GW - 114

11/91

WORK PLANS

ADDITIONAL

ASSESSMENT

ADDITIONAL ASSESSMENT
AND
REMEDIATION FEASIBILITY TESTING
DOWELL SCHLUMBERGER INCORPORATED
ARTESIA, NEW MEXICO

November 20, 1991

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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

During the week of September 9-16, 1991, Western Water Consultants, Inc. (WWC) installed three new ground-water monitoring wells, sampled ground water from all new and existing monitoring wells, drilled a new pump well and conducted a 24-hour aquifer pump test, and conducted soil vapor extraction (SVE) pilot tests at two separate locations at the Dowell Schlumberger facility in Artesia, New Mexico. All field work had been authorized by the New Mexico Environment Department as part of a continuing site investigation. The purpose of this portion of the investigation was to continue definition of on-site sources of soil and ground-water contamination and to provide information for use in future feasibility analyses of remediation options.

Soil and ground-water contamination by aromatic and chlorinated volatile hydrocarbons was detected at the facility. The distribution of contaminants defines plumes surrounding and extending downgradient (northeast) from two primary sources: the shop area and the former wastewater tank area. No conclusions are drawn concerning possible increases or decreases in contaminant concentrations pending a third round of ground-water sampling.

Lithology of the shallow alluvium encountered at the site is complex, consisting predominantly of brick-red silts, silty clays, and clays which are interbedded with thin layers of gypsum/carbonate. In unsaturated zones, the gypsum/carbonate material typically comprises off-white, soft, earthy-textured, very fine-grained layers, although well-indurated gravel-sized clasts also are found. In the saturated zones, the gypsum/carbonate layers resemble disaggregated "rubble" with widely-varying sizes of clasts and considerable voids resulting from dissolution of soluble material. The gypsum/carbonate rubble zones determine the hydraulic characteristics of the shallow alluvium and are the primary sources of water.

Data generated by the pump test was used to calculate transmissivity, hydraulic conductivity, and storage coefficient of the gypsum/carbonate rubble zones by both the Theis and the Cooper-Jacob methods; calculated values were similar for both methods. A graphical analysis of drawdown data from the observation wells indicated that the aquifer was slightly anisotropic with the direction of maximum transmissivity to the northeast. The elliptical cone-of-depression, contoured from drawdown measured at the end of the pump test, is elongated towards the northeast and corroborates the graphical analysis. The area affected by the 24-hour pump test is relatively large; drawdown was detected at MW-3, 340 feet northeast of the pump well (MW-16). Although individual gypsum/carbonate rubble layers are not easily correlated between wells, evidence from pump testing indicates that at least some of the layers are laterally continuous.

SVE pilot tests conducted in the vicinity of the acid plant and the former wastewater tanks yielded similar, fairly low permeabilities for both sites. Under the conditions of the test, the radius of influence of the vacuum wells was 11 feet, indicating that multiple extraction wells would need to be operated in a given area to achieve acceptable levels of contaminant removal from the soil.

1.0 INTRODUCTION

1.0 INTRODUCTION

1.1 Background

The work described in this report is part of an on-going investigation to assess soil and ground-water contamination associated with former underground fuel and wastewater storage tanks at the Dowell Schlumberger Inc. (DS) facility in Artesia, New Mexico. Only data from the September 1991 field work are presented herein. Results of the earlier investigation are documented in a Western Water Consultants, Inc. (WWC) report dated April 5, 1991 (Secondary Investigation, Dowell Schlumberger Incorporated, Artesia, New Mexico). Tank removals and the initial site investigation were performed by Reed and Associates, Inc. (RAI), a Geraghty and Miller company, located in Austin, Texas.

1.2 Authorization and Purpose

Additional field work was mandated by the New Mexico Environment Department (NMED), formerly the New Mexico Environmental Improvement Division (NMEID), after review of WWC's April 5, 1991 report. The NMED letter, dated May 9, 1991, is included in Appendix A. A work plan describing the additional field work was prepared by WWC and submitted to NMED. In a letter dated August 2, 1991, NMED authorized the work; the letter is included in Appendix A.

Field work, conducted during the week of September 9, 1991, was directed at two objectives: first, to continue definition of on-site sources, and second, to provide parameters to be used in future feasibility analyses of remediation options. The investigative work included installation of new ground-water monitoring wells on DS property to better define on-site contamination and stratigraphy to a depth of 50 feet, and sampling of ground water from all new and existing wells.

Two soil vapor extraction (SVE) pilot tests were conducted to provide preliminary information on the feasibility of an SVE system to remediate contaminated soil above the water table. In addition, a 6-inch diameter pump well (MW-16) was installed and a 24-hour pump test was performed to obtain hydrologic information about the uppermost part of the alluvial aquifer. Information generated by the pump test may be used to evaluate the pump and treat method as an alternative to reduce ground-water contaminant concentrations.

2.0 MONITORING WELL INSTALLATION AND SOIL SAMPLING

Western Water Consultants, Inc.

2.0 MONITORING WELL INSTALLATION AND SOIL SAMPLING

2.1 Monitoring Well Installation

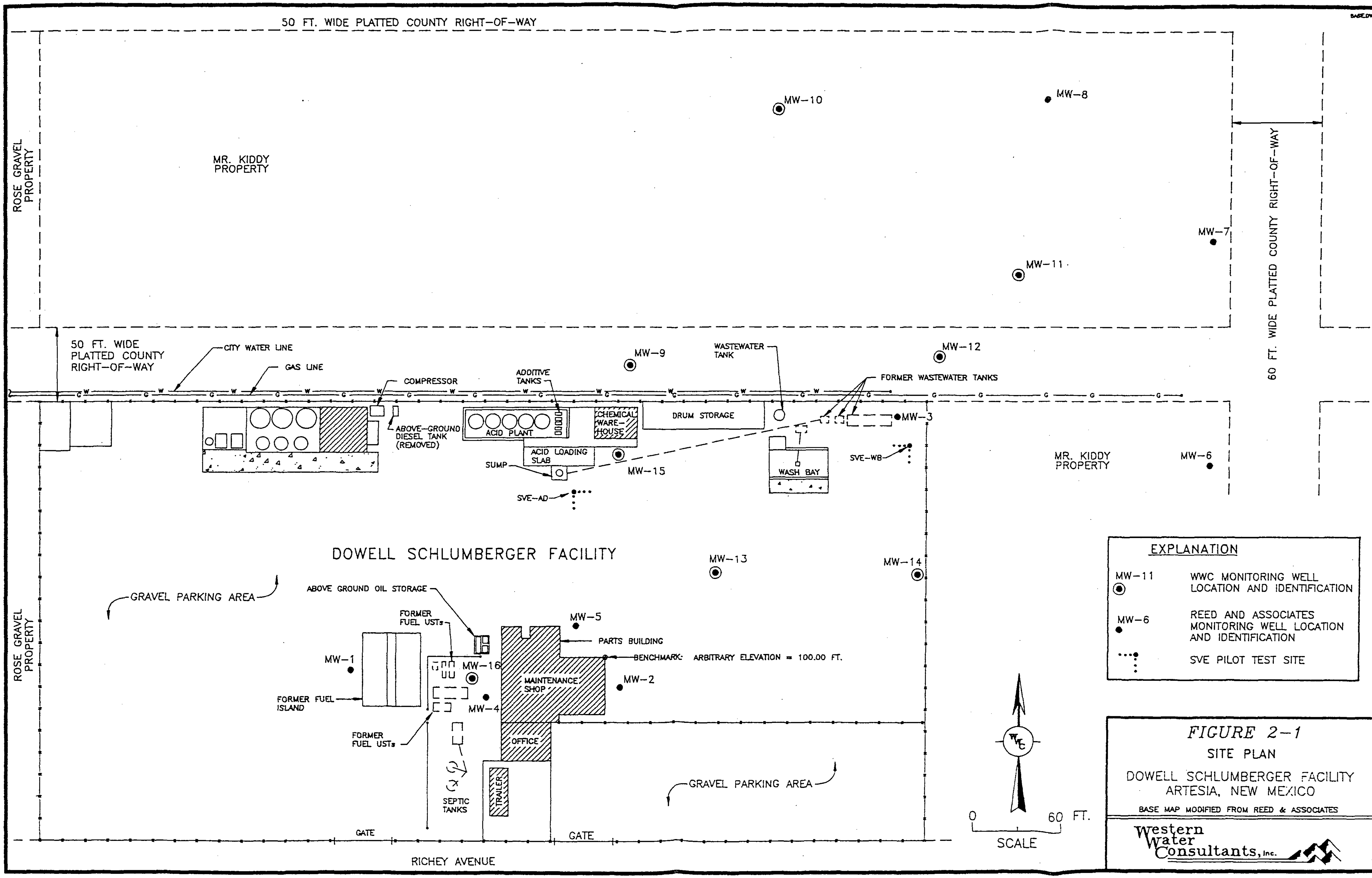
Ground-water monitoring wells, soil vapor extraction (SVE) vacuum and piezometer wells, and a new pump well were installed during the first three days of field work (September 9-11, 1991). Details of the pump well and the SVE pilot test wells are presented in Chapters 4 and 5, respectively.

2.1.1 Monitoring Well Drilling

The locations of existing monitoring wells installed by RAI, and all monitoring wells drilled by WWC during both the January and the September 1991 investigations are shown on Figure 2-1. Unless otherwise specified, the subsequent discussion refers only to wells installed in September.

The three new monitoring wells (MW-13, MW-14, and MW-15) and new pump well (MW-16) were drilled by Scarborough Drilling of Lamesa, Texas, using an air rotary rig with split-spoon sampling capabilities. The rig, drill bits and stem, and the split-spoon sampling equipment were decontaminated by steam-cleaning at the DS wash bay prior to drilling each monitoring well. During drilling, split-spoon sampling equipment was washed with soap and water, and rinsed with water after each sample.

WWC geologists visually observed the lithology, grain-size, moisture content, structure, and presence or absence of contamination in both cuttings and split-spoon samples. These


50 FT. WIDE PLATTED COUNTY RIGHT-OF-WAY
ROSE GRAVEL PROPERTY
MR. KIDDY PROPERTY
MW-10
MW-8
MW-7
MW-11
60 FT. WIDE PLATTED COUNTY RIGHT-OF-WAY
50 FT. WIDE PLATTED COUNTY RIGHT-OF-WAY
CITY WATER LINE
GAS LINE
COMPRESSOR
ADDITIVE TANKS
MW-9
WASTEWATER TANK
MW-12
FORMER WASTEWATER TANKS
ABOVE-GROUND DIESEL TANK (REMOVED)
ACID PLANT
CHEMICAL WARE-HOUSE
DRUM STORAGE
MW-3
ACID LOADING SLAB
SUMP
MW-15
SVE-WB
WASH BAY
MR. KIDDY PROPERTY
MW-6
SVE-AD
DOWELL SCHLUMBERGER FACILITY
MW-13
MW-14
GRAVEL PARKING AREA
ABOVE GROUND OIL STORAGE
FORMER FUEL USTs
MW-5
PARTS BUILDING
BENCHMARK: ARBITRARY ELEVATION = 100.00 FT.
ROSE GRAVEL PROPERTY
MW-1
MW-16
MAINTENANCE SHOP
MW-2
FORMER FUEL ISLAND
MW-4
FORMER FUEL USTs
OFFICE
SEPTIC TANKS
TRAILER
GRAVEL PARKING AREA
GATE
GATE
RICHEY AVENUE
EXPLANATION
MW-11 WWC MONITORING WELL LOCATION AND IDENTIFICATION
MW-6 REED AND ASSOCIATES MONITORING WELL LOCATION AND IDENTIFICATION
SVE PILOT TEST SITE
0 60 FT.
SCALE
FIGURE 2-1
SITE PLAN
DOWELL SCHLUMBERGER FACILITY
ARTESIA, NEW MEXICO
BASE MAP MODIFIED FROM REED & ASSOCIATES
Western Water Consultants, Inc.

characteristics are noted on well logs included in Appendix B.

2.1.2 Monitoring Well Completion

Ground-water monitoring wells MW-14 and MW-15 were completed at depths 12 to 15 feet below the apparent top of the saturated zone as determined from the well logs. Fifteen feet of 0.020-inch factory slotted 2-inch ID Schedule 80 PVC screen was threaded to 2-inch ID Schedule 80 blank casing and placed in the borehole. All wells had threaded bottom caps and water-tight top caps. Silica sand (8/16 mesh) was poured into the annulus around the screen, extending approximately two feet above the top of the screen. A minimum of three feet of bentonite chips, hydrated after emplacement, formed a seal above the sand pack. A concrete seal filled the annulus from the top of the bentonite to the surface. Flush-mounted steel protective casings with bolted lids were used at MW-13, MW-14, and MW-15 to minimize well interference with yard traffic.

MW-13, originally intended as a borehole, was completed as a monitoring well to provide more than one set of data on ground-water quality in the center of the yard between the shop and the former wastewater tank sources. Total depth of the well was 48 feet as compared to 30 to 35 feet for other monitoring wells on site. Except for the increased screened interval, well completion was identical to completion of the shallower monitoring wells. Details of monitoring well construction are included in the well logs in Appendix B. New Mexico State Engineer's well completion forms for the three newly installed monitoring wells are in Appendix C.

2.1.3 Development of New Wells

The new monitoring wells (MW-13, MW-14, and MW-15) were developed to remove sediments and water disturbed by drilling, and to allow unaffected ground water to enter the well. Ten casing volumes were removed from MW-13, MW-14, and MW-15 with disposable polyethylene bailers.

In all cases, water was initially opaque with fine sediments (silt and clay). Near the end of bailing, water from MW-13 and MW-14 contained only minor suspended fine sediment. The amount of suspended sediment in water from MW-15 decreased somewhat, however, water removed from this well was not as sediment-free as did bailed water from other wells on site. No hydrocarbon sheen was noted on any of the new wells. Recharge into the wells was rapid enough to produce no apparent drawdown at a bailing rate of approximately 0.25 to 0.5 gallons per minute.

2.1.4 Static Water Level Measurements

For all new ground-water wells, the elevations of static water level measuring points, located on the north side of the top of each PVC well casing, were surveyed with a level and stadia rod. Well elevations were referenced to the same temporary benchmark used during the January 1991 field work. The temporary benchmark is located on the concrete pad against the northeast corner of the building and was given an arbitrary elevation of 100.00 feet.

Static water levels were measured with an oil/water interface probe capable of discriminating between separate product and water phases. No floating hydrocarbon layer was detected in any well during water level measurements collected prior to conducting other field work. However, at the end of the pump test at MW-16, MW-3 developed 0.08 foot of floating product after 24.75 hours of pumping. Approximately 0.19 foot of drawdown was observed in the well at the time product was detected. When water levels were measured in the well 22 hours after pumping ceased, the water level had risen to approximately the pre-test level and no product layer was detected in MW-3. The product is believed to be residual in the soil, from which product bleeds into the well during periods of lower water levels.

Table 2-1 lists the elevations of measuring points, static water level measurements, and static water level elevations for the September 1991 data.

2.2 Geology and Hydrogeology

The geology and hydrogeology of the site were described in the WWC report dated April 5, 1991 (Secondary Investigation, Dowell Schlumberger Incorporated, Artesia, New Mexico). Observations of lithology made during the September 1991 drilling corroborate those made during the January 1991 field work. Predominant lithologies are light brown to reddish-brown silt and silty clay interbedded with clay layers and stringers of cream to pinkish earthy-textured gypsum/carbonate. These very fine-grained sediments were deposited in an arid, alluvial overbank environment, and can be expected to be more

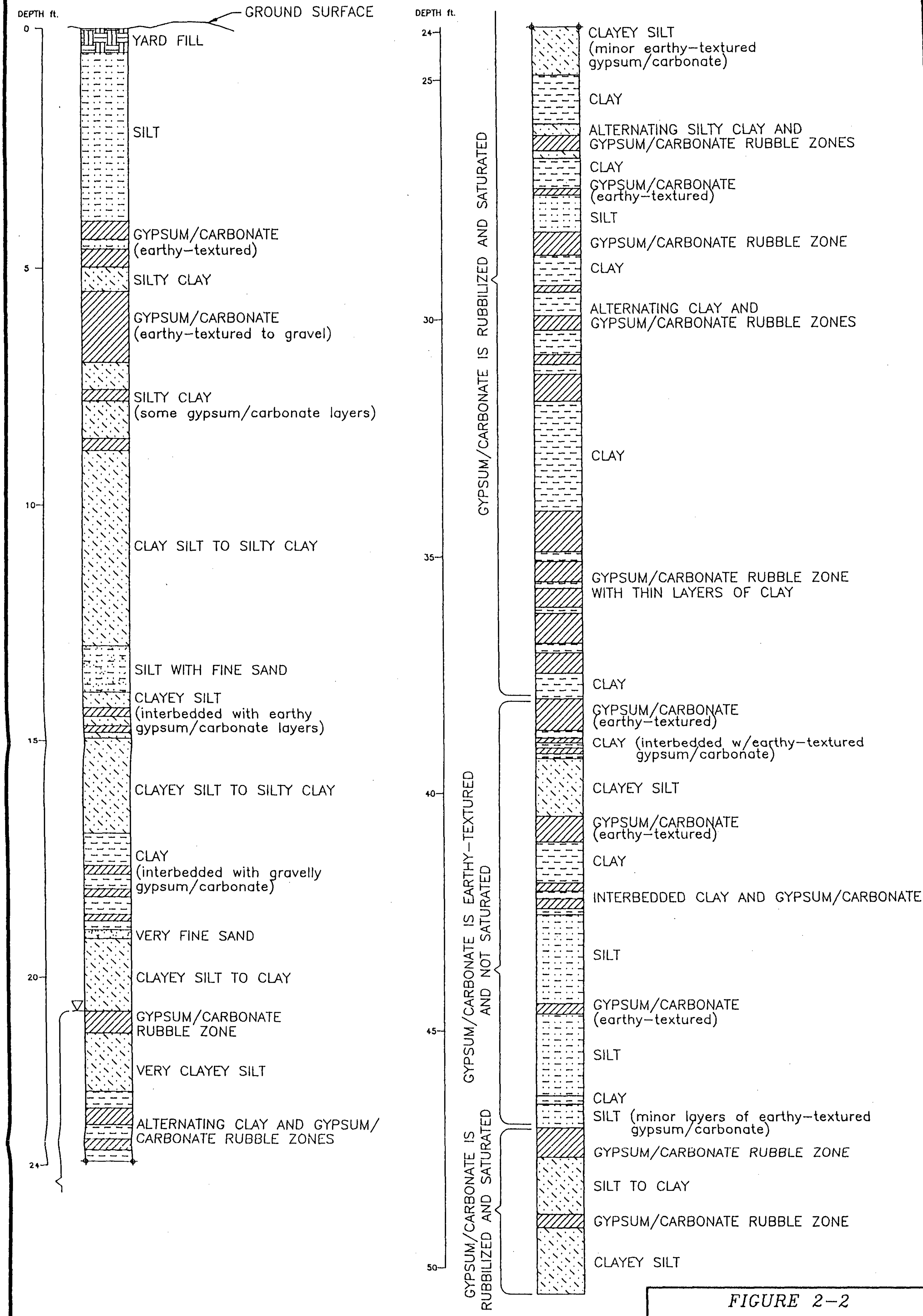
Table 2-1. Ground-Water Measurements and Elevations, Dowell Schlumberger Facility, Artesia, New Mexico.

WELL #	DATE	DEPTH TO GROUND WATER (ft)	MEASURING POINT ELEVATION* (ft)	GROUND-WATER ELEVATION* (ft)	COMMENTS
MW-1	9-13-91	16.04	100.56	84.52	No hydrocarbon odor.
MW-2	9-13-91	15.01	99.56	84.55	Strong hydrocarbon odor; hydrocarbon sheen present.
MW-3	9-13-91	14.66	98.33	83.67	Strong hydrocarbon odor; developed 0.1 ft. of product during pump test; only a thin film of product present during bailing.
MW-4	9-13-91	18.54	103.18	84.64	Very slight hydrocarbon odor.
MW-5	9-13-91	15.52	99.87	84.35	Slight hydrocarbon odor.
MW-6	9-13-91	17.43	100.84	83.41	Slight hydrocarbon odor.
MW-7	9-13-91	17.43	100.23	82.80	Slight hydrocarbon odor.
MW-8	9-13-91	18.80	101.47	82.67	Slight hydrocarbon odor.
MW-9	9-13-91	18.93	102.18	83.25	Slight hydrocarbon odor.
MW-10	9-13-91	18.56	101.34	82.78	No hydrocarbon odor.
MW-11	9-13-91	17.81	100.60	82.79	Moderate hydrocarbon odor.
MW-12	9-13-91	17.59	100.69	83.10	Strong hydrocarbon odor.
MW-13	9-13-91	15.10	99.25	84.15	Slight hydrocarbon odor.
MW-14	9-13-91	14.60	98.74	84.14	Moderate hydrocarbon odor.
MW-15	9-13-91	16.30	100.05	83.75	Moderate hydrocarbon odor.
MW-16	9-13-91	18.83	103.37	84.54	No hydrocarbon odor.

NOTE:
* = measured from a temporary benchmark of arbitrary elevation = 100.00 feet. Benchmark is located on the concrete right up against the east shop wall, at the northeast corner of the shop.

laterally continuous than coarse-grained alluvial channel deposits. The gypsum/carbonate layers are believed to be derived from evaporation of water with a high concentration of total dissolved solids. The thicker layers may be laterally continuous at the scale of the Artesia DS facility. A representative stratigraphic column for the alluvium at the Artesia facility (Figure 2-2) illustrates the complex and heterogeneous nature of the gypsum/carbonate layers and interbeds of silt and clay. The gypsum/carbonate layers range in thickness from 0.5 inch to 1.5 feet. At the level of detail logged in the monitoring wells, the layers could not be correlated between wells.

The conclusion from the January 1991 drilling that the gypsum/carbonate rubble layers constitute the primary water-bearing zones was supported by observations made in September. Saturated gypsum/carbonate rubble layers were first encountered at depths of 20 to 26 feet in all new monitoring wells. In MW-13, which was drilled to a depth of 50 feet to further define shallow alluvial stratigraphy, saturated cream to pinkish-white earthy-textured gypsiferous layers alternating with apparently unsaturated silt and clay were present from 26 to 50 feet. From 37 to 47 feet in MW-13, both the gypsum/carbonate layers and the interbedded silts and clays were apparently unsaturated. Clays and silts were typically damp to moist and stiff to slightly plastic, whereas the rubble zones, except in this unsaturated interval, were soupy with water. The unsaturated interval may contain more clay and less gypsum/carbonate than the over- and underlying saturated zones, however the exact reason for the apparent differentiation in saturation and the lateral extent of the unsaturated interval are unknown.



NOTE: 0–19 FEET FROM CONTINUOUS SPLIT-SPOON LOG OF SVE-AD

19–51.5 FEET FROM CONTINUOUS SPLIT-SPOON LOG OF MW-13

FIGURE 2–2

STRATIGRAPHIC COLUMN REPRESENTING TYPICAL LITHOLOGY

DOWELL SCHLUMBERGER FACILITY
ARTESIA, NEW MEXICO

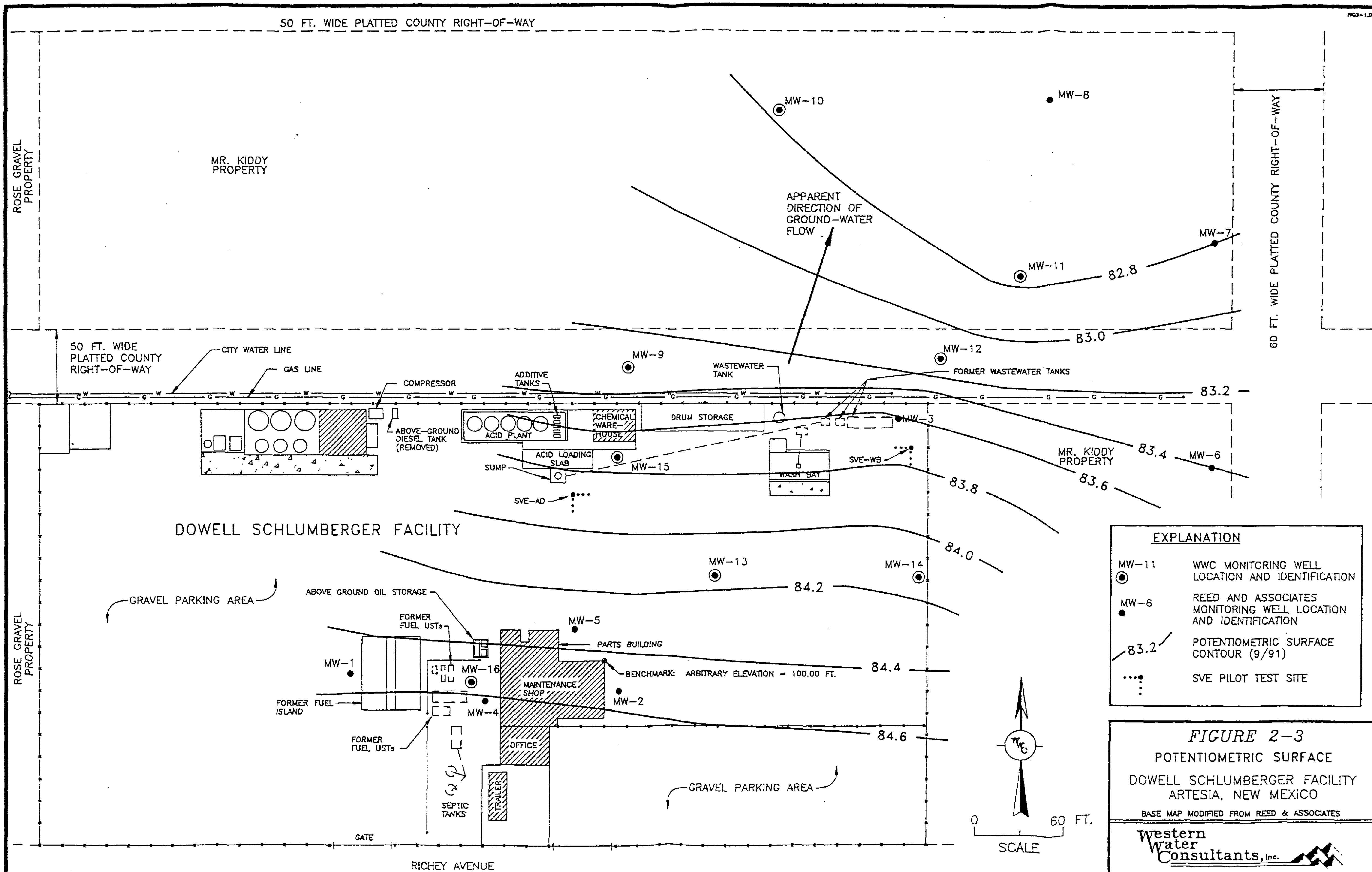
Western Water Consultants, Inc.

All wells are completed 30 to 35 feet below surface, except MW-4, MW-13, and MW-16, which are completed approximately 50 feet below surface. Nonetheless, it is believed that data from MW-13 are comparable to data from the shallower wells, since the unsaturated interval in MW-13 reduces the saturated interval to approximately the same interval which contributes water to the shallower wells. Data from MW-4 and MW-16 may not be comparable.

The apparent ground-water flow direction is to the north northeast and is illustrated in the potentiometric surface on Figure 2-3. Since analysis of pump test data indicated that the aquifer is slightly anisotropic, the actual direction of water flow may be at an angle to the apparent direction (more to the northeast). Aquifer parameters and presence of anisotropy determined from analysis of pump test data are discussed in Chapter 4.

2.3 Soil Sampling and Analysis

During monitoring well, pump well, and SVE borehole drilling, soil samples for laboratory analysis were collected from zones exhibiting visual, olfactory or HNu evidence of soil contamination. Three samples were collected: cuttings from a depth of approximately 16 feet in the former wastewater tank SVE vacuum well; core from 16 to 16.3 feet in the acid plant SVE vacuum well; and core from 15 to 17 feet in MW-16. Laboratory samples were stored in a cooler with ice after collection and during shipment to the lab. Soil samples were analyzed by Cenref Laboratories of Brighton, Colorado, for volatile hydrocarbons by EPA Method 8240.


50 FT. WIDE PLATTED COUNTY RIGHT-OF-WAY
ROSE GRAVEL PROPERTY
MR. KIDDY PROPERTY
MW-10
MW-8
APPARENT DIRECTION OF GROUND-WATER FLOW
MW-7
MW-11
82.8
60 FT. WIDE PLATTED COUNTY RIGHT-OF-WAY
83.0
50 FT. WIDE PLATTED COUNTY RIGHT-OF-WAY
CITY WATER LINE
GAS LINE
MW-9
MW-12
WASTEWATER TANK
FORMER WASTEWATER TANKS
COMPRESSOR
ADDITIVE TANKS
83.2
ABOVE-GROUND DIESEL TANK (REMOVED)
ACID PLANT
CHEMICAL WARE-HOUSE
DRUM STORAGE
MW-3
ACID LOADING SLAB
MW-15
SUMP
WASH BAY
SVE-WB
83.4
MW-6
MR. KIDDY PROPERTY
83.6
83.8
SVE-AD
DOWELL SCHLUMBERGER FACILITY
84.0
MW-13
MW-14
84.2
GRAVEL PARKING AREA
ABOVE GROUND OIL STORAGE
FORMER FUEL USTs
MW-5
PARTS BUILDING
MW-1
MW-16
BENCHMARK: ARBITRARY ELEVATION = 100.00 FT.
84.4
MAINTENANCE SHOP
MW-2
FORMER FUEL ISLAND
MW-4
FORMER FUEL USTs
84.6
OFFICE
SEPTIC TANKS
TRAILER
GRAVEL PARKING AREA
GATE
RICHEY AVENUE
0
60 FT.
SCALE
EXPLANATION
MW-11 WWC MONITORING WELL LOCATION AND IDENTIFICATION
MW-6 REED AND ASSOCIATES MONITORING WELL LOCATION AND IDENTIFICATION
83.2 POTENTIOMETRIC SURFACE CONTOUR (9/91)
SVE PILOT TEST SITE
FIGURE 2-3
POTENTIOMETRIC SURFACE
DOWELL SCHLUMBERGER FACILITY
ARTESIA, NEW MEXICO
BASE MAP MODIFIED FROM REED & ASSOCIATES
Western Water Consultants, Inc.

2.4 Results of Soil Observations and Analyses

During drilling, soil contamination was found in both SVE extraction wells (SVE-AD and SVE-WB) and in the pump well (MW-16). In SVE-AD, located southeast of the acid plant sump, the soil from 5 to 10 feet was not stained but had an odor which became stronger with depth. All soil from a depth of 10 feet to the bottom of the hole at 19 feet exhibited both odor and greenish-grey to black staining.

Cuttings from SVE-WB, located east of the wash bay and south of MW-3, showed no soil staining but had a strong odor from several feet to 17 feet below surface. Odor was strongest in the 14- to 16-foot interval.

The pump well, MW-16, exhibited mottled grayish staining from 15 to 21 feet. A odor was present from 15 to approximately 27 feet. Soil from MW-15, located east of the acid plant sump, had an odor from 12 to 30 feet. No signs of odor or staining were detected in soil from MW-13 and MW-14.

Results of laboratory analyses of soil samples are summarized in Table 2-2. The laboratory analytical reports are in Appendix D. Volatile hydrocarbon detected by laboratory analysis of the soil sample from SVE-AD were acetone and carbon disulfide. Soil from a depth of 16 feet in SVE-WB contained xylenes, ethylbenzene, and toluene. The laboratory has indicated that chloromethane, present at a concentration of 20 mg/kg in the sample from SVE-WB, is probably a laboratory contaminant. Xylenes and ethylbenzene were detected in soil from MW-16.

Table 2-2. Results from Laboratory Analyses of Soil Samples, September 1991, Dowell Schlumberger Facility, Artesia, New Mexico.

SAMPLE #	LOCATION	TOLUENE (mg/kg)	ETHYL-BENZENE (mg/kg)	XYLENES (mg/kg)	ACETONE (mg/kg)	CHLORO-METHANE (mg/kg)	CARBON DISULFIDE (mg/kg)
SVE-A2	core from 16-16.3 ft, acid plant SVE extraction well (SVE-AD)	ND(0.12)	ND(0.12)	ND(0.62)	12	ND(0.62)	3.6
SVE-W	cuttings from 16 ft, former wastewater tank area SVE extraction well (SVE-WB)	2.6	6.5	59	ND(12)	20**	ND(12)
0125-MW16S1	core from 15-17 ft, MW-16	ND(0.12)	3.6	6.5	ND(1.2)	ND(0.62)	ND(1.2)

NOTES:

ND(0.12) = not detected at detection limit shown in parentheses.

** = Chloromethane may be a laboratory contaminant.

3.0 GROUND-WATER SAMPLING AND ANALYSIS

Western Water Consultants, Inc.

3.0 GROUND-WATER SAMPLING AND ANALYSIS

3.1 Sampling Methods

To allow representative ground water to enter the wells prior to sampling, disposable polyethylene bailers were used to purge three casing volumes from 14 of the 16 wells. A 3.5-inch OD PVC bailer was used to remove three casing volumes from MW-4 which has 4-inch ID casing. It was not necessary to bail MW-16, since approximately 9,000 gallons of water had been removed from the well during the pump test.

Ground-water samples from all wells were collected using polyethylene bailers and nylon cord which were disposed after sampling at each well. Water samples were poured from the bailers into two 1-liter amber glass bottles and two VOA vials. A duplicate sample was collected from MW-7 to check the reproducibility of laboratory analyses.

All samples were stored in a cooler with ice immediately after collection and kept on ice during transport to the lab. Chain-of-custody and sample analysis request forms were used to document ground-water and soil sample numbering and handling, and to specify analyses required. All ground-water samples were analyzed by Cenref Laboratories of Brighton, Colorado, for volatile hydrocarbons by EPA Method 8240 and for total petroleum hydrocarbons (TPH) by ASTM D3328.

3.2 Results

3.2.1 Ground-Water Contamination: Field Observations

Visible hydrocarbon contamination was present only in MW-3 (0.08 foot of free product at the end of pump testing and a thin film of product during sampling), and MW-2 (hydrocarbon sheen). These wells also had a strong fuel odor, as did MW-12.

MW-11, MW-14, and MW-15 exhibited moderately strong hydrocarbon odors. In all other wells, either no odor was apparent or only a slight odor was detectable. These observations are noted in Table 2-1.

3.2.2 Ground-Water Contamination: Laboratory Data

Results of laboratory analyses of ground water are summarized in Table 3-1. The laboratory analytical reports are in Appendix D. For reference during the following discussion, all well locations are shown on Figure 2-1.

3.2.2.1 Wells Around the Shop/Former UST Location

The principal contaminants in three (MW-2, MW-4, and MW-5) of the five monitoring wells in the shop/former fuel UST area are the aromatic volatile hydrocarbons benzene, ethylbenzene, toluene, and xylenes (BETX). Very minor amounts of xylenes and toluene were detected in MW-1, the most upgradient well on site. No volatile hydrocarbons were detected in the pump well, MW-16. During the 24-hour pump test, approximately 9,000 gallons of water were evacuated from MW-16 and water from a large volume of the

Table 3-1. Results from Laboratory Analyses of Ground-Water Samples, September 1991, Dowell Schlumberger Facility, Artesia, New Mexico.

SAMPLE #	WELL #	BENZENE (mg/L)	ETHYL-BENZENE (mg/L)	TOLUENE (mg/L)	XYLENES (mg/L)	1,1-DCA (mg/L)	1,2-DCA (mg/L)	1,1-DCE (mg/L)	1,1,1-TCA (mg/L)	1,1,2-TCA (mg/L)	TCE (mg/L)	PCE (mg/L)	ACETONE (mg/L)	TPH (mg/L)
0125 1-9/91	MW-1	ND(0.001)	ND(0.001)	0.002*	0.009	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.01)	ND(1)
0125 2 9/91	MW 2	0.12	0.05	0.006*	0.69	0.1	ND(0.005)	0.005*	0.023	ND(0.005)	ND(0.005)	0.15	ND(0.05)	39
0125 3 9/91	MW 3	0.2	1.2	1.2	14	ND(0.2)	ND(0.2)	ND(0.2)	0.33	ND(0.2)	ND(0.2)	ND(0.2)	3.7	38
0125 4 9/91	MW 4	0.26	ND(0.002)	ND(0.002)	0.015	0.006	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.02)	1*
0125 5 9/91	MW 5	ND(0.001)	0.001*	ND(0.001)	ND(0.005)	0.005	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	0.018	ND(0.01)	2
0125 6 9/91	MW 6	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.005)	0.006	ND(0.001)	0.084	ND(0.001)	ND(0.001)	ND(0.001)	0.043	ND(0.01)	ND(1)
0125 7-9/91	MW-7	0.009	ND(0.001)	ND(0.001)	ND(0.005)	0.038	ND(0.001)	0.32	0.005	ND(0.001)	0.069	0.27	ND(0.01)	ND(1)
0125.70 9/91	MW-7dup	0.009	ND(0.001)	ND(0.001)	ND(0.005)	0.034	ND(0.001)	0.31	0.006	ND(0.001)	0.069	0.28	ND(0.01)	ND(1)
0125 8-9/91	MW 8	0.007	ND(0.001)	ND(0.001)	ND(0.005)	0.017	ND(0.001)	0.101	0.007	ND(0.001)	0.039	0.05	ND(0.01)	ND(1)
0125 9 9/91	MW 9	0.002*	0.032	ND(0.001)	ND(0.005)	0.035	ND(0.001)	0.002*	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	0.019	ND(1)
0125 10 9/91	MW-10	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.005)	ND(0.001)	ND(0.001)	0.012	0.002*	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.01)	ND(1)
0125 11-9/91	MW-11	0.056	ND(0.001)	ND(0.001)	ND(0.005)	0.068	ND(0.001)	0.47	0.017	ND(0.001)	0.12	0.33	ND(0.01)	14
0125.12 9/91	MW-12	0.15	0.62	0.63	2.2	0.12	ND(0.001)	0.3	0.11	ND(0.001)	0.2	0.061	0.29	3
0125 13 9/91	MW-13	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.005)	0.03	0.002*	0.038	0.005	ND(0.001)	0.004	0.24	ND(0.01)	ND(1)
0125.14-9/91	MW-14	0.022	ND(0.001)	ND(0.001)	ND(0.005)	0.13	0.002*	0.3	0.014	0.001*	0.002*	0.46	ND(0.01)	ND(1)
0125 15 9/91	MW-15	0.002*	0.01	ND(0.001)	0.006*	0.026	0.001*	0.005	ND(0.001)	ND(0.001)	ND(0.001)	0.004	0.024	ND(1)
0125 16 9/91	MW-16	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.005)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.01)	ND(1)

NOTES:

* = value is at or 1 part per billion (ug/l) above detection limit

ND = not detected at detection limit shown in parentheses

CHEMICAL ABBREVIATIONS

1,1-DCA = 1,1-dichloroethane
1,2-DCA = 1,2-dichloroethane
1,1-DCE = 1,1-dichloroethene
1,1,1-TCA = 1,1,1-trichloroethane
1,1,2-TCA = 1,1,2-trichloroethane
TCE = trichloroethene
PCE = tetrachloroethene
TPH = total petroleum hydrocarbons

aquifer was drawn into the well. Therefore, water sampled from MW-16 is representative of water quality over a large extent of the aquifer. Samples from all other wells are more representative of water quality in the immediate vicinity of each well, since much smaller volumes of water (10 to 70 gallons) were withdrawn during bailing.

Of the five shop wells, MW-2 has the highest BETX concentrations and is the only well in which all four aromatic volatiles are present. TPH concentrations were detected in MW-2, MW-4, and MW-5. In addition, the chlorinated hydrocarbons tetrachloroethene (PCE) and 1,1-dichloroethane (1,1-DCA) were identified in MW-2 and, to a lesser degree, in MW-5. These chemicals were not present upgradient from the shop in January 1991, however, small amounts of 1,1-DCA were found in MW-4 in September 1991.

3.2.2.2 Wells North and East of the Former Wastewater Tank Location

Aromatic hydrocarbons (BETX), chlorinated hydrocarbons, and acetone are present in wells surrounding the former wastewater tank location in the northeast corner of the property. Both chlorinated and aromatic hydrocarbons are present in the highest concentrations in wells closest to the former wastewater tank location and decrease significantly in concentration to the northeast (downgradient). Ethylbenzene, toluene, xylenes, and acetone were identified only in MW-3 and MW-12, the two wells closest to the source. Concentrations of benzene, 1,1-DCA, 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene (TCE), and PCE decrease in most of the wells north and east of the former wastewater tank area.

Four chlorinated hydrocarbons identified in downgradient wells were not detected in MW-3 because the sample from MW-3 had to be diluted prior to analysis which yielded higher detection limits. These chemicals may be present in MW-3 at concentrations below the detection limit. PCE and 1,1-DCE were detected in higher concentrations in the two wells downgradient from MW-12 (MW-11 and MW-7) than they were in MW-12. A similar situation was noted for these three wells in January 1991.

3.2.2.3 Wells Northeast of the Shop

MW-13 was intended to monitor water quality between the shop source and the former wastewater tank source and MW-14 was situated to detect migration of chemicals off-site along the east boundary of the property. PCE, 1,1-DCE, 1,1-DCA, 1,1,1-TCA, and TCE were present in both wells. Benzene was identified in MW-14 only; no other aromatic hydrocarbons were detected in either well. In general, volatile hydrocarbon concentrations were higher in MW-14, further from the shop source, than they were in MW-13. Most contaminants present in MW-2 east of the shop were present in decreased concentrations in MW-13 and MW-14. The two major exceptions are PCE and 1,1-DCE, both present in the two downgradient wells in concentrations 1.5 to 60 times the concentrations detected in MW-2.

3.2.2.4 Wells Around the Acid Plant

The two wells around the acid plant (MW-9 and MW-15) contain very similar suites of compounds. 1,1-DCA, acetone, and ethylbenzene are the primary chemicals present and concentrations are low.

MW-15 is located approximately 45 feet northeast of the acid plant sump, a potential source. MW-9 is 85 feet northeast of the sump. The fact that the concentrations are similar in MW-9 and MW-15 (some are even slightly higher in MW-9) may indicate that the sump is not the only source for contaminants.

3.3 Discussion of Analytical Results

The distributions of concentrations of total aromatic hydrocarbons (BETX) and total chlorinated hydrocarbons in ground water are depicted on Figures 3-1 and 3-2, respectively. For each category of volatile hydrocarbons, the totals for each well were calculated by summing the concentrations of the appropriate individual constituents detected in the well. Total concentrations have been contoured to show lines of equal concentration. In general, the total concentrations of both aromatic and chlorinated hydrocarbons is highest in MW-3 and decreases in monitoring wells to the northeast.

