID:PZ62-SS1-5
% Moisture: 0.00
Laboratory ID:4290-03
QC Batch No:S92QCB022PES
Matrix:SOIL(LOW)

Grams Sample Used: 30.00
Quantitation Units:ug/Kg
Date Extracted:09/09/92
Date Analyzed :09/30/92
Date Confirmed:09/30/92

Dilution Factor: 10.00

Compound	Result	Reporting Limit
Aldrin	ND	16.7
Alpha-BHC	ND	16.7
Beta-BHC	ND	16.7
Delta-BHC	ND	16.7
Gamma-BHC	ND	16.7
Chlordane	ND	16.7
4,4'-DDD	1100	33.3
4,4'-DDE	370	33.3
4,4'-DDT	1100	33.3
Dieldrin	37	33.3
Endosulfan I	ND	16.7
Endosulfan II	ND	33.3
Endosulfan Sulfate	ND	33
Endrin	ND	33.3
Endrin Aldehyde	ND	33.3
Heptachlor	ND	16.7
Heptachlor Epoxide	ND	17
Methoxychlor	ND	600
Toxaphene	ND	1667
PCB-1016	ND	333.3
PCB-1221	ND	667
PCB-1232	ND	333
PCB-1242	ND	333.3
PCB-1248	ND	333.3
PCB-1254	ND	333.3
PCB-1260	ND	333.3

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID: 62SS15

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4274S SAS No.: _____ SDG No.: SS1-15

Matrix (soil/water): SOIL_ Lab Sample ID: 4290.03___

Level (low/med): LOW__ Date Received: 08/29/92

% Solids: 85.2

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Concentration Units (ug/L or mg/kg as received): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	7.8			P
7440-38-2	Arsenic	11.3			F
7440-39-3	Barium	323			P
7440-43-9	Cadmium	2.2			P
7440-47-3	Chromium	96.0			P
7440-50-8	Copper	647			P
7439-92-1	Lead	545			F
7439-97-6	Mercury	0.04	B		CV
7440-02-0	Nickel	29.0			P
7782-49-2	Selenium	0.17	B		F
7440-22-4	Silver	9.2			P
7440-66-6	Zinc	942			P

Comments:

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 4290 Date Analyzed: 09/01/92

Laboratory ID: 4290-04 Matrix: SOIL

Client ID: PZ62-SS2-45 Level:LOW Dilution Fact: 1.0

Compound	Analytical Results ug/Kg	Reporting Limit
Chloromethane	ND J	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	7 J	5
Acetone	22 J	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND J	10
1,1-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethene (Total)	ND	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
2-Butanone	ND R	10
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Vinyl Acetate	ND J	10
Bromodichloromethane	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
Trichloroethene	ND	5
Benzene	ND	5
Dibromochloromethane	ND	5
1,1,2-Trichloroethane	ND	5
trans-1,3-Dichloropropene	ND	5
2-Chloroethylvinylether	ND R	10
Bromoform	ND	5
2-Hexanone	ND J	10
4-Methyl-2-pentanone	ND	10
Tetrachloroethene	ND	5
1,1,2,2-Tetrachloroethane	ND	5
Toluene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Styrene	ND	5
Total Xylenes	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

Analyst: D.C

Group Leader:

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4290

Date Extracted: 09/11/92

Laboratory ID: 4290-04

Date Analyzed: 09/15/92

Client ID: PZ62-SS2-45

Dilution Fact: 1.0

Matrix: SOIL

Level:LOW

Compound	Analytical Results ug/Kg	Reporting Limit
N-Nitroso-Dimethylamine	ND	330
Phenol	ND	330
bis(2-Chloroethyl)ether	ND	330
2-Chlorophenol	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
Benzyl Alcohol	ND J	330
1,2-Dichlorobenzene	ND	330
2-Methylphenol	ND	330
bis(2-chloroisopropyl)Ether	ND	330
4-Methylphenol	ND	330
N-Nitroso-Di-n-Propylamine	ND	330
Hexachloroethane	ND	330
Nitrobenzene	ND	330
Isophorone	ND	330
2-Nitrophenol	ND	330
2,4-Dimethylphenol	ND	330
bis(2-Chloroethoxy)methane	ND	330
2,4-Dichlorophenol	ND	330
Benzoic Acid	ND	830
1,2,4-Trichlorobenzene	ND	330
Naphthalene	ND	330
4-Chloroaniline	ND	330
Hexachlorobutadiene	ND	330
4-Chloro-3-Methylphenol	ND	330
2-Methylnaphthalene	ND	330
Hexachlorocyclopentadiene	ND J	330
2,4,6-Trichlorophenol	ND	330
2,4,5-Trichlorophenol	ND	830
2-Chloronaphthalene	ND	330
2-Nitroaniline	ND	830
Dimethylphthalate	ND	330
Acenaphthylene	ND	330
2,6-Dinitrotoluene	ND	330
3-Nitroaniline	ND	830
Acenaphthene	ND	330
2,4-Dinitrophenol	ND	830
Dibenzofuran	ND	330
4-Nitrophenol	ND	830

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4290

Date Extracted: 09/11/92

Laboratory ID: 4290-04

Date Analyzed: 09/15/92

Client ID: PZ62-SS2-45

Dilution Fact: 1.0

Matrix: SOIL

Level:LOW

Compound	Analytical Results ug/Kg	Reporting Limit
2,4-Dinitrotoluene	ND	330
Fluorene	ND	330
Diethylphthalate	ND	330
4-Chlorophenyl-phenylether	ND	330
4-Nitroaniline	ND	830
4,6-Dinitro-2-Methylphenol	ND	830
N-Nitrosodiphenylamine	ND	330
4-Bromophenyl-phenylether	ND	330
Hexachlorobenzene	ND	330
Pentachlorophenol	ND	830
Phenanthrene	ND	330
Anthracene	ND	330
Di-n-Butylphthalate	ND	330
Fluoranthene	ND	330
Pyrene	ND	330
Butylbenzylphthalate	ND	330
Benzo(a)Anthracene	ND	330
3,3'-Dichlorobenzidine	ND	660
Chrysene	ND	330
bis(2-Ethylhexyl)Phthalate	ND	330
Di-n-octylphthalate	ND	330
Benzo(b)Fluoranthene	ND	330
Benzo(k)Fluoranthene	ND	330
Benzo(a)Pyrene	ND	330
Indeno(1,2,3-cd)Pyrene	ND	330
Dibenz(a,h)Anthracene	ND	330
Benzo(g,h,i)Perylene	ND	330
Chloroacetophenone	ND	330

Analyst: Melissa Kachlenski

Group Leader:

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Work Order No.:4290

Client ID:PZ62-SS2-45
% Moisture: 0.00
Laboratory ID:4290-04
QC Batch No:S92QCB022PES
Matrix:SOIL(LOW)

Grams Sample Used: 30.00
Quantitation Units:ug/Kg
Date Extracted:09/09/92
Date Analyzed :09/30/92
Date Confirmed:09/30/92

Dilution Factor: 1.00

Compound	Result	Reporting Limit
Aldrin	ND	1.7
Alpha-BHC	ND	1.7
Beta-BHC	ND	1.7
Delta-BHC	ND	1.7
Gamma-BHC	ND	1.7
Chlordane	ND	1.7
4,4'-DDD	4.6	3.3
4,4'-DDE	ND	3.3
4,4'-DDT	5.2	3.3
Dieldrin	ND	3.3
Endosulfan I	ND	1.7
Endosulfan II	ND	3.3
Endosulfan Sulfate	ND	3
Endrin	ND	3.3
Endrin Aldehyde	ND	3.3
Heptachlor	ND	1.7
Heptachlor Epoxide	ND	2
Methoxychlor	ND	60
Toxaphene	ND	167
PCB-1016	ND	33.3
PCB-1221	ND	67
PCB-1232	ND	33
PCB-1242	ND	33.3
PCB-1248	ND	33.3
PCB-1254	ND	33.3
PCB-1260	ND	33.3

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

SS2-45

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4274S SAS No.: _____ SDG No.: SS1-15

Matrix (soil/water): SOIL_ Lab Sample ID: 4290.04___

Level (low/med): LOW__ Date Received: 08/29/92

% Solids: 89.9

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Concentration Units (ug/L or mg/kg as received): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.7	U		P
7440-38-2	Arsenic	2.0			F
7440-39-3	Barium	18.6	B		P
7440-43-9	Cadmium	0.20	U		P
7440-47-3	Chromium	16.1			P
7440-50-8	Copper	4.8			P
7439-92-1	Lead	7.2			F
7439-97-6	Mercury	0.02	U		CV
7440-02-0	Nickel	4.1			P
7782-49-2	Selenium	0.10	U		F
7440-22-4	Silver	0.40	U		P
7440-66-6	Zinc	13.1			P

Comments:

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 4290

Date Analyzed: 09/01/92

Laboratory ID: 4290-01

Matrix: SOIL

Client ID: PZ63-SS1-5 Level:LOW Dilution Fact: 1.0

Compound	Analytical Results ug/Kg	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND J	10
Methylene Chloride	9 J	5
Acetone	21 J	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND J	10
1,1-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethene (Total)	68	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
2-Butanone	ND R	10
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Vinyl Acetate	ND J	10
Bromodichloromethane	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
Trichloroethene	ND	5
Benzene	ND	5
Dibromochloromethane	ND	5
1,1,2-Trichloroethane	ND	5
trans-1,3-Dichloropropene	ND	5
2-Chloroethylvinylether	ND R	10
Bromoform	ND	5
2-Hexanone	ND J	10
4-Methyl-2-pentanone	ND	10
Tetrachloroethene	ND	5
1,1,2,2-Tetrachloroethane	ND	5
Toluene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Styrene	ND	5
Total Xylenes	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

Analyst: S.C.

