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**THIRD REPORT OF
OFF-SITE INVESTIGATION**

November 1, 1990

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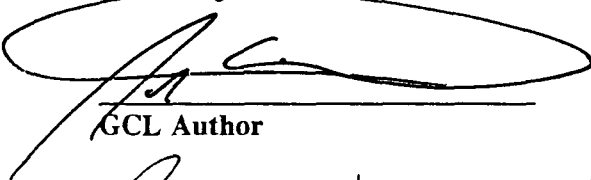
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THIRD REPORT OF
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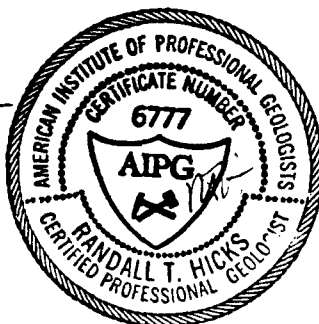


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1.0 EXECUTIVE SUMMARY

Giant Industries Arizona, Inc. (Giant) has installed sixteen monitor wells including one recovery well and two piezometers south of Giant's Bloomfield Refinery. The ground water from the sixteen monitor wells has been sampled and analyzed for metals, halogenated volatile organic compounds, aromatic volatile organic compounds, polynuclear aromatic hydrocarbons, and other chemical constituents that include major ions and total dissolved solids.

Measurements of petroleum product thickness indicate the presence of a free-phase hydrocarbon plume confined to within 100 feet on the east and 130 feet on the west of Bureau of Land Management monitor well BLM-37, within 150 feet on the east and 150 feet on the west of monitor well SHS-11, and extending south to an indeterminate distance north of monitor well SHS-14. Analytical results of ground-water sampling indicate that a dissolved-phase plume associated with the free-phase hydrocarbon is present at the site.

Aquifer analysis indicates that an adequate number of monitor/recovery wells are in place to control plume migration and recover free-phase hydrocarbon. Initiation of product recovery and control of plume migration is proposed by pumping product and ground water from four existing monitor/recovery wells. A request to modify the existing discharge plan GW-40 is recommended.

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2.0 INTRODUCTION

Giant Industries Arizona, Inc. has contracted Geoscience Consultants, Ltd. (GCL) to investigate the occurrence of free- and dissolved-phase hydrocarbon in and floating on the ground water beneath the area south of Giant's Bloomfield Refinery. GCL submitted a work plan to the New Mexico Oil Conservation Division (NMOCD) on July 7, 1989, entitled *Off-Site Hydrogeologic Investigation* (Geoscience Consultants, Ltd., 1989a). In accordance with the work plan, GCL installed two monitor wells (SHS-1 and SHS-2), performed a soil-vapor study, sampled and analyzed ground water from these wells, and submitted the results to the NMOCD in the *First Report of Off-Site Investigation on October 20, 1989* (Geoscience Consultants, Ltd., 1989b).

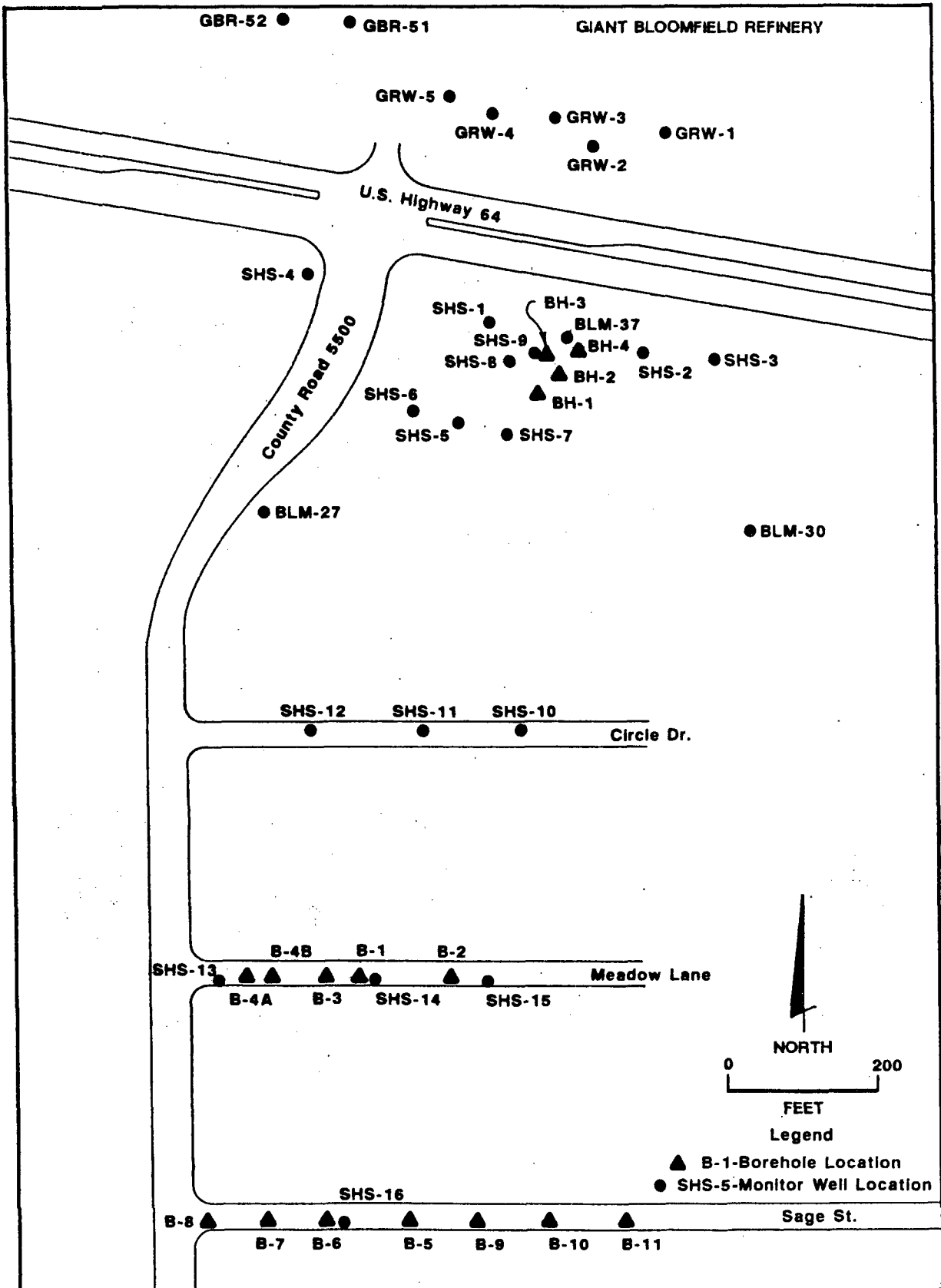
The *First Report of Off-Site Investigation* recommended that additional monitor wells be installed and that ground water be sampled and analyzed to further characterize ground-water conditions in the subsurface south of U.S. Highway 64. In January 1990, GCL installed six additional monitor wells, SHS-3 through SHS-8, and analyzed the ground water collected from them.

On February 23, 1990, Giant submitted the *Second Report of Off-Site Investigation*, which discussed the work performed that fulfilled the recommendation in the first report. This second report recommended the installation of a recovery well. In response to the submission of Giant's *Second Report of Off-Site Investigation*, the NMOCD requested that in addition to installing a recovery well, additional monitor wells be installed to delineate the extent of dissolved-phase hydrocarbons downgradient of the suspected plume.

Four boreholes, BH-1 through BH-4, were completed during April 1990, prior to the installation of the recovery well. The locations of the borings are shown on figure 2-1. The soil borings were used to identify the thickness of the saturated alluvium and to locate the top of the bedrock so that a recovery well location could be selected. The 6-inch recovery well, SHS-9, was installed immediately following the boring program. The recovery well is located inside the boundary of the suspected plume at the point where the boring program indicated the thickest section of saturated alluvium, and downgradient from the monitor well with the most free-phase product (BLM-37).

Three additional ground-water monitor wells, SHS-10, -11 and -12, were installed and ground-water samples were collected. Monitor wells SHS-10, -11 and -12 were located downgradient of the suspected free-phase plume boundary, along Circle Drive, as shown on figure 2-1.