The two primary sources of both aromatic and chlorinated hydrocarbons appear to be the former wastewater tank area and the shop area. Both aromatic and chlorinated hydrocarbons are associated with the acid plant; low concentrations of both types of

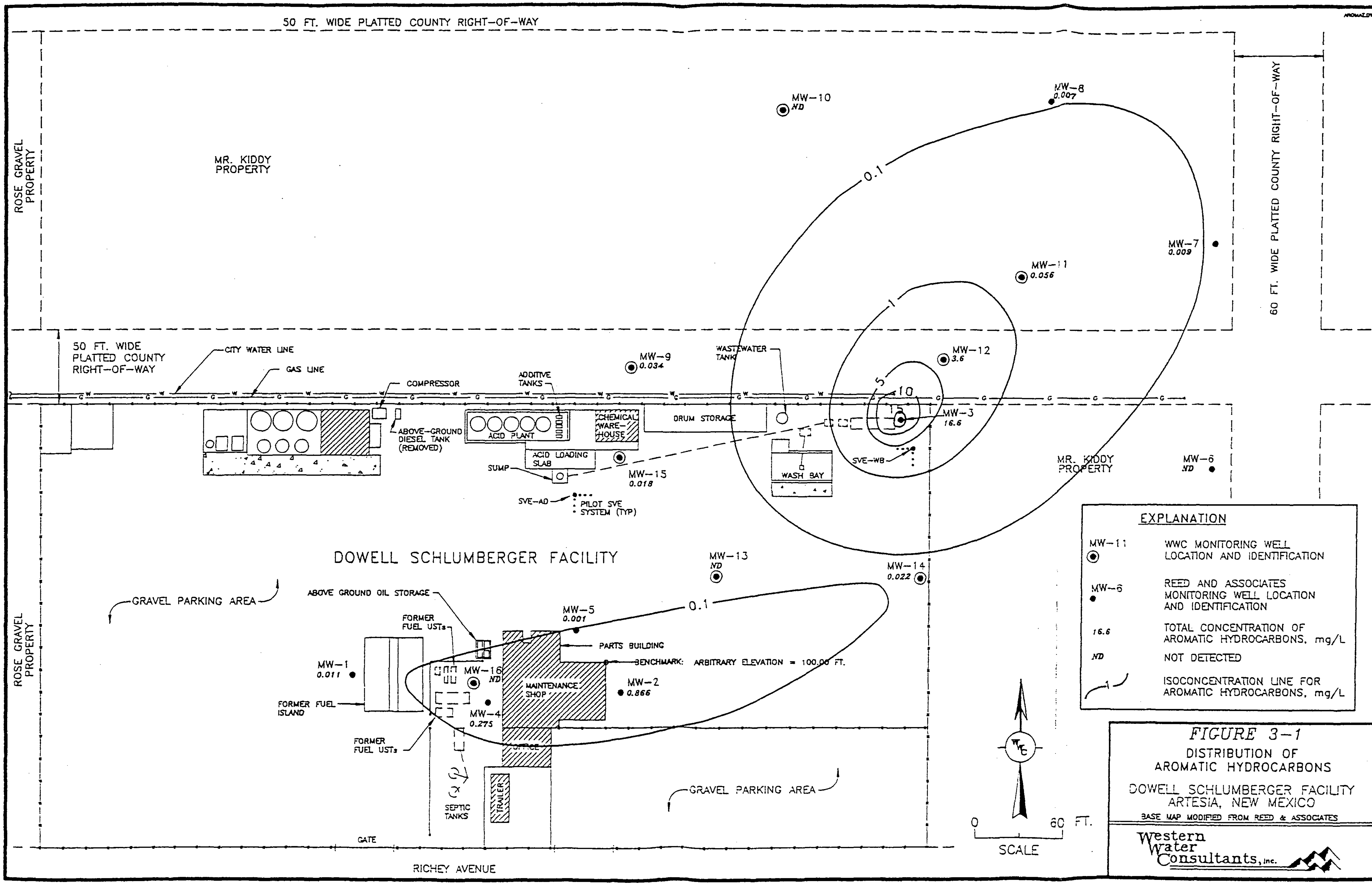


FIGURE 3-1

DISTRIBUTION OF AROMATIC HYDROCARBONS

DOWELL SCHLUMBERGER FACILITY
ARTESIA, NEW MEXICO

BASE MAP MODIFIED FROM REED & ASSOCIATES

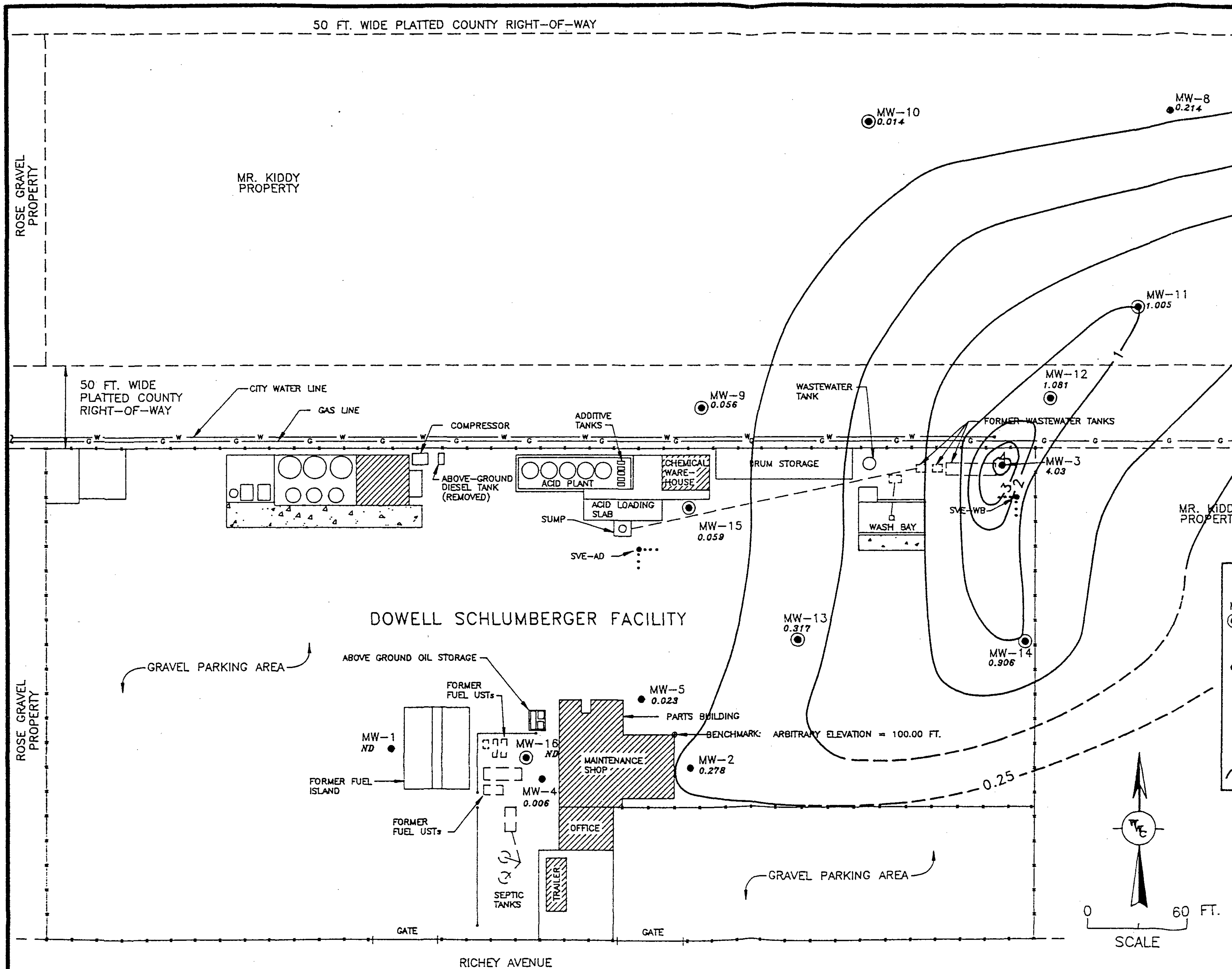


FIGURE 3-2
DISTRIBUTION OF CHLORINATED HYDROCARBONS
DOWELL SCHLUMBERGER FACILITY
ARTESIA, NEW MEXICO
BASE MAP MODIFIED FROM REED & ASSOCIATES

Western Water Consultants, Inc.

hydrocarbons indicate that this source is fairly minor.

3.3.1 Aromatic Hydrocarbons

The isoconcentration contours define two distinct plumes of aromatic hydrocarbons: one extending northeast from the vicinity of the former wastewater tanks, and the other surrounding the shop and trending east-northeast towards the east property fence. The location and distribution of contaminants in both plumes coincide with a northeasterly ground-water flow direction, and are indicative of separate sources in the northeast corner of the property and in the vicinity of the shop.

Benzene is the only aromatic hydrocarbon which persists any great distance from its source, whereas the ethylbenzene, toluene, and xylenes are below detection limits approximately 100 feet downgradient from the source. This observation is not unusual because benzene is a more soluble as well as a more stable and mobile chemical than the other three aromatic hydrocarbons. In addition, benzene has less affinity for soil particles than do ethylbenzene, toluene, and xylene, and tends to exist preferentially in the water phase.

3.3.2 Chlorinated Hydrocarbons

The isoconcentration contours for total chlorinated hydrocarbons delineate two coalescing plumes with sources in the vicinity of the shop and in the former wastewater tank area. Chlorinated hydrocarbons are more ubiquitous in their distribution and decrease in concentration with distance much less rapidly than do the aromatic hydrocarbons. The slower decomposition rate of chlorinated hydrocarbons compared to aromatic hydrocarbons may account for this phenomenon and for the lack of distinction between the plumes from the shop and the former wastewater tank area.

Plumes from sources in the shop and in the vicinity of the former wastewater tanks may combine near MW-14, yielding the relatively higher concentrations of chlorinated hydrocarbons in this well than in MW-13, which is located closer to the shop. Alternatively, MW-13 may delineate the north edge of the shop plume whereas MW-14 exhibits concentrations more typical of the center of the plume.

4.0 AQUIFER PUMP TESTING AND ANALYSIS

Western Water Consultants, Inc.

4.0 AQUIFER PUMP TESTING AND ANALYSIS

4.1 Introduction

On September 13-14, 1991, a pump test was conducted at the Dowell Schlumberger facility in Artesia, New Mexico. The purpose of the test was to define aquifer characteristics which may be used later to evaluate future remediation options.

Geologic data collected during past field work indicated that the aquifer is confined due to the presence of clayey silt and clay overlying the water-bearing zones, and static water levels 4 to 6 feet above the saturated zone.

Low concentrations of volatile aromatic hydrocarbons detected in water from MW-4 (the intended pump well) in January 1991 required disposing water generated during the pump test at an authorized facility. Information on the expected volume and chemical quality of the water was sent to Loco Hills Water Disposal in Loco Hills, New Mexico. Loco Hills Disposal requested and obtained permission from the New Mexico Oil Conservation Division (NMOCD) for disposal of pump test water at Loco Hills Disposal's facility. The NMOCD letter of authorization is presented in Appendix E.

4.2 Pretest

Prior to the pump test, a pretest was performed to establish the discharge rate that would produce the acceptable drawdown in the well during the 24-hour pump test. MW-4, constructed with 4-inch diameter casing, originally was to be the pump well at the site. However, the first pretest indicated that the 3.5-inch diameter 1/2 horse power (hp) pump would not provide sufficient drawdown for the pump test. A six-inch diameter well, MW-16, was installed so that a larger, 3 hp pump could be used. Using the larger pump in MW-16, a second pretest was conducted for about 3 hours. Based on the observed drawdown, a discharge rate of 7 gallons per minute (gpm) was deemed appropriate for the 24-hour pump test.

4.3 Pump Well Completion

Pump well MW-16 was drilled 20 feet from MW-4 so that the MW-4 could serve as the closest observation well for the pump test. MW-16 was constructed with six-inch diameter Schedule 80 PVC threaded casing. Thirty feet of 0.020-inch factory-slotted screen and 20 feet of blank casing were joined and placed in the borehole. Filter-pack sand, bentonite, and concrete were emplaced in the annulus around the casing in the same manner as described for the monitoring wells in Chapter 2. A steel above-ground well protector was set into the top of the concrete surface seal. The well protector was fitted with a locking lid to prevent unauthorized access to the well. Details of pump well construction are included on the well log in Appendix B. The New Mexico State Engineer's well completion form for MW-16 is presented in Appendix C.

To remove sediments and water disturbed by drilling and to improve well efficiency, the pump well was developed by air-lifting using Scarborough's drilling rig. Initially, water was opaque with fine sediments; sediment content decreased rapidly with continued development.

4.4 Pump Test Water Level Measurements

Water levels in the pump and observation wells were measured manually with a Solinst water level probe and a Flexi-dip interface probe. Distilled water was used to decontaminate the probes between well measurements. As a backup and to collect recovery data over the full 24-hour period, a transducer and a data logger were used in the pump well to automatically monitor the water level above the pump.

Water levels for all 16 wells were measured prior to the pump test and again before the test ended. Watches and the data logger were synchronized so that all water levels would be measured at approximately the same time after the test started. MW-16 and MW-4 were monitored manually every minute for the first ten minutes to record the rapid decline in water levels (drawdown) in the pump well and the closest observation well. As the rate of drawdown decreased, measurements were performed at greater intervals. Observation wells relatively close to the pump well (MW-4, MW-1, MW-2 and MW-5) were measured most frequently. More distant wells inside the site fence were measured once every one to two hours. Water level measurements for all wells monitored and the times at which measurements were taken are presented in Appendix F.

4.5 Pump Test Discharge Setup and Measurement

Water generated during the pump test was discharged through a 1-inch PVC line into a manway in the top of a 20,000 gallon frac tank located about 30 feet north of MW-16. Connected to the end of the discharge line were two valves: a gate valve for adjusting the discharge rate and a Dole valve to keep a constant discharge after the gate valve was set. Discharge was measured with a calibrated five-gallon bucket and a stop watch.

Discharge measurements were performed several times an hour to verify a constant discharge throughout the test. The discharge rate during the test was 6.5 to 6.9 gallons per minute (gpm).

4.6 Pump Test Recovery Measurements

Immediately after completion of the 24-hour pump test, water level recovery was measured at the same time intervals as the beginning of the pump test. After two or three hours of recovery, the frequency of manual water-level measurements was decreased to once every 3 to 4 hours. The data logger in the pump well, however, automatically collected measurements for the full 24-hour recovery period.

4.7 Aquifer Characteristics

The hydrostratigraphy consists of relatively impermeable clays and silty clays with interbeds of gypsum or calcium carbonate deposited in an alluvial system. In the saturated zone, the gypsum/carbonate interbeds have enhanced permeability through small-scale fracturing and/or dissolution which produces a disaggregated "rubble" appearance in core samples. It is believed that the rubble layers are the main avenues through which ground water flows. Hence, the aquifer is best defined as the rubble layers, whereas the interbeds of silt and clay function as aquitards between the more permeable gypsum/carbonate layers. The parameters calculated from the pump test data are considered representative of the rubble layers.

Although the gypsum/carbonate rubble layers may not be strictly defined as porous media, the degree and scale of fracturing/dissolution are such that the hydraulic characteristics of the layers can be considered an equivalent porous medium. Rubble layers are hydraulically well-connected throughout the site, as shown by the regular pattern of drawdown at all observation wells. In addition, the time-drawdown data at all observation wells follow closely to the Theis method (described below), which assumes a porous medium. Although it is reasonable to assume good hydraulic connection within a single rubble layer, the hydraulic connection between individual layers is unknown.

The aquifer thickness value (b) used in calculating aquifer parameters was taken to be the average of the cumulative thicknesses of gypsum/carbonate rubble layers determined from the log for each well across the site.

4.8 Data Analysis

Aquifer parameters were calculated using the Theis (unsteady state) and Cooper-Jacob straight line methods. These methods are applicable to the analysis of isotropic, homogeneous, confined aquifers. The Cooper-Jacob method was used to verify values calculated using the Theis method. For a detailed discussion of the equations and assumptions used in the Theis and Cooper-Jacob methods, the reader is referred to Kruseman and De Ridder (1991).

For each of the four observation wells located close to the pump well, drawdown (s) data was plotted against time/radius^2 (t/r^2) on log-log paper (Appendix G). The drawdown curves were fitted to the Theis curve to determine match point values used to calculate the aquifer parameters of transmissivity (T), hydraulic conductivity (K), and storage coefficient (S).

For analysis using the Cooper-Jacob method, time-drawdown data for each of the four closest observation wells were plotted on semi-log paper and straight lines were drawn through the late-time data points. The time-drawdown plots used to calculate aquifer parameters by the Cooper-Jacob method are presented in Appendix G. The values for the aquifer parameters obtained from both analytical methods are listed in Table 4-1.

Transmissivity, hydraulic conductivity, and storage coefficient values are very similar for the Cooper-Jacob and Theis methods. T values range from 353 to 689 ft^2/day with an average of about 540 ft^2/day. Using an aquifer thickness (b) of 4.5 feet, the K values range from 78 to 153 ft/day with an average of 121 ft/day. S values range from 3.2×10^{-3} to 7.1×10^{-3}, with an average 5.6×10^{-3}.

The cone of depression generated near the end of the pump test (1320 minutes) is shown on Figure 4-1. The distribution of observation wells is such that there were areas of

Table 4-1. **Calculated Parameters from Pump Test Analyses, Dowell Schlumberger Facility, Artesia, New Mexico**

Theis Method (Unsteady-State Flow)

Observation Well	T (ft^2/day)	K (ft/day)	S
MW-1	689	153	6.2×10^{-3}
MW-2	592	132	5.6×10^{-3}
MW-4	353	78	6.7×10^{-3}
MW-5	548	122	3.6×10^{-3}
AVERAGE =	549	122	5.5×10^{-3}

Cooper-Jacob Straight Line Method

Observation Well	T (ft^2/day)	K (ft/day)	S
MW-1	675	150	7.3×10^{-3}
MW-2	509	113	7.1×10^{-3}
MW-4	436	96.8	3.2×10^{-3}
MW-5	545	121	5.6×10^{-3}
AVERAGE =	541	120	5.8×10^{-3}

Symbols:

T = transmissivity
K = hydraulic conductivity
S = storage coefficient

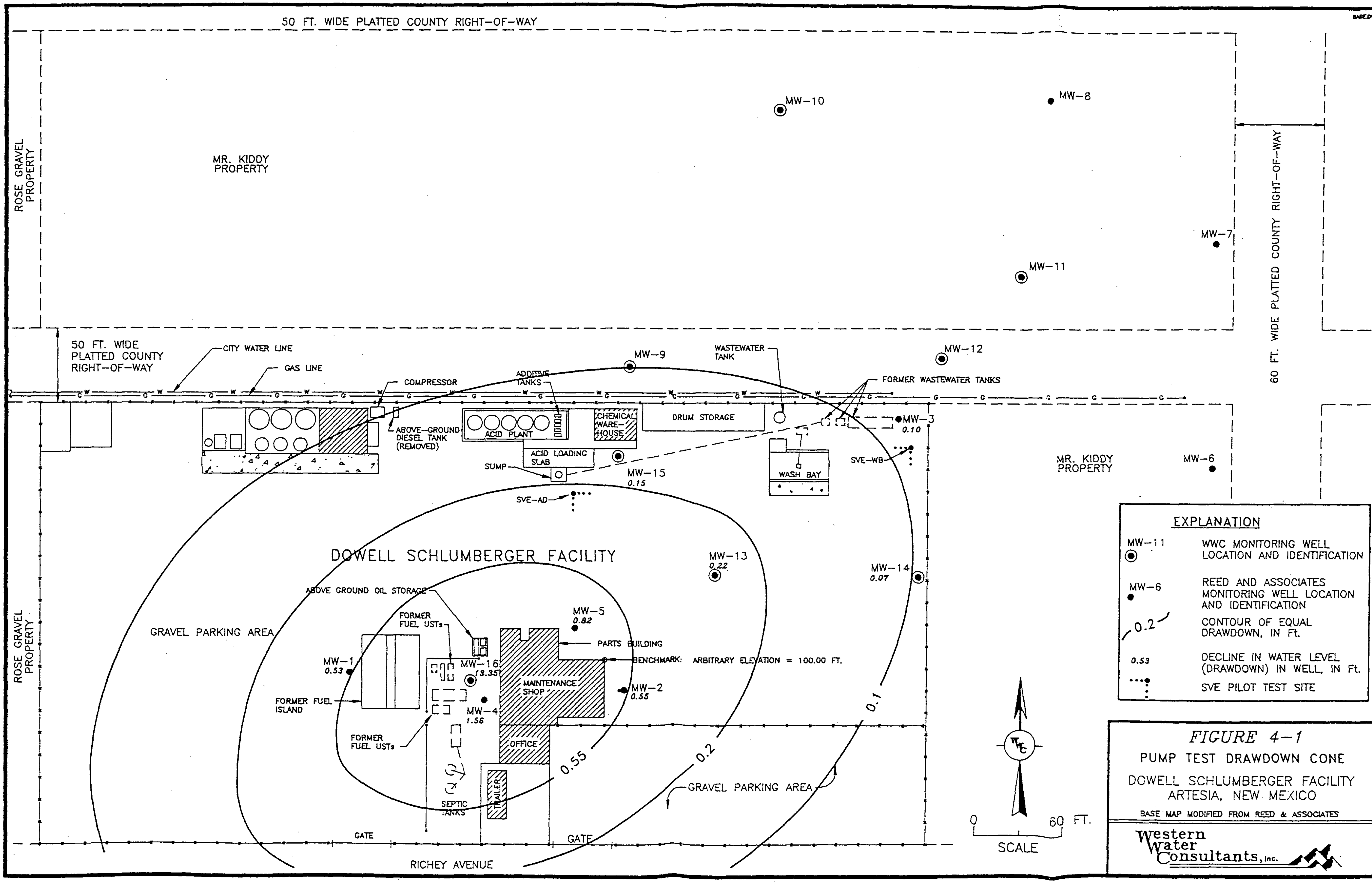


FIGURE 4-1

PUMP TEST DRAWDOWN CONE

DOWELL SCHLUMBERGER FACILITY
ARTESIA, NEW MEXICO

no data where the drawdown contours had to be estimated. The principle of symmetry, however, allowed contours from the one quadrant adequately covered by observation wells to be extrapolated into the other three.

Aquifers with fracture- and solution-enhanced permeability are commonly anisotropic, meaning that permeability varies with direction. Based on geologic data and apparent drawdown contours generated during the pump test, anisotropy was suspected in the aquifer at the Artesia facility. A graphical method to determine anisotropic transmissivity (Maslia and Randolph, 1987) showed that the direction of maximum transmissivity is approximately N62°E (Figure 4-2). Parameters used in constructing the anisotropy ellipse for the site are presented in Table 4-2. The ratio of the maximum to the minimum transmissivity (T_{max}:T_{min}) of 2.9 is not large, indicating that the aquifer is only slightly anisotropic. In addition, the relatively large K and T values for MW-1 and the smaller values for MW-4 calculated using the Theis and Cooper-Jacob methods are indicative of local heterogeneities which are common in fractured and solution-enhanced aquifers.

In anisotropic aquifers, the cone of depression generated during pumping typically will be elliptical. The major axis of the ellipse represents the direction of maximum transmissivity and the minor axis the direction of minimum transmissivity. Consequently, there should be general agreement between the drawdown ellipse and the ellipse defined by the Maslia and Randolph analysis. The major axis of the elliptical cone of depression shown on Figure 4-1 approximates the major axis direction of the transmissivity ellipse determined from the Maslia and Randolph analysis, thus confirming the direction of maximum transmissivity.

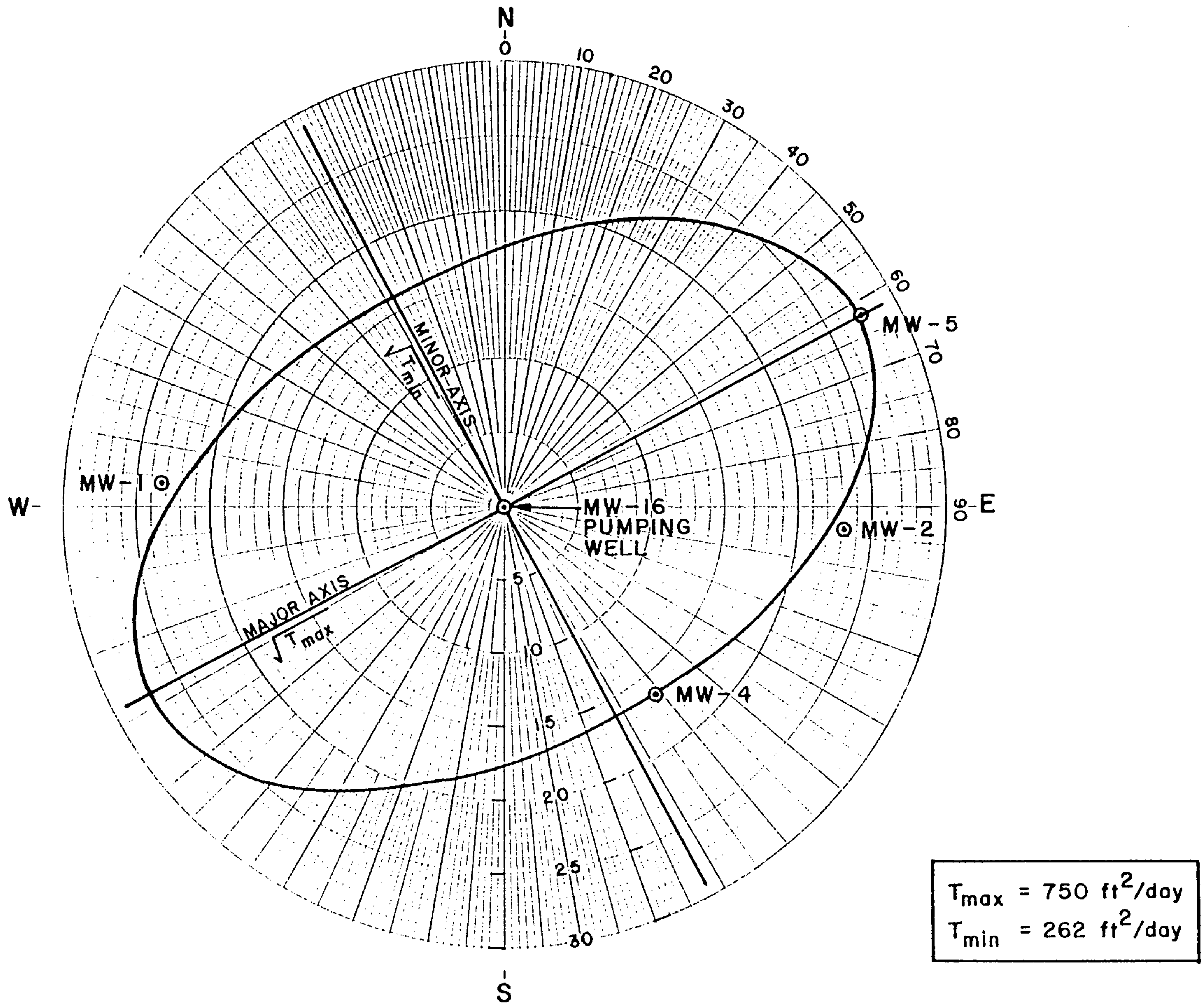


FIGURE 4-2. TRANSMISSIVITY ELLIPSE DERIVED USING MASLIA - RANDOLPH (1987) GRAPHICAL ANALYSIS DOWELL SCHLUMBERGER FACILITY, ARTESIA, NEW MEXICO

Table 4-2. **Results of Maslia and Randolph Analysis for Aquifer Anisotropy, Dowell Schlumberger Facility, Artesia, New Mexico**

Parameters:

Observation Well	Td (ft^2/day)	√Td	Degrees from Pump Well
MW-4	265	16.3	S39°E
MW-1	552	23.5	N86°W
MW-5	750	27.4	N62°E
MW-2	535	23.1	S86°E

Results:

T_{max} (ft^2/day)	T_{min} (ft^2/day)	T_{max}:T_{min}	Orientation of Major Axis	Orientation of Minor Axis
750	262	2.9	N62°E	N28°W

Symbols:

Td = directional transmissivity
√Td = square root of directional transmissivity
T_{max} = maximum transmissivity
T_{min} = minimum transmissivity

4.9 Discussion

The hydraulic conductivity (K) values calculated from the Theis and Cooper-Jacob methods are more typical of sands and gravels than of silts and clays. Using the Theis equation and pump test parameters, predicted drawdowns for observation wells MW-13, MW-5, and MW-4 were calculated using hydraulic conductivity values typical for 1) sand and gravel, and 2) clay. The calculated drawdowns were compared to actual drawdown measured during the pump test at MW-13, MW-5, and MW-4 (Table 4-3). Given a 4.5 feet thick sand and gravel aquifer (the average thickness of the gypsum/carbonate rubble layers in the screened intervals of the observation wells), calculated drawdown in all three wells was approximately half the observed drawdown. For a clay interval 30 feet thick (the average thickness of clay and silt in the screened intervals of the observation wells), no drawdown was predicted at MW-13 and MW-5, whereas a drawdown of 19.5 feet was calculated at MW-4. Drawdowns calculated using clay parameters do not resemble field observations. Because observed drawdowns more closely match those calculated for sand and gravel, and differ so greatly from those calculated for clay, it is reasonable to conclude that the gypsum/carbonate layers are the water-bearing intervals in the shallow alluvium.

The presence of relatively high permeability gypsum/carbonate rubble layers may have implications regarding contaminant transport. It is possible that when contaminants infiltrating downward through the vadose zone encounter the saturated zone, they may be transported in ground water primarily in the upper rubble zones. In this case, remediation efforts, if necessary, may be restricted to the first few rubble zones. This condition could be verified by water quality analyses from specific rubble zones.

Table 4-3. **Comparison of Calculated and Observed Drawdown, Dowell Schlumberger Facility, Artesia, New Mexico**

Pump Test Parameters

t	1.01 days
Q	1290 ft^3/d

Aquifer Parameters

	Clay	Sand
S	0.0117	0.0014
b	30 ft.	4.5 ft.
K	0.627 ft/d	267 ft/d

Drawdown Comparison

Well	Distance from Pump Well (ft)	Observed s (ft)	Calculated s (sand) (ft)	Calculated s (clay) (ft)
MW-13	180	0.22	0.35	no drawdown
MW-S	78	0.84	0.49	no drawdown
MW-4	20	1.58	0.74	19.5

Symbols:

t = time
Q = discharge
S = storage coefficient
b = aquifer thickness
K = hydraulic conductivity
s = drawdown

Although individual gypsum/carbonate layers cannot be correlated across the site, the consistency of data from other sources (i.e. water-level measurements, drawdown during the pump test, and ground-water quality data) indicate that lateral continuity within layers exists.

To determine whether interactions between the gypsum/carbonate matrix and the hydrocarbon contaminants may affect remediation, literature on the chemistry and mechanisms of transport of volatile hydrocarbons in carbonate/evaporite material currently is being reviewed. At this time, it is not possible to state definitively whether or not matrix chemistry will have adverse effects on the ability to mobilize and recover any hydrocarbons present in the gypsum/carbonate layers at the Artesia facility.

5.0 SOIL VAPOR EXTRACTION PILOT TESTS

Western Water Consultants, Inc.

5.0 SOIL VAPOR EXTRACTION PILOT TESTS

5.1 Introduction

Two soil vapor extraction (SVE) pilot tests were performed at the DS facility on September 7 - 11, 1991. The first test was performed adjacent to the former acid plant and the second test was performed east of the wash bay in the vicinity of the former wastewater tanks. These tests were conducted to determine the permeability of the soil and effective radius of influence for a vacuum well in order to evaluate the technical feasibility of an SVE treatment system in these areas. SVE is intended to remediate near-surface impacts at source areas to eliminate continued contaminant input into the ground water. This remediation method primarily affects soil contaminants; it will have a secondary affect on contamination currently in the aquifer.

For the pilot tests, temporary extraction wells were constructed along with several piezometers to monitor the soil system response. WWC's SVE test unit, which consists of a regenerative blower, associated controls, and monitoring equipment, was installed at each site and several tests were performed. The procedures, data, data analysis, and technical feasibility are presented in the following sections.

5.2 Permitting

Prior to conducting the pilot test, NMED Air Quality Bureau was contacted in order to obtain authorization. Copies of the letter to NMED explaining the proposed tests and their subsequent authorization are included in Appendix H.

5.3 Methodology

5.3.1 Test Layout

Due to uncertainties as to the homogeneity of the soil system, the two pilot tests were conducted within the zones of known contamination. These locations are shown on Figure 2-1. For each test, an extraction well was constructed within the area of concern. The well bores were drilled with an air rotary rig using an 8 inch bit. Total depths for the extraction wells at the acid plant (SVE-AD) and the former wastewater tank area (SVE-WB) locations were 19 feet and 17 feet, respectively. In SVE-AD, two one-foot intervals (at 14 to 15 feet and at 18 to 19 feet) of interbedded gypsum/carbonate material, clay, and clayey silt were present within the screened interval. Drill cuttings indicated that gypsum/carbonate layers were undoubtedly present in the screened interval in SVE-WB. Since no split-spoon samples were collected from this borehole, the precise intervals are not known.

Completion of the wells included 10 feet of Schedule 80 PVC screen with 0.050 inch slots and Schedule PVC 80 flush joint casing to the surface. Backfill from the bottom of the hole to approximately one foot above the screen consisted of 3/8 inch washed gravel. From the top of gravel to one foot below the surface, the borehole was sealed with hydrated bentonite. The top one foot was backfilled with natural material. A drilling log and completion details for SVE-AD (the acid plant extraction well) are presented on Figure 5-1. The former wastewater tank area extraction well (SVE-WB) was completed similarly.

To monitor responses to the vacuum applied at the extraction wells, a series of piezometers was installed. The piezometers were installed in north-south and east-west lines at each extraction well to detect the presence of any significant horizontal anisotropy. Schematic drawings of both pilot tests are shown on Figure 5-2. Using an air rotary rig with a 4 1/2-inch bit, piezometer boreholes were drilled to one foot below the anticipated total depth of the piezometer. The total depths for piezometers at the acid plant and former wastewater tank area test sites were 17 feet and 13 feet respectively. Three quarter inch diameter Schedule 80 PVC pipe was used to construct each piezometer. Boreholes for piezometers at both test sites were backfilled with washed 3/8-inch gravel from 1 foot below the piezometer to 9 feet below the ground surface. From that point to 1-2 feet below the ground surface the borehole was sealed with hydrated bentonite. Drill cuttings were placed in the top 1-2 feet of the borehole. A diagram of a representative piezometer construction is presented on Figure 5-3.

After completion of SVE tests at both locations, all extraction wells and temporary piezometers were abandoned. The PVC casings were removed, and 3/8-inch bentonite chips were poured into the borehole to within 2 feet of the surface and were hydrated in place. Cuttings filled the top several feet of each borehole.

EXTRACTION WELL SVE-AD

LOCATION Dowell Schlumberger, Artesia, New Mexico
7 ft S of acid dock, 14 ft W of acid dock
T17S, R26E, Sec 4, SE 1/4, SW 1/4, SW 1/4
LOG Western Water Consultants Inc (Robin Daley)
DRILLER Scarbough Drilling (Lane Scarbough)
DRILLERS LICENSE NO WD1188
INSTALLATION DATE September 09, 1991

WELL OWNER Dowell Schlumberger Inc (JN 0125)
DRILLING METHOD Air Rotary, 5 0" OD
CASING 2" Dia Flush Joint Sch 40 PVC
SCREEN Slotted Casing, 0 050 Inch Slots
FILTER PACK Pea Gravel
STATIC WATER ELEVATION NA
(Reference Datum Arbitrary = 100 00 feet)

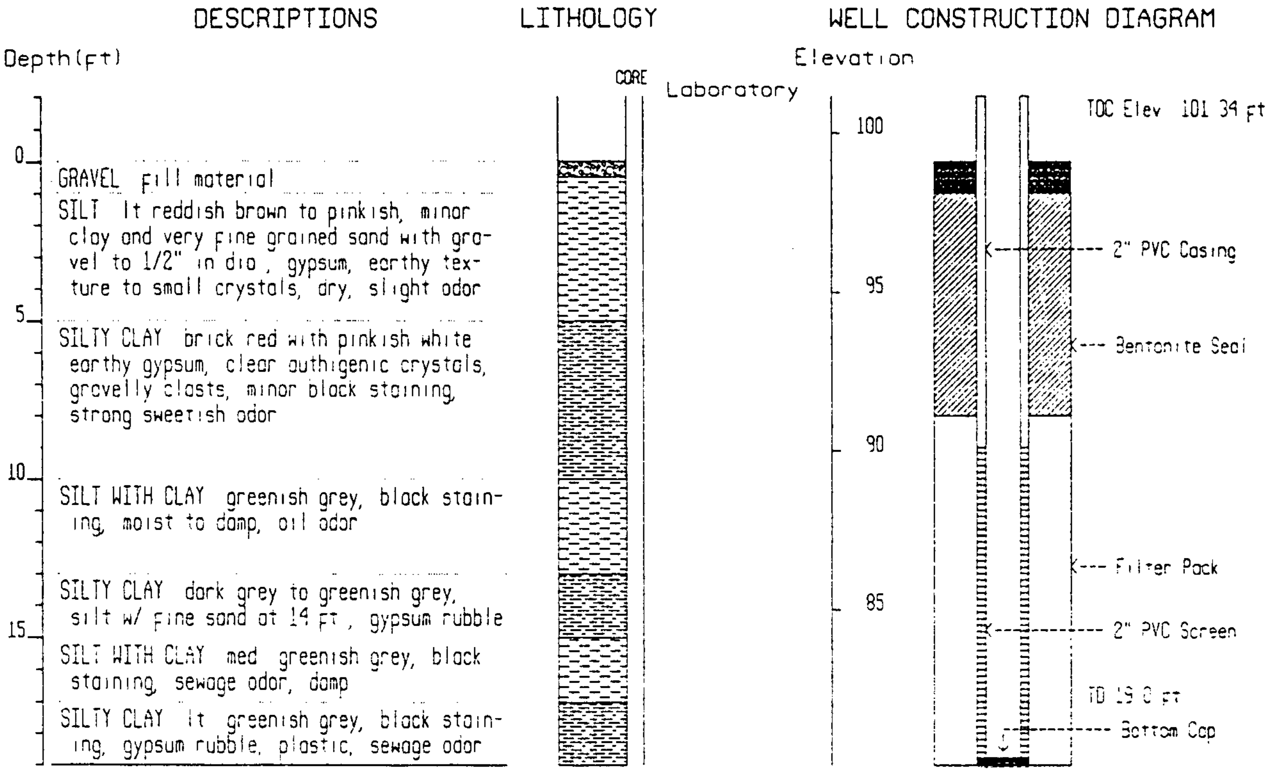


FIGURE 5–1: ACID DOCK SVE EXTRACTION LOG
DOWELL SCHLUMBERGER FACILITY, ARTESIA, NEW MEXICO

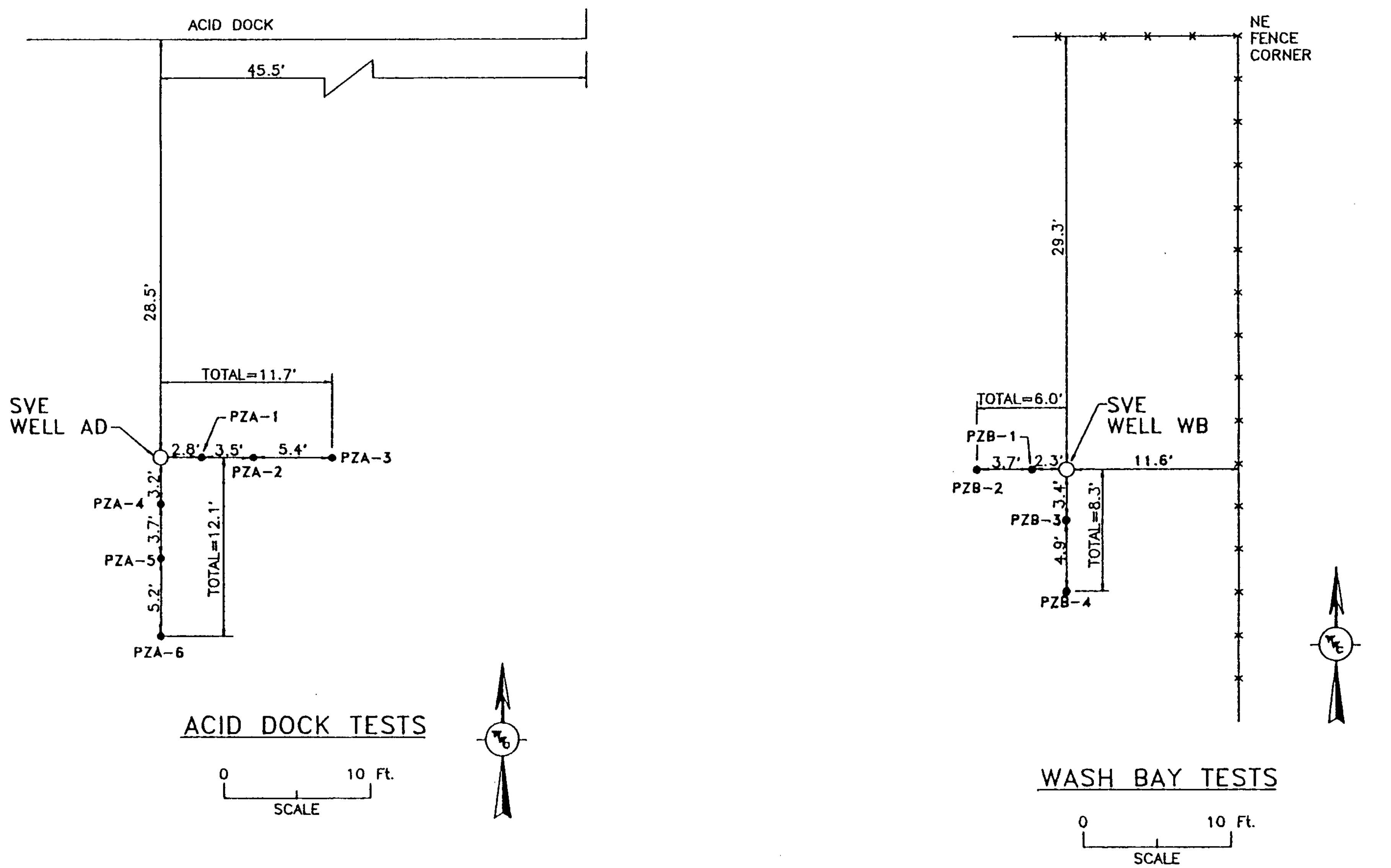


FIGURE 5-2: SVE PILOT TEST LAYOUT
DOWELL SCHLUMBERGER FACILITY, ARTESIA, NEW MEXICO

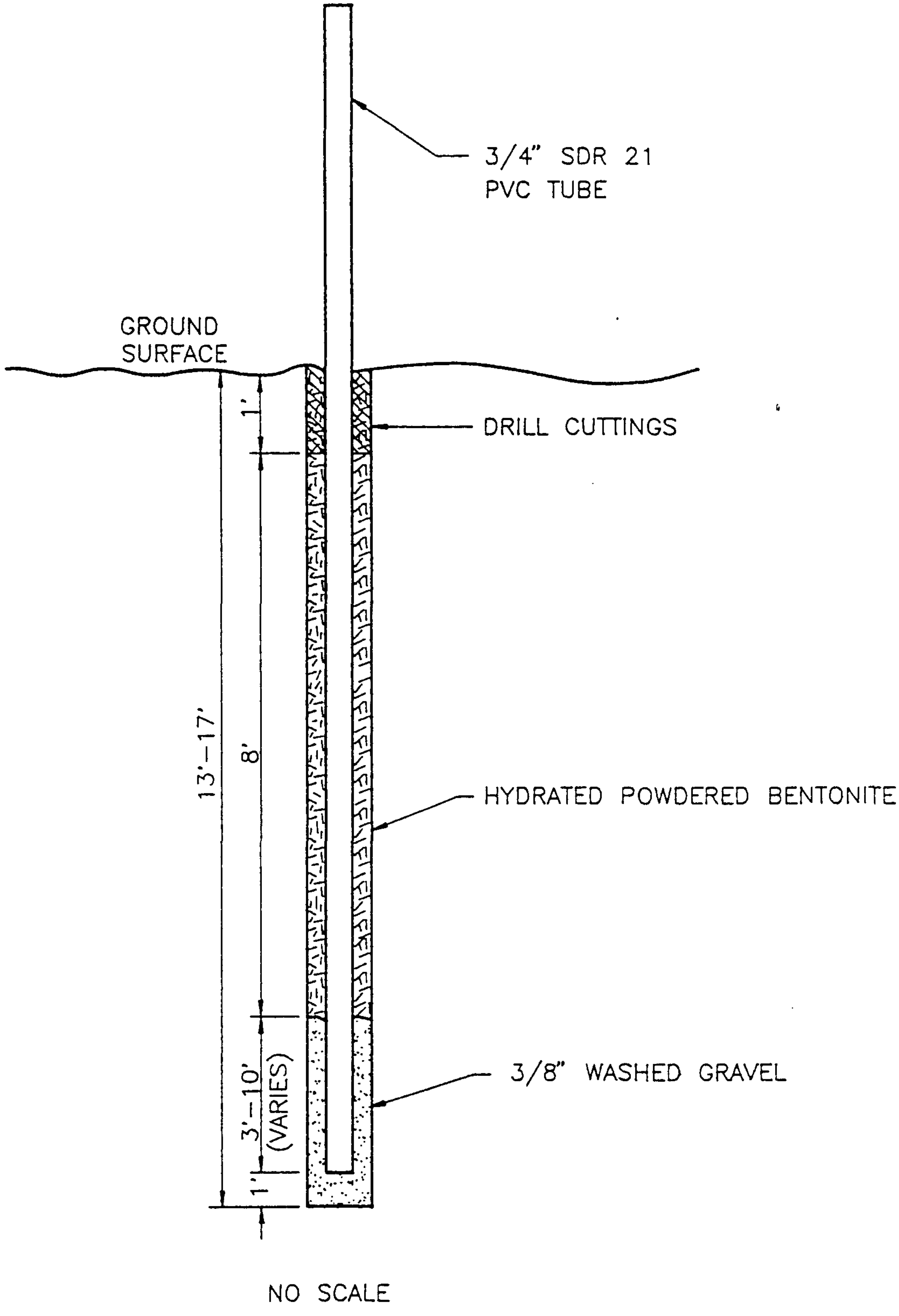


FIGURE 5-3: TYPICAL PIEZOMETER CONSTRUCTION FOR VACUUM MONITORING POINT
DOWELL SCHLUMBERGER FACILITY, ARTESIA, NEW MEXICO

5.3.2 Test Equipment

The arrangement of the vacuum source (blower) and appurtenances is shown on Figure 5-4. This system collectively is referred to as the test unit. The appurtenances include a vacuum gauge near the blower, a 10-micron particulate filter, a valved atmospheric air inlet, a flow meter, a moisture/particulate knockout pot, and a vacuum gauge near the well head.