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4290 Date Extracted: 09/11/92

Laboratory ID: 4290-01 Date Analyzed: 09/15/92

Client ID: PZ63-SS1-5 Dilution Fact: 1.0

Matrix: SOIL Level:LOW

Compound	Analytical Results ug/Kg	Reporting Limit
N-Nitroso-Dimethylamine	ND	330
Phenol	ND	330
bis(2-Chloroethyl)ether	ND	330
2-Chlorophenol	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
Benzyl Alcohol	ND J	330
1,2-Dichlorobenzene	ND	330
2-Methylphenol	ND	330
bis(2-chloroisopropyl)Ether	ND	330
4-Methylphenol	ND	330
N-Nitroso-Di-n-Propylamine	ND	330
Hexachloroethane	ND	330
Nitrobenzene	ND	330
Isophorone	ND	330
2-Nitrophenol	ND	330
2,4-Dimethylphenol	ND	330
bis(2-Chloroethoxy)methane	ND	330
2,4-Dichlorophenol	ND	330
Benzoic Acid	ND	830
1,2,4-Trichlorobenzene	ND	330
Naphthalene	ND	330
4-Chloroaniline	ND	330
Hexachlorobutadiene	ND	330
4-Chloro-3-Methylphenol	ND	330
2-Methylnaphthalene	ND	330
Hexachlorocyclopentadiene	ND J	330
2,4,6-Trichlorophenol	ND	330
2,4,5-Trichlorophenol	ND	830
2-Chloronaphthalene	ND	330
2-Nitroaniline	ND	830
Dimethylphthalate	ND	330
Acenaphthylene	ND	330
2,6-Dinitrotoluene	ND	330
3-Nitroaniline	ND	830
Acenaphthene	ND	330
2,4-Dinitrophenol	ND	830
Dibenzofuran	ND	330
4-Nitrophenol	ND	830

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4290

Laboratory ID: 4290-01

Client ID: PZ63-SS1-5

Matrix: SOIL

Level:LOW

Date Extracted: 09/11/92

Date Analyzed: 09/15/92

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg	Reporting Limit
2,4-Dinitrotoluene	ND	330
Fluorene	ND	330
Diethylphthalate	ND	330
4-Chlorophenyl-phenylether	ND	330
4-Nitroaniline	ND	830
4,6-Dinitro-2-Methylphenol	ND	830
N-Nitrosodiphenylamine	ND	330
4-Bromophenyl-phenylether	ND	330
Hexachlorobenzene	ND	330
Pentachlorophenol	ND	830
Phenanthrene	ND	330
Anthracene	ND	330
Di-n-Butylphthalate	ND	330
Fluoranthene	ND	330
Pyrene	ND	330
Butylbenzylphthalate	ND	330
Benzo(a)Anthracene	ND	330
3,3'-Dichlorobenzidine	ND	660
Chrysene	ND	330
bis(2-Ethylhexyl)Phthalate	ND	330
Di-n-octylphthalate	ND	330
Benzo(b)Fluoranthene	ND	330
Benzo(k)Fluoranthene	ND	330
Benzo(a)Pyrene	ND	330
Indeno(1,2,3-cd)Pyrene	ND	330
Dibenz(a,h)Anthracene	ND	330
Benzo(g,h,i)Perylene	ND	330
Chloroacetophenone	ND	330

Analyst: Nebojsa Kachlenski

Group Leader:

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ANALYTICAL REPORT
EPA 8080

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Work Order No.:4290

Client ID:PZ63-SS1-5
% Moisture: 0.00
Laboratory ID:4290-01
QC Batch No:S92QCB022PES
Matrix:SOIL(LOW)

Grams Sample Used: 30.00
Quantitation Units:ug/Kg
Date Extracted:09/09/92
Date Analyzed :09/30/92
Date Confirmed:09/30/92

Dilution Factor: 1.00

Compound	Result	Reporting Limit
Aldrin	ND	1.7
Alpha-BHC	ND	1.7
Beta-BHC	ND	1.7
Delta-BHC	ND	1.7
Gamma-BHC	ND	1.7
Chlordane	ND	1.7
4,4'-DDD	ND	3.3
4,4'-DDE	ND	3.3
4,4'-DDT	ND	3.3
Dieldrin	9.3	3.3
Endosulfan I	ND	1.7
Endosulfan II	ND	3.3
Endosulfan Sulfate	ND	3
Endrin	ND	3.3
Endrin Aldehyde	ND	3.3
Heptachlor	ND	1.7
Heptachlor Epoxide	ND	2
Methoxychlor	ND	60
Toxaphene	ND	167
PCB-1016	ND	33.3
PCB-1221	ND	67
PCB-1232	ND	33
PCB-1242	ND	33.3
PCB-1248	ND	33.3
PCB-1254	ND	33.3
PCB-1260	ND	33.3

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

63SS15

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4274S SAS No.: _____ SDG No.: SS1-15

Matrix (soil/water): SOIL_ RECEIVED Lab Sample ID: 4290.01___

Level (low/med): LOW__ OCT 13 1992 Date Received: 08/29/92

% Solids: 83.9

ES-ST. LOUIS

Concentration Units (ug/L or mg/kg as received): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.7	U		P
7440-38-2	Arsenic	4.5			F
7440-39-3	Barium	84.7			P
7440-43-9	Cadmium	0.20	U		P
7440-47-3	Chromium	9.7			P
7440-50-8	Copper	13.2			P
7439-92-1	Lead	9.8			F
7439-97-6	Mercury	0.02	U		CV
7440-02-0	Nickel	11.8			P
7782-49-2	Selenium	0.20	B		F
7440-22-4	Silver	0.39	U		P
7440-66-6	Zinc	44.3			P

Comments:

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EST. LOUIS

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 4290

Date Analyzed: 09/01/92

Laboratory ID: 4290-02

Matrix: SOIL

Client ID: PZ63-SS2-35 Level:LOW Dilution Fact: 1.0

Compound	Analytical Results ug/Kg	Reporting Limit
Chloromethane	ND J	10
Bromomethane	ND	10
Vinyl Chloride	23	10
Chloroethane	ND	10
Methylene Chloride	8J	5
Acetone	31J	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND J	10
1,1-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethene (Total)	190	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
2-Butanone	ND R	10
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Vinyl Acetate	ND J	10
Bromodichloromethane	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
Trichloroethene	5	5
Benzene	ND	5
Dibromochloromethane	ND	5
1,1,2-Trichloroethane	ND	5
trans-1,3-Dichloropropene	ND	5
2-Chloroethylvinylether	ND R	10
Bromoform	ND	5
2-Hexanone	ND J	10
4-Methyl-2-pentanone	ND	10
Tetrachloroethene	ND	5
1,1,2,2-Tetrachloroethane	18	5
Toluene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Styrene	ND	5
Total Xylenes	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

Analyst: S. C

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4290 Date Extracted: 09/11/92

Laboratory ID: 4290-02 Date Analyzed: 09/16/92

Client ID: PZ63-SS2-35 Dilution Fact: 2.0

Matrix: SOIL Level:LOW

Compound	Analytical Results ug/Kg	Reporting Limit
N-Nitroso-Dimethylamine	ND	660
Phenol	ND	660
bis(2-Chloroethyl)ether	ND	660
2-Chlorophenol	ND	660
1,3-Dichlorobenzene	ND	660
1,4-Dichlorobenzene	ND	660
Benzyl Alcohol	ND J	660
1,2-Dichlorobenzene	ND	660
2-Methylphenol	ND	660
bis(2-chloroisopropyl)Ether	ND	660
4-Methylphenol	ND	660
N-Nitroso-Di-n-Propylamine	ND	660
Hexachloroethane	ND	660
Nitrobenzene	ND	660
Isophorone	ND	660
2-Nitrophenol	ND	660
2,4-Dimethylphenol	ND	660
bis(2-Chloroethoxy)methane	ND	660
2,4-Dichlorophenol	ND	660
Benzoic Acid	ND	1700
1,2,4-Trichlorobenzene	ND	660
Naphthalene	ND	660
4-Chloroaniline	ND	660
Hexachlorobutadiene	ND	660
4-Chloro-3-Methylphenol	ND	660
2-Methylnaphthalene	ND	660
Hexachlorocyclopentadiene	ND J	660
2,4,6-Trichlorophenol	ND	660
2,4,5-Trichlorophenol	ND	1700
2-Chloronaphthalene	ND	660
2-Nitroaniline	ND	1700
Dimethylphthalate	ND	660
Acenaphthylene	ND	660
2,6-Dinitrotoluene	ND	660
3-Nitroaniline	ND	1700
Acenaphthene	ND	660
2,4-Dinitrophenol	ND	1700
Dibenzofuran	ND	660
4-Nitrophenol	ND J	1700