Figure 2-1
Monitor Well & Borehole Location Map



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Analytical results from ground-water samples collected following the installation of monitor wells SHS-10, -11 and -12 indicated the need for further investigation south of Circle Drive. A technical meeting was held on July 19, 1990, with representatives from Giant, GCL and NMOCD present. On July 31, Giant submitted a work plan to the NMOCD discussing further investigation of the occurrence of hydrocarbon south of Circle Drive. The work plan proposed a boring program that included soil analyses, the installation of additional monitor wells, and additional ground-water sampling. The work plan was implemented during August 1990. Eleven borings were made along Meadow Lane and Sage Street, and three soil samples were collected and analyzed for halogenated and aromatic volatile organic compounds. Ground-water monitor wells SHS-13 through SHS-15 were installed along Meadow Lane and monitor well SHS-16 was installed along Sage Street. The locations for monitor wells SHS-13 through SHS-16 were selected based on analysis of the information generated during the boring program. Monitor well and boring locations are shown in figure 2-1. The ground water collected from monitor wells SHS-13 through SHS-16 was analyzed for halogenated and aromatic volatile organic compounds, total metals, PAHs, and other chemical constituents.

To better understand the subsurface hydraulics south of the refinery, Giant initiated an aquifer study. In September 1990, aquifer slug tests were performed in nine of Giant's sixteen monitor wells associated with the off-site investigation.

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3.0 METHODS OF INVESTIGATION

3.1 Exploratory Soil Borings

The exploratory soil-boring program was performed by Western Technologies, Inc. (WTI) using a CME-55 drill rig with 10-7/8" inside diameter, hollow-stem augers. The drill rig and all of the drill augers were steam cleaned prior to setting up on each borehole. All borehole locations are shown in figure 2-1.

Boreholes BH1 through BH4, located adjacent to monitor well SHS-9, were drilled to determine the depth to bedrock and the saturated thickness of the alluvial aquifer in this area. No samples were collected from BH1 through BH4 for laboratory analysis.

The borings along Meadow Lane and Sage Street (B1 through B11) were drilled to determine the southern extent of hydrocarbon in the soil. The data collected from the boreholes aided in determining the locations of ground-water monitor wells. Split-spoon samples were collected at 5-foot intervals. The lithology of each sample was recorded on a lithologic log form. The lithologic logs for the borings are included as appendix A of this report. Soil samples were split in half. One half of each sample was retained, on ice, in a sealed glass jar for possible subsequent laboratory analysis. The other half of the sample was stored in a sealed glass container for on-site headspace analysis. If the on-site headspace analysis indicated 1 part per million or more organic vapor in the headspace of the sample, the other half of the sample was shipped to the laboratory for analysis. A total of three soil samples were analyzed by Radian Analytical Services using EPA Methods 8010 and 8020 for halogenated and aromatic volatile organic compounds, respectively.

3.2 Monitor Well Installation

Field work was performed following NMOCD approval of the proposed work plans. WTI of Farmington, New Mexico, was contracted to conduct the soil-boring program and to install the monitor wells using a hollow-stem auger drill rig. Mo-Te Drilling of Farmington, New Mexico, was contracted to install a recovery well and monitor wells SHS-13 and SHS-16 using an air-rotary drill rig.

The installation of the monitor wells SHS-10 through SHS-12 and SHS-14 and SHS-15 was performed using a CME-55 drill rig with 10-7/8" inside diameter, hollow-stem augers. A representative of Giant or GCL was present at all times during the investigation. All ground-water monitor wells were screened through the water/air interface in order to ob-

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serve any free-phase constituents that may have been floating on the surface of the ground water. GCL's standard operating procedures were followed for well installation (appendix A of the *Off-Site Hydrogeologic Investigation Plan*; [Geoscience Consultants, Ltd., 1989a]).

Lithologic logs for borings at monitor wells SHS-1 through SHS-16 are included as appendix A of this report. Monitor-well locations are shown in figure 2-1 and on the lithologic log forms.

After the well casing was installed, the auger flights were retrieved in 5-foot intervals. Pre-cleaned and prepackaged 10/20 silica sand was poured down the auger annulus to fill the void left as each 5-foot flight was removed. The 10/20 sand was placed to a level of 3 to 5 feet above the top of the screen.

A bentonite seal was placed on top of the silica sand to form an impervious barrier and to prevent downward migration of moisture. The remainder of the well annulus extending up to ground surface was grouted with a neat cement slurry containing 5% bentonite. The grout was introduced from the surface after all remaining auger flights had been removed. The well head was completed with the installation of a flush-to-grade concrete slab and waterproof steel vault. Well completion diagrams are included as appendix B.

Well development and purging were conducted by bailing. The water was bailed from the well in order to remove gross amounts of clay and silt. Each well was determined to be fully developed and/or purged when the indicator parameters of pH, temperature, and electrical conductance of the ground water had stabilized.

3.3 Ground-Water Sampling

Monitor wells SHS-1 through SHS-16 were sampled to characterize the ground-water chemistry. Samples were obtained using a bottom-filling teflon bailer. The bailer was washed with lab soap, rinsed with methanol, and triple-rinsed with distilled water prior to use at each well. The samples were collected according to guidelines cited in EPA's *RCRA Ground-water Monitoring Technical Enforcement Guidance Document* (OSWER-9950.1) and shipped to the laboratory in an ice chest, following strict chain-of-custody procedures. Ground-water samples were preserved according to methods described in EPA's *Test Methods for Evaluating Solid Waste* (SW-846).

Prior to sampling, the monitor wells were purged until three casing volumes of water were removed or indicator parameters of pH, temperature, and electrical conductivity of the ground water from each well had stabilized.

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Radian Analytical Services analyzed the ground-water samples from monitor wells SHS-1 through SHS-16 for polynuclear aromatic hydrocarbon compounds using EPA Method 610, halogenated volatile organic compounds using EPA Method 601, and aromatic volatile organic compounds using EPA Method 602. The ground water collected from monitor wells SHS-1 through SHS-16 was analyzed for metals using the appropriate EPA Method for each analyte. Inter-Mountain Laboratories, Inc., analyzed the ground-water samples from monitor wells SHS-1 through SHS-16 for major ions, total dissolved solids, Ph, electric conductance; and they also performed a mass balance analysis.

3.4 Aquifer Slug Tests

Aquifer slug tests were performed at ground-water monitor wells SHS-7 through SHS-15. The static water level in each well was measured prior to the slug test. Water levels were recorded with a GCL Data Logger designed especially for use in aquifer testing activities. Solid state, piezoresistive pressure sensors (Omega PX-83) were placed in the wells to provide continuous measurements of the water levels. The sensors that were used are rated at 0.25% accuracy and vent to the atmosphere to reduce the effects of barometric pressure changes that could affect the readings. Each sensor was connected to a programmable analog-to-computer interface (DGH D2000) that calibrated and conditioned the signals to provide accurate readings. This interface was connected to a Cambridge Z88 portable computer that manages the overall data collection and storage operations. The GCL Data Logger that was used is a self-contained unit consisting of a rechargeable regulated power supply, eight interface channels and a computer.

Pressure transducers were lowered into the test well being tested and secured so that the transducer was suspended 1 foot above the bottom of the well. A 2-inch diameter by 5-foot-long stainless steel slug was introduced into the ground water through the well casing. The response of the ground water in the monitor well to the introduction of the slug was then recorded. The data logger was programmed to record changes in the water level above the pressure transducer. Measurements were recorded at 1-second intervals for the first 5 minutes, followed by 5-second intervals for 25 minutes, and then 10-second intervals for 30 minutes. The intervals of recording measurements were adjusted after field observations indicated the response of the aquifer could be monitored by collecting fewer data points. Following the return of the aquifer to equilibrium, the slug was removed and the response of the ground water in the monitor well was recorded again. The stainless steel slug was decontaminated prior to use on each well to ensure that cross-contamination between monitor wells would not occur.

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3.5 Aquifer Analysis

Aquifer properties are limiting factors which must be considered in selecting the appropriate remedial strategy. Previous investigations (Geoscience Consultants, Ltd., 1987, 1989a) sought to determine on-site hydraulic characteristics and the current on-site remedial design was based on those determinations and was periodically modified after several months of observation. Data for analysis of off-site aquifer properties were obtained from slug tests of nine off-site monitor wells. Data from the slug tests were analyzed to determine the hydraulic conductivity of the off-site aquifer material. Water level measurements were taken in off-site wells to establish the orientation of the phreatic surface and hydraulic gradient. According to Darcy's equation, hydraulic conductivity and hydraulic gradient can be used to determine the average linear velocity of ground-water flow. Based on the determination of this velocity and conceptual models for the aquifer system developed in the previous on-site investigations (Geoscience Consultants, Ltd., 1987, 1989a.), the semi-analytical computer code RESSQ (Javandel, et al., 1984) was used to predict the probable hydraulic result of the proposed four-well pumping scenario.

3.6 Slug Test Analysis

As previously described in section 3-4, slug tests were performed on nine wells in the off-site area. Both a rising head (slug-in) and falling head (slug-out) test were performed on most wells. For wells SHS-12 and SHS-13, only slug-in tests were performed because of the long recovery time required at these locations. The results of the two methods should, theoretically, lead to the same value of hydraulic conductivity. Comparison of the two results for each well provides a method of quality assurance for the test results and a measure of reliability of the hydraulic conductivity calculation.