Soil vapor from the extraction well is drawn out through a vertical leg where the vacuum is measured using a Bourdon tube vacuum gauge. The vapor then enters a moisture/particulate knockout pot where the flow velocity is reduced, allowing moisture to condense and particles to settle. From the knockout pot, the flow is again directed to a vertical leg where the flow rate is measured with a variable-area flow meter (Rotameter). An atmospheric air inlet valve downgradient from the Rotameter is adjusted to control the magnitude of vacuum. The vapor stream then flows through a 10-micron filter provided for protection of the blower. After passing the 10-micron filter, a Bourdon tube vacuum gauge measures the vacuum at the blower inlet.

A Gast regenerative blower is used to provide the vacuum source for the SVE test unit. The performance curve of this blower is shown on Figure 5-5. The blower was driven by a 2 hp, 240V, single phase, explosion proof motor. The capacity of this pump was sufficient to accommodate all test requirements.

The vacuum monitoring equipment at the piezometers consisted of manometers constructed from Tygon tubing containing water as the manometer fluid. A scale was

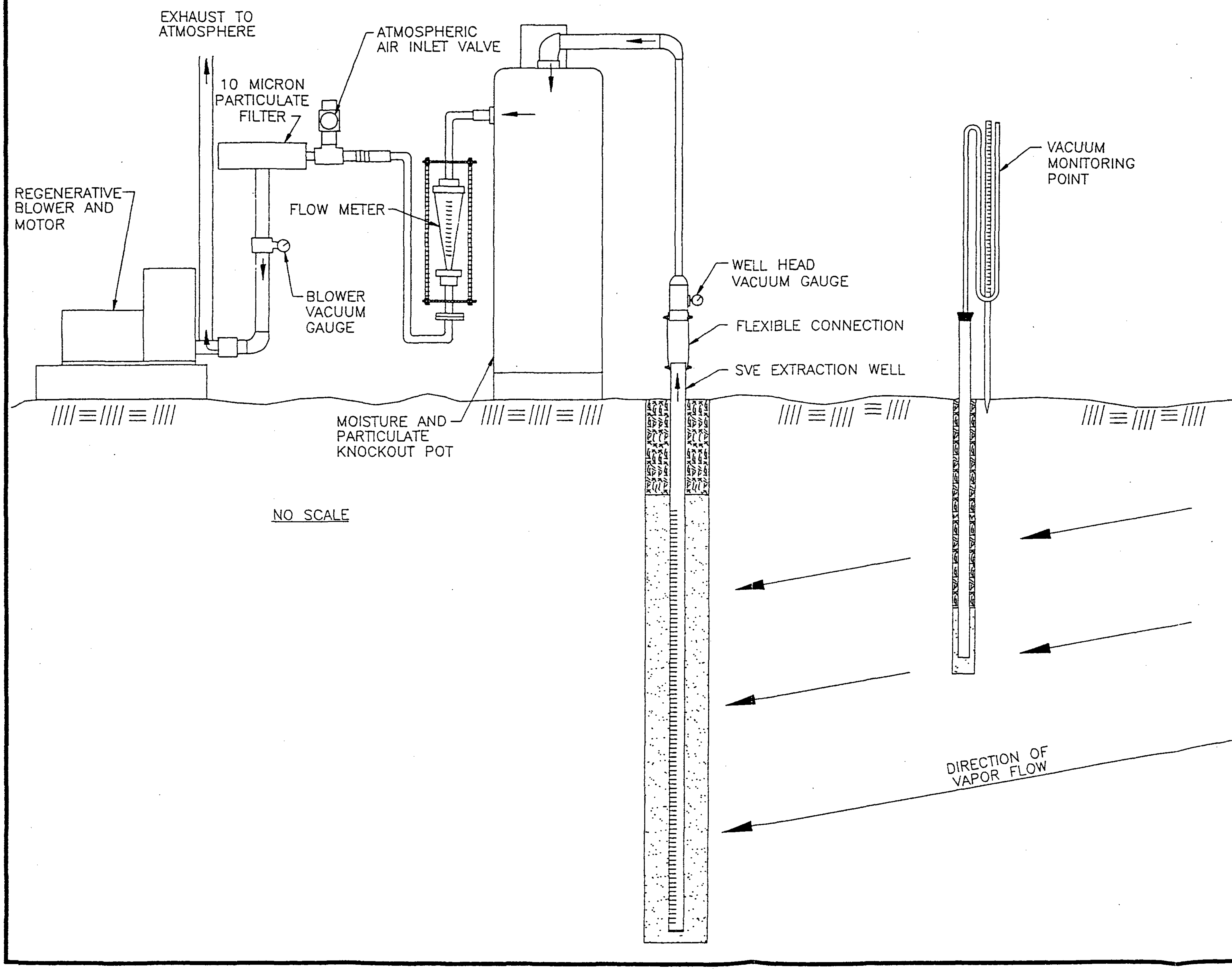


FIGURE 5–4

TYPICAL SOIL VAPOR EXTRACTION TEST LAYOUT

DOWELL SCHLUMBERGER FACILITY
ARTESIA, NEW MEXICO

Western Water Consultants, Inc.

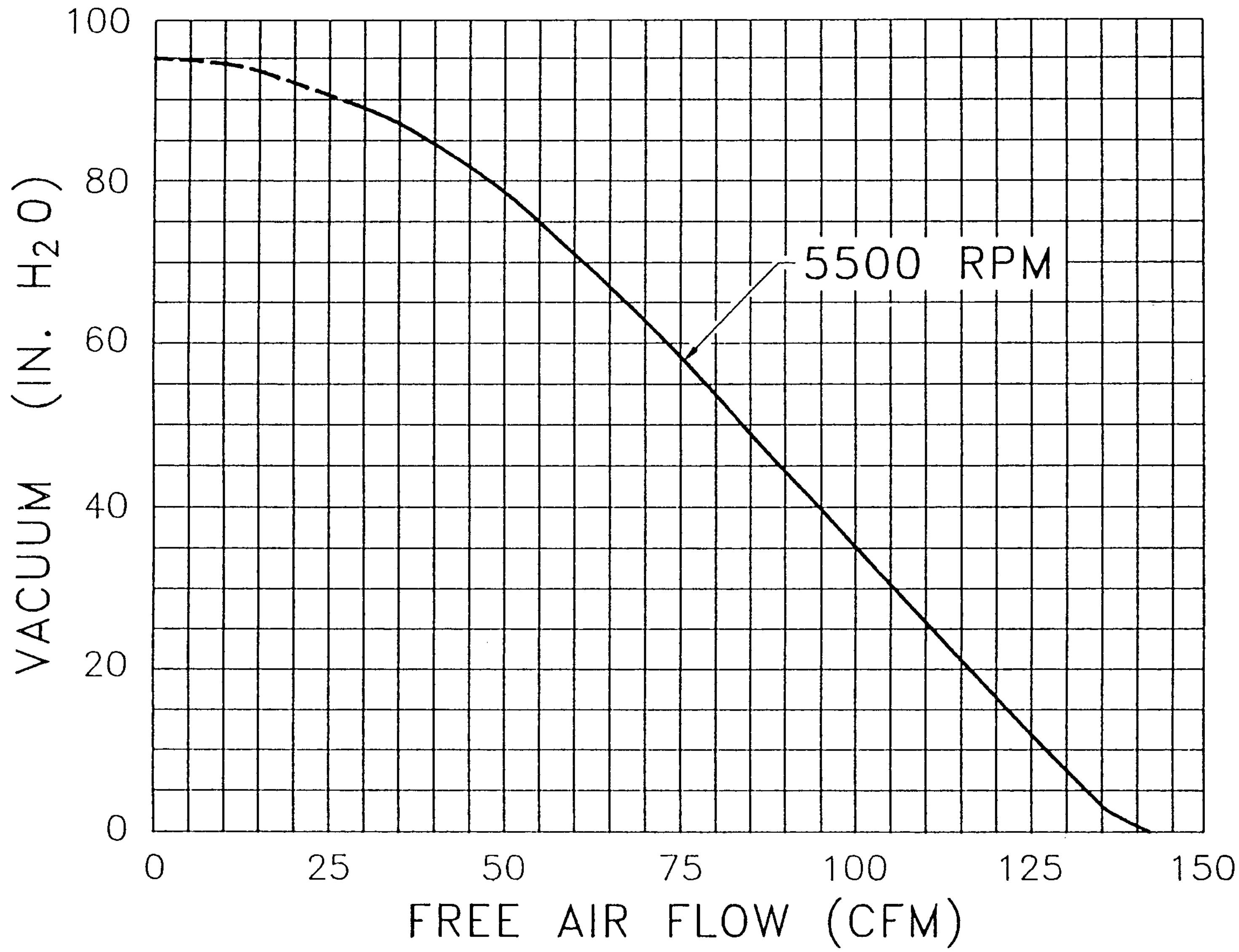


FIGURE 5–5: PERFORMANCE CURVE OF REGENERATIVE BLOWER USED FOR SOIL VAPOR EXTRACTION PILOT TESTS DOWELL SCHLUMBERGER FACILITY, ARTESIA, NEW MEXICO

attached to the manometer for reading differential pressure. For more rapid automatic readings at certain piezometers, pressure transducers connected to a data logger were used in manometers constructed from 1-inch PVC pipe.

5.3.3 Data Collection

A series of tests were performed at each site. Prior to these tests, a short duration test was performed to adjust the test unit to a reasonable flow rate and well vacuum. A summary of the tests, flow rate, and well vacuum is presented in Table 5-1.

Table 5-1. Summary of Performance Parameters for the SVE Pilot Tests, Dowell Schlumberger Facility, Artesia, New Mexico

Test Location	Test No.	Blower Vacuum (inches of water)	Flow Rate (scfm)	Well Vacuum (inches of water)
Acid Plant	AD-1	59.5	4	50.0
Acid Plant	AD-2	58.0	4	48.25
Former Waste-water Tanks	WB-1	58.0 - 63.0	10	40.0 - 46.0
Former Waste-water Tanks	WB-2	56.0 - 57.0	10	37.5 - 38.8
Former Waste-water Tanks	WB-3	58.0	10	38.0
Former Waste-water Tanks	WB-4	58.0	10	38.0

After the extraction well head vacuum was properly adjusted, the blower was shut off and the formation allowed to return to atmospheric pressure, as indicated by the manometers at vacuum monitoring points. The test was started by turning on the blower, and simultaneously starting a stop-watch and the data logger (if used). To maintain a constant flow rate, the atmospheric air inlet valve was adjusted as necessary. One person called out times at specified intervals when manometer measurements were to be recorded. The test was continued until no increase in the vacuum in the piezometers was detected, indicating that air flow through the soil had reached equilibrium. At this point the test was complete and the blower was shut off. When the pressure in the formation returned to atmospheric, the sequence was repeated.

For the first test, AD-1, three manometers were measured by pressure transducers and recorded by a data logger. However, the transducers were rated for different pressure intervals: 0-2.5 pounds per square inch (psi), 0-50 psi, and 0-100 psi. It was found that only the 0-2.5 psi transducer was sensitive enough to measure the change in water levels in the manometers. For the remaining tests, only the 0-2.5 psi transducer was utilized. It was installed in one of the piezometers closest to the vacuum well where the most rapid change in pressure was expected. All other manometers were read manually. Tests WB-3 and WB-4 had pressure transducer readings for piezometer PZWB-3 only. These two tests were conducted to verify that the test results could be duplicated. All data collected is presented in Appendix I.

5.3.4 Soil Vapor Chemical Components

Samples of exhaust from the blower and soil vapor from the vacuum wells were collected in Tedlar air-sampling bags using 1/4-inch Teflon tubing and a small vacuum pump.

Gas samples were analyzed on WWC's portable Sentex Scentograph gas chromatograph (GC). The GC was calibrated with mixtures of aromatic and chlorinated volatile hydrocarbons to allow identification of a number of volatile organic compounds in the samples.

The blower exhaust was sampled while the test was in progress. Soil vapor from the extraction well, however, had to be collected with the blower off, since the sampling pump was not sufficiently powerful to overcome the vacuum in the extraction well during the test.

Chemicals identified in soil vapor and exhaust from the acid plant SVE pilot test included 1,1-DCA, benzene, toluene, and xylenes. Cis-1,2-dichloroethene (cis-1,2-DCE), vinylidene chloride, and hexane were tentatively identified and may or may not actually be present. Benzene, toluene, xylenes, 1,1,1-TCA, and chlorobenzene were identified in soil vapor and exhaust from the former wastewater tank area test. Hexane and vinylidene chloride may also have been detected. Several peaks, present in chromatograms from samples collected at both sites, were unidentifiable because they did not match peaks generated by any of the standards.

No quantification of the GC data was attempted because the standards used to identify the majority of the aromatic and chlorinated hydrocarbons had undergone degradation such that the exact concentrations of the various constituents were unknown. Peak identification using these standards is still valid, however, since degradation affected only the relative concentrations, and did not appear to change the chemical make-up of the standards.

5.4 Data Analyses

5.4.1 Permeability Calculations

Determining permeability of the formation from the SVE pilot test data was accomplished using the methods of Johnson et al (1990). An approximate solution to a transient state equation for radial flow of gas through soil to a well was shown to be:

$$P' = \frac{Q}{4\pi m(k/\mu)}\left[-0.5772 - \ln\left(\frac{r^2 e\mu}{4ktP_{atm}}\right)\right] \qquad (1)$$

Where:

P'	=	"gauge" pressure measured at a distance r and time t
m	=	formation thickness
r	=	radial distance
k	=	soil permeability
μ	=	absolute viscosity of vapor (assumed to be air)
e	=	vapor filled porosity
t	=	time
Q	=	volumetric flow rate from extraction well
P_{atm}	=	ambient atmospheric pressure

This solution is valid where the variable U is sufficiently small to minimize error in the truncation of the Taylor series approximation, such that:

$$U = \frac{r^2 e\mu}{4ktP_{atm}} < 0.1$$

The assumption used to develop these equations are similar to those made in many analyses of flow through a porous media and are presented in Johnson et al (1990).

Equation 1 can be rearranged as:

$$P' = \frac{Q}{4\pi m(k/\mu)}[-0.5772 - \ln\frac{r^2 e\mu}{4kP_{atm}})] + \frac{Q}{4\pi m(k/\mu)}\ln t \qquad (2)$$

This equation is linear and it can be seen that a plot of pressure change versus the natural log of time should yield a straight line. Isolating the permeability and utilizing values from a plot of pressure change versus the natural log of time yields:

$$k = \frac{r^2 e\mu}{4P_{atm}}\exp^{\left(\frac{(yintercept)}{(slope)}+0.5772\right)} \qquad (3)$$

The first step in data analysis was the creation of plots of pressure drop versus the natural log of time for each test. Plots for each of the tests are presented in Appendix J. The raw data has been converted to units of pounds-force, feet, and seconds for consistency during analysis. Slopes and y-axis intercepts were obtained from these plots either by direct measurement or performing a least-squares linear regression on the appropriate data. From the borehole logs, the porosity of the soil was estimated to be 0.2. By utilizing these values for slope, y-axis intercept, and porosity along with distances between wells, an estimated atmospheric pressure, and the viscosity of air, the permeability was calculated with Equation 3. Table 5-2 contains a summary of the input data and calculated permeabilities for all of the tests.

Table 5-2. **Permeability Calculations from SVE Pilot Tests, Dowell Schlumberger Facility, Artesia, New Mexico**

Vapor Viscosity = 3.7×10^{-7} lb-sec/ft^2
Atmospheric Pressure = 26.57 inches of mercury
E = 0.2
Ambient Pressure = 1879 lb/ft^2

Vacuum Location	Radius	Slope	Y inter-cept	k (ft^2)	t (U= 0.1 sec)
PZA1-2	2.8	-1.35	-2.55	4×10^{-9}	0
PZA2-2	6.3	-0.55	2.10	6×10^{-11}	64
PZA3-2	11.7	-0.55	2.10	2×10^{-10}	64
PZA4-1	3.2	-1.46	-2.25	3×10^{-9}	0
PZA4-2	3.2	-2.84	1.66	4×10^{-10}	3
PZA5-1	6.9	-1.00	6.30	6×10^{-12}	764
PZA5-2	6.9	-1.00	4.10	5×10^{-11}	85
PZA6-1	12.1	-1.00	6.40	2×10^{-11}	845
PZA6-2	12.1	-0.50	1.80	3×10^{-10}	51
PZB1-1	2.3	-8.46	4.67	2×10^{-10}	2
PZB1-2	2.3	-9.45	13.46	9×10^{-11}	6
PZB2-1	6.0	-1.50	1.00	1×10^{-9}	3
PZB3-1	3.4	-4.00	1.50	6×10^{-10}	2
PZB3-2	3.4	-5.36	4.86	3×10^{-10}	3
PZB3-3	3.4	-5.77	6.15	3×10^{-10}	4
PZB3-4	3.4	-5.71	5.81	3×10^{-10}	4
PZB4-1	8.3	-1.50	3.50	5×10^{-10}	14
PZB4-2	8.3	-0.85	0.75	2×10^{-9}	3

Calculated permeabilities range from 4×10^{-9} to 6×10^{-11} ft^2 for 18 data calculations. However, 3×10^{-10} ft^2 is the mode, median, and geometric mean value for the data set. For the test at the acid plant the geometric mean is 2×10^{-10}. At the former wastewater tank area, the geometric mean is 4×10^{-10}. Although this is not an unbiased data set, it is reasonable to assume that 3×10^{-10} ft^2 is a good estimate of the soil permeability and that there is no significant difference in permeability between the two locations. For design purposes, a conservative value of 1×10^{-10} ft^2 for permeability will be used.

A review of the calculated permeabilities does not indicate significant horizontal anisotropy at the relatively small scale at which the SVE tests were conducted. Note that the total distances between extraction well and associated piezometers ranges from 6 to 12 feet; these distances are small compared to distances between pump and observation wells in the aquifer pump test. Therefore, the lack of anisotropy indicated by the smaller-scale SVE testing is not inconsistent with the presence of anisotropy determined from the relatively larger-scale pump test.

5.4.2 Radius of Influence

By examining Equation 2 it can be seen that if time is held constant, a plot of pressure drop versus the natural log of inverse radius squared should also yield a straight line. By utilizing a large time, after the effects of a recharge boundary are noticed, the point where this line crosses the x-axis indicates where there is no pressure drop which is defined as the radius of influence.

Plots of pressure drop versus the natural log of inverse radius squared are presented on Figures 5-6 and 5-7 for both test sites. A least-squares linear regression was used to determine the radius where the pressure change is predicted to be zero. The results are presented in Table 5-3.

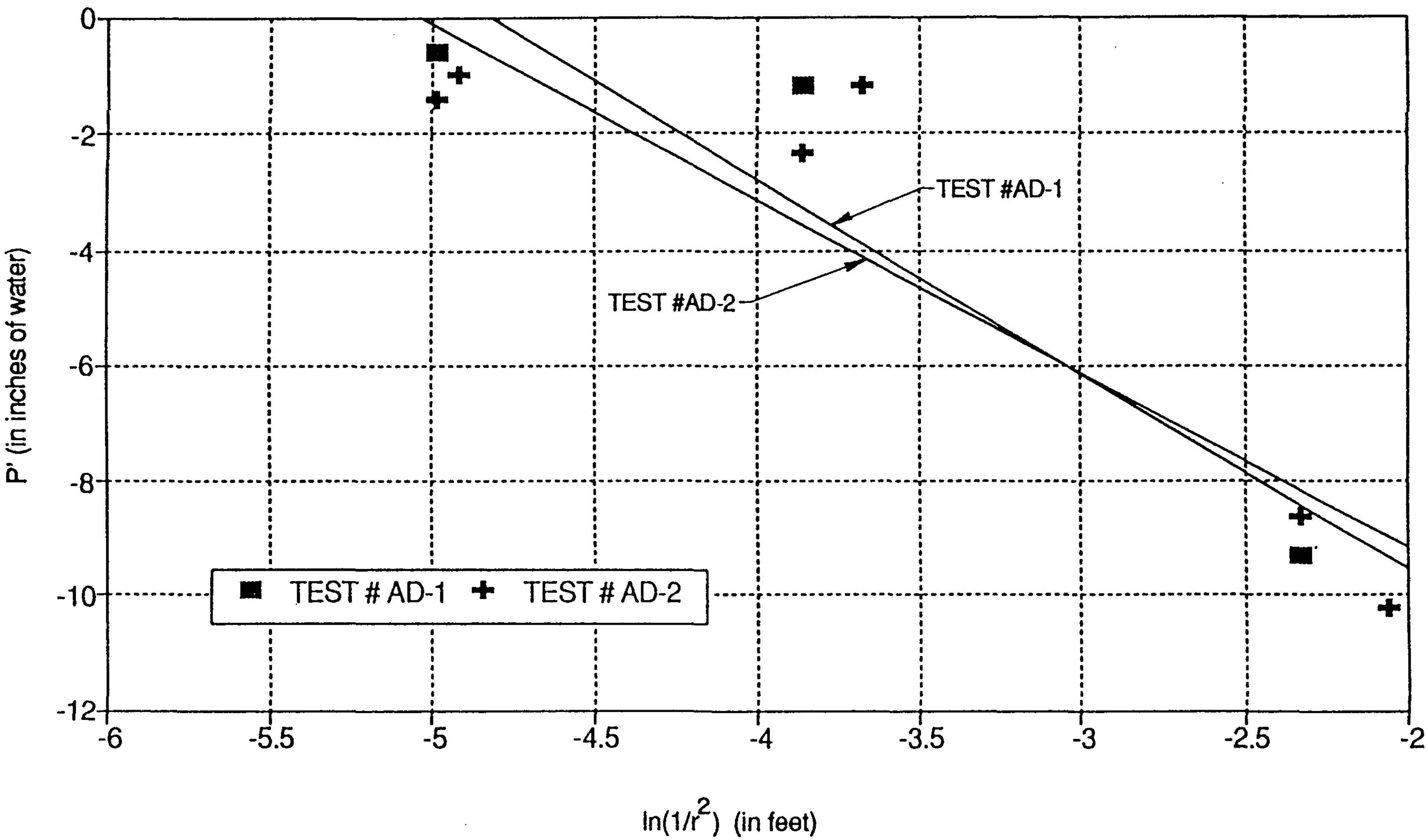


FIGURE 5-6. RADIUS OF INFLUENCE - FORMER WASTEWATER TANK SVE TEST
DOWELL SCHLUMBERGER FACILITY, ARTESIA, NEW MEXICO

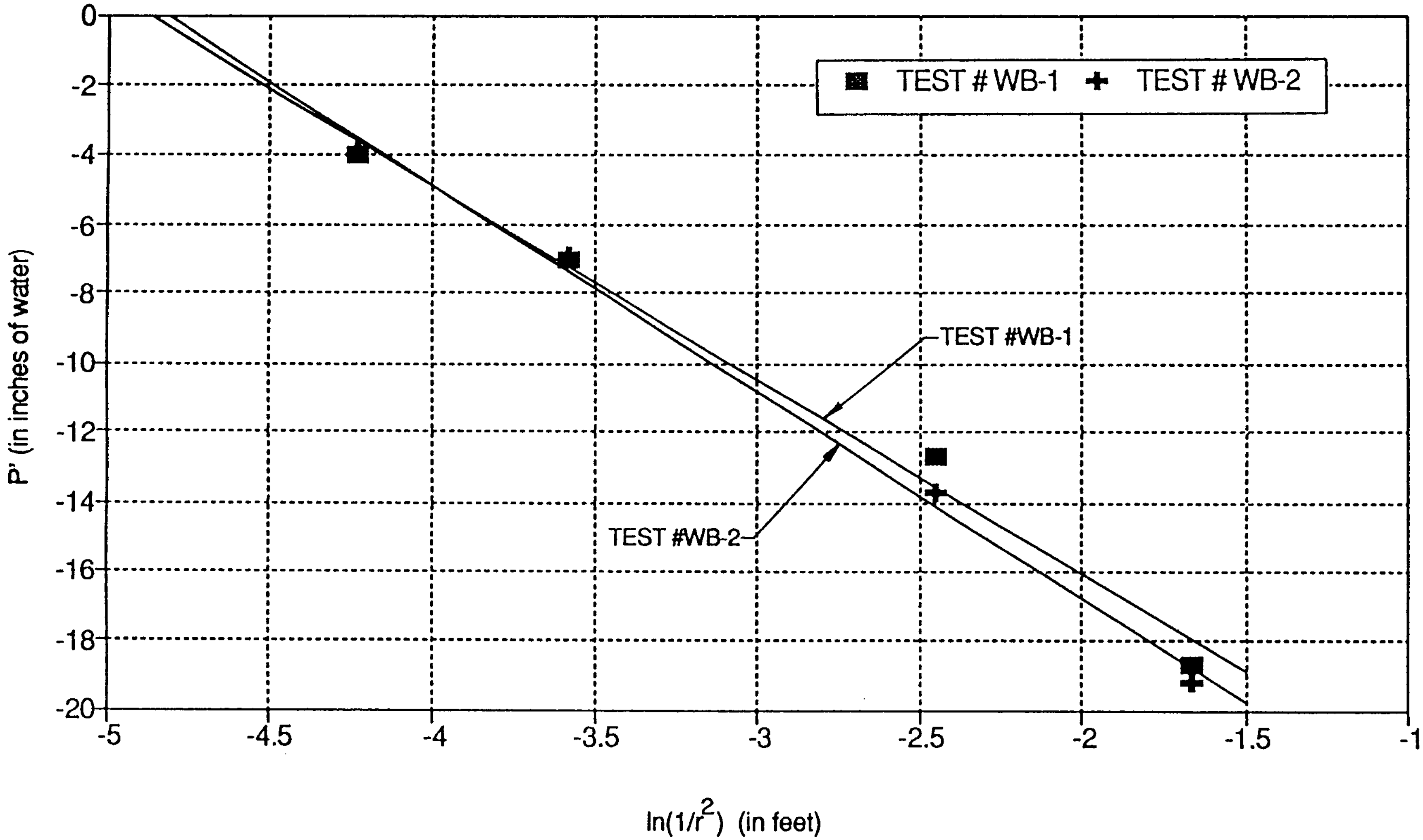


FIGURE 5-7. RADIUS OF INFLUENCE - ACID DOCK SVE TEST
DOWELL SCHLUMBERGER FACILITY, ARTESIA, NEW MEXICO

Table 5-3. **Calculations of Radius of Influence for SVE Pilot Tests, Dowell Schlumberger Facility, Artesia, New Mexico**

Test	Linear Regression (R-Squared)	$\ln(1/r^2)$ (P'= 0)	Radius of Influence (ft)
AD-1	.868	4.817	11.1
AD-2	.844	4.980	12.1
WB-1	.988	4.865	11.4
WB-2	.955	4.809	11.1

These results show that there is good correlation among the data and that the radius of influence is approximately 11 feet for the vacuum applied to the well during the test (38 to 50 inches of water).

5.5 SVE Feasibility

5.5.1 Vapor Flow Rates

Expected vapor flow rates at various effective well vacuums and flow rates are presented in Table 5-4. These calculations use a permeability of 3×10^{-9} ft^2 and a radius of influence of 11 feet for reasonable well vacuums. There does not appear to be enough variation between the two sites to warrant different design parameters.

As can be seen from Table 5-4, a flow rate of 30-59 scfm, depending on well efficiency, can be expected with 40 inches of water vacuum at the well head. Using this information and a radius of influence of 11 feet, a SVE system is feasible if multiple wells

Table 5-4. **Calculated Flow Rates Using Permeabilities and Radius of Influence Calculated from SVE Pilot Test Data, Dowell Schlumberger Facility, Artesia, New Mexico**

Values Used:

k	$1x10^{-10}$ ft^2
H	10 ft
R_w	6 inches
P_{atm}	26.6 inches of mercury
Viscosity	$3.6x10^{-7}$ lb-sec/ft^2

Results:

P_w (in. of water)	Vacuum (in. of water)	RI (ft)	Q/H (scfm/ ft)	Q (scfm) 100% Efficient	Q (scfm) 75% Efficient	Q (scfm) 50% Efficient
24.39	30	11	4.50	45	34	23
24.39	35	11	5.22	52	39	26
23.66	40	11	5.92	59	44	30
23.66	45	11	6.61	66	50	33
22.92	50	11	7.29	73	55	36
22.92	55	11	7.96	80	60	40

are spaced approximately ten feet apart. It may be possible to increase this spacing when air supply wells are examined during final design.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Western Water Consultants, Inc.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The following conclusions are supported by data collected during field work in September 1991:

- Additional drilling and sampling confirm that two primary sources of soil and ground-water contamination are present at the DS facility in Artesia, New Mexico. These primary sources are the shop/former fuel UST area and the area in the northeast corner of the property formerly occupied by underground wastewater tanks. The acid plant may constitute another, minor source. Aromatic and chlorinated volatile hydrocarbons are associated with all three areas.

- Relatively high concentrations of volatile hydrocarbons are restricted to ground water and soil in the two primary source areas; concentrations of contaminants decrease rapidly away from these locations. Residual hydrocarbons in the soil are the source of contamination detected in the ground water; if the soil contaminants are removed, natural attenuation will reduce concentrations in the ground water.

- The SVE pilot tests yielded a limited radius of influence of approximately 11 feet at flow rates of 4-10 scfm. This suggests that SVE would not be economically feasible if applied on a large, site-wide scale, but would be feasible for localized remediation of the vadose zone in the source areas.

- Since a 24-hour pump test at a discharge rate of 6.5-6.8 gpm affected an area at least 340 feet from the pump well, a pump-and-treat system for remediating ground-water contamination is feasible at this site.

6.2 Recommendations

WWC recommends that DS proceed with design and construction of systems to remediate contamination in the source areas. No further investigative work needs to be done at this site unless in conjunction with design. The principal goal at this point should be removing residual hydrocarbons in the soil and thus preventing their possible migration into the ground water.

Given the restriction of relatively high levels of hydrocarbons to soil and ground water in the source areas and the fact that residual contamination in the soil is acting as a source of contaminants to the ground water, WWC believes that SVE systems in each source area have the potential to remove the majority of the volatile hydrocarbons. Without a source of hydrocarbons, natural attenuation will probably reduce concentrations of contaminants in the ground water as effectively as an active ground-water pump and treat system.

In conjunction with installation and operation of the SVE systems, WWC recommends quarterly ground-water sampling to monitor the progress and effectiveness of clean-up activities. After the November 1991 sampling event, WWC does not propose to conduct quarterly ground-water sampling until remediation commences. If sampling concurrent with remediation yields results that indicate that the SVE systems are not sufficiently effective in removing contaminants, other options such as pumping and treating ground-water can be evaluated further. Pump and treat remediation methods may have several limitations at this site that would need to be investigated more extensively. First, ground water in the shallow alluvium may contain high concentrations of dissolved solids, due to the presence in the matrix of soluble carbonates and evaporites, which may cause problems with aeration of the water. Second, the regulatory implications of treatment and/or disposal of pumped ground water need to be determined.

Prior to design of SVE systems, soil vapor surveys specific to each source area should be conducted to determine the area of coverage for the system and to collect data for air emissions and rates of contaminant removal to facilitate permitting with the NMED Air Quality Bureau. At that time, excavation and disposal of the soil will be re-evaluated as a potential remediation method. If it proves equally effective and more economical to excavate and dispose of contaminated soil, this method of source removal will be employed. Otherwise, SVE system design will proceed.

REFERENCES

Western
Water
Consultants, Inc.

REFERENCES

Western Water Consultants, Inc., Site Investigation Dowell Schlumberger Incorporated, Artesia, New Mexico, April 5, 1991.

Johnson, P.C., C.C. Stanley, M.W. Kemblowski, D.L. Byers and J.D. Colthart "A Practical Approach to the Design, Operation, and Monitoring of In Situ Soil-Venting Systems", Ground Water Monitoring Review, Spring 1990, p.p. 159-178.

Maslia, M.L. and R.B. Randolph, "Methods and Computer Program Documentation for Determining Anisotropic Transmissivity Tensor Components of Two-Dimensional Ground-Water Flow", USGS Water-Supply Paper 2308 U.S. Government Printing Office: 1987, 16 p.

Kruseman, G.P. & N.A. de Ridder, Analysis and Evaluation of Pumping Test Data, Second Edition, International Institute for Land Reclamation and Improvement, Wageningen, The Netherlands, 1991, 377 p.

APPENDIX A

NEW MEXICO ENVIRONMENT DEPARTMENT LETTERS AUTHORIZING SEPTEMBER 1991 FIELD WORK

State of New Mexico
ENVIRONMENT DEPARTMENT
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2850

BRUCE KING
GOVERNOR

JUDITH M. ESPINOSA
SECRETARY

RON CURRY
DEPUTY SECRETARY

August 2, 1991

Mr. John Miller
Environmental Coordinator
Dowell-Schlumberger, Inc.
P.O. Box 4378
Houston, TX 77210

RE: HYDROGEOLOGIC INVESTIGATION REPORT, PROPOSED WORK PLAN, AND REQUEST FOR EXTENSION OF TIME DEADLINE FOR DOWELL SCHLUMBERGER, INC. FACILITY AT 500 EAST RICHEY STREET, ARTESIA, NEW MEXICO

Dear Mr. Miller:

This letter follows our telephone conversation of this date. The New Mexico Environment Department (NMED) has reviewed the work plan proposed to obtain the additional hydrogeologic information requested in my letter of May 9, 1991 and to initiate remedial activities at the Dowell-Schlumberger, Inc. facility at 500 East Richey Street, Artesia, New Mexico. NMED hereby approves the work plan in full.

As suggested in the workplan, NMED will defer the requirement that additional downgradient monitoring wells be installed to determine the lateral extent of ground-water contamination pending the results of two quarterly rounds of ground-water sampling and the initiation of remedial activities at the site. Following NMED's evaluation of these results, NMED may either require the installation of additional wells at that time or drop this requirement entirely.

In your letter of June 7, 1991, you requested that the time deadline for submittal of both the modified hydrogeologic investigation report and the reclamation proposal be extended until December 6, 1991. Pursuant to Section 1221 of the New Mexico Underground Storage Tank Regulations (USTR), the maximum time extension that may be granted for a corrective action or reporting deadline in USTR Part XII is 30 days. Therefore, based upon your cooperation and your good faith efforts to date to characterize the contamination at the site, NMED hereby grants a 30-day extension of the time deadline for the submittal of the modified hydrogeologic investigation report and reclamation proposal. These two documents will now be due on or before August 19, 1991. If you wish to request an additional time extension, the request must be submitted to this office on or before August 19, 1991.

NMED appreciates your cooperation in characterizing and initiating a clean up of the contamination at this site. If you have any questions, please call me at (505) 827-0215.

Sincerely,

Steve Wild
Water Resource Specialist
Underground Storage Tank Bureau

cc: NMED District IV Office
NMED Carlsbad Field Office
NMED Hobbs Field Office

State of New Mexico
ENVIRONMENT DEPARTMENT
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2850

Bruce King
Governor

Judith M. Espinosa
Secretary

Ron Curry
Deputy Secretary

WESTERN WATER CONSULTANTS, INC.
RECEIVED
MAY 13 1991
LARAMIE, WY 82070

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

May 9, 1991

Mr. John Miller
Environmental Coordinator
Dowell-Schlumberger, Inc.
P.O. Box 4128
Houston, TX 77210

RE: HYDROGEOLOGIC INVESTIGATION REPORT FOR DOWELL-SCHLUMBERGER FACILITY AT 500 EAST RICHEY STREET, ARTESIA, NEW MEXICO

Dear Mr. Miller:

This letter follows our telephone conversation of May 7, 1991. The New Mexico Environment Department ("NMED", formerly the Environmental Improvement Division of the Health and Environment Department) has reviewed the hydrogeologic investigation report for the Dowell-Schlumberger (DS) facility at 500 E. Richey St. in Artesia New Mexico that was submitted by Western Water Consultants (WWC) to satisfy the requirements of Section 1210 of the New Mexico Underground Storage Tank Regulations (USTR).

NMED is pleased with the quality of the work that has been performed at the site and the quality of the report that was submitted to this office. However, not all of the requirements of USTR 1210 C have been met by the work performed to date. Specifically, the horizontal and vertical extent of ground-water contamination has not been adequately defined. For example, the monitoring well that is farthest down gradient from the site, MW-7, contained 200 micrograms per liter (ug/l) tetrachloroethene when last sampled. The ground-water quality standard for this constituent established by the New Mexico Water Quality Control Commission Regulations is 20 ug/l. Thus, additional monitoring wells are required at the site in order to determine the horizontal and vertical extent of soil contamination.

Additionally, as stated in the "Recommendations" section of the report and pursuant to USTR 1205, the sources of the chlorinated solvents and the horizontal and vertical extent of soil contamination by these solvents need to be more thoroughly defined at the site. Thus, additional soil borings are required in order to adequately determine the horizonatal and vertical extent of soil contamination at the site.

Pursuant to USTR 1211, DS must correct these inadequacies in the hydrogeologic investigation report within 15 days of receipt of this letter. If DS requires an extension of time for this deadline, pursuant to USTR 1221, you or your representative may, before the expiration of the deadline, request an extension either in writing or orally followed by a written request within 7 days.

NMED commends DS and WWC for the quality of the work that has been performed and for your cooperation in characterizing this contamination incident. If you have any questions, please call me at (505) 827-0215.

Sincerely,

Steve Wild

Steve Wild
Water Resource Specialist
Underground Storage Tank Bureau

cc: NMED District IV Office
✓Robin Daly, Western Water Consultants

APPENDIX B

WWC WELL LOGS

MONITORING WELL MW-13

LOCATION Dowell Schlumberger, Artesia, New Mexico
141 ft W of E fence, 103 ft N of S fence
T17S, R25E, Sec 4, SE 1/4, SW 1/4, SW 1/4
LOG Western Water Consultants Inc (Robin Daley)
DRILLER Scarbough Drilling (Lane Scarbough)
DRILLERS LICENSE NO WD1188
INSTALLATION DATE September 9, 1991

WELL OWNER Dowell Schlumberger Inc (JN 0125)
DRILLING METHOD Air Rotary, 5.0" OD
CASING 2" Dia Flush Joint Sch 80 PVC
SCREEN Slotted Casing, 0.020 Inch Slots
FILTER PACK 8/16 Mesh Silica Sand
STATIC WATER ELEVATION 84.15 (9/13/91)
(Reference Datum Arbitrary = 100.00 feet)

DESCRIPTIONS

Depth(ft)

0 — SILT inferred since the cuttings were not described, previous drilling however has shown the lithology for the first five feet to be very consistent across the site

5 — SILTY CLAY lt greenish grey, clear gypsum crystals, slightly plastic, white gypsum clasts, dry to damp, no odor

10 — SAND lt brick red to greyish pink, very fine grained, layer of gypsum nodules at 11 ft, authigenic gypsum crystal

15 — SILTY CLAY brick red, lt reddish brown at 20 ft, slightly silty, fairly plastic, minor earthy gypsum, damp, no odor

20 — SILTY CLAY brick red, layer of gypsum rubble, minor organic mottles, moist, no odor

SILT WITH CLAY lt brick red, stiff, more clay with depth, moist, no odor

25 — SILT WITH CLAY lt brick red, stiff, more clay with depth, layer of greyish green earthy gypsum with hard clasts, no odor, soupy

30 — CLAY alternating bands of lt brick red clay and silty layer with hard gray clasts, very soupy in the silty rubble layers

SILTY CLAY alternating bands of brick red silty clay, pinkish gypsum rubble, and stiff brick red clay, soupy in the rubble layers

35 —

SILTY CLAY brick red, stiff to plastic, layer of pinkish white earthy gypsum, dry, no odor

40 — SILT WITH CLAY brick red with greyish white gypsum rubble, soft, plastic, moist, no odor

SILT WITH CLAY stiff to plastic, gypsum rubble layer, moist

45 — SILT WITH CLAY brick red to cream, mottled, bedded to finely laminated

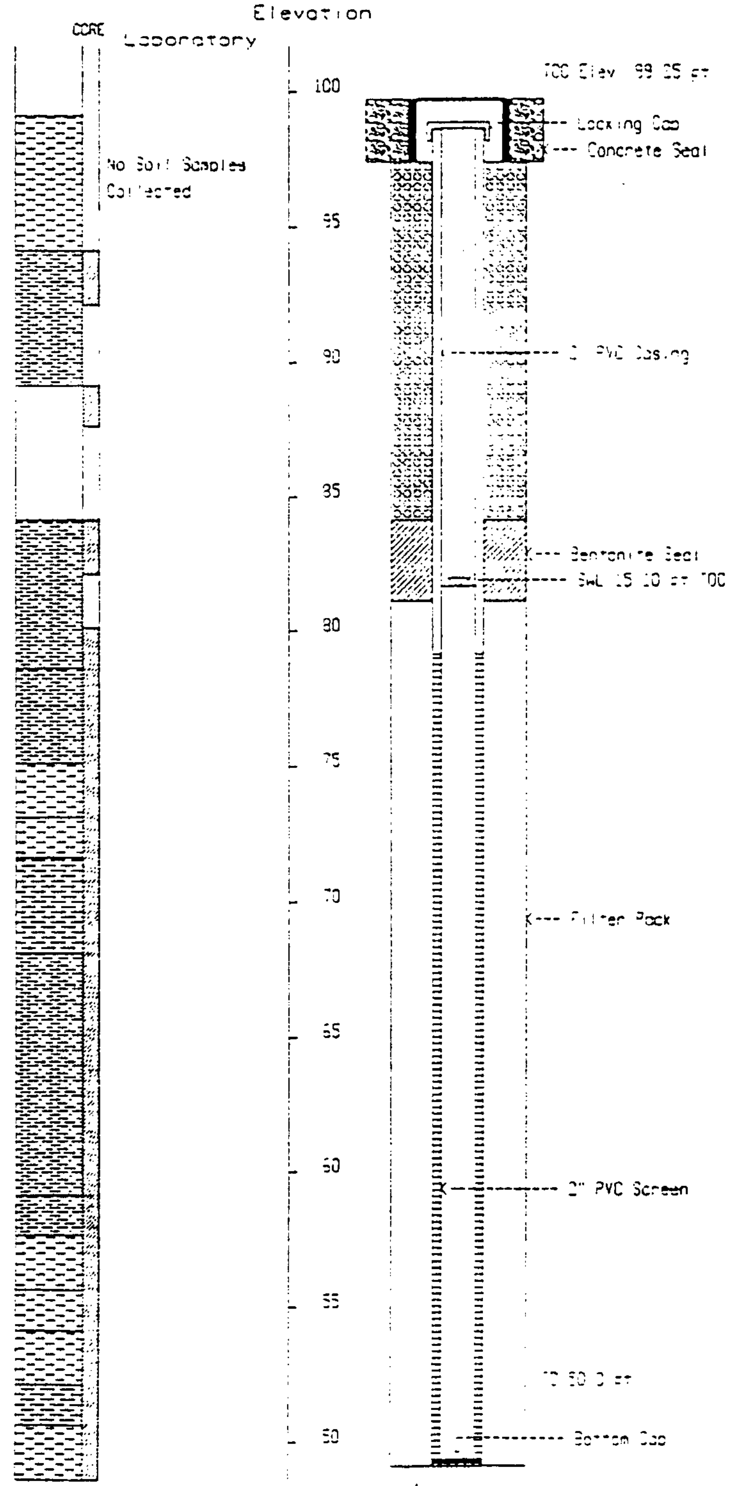
CLAY brick red with layers of silt, sand and gypsum rubble, wet

SILT WITH CLAY brick red, stiff to plastic, gypsum rubble layer, moist to damp, no odor

50 —

LITHOLOGY

WELL CONSTRUCTION DIAGRAM



Western Water Consultants, Inc.