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 4290

Laboratory ID: 4290-02

Client ID: PZ63-SS2-35

Matrix: SOIL

Level:LOW

Date Extracted: 09/11/92

Date Analyzed: 09/16/92

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg	Reporting Limit
2,4-Dinitrotoluene	ND	660
Fluorene	ND	660
Diethylphthalate	2600	660
4-Chlorophenyl-phenylether	ND	660
4-Nitroaniline	ND	1700
4,6-Dinitro-2-Methylphenol	ND	1700
N-Nitrosodiphenylamine	ND	660
4-Bromophenyl-phenylether	ND	660
Hexachlorobenzene	ND	660
Pentachlorophenol	ND	1700
Phenanthrene	ND	660
Anthracene	ND	660
Di-n-Butylphthalate	ND J	660
Fluoranthene	ND	660
Pyrene	ND	660
Butylbenzylphthalate	ND	660
Benzo(a)Anthracene	ND	660
3,3'-Dichlorobenzidine	ND	1300
Chrysene	ND	660
bis(2-Ethylhexyl)Phthalate	ND	660
Di-n-octylphthalate	ND	660
Benzo(b)Fluoranthene	ND	660
Benzo(k)Fluoranthene	ND	660
Benzo(a)Pyrene	ND	660
Indeno(1,2,3-cd)Pyrene	ND	660
Dibenz(a,h)Anthracene	ND	660
Benzo(g,h,i)Perylene	ND	660
Chloroacetophenone	ND	660

Analyst: Melissa Kachlinski

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

ANALYTICAL REPORT
EPA 8080

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ES-ST. LOUIS

Work Order No.:4290

Client ID:PZ63-SS2-35
% Moisture: 0.00
Laboratory ID:4290-02
QC Batch No:S92QCB022PES
Matrix:SOIL(LOW)

Grams Sample Used: 30.00
Quantitation Units:ug/Kg
Date Extracted:09/09/92
Date Analyzed :09/30/92
Date Confirmed:09/30/92

Dilution Factor: 1.00

Compound	Result	Reporting Limit
Aldrin	ND	1.7
Alpha-BHC	ND	1.7
Beta-BHC	ND	1.7
Delta-BHC	ND	1.7
Gamma-BHC	ND	1.7
Chlordane	ND	1.7
4,4'-DDD	10	3.3
4,4'-DDE	ND	3.3
4,4'-DDT	ND	3.3
Dieldrin	4.0	3.3
Endosulfan I	ND	1.7
Endosulfan II	ND	3.3
Endosulfan Sulfate	ND	3
Endrin	ND	3.3
Endrin Aldehyde	ND	3.3
Heptachlor	ND	1.7
Heptachlor Epoxide	ND	2
Methoxychlor	ND	60
Toxaphene	ND	167
PCB-1016	ND	33.3
PCB-1221	ND	67
PCB-1232	ND	33
PCB-1242	ND	33.3
PCB-1248	ND	33.3
PCB-1254	ND	33.3
PCB-1260	ND	33.3

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST:

GROUP LEADER:

Engineering Science - Berkeley Laboratory
Inorganics Report

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

SS2-35

Lab Name: E_S__BERKELEY_LABORATORY_ Contract: MEMPHIS___

Lab Code: ESBL__ Case No.: 4274S SAS No.: _____ SDG No.: SS1-15

Matrix (soil/water): SOIL_ Lab Sample ID: 4290.02___

Level (low/med): LOW__ Date Received: 08/29/92

% Solids: 85.2

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Concentration Units (ug/L or mg/kg as received): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony_	1.6	U		P_
7440-38-2	Arsenic__	2.2	_		F_
7440-39-3	Barium___	31.2	_		P_
7440-43-9	Cadmium__	0.19	U		P_
7440-47-3	Chromium_	19.2	_		P_
7440-50-8	Copper___	7.3	_		P_
7439-92-1	Lead_____	10.1	_		F_
7439-97-6	Mercury__	0.02	U		CV
7440-02-0	Nickel___	6.7	_		P_
7782-49-2	Selenium_	0.12	B		F_
7440-22-4	Silver___	0.38	U		P_
7440-66-6	Zinc_____	19.6	_		P_

Comments:

FORM I - IN

3/90

Soil and Water Sample Testing Results
Tested For Presence of Sulfur Mustard (HD)

Prepared For
Engineering–Science
Purchase Order Number: DEM–91192

Prepared By
GEOMET Technologies, Inc.
Laboratory Division

Report Date: 6 November 1992

Project Number: SLO16–21 – Defense Distribution Region Central/Memphis, TN.
Water Samples

Sample Date	Station Location	Number of Containers	Analysis Date	HD Detected (µg/ml)
25–Aug–92	PT1–SS1–15	2	04–Sep–92	ND
25–Aug–92	PT1–SS2–25	2	04–Sep–92	ND
25–Aug–92	PT1–SS3–35	2	04–Sep–92	ND
26–Aug–92	PZ61–SS1–5	2	04–Sep–92	ND
26–Aug–92	PZ61–SS2–73	2	04–Sep–92	ND
28–Aug–92	PZ63–SS1–5	2	04–Sep–92	ND
28–Aug–92	PZ3–SS2–35	2	04–Sep–92	ND
28–Aug–92	PZ62–SS1–5	2	04–Sep–92	ND
28–Aug–92	PZ62–SS2–45	2	04–Sep–92	ND

ND = Not Detectable (< 0.00294 µg/ml).

Project Number: SLO16–21 – Defense Distribution Region Central/Memphis, TN.
Soil Samples

Sample Date	Station Location	Number of Containers	Analysis Date	HD Detected (µg/gm)
15–Sep–92	PTW–RW1	1	23–Sep–92	ND
16–Sep–92	PTW–RW2	1	23–Sep–92	ND
17–Sep–92	PTW–RW3	1	23–Sep–92	ND
17–Sep–92	PTW–RW4	1	23–Sep–92	ND
17–Sep–92	PTW–TW1	1	23–Sep–92	ND
17–Sep–92	PTW–TW2	1	23–Sep–92	ND
17–Sep–92	PTW–TW3	1	23–Sep–92	ND
17–Sep–92	PTW–TW4	1	23–Sep–92	ND

ND = Not Detectable (< 0.00294 µg/gm).

DATA CHEM LABORATORIES

A SORENSON COMPANY

RECEIVED

OCT 2 2 1992

ES-St. Louis

October 22, 1992

Mr. Lee Gorday
Memphis Defense Depot
425 Woods Mill Road South
Suite 150
Chesterfield, Mo 63017

Lot	Analysis	Number of Field Samples	Comments
WAN	THIODIGLYCOL/Soil	9	

Explanation:

If you have any questions or need additional help please contact Dave Gayer, DCL at (801) 266-7700.

R. Goebel (DataChem)(w/o encl.)
D. L. Martin (DataChem)(w/o encl.)
E. Sjoberg (Data Entry File)(w/o encl.)

SALT LAKE OFFICE
960 WEST LeVOY DRIVE
SALT LAKE CITY, UTAH 84123-2547
801 266-7700, FAX 801 268-9992

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

DATA CHEM LABORATORIES

A SORENSON COMPANY

October 22, 1992
Refer To: 92DC001

RECEIVED

OCT 2 2 1992

ES-ST. LOUIS

Ms. Kathy Hemenway
Potomac Research, Inc.
Building 4590, Edgewood Area
APG, MD 21010

RE: TRANSFER OF MEMPHIS DEFENSE DEPOT DATA

Dear Kathy,

Enclosed please find one diskette containing level 1 data for the following Memphis Defense Depot lots.

WAN

This diskett is being sent by Federal Express because the 3COM is out of service as per Doug Scarborough at USATHAMA.

If we can be of further assistance please call Dave Gayer, DCL (801) 266-7700 EXT. 200.

Sincerely,

Edie Sjoberg

Edie Sjoberg
Data Entry

cc: L. Gorday (Memphis Defense Depot)(w/o encl.)
D. Gayer (DataChem)(w/o encl.)
E. Sjoberg (Data Entry File)(w/o encl.)

SALT LAKE OFFICE
960 WEST LeVOY DRIVE
SALT LAKE CITY, UTAH 84123-2547
801 266-7700. FAX 801 268-9992

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI OHIO 45242-3706
513 733-5336 FAX 513 733-5347

Group checking process
Installation: ME Lab: UB Lot: WAN

10/22/92
08:34:27

Map file \irmap\MECOORDB.DBF does not exist
Map file \irmap\MECOORDB.NTX does not exist
Map file \irmap\MELSMP.DBF does not exist
Map file \irmap\MELSMP.NTX does not exist

Quality Control Acceptance - Certification Level C1

Test Name	Blank Required	Blank Found	Standard Matrix QC Low Spike Required	Low Spike Found	High Spike Required	High Spike Found
TDGCL	1	1	1	1	2	2

QC Test parameters as determined from Lot data:

Test Name	Low Spike Concentration Mantissa	Low Spike Concentration Exponent	High Spike Concentration Mantissa	High Spike Concentration Exponent
TDGCL	1.03	1	5.03	1

Data in the lot - Installation: ME Lab: UB Lot: WAN
contains errors even though record check is correct.