Field data from the slug tests were reduced for the purpose of analysis. The first step in the analysis was to convert the drawdown data from each test to the corresponding value of H/H_0 as described by Cedergren (1977). The resulting data sets (H/H_0 vs Time) were plotted on semi-logarithmically scaled paper. When the implicit assumptions and conditions of the method (Cedergren, 1977) are met, these data produce a straight line plot. The plotted data were examined to determine which portion of the data best met the required conditions (i.e., plotted on a straight line). These data were used for hydraulic conductivity analysis.

Once the appropriate straight-line data had been selected as described above, the public domain computer code TLP (Thompson, 1987) was used to calculate hydraulic conductivity for each test. This program, which has been tested and validated by GCL, employs the method described by Cedergren (1977) to determine hydraulic conductivity.

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3.7 Capture Zone Estimation

The semi-analytical method of Javendal, et al. (1984), known as RESSQ may be used to determine the hydraulic effect of various pumping strategies. This method is more powerful than simple analytical methods but is much simpler in its application and execution than most robust numerical methods. The simplicity of the method allowed the benefit of its power to be utilized here, even though the scope of this investigation is very limited.

It must be noted that the fundamental assumptions and conditions required for complete validity of the RESSQ method are not completely satisfied by the off-site aquifer matrix. However, by choosing conservative input parameters and by exercising caution and reasonable scientific judgment in the interpretation of the results of this method, it is felt that a reasonable preliminary estimate of hydraulic conditions has been made. Since the method is a computer model based on certain assumptions that are not completely satisfied by the natural system, its predictions should be verified by actual field observation and subsequent evaluation.

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4.0 RESULTS

The area south of Giant's Bloomfield Refinery is located on alluvial sediments comprised of interbedded clays and sands, with discontinuous lenses of cobbles occurring locally. Subsurface terrace deposits from sediment deposition by the San Juan River may account for some of the discontinuity encountered in the area. The alluvial sediments are poorly to well sorted and unconsolidated. The thickness of the alluvium ranges from 39.5 feet at monitor well SHS-2 to over 58 feet at monitor well SHS-11. Borehole logs indicate that the alluvial sediment thickens to the west and to the south. An active arroyo that once ran through the study area has been diverted to the west of County Road 5500.

Underlying the alluvial sediments is the Tertiary Nacimiento Formation. Locally, the Nacimiento Formation is comprised of consolidated claystones/shales and cemented sandstones.

The alluvial sediments and the Nacimiento Formation are host to an unconfined- to partially-confined aquifer. These units merge hydrologically with the San Juan River alluvium to the south. The thickness of the saturated alluvium ranges from approximately 2 feet at monitor well SHS-2 to greater than 20 feet at monitor well SHS-11. Water surface elevations for surrounding wells are shown in table 4-1.

A potentiometric surface map for the area south of State Highway 64 is shown on plate 1. The direction of the gradient of the ground water in the off-site study area is approximately 20 degrees west of south.

4.1 Results of Boring Program

Data from borings BH1 through BH4, in the vicinity of SHS-9, indicated that the top of the bedrock in this area is a planar paleo surface that dips to the west. Consequently, the thickness of the saturated alluvium increases to the west.

The borings on Meadow Lane indicate that hydrocarbon constituents are present in the soil at locations B1, B3, and B4 (figure 2-1). The headspace analyses performed on soil samples collected along Sage Street indicate that no hydrocarbon was present. None of the soil samples from along Sage Street were analyzed at the laboratory. The laboratory reports for the soil analysis at B1, B3 and B4 are included in appendix C.

Table 4-1
Water Level Data

Well	Depth to Water	Casing Elevation	Water Surface Elevation
SHS-1 ¹	41.22	5383.54	5342.32
SHS-2 ²	37.18	5381.66	5344.48
SHS-3	35.86	5383.33	5347.47
SHS-4	41.35	5383.62	5342.27
SHS-5	38.44	5378.36	5339.92
SHS-6	38.55	5378.17	5339.62
SHS-7	38.95	5378.77	5339.82
SHS-8 ³	38.81	5380.25	5341.44
SHS-9	38.10	5380.79	5342.69
SHS-10	37.12	5373.80	5336.68
SHS-11 ⁴	38.26	5373.17	5334.91
SHS-12	40.03	5373.94	5333.91
SHS-13	36.93	5367.81	5330.88
SHS-14	35.28	5367.07	5331.79
SHS-15	34.19	5366.21	5332.02
SHS-16	32.01	5362.58	5330.57
GRW-1	51.57	5388.65	5337.08
GRW-2	49.75	5391.28	5341.53
GRW-3	53.50	5388.77	5335.27
GRW-4	45.20	5390.02	5344.82
GRW-5	58.70	5390.56	5331.86
BLM-30	32.91	5369.75	5336.84
BLM-27	42.82	5379.01	5336.19
BLM-37 ⁵	39.19	5383.46	5344.27

BLM Water Levels Taken 12/11/89

SHS Water Levels Taken 9/12/90

GRW Water Levels Taken 9/5/90

¹Water Level Corrected for .11' HC

²Water Level Corrected for .45' HC

³Water Level Corrected for 0.03' HC

⁴Water Level Corrected for 1.31' HC

⁵Water Level Corrected for 1.38' HC

All Data are in Feet

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4.2 Results of Ground-Water Analysis

Free-phase hydrocarbon was found floating on the ground water in monitor wells SHS-1, -2, -8, -11 and BLM-37. There was no product found in monitor well SHS-9 on September 12, 1990. Product/water level measurements taken prior to ground-water sampling on June 21, 1990, indicated that 0.20 feet of product was present at that time. Dissolved-phase constituents were found at all monitor well locations where free-phase hydrocarbon is present. Additionally, dissolved-phase aromatic hydrocarbon constituents were found to be greater than five times the analytical detection limit at monitor wells SHS-7, -10, and -14.

The results of the laboratory analyses are summarized in tables 4-2 through 4-6, and the laboratory reports are presented in appendix C of this report. The concentration of benzene, toluene, ethylbenzene and xylene (BTEX) constituents for samples from ground-water monitor wells SHS-1 through SHS-16 are shown on plate 2.

4.3 Results of Aquifer Analysis

RESSQ requires input parameters for aquifer thickness (b), porosity (n), average linear ground-water velocity (v), direction of regional flow (α), and the adsorption capacity of the aquifer matrix (A). Table 4-7 lists the values selected for these input parameters. The thickness of the phreatic aquifer in the off-site area varies from a minimum of 39.5 feet to greater than 58 feet (the deepest total depth drilled not encountering the base of the phreatic aquifer). Many of the off-site wells did not reach the base of the phreatic aquifer. In choosing a representative value for aquifer thickness, reliance was made on the conceptual models developed in previous investigations of the on-site areas. These studies were geologically more comprehensive in nature than the current investigation. And the results of the current investigation have led to an interpretation of the off-site geology that is completely consistent with the conceptual interpretation of the on-site geology. The on-site investigation involved drilling of sufficiently deep wells to allow an estimate of average aquifer thickness and calibration of a numerical model of ground water flow. A value of 62.5 feet was chosen for use in off-site modeling, based upon the observed agreement between the previous model and actual conditions.

Table 4-8 presents the results of the slug test analysis. The conductivity values center strongly at the 10^{-5} order of magnitude. This value was selected for use in computer modeling of the off-site area. Calculated variations from this value of hydraulic conductivity range over three orders of magnitude (table 4-8). These variations are explained by geologic heterogeneity which is well documented, formation damage caused by the drilling process, well inefficiencies caused by well construction, slug-test operator error, or a combination of these factors.