MONITORING WELL MW-14

LOCATION Dowell Schlumberger, Artesia, New Mexico
16 ft W of E fence, 102 ft N of S fence
T17S, R26E, Sec 4, SE 1/4, SW 1/4, SW 1/4
LOG Western Water Consultants Inc (Robin Daley)
DRILLER Scarbough Drilling (Lone Scarbough)
DRILLERS LICENSE NO WD1198
INSTALLATION DATE September 10, 1991

WELL OWNER Dowell Schlumberger Inc (JN 0125)
DRILLING METHOD Air Rotary, 5.0" OD
CASING 2" Dia Flush Joint Sch 80 PVC
SCREEN Slotted Casing, 0.020 Inch Slots
FILTER PACK 8/16 Mesh Silica Sand
STATIC WATER ELEVATION 84.74 (9/13/91)
(Reference Datum Arbitrary = 100.00 feet)

DESCRIPTIONS

Depth (ft)

0 SILT inferred since the cuttings were not described, previous drilling however has shown the lithology for the upper five ft to be consistant across the site

5 GYPSUM cream to pale pink, earthy texure, minor brick red silty clay, damp, no odor

10

15 SILT WITH CLAY lt brick red, uniform, massive, stiff to plastic, damp, no odor

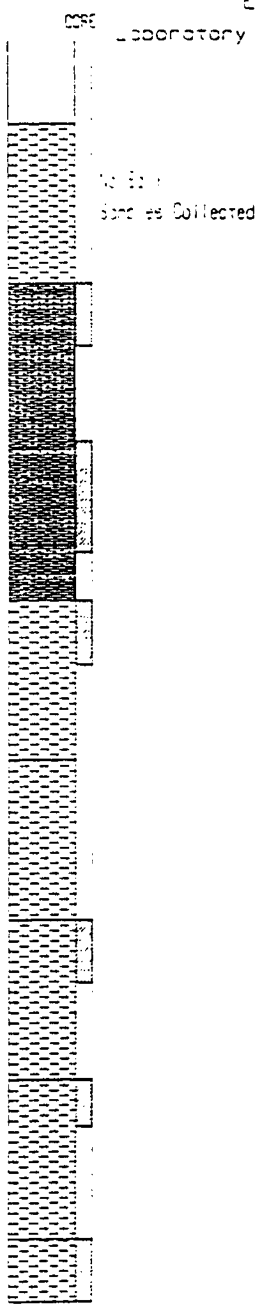
20 SILT WITH CLAY alternating bands of lt - med brick red silt with clay, lt pinkish earthy gypsum, minor very fine grained sand, moist, no odor

25 SILT WITH CLAY stiff, minor clay, thin layer of earthy gypsum rubble, no odor

30 SILT WITH CLAY alternating bands of brick red silt with clay, stiff, and lt pinkish cream gypsum rubble, earthy, damp to saturated, no odor or staining

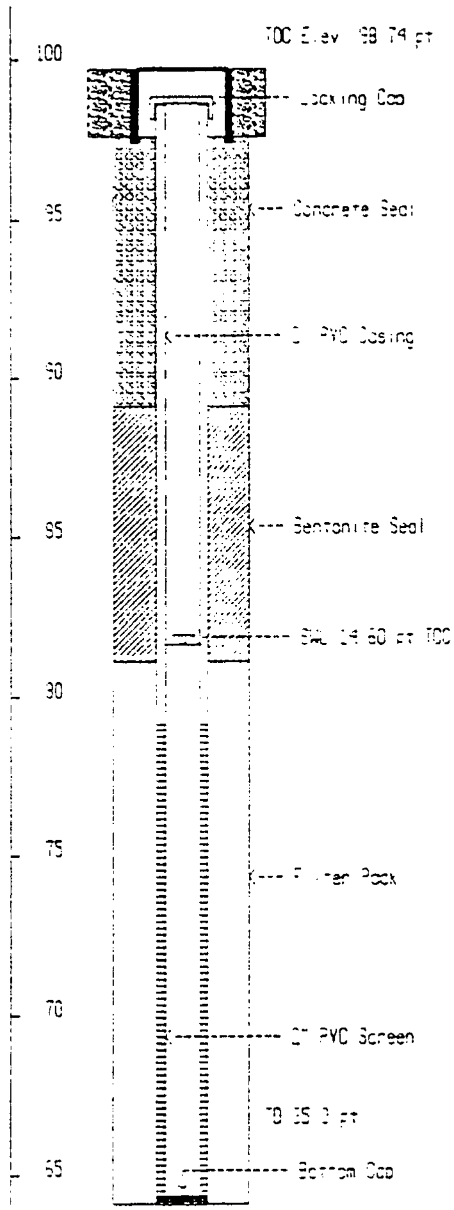
35 SILT WITH CLAY some rubble material, soupy

LITHOLOGY



WELL CONSTRUCTION DIAGRAM

Elevation



Western Water Consultants, Inc.

MONITORING WELL MW-15

LOCATION Dowell Schlumberger, Artesia, New Mexico
7 ft S of acid dock, 14 ft W of acid dock
T17S, R25E, Sec 4, SE 1/4, SW 1/4, SW 1/4
LOG Western Water Consultants Inc (Robin Daley)
DRILLER Scarbough Drilling (Lane Scarbough)
DRILLERS LICENSE NO WD1188
INSTALLATION DATE September 11, 1991

WELL OWNER Dowell Schlumberger Inc (JN 0125)
DRILLING METHOD Air Rotary, 5.0" OD
CASING 2" Dia Flush Joint Sch 80 PVC
SCREEN Slotted Casing, 0.020 Inch Slots
FILTER PACK 8/16 Mesh Silica Sand
STATIC WATER ELEVATION 83.75 (9/13/91)
(Reference Datum Arbitrary = 100.00 feet)

DESCRIPTIONS

Depth (ft)

0 — SILT pinkish white, very fine grained

5 — GYPSUM cream to pale pink, earthy texure, minor brick red silty clay, damp, minor sweet odor

10 — SILT WITH CLAY lt brick red, numerous earthy cream to pinkish gypsum blebs, gravel to 1/2" dia , gypsum rubble layer at the base, rounded pebbles have a micritic appearance, damp, no odor

15 — SILTY CLAY brick red with black organic streaks, rounded gravel clasts, black organic streaks, stiff but plastic

SILT WITH CLAY lt brick red, stiff, minor clay, thin layer of earthy, hard, fractured gypsum rubble, minor black staining, slight decomposed HC odor

20

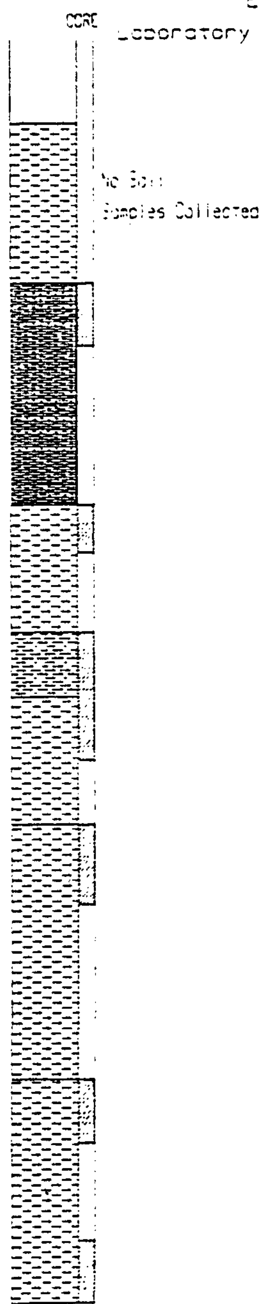
SILT WITH CLAY med brick red, very clayey, black stringers, strong metallic HC odor, wet and saturated

25

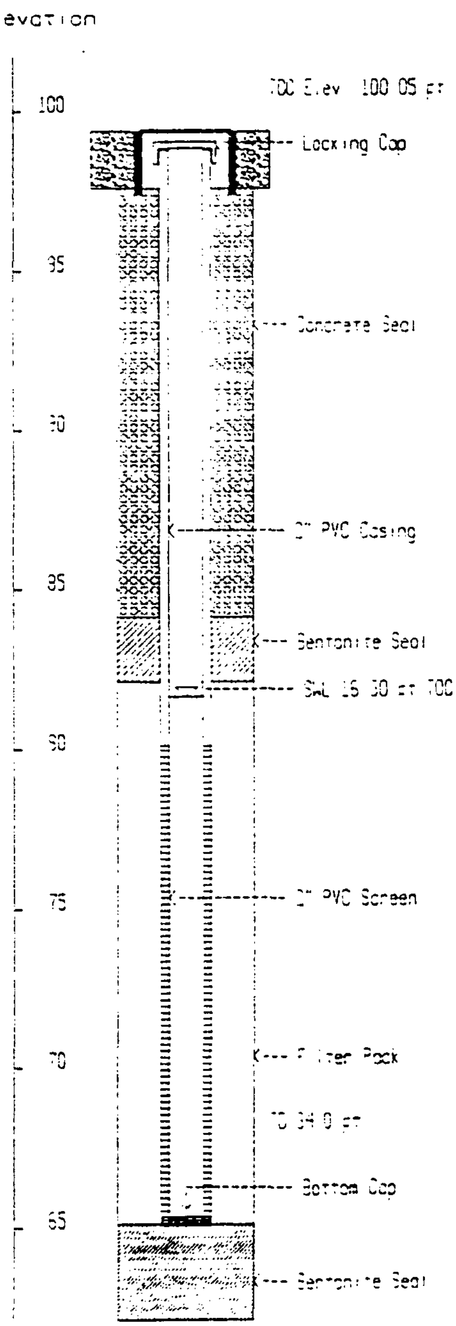
30 — SILT WITH CLAY brick red, very stiff, very clayey, minor authigenic gypsum crystals, faint HC odor but no staining, not saturated

35

LITHOLOGY



WELL CONSTRUCTION DIAGRAM



Western Water Consultants, Inc.

MONITORING WELL MW-16

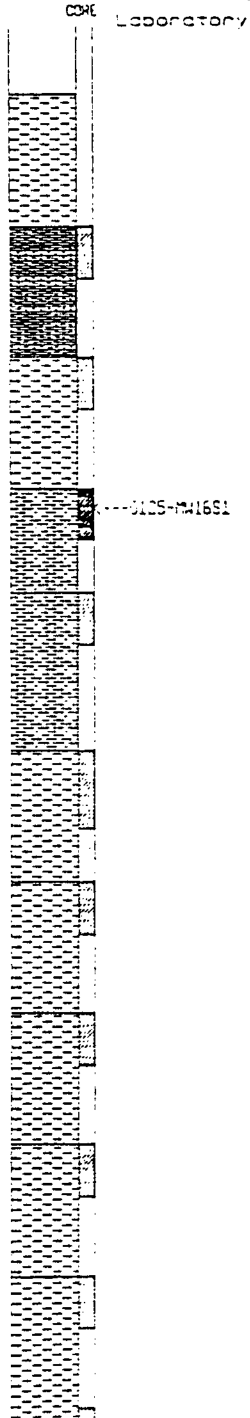
LOCATION Dowell Schlumberger, Artesia, New Mexico
20 ft NW of MW-4
T17S, R26E, Sec 4, SE 1/4, SW 1/4, SW 1/4
LOG Western Water Consultants Inc (Robin Daley)
DRILLER Scarbough Drilling (Lane Scarbough)
DRILLERS LICENSE NO WD1186
INSTALLATION DATE September 11, 1991

WELL OWNER Dowell Schlumberger Inc (JN 0125)
DRILLING METHOD Air Rotary, 10.0" OD
CASING 6" Dia Flush Joint Sch 80 PVC
SCREEN Slotted Casing, 0.020 Inch Slots
FILTER PACK 8/16 Mesh Silica Sand
STATIC WATER ELEVATION 84.54 (9/13/91)
(Reference Datum Arbitrary = 100.00 feet)

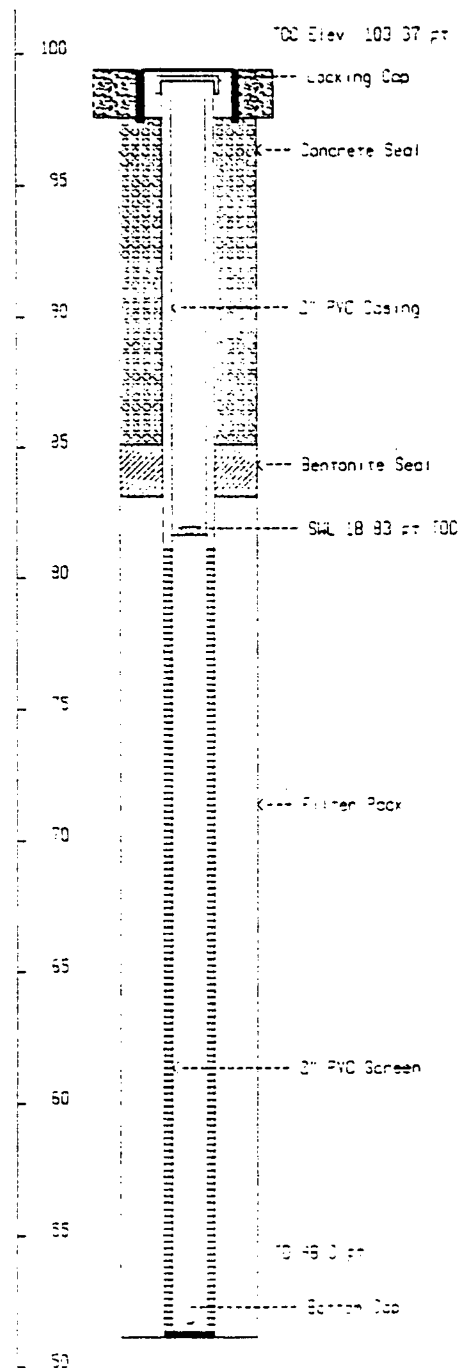
DESCRIPTIONS

Depth (ft)	Description
0	SILT pinkish white, very fine grained
5	GYPSUM cream to white, earthy texure, very fine grained, minor brick red silty clay, numerous authigenic gypsum crystals damp
10	SILT WITH CLAY mottled lt brick red and pale pinkish cream, minor coarse sand and very fine grained gravel clasts, minor authigenic gypsum crystals, damp, no staining or odor
15	SILTY CLAY med brick red with grey streaking, small cream gypsum nodules, gasoline and diesel odor
20	SILTY CLAY brick red with black organic streaks, moderate fuel odor
25	SILT WITH CLAY very lt brick red to pale, pinkish cream, very stiff, very clayey, thin layer of earthy, hard, fractured gypsum rubble, minor fuel odor
30	SILT WITH CLAY alternating layers of very stiff brick red silt with clay, clay, and silt, saturated
35	SILT WITH CLAY brick red, thin layers of greenish tinged silt, gypsum rubble @ 36 ft, clay is very stiff
40	SILT WITH CLAY alternating layers of brick red silt with clay, pinkish cream gypsum rubble, lt brick red finr to very fine grained sand, and brick red stiff clay, no odor
45	SILT WITH CLAY brick red, stiff, alternating with layers of micritic gypsum rubble, dry, no odor
50	

LITHOLOGY



WELL CONSTRUCTION DIAGRAM



Western Water Consultants, Inc.

APPENDIX C

NEW MEXICO STATE ENGINEER'S WELL COMPLETION FORMS

Western Water Consultants, Inc.

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Dowell Schlumberger Inc. Owner's Well No. MW - 13
Street or Post Office Address 500 E. Richey Ave.
City and State Artesia, New Mexico 88210

Well was drilled under Permit No. WD1188 and is located in the:

a. ____ ¼ SE ¼ SW ¼ SW ¼ of Section 4 Township 17S Range 26E N.M.P.M.

b. Tract No. ____ of Map No. ____ of the ____

c. Lot No. ____ of Block No. ____ of the ____
Subdivision, recorded in ____ County.

d. X= ____ feet, Y= ____ feet, N.M. Coordinate System ____ Zone in the ____ Grant.

(B) Drilling Contractor Scarborough Drilling, Inc. License No. WD1188

Address 122 N. 24th St., Lamesa, Texas 79331

Drilling Began 9-9-91 Completed 9-9-91 Type tools 5" Insert Bit Size of hole 5" in.

Elevation of land surface or ____ at well is 3360 ft. Total depth of well 50.5 drilled ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 15.1 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
20	50	30	Reddish-brown silty clay with inter-beds of carbonate/gypsum rubble	2-5

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
2" PVC	Sch 80	NA	+ 2	20	22	NA	NA	NA
2" PVC	Sch 80	0.020" slots	20	50	30	NA	20	50

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				
0	15	5"	Cement	NA	Mixed with water; poured in
15	18	5"	3/8" Chipped Bentonite	NA	Poured in; hydrated in place
18	50	5"	8-16 mesh silica sand	NA	Poured in

Section 5. PLUGGING RECORD

Plugging Contractor ____
Address ____
Plugging Method ____
Date Well Plugged ____
Plugging approved by:

____
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ____ FWL ____ FSL ____

File No. ____ Use ____ Location No. ____

Section 6. LOG OF HOLE

Depth in Feet		Thickness in Feet	Color and Type of Material Encountered
From	To		
0	10	10	Silty clay; light greenish-grey; gypsiferous
10	20.5	10.5	Silt, silty clay, very fine sand (interbedded); brick red to cream
20.5	50.5	30	Clay to clayey silt interbedded with gypsum/carbonate rubble (saturated); clay and silt are brick red, rubble is cream colored

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Robert D[...] (signature)
~~Driller~~ Geologist

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Dowell Schlumberger Inc. Owner's Well No. MW-14
Street or Post Office Address 500 E. Richey Ave.
City and State Artesia, New Mexico 88210

Well was drilled under Permit No. WD1188 and is located in the:

a. ___ ¼ SE ¼ SW ¼ SW ¼ of Section 4 Township 17S Range 26E N.M.P.M.

b. Tract No. ___ of Map No. ___ of the ___

c. Lot No. ___ of Block No. ___ of the ___
Subdivision, recorded in ___ County.

d. X= ___ feet, Y= ___ feet, N.M. Coordinate System ___ Zone in the ___ Grant.

(B) Drilling Contractor Scarborough Drilling, Inc. License No. WD1188

Address 122 N. 24th St., Lamesa, Texas 79331

Drilling Began 9-10-91 Completed 9-10-91 Type tools 5" Insert Bit Size of hole 5" in.

Elevation of land surface or ___ at well is 3360 ft. Total depth of well 35 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 14.6 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
20	37	17	Reddish-brown silty clay with inter-beds of carbonate/gypsum rubble	2-5

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
2" PVC	Sch 80	NA	0	20	20	NA	NA	NA
2" PVC	Sch 80	0.020" slots	20	35	15	NA	20	35

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				
0	10	5"	Cement	NA	Mixed with water; poured in
10	18	5"	3/8" Chipped Bentonite	NA	Poured in; hydrated in place
18	35	5"	8-16 mesh silica sand	NA	Poured in

Section 5. PLUGGING RECORD

Plugging Contractor ___
Address ___
Plugging Method ___
Date Well Plugged ___
Plugging approved by:

___
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ___ FWL ___ FSL ___

File No. ___ Use ___ Location No. ___

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	37	37	Silt, clayey silt, clay, very fine sand interbedded with earthy textured gypsum/carbonate rubble

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

~~Driller~~ Geologist

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Dowell Schlumberger Inc. Owner's Well No. MW-15
Street or Post Office Address 500 E. Richey Ave.
City and State Artesia, New Mexico 88210

Well was drilled under Permit No. WD1188 and is located in the:

a. ____ ¼ SE ¼ SW ¼ SW ¼ of Section 4 Township 17S Range 26E N.M.P.M.

b. Tract No. ____ of Map No. ____ of the ____

c. Lot No. ____ of Block No. ____ of the ____
Subdivision, recorded in ____ County.

d. X= ____ feet, Y= ____ feet, N.M. Coordinate System ____ Zone in the ____ Grant.

(B) Drilling Contractor Scarborough Drilling, Inc. License No. WD1188

Address 122 N. 24th St., Lamesa, Texas 79331

Drilling Began 9-11-91 Completed 9-11-91 Type tools 5" Insert Bit Size of hole 5" in.

Elevation of land surface or ____ at well is 3360 ft. Total depth of well 34 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 16.3 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
22	35	13	Reddish-brown silty clay to clay with some interbeds of carbonate/gypsum	2-3
			rubble	

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
2" PVC	Sch 80	NA	0	19	19	NA	NA	NA
2" PVC	Sch 80	0.020" slots	19	34	15	NA	21	34

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				
0	15	5"	Cement	NA	Mixed with water; poured in
15	17	5"	3/8" Chipped Bentonite	NA	Poured in; hydrated in place
17	34	5"	8-16 mesh silica sand	NA	Poured in
34	37	5"	3/8" Chipped Bentonite	NA	Poured in; hydrated in place

Section 5. PLUGGING RECORD

Plugging Contractor ____
Address ____
Plugging Method ____
Date Well Plugged ____
Plugging approved by:

____
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ____ FWL ____ FSL ____

File No. ____ Use ____ Location No. ____

Section 6. LOG OF HOLE

Depth in Feet From	To	Thickness in Feet	Color and Type of Material Encountered
0	19	19	Silt to clayey silt interbedded with earthy-textured to well-indurated gypsum/carbonate; brick red to cream
19	37	18	Clayey silt interbedded with minor gypsum/carbonate rubble; brick red to cream

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

[signature]

~~Driller~~ Geologist

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Dowell Schlumberger Inc. Owner's Well No. MW-16
Street or Post Office Address 500 E. Richey Ave.
City and State Artesia, New Mexico 88210

Well was drilled under Permit No. WD1188 and is located in the:

a. ____ ¼ SE ¼ SW ¼ SW ¼ of Section 4 Township 17S Range 26E N.M.P.M.

b. Tract No. ____ of Map No. ____ of the ____

c. Lot No. ____ of Block No. ____ of the ____
Subdivision, recorded in ____ County.

d. X= ____ feet, Y= ____ feet, N.M. Coordinate System ____ Zone in the ____ Grant.

(B) Drilling Contractor Scarborough Drilling, Inc. License No. WD1188

Address 122 N. 24th St., Lamesa, Texas 79331

Drilling Began 9-11-91 Completed 9-12-91 Type tools 5" Bit; 9 3/4" Ream Size of hole 10 in.

Elevation of land surface or ____ at well is 3360 ft. Total depth of well 48 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 16.8 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
19	51.5	32.5	Reddish-brown silty clay with inter-beds of carbonate/gypsum rubble	2-5

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
2" PVC	Sch 80	NA	0	18	18	NA	NA	NA
2" PVC	Sch 80	0.020" Slots	18	48	30	NA	18	48

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				
0	14	10"	Cement	NA	Mixed with water; poured in
14	16	10"	3/8" Chipped Bentonite	NA	Poured in; hydrated in place
16	48	10"	8-16 Mesh Silica Sand	NA	Poured in

Section 5. PLUGGING RECORD

Plugging Contractor ____
Address ____
Plugging Method ____
Date Well Plugged ____
Plugging approved by:

____
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ____ FWL ____ FSL ____

File No. ____ Use ____ Location No. ____

Section 6. LOG OF HOLE

Depth in Feet		Thickness in Feet	Color and Type of Material Encountered
From	To		
0	19	19	Silty clay interbedded with earthy-textured gypsum/carbonate; brick red to cream
19	51.5	32.5	Clayey silt, silt, clay interbedded with gypsum/carbonate rubble; minor fine sand, minor limestone gravel; brick red to cream

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

[signature]

~~Driller~~ Geologist

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

APPENDIX D

LABORATORY ANALYSES

Western Water Consultants, Inc.

DOWELL SCHLUMBERGER, ARTESIA, NEW MEXICO
SAMPLE DESCRIPTIONS

SAMPLE #	SAMPLE DESCRIPTION	VOLS. EPA 8240	TPH ASTM D3328
0125.1-9/91	ground water - MW-1	X	X
0125.2-9/91	ground water - MW-2	X	X
0125.3-9/91	ground water - MW-3	X	X
0125.4-9/91	ground water - MW-4	X	X
0125.5-9/91	ground water - MW-5	X	X
0125.6-9/91	ground water - MW-6	X	X
0125.7-9/91	ground water - MW-7	X	X
0125.70-9/91	ground water - MW-7 duplicate	X	X
0125.8-9/91	ground water - MW-8	X	X
0125.9-9/91	ground water - MW-9	X	X
0125.10-9/91	ground water - MW-10	X	X
0125.11-9/91	ground water - MW-11	X	X
0125.12-9/91	ground water - MW-12	X	X
0125.13-9/91	ground water - MW-13	X	X
0125.14-9/91	ground water - MW-14	X	X
0125.15-9/91	ground water - MW-15	X	X
0125.16-9/91	ground water - MW-16	X	X
Trip Blank	laboratory-prepared trip blank	X	
SVE-A2	soil from split spoon core at 16-16.3 feet depth, SVE vacuum well, acid dock	X	
SVE-W	soil from approximately 16 feet depth, SVE vacuum well, wash bay	X	
0125-MW16S1	soil from split spoon core at 15-17 feet depth, MW-16	X	

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9965
SAMPLE IDENTIFICATION: 0125.1-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	1	BDL
1,1-Dichloroethane	75-34-3	1	BDL
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	BDL
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	BDL
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	BDL
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	BDL
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	1	BDL
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	2
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	BDL
Styrene	100-42-5	5	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9965
SAMPLE IDENTIFICATION: 0125.1-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	9
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9980
SAMPLE IDENTIFICATION: 0125.2-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	25	BDL
Bromomethane	74-83-9	25	BDL
Vinyl Chloride	75-01-4	25	BDL
Chloroethane	75-00-3	25	BDL
Trichlorofluoromethane	75-69-4	25	BDL
Methylene Chloride	75-09-2	25	BDL
Acetone	67-64-1	50	BDL
Carbon Disulfide	75-15-0	50	BDL
1,1-Dichloroethene	75-35-4	5	5
1,1-Dichloroethane	75-34-3	5	100
Total-1,2-Dichloroethene	540-59-0	10	BDL
Chloroform	67-66-3	5	BDL
1,2-Dichloroethane	107-06-2	5	BDL
2-Butanone	78-93-3	50	BDL
1,1,1-Trichloroethane	71-55-6	5	23
Carbon Tetrachloride	56-23-5	5	BDL
Vinyl Acetate	108-05-4	50	BDL
Bromodichloromethane	75-27-4	5	BDL
1,2-Dichloropropane	78-87-5	5	BDL
2-Chloroethyl vinyl ether	110-75-8	50	BDL
cis-1,3-Dichloropropene	10061-01-5	5	BDL
Trichloroethene	79-01-6	5	BDL
Dibromochloromethane	124-48-1	5	BDL
1,1,2-Trichloroethane	79-00-5	5	BDL
Benzene	71-43-2	5	120
trans-1,3-Dichloropropene	10061-02-6	5	BDL
Bromoform	75-25-2	5	BDL
4-Methyl-2-Pentanone	108-10-1	50	BDL
2-Hexanone	591-78-6	50	BDL
Tetrachloroethene	127-18-4	5	150
1,1,2,2-Tetrachloroethane	79-34-5	5	BDL
Toluene	108-88-3	5	6
Chlorobenzene	108-90-7	5	BDL
Ethylbenzene	100-41-4	5	50
Styrene	100-42-5	25	BDL

Page 2 continued

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9980
SAMPLE IDENTIFICATION: 0125.2-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	690
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ____________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9979
SAMPLE IDENTIFICATION: 0125.3-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	1000	BDL
Bromomethane	74-83-9	1000	BDL
Vinyl Chloride	75-01-4	1000	BDL
Chloroethane	75-00-3	1000	BDL
Trichlorofluoromethane	75-69-4	1000	BDL
Methylene Chloride	75-09-2	1000	BDL
Acetone	67-64-1	2000	3700
Carbon Disulfide	75-15-0	2000	BDL
1,1-Dichloroethene	75-35-4	200	BDL
1,1-Dichloroethane	75-34-3	200	BDL
Total-1,2-Dichloroethene	540-59-0	400	BDL
Chloroform	67-66-3	200	BDL
1,2-Dichloroethane	107-06-2	200	BDL
2-Butanone	78-93-3	2000	BDL
1,1,1-Trichloroethane	71-55-6	200	330
Carbon Tetrachloride	56-23-5	200	BDL
Vinyl Acetate	108-05-4	2000	BDL
Bromodichloromethane	75-27-4	200	BDL
1,2-Dichloropropane	78-87-5	200	BDL
2-Chloroethyl vinyl ether	110-75-8	2000	BDL
cis-1,3-Dichloropropene	10061-01-5	200	BDL
Trichloroethene	79-01-6	200	BDL
Dibromochloromethane	124-48-1	200	BDL
1,1,2-Trichloroethane	79-00-5	200	BDL
Benzene	71-43-2	200	200
trans-1,3-Dichloropropene	10061-02-6	200	BDL
Bromoform	75-25-2	200	BDL
4-Methyl-2-Pentanone	108-10-1	2000	BDL
2-Hexanone	591-78-6	2000	BDL
Tetrachloroethene	127-18-4	200	BDL
1,1,2,2-Tetrachloroethane	79-34-5	200	BDL
Toluene	108-88-3	200	1200
Chlorobenzene	108-90-7	200	BDL
Ethylbenzene	100-41-4	200	1200
Styrene	100-42-5	1000	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9979
SAMPLE IDENTIFICATION: 0125.3-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	1000	14000
1,2-Dichlorobenzene	95-50-1	1000	BDL
1,3-Dichlorobenzene	541-73-1	1000	BDL
1,4-Dichlorobenzene	106-46-7	1000	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9966
SAMPLE IDENTIFICATION: 0125.4-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	10	BDL
Bromomethane	74-83-9	10	BDL
Vinyl Chloride	75-01-4	10	BDL
Chloroethane	75-00-3	10	BDL
Trichlorofluoromethane	75-69-4	10	BDL
Methylene Chloride	75-09-2	10	BDL
Acetone	67-64-1	20	BDL
Carbon Disulfide	75-15-0	20	BDL
1,1-Dichloroethene	75-35-4	2	BDL
1,1-Dichloroethane	75-34-3	2	6
Total-1,2-Dichloroethene	540-59-0	4	BDL
Chloroform	67-66-3	2	BDL
1,2-Dichloroethane	107-06-2	2	BDL
2-Butanone	78-93-3	20	BDL
1,1,1-Trichloroethane	71-55-6	2	BDL
Carbon Tetrachloride	56-23-5	2	BDL
Vinyl Acetate	108-05-4	20	BDL
Bromodichloromethane	75-27-4	2	BDL
1,2-Dichloropropane	78-87-5	2	BDL
2-Chloroethyl vinyl ether	110-75-8	20	BDL
cis-1,3-Dichloropropene	10061-01-5	2	BDL
Trichloroethene	79-01-6	2	BDL
Dibromochloromethane	124-48-1	2	BDL
1,1,2-Trichloroethane	79-00-5	2	BDL
Benzene	71-43-2	2	260
trans-1,3-Dichloropropene	10061-02-6	2	BDL
Bromoform	75-25-2	2	BDL
4-Methyl-2-Pentanone	108-10-1	20	BDL
2-Hexanone	591-78-6	20	BDL
Tetrachloroethene	127-18-4	2	BDL
1,1,2,2-Tetrachloroethane	79-34-5	2	BDL
Toluene	108-88-3	2	BDL
Chlorobenzene	108-90-7	2	BDL
Ethylbenzene	100-41-4	2	BDL
Styrene	100-42-5	10	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9966
SAMPLE IDENTIFICATION: 0125.4-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	10	15
1,2-Dichlorobenzene	95-50-1	10	BDL
1,3-Dichlorobenzene	541-73-1	10	BDL
1,4-Dichlorobenzene	106-46-7	10	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9968
SAMPLE IDENTIFICATION: 0125.5-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	1	BDL
1,1-Dichloroethane	75-34-3	1	5
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	BDL
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	BDL
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	BDL
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	BDL
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	1	18
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	1
Styrene	100-42-5	5	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9968
SAMPLE IDENTIFICATION: 0125.5-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9972
SAMPLE IDENTIFICATION: 0125.6-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	1	84
1,1-Dichloroethane	75-34-3	1	6
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	BDL
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	BDL
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	BDL
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	BDL
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	1	43
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	BDL
Styrene	100-42-5	5	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9972
SAMPLE IDENTIFICATION: 0125.6-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9973
SAMPLE IDENTIFICATION: 0125.7-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	5	320
1,1-Dichloroethane	75-34-3	1	38
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	BDL
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	5
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	69
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	9
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	5	270
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	BDL
Styrene	100-42-5	5	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9973
SAMPLE IDENTIFICATION: 0125.7-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9981
SAMPLE IDENTIFICATION: 0125.70-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	10	310
1,1-Dichloroethane	75-34-3	1	34
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	BDL
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	6
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	69
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	9
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	10	280
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	BDL
Styrene	100-42-5	5	BDL

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COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9981
SAMPLE IDENTIFICATION: 0125.70-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9974
SAMPLE IDENTIFICATION: 0125.8-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	1	101
1,1-Dichloroethane	75-34-3	1	17
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	BDL
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	7
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	39
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	7
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	1	50
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	BDL
Styrene	100-42-5	5	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9974
SAMPLE IDENTIFICATION: 0125.8-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ____________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9976
SAMPLE IDENTIFICATION: 0125.9-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	19
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	1	2
1,1-Dichloroethane	75-34-3	1	35
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	BDL
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	BDL
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	BDL
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	2
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	1	BDL
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	32
Styrene	100-42-5	5	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9976
SAMPLE IDENTIFICATION: 0125.9-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9975
SAMPLE IDENTIFICATION: 0125.10-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	1	12
1,1-Dichloroethane	75-34-3	1	BDL
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	BDL
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	2
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	BDL
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	BDL
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	1	BDL
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	BDL
Styrene	100-42-5	5	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9975
SAMPLE IDENTIFICATION: 0125.10-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9977
SAMPLE IDENTIFICATION: 0125.11-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	10	470
1,1-Dichloroethane	75-34-3	1	68
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	1
1,2-Dichloroethane	107-06-2	1	BDL
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	17
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	120
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	56
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	10	330
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	BDL
Styrene	100-42-5	5	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9977
SAMPLE IDENTIFICATION: 0125.11-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9978
SAMPLE IDENTIFICATION: 0125.12-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	50	BDL
Bromomethane	74-83-9	50	BDL
Vinyl Chloride	75-01-4	50	BDL
Chloroethane	75-00-3	50	BDL
Trichlorofluoromethane	75-69-4	50	BDL
Methylene Chloride	75-09-2	50	BDL
Acetone	67-64-1	100	290
Carbon Disulfide	75-15-0	100	BDL
1,1-Dichloroethene	75-35-4	10	300
1,1-Dichloroethane	75-34-3	10	120
Total-1,2-Dichloroethene	540-59-0	20	BDL
Chloroform	67-66-3	10	BDL
1,2-Dichloroethane	107-06-2	10	BDL
2-Butanone	78-93-3	100	BDL
1,1,1-Trichloroethane	71-55-6	10	110
Carbon Tetrachloride	56-23-5	10	BDL
Vinyl Acetate	108-05-4	100	BDL
Bromodichloromethane	75-27-4	10	BDL
1,2-Dichloropropane	78-87-5	10	BDL
2-Chloroethyl vinyl ether	110-75-8	100	BDL
cis-1,3-Dichloropropene	10061-01-5	10	BDL
Trichloroethene	79-01-6	10	200
Dibromochloromethane	124-48-1	10	BDL
1,1,2-Trichloroethane	79-00-5	10	BDL
Benzene	71-43-2	10	150
trans-1,3-Dichloropropene	10061-02-6	10	BDL
Bromoform	75-25-2	10	BDL
4-Methyl-2-Pentanone	108-10-1	100	BDL
2-Hexanone	591-78-6	100	BDL
Tetrachloroethene	127-18-4	10	61
1,1,2,2-Tetrachloroethane	79-34-5	10	BDL
Toluene	108-88-3	10	63
Chlorobenzene	108-90-7	10	BDL
Ethylbenzene	100-41-4	10	620
Styrene	100-42-5	50	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9978
SAMPLE IDENTIFICATION: 0125.12-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	50	2200
1,2-Dichlorobenzene	95-50-1	50	BDL
1,3-Dichlorobenzene	541-73-1	50	BDL
1,4-Dichlorobenzene	106-46-7	50	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ____________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9970
SAMPLE IDENTIFICATION: 0125.13-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	1	38
1,1-Dichloroethane	75-34-3	1	30
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	2
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	5
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	4
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	BDL
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	5	240
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	BDL
Styrene	100-42-5	5	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9970
SAMPLE IDENTIFICATION: 0125.13-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ____________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9971
SAMPLE IDENTIFICATION: 0125.14-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	10	300
1,1-Dichloroethane	75-34-3	1	130
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	2
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	14
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	2
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	1
Benzene	71-43-2	1	22
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	10	460
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	BDL
Styrene	100-42-5	5	BDL

Page 2 continued

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9971
SAMPLE IDENTIFICATION: 0125.14-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ____________________

COMPANY NAME:	Western Water Consultants
CENREF PROJECT NUMBER:	PR912003
CENREF SAMPLE NUMBER:	9969
SAMPLE IDENTIFICATION:	0125.15-9/91
SAMPLED ON:	9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	24
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	1	5
1,1-Dichloroethane	75-34-3	1	26
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	1
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	BDL
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	BDL
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	2
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	1	4
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	10
Styrene	100-42-5	5	BDL

Page 2 continued

COMPANY NAME:	Western Water Consultants
CENREF PROJECT NUMBER:	PR912003
CENREF SAMPLE NUMBER:	9969
SAMPLE IDENTIFICATION:	0125.15-9/91
SAMPLED ON:	9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	6
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ____________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9967
SAMPLE IDENTIFICATION: 0125.16-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	1	BDL
1,1-Dichloroethane	75-34-3	1	BDL
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	BDL
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	BDL
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	BDL
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	BDL
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	1	BDL
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	BDL
Styrene	100-42-5	5	BDL
Xylene (total)	1330-20-7	5	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9967
SAMPLE IDENTIFICATION: 0125.16-9/91
SAMPLED ON: 9/15/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9965
SAMPLE IDENTIFICATION: 0125.1-9/91
SAMPLED ON: 9/15/91

TPH ANALYSIS
METHOD ASTM D3328

CENREF SAMPLE NO.	SAMPLE IDENTIFICATION	SDL (mg/l)	RESULT (mg/l)
9965	0125.1-9/91	1	BDL
9966	0125.4-9/91	1	1
9967	0125.16-9/91	1	BDL
9968	0125.5-9/91	1	2
9969	0125.15-9/91	1	BDL
9970	0125.13-9/91	1	BDL
9971	0125.14-9/91	1	BDL
9972	0125.6-9/91	1	BDL
9973	0125.7-9/91	1	BDL
9974	0125.8-9/91	1	BDL
9975	0125.10-9/91	1	BDL
9976	0125.9-9/91	1	BDL
9977	0125.11-9/91	1	14
9978	0125.12-9/91	1	3
9979	0125.3-9/91	1	38
9980	0125.2-9/91	1	39
9981	0125.70-9/91	1	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9985
SAMPLE IDENTIFICATION: Trip Blank

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Chloromethane	74-87-3	5	BDL
Bromomethane	74-83-9	5	BDL
Vinyl Chloride	75-01-4	5	BDL
Chloroethane	75-00-3	5	BDL
Trichlorofluoromethane	75-69-4	5	BDL
Methylene Chloride	75-09-2	5	BDL
Acetone	67-64-1	10	BDL
Carbon Disulfide	75-15-0	10	BDL
1,1-Dichloroethene	75-35-4	1	BDL
1,1-Dichloroethane	75-34-3	1	BDL
Total-1,2-Dichloroethene	540-59-0	2	BDL
Chloroform	67-66-3	1	BDL
1,2-Dichloroethane	107-06-2	1	BDL
2-Butanone	78-93-3	10	BDL
1,1,1-Trichloroethane	71-55-6	1	BDL
Carbon Tetrachloride	56-23-5	1	BDL
Vinyl Acetate	108-05-4	10	BDL
Bromodichloromethane	75-27-4	1	BDL
1,2-Dichloropropane	78-87-5	1	BDL
2-Chloroethyl vinyl ether	110-75-8	10	BDL
cis-1,3-Dichloropropene	10061-01-5	1	BDL
Trichloroethene	79-01-6	1	BDL
Dibromochloromethane	124-48-1	1	BDL
1,1,2-Trichloroethane	79-00-5	1	BDL
Benzene	71-43-2	1	BDL
trans-1,3-Dichloropropene	10061-02-6	1	BDL
Bromoform	75-25-2	1	BDL
4-Methyl-2-Pentanone	108-10-1	10	BDL
2-Hexanone	591-78-6	10	BDL
Tetrachloroethene	127-18-4	1	BDL
1,1,2,2-Tetrachloroethane	79-34-5	1	BDL
Toluene	108-88-3	1	BDL
Chlorobenzene	108-90-7	1	BDL
Ethylbenzene	100-41-4	1	BDL
Styrene	100-42-5	5	BDL

Page 2 continued

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9985
SAMPLE IDENTIFICATION: Trip Blank

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/l)	RESULT (ug/l)
Xylene (total)	1330-20-7	5	BDL
1,2-Dichlorobenzene	95-50-1	5	BDL
1,3-Dichlorobenzene	541-73-1	5	BDL
1,4-Dichlorobenzene	106-46-7	5	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ____________________

CenrefLabs

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9983
SAMPLE IDENTIFICATION: SVE-A 2
SAMPLED ON: 9/09/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/kg)	RESULT (ug/kg)
Chloromethane	74-87-3	620	BDL
Bromomethane	74-83-9	620	BDL
Vinyl Chloride	75-01-4	620	BDL
Chloroethane	75-00-3	620	BDL
Trichlorofluoromethane	75-69-4	620	BDL
Methylene Chloride	75-09-2	620	BDL
Acetone	67-64-1	1200	12000
Carbon Disulfide	75-15-0	1200	3600
1,1-Dichloroethene	75-35-4	120	BDL
1,1-Dichloroethane	75-34-3	120	BDL
Total-1,2-Dichloroethene	540-59-0	250	BDL
Chloroform	67-66-3	120	BDL
1,2-Dichloroethane	107-06-2	120	BDL
2-Butanone	78-93-3	1200	BDL
1,1,1-Trichloroethane	71-55-6	120	BDL
Carbon Tetrachloride	56-23-5	120	BDL
Vinyl Acetate	108-05-4	1200	BDL
Bromodichloromethane	75-27-4	120	BDL
1,2-Dichloropropane	78-87-5	120	BDL
2-Chloroethyl vinyl ether	110-75-8	1200	BDL
cis-1,3-Dichloropropene	10061-01-5	120	BDL
Trichloroethene	79-01-6	120	BDL
Dibromochloromethane	124-48-1	120	BDL
1,1,2-Trichloroethane	79-00-5	120	BDL
Benzene	71-43-2	120	BDL
trans-1,3-Dichloropropene	10061-02-6	120	BDL
Bromoform	75-25-2	120	BDL
4-Methyl-2-Pentanone	108-10-1	1200	BDL
2-Hexanone	591-78-6	1200	BDL
Tetrachloroethene	127-18-4	120	BDL
1,1,2,2-Tetrachloroethane	79-34-5	120	BDL
Toluene	108-88-3	120	BDL
Chlorobenzene	108-90-7	120	BDL
Ethylbenzene	100-41-4	120	BDL
Styrene	100-42-5	620	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9983
SAMPLE IDENTIFICATION: SVE-A 2
SAMPLED ON: 9/09/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/kg)	RESULT (ug/kg)
Xylenes (total)	1330-20-7	620	BDL
1,2-Dichlorobenzene	95-50-1	620	BDL
1,3-Dichlorobenzene	541-73-1	620	BDL
1,4-Dichlorobenzene	106-46-7	620	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9982
SAMPLE IDENTIFICATION: SVE-W
SAMPLED ON: 9/10/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/kg)	RESULT (ug/kg)
Chloromethane	74-87-3	6200	20000 *
Bromomethane	74-83-9	6200	BDL
Vinyl Chloride	75-01-4	6200	BDL
Chloroethane	75-00-3	6200	BDL
Trichlorofluoromethane	75-69-4	6200	BDL
Methylene Chloride	75-09-2	6200	BDL
Acetone	67-64-1	12000	BDL
Carbon Disulfide	75-15-0	12000	BDL
1,1-Dichloroethene	75-35-4	1200	BDL
1,1-Dichloroethane	75-34-3	1200	BDL
Total-1,2-Dichloroethene	540-59-0	2500	BDL
Chloroform	67-66-3	1200	BDL
1,2-Dichloroethane	107-06-2	1200	BDL
2-Butanone	78-93-3	12000	BDL
1,1,1-Trichloroethane	71-55-6	1200	BDL
Carbon Tetrachloride	56-23-5	1200	BDL
Vinyl Acetate	108-05-4	12000	BDL
Bromodichloromethane	75-27-4	1200	BDL
1,2-Dichloropropane	78-87-5	1200	BDL
2-Chloroethyl vinyl ether	110-75-8	12000	BDL
cis-1,3-Dichloropropene	10061-01-5	1200	BDL
Trichloroethene	79-01-6	1200	BDL
Dibromochloromethane	124-48-1	1200	BDL
1,1,2-Trichloroethane	79-00-5	1200	BDL
Benzene	71-43-2	1200	BDL
trans-1,3-Dichloropropene	10061-02-6	1200	BDL
Bromoform	75-25-2	1200	BDL
4-Methyl-2-Pentanone	108-10-1	12000	BDL
2-Hexanone	591-78-6	12000	BDL
Tetrachloroethene	127-18-4	1200	BDL
1,1,2,2-Tetrachloroethane	79-34-5	1200	BDL
Toluene	108-88-3	1200	2600
Chlorobenzene	108-90-7	1200	BDL
Ethylbenzene	100-41-4	1200	6500
Styrene	100-42-5	6200	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9982
SAMPLE IDENTIFICATION: SVE-W
SAMPLED ON: 9/10/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/kg)	RESULT (ug/kg)
Xylenes (total)	1330-20-7	6200	59000
1,2-Dichlorobenzene	95-50-1	6200	BDL
1,3-Dichlorobenzene	541-73-1	6200	BDL
1,4-Dichlorobenzene	106-46-7	6200	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: * Possibly due to laboratory contamination.