Completion time - 08:34:30

Lot:

Instl	Lab	Lot No	Meth No	Units Meas	Analyst	Class	Prime Contr
ME	UB	WAN	LL9	UGG	PCG	N	EZ

mple:

Samp Anal No:	001	File:	CQC	Site Type:	
Site ID:		Field Samp No:		Samp Date:	/ /
Samp Program:	LIT	Samp Depth:		Samp Tech:	
Lab Samp No:	WAN001	Samp Prep Date:	09/01/92	Anal Date:	09/25/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.20	0					M	0.00	0

Sample:

Samp Anal No:	002	File:	CQC	Site Type:	
Site ID:		Field Samp No:		Samp Date:	/ /
Samp Program:	LIT	Samp Depth:		Samp Tech:	
Lab Samp No:	WAN002	Samp Prep Date:	09/01/92	Anal Date:	09/25/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL		8.13	0					S	1.03	1

Sample:

Samp Anal No:	003	File:	CQC	Site Type:	
Site ID:		Field Samp No:		Samp Date:	/ /
Samp Program:	LIT	Samp Depth:		Samp Tech:	
Lab Samp No:	WAN003	Samp Prep Date:	09/01/92	Anal Date:	09/25/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL		3.38	1					S	5.03	1

Sample:

Samp Anal No:	004	File:	CQC	Site Type:	
Site ID:		Field Samp No:		Samp Date:	/ /
Samp Program:	LIT	Samp Depth:		Samp Tech:	
Lab Samp No:	WAN004	Samp Prep Date:	09/01/92	Anal Date:	09/25/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL		3.63	1					S	5.03	1

* - Indicates that the data is either in error or has not been validated

Sample:

Samp Anal No:	005	File:	CSO	Site Type:	BORE
Site ID:	PT1-SS1-15	Field Samp No:		Samp Date:	08/25/92
Samp Program:	IRS	Samp Depth:	15.0	Samp Tech:	G
Lab Samp No:	WAN005	Samp Prep Date:	09/01/92	Anal Date:	09/25/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.20	0							

Sample:

Samp Anal No:	006	File:	CSO	Site Type:	BORE
Site ID:	PT1-SS2-25	Field Samp No:		Samp Date:	08/25/92
Samp Program:	IRS	Samp Depth:	25.0	Samp Tech:	G
Lab Samp No:	WAN006	Samp Prep Date:	09/01/92	Anal Date:	09/25/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.20	0							

Sample:

Samp Anal No:	007	File:	CSO	Site Type:	BORE
Site ID:	PT1-SS3-35	Field Samp No:		Samp Date:	08/25/92
Samp Program:	IRS	Samp Depth:	35.0	Samp Tech:	G
Lab Samp No:	WAN007	Samp Prep Date:	09/01/92	Anal Date:	09/25/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.20	0							

Sample:

Samp Anal No:	008	File:	CSO	Site Type:	BORE
Site ID:	PZ61-SS1-5	Field Samp No:		Samp Date:	08/26/92
Samp Program:	IRS	Samp Depth:	5.0	Samp Tech:	G
Lab Samp No:	WAN008	Samp Prep Date:	09/01/92	Anal Date:	09/25/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.20	0							

* - Indicates that the data is either in error or has not been validated

Sample:
Samp Anal No: 009 File: CSO Site Type: BORE
Site ID: PZ61-SS2 Field Samp No: Samp Date: 08/26/92
Samp Program: IRS Samp Depth: 73.0 Samp Tech: G
Lab Samp No: WAN009 Samp Prep Date: 09/01/92 Anal Date: 09/25/92
Base Closure: N Delivery Order No:

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.20	0							

Sample:
Samp Anal No: 010 File: CSO Site Type: BORE
Site ID: PZ63-SS1-5 Field Samp No: Samp Date: 08/28/92
Samp Program: IRS Samp Depth: 5.0 Samp Tech: G
Lab Samp No: WAN010 Samp Prep Date: 09/01/92 Anal Date: 09/25/92
Base Closure: N Delivery Order No:

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.20	0							

Sample:
Samp Anal No: 011 File: CSO Site Type: BORE
Site ID: PZ63-SS2 Field Samp No: Samp Date: 08/28/92
Samp Program: IRS Samp Depth: 35.0 Samp Tech: G
Lab Samp No: WAN011 Samp Prep Date: 09/01/92 Anal Date: 09/25/92
Base Closure: N Delivery Order No:

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.20	0							

Sample:
Samp Anal No: 012 File: CSO Site Type: BORE
Site ID: PZ62-SS1-5 Field Samp No: Samp Date: 08/28/92
Samp Program: IRS Samp Depth: 5.0 Samp Tech: G
Lab Samp No: WAN012 Samp Prep Date: 09/01/92 Anal Date: 09/25/92
Base Closure: N Delivery Order No:

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.20	0							

* - Indicates that the data is either in error or has not been validated

Sample:

Samp Anal No:	013	File:	CSO	Site Type:	BORE
Site ID:	PZ62-SS2	Field Samp No:		Samp Date:	08/28/92
Samp Program:	IRS	Samp Depth:	45.0	Samp Tech:	G
Lab Samp No:	WAN013	Samp Prep Date:	09/01/92	Anal Date:	09/25/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.20	0							

* - Indicates that the data is in error or that it has not been validated

DATA CHEM LABORATORIES

FAX TRANSMITTAL COVER SHEET

DATE: November 12, 1992

TO: David Mizell

COMPANY: Engineering-Science

FROM: Dave Gayer

NUMBER OF PAGES: 4
(Including this page)

ADDITIONAL INFORMATION:

David,

Here are the three pages which define lot WLH for thiodiglycol in water. I re-confirmed the send-out date of November 5....so you should be getting these soon. The data show no thiodiglycol hits.

If you need anything else, please give me a call. Thanks.

FAX OPERATOR: Dave Gayer

If you do not receive all of the transmission, please call (801) 266-7700.

960 West LeVoy Drive / Salt Lake City, Utah 84123
801-266-7700 / FAX: 801-268-9992
4388 Glendale-Milford Road / Cincinnati, OH 45242
513-733-5336 / FAX: 513-733-5347

DATACHEM LABORATORIES - A SORENSON COMPANY

Lot:

Instl	Lab	Lot No	Meth No	Units Meas	Analyst	Class	Prime Contr
ME	UB	WLH	99	UGL	KMS	N	EZ

Sample:

Samp Anal No:	001	File:	CQC	Site Type:	
Site ID:		Field Samp No:		Samp Date:	
Samp Program:	LIT	Samp Depth:	0.0	Samp Tech:	
Lab Samp No:	WLH001	Samp Prep Date:	10/29/92	Anal Date:	10/29/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.88	0					M	0.00	+00

Sample:

Samp Anal No:	002	File:	CQC	Site Type:	
Site ID:		Field Samp No:		Samp Date:	
Samp Program:	LIT	Samp Depth:	0.0	Samp Tech:	
Lab Samp No:	WLH002	Samp Prep Date:	10/29/92	Anal Date:	10/29/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL		1.31	1					S	1.50	+01

Sample:

Samp Anal No:	003	File:	CQC	Site Type:	
Site ID:		Field Samp No:		Samp Date:	
Samp Program:	LIT	Samp Depth:	0.0	Samp Tech:	
Lab Samp No:	WLH003	Samp Prep Date:	10/29/92	Anal Date:	10/29/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL		9.82	1					S	1.00	+02

Sample:

Samp Anal No:	004	File:	CQC	Site Type:	
Site ID:		Field Samp No:		Samp Date:	
Samp Program:	LIT	Samp Depth:	0.0	Samp Tech:	
Lab Samp No:	WLH004	Samp Prep Date:	10/29/92	Anal Date:	10/29/92
Base Closure:	N	Delivery Order No:			

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL		8.62	1					S	1.00	+02

* - Indicates that the data is either in error or has not been validated

Sample:
Samp Anal No: 005 File: CGW Site Type: WELL
Site ID: PTW-RW1 Field Samp No: Samp Date: 09/15/92
Samp Program: MON Samp Depth: 0.0 Samp Tech: G
Lab Samp No: WLH005 Samp Prep Date: 10/29/92 Anal Date: 10/29/92
Base Closure: N Delivery Order No:

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.88	0							

Sample:
Samp Anal No: 006 File: CGW Site Type: WELL
Site ID: PTW-RW2 Field Samp No: Samp Date: 09/16/92
Samp Program: MON Samp Depth: 0.0 Samp Tech: G
Lab Samp No: WLH006 Samp Prep Date: 10/29/92 Anal Date: 10/29/92
Base Closure: N Delivery Order No:

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.88	0							

Sample:
Samp Anal No: 007 File: CGW Site Type: WELL
Site ID: PTW-RW3 Field Samp No: Samp Date: 09/17/92
Samp Program: MON Samp Depth: 0.0 Samp Tech: G
Lab Samp No: WLH007 Samp Prep Date: 10/29/92 Anal Date: 10/29/92
Base Closure: N Delivery Order No:

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.88	0							

Sample:
Samp Anal No: 008 File: CGW Site Type: WELL
Site ID: PTW-RW4 Field Samp No: Samp Date: 09/17/92
Samp Program: MON Samp Depth: 0.0 Samp Tech: G
Lab Samp No: WLH008 Samp Prep Date: 10/29/92 Anal Date: 10/29/92
Base Closure: N Delivery Order No:

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.88	0							

* - Indicates that the data is either in error or has not been validated

Sample:
Samp Anal No: 009
Site ID: PTW-TW1
amp Program: DFG
Lab Samp No: WLH009
Base Closure: N
File: CGW
Field Samp No:
Samp Depth: 0.0
Samp Prep Date: 10/29/92
Delivery Order No:
Site Type: WELL
Samp Date: 09/17/92
Samp Tech: G
Anal Date: 10/29/92

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.88	0							

Sample:
Samp Anal No: 010
Site ID: PTW-TW2
Samp Program: DFG
Lab Samp No: WLH010
Base Closure: N
File: CGW
Field Samp No:
Samp Depth: 0.0
Samp Prep Date: 10/29/92
Delivery Order No:
Site Type: WELL
Samp Date: 09/17/92
Samp Tech: G
Anal Date: 10/29/92

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.88	0							

Sample:
Samp Anal No: 011
Site ID: PTW-TW3
Samp Program: DFG
Lab Samp No: WLH011
Base Closure: N
File: CGW
Field Samp No:
Samp Depth: 0.0
Samp Prep Date: 10/29/92
Delivery Order No:
Site Type: WELL
Samp Date: 09/17/92
Samp Tech: G
Anal Date: 10/29/92