Table 4-2
Results of Sampling for Aromatic Volatiles

M&A Offsite Samples
Aromatic Volatiles (EPA 602)
Sampling Event 06/20/90 - 08/23/90;

Units: ug/L

	SHS-1	SHS-2	SHS-3	SHS-4	SHS-5
1,2-Dichlorobenzene	ND (4.0)	ND (4.0)	ND (0.40)	ND (0.40)	ND (4.0)
1,3-Dichlorobenzene	ND (4.0)	ND (4.0)	ND (0.40)	ND (0.40)	ND (4.0)
1,4-Dichlorobenzene	ND (3.0)	ND (3.0)	ND (0.30)	ND (0.30)	ND (3.0)
Benzene	ND (2.0)	5.4 (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
Chlorobenzene	4.4 (2.0)	230 (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
Ethylbenzene	57 (2.0)	78 (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
Toluene	ND (2.0)	19 (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
Total Xylenes	24 (2.0)	730 (2.0)	ND (0.20)	ND (0.20)	ND (2.0)

() = Detection Limit
ND = Not Detected at Detection Limit

Table 4-2

Results of Sampling for Aromatic Volatiles

M&A Offsite Samples
Aromatic Volatiles (EPA 602)
Sampling Event 06/20/90 - 08/23/90;

Units: ug/L

	SHS-6	SHS-7	SHS-8	SHS-9	SHS-10
1,2-Dichlorobenzene	ND (0.40)	ND (0.40)	ND (2000)	ND (800)	ND (4.0)
1,3-Dichlorobenzene	ND (0.40)	ND (0.40)	ND (2000)	ND (800)	ND (4.0)
1,4-Dichlorobenzene	ND (0.30)	ND (0.30)	ND (1500)	ND (600)	ND (3.0)
Benzene	ND (0.20)	80 (0.20)	ND (1000)	2400 (400)	ND (2.0)
Chlorobenzene	ND (0.20)	4.0 (0.20)	ND (1000)	1800 (400)	3.0 (2.0)
Ethylbenzene	ND (0.20)	140 (0.20)	ND (1000)	13000 (400)	69 (2.0)
Toluene	ND (0.20)	1.1 (0.20)	ND (1000)	1100 (400)	3.2 (2.0)
Total Xylenes	ND (0.20)	27 (0.20)	3600 (1000)	79000 (400)	150 (2.0)

() = Detection Limit
ND = Not Detected at Detection Limit

Table 4-2
Results of Sampling for Aromatic Volatiles

M&A Offsite Samples
Aromatic Volatiles (EPA 602)
Sampling Event 06/20/90 - 08/23/90;

Units: ug/L

	SHS-11	SHS-12	SHS-13	SHS-14	SHS-15	SHS-16
1,2-Dichlorobenzene	ND (40)	ND (4.0)	ND (0.40)	ND (4.0)	ND (0.40)	ND (0.40)
1,3-Dichlorobenzene	ND (40)	ND (4.0)	ND (0.40)	ND (4.0)	ND (0.40)	ND (0.40)
1,4-Dichlorobenzene	ND (30)	ND (3.0)	ND (0.30)	140 (3.0)	0.38 (0.30)	ND (0.30)
Benzene	800 (20)	ND (2.0)	ND (0.20)	11 (2.0)	ND (0.20)	ND (0.20)
Chlorobenzene	ND (20)	ND (2.0)	ND (0.20)	ND (2.0)	ND (0.20)	ND (0.20)
Ethylbenzene	1100 (20)	ND (2.0)	ND (0.20)	77 (2.0)	0.24 (0.20)	ND (0.20)
Toluene	ND (20)	ND (2.0)	0.79 (0.20)	31 (2.0)	0.33 (0.20)	ND (0.20)
Total Xylenes	5100 (20)	ND (2.0)	ND (0.20)	260 (2.0)	0.97 (0.20)	ND (0.20)

() = Detection Limit
ND = Not Detected at Detection Limit

Table 4-3

Results of Sampling for Halogenated Volatiles

M&A Offsite Samples
 Halogenated Volatiles (EPA 601)
 Sampling Event: 06/20/90 - 08/23/90;

Units ug/L

	SHS-1	SHS-2	SHS-3	SHS-4	SHS-5
cis-1,2-Dichloroethene	39 (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	14 (2.0)
1,1,1-Trichloroethane	ND (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
1,1,2,2-Tetrachloroethane	ND (1.5)	ND (1.5)	ND (0.15)	ND (0.15)	ND (1.5)
1,1,2-Trichloroethane	ND (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
1,1-Dichloroethane	ND (5.0)	ND (5.0)	ND (0.50)	ND (0.50)	ND (5.0)
1,1-Dichloroethene	ND (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
1,2-Dichlorobenzene	ND (5.0)	ND (5.0)	ND (0.50)	ND (0.50)	ND (5.0)
1,2-Dichloroethane	7.1 (1.0)	ND (1.0)	ND (0.10)	ND (0.10)	ND (1.0)
1,2-Dichloropropane	ND (1.0)	ND (1.0)	ND (0.10)	ND (0.10)	ND (1.0)
1,3-Dichlorobenzene	ND (3.2)	ND (3.2)	ND (0.32)	ND (0.32)	ND (3.2)
1,4-Dichlorobenzene	ND (2.4)	ND (2.4)	ND (0.24)	ND (0.24)	ND (2.4)
2-Chloroethylvinyl Ether	ND (5.0)	ND (5.0)	ND (0.50)	ND (0.50)	ND (5.0)
Bromodichloromethane	ND (1.0)	ND (1.0)	ND (0.10)	ND (0.10)	ND (1.0)
Bromoform	ND (5.0)	ND (5.0)	ND (0.50)	ND (0.50)	ND (5.0)
Bromomethane	ND (12)	ND (12.0)	ND (1.2)	ND (1.2)	ND (12)
Carbon Tetrachloride	ND (1.2)	ND (1.2)	ND (0.12)	ND (0.12)	ND (1.2)
Chlorobenzene	ND (2.5)	ND (2.5)	ND (0.25)	ND (0.25)	ND (2.5)
Chloroethane	ND (5.2)	ND (5.2)	ND (0.52)	ND (0.52)	ND (5.2)
Chloroform	ND (1.0)	ND (1.0)	ND (0.10)	ND (0.10)	ND (1.0)
Chloromethane	ND (3.0)	ND (3.0)	ND (0.30)	ND (0.30)	ND (3.0)
cis-1,3-Dichloropropene	ND (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
Dibromochloromethane	ND (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
Methylene Chloride	ND (4.0)	ND (4.0)	ND (0.40)	ND (0.40)	ND (4.0)
Tetrachloroethene	1.2 (1.0)	2.1 (1.0)	ND (0.10)	ND (0.10)	2.7 (1.0)
trans 1,2-Dichloroethene	ND (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
trans-1,3-Dichloropropene	ND (3.4)	ND (3.4)	ND (0.34)	ND (0.34)	ND (3.4)
Trichlorofluoromethane	ND (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
Vinyl Chloride	ND (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	ND (2.0)
Trichloroethene	2.9 (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	3.0 (2.0)

() = Detection Limit

ND = Not Detected at Detection Limit

NA = Not Analyzed

Table 4-3

Results of Sampling for Halogenated Volatiles

M&A Offsite Samples
Halogenated Volatiles (EPA 601)
Sampling Event: 06/20/90 - 08/23/90;

Units ug/L

	SHS-6	SHS-7	SHS-8	SHS-9	SHS-10
cis-1,2-Dichloroethene	ND (0.20)	1.3 (0.20)	ND (1000)	ND (400)	ND (2.0)
1,1,1-Trichloroethane	0.35 (0.20)	ND (0.20)	ND (1000)	ND (400)	ND (2.0)
1,1,2,2-Tetrachloroethane	ND (0.15)	ND (0.15)	ND (750)	ND (300)	5.5 (1.5)
1,1,2-Trichloroethane	ND (2.0)	ND (0.20)	ND (1000)	ND (400)	ND (2.0)
1,1-Dichloroethane	ND (0.50)	2.2 (0.50)	ND (2500)	ND (1000)	ND (5.0)
1,1-Dichloroethene	ND (0.20)	ND (0.20)	ND (1000)	ND (400)	ND (2.0)
1,2-Dichlorobenzene	ND (0.50)	ND (0.50)	ND (2500)	ND (1000)	ND (5.0)
1,2-Dichloroethane	ND (0.10)	5.2 (0.10)	ND (500)	ND (200)	ND (1.0)
1,2-Dichloropropane	ND (0.10)	ND (0.10)	ND (500)	ND (200)	ND (1.0)
1,3-Dichlorobenzene	ND (0.32)	ND (0.32)	ND (1600)	ND (640)	ND (3.2)
1,4-Dichlorobenzene	ND (0.24)	ND (0.24)	ND (1200)	ND (480)	ND (2.4)
2-Chloroethylvinyl Ether	ND (0.50)	ND (0.50)	ND (2500)	ND (1000)	ND (5.0)
Bromodichloromethane	ND (0.10)	2.5 (0.10)	ND (500)	ND (200)	ND (1.0)
Bromoform	ND (0.50)	ND (0.50)	ND (2900)	ND (1000)	ND (5.0)
Bromomethane	ND (1.2)	ND (1.2)	ND (5900)	ND (2400)	ND (12)
Carbon Tetrachloride	ND (0.12)	ND (0.12)	ND (600)	ND (240)	ND (1.2)
Chlorobenzene	ND (0.25)	ND (0.25)	ND (1300)	ND (500)	ND (2.5)
Chloroethane	ND (0.52)	ND (0.52)	ND (2600)	ND (1000)	ND (5.2)
Chloroform	ND (0.10)	ND (0.10)	ND (500)	ND (200)	4.3 (1.0)
Chloromethane	ND (0.30)	ND (0.30)	ND (1500)	ND (600)	ND (3.0)
cis-1,3-Dichloropropene	ND (0.20)	ND (0.20)	ND (1000)	ND (400)	ND (2.0)
Dibromochloromethane	ND (0.20)	ND (0.20)	ND (1000)	ND (400)	ND (2.0)
Methylene Chloride	ND (0.40)	ND (0.40)	ND (2000)	ND (800)	ND (4.0)
Tetrachloroethene	0.42 (0.10)	ND (0.10)	ND (500)	ND (200)	ND (1.0)
trans-1,2-Dichloroethene	ND (0.20)	ND (0.20)	ND (1000)	ND (400)	ND (2.0)
trans-1,3-Dichloropropene	ND (0.34)	ND (0.30)	ND (1000)	ND (400)	ND (3.4)
1,1,2-Trichloroethene	ND (0.20)	ND (0.10)	ND (1000)	ND (400)	ND (2.0)
Trichlorofluoromethane	ND (0.20)	ND (0.20)	ND (1000)	ND (400)	ND (2.0)
Vinyl Chloride	ND (0.20)	ND (0.20)	ND (1000)	ND (400)	ND (2.0)
Trichloroethene	ND (0.20)	.28 (0.20)	3200 (1000)	ND (400)	ND (2.0)