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9984
SAMPLE IDENTIFICATION: 0125-MW16S1
SAMPLED ON: 9/11/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/kg)	RESULT (ug/kg)
Chloromethane	74-87-3	620	BDL
Bromomethane	74-83-9	620	BDL
Vinyl Chloride	75-01-4	620	BDL
Chloroethane	75-00-3	620	BDL
Trichlorofluoromethane	75-69-4	620	BDL
Methylene Chloride	75-09-2	620	BDL
Acetone	67-64-1	1200	BDL
Carbon Disulfide	75-15-0	1200	BDL
1,1-Dichloroethene	75-35-4	120	BDL
1,1-Dichloroethane	75-34-3	120	BDL
Total-1,2-Dichloroethene	540-59-0	250	BDL
Chloroform	67-66-3	120	BDL
1,2-Dichloroethane	107-06-2	120	BDL
2-Butanone	78-93-3	1200	BDL
1,1,1-Trichloroethane	71-55-6	120	BDL
Carbon Tetrachloride	56-23-5	120	BDL
Vinyl Acetate	108-05-4	1200	BDL
Bromodichloromethane	75-27-4	120	BDL
1,2-Dichloropropane	78-87-5	120	BDL
2-Chloroethyl vinyl ether	110-75-8	1200	BDL
cis-1,3-Dichloropropene	10061-01-5	120	BDL
Trichloroethene	79-01-6	120	BDL
Dibromochloromethane	124-48-1	120	BDL
1,1,2-Trichloroethane	79-00-5	120	BDL
Benzene	71-43-2	120	BDL
trans-1,3-Dichloropropene	10061-02-6	120	BDL
Bromoform	75-25-2	120	BDL
4-Methyl-2-Pentanone	108-10-1	1200	BDL
2-Hexanone	591-78-6	1200	BDL
Tetrachloroethene	127-18-4	120	BDL
1,1,2,2-Tetrachloroethane	79-34-5	120	BDL
Toluene	108-88-3	120	BDL
Chlorobenzene	108-90-7	120	BDL
Ethylbenzene	100-41-4	120	3600
Styrene	100-42-5	620	BDL

COMPANY NAME: Western Water Consultants

CENREF PROJECT NUMBER: PR912003
CENREF SAMPLE NUMBER: 9984
SAMPLE IDENTIFICATION: 0125-MW16S1
SAMPLED ON: 9/11/91

METHOD EPA 8240

ANALYSIS	CAS NO.	SDL (ug/kg)	RESULT (ug/kg)
Xylenes (total)	1330-20-7	620	6500
1,2-Dichlorobenzene	95-50-1	620	BDL
1,3-Dichlorobenzene	541-73-1	620	BDL
1,4-Dichlorobenzene	106-46-7	620	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: ______________________________

APPENDIX E

LETTER OF AUTHORIZATION FROM THE NEW MEXICO OIL CONSERVATION DIVISION FOR DISPOSAL OF PUMP TEST WATER AT LOCO HILLS WATER DISPOSAL COMPANY

Western Water Consultants, Inc.

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

July 16, 1991

CERTIFIED MAIL
RETURN RECEIPT NO. P-757-737-758

Mr. James R. Maloney
Vice President
Loco Hills Water Disposal Company
P. O. Box 68
Loco Hills, New Mexico 88255

Dear Mr. Maloney:

The Oil Conservation Division (OCD) has received your request dated July 11, 1991 to receive and dispose of wastewater generated from a pumping test at Dowell-Schlumberger's Artesia yard. Analysis reports provided with the request show the wastewater to be non-hazardous. Based on the information provided with your request, authorization is granted for Loco Hills Water Disposal Company to receive and dispose of the requested wastewater.

If you have any questions, feel free to contact me at (505) 827-5812.

Sincerely,

David G. Boyer, Hydrogeologist
Environmental Bureau Chief

DGB/sl

cc: OCD Artesia Office

APPENDIX F

PUMP TEST DATA

Western Water Consultants, Inc.

ESTIMATION OF MAXIMUM EMISSIONS OF ORGANIC COMPOUNDS FROM TWO SOIL VAPOR EXTRACTION TESTS AT THE DOWELL SCHLUMBERGER FACILITY, ARTESIA, NEW MEXICO

I. BASIS FOR CALCULATIONS:

FLOW RATE:	20.0 ACFM			
TEST DURATION:	2.0 HOURS			
SOIL TEMPERATURE:	70.0 degrees F. =	21.11 degrees C. =	294.21 degrees K.	

VAPOR PRESSURE OF CONTAMINANTS AT SOIL TEMPERATURE, mm Hg:	
ETHYLBENZENE	8.00
TOLUENE	24.05
XYLENE (para)	7.38
PCE	15.85

CONTAMINANT CONCENTRATIONS AT TRUCK WASH FACILITY, mg/Kg:	MINIMUM	MAXIMUM
ETHYLBENZENE	5	25
TOLUENE	7	19
XYLENE	42	270
PCE	0.44	1.30

CONTAMINANT CONCENTRATIONS AT ACID DOCK SUMP, mg/Kg:	
ETHYLBENZENE	46
XYLENE	290

II: ASSUME THAT SOIL VAPOR WILL BE SATURATED WITH XYLENE, AND THAT THE RATIO OF PARTIAL PRESSURE TO VAPOR PRESSURE FOR OTHER CONTAMINANTS WILL BE PROPORTIONAL TO THE RATIO OF THEIR CONCENTRATION IN THE SOIL WITH RESPECT TO THE SOIL CONCENTRATION OF XYLENE.

PARTIAL PRESSURE IN EXHAUST SOIL VAPOR AT TRUCK WASH FACILITY, mm Hg	
ETHYLBENZENE	0.95
TOLUENE	4.01
XYLENE	7.38
PCE	0.17

PARTIAL PRESSURE IN EXHAUST SOIL VAPOR AT ACID DOCK SUMP, mm Hg	
ETHYLBENZENE	1.27
XYLENE	7.38

file 0125-E

State of New Mexico
ENVIRONMENT DEPARTMENT
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2850

BRUCE KING
GOVERNOR

JUDITH M. ESPINOSA
SECRETARY

RON CURRY
DEPUTY SECRETARY

WESTERN WATER CONSULTANTS, INC
RECEIVED
JUL 22 1991
LARAMIE, WY 82070

July 16, 1991

Ms. Robin Daley
Western Water Consultants, Inc.
P.O. Box 4128
Laramie, WY 82071

Dear Ms. Daley,

The Bureau has received your July 8, 1991 letter notifying us of the planned SVE tests in Artesia, NM. Based on the information supplied in the letter and estimating techniques in EPA's UST Cleanup publication, the Bureau agrees with your conclusion that the predicted emissions from these tests will fall below the requirements of AQCR 703.1, Notice of Intent. Therefore, no further Air Quality Bureau related action is required by WWC for the project as outlined.

For your information, I have enclosed a copy of AQCR 702. Please note Part III of this regulation - Permits for Toxic Air Pollutant Emissions. The anticipated pollutants from the proposed tests are found in this part of the regulation. However, based on your figures, they are not to be emitted in quantities exceeding those in the regulation, and therefore do not require a permit. However, you may wish to review this portion of the regulation for any future work as well.

Thank you for informing the Bureau of your plans.
Sincerely,

Robert L. Myers II
Environmental Engineer, New Source Review Unit
Technical Analysis and Permits Section
Air Quality Bureau

RLM/rlm

enclosure

Pump Test Data from the Active Dowell Schlumberger Inc.
Artesia, New Mexico Facility 9/13/91 - 9/14/91

TAPE MEASUREMENTS DRAWDOWN (s)

Elapsed Time (min.)	MW-3 (s)	r=328 ft t/r2
0	0	
77	0.02	0.000716
151	0.025	0.001404
209	0.03	0.001943
289	0.015	0.002686
347	0.02	0.003225
407	0.02	0.003783
464	0.02	0.004313
548	0.03	0.005094
620	0.03	0.005763
739	0.08	0.006869
855	0.08	0.007947
1034	0.08	0.009611
1149	0.09	0.01068
1228	0.09	0.011414
1332	0.1	0.012381
1485	0.19	0.013803

Elapsed Time (min.)	MW-4 (s)	r=20 ft t/r2
0	0	
1	0.01	0.0025
2	0.03	0.005
3	0.06	0.0075
4	0.1	0.01
5	0.135	0.0125
6	0.17	0.015
7	0.2	0.0175
8	0.23	0.02
9	0.26	0.0225
10	0.29	0.025
12	0.335	0.03
15	0.395	0.0375
18	0.45	0.045
21	0.49	0.0525
25	0.54	0.0625
30	0.59	0.075

Elapsed Time (min.)	MW-4 Cont. (s)	r=20 ft t/r2
35	0.64	0.0875
40	0.67	0.1
45	0.705	0.1125
50	0.74	0.125
55	0.75	0.1375
60	0.78	0.15
65	0.8	0.1625
70	0.84	0.175
80	0.87	0.2
90	0.92	0.225
100	0.925	0.25
110	0.955	0.275
120	1	0.3
140	1.025	0.35
160	1.08	0.4
180	1.09	0.45
200	1.115	0.5
221	1.15	0.5525
240	1.18	0.6
270	1.19	0.675
300	1.21	0.75
330	1.25	0.825
360	1.26	0.9
392	1.27	0.98
420	1.29	1.05
450	1.33	1.125
480	1.34	1.2
540	1.36	1.35
600	1.375	1.5
660	1.41	1.65
720	1.43	1.8
780	1.44	1.95
840	1.46	2.1
900	1.48	2.25
960	1.49	2.4
1022	1.51	2.555
1081	1.515	2.7025
1140	1.53	2.85
1200	1.535	3
1260	1.55	3.15

Elapsed Time (min.)	MW-4 Cont. (s)	r=20 ft t/r2
1320	1.56	3.3
1440	1.58	3.6

Elapsed Time (min.)	MW-5 (s)	r=70 ft t/r2
0	0	
23	0.11	0.0046939
27	0.13	0.0055102
37	0.18	0.007551
47	0.22	0.0095918
62	0.23	0.0126531
97	0.31	0.0197959
146	0.38	0.0297959
205	0.44	0.0418367
284	0.49	0.0579592
342	0.52	0.0697959
402	0.55	0.0820408
459	0.58	0.0936735
527	0.61	0.107551
583	0.63	0.1189796
642	0.655	0.1310204
730	0.69	0.1489796
785	0.7	0.1602041
846	0.72	0.1726531
906	0.73	0.184898
967	0.74	0.1973469
1026	0.75	0.2093878
1085	0.77	0.2214286
1137	0.78	0.2320408
1216	0.79	0.2481633
1323	0.82	0.27
1451	0.84	0.2961224

Pump Test Data from the Active Dowell Schlumberger Inc.
Artesia, New Mexico Facility 9/13/91 - 9/14/91

TAPE MEASUREMENTS DRAWDOWN (s)

Elapsed Time (min.)	MW-13 (s)	r=176 ft t/r2
0	0	
74	0.045	0.0023889
95	0.045	0.0030669
148	0.055	0.0047779
207	0.075	0.0066826
287	0.065	0.0092652
342	0.07	0.0110408
404	0.085	0.0130424
461	0.095	0.0148825
544	0.115	0.017562
588	0.115	0.0189824
646	0.135	0.0208549
734	0.145	0.0236958
789	0.165	0.0254713
851	0.165	0.0274729
910	0.175	0.0293776
972	0.175	0.0313791
1030	0.185	0.0332515
1088	0.195	0.035124
1144	0.205	0.0369318
1222	0.195	0.0394499
1327	0.215	0.0428396
1455	0.245	0.0469718

Elapsed Time (min.)	MW-14 (s)	r=303 ft t/r2
0	0	
93	0.01	0.001013
150	0.01	0.0016338
208	0.01	0.0022656
288	0.01	0.0031369
346	0.01	0.0037687
406	0.01	0.0044222
462	0.005	0.0050322
546	0.01	0.0059471
617	0.02	0.0067205
652	0.02	0.0071017

Elapsed Time (min.)	MW-14 Cont. (s)	r=303 ft t/r2
737	0.04	0.0080275
853	0.05	0.009291
1032	0.05	0.0112407
1147	0.06	0.0124933
1224	0.09	0.013332
1329	0.07	0.0144757
1458	0.1	0.0158808

Elapsed Time (min.)	MW-15 (s)	r=176 ft t/r2
0	0	0
75	0	0.0024212
105	0	0.0033897
153	0.01	0.0049393
212	0.02	0.006844
291	0	0.0093944
350	0.015	0.0112991
409	0.02	0.0132038
466	0.03	0.0150439
551	0.05	0.017788
590	0.05	0.019047
649	0.07	0.0209517
741	0.11	0.0239217
791	0.09	0.0255359
858	0.11	0.0276989
912	0.1	0.0294421
974	0.1	0.0314437
1036	0.13	0.0334452
1091	0.11	0.0352208
1151	0.12	0.0371578
1231	0.13	0.0397404
1335	0.15	0.0430979
1466	0.15	0.047327

Pump Test Data from the Active Dowell Schlumberger Inc.
Artesia, New Mexico Facility 9/13/91 - 9/14/91

Tape Measurements Drawdown (s)

Elapsed Time (min.)	depth	MW-16 Pumpwell (s)	Discharge Rate (gpm)
0	18.83	0	
1	21.65	2.82	
2	23.14	4.31	
3	24.42	5.59	
4	25.59	6.76	
5	26.55	7.72	
6	27.34	8.51	
7	28.11	9.28	
8	28.74	9.91	
9	29.31	10.48	
10	29.79	10.96	
12	30.53	11.7	
15	31.41	12.58	
18	32.14	13.31	
21	32.68	13.85	7
25	33.28	14.45	
30	33.74	14.91	
35	34.13	15.3	
40	34.46	15.63	
45	34.73	15.9	7
50	34.95	16.12	
55	35.13	16.3	
60	35.27	16.44	
65	35.39	16.56	
70	35.51	16.68	6.6
80	35.7	16.87	
90	35.86	17.03	
100	36.01	17.18	
110	36.13	17.3	6.7
120	36.26	17.43	
140	36.49	17.66	6.6
160	36.63	17.8	
180	36.76	17.93	6.7
200	36.89	18.06	
220	37.01	18.18	
240	37.05	18.22	6.6
272	37.13	18.3	
300	37.26	18.43	
330	37.38	18.55	
360	37.42	18.59	6.8
390	37.44	18.61	
420	37.49	18.66	6.8

Elapsed Time (min.)	MW-16 Cont.	(s)	Discharge Rate (gpm)
450	37.56	18.73	
480	37.6	18.77	6.7
540	37.69	18.86	6.7
600	37.72	18.89	
660	37.67	18.84	6.7
720	37.71	18.88	6.86
780	37.64	18.81	
840	37.61	18.78	
900	37.57	18.74	6.8
960	37.44	18.61	
1020	37.39	18.56	
1080	37.37	18.54	6.7
1140	37.35	18.52	
1200	37.28	18.45	6.9
1260	37.22	18.39	6.7
1320	37.18	18.35	6.3
1440	37.11	18.28	6.5

Elapsed Time (min.)	MW-1 (s)	r=84 ft t/r2
0	0	
17	0.01	0.00241
26	0.04	0.00368
41	0.09	0.00581
53	0.12	0.00751
102	0.18	0.01446
144	0.21	0.02041
203	0.25	0.02877
282	0.28	0.03997
341	0.305	0.04833
400	0.33	0.05669
457	0.35	0.06477
525	0.375	0.0744
581	0.39	0.08234
638	0.41	0.09042
725	0.43	0.10275
783	0.44	0.11097
843	0.45	0.11947
904	0.46	0.12812

Elapsed Time (min.)	MW-1 Cont. (s)	r=84 ft t/r2
965	0.46	0.136763
1024	0.49	0.145125
1083	0.49	0.153486
1134	0.5	0.160714
1213	0.51	0.17191
1321	0.53	0.187217
1448	0.56	0.205215

Elapsed Time (min.)	MW-2 (s)	r=99 ft t/r2
0	0	0
38	0.07	0.003877
63	0.09	0.006428
96	0.14	0.009795
147	0.19	0.014998
205	0.24	0.020916
286	0.27	0.029181
343	0.29	0.034996
403	0.315	0.041118
460	0.34	0.046934
529	0.36	0.053974
585	0.38	0.059688
643	0.4	0.065606
732	0.43	0.074686
787	0.45	0.080298
849	0.46	0.086624
908	0.46	0.092644
969	0.47	0.098867
1028	0.49	0.104887
1087	0.51	0.110907
1142	0.51	0.116519
1218	0.52	0.124273
1325	0.55	0.13519
1453	0.58	0.14825

APPENDIX G

LOGARITHMIC PLOTS OF DRAWDOWN VS T/R²
FOR THE THEIS METHOD AND
TIME-DRAWDOWN PLOTS
FOR THE COOPER-JACOB METHOD

KEY TO ABBREVIATIONS

THEIS

Q = discharge rate during pumping, in ft^3/d

r = distance of well from pump well, in ft

s = decline in water level in well (drawdown), in ft

t = time, in days

W(u) = Theis well function (dimensionless)

u = variable for well function (dimensionless), $u = \frac{r^2S}{4Tt}$

b = thickness of aquifer, in feet

t = transmissivity, in ft^2/day

k = hydraulic conductivity, in ft/day

S = storage coefficient, dimensionless

COOPER-JACOB

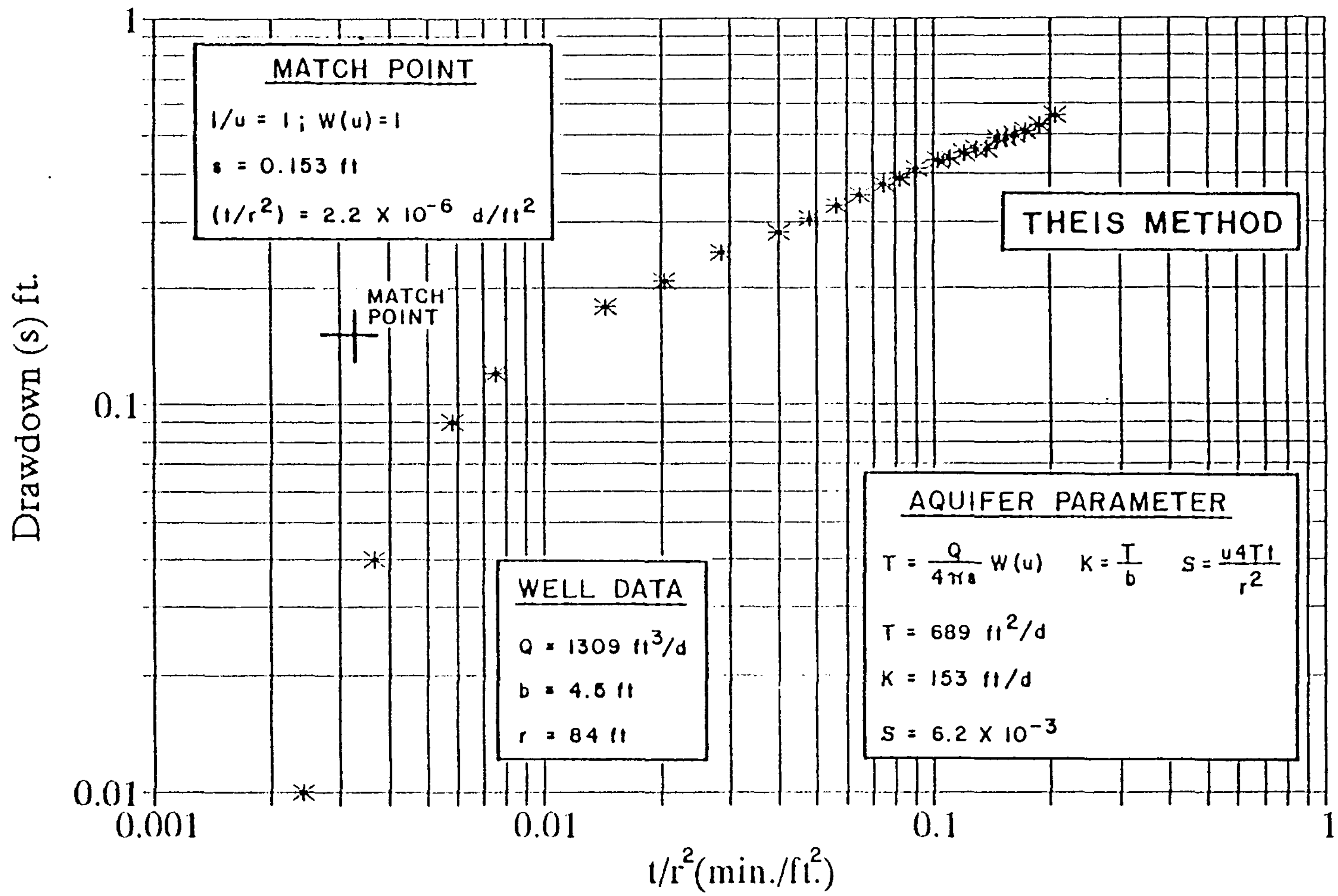
ΔS = change in drawdown over 1 log cycle

t_0 = time at which drawdown = 0 (x - intercept)

Td = directional transmissivity

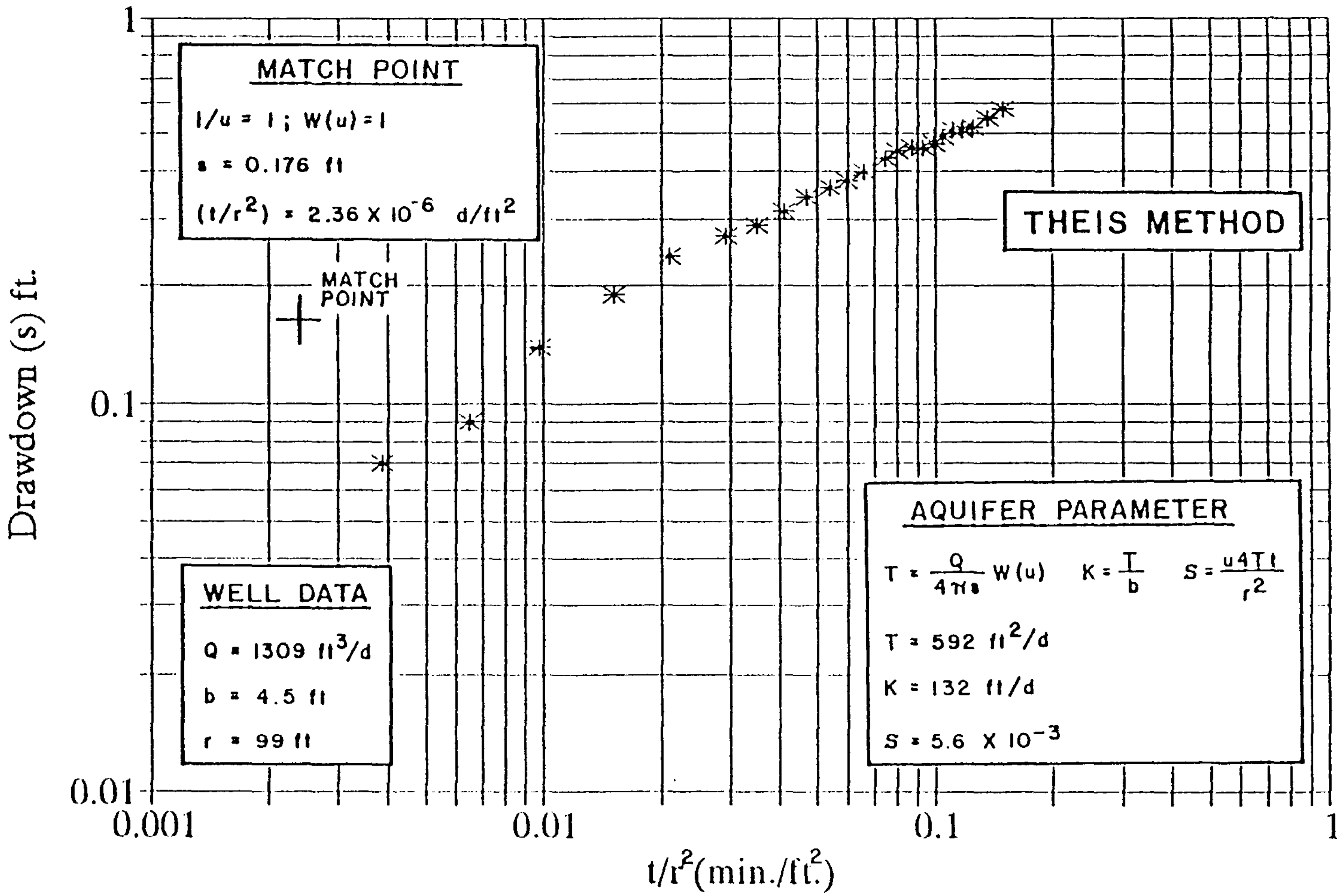
MW-1

Observation Well



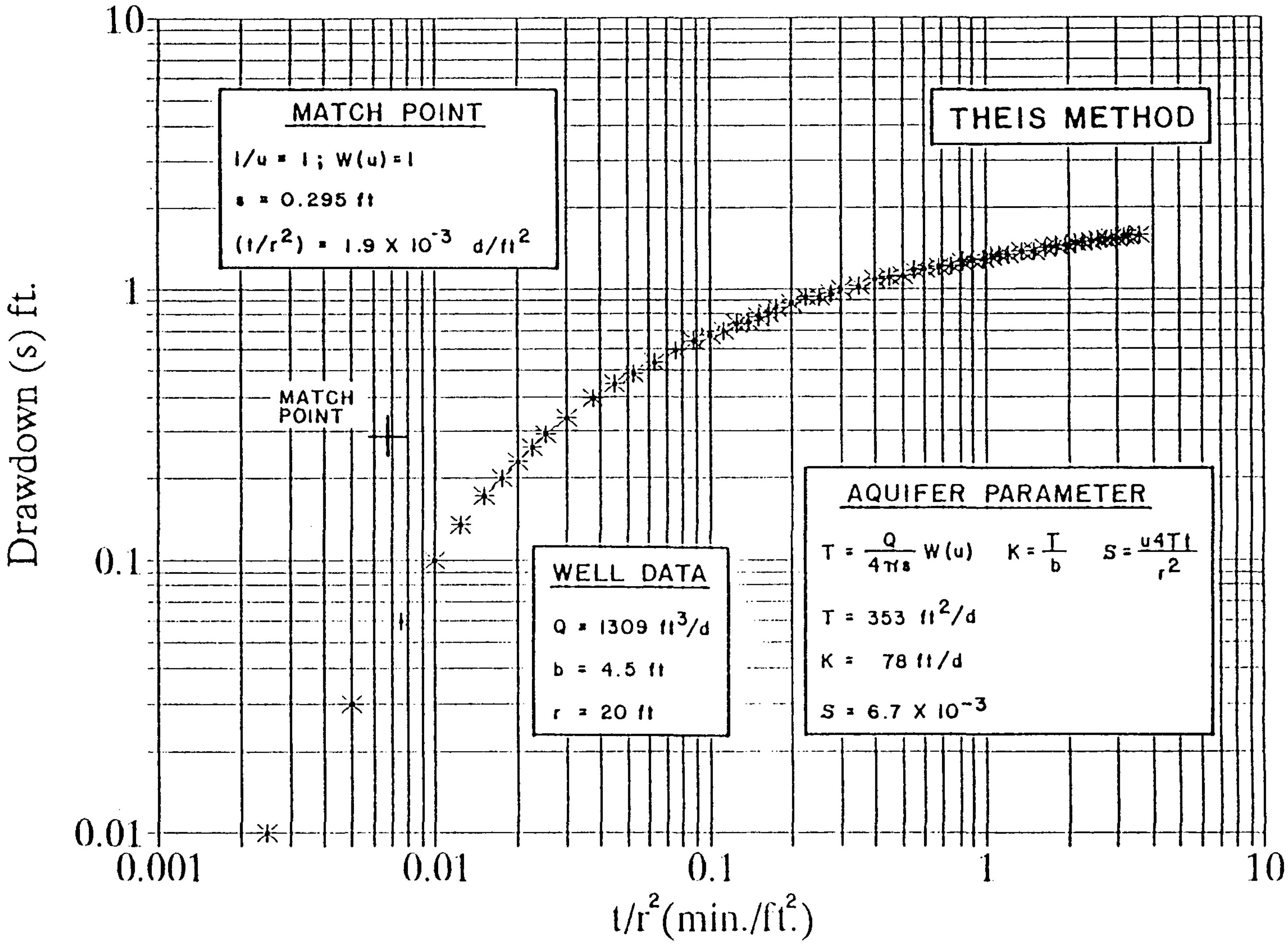
MW-2

Oservation Well

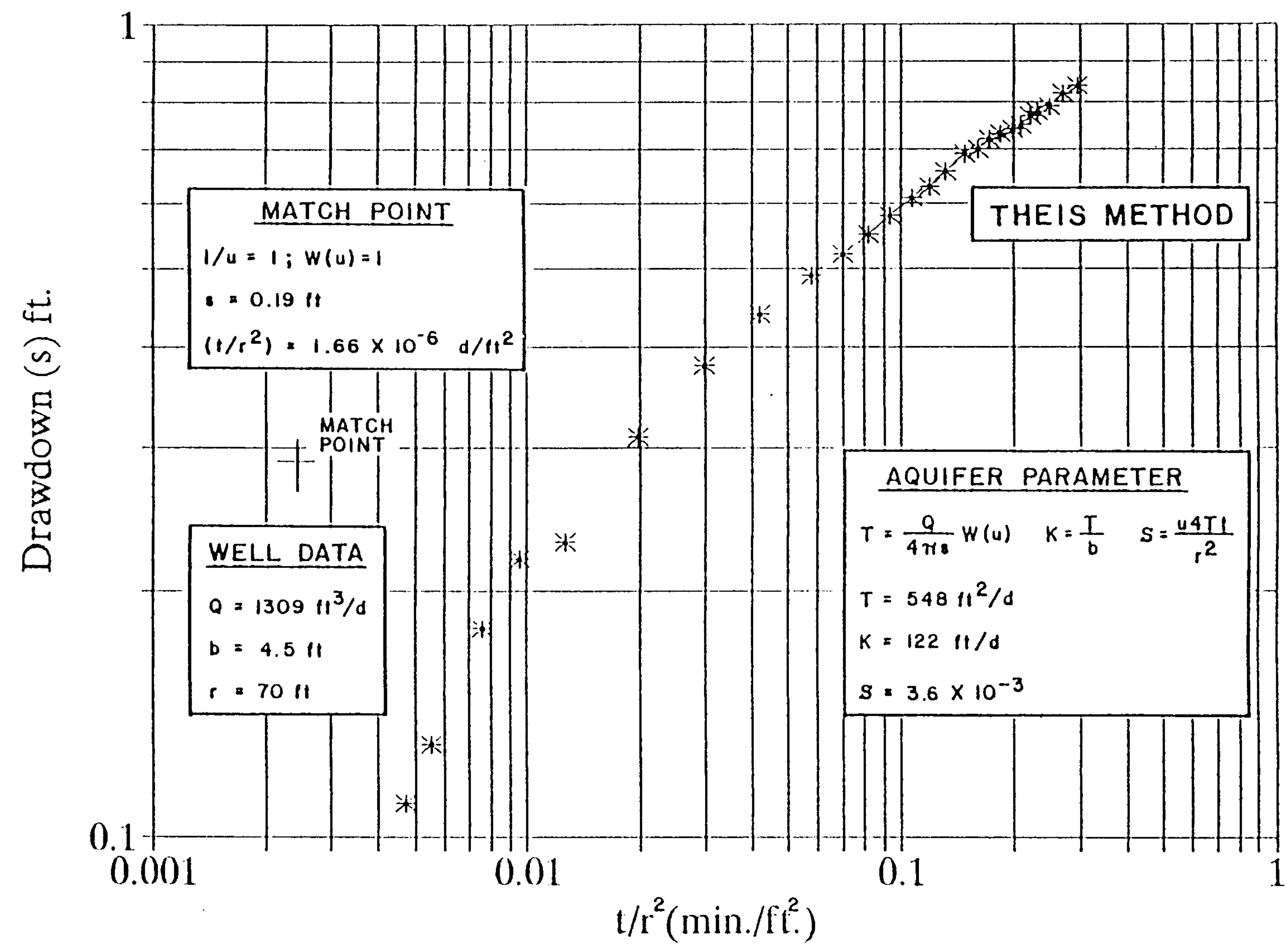


MW-4

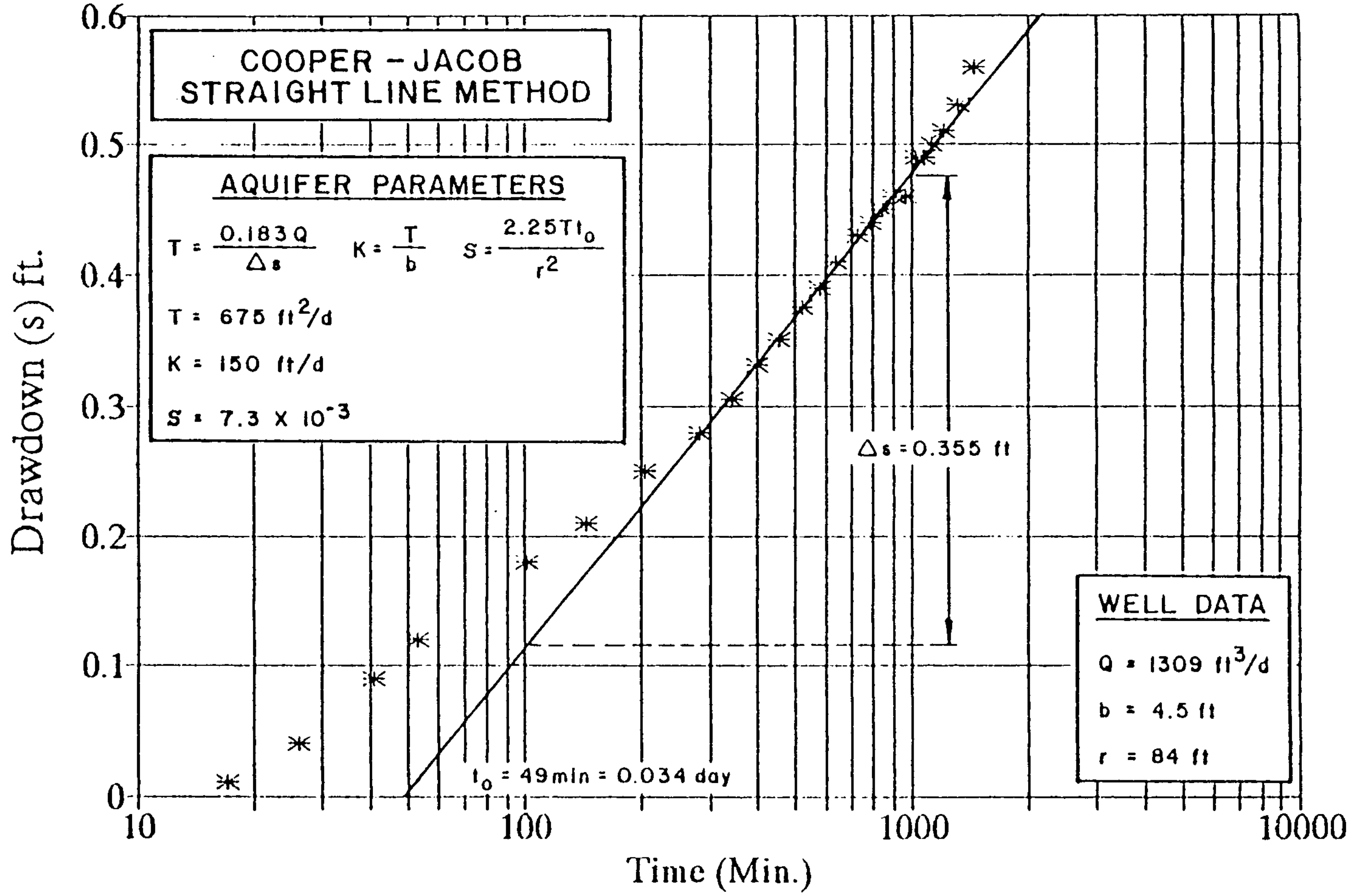
Observation Well



MW-5
Observation Well

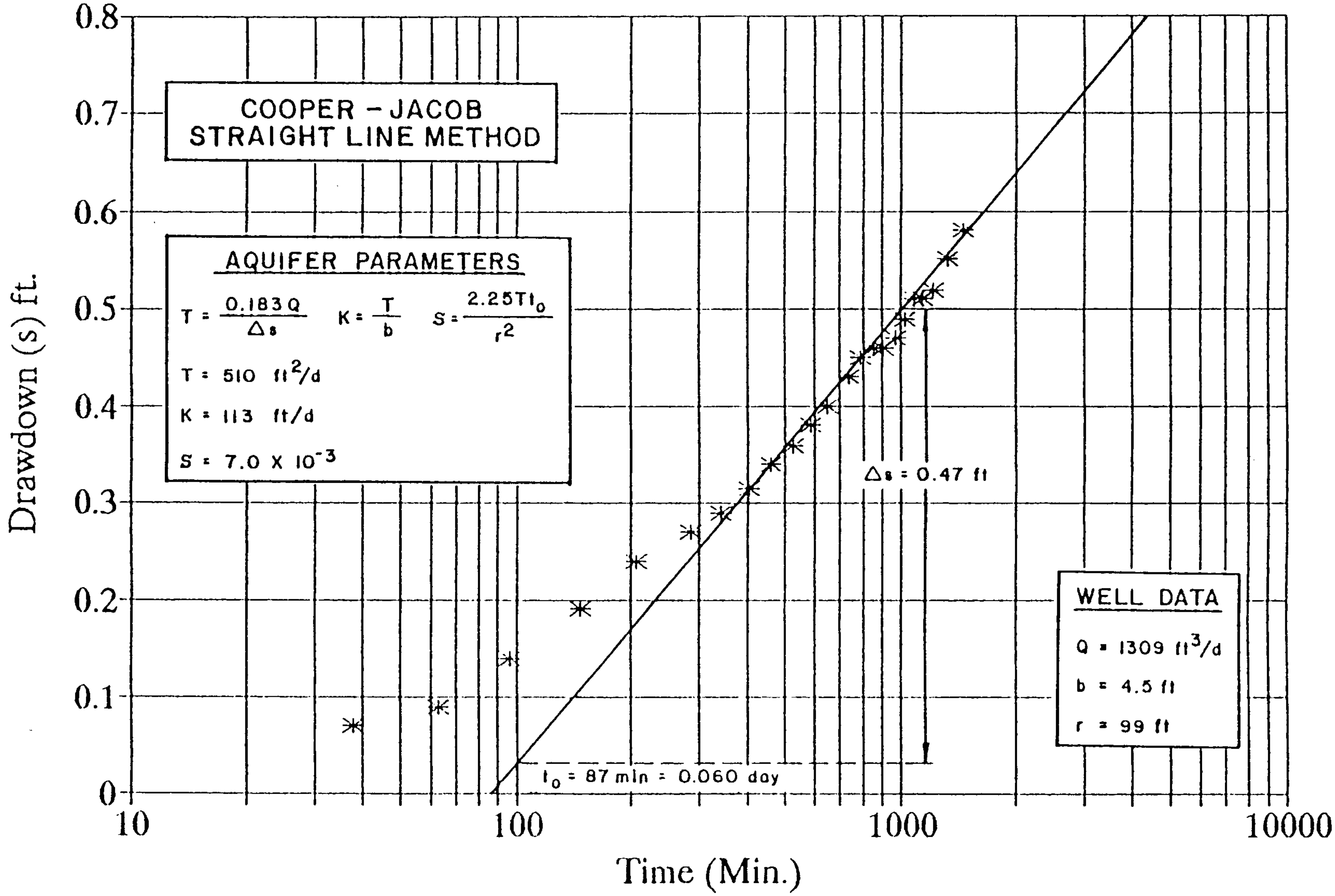


MW-1



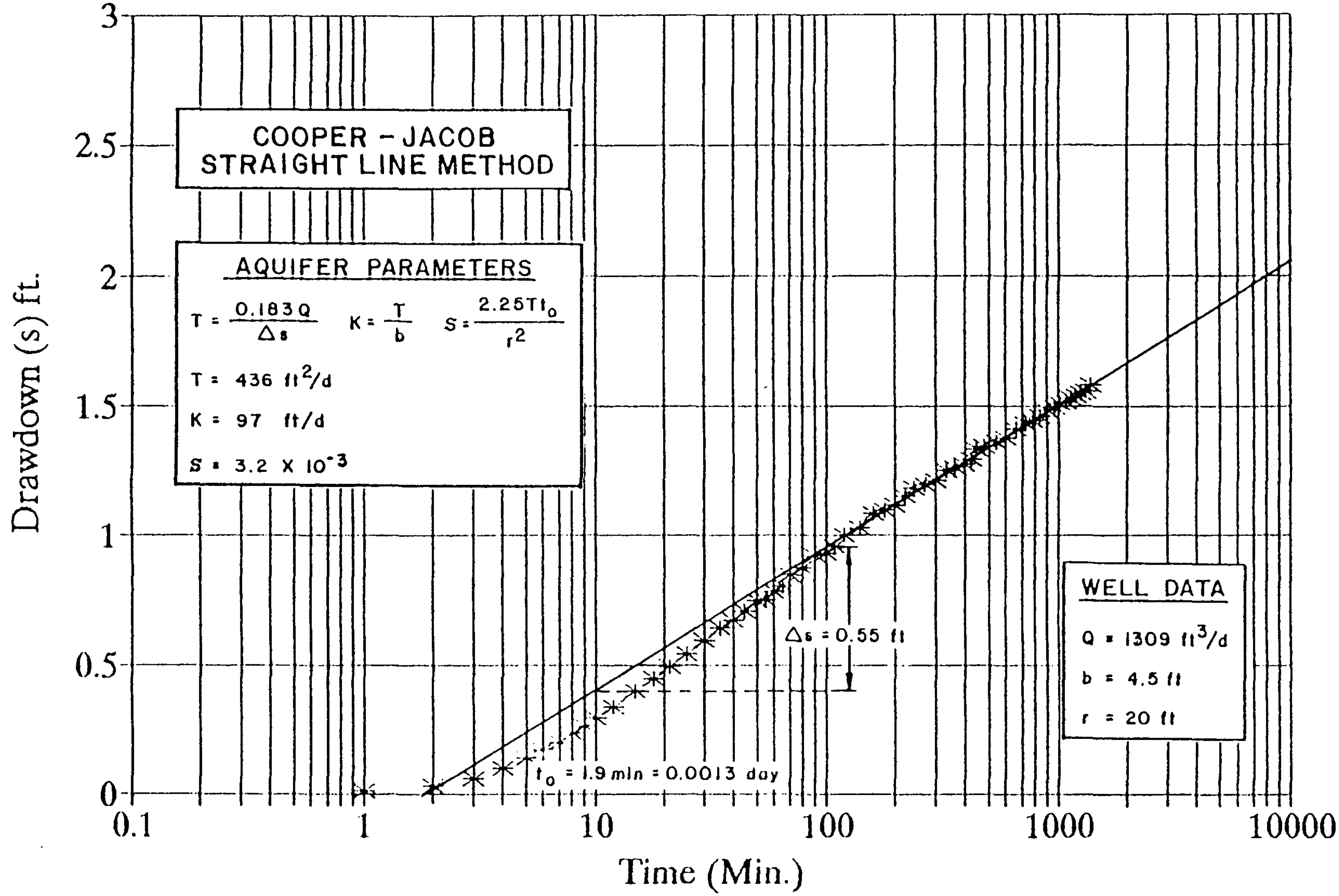
COOPER - JACOB
STRAIGHT LINE METHOD
AQUIFER PARAMETERS
T = 0.183 Q / Δs
K = T / b
S = 2.25 T t₀ / r²
T = 675 ft²/d
K = 150 ft/d
S = 7.3 X 10⁻³
Δs = 0.355 ft
t₀ = 49 min = 0.034 day
WELL DATA
Q = 1309 ft³/d
b = 4.5 ft
r = 84 ft
Drawdown (s) ft.
0.6
0.5
0.4
0.3
0.2
0.1
0
10
100
1000
10000
Time (Min.)