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.88	0							

Sample:
Samp Anal No: 012
Site ID: PTW-TW4
Samp Program: DFG
Lab Samp No: WLH012
Base Closure: N
File: CGW
Field Samp No:
Samp Depth: 0.0
Samp Prep Date: 10/29/92
Delivery Order No:
Site Type: WELL
Samp Date: 09/17/92
Samp Tech: G
Anal Date: 10/29/92

Analysis:

Test Name	Bool	Unc Mant	Unc Exp	Dil Mant	Dil Exp	Moist	FC	QC	QC Mant	QC Exp
TDGCL	LT	4.88	0							

* - Indicates that the data is in error or that it has not been validated

Appendix F

Barometric Pressure Data

Appendix F
Barometric Pressure Data Recorded at the National Weather Service 9/14/92 through 9/18/92
Corrected to Sea Level

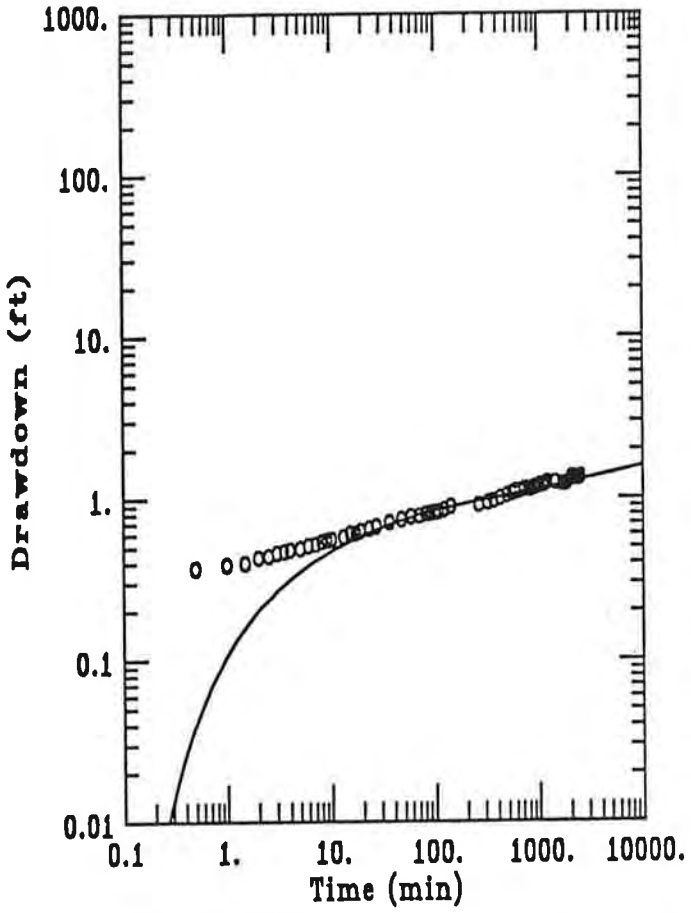
Time (CDT)	9/14/92	9/15/92	9/16/92	9/17/92	9/18/92
0053	30.12	30.14	30.18	30.08	29.93
0151	30.13	30.15	30.18	30.07	29.92
0250	30.12	30.15	30.18	30.06	29.90
0351	30.12	30.17	30.18	30.06	29.90
0450	30.12	30.18	30.19	30.06	29.90
0552	30.13	30.19	30.19	30.06	29.91
0653	30.14	30.21	30.19	30.07	29.94
0750	30.15	30.23	30.21	30.07	29.55
0850	30.16	30.24	30.21	30.07	29.96
0951	30.17	30.26	30.21	30.07	29.96
1050	30.16	30.26	30.20	30.06	29.97
1151	30.15	30.25	30.18	30.06	29.96
1251	30.15	30.23	30.17	30.04	29.94
1350	30.14	30.21	30.14	30.00	29.91
1450	30.12	30.20	30.12	29.97	29.88
1550	30.10	30.18	30.10	29.95	29.86
1652	30.09	30.16	30.08	29.95	29.85
1750	30.09	30.15	30.07	29.95	29.87
1851	30.09	30.16	30.07	29.94	29.88
1952	30.10	30.17	30.06	29.95	29.88
2052	30.12	30.18	30.07	29.95	29.92
2150	30.13	30.19	30.08	29.95	29.95
2250	30.14	30.19	30.10	29.55	29.96
2350	30.15	30.19	30.09	29.94	29.95

Appendix G

Drawdown Graphs

Engineering-Science, Inc.	Client: U.S. Army Corps of Engineers
Project No.: S1016.22	Location: DDRC Memphis, Tennessee

DDRC Pumping Test PZ-61



DATA SET:
pz61pum.dat
10/29/92

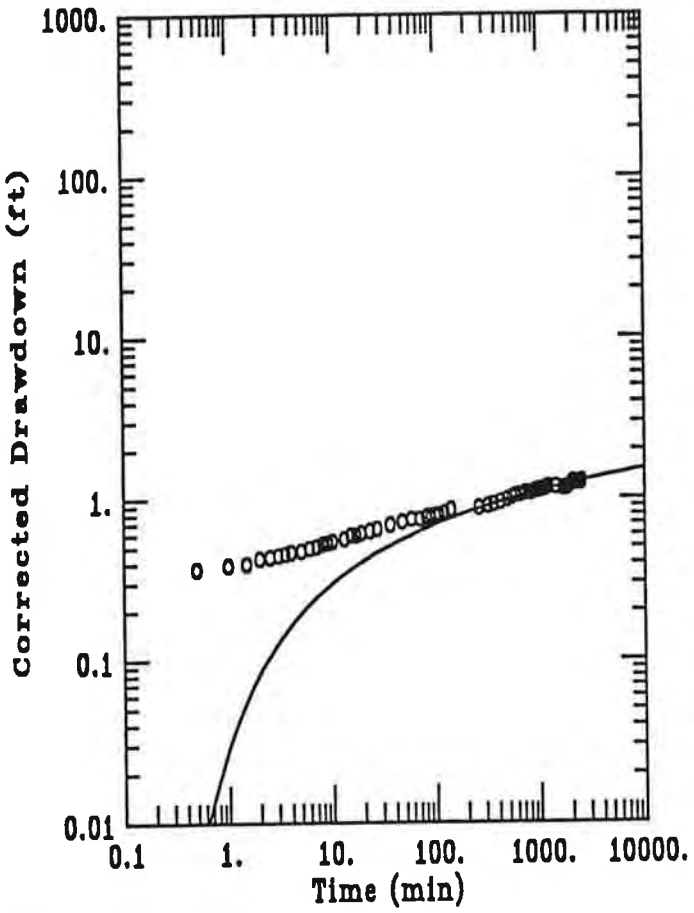
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
September 15-18, 1992
OBS. WELL:
PZ-61

ESTIMATED PARAMETERS:
T = 1.204 ft^2/min
S = 0.02591
Sy = 0.1467
β = 0.004

TEST DATA:
Q = 3.25 ft^3/min
r = 10. ft
b = 20. ft

Engineering-Science, Inc.	Client: U.S. Corps of Engineers
Project No.: SL016.22	Location: DDRC Memphis, Tennessee

DDRC Pumping Test PZ-61 Pumping



DATA SET:
pz61pcr.aqt
10/29/92

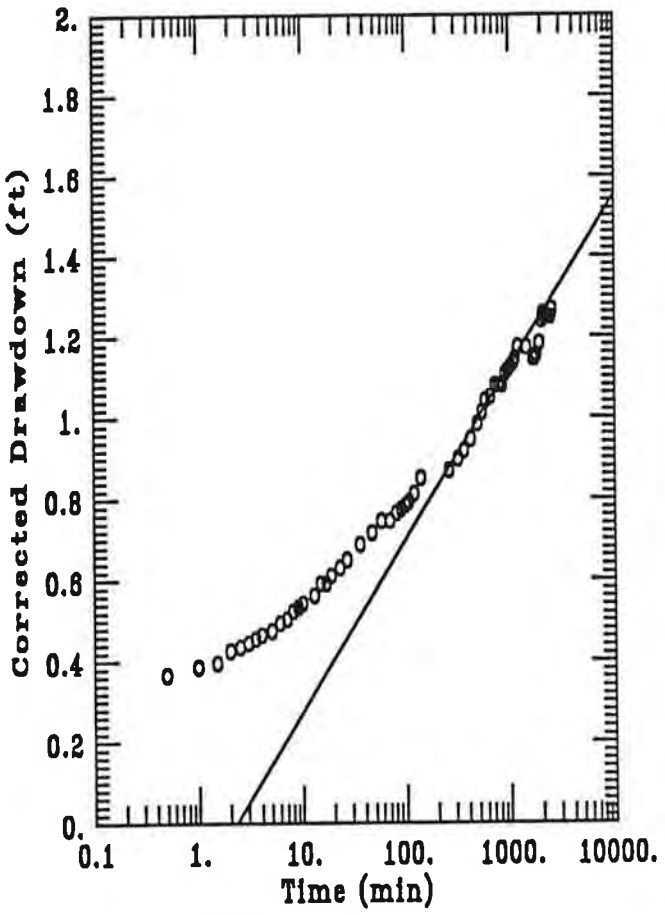
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Theis
TEST DATE:
September 15-18, 1992
OBS. WELL:
PZ-61

ESTIMATED PARAMETERS:
T = 1.501 ft^2/min
S = 0.06482

TEST DATA:
Q = 3.25 ft^3/min
r = 10. ft
b = 20. ft

Engineering-Science, Inc.	Client: U.S. Corps of Engineers
Project No.: SL016.22	Location: DDRC Memphis, Tennessee