() = Detection Limit

ND = Not Detected at Detection Limit

NA = Not Analyzed

Table 4-3

Results of Sampling for Halogenated Volatiles

M&A Offsite Samples
 Halogenated Volatiles (EPA 601)
 Sampling Event: 06/20/90 - 08/23/90;

Units ug/L

	SHS-11	SHS-12	SHS-13	SHS-14	SHS-15	SHS-16
cis-1,2-Dichloroethene	22 (20.0)	10 (2.0)	NA (0.20)	NA (2.0)	NA (0.20)	NA (0.20)
1,1,1-Trichloroethane	ND (20)	ND (2.0)	ND (0.15)	ND (1.5)	ND (0.15)	ND (0.15)
1,1,2,2-Tetrachloroethane	ND (15)	ND (1.5)	ND (0.20)	ND (2.0)	ND (0.20)	ND (0.20)
1,1,2-Trichloroethane	ND (20)	ND (2.0)	ND (0.50)	ND (5.0)	ND (0.50)	ND (0.50)
1,1-Dichloroethane	ND (50)	ND (5.0)	0.53 (0.50)	2.0 (2.0)	ND (0.20)	ND (0.20)
1,1-Dichloroethene	ND (20)	ND (2.0)	ND (0.20)	ND (5.0)	ND (0.50)	ND (0.50)
1,2-Dichlorobenzene	ND (50)	ND (5.0)	ND (0.10)	ND (1.0)	ND (0.10)	ND (0.10)
1,2-Dichloroethane	ND (10)	ND (1.0)	ND (0.10)	ND (1.0)	ND (0.10)	ND (0.10)
1,2-Dichloropropane	ND (10)	ND (1.0)	ND (0.10)	ND (1.0)	ND (0.10)	ND (0.10)
1,3-Dichlorobenzene	ND (32)	ND (3.2)	ND (0.32)	ND (3.2)	ND (0.32)	ND (0.32)
1,4-Dichlorobenzene	ND (24)	ND (2.4)	ND (0.24)	ND (2.4)	ND (0.24)	ND (0.24)
2-Chloroethylvinyl Ether	ND (50)	ND (5.0)	ND (0.50)	ND (5.0)	ND (0.50)	ND (0.50)
Bromodichloromethane	ND (10)	ND (1.0)	ND (0.10)	ND (1.0)	ND (0.10)	ND (0.10)
Bromoform	ND (50)	ND (5.0)	ND (0.50)	ND (5.0)	ND (0.50)	ND (0.50)
Bromomethane	ND (120)	ND (12)	ND (1.2)	ND (12)	ND (1.2)	ND (1.2)
Carbon Tetrachloride	ND (12)	ND (1.2)	ND (0.12)	ND (1.2)	ND (0.12)	ND (0.12)
Chlorobenzene	ND (25)	ND (2.5)	ND (0.25)	ND (2.5)	ND (0.25)	ND (0.25)
Chloroethane	ND (52)	ND (5.2)	ND (0.52)	ND (5.2)	ND (0.52)	ND (0.52)
Chloroform	ND (10)	5.6 (1.0)	ND (0.10)	ND (1.0)	ND (0.10)	0.17 (0.10)
Chloromethane	ND (30)	ND (3.0)	ND (0.30)	ND (3.0)	ND (0.30)	ND (0.30)
cis-1,3-Dichloropropene	ND (20)	ND (2.0)	ND (0.20)	ND (2.0)	ND (0.20)	ND (0.20)
Dibromochloromethane	ND (20)	ND (2.0)	ND (0.20)	ND (2.0)	ND (0.20)	ND (0.20)
Methylene Chloride	ND (40)	ND (4.0)	ND (0.40)	ND (4.0)	ND (0.40)	ND (0.40)
Tetrachloroethene	ND (10)	3.1 (1.0)	0.34 (0.10)	4.6 (1.0)	0.40 (0.10)	ND (0.10)
trans 1,2-Dichloroethene	ND (20)	ND (2.0)	NA (0.34)	NA (3.4)	NA (0.34)	NA (0.34)
trans-1,3-Dichloropropene	ND (34)	ND (3.4)	0.26 (0.20)	ND (2.0)	ND (0.20)	ND (0.20)
Trichloroethene	ND (20)	2.0 (2.0)	ND (0.20)	ND (2.0)	ND (0.20)	ND (0.20)
Trichlorofluoromethane	ND (20)	ND (2.0)	ND (0.20)	ND (2.0)	ND (0.20)	ND (0.20)
Vinyl Chloride	ND (20)	ND (2.0)	ND (10)	ND (100)	ND (10)	ND (10)
Benzyl Chloride	NA	NA	ND (5.0)	ND (50)	ND (5.0)	ND (5.0)
Bromobenzene	NA	NA	ND (5.0)	ND (50)	ND (5.0)	ND (5.0)
1-Chlorohexane	NA	NA	ND (10)	ND (100)	ND (10)	ND (10)
bis-Chloroisopropylether	NA	NA	ND (25)	ND (250)	ND (25)	ND (25)
Chlorotoluene (total)	NA	NA	ND (0.20)	ND (2.0)	ND (0.20)	ND (0.20)
Dibromomethane	NA	NA	0.28 (0.20)	ND (2.0)	ND (0.20)	0.34 (0.20)
1,2-Dichloroethene (total)	NA	NA	ND (5.0)	ND (50)	ND (5.0)	ND (5.0)
1,2,3-Trichloropropane	NA	NA	ND (5.0)	ND (50)	ND (5.0)	ND (5.0)

() = Detection Limit

ND = Not Detected at Detection Limit

NA = Not Analyzed

Table 4-4

Results of Sampling for Metals

M&A Offsite Samples

Metals

Sampling Event 02/12/89 - 08/23/90;

Units mg/L

	SHS-1	SHS-2	SHS-3	SHS-4	SHS-5	SHS-6
Molybdenum	NA	NA	ND (0.0080)	ND (0.0080)	NA (0.034)	NA (0.034)
Antimony	NA	NA	NA	NA	ND (0.0010)	0.016 (0.0010)
Beryllium	NA	NA	NA	NA	ND (0.0040)	0.005* (0.0040)
Cadmium	ND (<0.0050)	ND (<0.0050)	0.29 (0.0070)	0.094 (0.0070)	0.009* (0.0070)	0.20 (0.0070)
Chromium	ND (<0.010)	ND (<0.010)	0.67 (0.0060)	0.12 (0.0060)	0.036 (0.0060)	0.19 (0.0060)
Copper	NA	NA	0.19 (0.015)	0.047 (0.015)	0.13 (0.015)	0.24 (0.015)
Nickel	NA	NA	ND (0.0070)	ND (0.0070)	ND (0.0070)	ND (0.0070)
Silver	ND (<0.010)	ND (<0.010)	0.82 (0.0020)	0.19 (0.0020)	0.20 (0.0020)	0.75 (0.0020)
Zinc	NA	NA	ND (0.020)	ND (0.080)	ND (0.0040)	ND (0.020)
Arsenic	0.024 (0.002)	0.0048 (0.002)*	ND	NA	ND (0.0002)	ND (0.0002)
Mercury	ND (<0.0002)	ND (<0.0002)	0.099 (0.0060)	0.027 (0.0030)	0.006* (0.0030)	0.058 (0.0030)
Lead	0.030 (0.002)	0.0045 (0.002)*	ND (0.0050)	ND (0.0030)	ND (0.0050)	ND (0.0050)
Selenium	ND (<0.0020)	ND (<0.0020)	NA	NA	ND (0.0050)	ND (0.0050)
Thallium	NA	NA	3.7 (0.0020)	0.93 (0.0020)	NA	NA
Barium	0.24 (0.010)	0.40 (0.010)	210 (0.045)	45 (0.045)	NA	NA
Aluminum	NA	NA	0.31 (0.0060)	0.41 (0.0060)	NA	NA
Boron	NA	NA	0.18 (0.0070)	0.053 (0.0070)	NA	NA
Cobalt	NA	NA	300 (0.014)	82 (0.0070)	NA	NA
Iron	NA	NA	5.7 (0.0020)	5.3 (0.0020)	NA	NA
Manganese	NA	NA				