MW-2



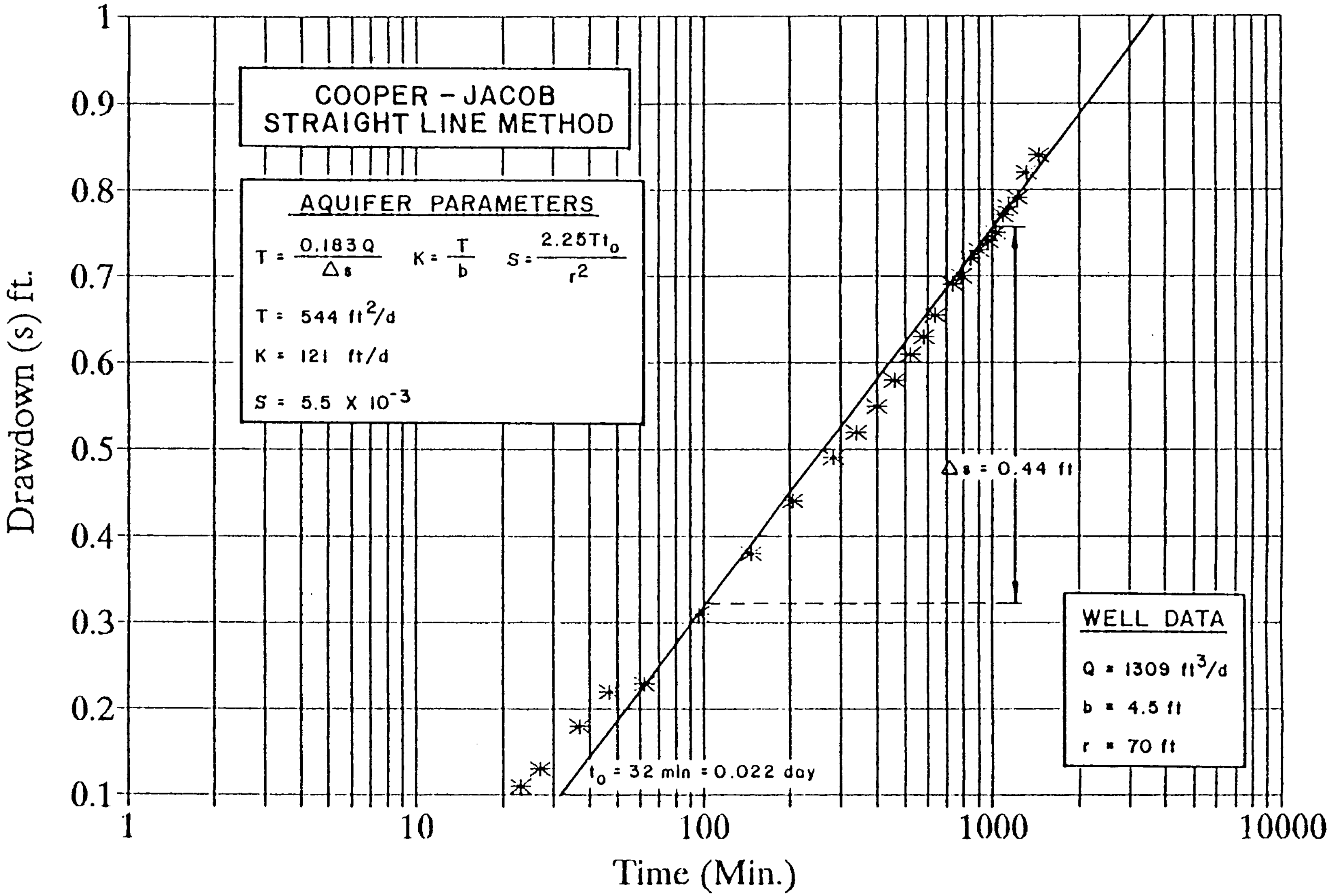
COOPER - JACOB
STRAIGHT LINE METHOD
AQUIFER PARAMETERS
T = 0.183 Q / Δs   K = T / b   S = 2.25 T t₀ / r²
T = 510 ft²/d
K = 113 ft/d
S = 7.0 X 10⁻³
Δs = 0.47 ft
t₀ = 87 min = 0.060 day
WELL DATA
Q = 1309 ft³/d
b = 4.5 ft
r = 99 ft
Drawdown (s) ft.
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
10
100
1000
10000
Time (Min.)

MW-4



COOPER - JACOB
STRAIGHT LINE METHOD
AQUIFER PARAMETERS
T = 0.183Q / Δs   K = T / b   S = 2.25Tt₀ / r²
T = 436 ft²/d
K = 97 ft/d
S = 3.2 X 10⁻³
WELL DATA
Q = 1309 ft³/d
b = 4.5 ft
r = 20 ft
Δs = 0.55 ft
t₀ = 1.9 min = 0.0013 day
Drawdown (s) ft.
0
0.5
1
1.5
2
2.5
3
0.1
1
10
100
1000
10000
Time (Min.)

MW-5



COOPER - JACOB
STRAIGHT LINE METHOD
AQUIFER PARAMETERS
$T = \frac{0.183Q}{\Delta s}$ $K = \frac{T}{b}$ $S = \frac{2.25Tt_o}{r^2}$
$T = 544\ ft^2/d$
$K = 121\ ft/d$
$S = 5.5 \times 10^{-3}$
$\Delta s = 0.44$ ft
$t_o = 32$ min = 0.022 day
WELL DATA
$Q = 1309\ ft^3/d$
b = 4.5 ft
r = 70 ft
Drawdown (s) ft.
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
1
10
100
1000
10000
Time (Min.)

APPENDIX H

LETTER FROM WWC REQUESTING PERMISSION TO CONDUCT SVE PILOT TESTS AND LETTER OF AUTHORIZATION FROM NMED

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July 8, 1991

Mr. Bobby Myers
Air Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Harold Runnels Building
Santa Fe, NM 87502

Re: **Notification of intent to conduct two pilot SVE tests at the Dowell Schlumberger facility in Artesia, New Mexico, WWC JN 0125.**

Dear Mr. Myers,

As per our telephone conversation of June 28, 1991, I am providing you with information about the emissions predicted to be generated from two soil vapor extraction (SVE) pilot tests Western Water Consultants (WWC) will be conducting at the Dowell Schlumberger Inc. (DSI) facility in Artesia, New Mexico. The results of our emissions calculations indicate that WWC does not need a permit to conduct these tests since the SVE emissions will be less than 10 lbs/hr and less than 10 tons/yr.

WWC plans to perform the SVE pilot tests during the week of July 22 - 26, 1991. These pilot tests will be conducted at two separate locations at the DSI facility: around the truck wash facility, and near the acid dock sump. Ethylbenzene, toluene, xylenes, and tetrachloroethylene (PCE) were present in soil samples from the vicinity of the truck wash facility. Ethylbenzene and xylenes were detected in soil near the acid dock sump. Concentrations of soil contaminants are presented in the accompanying table. For calculation purposes, the soil vapor was assumed to be saturated with xylenes, the chemical present in the greatest concentration in both areas. The ratio of partial pressure to vapor pressure for the other chemicals present was assumed to be proportional to the ratio of their soil concentrations with respect to the soil concentration of xylenes.

The soils underlying the DSI Artesia facility are typically fine-grained: gypsiferous silts, clayey silts, and discontinuous clays. Previous SVE tests performed by WWC in similar fine-grained material produced flow rates of 1 to 10 cfm. A maximum flow rate of 20 cfm (cubic feet per minute) was used in the calculations, representing a generous upper limit for possible emissions from the Artesia SVE tests. The SVE tests will be producing emissions for approximately 2 hours per test.

APPENDIX I

SVE PILOT TEST DATA

SVE PILOT TEST - ACID DOCK AT DSI ARTESIA, NM FACILITY
DATA LOGGER RECORDINGS AND DATA CONVERSION

Date Tuesday September 10, 1991 9:44 PM
PlotFile C:\TEMP\DATA\ART#201.PRN
DataFile C:\TEMP\DATA\ART#2.HEX
ARTESIA #1
Time of First Log in Specified Window
33491.396921 0.3969212963

Date	Time	Analog#01 CURRENT.... FT.........	Analog#02 CURRENT.... FT.........	Analog#03 CURRENT.... FT.........	Time	Elapsed t sec.	Ln(t)	PZA-1 0-150psi delta P PSF	PZA-2 0-50psi delta P PSF	PZA-3 0-2.5psi delta P PSF
33491.3969	0.396921	2.0790	1.6170	1.7267	09:31					
33491.3970	0.397047	2.0790	1.6170	1.7267	09:31					
33491.3972	0.397163	2.0790	1.6170	1.7267	09:31					
33491.3973	0.397279	2.0790	1.6170	1.7267	09:32					
33491.3974	0.397395	2.0790	1.6170	1.7267	09:32					
33491.3975	0.397510	2.0790	1.6170	1.7267	09:32					
33491.3976	0.397626	2.0790	1.6170	1.7267	09:32					
33491.3977	0.397742	2.0790	1.6170	1.7267	09:32					
33491.3979	0.397858	2.0790	1.6170	1.7267	09:32					
33491.3980	0.397973	2.0790	1.6170	1.7267	09:33					
33491.3981	0.398089	2.0790	1.6170	1.7267	09:33					
33491.3982	0.398205	2.0790	1.6170	1.7267	09:33					
33491.3983	0.398321	2.0790	1.6170	1.7267	09:33					
33491.3984	0.398436	2.0790	1.6170	1.7267	09:33					
33491.3986	0.398552	2.0790	1.6170	1.7267	09:33					
33491.3987	0.398668	2.0790	1.6170	1.7267	09:34					
33491.3988	0.398784	2.0790	1.6170	1.7267	09:34					
33491.3989	0.398899	2.0790	1.6170	1.7267	09:34					
33491.3990	0.399015	2.0790	1.6170	1.7267	09:34					
33491.3991	0.399131	2.0790	1.6170	1.7325	09:34					
33491.3992	0.399247	2.0790	1.6170	1.7325	09:34					
33491.3993	0.399306	2.0790	1.6170	1.7267	09:35	0.000	0.000	0.00	0.00	0.00
33491.3993	0.399333	2.0790	1.6170	1.7267	09:35	2.333	0.847	0.00	0.00	0.00
33491.3994	0.399370	2.0790	1.6170	1.7267	09:35	5.530	1.710	0.00	0.00	0.00
33491.3994	0.399399	2.0790	1.6170	1.7267	09:35	8.035	2.084	0.00	0.00	0.00
33491.3994	0.399427	2.0790	1.5015	1.7267	09:35	10.454	2.347	0.00	-14.41	0.00
33491.3995	0.399456	2.0790	1.5015	1.7267	09:35	12.960	2.562	0.00	-14.41	0.00
33491.3995	0.399485	2.0790	1.5015	1.7209	09:35	15.466	2.739	0.00	-14.41	-0.72
33491.3995	0.399514	2.0790	1.5015	1.7267	09:35	17.971	2.889	0.00	-14.41	0.00
33491.3996	0.399550	2.0790	1.5015	1.7267	09:35	21.082	3.048	0.00	-14.41	0.00
33491.3996	0.399579	2.0790	1.6170	1.7267	09:35	23.587	3.161	0.00	0.00	0.00
33491.3996	0.399608	2.0790	1.5015	1.7267	09:35	26.093	3.262	0.00	-14.41	0.00
33491.3996	0.399637	2.0790	1.5015	1.7267	09:35	28.598	3.353	0.00	-14.41	0.00
33491.3997	0.399666	2.0790	1.5015	1.7267	09:35	31.104	3.437	0.00	-14.41	0.00
33491.3997	0.399701	2.0790	1.5015	1.7209	09:35	34.128	3.530	0.00	-14.41	-0.72
33491.3997	0.399730	2.0790	1.5015	1.7267	09:35	36.634	3.601	0.00	-14.41	0.00
33491.3998	0.399759	2.0790	1.5015	1.7209	09:35	39.139	3.667	0.00	-14.41	-0.72
33491.3998	0.399788	1.7325	1.5015	1.7267	09:35	41.645	3.729	-43.24	-14.41	0.00
33491.3998	0.399816	2.0790	1.5015	1.7209	09:35	44.064	3.786	0.00	-14.41	-0.72
33491.3998	0.399845	2.0790	1.5015	1.7209	09:35	46.570	3.841	0.00	-14.41	-0.72
33491.3999	0.399882	2.0790	1.5015	1.7209	09:35	49.766	3.907	0.00	-14.41	-0.72
33491.3999	0.399910	2.0790	1.5015	1.7267	09:35	52.186	3.955	0.00	-14.41	0.00
33491.3999	0.399939	1.7325	1.5015	1.7209	09:35	54.691	4.002	-43.24	-14.41	-0.72
33491.4000	0.399968	2.0790	1.5015	1.7209	09:35	57.197	4.046	0.00	-14.41	-0.72
33491.4000	0.399997	2.0790	1.5015	1.7267	09:36	59.702	4.089	0.00	-14.41	0.00
33491.4000	0.400025	1.7325	1.5015	1.7209	09:36	62.122	4.129	-43.24	-14.41	-0.72
33491.4001	0.400061	2.0790	1.5015	1.7209	09:36	65.232	4.178	0.00	-14.41	-0.72
33491.4001	0.400090	1.7325	1.5015	1.7209	09:36	67.738	4.216	-43.24	-14.41	-0.72
33491.4001	0.400119	2.0790	1.5015	1.7209	09:36	70.243	4.252	0.00	-14.41	-0.72

SVE PILOT TEST - ACID DOCK AT DSI ARTESIA, NM FACILITY
DATA LOGGER RECORDINGS AND DATA CONVERSION

33491.4001	0.400148	2.0790	1.5015	1.7209	09:36	72.749	4.287	0.00	-14.41	-0.72
33491.4002	0.400177	2.0790	1.5015	1.7209	09:36	75.254	4.321	0.00	-14.41	-0.72
33491.4002	0.400213	2.0790	1.5015	1.7209	09:36	78.365	4.361	0.00	-14.41	-0.72
33491.4002	0.400242	1.7325	1.5015	1.7267	09:36	80.870	4.393	-43.24	-14.41	0.00
33491.4003	0.400271	2.0790	1.5015	1.7267	09:36	83.376	4.423	0.00	-14.41	0.00
33491.4003	0.400300	2.0790	1.5015	1.7267	09:36	85.882	4.453	0.00	-14.41	0.00
33491.4003	0.400329	2.0790	1.5015	1.7267	09:36	88.387	4.482	0.00	-14.41	0.00
33491.4004	0.400358	2.0790	1.5015	1.7267	09:36	90.893	4.510	0.00	-14.41	0.00
33491.4004	0.400394	1.7325	1.5015	1.7209	09:36	94.003	4.543	-43.24	-14.41	-0.72
33491.4004	0.400422	2.0790	1.5015	1.7209	09:36	96.422	4.569	0.00	-14.41	-0.72
33491.4005	0.400451	2.0790	1.5015	1.7209	09:36	98.928	4.594	0.00	-14.41	-0.72
33491.4005	0.400480	2.0790	1.5015	1.7209	09:36	101.434	4.619	0.00	-14.41	-0.72
33491.4005	0.400508	2.0790	1.5015	1.7209	09:36	103.853	4.643	0.00	-14.41	-0.72
33491.4005	0.400537	2.0790	1.5015	1.7267	09:36	106.358	4.667	0.00	-14.41	0.00
33491.4006	0.400574	1.7325	1.5015	1.7209	09:36	109.555	4.696	-43.24	-14.41	-0.72
33491.4006	0.400602	2.0790	1.5015	1.7209	09:36	111.974	4.718	0.00	-14.41	-0.72
33491.4006	0.400631	1.7325	1.5015	1.7209	09:36	114.480	4.740	-43.24	-14.41	-0.72
33491.4007	0.400661	2.0790	1.5015	1.7209	09:36	117.072	4.763	0.00	-14.41	-0.72
33491.4007	0.400713	2.0790	1.5015	1.7267	09:37	121.565	4.800	0.00	-14.41	0.00
33491.4008	0.400774	1.7325	1.5015	1.7209	09:37	126.835	4.843	-43.24	-14.41	-0.72
33491.4008	0.400826	1.7325	1.5015	1.7209	09:37	131.328	4.878	-43.24	-14.41	-0.72
33491.4009	0.400880	2.0790	1.5015	1.7209	09:37	135.994	4.913	0.00	-14.41	-0.72
33491.4009	0.400933	1.7325	1.5015	1.7209	09:37	140.573	4.946	-43.24	-14.41	-0.72
33491.4010	0.400986	1.7325	1.5015	1.7209	09:37	145.152	4.978	-43.24	-14.41	-0.72
33491.4010	0.401038	1.7325	1.5015	1.7209	09:37	149.645	5.008	-43.24	-14.41	-0.72
33491.4011	0.401100	2.0790	1.5015	1.7267	09:37	155.002	5.043	0.00	-14.41	0.00
33491.4012	0.401152	1.7325	1.5015	1.7209	09:37	159.494	5.072	-43.24	-14.41	-0.72
33491.4012	0.401205	1.7325	1.5015	1.7209	09:37	164.074	5.100	-43.24	-14.41	-0.72
33491.4013	0.401258	1.7325	1.5015	1.7267	09:37	168.653	5.128	-43.24	-14.41	0.00
33491.4013	0.401311	2.0790	1.5015	1.7209	09:37	173.232	5.155	0.00	-14.41	-0.72
33491.4014	0.401365	1.7325	1.5015	1.7209	09:37	177.898	5.181	-43.24	-14.41	-0.72
33491.4014	0.401425	1.7325	1.5015	1.7267	09:38	183.082	5.210	-43.24	-14.41	0.00
33491.4015	0.401478	1.7325	1.5015	1.7209	09:38	187.661	5.235	-43.24	-14.41	-0.72
33491.4015	0.401530	1.7325	1.5015	1.7267	09:38	192.154	5.258	-43.24	-14.41	0.00
33491.4016	0.401583	1.7325	1.5015	1.7209	09:38	196.733	5.282	-43.24	-14.41	-0.72
33491.4016	0.401637	1.7325	1.5015	1.7209	09:38	201.398	5.305	-43.24	-14.41	-0.72
33491.4017	0.401698	1.7325	1.5015	1.7267	09:38	206.669	5.331	-43.24	-14.41	0.00
33491.4018	0.401750	1.7325	1.5015	1.7383	09:38	211.162	5.353	-43.24	-14.41	1.45
33491.4018	0.401803	1.7325	1.5015	1.7267	09:38	215.741	5.374	-43.24	-14.41	0.00
33491.4019	0.401856	1.7325	1.5015	1.7209	09:38	220.320	5.395	-43.24	-14.41	-0.72
33491.4019	0.401910	1.7325	1.5015	1.7209	09:38	224.986	5.416	-43.24	-14.41	-0.72
33491.4020	0.401963	1.7325	1.5015	1.7209	09:38	229.565	5.436	-43.24	-14.41	-0.72
33491.4020	0.402023	1.7325	1.5015	1.7267	09:38	234.749	5.459	-43.24	-14.41	0.00
33491.4021	0.402076	1.7325	1.5015	1.7209	09:38	239.328	5.478	-43.24	-14.41	-0.72
33491.4021	0.402130	1.7325	1.5015	1.7209	09:39	243.994	5.497	-43.24	-14.41	-0.72
33491.4022	0.402183	1.7325	1.5015	1.7209	09:39	248.573	5.516	-43.24	-14.41	-0.72
33491.4022	0.402236	1.7325	1.5015	1.7209	09:39	253.152	5.534	-43.24	-14.41	-0.72
33491.4023	0.402296	1.7325	1.5015	1.7209	09:39	258.336	5.554	-43.24	-14.41	-0.72
33491.4024	0.402350	1.7325	1.5015	1.7209	09:39	263.002	5.572	-43.24	-14.41	-0.72
33491.4024	0.402402	1.7325	1.5015	1.7209	09:39	267.494	5.589	-43.24	-14.41	-0.72
33491.4025	0.402455	1.7325	1.5015	1.7209	09:39	272.074	5.606	-43.24	-14.41	-0.72
33491.4026	0.402558	1.7325	1.5015	1.7267	09:39	280.973	5.638	-43.24	-14.41	0.00
33491.4027	0.402674	1.7325	1.5015	1.7267	09:39	290.995	5.673	-43.24	-14.41	0.00
33491.4028	0.402789	1.7325	1.5015	1.7267	09:40	300.931	5.707	-43.24	-14.41	0.00
33491.4029	0.402905	1.7325	1.5015	1.7267	09:40	310.954	5.740	-43.24	-14.41	0.00
33491.4030	0.403020	1.7325	1.5015	1.7267	09:40	320.890	5.771	-43.24	-14.41	0.00
33491.4031	0.403135	1.7325	1.5015	1.7267	09:40	330.826	5.802	-43.24	-14.41	0.00
33491.4033	0.403251	1.7325	1.5015	1.7267	09:40	340.848	5.831	-43.24	-14.41	0.00
33491.4034	0.403368	1.7325	1.5015	1.7267	09:40	350.957	5.861	-43.24	-14.41	0.00
33491.4035	0.403484	2.0790	1.5015	1.7267	09:41	360.979	5.889	0.00	-14.41	0.00
33491.4038	0.403830	1.7325	1.5015	1.7267	09:41	390.874	5.968	-43.24	-14.41	0.00
33491.4042	0.404178	1.7325	1.5015	1.7267	09:42	420.941	6.042	-43.24	-14.41	0.00
33491.4045	0.404525	1.7325	1.5015	1.7209	09:42	450.922	6.111	-43.24	-14.41	-0.72

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33491.4049	0.404872	1.7325	1.5015	1.7267	09:43	480.902	6.176	-43.24	-14.41	0.00
33491.4052	0.405219	1.7325	1.5015	1.7267	09:43	510.883	6.236	-43.24	-14.41	0.00
33491.4056	0.405566	1.7325	1.5015	1.7267	09:44	540.864	6.293	-43.24	-14.41	0.00
33491.4059	0.405913	1.7325	1.5015	1.7325	09:44	570.845	6.347	-43.24	-14.41	0.72
33491.4063	0.406260	1.7325	1.5015	1.7325	09:45	600.826	6.398	-43.24	-14.41	0.72
33491.4066	0.406608	1.7325	1.5015	1.7325	09:45	630.893	6.447	-43.24	-14.41	0.72
33491.4070	0.406956	1.7325	1.5015	1.7325	09:46	660.960	6.494	-43.24	-14.41	0.72
33491.4073	0.407302	1.7325	1.5015	1.7267	09:46	690.854	6.538	-43.24	-14.41	0.00
33491.4076	0.407649	1.7325	1.5015	1.7325	09:47	720.835	6.580	-43.24	-14.41	0.72
33491.4080	0.407998	1.7325	1.5015	1.7325	09:47	750.989	6.621	-43.24	-14.41	0.72
33491.4083	0.408345	1.7325	1.5015	1.7267	09:48	780.970	6.661	-43.24	-14.41	0.00
33491.4087	0.408691	1.7325	1.5015	1.7267	09:48	810.864	6.698	-43.24	-14.41	0.00
33491.4090	0.409038	1.7325	1.5015	1.7267	09:49	840.845	6.734	-43.24	-14.41	0.00
33491.4094	0.409387	1.7325	1.5015	1.7267	09:49	870.998	6.770	-43.24	-14.41	0.00
33491.4097	0.409733	1.7325	1.5015	1.7267	09:50	900.893	6.803	-43.24	-14.41	0.00
33491.4101	0.410081	1.7325	1.5015	1.7209	09:50	930.960	6.836	-43.24	-14.41	-0.72
33491.4104	0.410428	1.7325	1.5015	1.7267	09:51	960.941	6.868	-43.24	-14.41	0.00
33491.4111	0.411122	1.7325	1.5015	1.7267	09:52	1020.902	6.928	-43.24	-14.41	0.00
33491.4118	0.411816	1.7325	1.5015	1.7267	09:53	1080.864	6.986	-43.24	-14.41	0.00
33491.4125	0.412510	1.7325	1.5015	1.7209	09:54	1140.826	7.040	-43.24	-14.41	-0.72
33491.4132	0.413205	1.7325	1.5015	1.7267	09:55	1200.874	7.091	-43.24	-14.41	0.00
33491.4139	0.413899	1.7325	1.5015	1.7209	09:56	1260.835	7.140	-43.24	-14.41	-0.72
33491.4146	0.414594	1.7325	1.5015	1.7267	09:57	1320.883	7.186	-43.24	-14.41	0.00
33491.4153	0.415288	1.7325	1.5015	1.7267	09:58	1380.845	7.230	-43.24	-14.41	0.00
33491.4160	0.415983	1.7325	1.5015	1.7209	09:59	1440.893	7.273	-43.24	-14.41	-0.72
33491.4167	0.416677	1.7325	1.5015	1.7267	10:00	1500.854	7.314	-43.24	-14.41	0.00
33491.4174	0.417372	1.7325	1.5015	1.7209	10:01	1560.902	7.353	-43.24	-14.41	-0.72
33491.4181	0.418066	1.7325	1.5015	1.7209	10:02	1620.864	7.391	-43.24	-14.41	-0.72
33491.4188	0.418760	1.7325	1.5015	1.7209	10:03	1680.826	7.427	-43.24	-14.41	-0.72
33491.4195	0.419455	1.7325	1.5015	1.7209	10:04	1740.874	7.462	-43.24	-14.41	-0.72
33491.4201	0.420149	1.7325	1.5015	1.7209	10:05	1800.835	7.496	-43.24	-14.41	-0.72
33491.4208	0.420844	1.7325	1.5015	1.7209	10:06	1860.883	7.529	-43.24	-14.41	-0.72
33491.4215	0.421538	1.7325	1.5015	1.7209	10:07	1920.845	7.561	-43.24	-14.41	-0.72
33491.4222	0.422233	1.7325	1.5015	1.7267	10:08	1980.893	7.591	-43.24	-14.41	0.00
33491.4229	0.422927	1.7325	1.5015	1.7267	10:09	2040.854	7.621	-43.24	-14.41	0.00
33491.4236	0.423622	1.7325	1.5015	1.7267	10:10	2100.902	7.650	-43.24	-14.41	0.00
33491.4243	0.424316	1.7325	1.5015	1.7209	10:11	2160.864	7.678	-43.24	-14.41	-0.72
33491.4250	0.425010	1.7325	1.3860	1.7267	10:12	2220.826	7.706	-43.24	-28.83	0.00
33491.4257	0.425705	1.7325	1.5015	1.7152	10:13	2280.874	7.732	-43.24	-14.41	-1.44
33491.4264	0.426399	1.7325	1.3860	1.7209	10:14	2340.835	7.758	-43.24	-28.83	-0.72
33491.4271	0.427094	1.7325	1.5015	1.7209	10:15	2400.883	7.784	-43.24	-14.41	-0.72
33491.4278	0.427788	1.7325	1.3860	1.7209	10:16	2460.845	7.808	-43.24	-28.83	-0.72
33491.4285	0.428483	1.7325	1.5015	1.7267	10:17	2520.893	7.832	-43.24	-14.41	0.00
33491.4292	0.429177	1.7325	1.5015	1.7267	10:18	2580.854	7.856	-43.24	-14.41	0.00
33491.4299	0.429872	1.7325	1.5015	1.7209	10:19	2640.902	7.879	-43.24	-14.41	-0.72
33491.4306	0.430566	1.7325	1.3860	1.7209	10:20	2700.864	7.901	-43.24	-28.83	-0.72
33491.4313	0.431260	1.7325	1.5015	1.7267	10:21	2760.826	7.923	-43.24	-14.41	0.00
33491.4320	0.431955	1.7325	1.5015	1.7267	10:22	2820.874	7.945	-43.24	-14.41	0.00
33491.4326	0.432649	1.7325	1.5015	1.7267	10:23	2880.835	7.966	-43.24	-14.41	0.00
33491.4333	0.433344	1.7325	1.5015	1.7267	10:24	2940.883	7.986	-43.24	-14.41	0.00
33491.4340	0.434038	1.7325	1.5015	1.7267	10:25	3000.845	8.007	-43.24	-14.41	0.00
33491.4347	0.434733	1.7325	1.5015	1.7267	10:26	3060.893	8.026	-43.24	-14.41	0.00
33491.4354	0.435427	1.7325	1.5015	1.7267	10:27	3120.854	8.046	-43.24	-14.41	0.00
33491.4361	0.436122	1.3860	1.3860	1.7267	10:28	3180.902	8.065	-86.49	-28.83	0.00
33491.4368	0.436816	1.7325	1.5015	1.7267	10:29	3240.864	8.084	-43.24	-14.41	0.00
33491.4375	0.437510	1.7325	1.3860	1.7267	10:30	3300.826	8.102	-43.24	-28.83	0.00
33491.4382	0.438205	1.3860	1.3860	1.7267	10:31	3360.874	8.120	-86.49	-28.83	0.00
33491.4389	0.438899	1.3860	1.3860	1.7209	10:32	3420.835	8.138	-86.49	-28.83	-0.72
33491.4396	0.439594	1.3860	1.3860	1.7209	10:33	3480.883	8.155	-86.49	-28.83	-0.72
33491.4403	0.440288	1.3860	1.3860	1.7267	10:34	3540.845	8.172	-86.49	-28.83	0.00
33491.4410	0.440983	1.3860	1.3860	1.7267	10:35	3600.893	8.189	-86.49	-28.83	0.00
33491.4417	0.441677	1.3860	1.3860	1.7267	10:36	3660.854	8.205	-86.49	-28.83	0.00
33491.4424	0.442372	1.3860	1.3860	1.7325	10:37	3720.902	8.222	-86.49	-28.83	0.72

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33491.4431	0.443066	1.3860	1.3860	1.7267	10:38	3780.864	8.238	-86.49	-28.83	0.00
33491.4438	0.443760	1.3860	1.3860	1.7267	10:39	3840.826	8.253	-86.49	-28.83	0.00
33491.4445	0.444455	1.3860	1.3860	1.7267	10:40	3900.874	8.269	-86.49	-28.83	0.00
33491.4451	0.445149	1.3860	1.3860	1.7325	10:41	3960.835	8.284	-86.49	-28.83	0.72
33491.4458	0.445844	1.3860	1.3860	1.7325	10:42	4020.883	8.299	-86.49	-28.83	0.72
33491.4465	0.446538	1.3860	1.3860	1.7325	10:43	4080.845	8.314	-86.49	-28.83	0.72
33491.4472	0.447233	1.3860	1.3860	1.7325	10:44	4140.893	8.329	-86.49	-28.83	0.72
33491.4479	0.447927	1.3860	1.3860	1.7325	10:45	4200.854	8.343	-86.49	-28.83	0.72
33491.4486	0.448622	1.3860	1.3860	1.7325	10:46	4260.902	8.357	-86.49	-28.83	0.72
33491.4493	0.449316	1.3860	1.3860	1.7325	10:47	4320.864	8.371	-86.49	-28.83	0.72
33491.4500	0.450010	1.3860	1.3860	1.7325	10:48	4380.826	8.385	-86.49	-28.83	0.72
33491.4507	0.450705	1.3860	1.3860	1.7325	10:49	4440.874	8.399	-86.49	-28.83	0.72
33491.4514	0.451399	1.3860	1.3860	1.7325	10:50	4500.835	8.412	-86.49	-28.83	0.72
33491.4521	0.452094	1.3860	1.3860	1.7325	10:51	4560.883	8.425	-86.49	-28.83	0.72
33491.4528	0.452788	1.3860	1.3860	1.7325	10:52	4620.845	8.438	-86.49	-28.83	0.72
33491.4535	0.453483	1.3860	1.3860	1.7325	10:53	4680.893	8.451	-86.49	-28.83	0.72
33491.4542	0.454177	1.3860	1.3860	1.7383	10:54	4740.854	8.464	-86.49	-28.83	1.45
33491.4549	0.454872	1.3860	1.3860	1.7383	10:55	4800.902	8.477	-86.49	-28.83	1.45
33491.4556	0.455566	1.3860	1.3860	1.7383	10:56	4860.864	8.489	-86.49	-28.83	1.45

Date	Time	Analog#01 CURRENT.... FT.........	Analog#02 CURRENT.... FT.........	Analog#03 CURRENT.... FT.........	Time	Elapsed t sec.		PZA-4
					00:00			
33491.6040	0.603985	1.5419			14:29			
33491.6041	0.604108	1.5419			14:29			
33491.6046	0.604608	1.5419			14:30			
33491.6192	0.619207	1.5477			14:51			
33491.6196	0.619559	1.5477			14:52			
33491.6199	0.619906	1.5477			14:52			
33491.6203	0.620253	1.5477			14:53			
33491.6206	0.620601	1.5477			14:53			
33491.6209	0.620948	1.5419			14:54			
33491.6213	0.621295	1.5477			14:54			
33491.6215	0.621539	1.5419			14:55	0.000		0.00
33491.6216	0.621564	1.5361			14:55	2.160	0.770	-0.72
33491.6216	0.621575	1.5304			14:55	3.110	1.135	-1.44
33491.6216	0.621587	1.5246			14:55	4.147	1.422	-2.16
33491.6216	0.621598	1.5188			14:55	5.098	1.629	-2.88
33491.6216	0.621610	1.5130			14:55	6.134	1.814	-3.61
33491.6216	0.621622	1.5073			14:55	7.171	1.970	-4.32
33491.6216	0.621640	1.5073			14:55	8.726	2.166	-4.32
33491.6217	0.621652	1.5015			14:55	9.763	2.279	-5.04
33491.6217	0.621663	1.5015			14:55	10.714	2.372	-5.04
33491.6217	0.621675	1.4957			14:55	11.750	2.464	-5.77
33491.6217	0.621686	1.4957			14:55	12.701	2.542	-5.77
33491.6217	0.621706	1.4957			14:55	14.429	2.669	-5.77
33491.6217	0.621718	1.4957			14:55	15.466	2.739	-5.77
33491.6217	0.621729	1.4899			14:55	16.416	2.798	-6.49
33491.6217	0.621741	1.4899			14:55	17.453	2.860	-6.49
33491.6218	0.621752	1.4899			14:55	18.403	2.913	-6.49
33491.6218	0.621764	1.4899			14:55	19.440	2.967	-6.49
33491.6218	0.621784	1.4899			14:55	21.168	3.052	-6.49
33491.6218	0.621795	1.4899			14:55	22.118	3.096	-6.49
33491.6218	0.621807	1.4842			14:55	23.155	3.142	-7.20
33491.6218	0.621818	1.4842			14:55	24.106	3.182	-7.20
33491.6218	0.621830	1.4899			14:55	25.142	3.225	-6.49
33491.6218	0.621841	1.4899			14:55	26.093	3.262	-6.49
33491.6219	0.621861	1.4842			14:55	27.821	3.326	-7.20
33491.6219	0.621873	1.4899			14:55	28.858	3.362	-6.49
33491.6219	0.621884	1.4842			14:55	29.808	3.395	-7.20
33491.6219	0.621896	1.4842			14:55	30.845	3.429	-7.20

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33491.6219	0.621907	1.4899	14:55	31.795	3.459	-6.49
33491.6219	0.621926	1.4842	14:55	33.437	3.510	-7.20
33491.6219	0.621939	1.4899	14:55	34.560	3.543	-6.49
33491.6220	0.621950	1.4842	14:55	35.510	3.570	-7.20
33491.6220	0.621962	1.4899	14:55	36.547	3.599	-6.49
33491.6220	0.621973	1.4784	14:55	37.498	3.624	-7.92
33491.6220	0.621985	1.4842	14:55	38.534	3.652	-7.20
33491.6220	0.622009	1.4842	14:55	40.608	3.704	-7.20
33491.6220	0.622036	1.4842	14:55	42.941	3.760	-7.20
33491.6221	0.622059	1.4842	14:55	44.928	3.805	-7.20
33491.6221	0.622082	1.4842	14:55	46.915	3.848	-7.20
33491.6221	0.622105	1.4842	14:55	48.902	3.890	-7.20
33491.6221	0.622128	1.4842	14:55	50.890	3.930	-7.20
33491.6222	0.622152	1.4842	14:55	52.963	3.970	-7.20
33491.6222	0.622175	1.4842	14:55	54.950	4.006	-7.20
33491.6222	0.622198	1.4842	14:55	56.938	4.042	-7.20
33491.6222	0.622222	1.4784	14:56	59.011	4.078	-7.92
33491.6222	0.622244	1.4842	14:56	60.912	4.109	-7.20
33491.6223	0.622302	1.4842	14:56	65.923	4.188	-7.20
33491.6224	0.622361	1.4842	14:56	71.021	4.263	-7.20
33491.6224	0.622418	1.4784	14:56	75.946	4.330	-7.92
33491.6225	0.622476	1.4784	14:56	80.957	4.394	-7.92
33491.6225	0.622534	1.4784	14:56	85.968	4.454	-7.92
33491.6226	0.622591	1.4842	14:56	90.893	4.510	-7.20
33491.6226	0.622649	1.4784	14:56	95.904	4.563	-7.92
33491.6227	0.622708	1.4842	14:56	101.002	4.615	-7.20
33491.6228	0.622766	1.4784	14:56	106.013	4.664	-7.92
33491.6228	0.622823	1.4784	14:56	110.938	4.709	-7.92
33491.6229	0.622881	1.4784	14:56	115.949	4.753	-7.92
33491.6229	0.622939	1.4784	14:57	120.960	4.795	-7.92
33491.6230	0.622997	1.4784	14:57	125.971	4.836	-7.92
33491.6231	0.623056	1.4784	14:57	131.069	4.876	-7.92
33491.6231	0.623112	1.4726	14:57	135.907	4.912	-8.65
33491.6232	0.623170	1.4726	14:57	140.918	4.948	-8.65
33491.6232	0.623229	1.4784	14:57	146.016	4.984	-7.92
33491.6233	0.623286	1.4784	14:57	150.941	5.017	-7.92
33491.6233	0.623344	1.4784	14:57	155.952	5.050	-7.92
33491.6234	0.623402	1.4784	14:57	160.963	5.081	-7.92
33491.6235	0.623459	1.4726	14:57	165.888	5.111	-8.65
33491.6235	0.623517	1.4726	14:57	170.899	5.141	-8.65
33491.6236	0.623575	1.4726	14:57	175.910	5.170	-8.65
33491.6236	0.623634	1.4726	14:58	181.008	5.199	-8.65
33491.6237	0.623749	1.4784	14:58	190.944	5.252	-7.92
33491.6239	0.623865	1.4726	14:58	200.966	5.303	-8.65
33491.6240	0.623980	1.4784	14:58	210.902	5.351	-7.92
33491.6241	0.624096	1.4726	14:58	220.925	5.398	-8.65
33491.6242	0.624212	1.4726	14:58	230.947	5.442	-8.65
33491.6243	0.624328	1.4726	14:59	240.970	5.485	-8.65
33491.6244	0.624443	1.4726	14:59	250.906	5.525	-8.65
33491.6246	0.624559	1.4726	14:59	260.928	5.564	-8.65
33491.6247	0.624676	1.4726	14:59	271.037	5.602	-8.65
33491.6248	0.624791	1.4726	14:59	280.973	5.638	-8.65
33491.6249	0.624906	1.4726	14:59	290.909	5.673	-8.65
33491.6250	0.625022	1.4726	15:00	300.931	5.707	-8.65
33491.6251	0.625138	1.4784	15:00	310.954	5.740	-7.92
33491.6253	0.625253	1.4726	15:00	320.890	5.771	-8.65
33491.6254	0.625369	1.4726	15:00	330.912	5.802	-8.65
33491.6255	0.625485	1.4726	15:00	340.934	5.832	-8.65
33491.6256	0.625601	1.4726	15:00	350.957	5.861	-8.65
33491.6257	0.625718	1.4726	15:01	361.066	5.889	-8.65
33491.6261	0.626064	1.4726	15:01	390.960	5.969	-8.65
33491.6264	0.626411	1.4726	15:02	420.941	6.042	-8.65
33491.6268	0.626758	1.4726	15:02	450.922	6.111	-8.65

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33491.6271	0.627105	1.4726	15:03	480.902	6.176	-8.65
33491.6275	0.627453	1.4726	15:03	510.970	6.236	-8.65
33491.6278	0.627800	1.4726	15:04	540.950	6.293	-8.65
33491.6281	0.628147	1.4726	15:04	570.931	6.347	-8.65
33491.6285	0.628494	1.4726	15:05	600.912	6.398	-8.65
33491.6288	0.628841	1.4784	15:05	630.893	6.447	-7.92
33491.6292	0.629189	1.4726	15:06	660.960	6.494	-8.65
33491.6295	0.629536	1.4726	15:06	690.941	6.538	-8.65
33491.6299	0.629884	1.4726	15:07	721.008	6.581	-8.65
33491.6302	0.630230	1.4726	15:07	750.902	6.621	-8.65
33491.6306	0.630578	1.4668	15:08	780.970	6.661	-9.37
33491.6309	0.630925	1.4726	15:08	810.950	6.698	-8.65
33491.6313	0.631272	1.4726	15:09	840.931	6.735	-8.65
33491.6316	0.631620	1.4726	15:09	870.998	6.770	-8.65
33491.6320	0.631968	1.4726	15:10	901.066	6.804	-8.65
33491.6323	0.632314	1.4726	15:10	930.960	6.836	-8.65
33491.6327	0.632662	1.4668	15:11	961.027	6.868	-9.37
33491.6334	0.633355	1.4726	15:12	1020.902	6.928	-8.65
33491.6341	0.634050	1.4726	15:13	1080.950	6.986	-8.65
33491.6347	0.634744	1.4726	15:14	1140.912	7.040	-8.65
33491.6356	0.635574	1.4726	15:15	1212.624	7.101	-8.65
33491.6360	0.635978	1.4726	15:15	1247.530	7.129	-8.65
33491.6361	0.636133	1.4668	15:16	1260.922	7.140	-9.37
33491.6368	0.636828	1.4668	15:17	1320.970	7.186	-9.37
33491.6375	0.637522	1.4726	15:18	1380.931	7.231	-8.65
33491.6382	0.638216	1.4726	15:19	1440.893	7.273	-8.65
33491.6389	0.638911	1.4726	15:20	1500.941	7.314	-8.65
33491.6396	0.639605	1.4726	15:21	1560.902	7.353	-8.65
33491.6403	0.640300	1.4726	15:22	1620.950	7.391	-8.65
33491.6410	0.640994	1.4726	15:23	1680.912	7.427	-8.65
33491.6417	0.641689	1.4726	15:24	1740.960	7.462	-8.65
33491.6424	0.642383	1.4784	15:25	1800.922	7.496	-7.92
33491.6431	0.643078	1.4726	15:26	1860.970	7.529	-8.65
33491.6438	0.643772	1.4726	15:27	1920.931	7.561	-8.65
33491.6445	0.644466	1.4726	15:28	1980.893	7.591	-8.65
33491.6452	0.645161	1.4784	15:29	2040.941	7.621	-7.92
33491.6459	0.645855	1.4668	15:30	2100.902	7.650	-9.37
33491.6466	0.646550	1.4726	15:31	2160.950	7.678	-8.65
33491.6472	0.647244	1.4726	15:32	2220.912	7.706	-8.65
33491.6479	0.647939	1.4726	15:33	2280.960	7.732	-8.65
33491.6486	0.648633	1.4726	15:34	2340.922	7.758	-8.65
33491.6493	0.649328	1.4726	15:35	2400.970	7.784	-8.65
33491.6500	0.650022	1.4726	15:36	2460.931	7.808	-8.65
33491.6507	0.650718	1.4726	15:37	2521.066	7.832	-8.65
33491.6514	0.651411	1.4726	15:38	2580.941	7.856	-8.65
33491.6521	0.652105	1.4726	15:39	2640.902	7.879	-8.65
33491.6528	0.652800	1.4726	15:40	2700.950	7.901	-8.65
33491.6535	0.653494	1.4784	15:41	2760.912	7.923	-7.92
33491.6542	0.654189	1.4726	15:42	2820.960	7.945	-8.65
33491.6549	0.654883	1.4726	15:43	2880.922	7.966	-8.65
33491.6556	0.655578	1.4726	15:44	2940.970	7.986	-8.65
33491.6563	0.656272	1.4726	15:45	3000.931	8.007	-8.65
33491.6570	0.656966	1.4726	15:46	3060.893	8.026	-8.65
33491.6577	0.657661	1.4726	15:47	3120.941	8.046	-8.65
33491.6584	0.658355	1.4726	15:48	3180.902	8.065	-8.65
33491.6591	0.659051	1.4726	15:49	3241.037	8.084	-8.65
33491.6597	0.659745	1.4726	15:50	3300.998	8.102	-8.65
33491.6604	0.660439	1.4726	15:51	3360.960	8.120	-8.65
33491.6611	0.661133	1.4726	15:52	3420.922	8.138	-8.65
33491.6618	0.661828	1.4726	15:53	3480.970	8.155	-8.65
33491.6625	0.662522	1.4726	15:54	3540.931	8.172	-8.65
33491.6632	0.663216	1.4726	15:55	3600.893	8.189	-8.65
33491.6639	0.663912	1.4726	15:56	3661.027	8.205	-8.65