DDRC Pumping Test PZ-61 Pumping



DATA SET:
pz61pcr.aqt
10/29/92

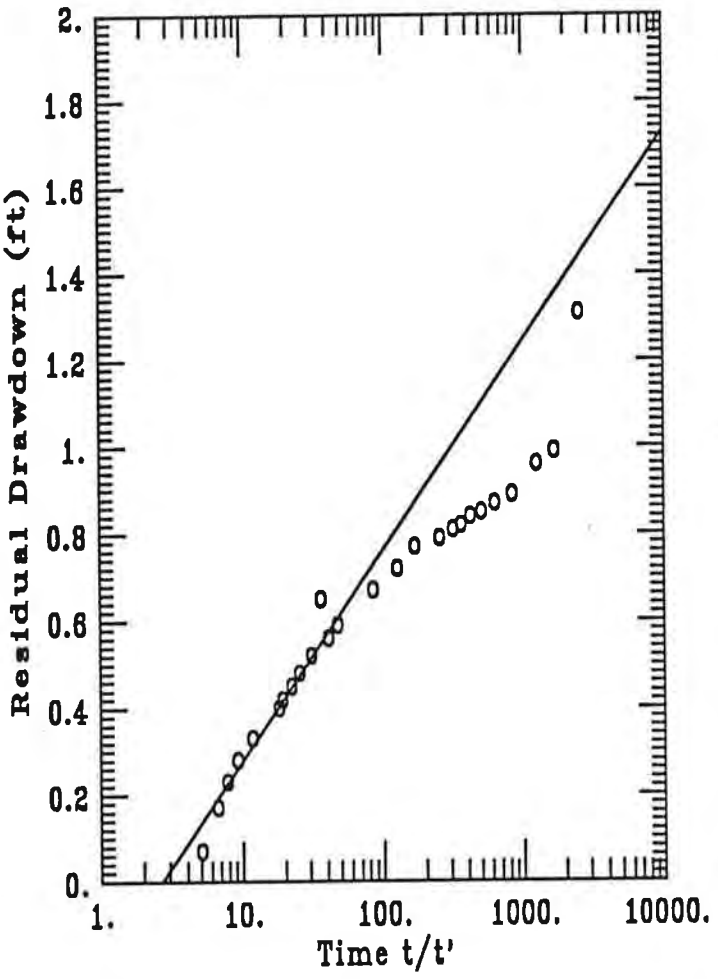
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
September 15-18, 1992
OBS. WELL:
PZ-61

ESTIMATED PARAMETERS:
T = 1.396 ft^2/min
S = 0.07121

TEST DATA:
Q = 3.25 ft^3/min
r = 10. ft
b = 20. ft

Engineering-Science, Inc.	Client: U.S. Army Corps of Engineers
Project No.: SL016.22	Location: DDRC Memphis, Tennessee

DDRC Pumping Test PZ-61 Recovery



DATA SET:
pz61rec.aqt
10/29/92

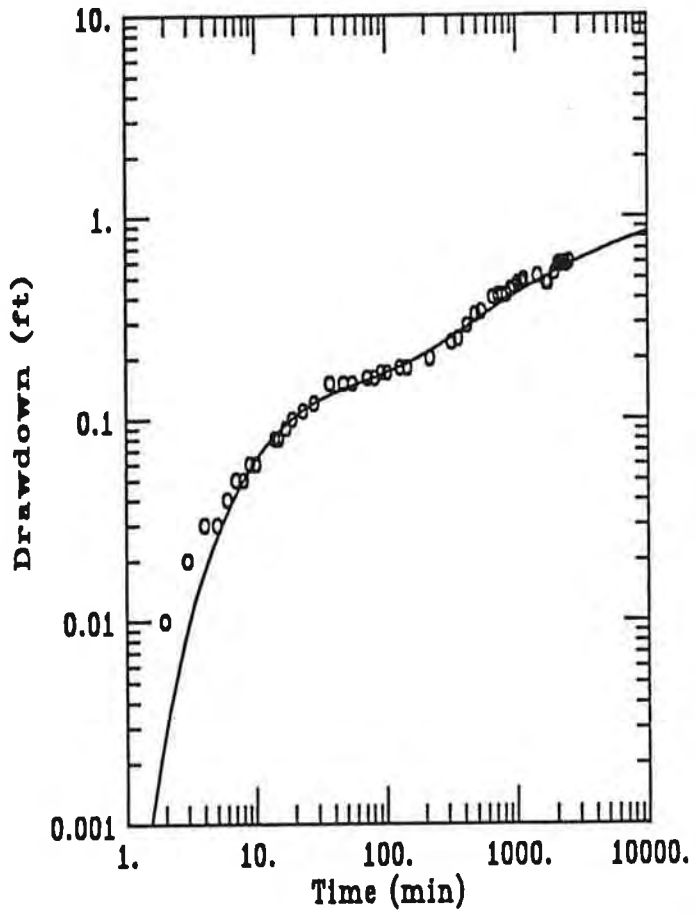
AQUIFER TYPE:
Confined
SOLUTION METHOD:
Theis Recovery
TEST DATE:
September 15-18, 1992
OBS. WELL:
PZ-61

ESTIMATED PARAMETERS:
T = 1.232 ft^2/min
S' = 2.653

TEST DATA:
Q = 3.25 ft^3/min
t pumping = 2520. min

Engineering-Science, Inc.	Client: U.S. Army Corps of Engineers
Project No.: S1016.22	Location: DDRC Memphis, Tennessee

DDRC Pumping Test PZ-62 Pumping



DATA SET:
pz62pum.aqt
11/03/92

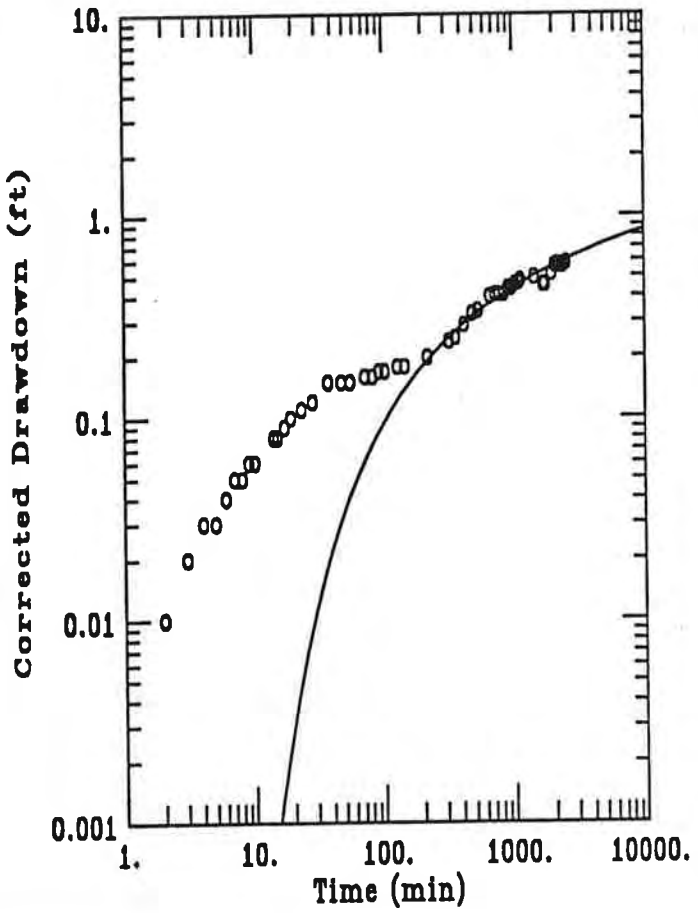
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
September 15-18, 1992
OBS. WELL:
PZ-62

ESTIMATED PARAMETERS:
T = 1.328 ft^2/min
S = 0.01824
Sy = 0.2235
β = 0.4

TEST DATA:
Q = 3.25 ft^3/min
r = 40. ft
b = 20. ft

Engineering-Science, Inc.	Client: U.S. Army Corps of Engineers
Project No.: SL016.22	Location: DDRC Memphis, Tennessee

DDRC Pumping Test PZ-62 Pumping



DATA SET:
pz62pcr.aqt
11/03/92

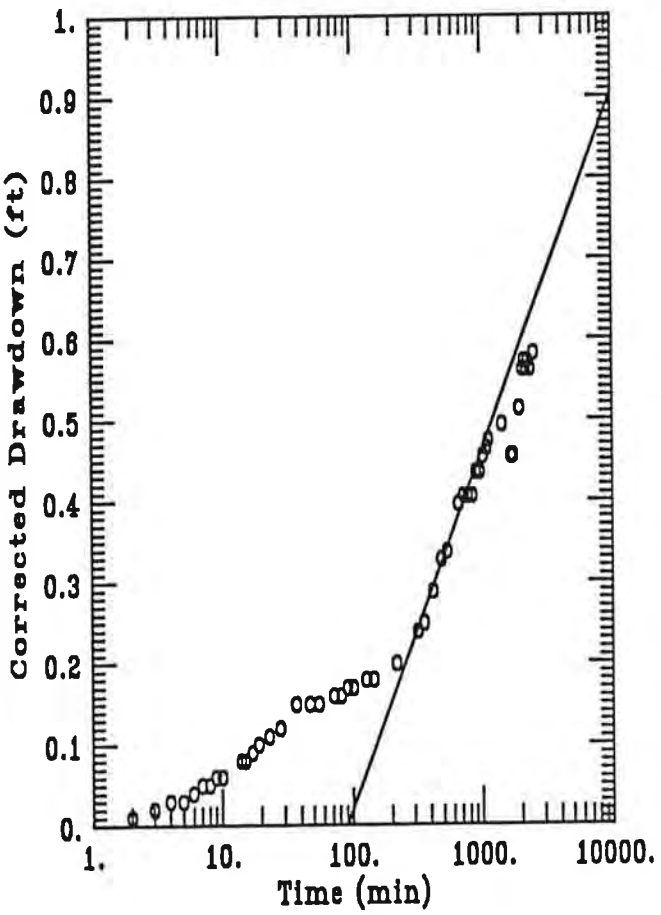
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Theis
TEST DATE:
September 115-18, 1992
OBS. WELL:
PZ62