() = Detection Limit

ND = Not Detected at Detection Limit

NA = Not Analyzed

* = Est. Result Less Than 5 Times Detection Limit

Table 4-4

Results of Sampling for Metals

M&A Offsite Samples

Metals

Sampling Event 02/12/89 - 08/23/90;

Units mg/L

	SHS-7	SHS-8	SHS-9	SHS-10	SHS-11	SHS-12
Molybdenum	NA	NA	NA	ND (0.0080)	NA	NA
Antimony	0.045* (0.034)	0.059* (0.034)	NA	NA	NA	NA
Beryllium	0.003* (0.0010)	0.007 (0.0010)	NA	NA	NA	NA
Cadmium	ND (0.0040)	ND (0.0040)	ND (0.0040)	NA (0.0070)	ND (0.0040)	ND (0.0040)
Chromium	0.024* (0.0070)	0.042 (0.0070)	0.016 (0.0070)	ND (0.0060)	ND (0.0070)	0.025 (0.0070)
Copper	0.075 (0.0080)	0.12 (0.0060)	NA	ND (0.015)	NA	NA
Nickel	0.16 (0.015)	0.26 (0.015)	NA	ND (0.0070)	NA (0.0070)	NA
Silver	ND (0.0070)	ND (0.0070)	ND (0.0070)	ND (0.0020)	NA	ND (0.0070)
Zinc	0.12 (0.0020)	0.24 (0.0020)	NA	0.015 (0.0040)	NA	NA
Arsenic	ND (0.0040)	ND (0.012)	ND (0.053)	ND (0.0020)	ND (0.053)	ND (0.053)
Mercury	ND (0.0002)	ND (0.0002)	ND (0.0002)	NA (0.0030)	ND (0.0002)	ND (0.0002)
Lead	0.028 (0.0030)	0.039 (0.0030)	0.27 (0.042)	ND (0.0050)	0.046* (0.042)	ND (0.042)
Selenium	ND (0.0050)	ND (0.0050)	ND (0.075)	ND (0.0050)	ND (0.075)	ND (0.075)
Thallium	ND (0.0050)	ND (0.0050)	NA	NA	NA	NA
Barium	NA	NA	0.080 (0.002)	0.051 (0.0020)	0.083 (0.0020)	0.36 (0.0020)
Aluminum	NA	NA	NA	1.0 (0.045)	NA	NA
Boron	NA	NA	NA	0.50 (0.0060)	NA	NA
Cobalt	NA	NA	NA	ND (0.0070)	NA	NA
Iron	NA	NA	NA	3.2 (0.0070)	NA	NA
Manganese	NA	NA	NA	10 (0.0020)	NA	NA

() = Detection Limit

ND = Not Detected at Detection Limit

NA = Not Analyzed

* = Est. Result Less Than 5 Times Detection Limit

Table 4-4

Results of Sampling for Metals

M&A Offsite Samples

Metals

Sampling Event 02/12/89 - 08/23/90;

Units mg/L

	SHS-13	SHS-14	SHS-15	SHS-16
Molybdenum	NA	NA	NA	NA
Antimony	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA
Cadmium	0.004* (0.0040)	0.005* (0.0040)	0.004* (0.0040)	ND (0.0040)
Chromium	0.008* (0.0070)	0.029* (0.0070)	0.024* (0.0070)	0.009 (0.0070)
Copper	NA	NA	NA	NA
Nickel	NA	NA	NA	NA
Silver	ND (0.0070)	ND (0.0070)	ND (0.0070)	ND (0.0070)
Zinc	NA	NA	NA	NA
Arsenic	ND (0.053)	ND (0.053)	ND (0.053)	ND (0.053)
Mercury	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
Lead	ND (0.042)	0.071* (0.042)	0.063* (0.042)	ND (0.042)
Selenium	ND (0.075)	ND (0.075)	ND (0.075)	ND (0.075)
Thallium	NA	NA	NA	NA
Barium	0.30 (0.0020)	1.1 (0.0020)	0.88 (0.0020)	0.13 (0.0020)
Aluminum	NA	NA	NA	NA
Boron	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA
Iron	NA	NA	NA	NA
Manganese	NA	NA	NA	NA

() = Detection Limit

ND = Not Detected at Detection Limit

NA = Not Analyzed

* = Est. Result Less Than 5 Times Detection Limit

Table 4-5

Results of Sampling for Major Ions and TDS

M&A Offsite Samples
General Water Chemistry
Sampling Event 06/20/90 - 08/23/90;

	SHS-1	SHS-2	SHS-3	SHS-4	SHS-5
Bicarbonate as HC03	838.9	943.7	291.3	198.1	384.5
Calcium	373.5	317.3	578.3	297.2	208.8
Carbonate as C03	0.00	0.00	0.00	0.00	0.00
Cation/Anion Difference	0.79	0.41	1.37	1.11	0.29
Chloride	685.3	380.7	279.2	25.4	356.8
Conductivity	5034	4440	4710	3284	3911
Magnesium	59.1	98.1	93.5	151.7	127.2
Major Anions	53.57	50.18	58.93	40.72	42.87
Major Cations	54.43	49.78	57.33	39.83	42.63
Nitrate	NA	NA	NA	NA	NA
pH	7.93	7.92	7.76	8.11	8.09
Potassium	4.7	6.8	10.7	4.5	3.9
Resistivity	1.9865	2.2523	2.1231	3.0451	2.5569
Sodium	708.5	591.0	471.6	285.2	497.6
Sodium Absorption Ratio	8.99	7.44	4.80	3.36	6.70
Sulfate	983.5	1150.6	2221.3	1764.5	1272.4
Total Acidity as CaC03	0.00	0.00	0.00	0.00	0.00
Total Alkalinity as CaC03	687.60	773.55	238.75	162.35	315.15
Total Dissolved Solids (180)	3344	3394	3952	2806	2804
Total Dissolved Solids (calc)	3227	3009	3798	2626	2656
Total Hardness as CaC03	1174.68	1194.76	1827.28	1365.44	1044.16

NA = Not Analyzed

Table 4-5

Results of Sampling for Major Ions and TDS

M&A Offsite Samples
General Water Chemistry
Sampling Event 06/20/90 - 08/23/90;

	SHS-6	SHS-7	SHS-8	SHS-9	SHS-10
Bicarbonate as HC03	337.9	1304.9	897.1	932.1	228.4
Calcium	397.6	180.7	329.3	357.4	297.2
Carbonate as C03	0.00	0.00	0.00	0.00	0.00
Cation/Anion Difference	1.23	0.49	1.00	1.47	0.03
Chloride	126.9	570.8	614.9	430.2	83.9
Conductivity	3306	4120	4590	4266	2923
umhos/cm @ 25C					
Magnesium	32.2	44.2	15.1	24.9	41.4
Major Anions	38.46	40.27	45.67	46.16	31.06
Major Cations	37.52	40.67	46.59	44.82	31.07
Nitrate	NA	NA	NA	NA	NA
pH	7.84	7.84	7.68	7.83	6.83
Potassium	8.0	2.2	3.6	5.8	14.4
Resistivity	3.0248	2.4272	2.1786	2.3441	3.4211
Sodium	340.8	642.8	662.8	570.0	286.8
Sodium Absorption Ratio	4.42	11.12	9.70	7.86	4.13
Sulfate	1408.2	133.3	653.5	899.5	1197.5
Total Acidity as CaC03	0.00	0.00	0.00	0.00	0.00
Total Alkalinity as CaC03	276.95	1069.6	735.35	764.00	187.18
Total Dissolved Solids (180)	2572	2280	2734	2742	2078
Total Dissolved Solids (calc)	2480	2216	2720	2746	2033
Total Hardness as CaC03	1124.48	632.52	883.52	993.96	911.63

NA = Not Analyzed

Table 4-5

Results of Sampling for Major Ions and TDS

M&A Offsite Samples
General Water Chemistry
Sampling Event 06/20/90 - 08/23/90;