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33491.6646	0.664605	1.4726
33491.6653	0.665300	1.4726
33491.6660	0.665994	1.4726
33491.6667	0.666689	1.4726
33491.6674	0.667383	1.4726
33491.6681	0.668078	1.4726
33491.6688	0.668772	1.4668
33491.6695	0.669466	1.4668
33491.6702	0.670161	1.4726
33491.6709	0.670855	1.4668
33491.6716	0.671550	1.4668
33491.6722	0.672244	1.4726
33491.6729	0.672939	1.4726
33491.6736	0.673633	1.4668
33491.6743	0.674328	1.4726
33491.6750	0.675022	1.4726
33491.6757	0.675716	1.4726
33491.6764	0.676412	1.4668
33491.6771	0.677105	1.4726
33491.6778	0.677800	1.4726
33491.6785	0.678494	1.4726
33491.6792	0.679189	1.4726
33491.6799	0.679883	1.4726
33491.6806	0.680579	1.4726
33491.6813	0.681272	1.4726
33491.6820	0.681966	1.4726
33491.6827	0.682661	1.4726
33491.6834	0.683355	1.4726
33491.6841	0.684050	1.4726
33491.6847	0.684744	1.4784
33491.6854	0.685439	1.4726
33491.6861	0.686133	1.4726
33491.6868	0.686828	1.4726
33491.6875	0.687522	1.4726
33491.6882	0.688216	1.4726
33491.6889	0.688911	1.4726
33491.6896	0.689605	1.4726
33491.6903	0.690300	1.4726
33491.6910	0.690994	1.4726
33491.6917	0.691689	1.4726
33491.6924	0.692383	1.4784
33491.6931	0.693078	1.4726
33491.6938	0.693772	1.4726
33491.6945	0.694466	1.4726
33491.6952	0.695161	1.4784
33491.6959	0.695855	1.4726
33491.6966	0.696550	1.4726
33491.6972	0.697244	1.4784
33491.6979	0.697939	1.4726
33491.6986	0.698633	1.4726
33491.6993	0.699328	1.4957
33491.7000	0.700022	1.4899
33491.7007	0.700716	1.4784
33491.7014	0.701411	1.4726
33491.7021	0.702105	1.4726
33491.7028	0.702800	1.4726
33491.7035	0.703494	1.4726
33491.7042	0.704189	1.4784
33491.7049	0.704883	1.4726
33491.7056	0.705578	1.4784
33491.7063	0.706272	1.5304
33491.7070	0.706966	1.5419
33491.7077	0.707661	1.5419

15:57	3720.902	8.222	-8.65
15:58	3780.950	8.238	-8.65
15:59	3840.912	8.253	-8.65
16:00	3900.960	8.269	-8.65
16:01	3960.922	8.284	-8.65
16:02	4020.970	8.299	-8.65
16:03	4080.931	8.314	-9.37
16:04	4140.893	8.329	-9.37
16:05	4200.941	8.343	-8.65
16:06	4260.902	8.357	-9.37
16:07	4320.950	8.371	-9.37
16:08	4380.912	8.385	-8.65
16:09	4440.960	8.399	-8.65
16:10	4500.922	8.412	-9.37
16:11	4560.970	8.425	-8.65
16:12	4620.931	8.438	-8.65
16:13	4680.893	8.451	-8.65
16:14	4741.027	8.464	-9.37
16:15	4800.902	8.477	-8.65
16:16	4860.950	8.489	-8.65
16:17	4920.912	8.501	-8.65
16:18	4980.960	8.513	-8.65
16:19	5040.922	8.525	-8.65
16:20	5101.056	8.537	-8.65
16:21	5160.931	8.549	-8.65
16:22	5220.893	8.560	-8.65
16:23	5280.941	8.572	-8.65
16:24	5340.902	8.583	-8.65
16:25	5400.950	8.594	-8.65
16:26	5460.912	8.605	-7.92
16:27	5520.960	8.616	-8.65
16:28	5580.922	8.627	-8.65
16:29	5640.970	8.638	-8.65
16:30	5700.931	8.648	-8.65
16:31	5760.893	8.659	-8.65
16:32	5820.941	8.669	-8.65
16:33	5880.902	8.679	-8.65
16:34	5940.950	8.690	-8.65
16:35	6000.912	8.700	-8.65
16:36	6060.960	8.710	-8.65
16:37	6120.922	8.719	-7.92
16:38	6180.970	8.729	-8.65
16:39	6240.931	8.739	-8.65
16:40	6300.893	8.748	-8.65
16:41	6360.941	8.758	-7.92
16:42	6420.902	8.767	-8.65
16:43	6480.950	8.777	-8.65
16:44	6540.912	8.786	-7.92
16:45	6600.960	8.795	-8.65
16:46	6660.922	8.804	-8.65
16:47	6720.970	8.813	-5.77
16:48	6780.931	8.822	-6.49
16:49	6840.893	8.831	-7.92
16:50	6900.941	8.839	-8.65
16:51	6960.902	8.848	-8.65
16:52	7020.950	8.857	-8.65
16:53	7080.912	8.865	-8.65
16:54	7140.960	8.874	-7.92
16:55	7200.922	8.882	-8.65
16:56	7260.970	8.890	-7.92
16:57			
16:58			
16:59			

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33491.7084	0.708355	1.5419	17:00
33491.7091	0.709050	0.0578	17:01

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	PZA1 cm	PZA2 cm	PZA3 cm	PZA4 cm	PZA5 cm	PZA6 cm	Delta t sec	ln(t)	PZA4 delta P PSF	PZA5 delta P PSF	PZA6 delta P PSF
FIRST TEST											
0				28	51.8	62.7	0		0	0	0
0.25				26.5	51.8	62.7	15	2.70805	-6.1417	0	0
0.5				26.2	51.8	62.7	30	3.4012	-7.3701	0	0
0.75				26.1	51.8	62.7	45	3.80666	-7.7795	0	0
1				26	51.7	62.7	60	4.09434	-8.189	-0.4094	0
1.25				26	51.7	62.7	75	4.31749	-8.189	-0.4094	0
1.5				26	51.7	62.7	90	4.49981	-8.189	-0.4094	0
1.75				25.95	51.7	62.7	105	4.65396	-8.3937	-0.4094	0
2				25.95	51.7	62.7	120	4.78749	-8.3937	-0.4094	0
2.25				25.9	51.7	62.7	135	4.90527	-8.5984	-0.4094	0
2.5				25.9	51.7	62.7	150	5.01064	-8.5984	-0.4094	0
3				25.9	51.7	62.7	180	5.19296	-8.5984	-0.4094	0
3.5				25.8	51.7	62.7	210	5.34711	-9.0079	-0.4094	0
4				25.8	51.7	62.7	240	5.48064	-9.0079	-0.4094	0
4.5				25.8	51.7	62.7	270	5.59842	-9.0079	-0.4094	0
5				25.8	51.7	62.7	300	5.70378	-9.0079	-0.4094	0
11.25				25.75	51.7	62.8	675	6.51471	-9.2126	-0.4094	0.40945
12				25.75	51.7	62.7	720	6.57925	-9.2126	-0.4094	0
20						62.6	1200	7.09008			-0.4094
21.75				25.75	51.5	62.6	1305	7.17396	-9.2126	-1.2283	-0.4094
22.25				25.75	51.5	62.55	1335	7.19669	-9.2126	-1.2283	-0.6142
23				25.75	51.5	62.5	1380	7.22984	-9.2126	-1.2283	-0.8189
26				25.75	51.5	62.55	1560	7.35244	-9.2126	-1.2283	-0.6142
71				25.7	51.6	63	4260	8.35702	-9.4173	-0.8189	

	PZA1 cm	PZA2 cm	PZA3 cm	PZA4 cm	PZA5 cm	PZA6 cm	Delta t sec	ln(t)	PZA1 delta P PSF	PZA2 delta P PSF	PZA3 delta P PSF	PZA5 delta P PSF	PZA6 delta P PSF
SECOND TEST													
0	28	51.8	62.85		13.8	56	0		0	0	0	0	0
0.25	26.5				13.8	56	15	2.70805	-6.1417			0	0
0.5	26.2	51.65	62.8			56	30	3.4012	-7.3701	-0.6142	-0.2047		0
0.75	26.15		62.8		13.9	56	45	3.80666	-7.5748		-0.2047	0.40945	0
1	26.05	51.65	62.8			56	60	4.09434	-7.9843	-0.6142	-0.2047		0
1.25	26	51.6	62.8		14	56	75	4.31749	-8.189	-0.8189	-0.2047	0.8189	0
1.5	26	51.6	62.8		14	56	90	4.49981	-8.189	-0.8189	-0.2047	0.8189	0
1.75	26	51.6			14		105	4.65396	-8.189	-0.8189		0.8189	
2	25.9	51.6	62.7		14	55.9	120	4.78749	-8.5984	-0.8189	-0.6142	0.8189	-0.4094
2.25	25.85				14	55.9	135	4.90527	-8.8031			0.8189	-0.4094
2.5	25.8				14	55.9	150	5.01064	-9.0079			0.8189	-0.4094
3	25.8	51.6	62.75		14	55.9	180	5.19296	-9.0079	-0.8189	-0.4094	0.8189	-0.4094
3.25	25.8	51.55			14	55.9	195	5.273	-9.0079	-1.0236		0.8189	-0.4094
3.5	25.8	51.6			14	55.9	210	5.34711	-9.0079	-0.8189		0.8189	-0.4094
4	25.8	51.6	62.7		14	55.9	240	5.48064	-9.0079	-0.8189	-0.6142	0.8189	-0.4094
4.5	25.75	51.6	62.7		14	55.9	270	5.59842	-9.2126	-0.8189	-0.6142	0.8189	-0.4094
5	25.7	51.6	62.65		14	55.9	300	5.70378	-9.4173	-0.8189	-0.8189	0.8189	-0.4094
5.5		51.6	62.65		14.1	55.9	330	5.79909		-0.8189	-0.8189	1.22835	-0.4094
8							480	6.17379					
9.5	25.6	51.55	62.65				570	6.34564	-9.8268	-1.0236	-0.8189		
10.5					13.4		630	6.44572				-1.6378	
10.75						55.8	645	6.46925					-0.8189
14.5	25.6						870	6.76849	-9.8268				
15		51.5	62.6				900	6.80239		-1.2283	-1.0236		
16.3						55.75	978	6.88551					-1.0236
17					13.25		1020	6.92756				-2.252	
18	25.5						1080	6.98472	-10.236				
18.5		51.5					1110	7.01212		-1.2283			
18.75			62.6				1125	7.02554			-1.0236		
23		51.65					1380	7.22984		-0.6142			
24.5	25.5		62.6				1470	7.29302	-10.236		-1.0236		
25.5					13.25		1530	7.33302				-2.252	

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26					55.75	1560	7.35244					-1.0236
44.25	25.5					2655	7.8842	-10.236				
44.5		51.25				2670	7.88983		-2.252			
45			62.4			2700	7.90101			-1.8425		
45.5				13.05		2730	7.91206				-3.0709	
46					55.65	2760	7.92299					-1.4331
60			62.6			3600	8.18869			-1.0236		
60.5		51.55				3630	8.19699		-1.0236			
61	25.5					3660	8.20522	-10.236				
61.5				13.25		3690	8.21338				-2.252	
62					55.8	3720	8.22148					-0.8189
65.5			62.7			3930	8.27639			-0.6142		
76			62.8			4560	8.42508			-0.2047		
76.75		51.7				4605	8.4349		-0.4094			
77	25.45					4620	8.43815	-10.441				
77.5				13.45		4650	8.44462				-1.4331	
78					55.95	4680	8.45105					-0.2047
78.5					55.9	4710	8.45744					-0.4094
79.5				13.4		4770	8.4701				-1.6378	
101			63			6060	8.70947			0.61417		
102		51.9				6120	8.71932		0.40945			
102.5	25.55					6150	8.72421	-10.031				
103.5				13.65		6210	8.73392				-0.6142	
104.5					56.1	6270	8.74353					0.40945
119	25.6					7140	8.87347	-9.8268				
119.75		52				7185	8.87975		0.8189			
120.25				13.7		7215	8.88392				-0.4094	
120.75					56.1	7245	8.88807					0.40945

SVE PILOT TEST - WASH BAY AT DSI ARTESIA, NM FACILITY
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Date Wednesday September 11, 1991 6:49 PM
PlotFile C:\TEMP\DATA\ART-2A01.PRN
DataFile C:\TEMP\DATA\ART-2A.HEX
ARTESIA #2
Time of First Log in Specified Window
33492.423726857 0.4237268519

Date	Time	Analog#01 CURRENT.... FT.........	Clock Time	Elapsed Time sec.	Ln(t)	PZB-1 delta P PSF
33492.4237	0.423727	1.3456	10:10:10			
33492.4242	0.424215	1.3398	10:10:52			
33492.4246	0.424571	1.3456	10:11:23			
33492.4249	0.424918	1.3456	10:11:53			
33492.4253	0.425265	1.3456	10:12:23			
33492.4256	0.425612	1.3456	10:12:53			
33492.4260	0.425959	1.3456	10:13:23			
33492.4263	0.426307	1.3456	10:13:53			
33492.4267	0.426654	1.3456	10:14:23			
33492.4270	0.427001	1.3456	10:14:53			
33492.4271	0.427095	1.3398	10:15:01	0.000		-0.72
33492.4271	0.427117	1.3225	10:15:03	1.901	0.642	-2.88
33492.4271	0.427128	1.3109	10:15:04	2.851	1.048	-4.33
33492.4271	0.427140	1.2936	10:15:05	3.888	1.358	-6.49
33492.4272	0.427160	1.2647	10:15:07	5.616	1.726	-10.10
33492.4272	0.427171	1.2532	10:15:08	6.566	1.882	-11.53
33492.4272	0.427183	1.2474	10:15:09	7.603	2.029	-12.26
33492.4272	0.427194	1.2416	10:15:10	8.554	2.146	-12.98
33492.4272	0.427206	1.2358	10:15:11	9.590	2.261	-13.70
33492.4272	0.427226	1.2301	10:15:12	11.318	2.426	-14.41
33492.4272	0.427237	1.2243	10:15:13	12.269	2.507	-15.14
33492.4273	0.427250	1.2301	10:15:14	13.392	2.595	-14.41
33492.4273	0.427262	1.2243	10:15:15	14.429	2.669	-15.14
33492.4273	0.427273	1.2243	10:15:16	15.379	2.733	-15.14
33492.4273	0.427293	1.2185	10:15:18	17.107	2.839	-15.86
33492.4273	0.427304	1.2185	10:15:19	18.058	2.894	-15.86
33492.4273	0.427316	1.2185	10:15:20	19.094	2.949	-15.86
33492.4273	0.427328	1.2185	10:15:21	20.131	3.002	-15.86
33492.4273	0.427339	1.2185	10:15:22	21.082	3.048	-15.86
33492.4274	0.427351	1.2127	10:15:23	22.118	3.096	-16.59
33492.4274	0.427370	1.2185	10:15:25	23.760	3.168	-15.86
33492.4274	0.427382	1.2127	10:15:26	24.797	3.211	-16.59
33492.4274	0.427394	1.2127	10:15:27	25.834	3.252	-16.59
33492.4274	0.427405	1.2127	10:15:28	26.784	3.288	-16.59
33492.4274	0.427417	1.2127	10:15:29	27.821	3.326	-16.59
33492.4274	0.427436	1.2127	10:15:30	29.462	3.383	-16.59
33492.4274	0.427448	1.2070	10:15:32	30.499	3.418	-17.30
33492.4275	0.427459	1.2127	10:15:32	31.450	3.448	-16.59
33492.4275	0.427471	1.2127	10:15:33	32.486	3.481	-16.59
33492.4275	0.427483	1.2127	10:15:35	33.523	3.512	-16.59
33492.4275	0.427502	1.2127	10:15:36	35.165	3.560	-16.59
33492.4275	0.427514	1.2127	10:15:37	36.202	3.589	-16.59
33492.4275	0.427525	1.2127	10:15:38	37.152	3.615	-16.59
33492.4275	0.427538	1.2070	10:15:39	38.275	3.645	-17.30
33492.4276	0.427550	1.2070	10:15:40	39.312	3.672	-17.30
33492.4276	0.427561	1.2070	10:15:41	40.262	3.695	-17.30
33492.4276	0.427591	1.2070	10:15:44	42.854	3.758	-17.30
33492.4276	0.427615	1.2070	10:15:46	44.928	3.805	-17.30
33492.4276	0.427638	1.2070	10:15:48	46.915	3.848	-17.30
33492.4277	0.427661	1.2070	10:15:50	48.902	3.890	-17.30
33492.4277	0.427684	1.2070	10:15:52	50.890	3.930	-17.30
33492.4277	0.427707	1.2070	10:15:54	52.877	3.968	-17.30
33492.4277	0.427730	1.2070	10:15:56	54.864	4.005	-17.30
33492.4278	0.427753	1.2012	10:15:58	56.851	4.040	-18.02
33492.4278	0.427779	1.2012	10:16:00	59.098	4.079	-18.02
33492.4278	0.427800	1.2012	10:16:02	60.912	4.109	-18.02

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33492.4279	0.427859	1.2012	10:16:07	66.010	4.190	-18.02
33492.4279	0.427917	1.2012	10:16:12	71.021	4.263	-18.02
33492.4280	0.427975	1.1954	10:16:17	76.032	4.331	-18.74
33492.4280	0.428032	1.2012	10:16:22	80.957	4.394	-18.02
33492.4281	0.428090	1.1954	10:16:27	85.968	4.454	-18.74
33492.4281	0.428148	1.1954	10:16:32	90.979	4.511	-18.74
33492.4282	0.428206	1.2012	10:16:37	95.990	4.564	-18.02
33492.4283	0.428264	1.2012	10:16:42	101.002	4.615	-18.02
33492.4283	0.428322	1.1954	10:16:47	106.013	4.664	-18.74
33492.4284	0.428380	1.1954	10:16:52	111.024	4.710	-18.74
33492.4284	0.428438	1.1954	10:16:57	116.035	4.754	-18.74
33492.4285	0.428495	1.1954	10:17:02	120.960	4.795	-18.74
33492.4286	0.428553	1.1954	10:17:07	125.971	4.836	-18.74
33492.4286	0.428610	1.1954	10:17:12	130.896	4.874	-18.74
33492.4287	0.428669	1.1954	10:17:17	135.994	4.913	-18.74
33492.4287	0.428727	1.1954	10:17:22	141.005	4.949	-18.74
33492.4288	0.428785	1.1954	10:17:27	146.016	4.984	-18.74
33492.4288	0.428843	1.1954	10:17:32	151.027	5.017	-18.74
33492.4289	0.428900	1.1954	10:17:37	155.952	5.050	-18.74
33492.4290	0.428958	1.1954	10:17:42	160.963	5.081	-18.74
33492.4290	0.429016	1.1954	10:17:47	165.974	5.112	-18.74
33492.4291	0.429074	1.1954	10:17:52	170.986	5.142	-18.74
33492.4291	0.429132	1.1954	10:17:57	175.997	5.170	-18.74
33492.4292	0.429190	1.1954	10:18:02	181.008	5.199	-18.74
33492.4293	0.429306	1.1954	10:18:12	191.030	5.252	-18.74
33492.4294	0.429421	1.1954	10:18:22	200.966	5.303	-18.74
33492.4295	0.429536	1.1954	10:18:32	210.902	5.351	-18.74
33492.4297	0.429652	1.1954	10:18:42	220.925	5.398	-18.74
33492.4298	0.429767	1.1954	10:18:52	230.861	5.442	-18.74
33492.4299	0.429884	1.1954	10:19:02	240.970	5.485	-18.74
33492.4300	0.430000	1.1954	10:19:12	250.992	5.525	-18.74
33492.4301	0.430116	1.1954	10:19:22	261.014	5.565	-18.74
33492.4302	0.430231	1.1896	10:19:32	270.950	5.602	-19.47
33492.4303	0.430347	1.1954	10:19:42	280.973	5.638	-18.74
33492.4305	0.430463	1.1954	10:19:52	290.995	5.673	-18.74
33492.4306	0.430579	1.1954	10:20:02	301.018	5.707	-18.74
33492.4307	0.430694	1.1954	10:20:12	310.954	5.740	-18.74
33492.4308	0.430810	1.1954	10:20:22	320.976	5.771	-18.74
33492.4309	0.430926	1.1896	10:20:32	330.998	5.802	-19.47
33492.4310	0.431041	1.1954	10:20:42	340.934	5.832	-18.74
33492.4312	0.431157	1.1896	10:20:52	350.957	5.861	-19.47
33492.4313	0.431273	1.1896	10:21:02	360.979	5.889	-19.47
33492.4316	0.431619	1.1896	10:21:32	390.874	5.968	-19.47
33492.4320	0.431968	1.1896	10:22:02	421.027	6.043	-19.47
33492.4323	0.432314	1.1896	10:22:32	450.922	6.111	-19.47
33492.4327	0.432661	1.1896	10:23:02	480.902	6.176	-19.47
33492.4330	0.433008	1.1896	10:23:32	510.883	6.236	-19.47
33492.4334	0.433356	1.1896	10:24:02	540.950	6.293	-19.47
33492.4337	0.433703	1.1896	10:24:32	570.931	6.347	-19.47
33492.4341	0.434050	1.1839	10:25:02	600.912	6.398	-20.18
33492.4344	0.434397	1.1839	10:25:32	630.893	6.447	-20.18
33492.4347	0.434744	1.1839	10:26:02	660.874	6.494	-20.18
33492.4351	0.435091	1.1839	10:26:32	690.854	6.538	-20.18
33492.4354	0.435439	1.1839	10:27:02	720.922	6.581	-20.18
33492.4358	0.435787	1.1839	10:27:32	750.989	6.621	-20.18
33492.4361	0.436133	1.1839	10:28:02	780.883	6.660	-20.18
33492.4365	0.436480	1.1839	10:28:32	810.864	6.698	-20.18
33492.4368	0.436829	1.1781	10:29:02	841.018	6.735	-20.90
33492.4372	0.437175	1.1839	10:29:32	870.912	6.770	-20.18
33492.4375	0.437523	1.1781	10:30:02	900.979	6.803	-20.90
33492.4379	0.437870	1.1839	10:30:32	930.960	6.836	-20.18
33492.4382	0.438218	1.1781	10:31:02	961.027	6.868	-20.90
33492.4389	0.438911	1.1781	10:32:02	1020.902	6.928	-20.90
33492.4396	0.439605	1.1781	10:33:02	1080.864	6.986	-20.90
33492.4403	0.440300	1.1723	10:34:02	1140.912	7.040	-21.63
33492.4410	0.440994	1.1723	10:35:02	1200.874	7.091	-21.63
33492.4417	0.441689	1.1723	10:36:02	1260.922	7.140	-21.63
33492.4424	0.442383	1.1723	10:37:02	1320.883	7.186	-21.63
33492.4431	0.443078	1.1781	10:38:02	1380.931	7.231	-20.90
33492.4438	0.443772	1.1665	10:39:02	1440.893	7.273	-22.35

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33492.4445	0.444466	1.1781	10:40:02	1500.854	7.314	-20.90
33492.4452	0.445161	1.1723	10:41:02	1560.902	7.353	-21.63
33492.4459	0.445855	1.1723	10:42:02	1620.864	7.391	-21.63
33492.4466	0.446550	1.1781	10:43:02	1680.912	7.427	-20.90
33492.4472	0.447244	1.1781	10:44:02	1740.874	7.462	-20.90
33492.4479	0.447939	1.1781	10:45:02	1800.922	7.496	-20.90
33492.4486	0.448634	1.1781	10:46:02	1860.970	7.529	-20.90
33492.4500	0.450022	1.1723	10:48:02	1980.893	7.591	-21.63
33492.4514	0.451411	1.1723	10:50:02	2100.902	7.650	-21.63
33492.4528	0.452800	1.1723	10:52:02	2220.912	7.706	-21.63
33492.4542	0.454189	1.1723	10:54:02	2340.922	7.758	-21.63
33492.4556	0.455578	1.1723	10:56:02	2460.931	7.808	-21.63
33492.4570	0.456966	1.1723	10:58:02	2580.854	7.856	-21.63
33492.4584	0.458355	1.1723	11:00:02	2700.864	7.901	-21.63
33492.4597	0.459744	1.1665	11:02:02	2820.874	7.945	-22.35
33492.4611	0.461133	1.1665	11:04:02	2940.883	7.986	-22.35
33492.4625	0.462522	1.1723	11:06:02	3060.893	8.026	-21.63
33492.4639	0.463911	1.1723	11:08:02	3180.902	8.065	-21.63
33492.4653	0.465300	1.1665	11:10:02	3300.912	8.102	-22.35
33492.4667	0.466689	1.1665	11:12:02	3420.922	8.138	-22.35
33492.4681	0.468078	1.1665	11:14:02	3540.931	8.172	-22.35
33492.4695	0.469466	1.1665	11:16:02	3660.854	8.205	-22.35
33492.4709	0.470855	1.1665	11:18:02	3780.864	8.238	-22.35
33492.4722	0.472244	1.1665	11:20:02	3900.874	8.269	-22.35
33492.4736	0.473633	1.1665	11:22:02	4020.883	8.299	-22.35
33492.4750	0.475022	1.1608	11:24:02	4140.893	8.329	-23.06
33492.4764	0.476411	1.1608	11:26:02	4260.902	8.357	-23.06
33492.4778	0.477800	1.1665	11:28:02	4380.912	8.385	-22.35
33492.4792	0.479189	1.1608	11:30:02	4500.922	8.412	-23.06
33492.4806	0.480578	1.1608	11:32:02	4620.931	8.438	-23.06
33492.4820	0.481966	1.1665	11:34:02	4740.854	8.464	-22.35
33492.4834	0.483355	1.1608	11:36:02	4860.864	8.489	-23.06
33492.4847	0.484744	1.1665	11:38:02	4980.874	8.513	-22.35
33492.4861	0.486133	1.1608	11:40:02	5100.883	8.537	-23.06
33492.4875	0.487522	1.1608	11:42:02	5220.893	8.560	-23.06
33492.4889	0.488911	1.1608	11:44:02	5340.902	8.583	-23.06
33492.4903	0.490300	1.1608	11:46:02	5460.912	8.605	-23.06
33492.4917	0.491689	1.1608	11:48:02	5580.922	8.627	-23.06
33492.4931	0.493078	1.1608	11:50:02	5700.931	8.648	-23.06
33492.4945	0.494466	1.1608	11:52:02	5820.854	8.669	-23.06
33492.4959	0.495855	1.1608	11:54:02	5940.864	8.690	-23.06
33492.4972	0.497244	1.1608	11:56:02	6060.874	8.710	-23.06
33492.4986	0.498633	1.1550	11:58:02	6180.883	8.729	-23.79
33492.5000	0.500022	1.1608	12:00:02	6300.893	8.748	-23.06
33492.5014	0.501411	1.3225	12:02:02			
33492.5028	0.502800	1.3282	12:04:02			
WASHBAY AFTERNOON SVE TESTS						
33492.5804	0.580351	1.3340	13:55:42			
33492.5813	0.581294	1.3340	13:57:04			
33492.5817	0.581654	1.3340	13:57:35			
33492.5820	0.582001	1.3398	13:58:05			
33492.5823	0.582348	1.3282	13:58:35			
33492.5827	0.582696	1.3398	13:59:05			
33492.5830	0.583043	1.3340	13:59:35			
						PZB-3
33492.5833	0.583345	1.3398	14:00:01	0.000		0.72
33492.5834	0.583367	1.3225	14:00:03	1.901	0.642	-1.44
33492.5834	0.583378	1.3167	14:00:04	2.851	1.048	-2.16
33492.5834	0.583398	1.3051	14:00:06	4.579	1.522	-3.61
33492.5834	0.583410	1.2994	14:00:07	5.616	1.726	-4.32
33492.5834	0.583421	1.2994	14:00:08	6.566	1.882	-4.32
33492.5834	0.583433	1.2820	14:00:09	7.603	2.029	-6.49
33492.5834	0.583444	1.2763	14:00:10	8.554	2.146	-7.20
33492.5835	0.583456	1.2763	14:00:11	9.590	2.261	-7.20
33492.5835	0.583476	1.2705	14:00:12	11.318	2.426	-7.92
33492.5835	0.583487	1.2589	14:00:13	12.269	2.507	-9.37
33492.5835	0.583499	1.2589	14:00:14	13.306	2.588	-9.37
33492.5835	0.583510	1.2589	14:00:15	14.256	2.657	-9.37
33492.5835	0.583522	1.2589	14:00:16	15.293	2.727	-9.37
33492.5835	0.583542	1.2532	14:00:18	17.021	2.834	-10.08

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33492.5836	0.583553	1.2532	14:00:19	17.971	2.889	-10.08
33492.5836	0.583565	1.2416	14:00:20	19.008	2.945	-11.53
33492.5836	0.583576	1.2474	14:00:21	19.958	2.994	-10.81
33492.5836	0.583588	1.2416	14:00:22	20.995	3.044	-11.53
33492.5836	0.583608	1.2589	14:00:24	22.723	3.123	-9.37
33492.5836	0.583619	1.2358	14:00:25	23.674	3.164	-12.26
33492.5836	0.583631	1.2474	14:00:26	24.710	3.207	-10.81
33492.5836	0.583642	1.2416	14:00:27	25.661	3.245	-11.53
33492.5837	0.583654	1.2416	14:00:28	26.698	3.285	-11.53
33492.5837	0.583666	1.2416	14:00:29	27.734	3.323	-11.53
33492.5837	0.583685	1.2416	14:00:30	29.376	3.380	-11.53
33492.5837	0.583697	1.2358	14:00:31	30.413	3.415	-12.26
33492.5837	0.583708	1.2358	14:00:32	31.363	3.446	-12.26
33492.5837	0.583720	1.2358	14:00:33	32.400	3.478	-12.26
33492.5837	0.583731	1.2358	14:00:34	33.350	3.507	-12.26
33492.5838	0.583751	1.2358	14:00:36	35.078	3.558	-12.26
33492.5838	0.583763	1.2358	14:00:37	36.115	3.587	-12.26
33492.5838	0.583774	1.2358	14:00:38	37.066	3.613	-12.26
33492.5838	0.583786	1.2358	14:00:39	38.102	3.640	-12.26
33492.5838	0.583797	1.2358	14:00:40	39.053	3.665	-12.26
33492.5838	0.583815	1.2358	14:00:42	40.608	3.704	-12.26
33492.5838	0.583840	1.2301	14:00:44	42.768	3.756	-12.97
33492.5839	0.583865	1.2416	14:00:46	44.928	3.805	-11.53
33492.5839	0.583888	1.2358	14:00:48	46.915	3.848	-12.26
33492.5839	0.583911	1.2301	14:00:50	48.902	3.890	-12.97
33492.5839	0.583934	1.2301	14:00:52	50.890	3.930	-12.97
33492.5840	0.583957	1.2301	14:00:54	52.877	3.968	-12.97
33492.5840	0.583980	1.2301	14:00:56	54.864	4.005	-12.97
33492.5840	0.584003	1.2358	14:00:58	56.851	4.040	-12.26
33492.5840	0.584029	1.2301	14:01:00	59.098	4.079	-12.97
33492.5841	0.584050	1.2358	14:01:02	60.912	4.109	-12.26
33492.5841	0.584108	1.2243	14:01:07	65.923	4.188	-13.69
33492.5842	0.584166	1.2301	14:01:12	70.934	4.262	-12.97
33492.5842	0.584223	1.2243	14:01:17	75.859	4.329	-13.69
33492.5843	0.584281	1.2301	14:01:22	80.870	4.393	-12.97
33492.5843	0.584339	1.2301	14:01:27	85.882	4.453	-12.97
33492.5844	0.584397	1.2301	14:01:32	90.893	4.510	-12.97
33492.5845	0.584455	1.2301	14:01:37	95.904	4.563	-12.97
33492.5845	0.584513	1.2301	14:01:42	100.915	4.614	-12.97
33492.5846	0.584571	1.2301	14:01:47	105.926	4.663	-12.97
33492.5846	0.584628	1.2243	14:01:52	110.851	4.708	-13.69
33492.5847	0.584686	1.2301	14:01:57	115.862	4.752	-12.97
33492.5847	0.584744	1.2301	14:02:02	120.874	4.795	-12.97
33492.5848	0.584802	1.2301	14:02:07	125.885	4.835	-12.97
33492.5849	0.584860	1.2301	14:02:12	130.896	4.874	-12.97
33492.5849	0.584918	1.2301	14:02:17	135.907	4.912	-12.97
33492.5850	0.584976	1.2301	14:02:22	140.918	4.948	-12.97
33492.5850	0.585034	1.2301	14:02:27	145.930	4.983	-12.97
33492.5851	0.585091	1.2301	14:02:32	150.854	5.016	-12.97
33492.5851	0.585149	1.2243	14:02:37	155.866	5.049	-13.69
33492.5852	0.585207	1.2243	14:02:42	160.877	5.081	-13.69
33492.5853	0.585265	1.2243	14:02:47	165.888	5.111	-13.69
33492.5853	0.585323	1.2243	14:02:52	170.899	5.141	-13.69
33492.5854	0.585381	1.2243	14:02:57	175.910	5.170	-13.69
33492.5854	0.585440	1.2243	14:03:02	181.008	5.199	-13.69
33492.5856	0.585554	1.2243	14:03:12	190.858	5.252	-13.69
33492.5857	0.585670	1.2243	14:03:22	200.880	5.303	-13.69
33492.5858	0.585786	1.2243	14:03:32	210.902	5.351	-13.69
33492.5859	0.585902	1.2243	14:03:42	220.925	5.398	-13.69
33492.5860	0.586017	1.2243	14:03:52	230.861	5.442	-13.69
33492.5861	0.586133	1.2243	14:04:02	240.883	5.484	-13.69
33492.5862	0.586249	1.2243	14:04:12	250.906	5.525	-13.69
33492.5864	0.586365	1.2243	14:04:22	260.928	5.564	-13.69
33492.5865	0.586480	1.2243	14:04:32	270.864	5.602	-13.69
33492.5866	0.586596	1.2243	14:04:42	280.886	5.638	-13.69
33492.5867	0.586712	1.2243	14:04:52	290.909	5.673	-13.69
33492.5868	0.586828	1.2243	14:05:02	300.931	5.707	-13.69
33492.5869	0.586943	1.2243	14:05:12	310.867	5.739	-13.69
33492.5871	0.587059	1.2243	14:05:22	320.890	5.771	-13.69
33492.5872	0.587175	1.2070	14:05:32	330.912	5.802	-15.85

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33492.5873	0.587291	1.2301	14:05:42	340.934	5.832	-12.97
33492.5874	0.587406	1.2243	14:05:52	350.870	5.860	-13.69
33492.5875	0.587523	1.2185	14:06:02	360.979	5.889	-14.41
33492.5879	0.587869	1.2243	14:06:32	390.874	5.968	-13.69
33492.5882	0.588216	1.2243	14:07:02	420.854	6.042	-13.69
33492.5886	0.588564	1.2127	14:07:32	450.922	6.111	-15.14
33492.5889	0.588911	1.2243	14:08:02	480.902	6.176	-13.69
33492.5893	0.589258	1.2243	14:08:32	510.883	6.236	-13.69
33492.5896	0.589605	1.2127	14:09:02	540.864	6.293	-15.14
33492.5900	0.589953	1.2243	14:09:32	570.931	6.347	-13.69
33492.5903	0.590300	1.2243	14:10:02	600.912	6.398	-13.69
33492.5906	0.590647	1.2301	14:10:32	630.893	6.447	-12.97
33492.5910	0.590994	1.2243	14:11:02	660.874	6.494	-13.69
33492.5913	0.591341	1.2243	14:11:32	690.854	6.538	-13.69
33492.5917	0.591689	1.2243	14:12:02	720.922	6.581	-13.69
33492.5920	0.592036	1.2243	14:12:32	750.902	6.621	-13.69
33492.5924	0.592383	1.2243	14:13:02	780.883	6.660	-13.69
33492.5927	0.592730	1.2301	14:13:32	810.864	6.698	-12.97
33492.5931	0.593078	1.2301	14:14:02	840.931	6.735	-12.97
33492.5934	0.593425	1.2243	14:14:32	870.912	6.770	-13.69
33492.5938	0.593772	1.2243	14:15:02	900.893	6.803	-13.69
33492.5941	0.594119	1.2243	14:15:32	930.874	6.836	-13.69
33492.5945	0.594468	1.2243	14:16:02	961.027	6.868	-13.69
33492.5952	0.595161	1.2243	14:17:02	1020.902	6.928	-13.69
33492.5959	0.595855	1.2301	14:18:02	1080.864	6.986	-12.97
33492.5966	0.596550	1.2243	14:19:02	1140.912	7.040	-13.69
33492.5972	0.597244	1.2243	14:20:02	1200.874	7.091	-13.69
33492.5979	0.597939	1.2243	14:21:02	1260.922	7.140	-13.69
33492.5986	0.598633	1.2301	14:22:02	1320.883	7.186	-12.97
33492.5993	0.599328	1.2243	14:23:02	1380.931	7.231	-13.69
33492.6000	0.600022	1.2301	14:24:02	1440.893	7.273	-12.97
33492.6007	0.600716	1.2301	14:25:02	1500.854	7.314	-12.97
33492.6014	0.601411	1.2301	14:26:02	1560.902	7.353	-12.97
33492.6021	0.602105	1.2301	14:27:02	1620.864	7.391	-12.97
33492.6028	0.602800	1.2301	14:28:02	1680.912	7.427	-12.97
33492.6035	0.603494	1.2301	14:29:02	1740.874	7.462	-12.97
33492.6042	0.604189	1.2301	14:30:02	1800.922	7.496	-12.97
33492.6049	0.604884	1.2301	14:31:02	1860.970	7.529	-12.97
33492.6063	0.606272	1.2301	14:33:02	1980.893	7.591	-12.97
33492.6077	0.607661	1.2243	14:35:02	2100.902	7.650	-13.69
33492.6091	0.609050	1.2301	14:37:02	2220.912	7.706	-12.97
33492.6104	0.610439	1.2358	14:39:02	2340.922	7.758	-12.26
33492.6118	0.611828	1.2243	14:41:02	2460.931	7.808	-13.69
33492.6132	0.613216	1.2301	14:43:02	2580.854	7.856	-12.97
33492.6146	0.614605	1.2301	14:45:02	2700.864	7.901	-12.97
33492.6160	0.615994	1.2301	14:47:02	2820.874	7.945	-12.97
33492.6174	0.617383	1.2301	14:49:02	2940.883	7.986	-12.97
33492.6188	0.618772	1.2301	14:51:02	3060.893	8.026	-12.97
33492.6202	0.620161	1.2301	14:53:02	3180.902	8.065	-12.97
33492.6216	0.621550	1.2301	14:55:02	3300.912	8.102	-12.97
33492.6229	0.622939	1.2301	14:57:02	3420.922	8.138	-12.97
33492.6243	0.624328	1.2301	14:59:02	3540.931	8.172	-12.97
33492.6257	0.625716	1.2301	15:01:02	3660.854	8.205	-12.97
33492.6271	0.627105	1.2301	15:03:02	3780.864	8.238	-12.97
33492.6285	0.628494	1.2301	15:05:02	3900.874	8.269	-12.97
33492.6299	0.629883	1.2301	15:07:02	4020.883	8.299	-12.97
33492.6313	0.631272	1.2301	15:09:02	4140.893	8.329	-12.97
33492.6419	0.641909	1.3340	15:24:21			
33492.6420	0.641966	1.3340	15:24:26			
33492.6420	0.642024	1.3340	15:24:31			
33492.6421	0.642082	1.3340	15:24:36			
33492.6421	0.642140	1.3340	15:24:41			
33492.6422	0.642198	1.3340	15:24:46			
33492.6423	0.642256	1.3398	15:24:51			
33492.6423	0.642314	1.3398	15:24:56			
33492.6424	0.642372	1.3398	15:25:01			
33492.6424	0.642429	1.3340	15:25:06			
SHORT TEST						
33492.6507	0.650696	1.3340	15:37:00	0.000		0.00