ESTIMATED PARAMETERS:
T = 1.462 ft^2/min
S = 0.1824

TEST DATA:
Q = 3.25 ft^3/min
r = 40. ft
b = 20. ft

Engineering-Science, Inc.	Client: **U.S. Army Corps of Engineers**
Project No.: **SL016.22**	Location: **DDRC Memphis, Tennessee**

DDRC Pumping Test PZ-62 Pumping



DATA SET:
pz62pcr.aqt
11/03/92

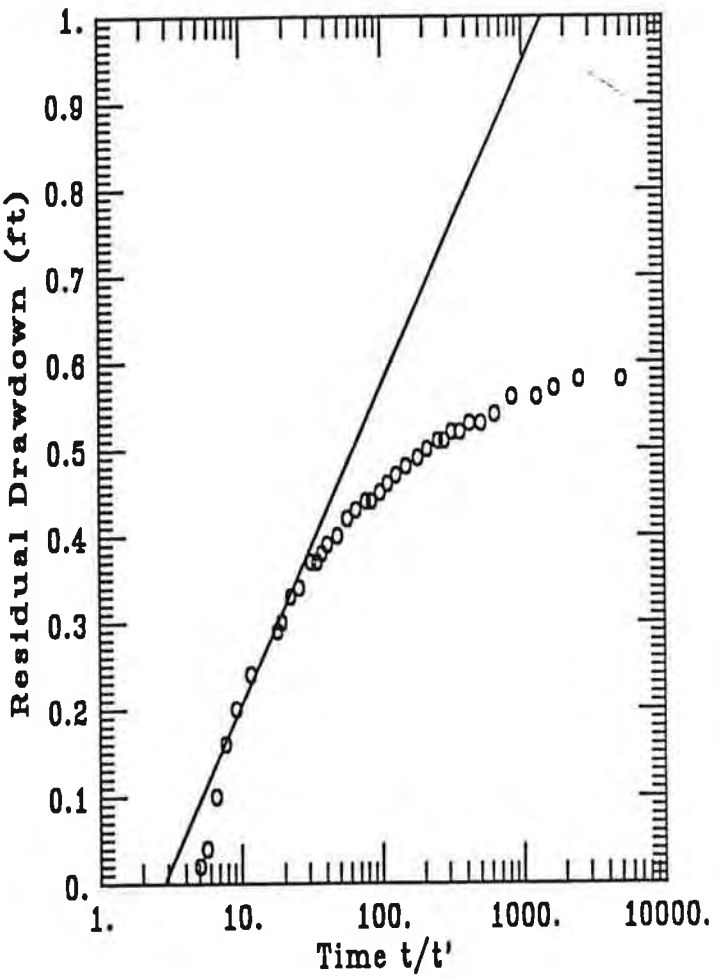
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
September 115-18, 1992
OBS. WELL:
PZ62

ESTIMATED PARAMETERS:
T = 1.345 ft^2/min
S = 0.1698

TEST DATA:
Q = 3.25 ft^3/min
r = 40. ft
b = 20. ft

Engineering-Science, Inc.	Client: U.S. Army Corps of Engineers
Project No.: SL016.22	Location: DDRC Memphis, Tennessee

DDRC Pumping Test PZ-62 Recovery



DATA SET:
pz62rec.aqt
11/03/92

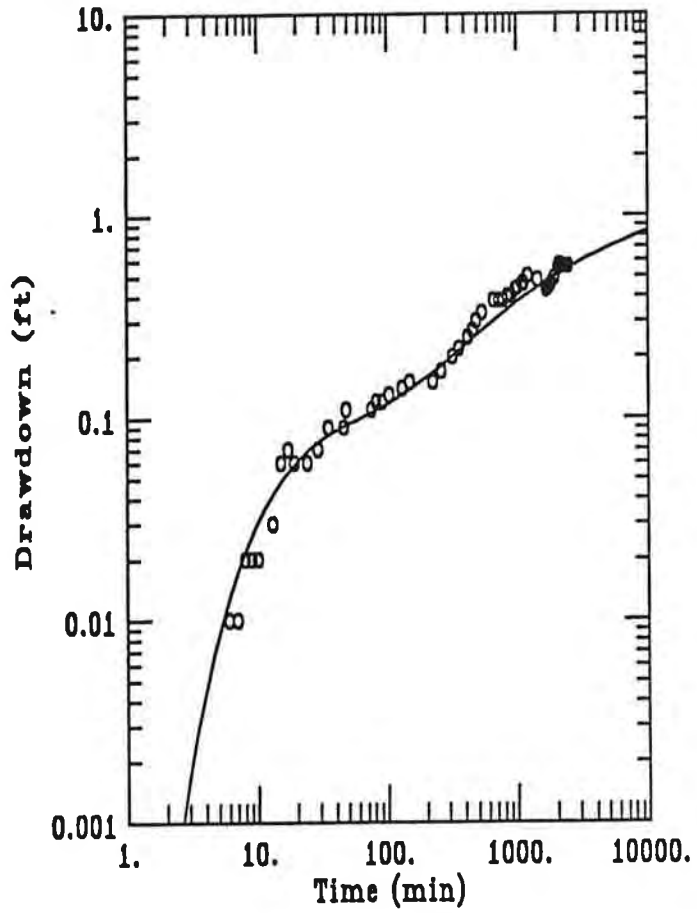
AQUIFER TYPE:
Confined
SOLUTION METHOD:
Theis Recovery
TEST DATE:
September 115-18, 1992
OBS. WELL:
PZ62

ESTIMATED PARAMETERS:
T = 1.605 ft^2/min
S' = 2.817

TEST DATA:
Q = 3.25 ft^3/min
t pumping = 2520. min

Engineering-Science, Inc.	Client: U.S. Army Corps of Engineers
Project No.: SL016.22	Location: DDRC Memphis, Tennessee

DDRC Pumping Test PZ-63 Pumping



DATA SET:
pz63pum.dat
11/02/92

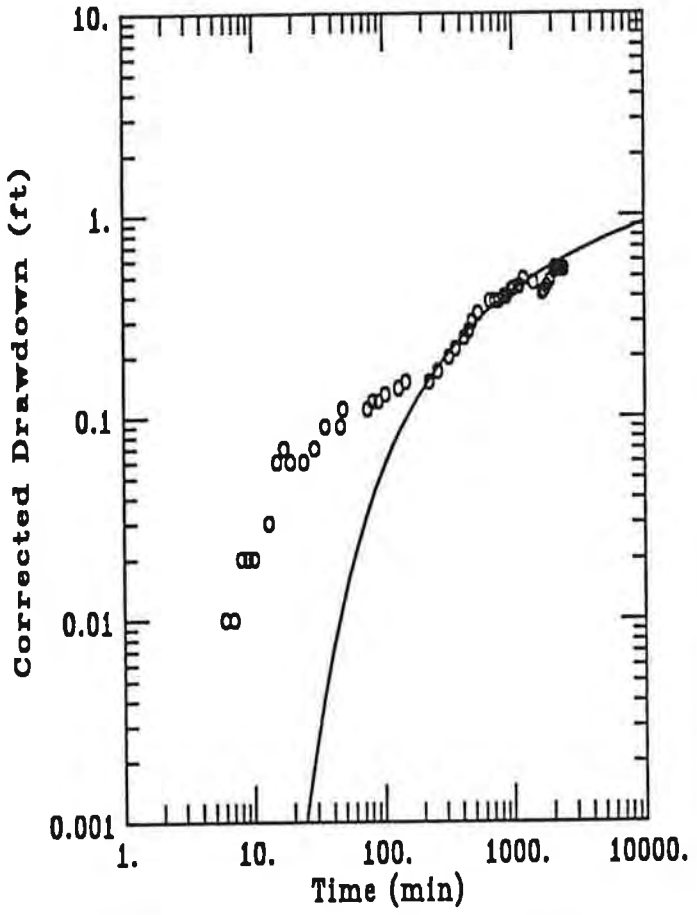
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
September 15-18, 1992
OBS. WELL:
PZ-63

ESTIMATED PARAMETERS:
T = 1.197 ft^2/min
S = 0.02845
Sy = 0.3158
β = 0.8

TEST DATA:
Q = 3.25 ft^3/min
r = 40. ft
b = 20. ft

Engineering-Science, Inc.	Client: U.S. Army Corps of Engineers
Project No.: SL016.22	Location: DDRC Memphis, Tennessee