	SHS-11	SHS-12	SHS-13	SHS-14	SHS-15	SHS-16
Bicarbonate as HCO ₃	978.7	337.9	535.9	330.9	247.0	279.6
Calcium	421.7	249.0	159.0	449.8	397.6	301.2
Carbonate as CO ₃	0.00	0.00	0.0	0.0	0.0	0.0
Cation/Anion Difference	1.87	1.71	2.31	1.77	0.97	-99
Chloride	624.3	288.6	402.9	46.2	33.6	42.0
Conductivity	5106	3325	3090	2556	2778	3090
umhos/cm @ 25C						
Magnesium	54.2	73.6	45.1	5.4	105.5	164.0
Major Anions	55.86	34.46	29.63	31.30	55.62	39.65
Major Cations	53.81	35.66	31.03	30.21	36.31	38.87
Nitrate	NA	NA	NA	NA	NA	NA
pH	7.23	7.73	7.82	7.45	7.91	7.91
Potassium	4.1	4.6	4.3	3.7	3.1	3.6
Resistivity	1.9585	3.0075	3.2362	3.9124	3.5997	3.2362
Sodium	648.4	392.4	443.2	166.0	177.5	236.0
Sodium Absorption Ratio	7.90	5.62	7.99	2.13	2.04	2.72
Sulfate	1065.8	997.5	455.1	1179.4	1469.9	1626.2
Total Acidity as CaCO ₃	0.00	0.00	0.00	0.00	0.00	0.00
Total Alkalinity as CaCO ₃	802.20	276.95	439.30	271.22	202.46	229.20
Total Dissolved Solids (180)	3298	2296	1790	2078	2432	2714
Total Dissolved Solids (calc)	3300	2172	1773	2013	2309	2511
Total Hardness as CaCO ₃	1275.08	923.68	582.32	1144.56	1425.68	1425.68

NA = Not Analyzed

Table 4-6

Results of Sampling for Polynuclear Aromatics

M&A Offsite Samples
 Polynuclear Aromatics
 Sampling Event 06/20/90 - 08/23/90;

Units µg/L

	SHS-1	SHS-2	SHS-3	SHS-4	SHS-5	SHS-6
Acenaphthene	ND (9.0)	ND (180)	ND (1.8)	ND (1.8)	ND (1.8)	ND (1.8)
Acenaphthylene	ND (12)	ND (230)	ND (2.3)	ND (2.3)	ND (2.3)	ND (2.3)
Anthracene	ND (3.3)	ND (33)	ND (0.66)	ND (0.66)	ND (0.66)	ND (0.66)
Benzo(a)anthracene	0.60 (0.065)	1.4 (0.65)	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.013)
Benzo(a)pyrene	0.14 (0.12)	ND (1.2)	ND (0.023)	ND (0.023)	ND (0.023)	ND (0.023)
Benzo(b)fluoranthene	0.44 (0.090)	ND (0.90)	ND (0.018)	ND (0.018)	ND (0.018)	ND (0.018)
Benzo(g,h,i)perylene	0.52 (0.38)	ND (3.8)	ND (0.076)	ND (0.076)	ND (0.076)	ND (0.076)
Benzo(k)fluoranthene	ND (0.085)	ND (0.85)	ND (0.017)	ND (0.017)	ND (0.017)	ND (0.017)
Chrysene	3.9 (0.75)	9.3 (7.5)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
Dibenzo(a,h)anthracene	ND (0.15)	ND (1.5)	ND (0.030)	ND (0.030)	ND (0.030)	ND (0.030)
Fluoranthene	ND (1.0)	ND (10)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)
Fluorene	5.2 (1.0)	64 (21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)
Indeno(1,2,3-cd)pyrene	ND (0.22)	ND (4.3)	ND (0.043)	ND (0.043)	ND (0.043)	ND (0.043)
Naphthalene	ND (9.0)	230 (180)	ND (1.8)	ND (1.8)	ND (1.8)	ND (1.8)
Phenanthrene	11 (3.2)	150 (32)	ND (0.64)	ND (0.64)	ND (0.64)	ND (0.64)
Pyrene	ND (1.4)	ND (14)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)

() = Detection Limit

ND = Not Detected at Detection Limit

NA = Not Analyzed

Table 4-6

Results of Sampling for Polynuclear Aromatics

M&A Offsite Samples
 Polynuclear Aromatics
 Sampling Event 06/20/90 - 08/23/90;

Units µg/L

	SHS-7	SHS-8	SHS-9	SHS-10	SHS-11	SHS-12
Acenaphthene	19 (9.0)	ND (180)	ND (170)	ND (17)	ND (340)	ND (1.8)
Acenaphthylene	ND (12)	ND (230)	ND (220)	ND (22)	ND (440)	ND (2.3)
Anthracene	ND (3.3)	ND (66)	ND (16)	ND (0.62)	ND (25)	ND (0.66)
Benzo(a)anthracene	ND (0.065)	8.4 (1.3)	ND (0.31)	ND (0.012)	ND (0.49)	ND (0.013)
Benzo(a)pyrene	ND (0.12)	2.8 (2.3)	ND (0.55)	ND (0.022)	ND (0.87)	ND (0.023)
Benzo(b)fluoranthene	ND (0.090)	7.4 (1.8)	ND (0.43)	ND (0.017)	ND (0.68)	ND (0.018)
Benzo(g,h,i)perylene	ND (0.38)	10.9 (7.6)	ND (1.8)	ND (0.071)	ND (2.9)	ND (0.076)
Benzo(k)fluoranthene	ND (0.085)	ND (1.7)	ND (0.41)	ND (0.016)	ND (0.65)	ND (0.017)
Chrysene	ND (0.75)	65 (15)	ND (3.6)	ND (0.14)	ND (5.7)	ND (0.15)
Dibenzo(a,h)anthracene	ND (0.15)	9.4 (3.0)	ND (0.72)	ND (0.028)	ND (1.1)	ND (0.030)
Fluoranthene	ND (1.0)	107 (42)	23 (5.0)	ND (0.20)	22 (8.0)	ND (0.21)
Fluorene	3.6 (1.0)	91 (21)	74 (20)	2.2 (2.0)	85 (40)	ND (0.21)
Indeno(1,2,3-cd)pyrene	ND (0.22)	ND (4.3)	ND (4.0)	ND (0.40)	ND (8.2)	ND (0.043)
Naphthalene	20 (9.0)	320 (180)	210 (170)	ND (17)	540 (340)	ND (1.8)
Phenanthrene	ND (3.2)	510 (64)	190 (15)	0.84 (0.60)	230 (24)	ND (0.64)
Pyrene	ND (1.4)	31 (27)	68 (6.5)	ND (0.25)	67 (10)	ND (0.27)

() = Detection Limit

ND = Not Detected at Detection Limit

NA = Not Analyzed

Table 4-6
Results of Sampling for Polynuclear Aromatics

M&A Offsite Samples
Polynuclear Aromatics
Sampling Event 06/20/90 - 08/23/90;

Units µg/L

	SHS-13	SHS-14	SHS-15	SHS-16
Acenaphthene	ND (1.7)	ND (8.6)	ND (1.7)	ND (1.7)
Acenaphthylene	7.9 (2.2)	ND (11)	ND (2.2)	ND (2.2)
Anthracene	ND (0.63)	ND (3.2)	ND (0.62)	ND (0.63)
Benzo(a)anthracene	ND (0.012)	ND (0.062)	ND (0.012)	ND (0.012)
Benzo(a)pyrene	ND (0.022)	ND (0.11)	ND (0.022)	ND (0.022)
Benzo(b)fluoranthene	ND (0.017)	ND (0.086)	ND (0.017)	ND (0.017)
Benzo(g,h,i)perylene	ND (0.072)	ND (0.36)	ND (0.071)	ND (0.072)
Benzo(k)fluoranthene	ND (0.016)	ND (0.082)	ND (0.016)	ND (0.016)
Chrysene	ND (0.14)	ND (0.72)	ND (0.14)	ND (0.14)
Dibenzo(a,h)anthracene	ND (0.028)	ND (0.14)	ND (0.028)	ND (0.028)
Fluoranthene	ND (0.20)	1.2 (1.0)	ND (0.20)	ND (0.20)
Indeno(1,2,3-cd)pyrene	0.56 (0.20)	3.6 (1.0)	0.23 (0.20)	0.77 (0.20)
Naphthalene	ND (0.041)	ND (0.21)	ND (0.040)	ND (0.041)
Phenanthrene	12 (1.7)	48 (8.6)	ND (1.7)	ND (1.7)
Pyrene	2.8 (0.61)	8.0 (3.1)	ND (0.60)	ND (0.61)
	ND (0.26)	1.8 (1.3)	ND (0.25)	ND (0.26)