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33492.6507	0.650713	1.3340	15:37:02	1.469	0.384	0.00
33492.6507	0.650725	1.3282	15:37:03	2.506	0.919	-0.72
33492.6507	0.650736	1.3225	15:37:04	3.456	1.240	-1.44
33492.6508	0.650756	1.3109	15:37:05	5.184	1.646	-2.88
33492.6508	0.650767	1.2994	15:37:06	6.134	1.814	-4.32
33492.6508	0.650779	1.2936	15:37:07	7.171	1.970	-5.04
33492.6508	0.650791	1.2878	15:37:08	8.208	2.105	-5.77
33492.6508	0.650802	1.2763	15:37:09	9.158	2.215	-7.20
33492.6508	0.650822	1.2705	15:37:11	10.886	2.388	-7.92
33492.6508	0.650833	1.2647	15:37:12	11.837	2.471	-8.65
33492.6508	0.650845	1.2647	15:37:13	12.874	2.555	-8.65
33492.6509	0.650856	1.2589	15:37:14	13.824	2.626	-9.37
33492.6509	0.650868	1.2589	15:37:15	14.861	2.699	-9.37
33492.6509	0.650888	1.2532	15:37:17	16.589	2.809	-10.08
33492.6509	0.650899	1.2532	15:37:18	17.539	2.864	-10.08
33492.6509	0.650911	1.2474	15:37:19	18.576	2.922	-10.81
33492.6509	0.650922	1.2474	15:37:20	19.526	2.972	-10.81
33492.6509	0.650934	1.2474	15:37:21	20.563	3.024	-10.81
33492.6509	0.650946	1.2474	15:37:22	21.600	3.073	-10.81
33492.6510	0.650965	1.2474	15:37:23	23.242	3.146	-10.81
33492.6510	0.650977	1.2474	15:37:24	24.278	3.190	-10.81
33492.6510	0.650988	1.2416	15:37:25	25.229	3.228	-11.53
33492.6510	0.651000	1.2416	15:37:26	26.266	3.268	-11.53
33492.6510	0.651012	1.2416	15:37:27	27.302	3.307	-11.53
33492.6510	0.651031	1.2301	15:37:29	28.944	3.365	-12.97
33492.6510	0.651043	1.2358	15:37:30	29.981	3.401	-12.26
33492.6511	0.651054	1.2358	15:37:31	30.931	3.432	-12.26
33492.6511	0.651066	1.2358	15:37:32	31.968	3.465	-12.26
33492.6511	0.651078	1.2358	15:37:33	33.005	3.497	-12.26
33492.6511	0.651098	1.2358	15:37:35	34.733	3.548	-12.26
33492.6511	0.651110	1.2358	15:37:36	35.770	3.577	-12.26
33492.6511	0.651122	1.2358	15:37:37	36.806	3.606	-12.26
33492.6511	0.651133	1.2358	15:37:38	37.757	3.631	-12.26
33492.6511	0.651145	1.2358	15:37:39	38.794	3.658	-12.26
33492.6512	0.651168	1.2358	15:37:41	40.781	3.708	-12.26
33492.6512	0.651193	1.2301	15:37:43	42.941	3.760	-12.97
33492.6512	0.651214	1.2358	15:37:45	44.755	3.801	-12.26
33492.6512	0.651237	1.2358	15:37:47	46.742	3.845	-12.26
33492.6513	0.651260	1.2358	15:37:49	48.730	3.886	-12.26
33492.6513	0.651284	1.2358	15:37:51	50.803	3.928	-12.26
33492.6513	0.651307	1.2358	15:37:53	52.790	3.966	-12.26
33492.6513	0.651330	1.2358	15:37:55	54.778	4.003	-12.26
33492.6514	0.651353	1.2358	15:37:57	56.765	4.039	-12.26
33492.6514	0.651378	1.2358	15:37:59	58.925	4.076	-12.26
33492.6514	0.651399	1.2358	15:38:01	60.739	4.107	-12.26
33492.6515	0.651457	1.2358	15:38:06	65.750	4.186	-12.26
33492.6515	0.651515	1.2358	15:38:11	70.762	4.259	-12.26
33492.6516	0.651573	1.2358	15:38:16	75.773	4.328	-12.26
33492.6516	0.651631	1.2358	15:38:21	80.784	4.392	-12.26
33492.6517	0.651689	1.2358	15:38:26	85.795	4.452	-12.26
33492.6517	0.651747	1.2358	15:38:31	90.806	4.509	-12.26
33492.6518	0.651804	1.2358	15:38:36	95.731	4.562	-12.26
33492.6519	0.651862	1.2301	15:38:41	100.742	4.613	-12.97
33492.6519	0.651920	1.2358	15:38:46	105.754	4.661	-12.26
33492.6520	0.651978	1.2358	15:38:51	110.765	4.707	-12.26
33492.6520	0.652036	1.2358	15:38:56	115.776	4.752	-12.26
33492.6521	0.652094	1.2301	15:39:01	120.787	4.794	-12.97
33492.6522	0.652152	1.2243	15:39:06	125.798	4.835	-13.69
33492.6522	0.652209	1.2301	15:39:11	130.723	4.873	-12.97
33492.6523	0.652267	1.2358	15:39:16	135.734	4.911	-12.26
33492.6523	0.652325	1.2301	15:39:21	140.746	4.947	-12.97
33492.6524	0.652383	1.2301	15:39:26	145.757	4.982	-12.97
33492.6524	0.652441	1.2301	15:39:31	150.768	5.016	-12.97
33492.6525	0.652499	1.2301	15:39:36	155.779	5.048	-12.97
33492.6526	0.652557	1.2301	15:39:41	160.790	5.080	-12.97
33492.6526	0.652615	1.2301	15:39:46	165.802	5.111	-12.97
33492.6527	0.652672	1.2301	15:39:51	170.726	5.140	-12.97
33492.6527	0.652730	1.2301	15:39:56	175.738	5.169	-12.97
33492.6528	0.652789	1.2243	15:40:01	180.835	5.198	-13.69
33492.6529	0.652904	1.2301	15:40:11	190.771	5.251	-12.97

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33492.6530	0.653020	1.2301	15:40:21	200.794	5.302	-12.97
33492.6531	0.653135	1.2301	15:40:31	210.730	5.351	-12.97
33492.6533	0.653251	1.2301	15:40:41	220.752	5.397	-12.97
33492.6534	0.653367	1.2301	15:40:51	230.774	5.441	-12.97
33492.6535	0.653483	1.2301	15:41:01	240.797	5.484	-12.97
33492.6536	0.653598	1.2301	15:41:11	250.733	5.524	-12.97
33492.6537	0.653714	1.2301	15:41:21	260.755	5.564	-12.97
33492.6538	0.653830	1.2301	15:41:31	270.778	5.601	-12.97
33492.6539	0.653946	1.2301	15:41:41	280.800	5.638	-12.97
33492.6541	0.654061	1.2705	15:41:51			
33492.6542	0.654177	1.3109	15:42:01			
33492.6543	0.654293	1.3282	15:42:11			
33492.6544	0.654409	1.3282	15:42:21			
33492.6545	0.654524	1.3340	15:42:31			
33492.6546	0.654640	1.3340	15:42:41			
33492.6548	0.654756	1.3340	15:42:51			
33492.6549	0.654873	1.3340	15:43:01			
33492.6552	0.655219	1.3340	15:43:31			
33492.6597	0.659728	1.3340	15:50:00	0.000		0.00
33492.6597	0.659748	1.3398	15:50:02	1.728	0.547	0.72
33492.6598	0.659759	1.3282	15:50:03	2.678	0.985	-0.72
33492.6598	0.659771	1.3225	15:50:04	3.715	1.312	-1.44
33492.6598	0.659782	1.3109	15:50:05	4.666	1.540	-2.88
33492.6598	0.659794	1.3051	15:50:06	5.702	1.741	-3.61
33492.6598	0.659814	1.2878	15:50:08	7.430	2.006	-5.77
33492.6598	0.659825	1.2820	15:50:09	8.381	2.126	-6.49
33492.6598	0.659837	1.2763	15:50:10	9.418	2.243	-7.20
33492.6598	0.659848	1.2705	15:50:11	10.368	2.339	-7.92
33492.6599	0.659860	1.2647	15:50:12	11.405	2.434	-8.65
33492.6599	0.659880	1.2589	15:50:14	13.133	2.575	-9.37
33492.6599	0.659891	1.2589	15:50:15	14.083	2.645	-9.37
33492.6599	0.659903	1.2532	15:50:16	15.120	2.716	-10.08
33492.6599	0.659914	1.2532	15:50:17	16.070	2.777	-10.08
33492.6599	0.659926	1.2532	15:50:18	17.107	2.839	-10.08
33492.6599	0.659937	1.2474	15:50:19	18.058	2.894	-10.81
33492.6600	0.659957	1.2474	15:50:20	19.786	2.985	-10.81
33492.6600	0.659969	1.2474	15:50:21	20.822	3.036	-10.81
33492.6600	0.659980	1.2416	15:50:22	21.773	3.081	-11.53
33492.6600	0.659992	1.2416	15:50:23	22.810	3.127	-11.53
33492.6600	0.660003	1.2416	15:50:24	23.760	3.168	-11.53
33492.6600	0.660023	1.2416	15:50:26	25.488	3.238	-11.53
33492.6600	0.660035	1.2358	15:50:27	26.525	3.278	-12.26
33492.6600	0.660046	1.2416	15:50:28	27.475	3.313	-11.53
33492.6601	0.660058	1.2358	15:50:29	28.512	3.350	-12.26
33492.6601	0.660069	1.2358	15:50:30	29.462	3.383	-12.26
33492.6601	0.660089	1.2358	15:50:32	31.190	3.440	-12.26
33492.6601	0.660101	1.2358	15:50:33	32.227	3.473	-12.26
33492.6601	0.660112	1.2358	15:50:34	33.178	3.502	-12.26
33492.6601	0.660125	1.2358	15:50:35	34.301	3.535	-12.26
33492.6601	0.660137	1.2358	15:50:36	35.338	3.565	-12.26
33492.6601	0.660148	1.2358	15:50:37	36.288	3.591	-12.26
33492.6602	0.660168	1.2358	15:50:39	38.016	3.638	-12.26
33492.6602	0.660179	1.2358	15:50:39	38.966	3.663	-12.26
33492.6602	0.660191	1.2358	15:50:41	40.003	3.689	-12.26
33492.6602	0.660219	1.2358	15:50:43	42.422	3.748	-12.26
33492.6602	0.660242	1.2358	15:50:45	44.410	3.793	-12.26
33492.6603	0.660265	1.2358	15:50:47	46.397	3.837	-12.26
33492.6603	0.660291	1.2358	15:50:49	48.643	3.885	-12.26
33492.6603	0.660311	1.2358	15:50:51	50.371	3.919	-12.26
33492.6603	0.660334	1.2301	15:50:53	52.358	3.958	-12.97
33492.6604	0.660358	1.2358	15:50:55	54.432	3.997	-12.26
33492.6604	0.660381	1.2358	15:50:57	56.419	4.033	-12.26
33492.6604	0.660404	1.2301	15:50:59	58.406	4.067	-12.97
33492.6604	0.660428	1.2358	15:51:01	60.480	4.102	-12.26
33492.6605	0.660485	1.2358	15:51:06	65.405	4.181	-12.26
33492.6605	0.660543	1.2301	15:51:11	70.416	4.254	-12.97
33492.6606	0.660601	1.2301	15:51:16	75.427	4.323	-12.97
33492.6607	0.660659	1.2301	15:51:21	80.438	4.387	-12.97
33492.6607	0.660716	1.2301	15:51:26	85.363	4.447	-12.97

SVE PILOT TEST - WASH BAY AT DSI ARTESIA, NM FACILITY
DATA LOGGER RECORDINGS AND DATA CONVERSION

33492.6608	0.660774	1.2301	15:51:31	90.374	4.504	-12.97
33492.6608	0.660832	1.2301	15:51:36	95.386	4.558	-12.97
33492.6609	0.660890	1.2301	15:51:41	100.397	4.609	-12.97
33492.6609	0.660948	1.2301	15:51:46	105.408	4.658	-12.97
33492.6610	0.661006	1.2301	15:51:51	110.419	4.704	-12.97
33492.6611	0.661064	1.2301	15:51:56	115.430	4.749	-12.97
33492.6611	0.661122	1.2301	15:52:01	120.442	4.791	-12.97
33492.6612	0.661179	1.2358	15:52:06	125.366	4.831	-12.26
33492.6612	0.661237	1.2301	15:52:11	130.378	4.870	-12.97
33492.6613	0.661295	1.2301	15:52:16	135.389	4.908	-12.97
33492.6614	0.661353	1.2301	15:52:21	140.400	4.944	-12.97
33492.6614	0.661411	1.2301	15:52:26	145.411	4.980	-12.97
33492.6615	0.661469	1.2301	15:52:31	150.422	5.013	-12.97
33492.6615	0.661527	1.2243	15:52:36	155.434	5.046	-13.69
33492.6616	0.661584	1.2301	15:52:41	160.358	5.077	-12.97
33492.6616	0.661642	1.2243	15:52:46	165.370	5.108	-13.69
33492.6617	0.661700	1.2301	15:52:51	170.381	5.138	-12.97
33492.6618	0.661758	1.2358	15:52:56	175.392	5.167	-12.26
33492.6618	0.661817	1.2243	15:53:01	180.490	5.196	-13.69
33492.6619	0.661932	1.2301	15:53:11	190.426	5.249	-12.97
33492.6620	0.662047	1.2301	15:53:21	200.362	5.300	-12.97
33492.6622	0.662163	1.2301	15:53:31	210.384	5.349	-12.97
33492.6623	0.662279	1.2301	15:53:41	220.406	5.395	-12.97
33492.6624	0.662395	1.2301	15:53:51	230.429	5.440	-12.97
33492.6625	0.662510	1.2301	15:54:01	240.365	5.482	-12.97
33492.6626	0.662626	1.2358	15:54:11	250.387	5.523	-12.26
33492.6627	0.662742	1.2994	15:54:21			
33492.6629	0.662858	1.3167	15:54:31			
33492.6630	0.662973	1.3282	15:54:41			
33492.6631	0.663089	1.3340	15:54:51			
33492.6632	0.663205	1.3340	15:55:01			
33492.6633	0.663321	1.3456	15:55:11			
33492.6634	0.663436	1.3340	15:55:21			
33492.6636	0.663552	1.3340	15:55:31			
33492.6637	0.663668	1.3340	15:55:41			
33492.6638	0.663784	1.3340	15:55:51			
33492.6639	0.663900	1.3340	15:56:01			

SVE PILOT TEST - AT DSI ARTESIA, NM FACILITY
MANUAL RECORDINGS AND DATA CONVERSION

Time min	PZB1 cm	PZB2 cm	PZB3 cm	PZB4 cm	Time sec	ln(t)	PZB2 Delta P PSF	PZB3 Delta P PSF	PZB4 Delta P PSF
0.00		68.60	74.90	77.20	0		0.00	0.00	0.00
0.25		67.60	72.90	76.80	15	2.708	-4.09	-8.19	-1.64
0.50		67.30	72.30	76.50	30	3.401	-5.32	-10.65	-2.87
0.75		67.20	72.15	76.40	45	3.807	-5.73	-11.26	-3.28
1.00		67.10	72.00	76.38	60	4.094	-6.14	-11.87	-3.36
1.25		67.00	71.90	76.35	75	4.317	-6.55	-12.28	-3.48
1.50		67.00	71.90	76.30	90	4.500	-6.55	-12.28	-3.69
1.75		67.00	71.85	76.30	105	4.654	-6.55	-12.49	-3.69
2.00		66.90	71.85	76.28	120	4.787	-6.96	-12.49	-3.77
2.25		66.90	71.80	76.25	135	4.905	-6.96	-12.69	-3.89
2.50		66.90	71.80	76.25	150	5.011	-6.96	-12.69	-3.89
2.75		66.90	71.80	76.22	165	5.106	-6.96	-12.69	-4.01
3.00		66.90	71.80	76.22	180	5.193	-6.96	-12.69	-4.01
3.25		66.90	71.80	76.22	195	5.273	-6.96	-12.69	-4.01
3.50		66.90	71.80	76.22	210	5.347	-6.96	-12.69	-4.01
3.75		66.90	71.80	76.22	225	5.416	-6.96	-12.69	-4.01
4.00		66.90	71.75	76.22	240	5.481	-6.96	-12.90	-4.01
4.25		66.90	71.75	76.22	255	5.541	-6.96	-12.90	-4.01
4.50		66.90	71.75	76.20	270	5.598	-6.96	-12.90	-4.09
4.75		66.90	71.75	76.20	285	5.652	-6.96	-12.90	-4.09
5.00		66.90	71.75	76.20	300	5.704	-6.96	-12.90	-4.09
10.00		66.85	71.65	76.15	600	6.397	-7.17	-13.31	-4.30
18.00		66.80	71.55	76.10	1080	6.985	-7.37	-13.72	-4.50
30.00		66.80	71.70	76.15	1800	7.496	-7.37	-13.10	-4.30
45.00		66.80	71.65	76.10	2700	7.901	-7.37	-13.31	-4.50
60.00		66.70	71.55	76.10	3600	8.189	-7.78	-13.72	-4.50
75.00		66.75	71.50	76.10	4500	8.412	-7.57	-13.92	-4.50
100.00		66.75	71.50	76.05	6000	8.700	-7.57	-13.92	-4.71

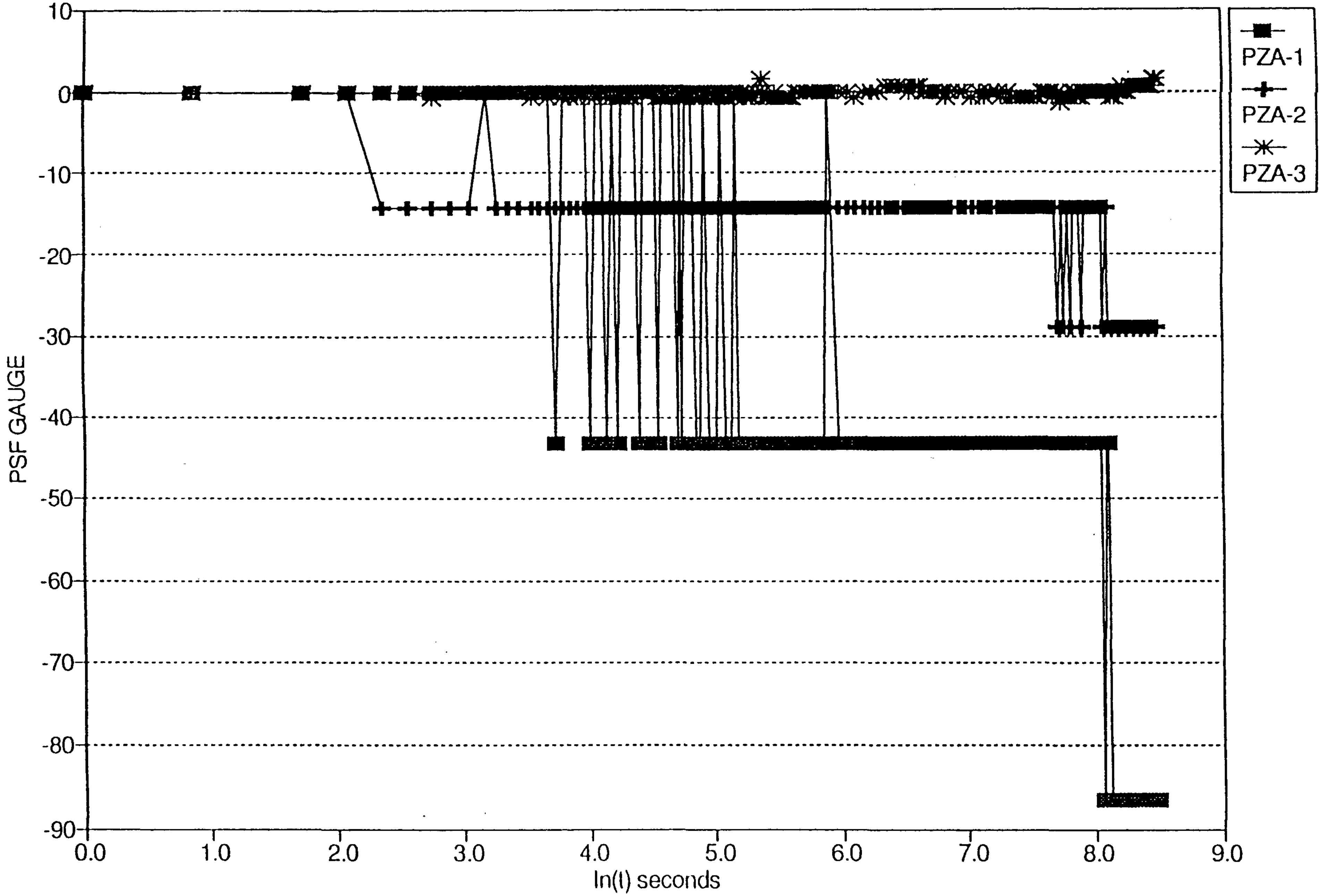
					ln(t)	PZB1	PZB2	PZB4
0.00	74.60	68.20	77.00	0		0.00	0.00	0.00
0.17	73.00			10.2	2.322	-6.55		
0.25	70.90			15	2.708	-15.15		
0.50	70.30			30	3.401	-17.61		
0.75	70.10		76.30	45	3.807	-18.43		-2.87
1.00	70.00		76.25	60	4.094	-18.83		-3.07
1.25		66.60	76.20	75	4.317		-6.55	-3.28
1.50	70.00		76.15	90	4.500	-18.83		-3.48
1.75		66.60	76.15	105	4.654		-6.55	-3.48
2.00		66.60	76.10	120	4.787		-6.55	-3.69
2.25	70.00			135	4.905	-18.83		
2.50	69.90			150	5.011	-19.24		
2.75		66.55	76.10	165	5.106		-6.76	-3.69
3.00	69.90		76.05	180	5.193	-19.24		-3.89
3.50		66.50	76.05	210	5.347		-6.96	-3.89
4.00	69.85		76.05	240	5.481	-19.45		-3.89
4.50	69.85	66.50	76.05	270	5.598	-19.45	-6.96	-3.89
5.00	69.80		76.00	300	5.704	-19.65		-4.09
5.25		66.50	76.00	315	5.753		-6.96	-4.09
6.50			76.00	390	5.966			-4.09
7.50	69.80	66.50	76.00	450	6.109	-19.65	-6.96	-4.09
13.00	69.80	66.45	76.00	780	6.659	-19.65	-7.17	-4.09
20.00	69.80	66.40	76.00	1200	7.090	-19.65	-7.37	-4.09
30.00	69.80	66.45	76.00	1800	7.496	-19.65	-7.17	-4.09
45.00	69.80	66.50	76.00	2700	7.901	-19.65	-6.96	-4.09
60.00	69.80	66.40	76.00	3600	8.189	-19.65	-7.37	-4.09

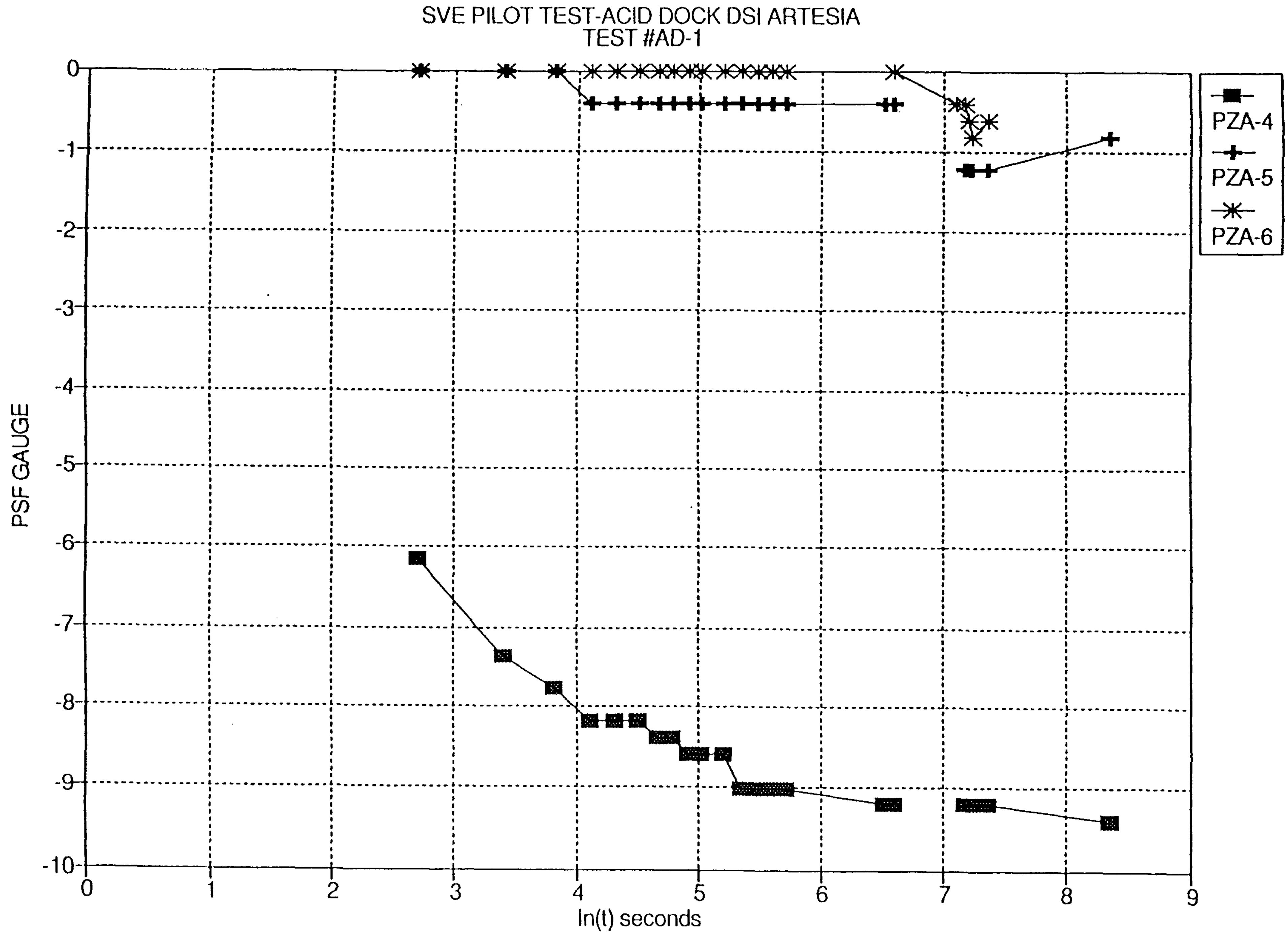
APPENDIX J

PLOTS OF SVE PILOT TEST DATA

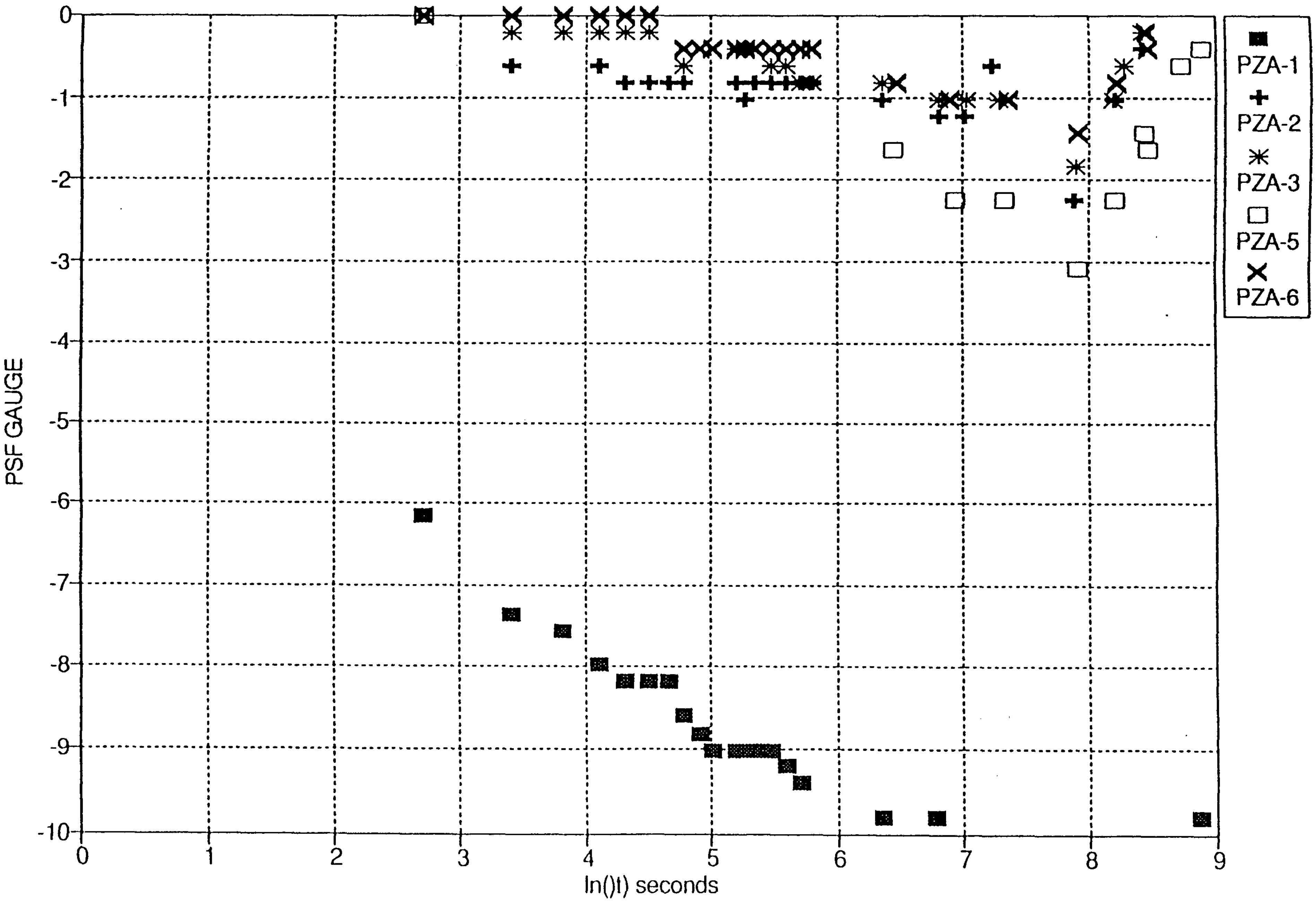
Western Water Consultants, Inc.

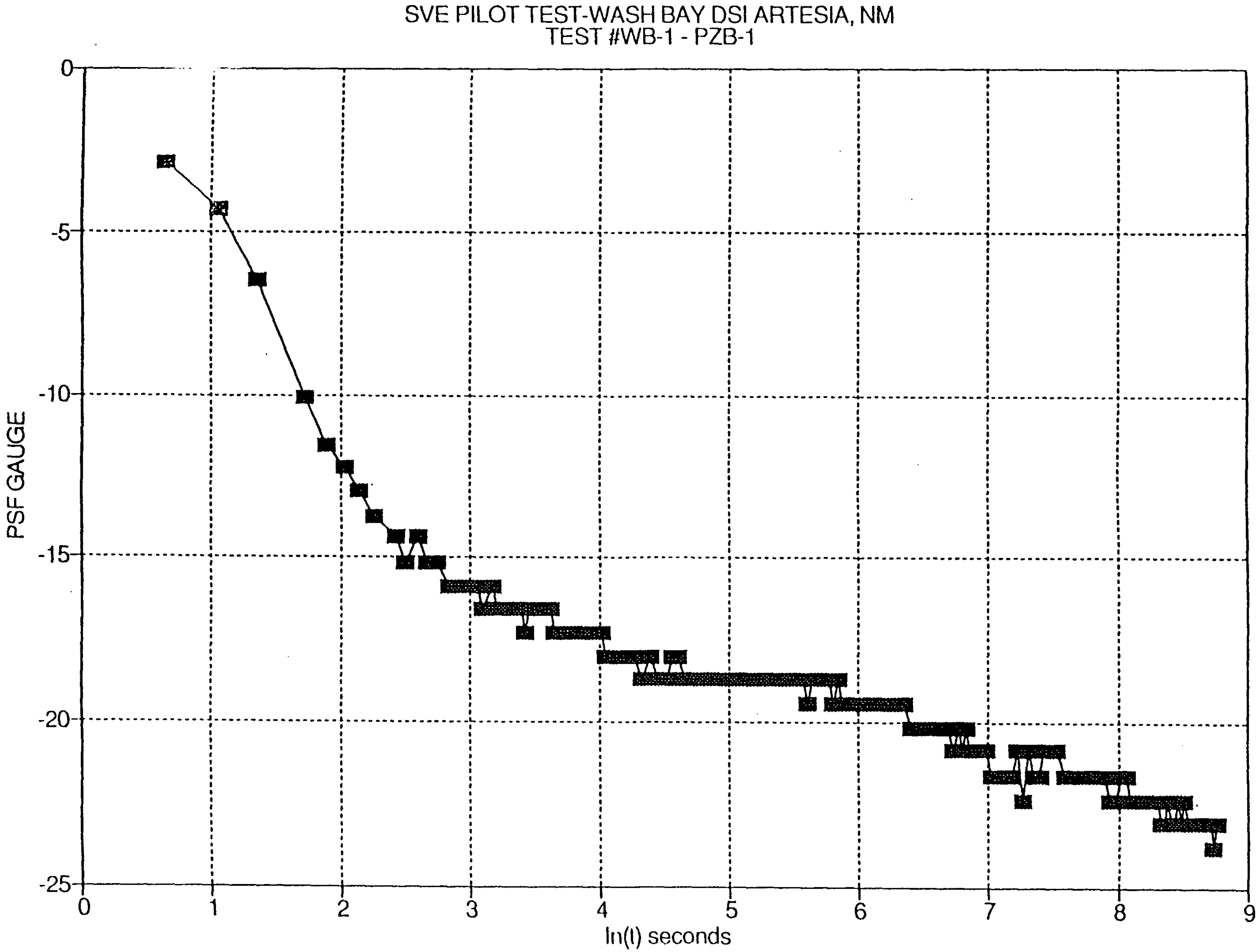
SVE PILOT TEST-ACID DOCK DSI ARTESIA,NM
TEST AD#1



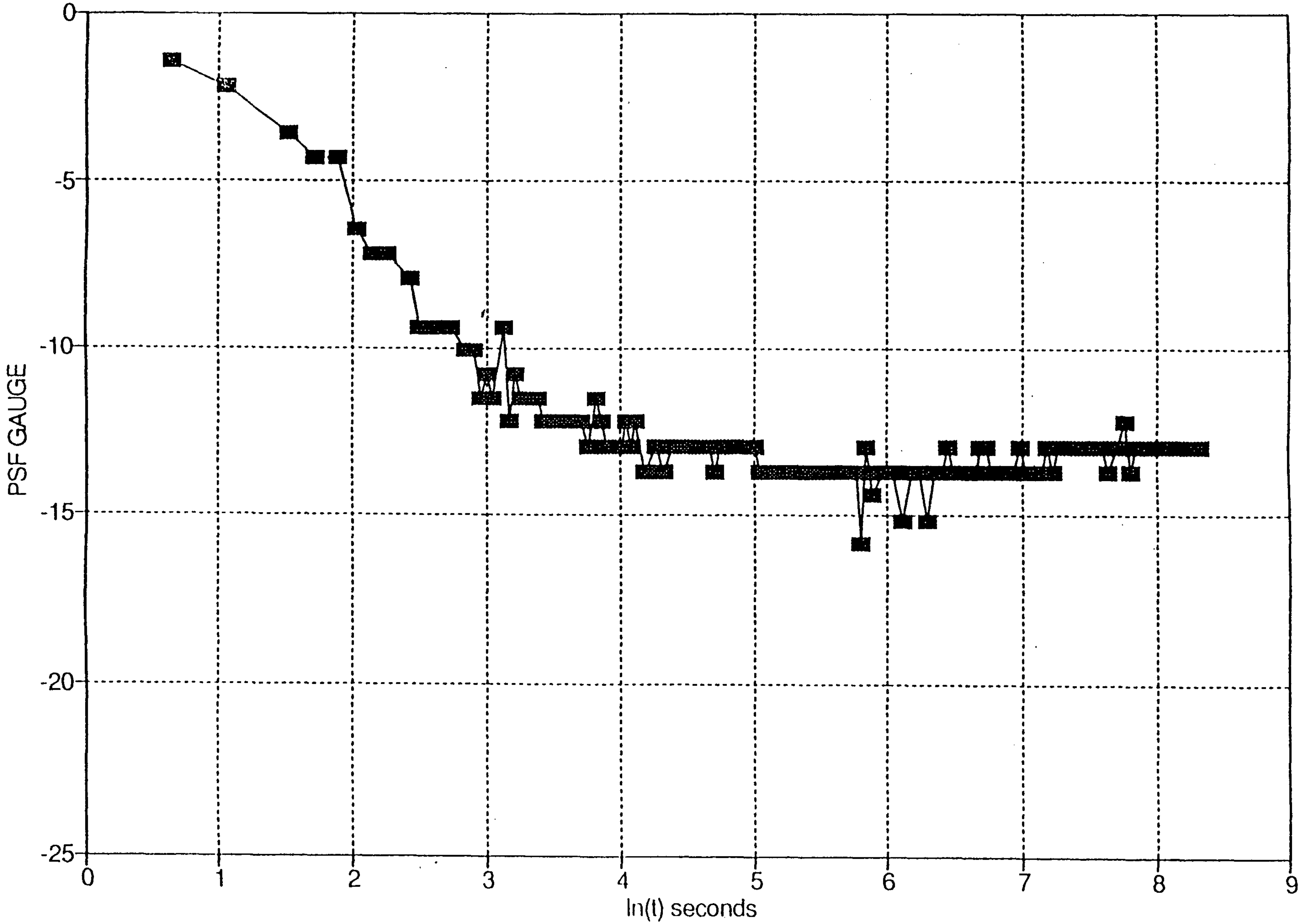

SVE PILOT TEST-ACID DOCK DSI ARTESIA
TEST #AD-1
PSF GAUGE
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
0
1
2
3
4
5
6
7
8
9
ln(t) seconds
PZA-4
PZA-5
PZA-6

SVE PILOT TEST-ACID DOCK DSI ARTESIA
TEST #AD-2

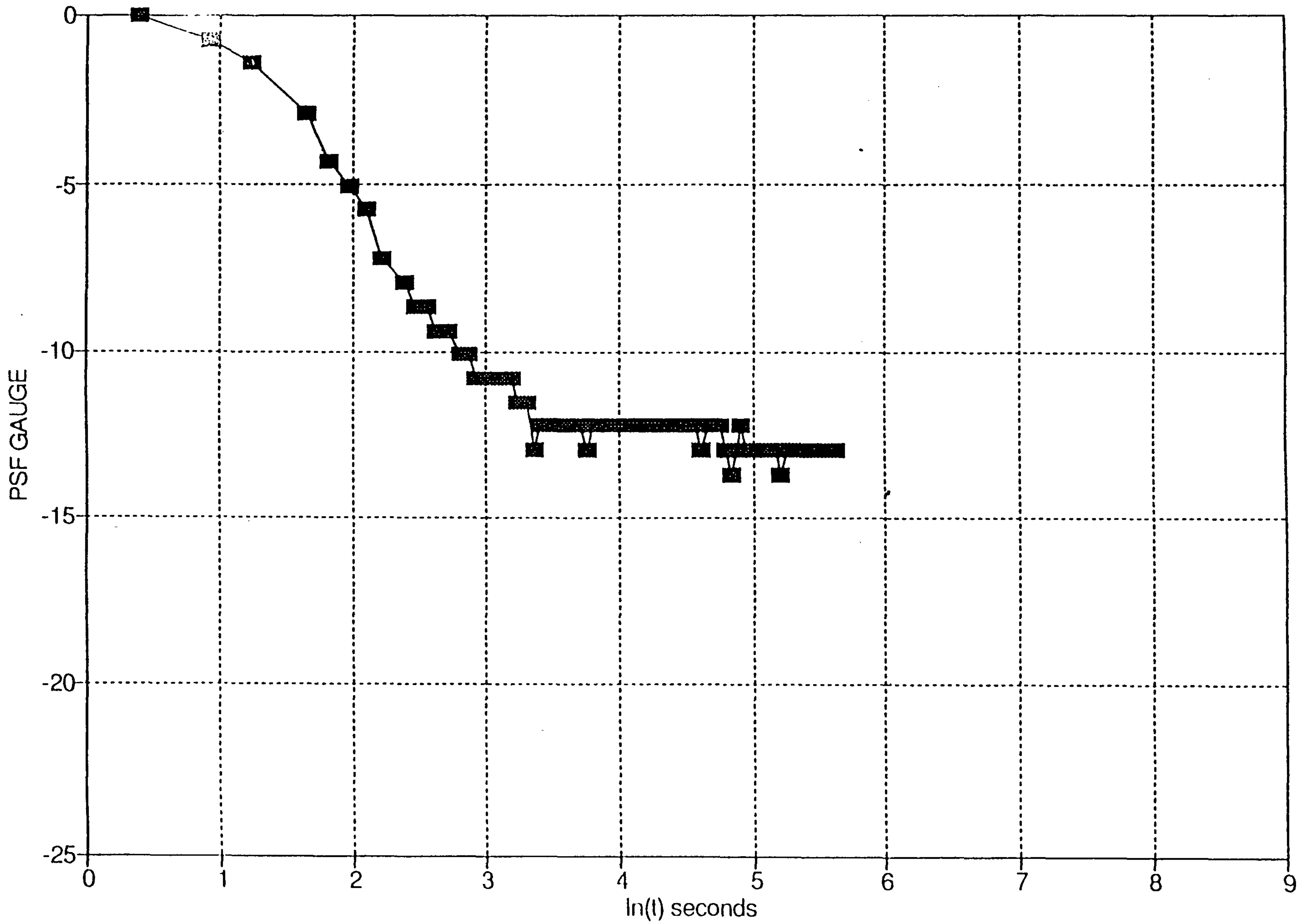



SVE PILOT TEST-WASH BAY DSI ARTESIA, NM
TEST #WB-1 - PZB-1
PSF GAUGE
0
-5
-10
-15
-20
-25
0
1
2
3
4
5
6
7
8
9
ln(t) seconds

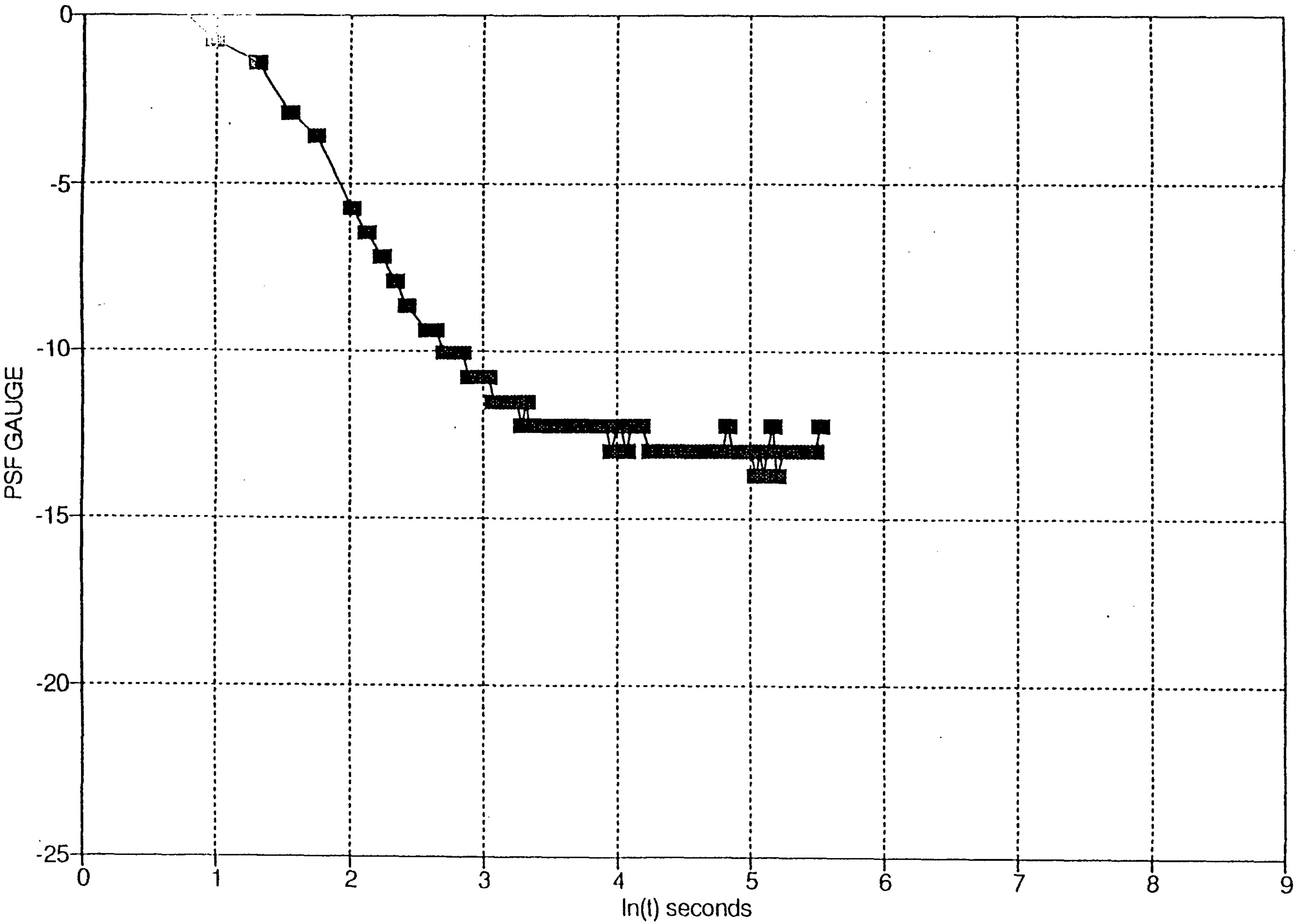
SVE PILOT TEST-WASH BAT DSI ARTESIA,NM
TEST #WB-2 - PZB-3



SVE PILOT TEST-WASH BAY DSI ARTESIA, NM
TEST #WB-3 - PZB-3



SVE PILOT TEST-WASH BAY DSI ARTESIA, NM
TEST #WB-4 - PZB-3



SVE PILOT TEST-WASH BAY DSI ARTESIA, NM
TEST #WB-1