DDRC Pumping Test PZ-63 Pumping



DATA SET:
pz63pcr.aqt
11/02/92

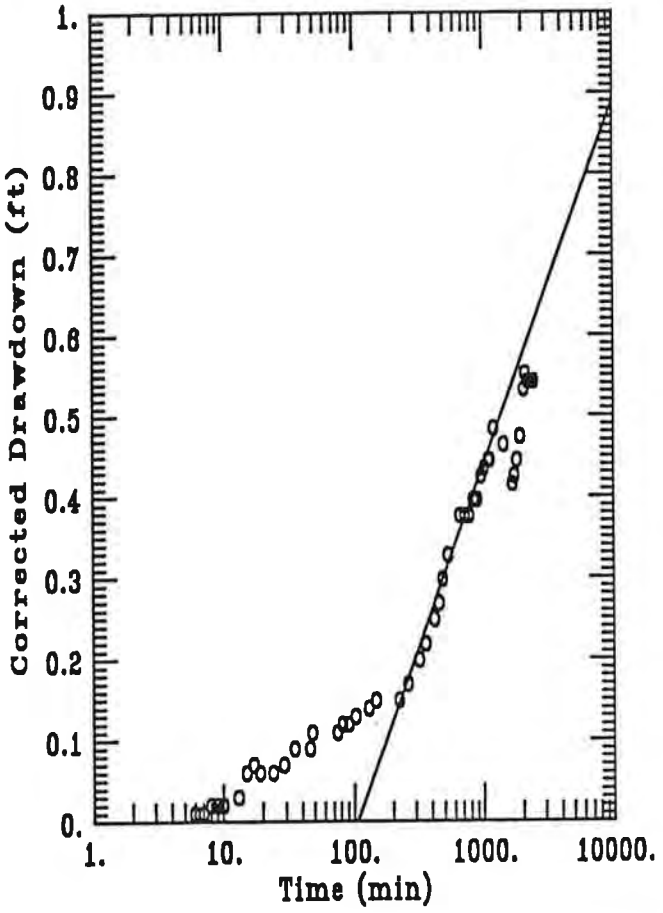
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Theis
TEST DATE:
September 15-18, 1992
OBS. WELL:
PZ-63

ESTIMATED PARAMETERS:
T = 1.208 ft^2/min
S = 0.2549

TEST DATA:
Q = 3.25 ft^3/min
r = 40. ft
b = 20. ft

Engineering-Science, Inc.	Client: **U.S. Army Corps of Engineers**
Project No.: **SL016.22**	Location: **DDRC Memphis, Tennessee**

DDRC Pumping Test PZ-63 Pumping



DATA SET:
pz63pcr.aqt
11/02/92

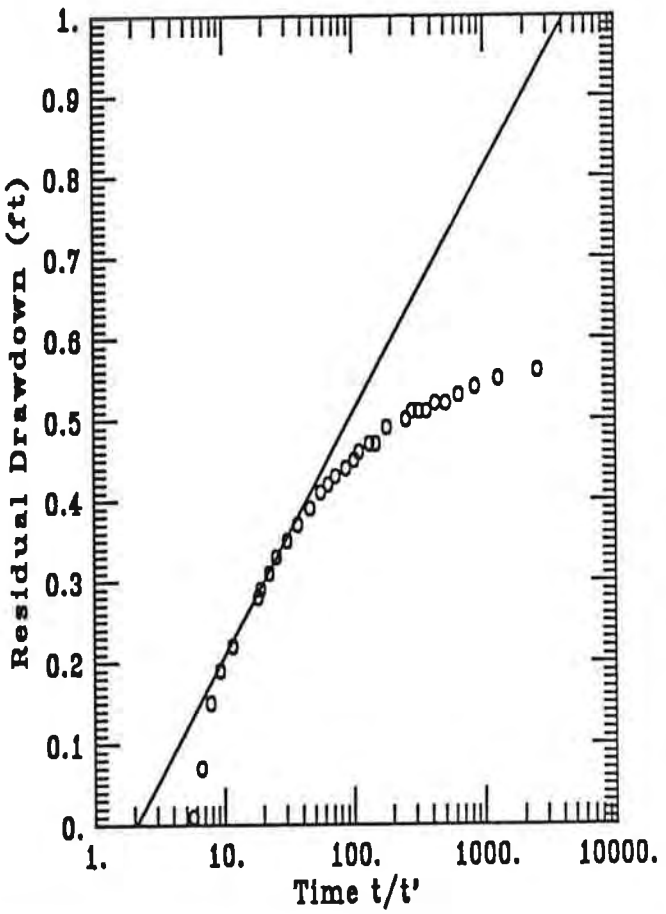
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
September 15-18, 1992
OBS. WELL:
PZ-63

ESTIMATED PARAMETERS:
T = 1.319 ft^2/min
S = 0.1971

TEST DATA:
Q = 3.25 ft^3/min
r = 40. ft
b = 20. ft

Engineering-Science, Inc.	Client: U.S. Army Corps of Engineers
Project No.: SL016.22	Location: DDRC Memphis, Tennessee

DDRC Pumping Test PZ-63 Recovery



DATA SET:
pz63rec.dat
11/03/92

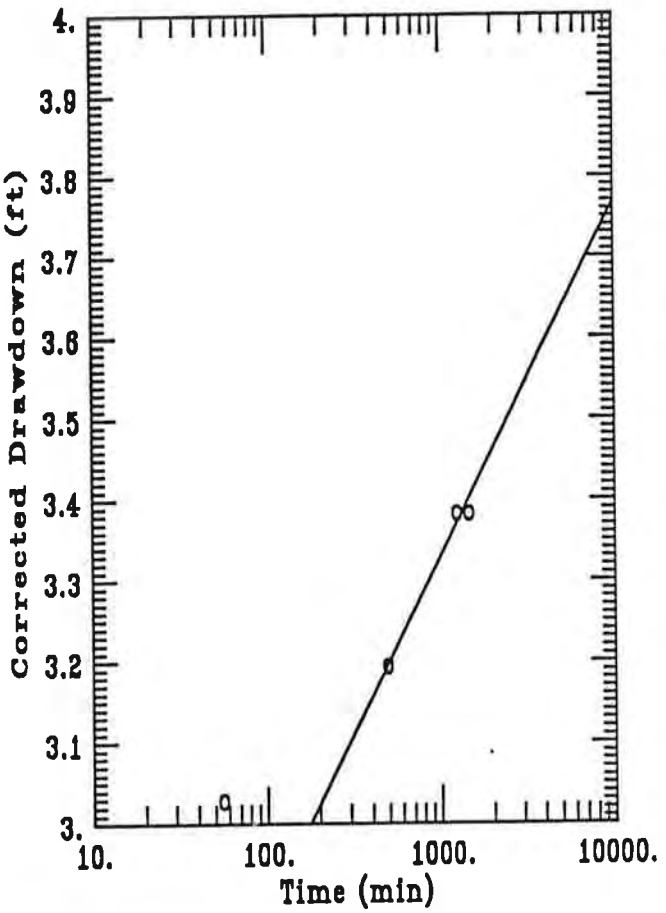
AQUIFER TYPE:
Confined
SOLUTION METHOD:
Theis Recovery
TEST DATE:
September 15-18, 1992
OBS. WELL:
PZ-63

ESTIMATED PARAMETERS:
T = 1.969 ft^2/min
S' = 2.061

TEST DATA:
Q = 3.25 ft^3/min
t pumping = 2520. min

Engineering-Science, Inc.	Client: **U.S. Army Corps of Engineers**
Project No.: **SL016.22**	Location: **DDRC Memphis, Tennessee**

DDRC Pumping Test Pump Well Pumping



DATA SET:
pwellpcr.aqt
11/04/92

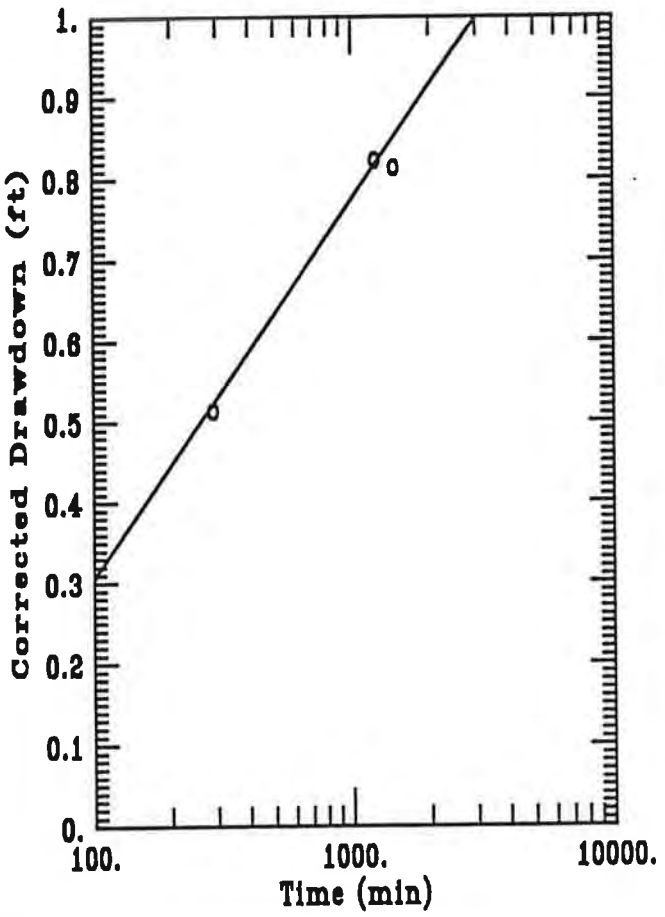
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
September 15-18, 1992
OBS. WELL:
Pumping Well

ESTIMATED PARAMETERS:
T = 1.361 ft^2/min
S = 0.0002984

TEST DATA:
Q = 3.25 ft^3/min
r = 0.5 ft
b = 20. ft

Engineering-Science, Inc.	Client: U.S. Army Corps of Engineers
Project No.: SL016.22	Location: DDRC Memphis, Tennessee

DDRC Pumping Test MW-3 Pumping



DATA SET:
mw-3pcr.aqt
11/04/92

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Cooper-Jacob

TEST DATE:
September 15-18, 1992

OBS. WELL:
MW-3

ESTIMATED PARAMETERS:
T = 1.27 ft^2/min
S = 0.1588

TEST DATA:
Q = 3.25 ft^3/min
r = 20. ft
b = 20. ft