() = Detection Limit
ND = Not Detected at Detection Limit
NA = Not Analyzed

Table 4-7

Aquifer Parameters for RESSQ

$$b = 62.5 \text{ feet}$$

$$n = 30 \text{ percent}$$

$$v = KI/n = 0.04 \text{ ft/day}$$

$$K = 10^{-5} \text{ ft/sec}$$

$$I = 0.014$$

$$\alpha = S20E = 160^\circ$$

$$A = 1 - (1/R) = 0$$

R = retardation coefficient

Table 4-8

Slug Test Derived Hydraulic Conductivities

WELL	HYDRAULIC CONDUCTIVITY (ft/sec)			
	SLUG-IN	R	SLUG-OUT	R
SHS-7	0.2×10^{-5}	-0.983	0.1×10^{-5}	-0.987
SHS-8	0.2×10^{-4}	-0.987	0.5×10^{-5}	-0.982
SHS-9	0.4×10^{-5}	-0.999	0.5×10^{-5}	-0.992
SHS-10	0.2×10^{-5}	-0.999	0.5×10^{-6}	-0.994
SHS-11	0.3×10^{-5}	-0.997	0.1×10^{-5}	-0.994
SHS-12	0.1×10^{-5}	-0.996		
SHS-13	0.2×10^{-5}	-0.976		
SHS-14	0.2×10^{-4}	-0.997	0.4×10^{-4}	-0.997
SHS-15	0.3×10^{-4}	-0.998	0.2×10^{-4}	-0.999

R = regression coefficient of best-fit line.

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Tables of reduced data used in the slug test analysis and the graphical plots of test data used to evaluate the variables required for the calculation of hydraulic conductivity are presented in appendix D.

The average linear velocity of ground water may be calculated as

$$V=KI/n \quad (1)$$

where K is the hydraulic conductivity, I is the hydraulic gradient, and n is the effective porosity of the aquifer matrix. The average hydraulic conductivity of the off-site aquifer unit (10^{-5} ft/sec, as determined from the slug test analysis), and the hydraulic gradient (0.014, as determined from water level measurements, table 4-1, and the potentiometric data from plate 1) were used in equation (1) to determine an average linear velocity of ground water in the off-site area of 0.04 ft/day. The direction of ground-water flow, as determined from plate 1, is S20W (200°). The average effective porosity of the aquifer material was estimated at 30% from soil boring logs from the off-site area.

RESSQ allows inclusion of a factor representing the retardation of the contaminant front due to adsorption of the contaminants to the rock matrix. The actual degree to which such contaminant adsorption would retard the front is difficult to determine even when laboratory analysis of such properties as total organic carbon and clay distribution are known. In absence of these properties and when the time of an instantaneous release is known, empirical observations of plume migration can be used to estimate the retardation of a plume by all mechanisms. Since none of this information is available for the current investigation, an estimate of an appropriate retardation factor could not be made. Therefore, the RESSQ models were produced assuming no adsorption of the contaminant front. This has no bearing on the hydraulics governing zone of capture, but it would affect subsequent calculations relating to cleanup timing.

4.4 Capture Zone

RESSQ was used to predict the results of various pumping scenarios in consideration of the areal extent of the known free-phase and dissolved-phase product plumes. Monitor wells SHS 7, SHS-9, SHS-11, and SHS-14 were considered as possible pumping sites. Although some or all of these wells could reasonably be expected to produce at a rate of three gallons per minute (gpm), the capture zone calculation from RESSQ is based on a conservative pumping rate of 1 gpm for each well. The model also assumed that the existing on-site recovery system would continue to operate. The analysis revealed that the most effective capture cross section would be produced by the combined pumping of all four wells at 1 gpm each. The cross section produced by this pumping scenario (as predicted by RESSQ)

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is presented in plate 3. This plate shows that the proposed combined pumping of wells SHS-7, -9, -11, and -14 would produce a hydraulic capture zone adequate to contain the existing free-phase and dissolved-phase product plumes. This pumping plan would also allow the removal of the free-phase and dissolved-phase plumes.

It should be remembered that the RESSQ model is based on the assumption of a confined aquifer. Conditions at the off-site area are thought to be unconfined. Unconfined conditions could cause a significantly narrower zone of capture than shown in plate 3. However, increased pumping rates, where possible, would offset this tendency. As previously mentioned, the RESSQ model is an approximation of expected conditions only. Its predictions, therefore, should not be used as a substitute for actual observational data and verification. The RESSQ results may be used to recommend the appropriate pumping strategy. The actual efficacy of this strategy must be demonstrated by continued monitoring.

The actual RESSQ output for the four well pumping scenario is presented in appendix E.

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5.0 CONCLUSIONS

A free-phase petroleum hydrocarbon plume occurs south of the Giant Bloomfield Refinery. Also, there is a dissolved-phase plume that is associated with the free-phase hydrocarbon. The approximate boundaries of the free-phase and the dissolved-phase hydrocarbon plumes are shown on plate 2. The geometry of the plumes indicates preferential subsurface flow of the ground water/hydrocarbon plume. The hydrocarbon flow path appears to follow a subsurface channel or other geologic heterogeneity through the study area.

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6.0 RECOMMENDATIONS

The following recommendations are proposed to initiate remediation of the petroleum hydrocarbon constituents found on and dissolved in ground water beneath the area south of Giant's Bloomfield Refinery.

- Continue to capture ground water at the refinery site pursuant to the approved Discharge Plan (GW-40).
- Begin recovery of free-phase/dissolved phase hydrocarbon from monitor wells SHS-7, -9, -11, and -14. Pump wells at sustainable rates to minimize the time required for remediation.
- Pump recovered ground water from these off-site wells to the existing water treatment system at the refinery site. Expand or modify treatment system as appropriate to manage the increased flow from the off-site collection system.
- Discharge treated ground water to injection wells or infiltration galleries within the off-site area to enhance migration of hydrocarbons to recovery wells.
- Create appropriate monitoring strategy to ensure that the proposed remedial system successfully remediates the off-site area.
- Amend existing discharge plan to include recommendations listed above.

GIANT INDUSTRIES THIRD REPORT OF OFF-SITE INVESTIGATION

Geoscience Consultants, Ltd.

7.0 REFERENCES CITED

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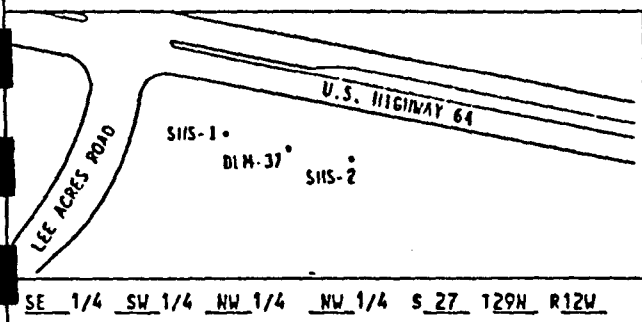
0653/OFFSIT3.RPT

APPENDIX A

Lithologic Logs

BOREHOLE LOG (SOIL)

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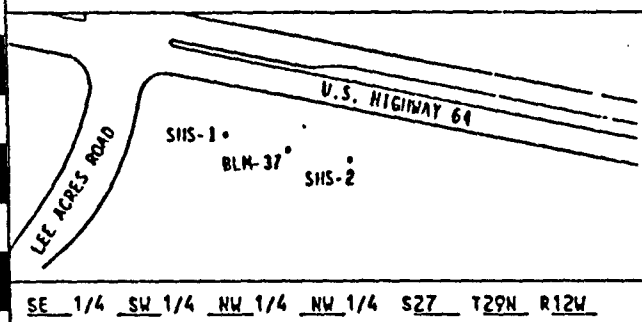


SITE ID: Lee Acres Community LOCATION ID: SHS-1
 SITE COORDINATES (ft.): Coordinates are local to GBR
 N 9896-34 E 11406.67
 GROUND ELEVATION (ft. MSL): Approximately 5381
 STATE: New Mexico COUNTY: San Juan
 DRILLING METHOD: Hollow Stem Auger
 DRILLING CONTR.: Western Tech
 DATE STARTED: 7/31/89 DATE COMPLETED: 8/1/89
 FIELD REP.: M. Nee
 COMMENTS:

LOCATION DESCRIPTION: South of Giant's Bloomfield refinery on NMSR 64 right of way, 100 ft west of BLM-37

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0			2	1	0	3			SW	0-28' Sand Mod Brn, 10 YR 4/4, v fine to fine grained, well sorted, unconsol., slightly moist at approx. 13'. Minor pebble gravel at 11'-13'.
5			5	2	3	8			CL	Silty clayey sand stringer, moderate brown, 10 YR 4/4, at approx. 15'-15.5'.
10			3	3	8	13			GP	Minor small pebble gravel 22-28'.
15			3	4	13	18			SW	28'-30' Clay, moderate olive brn, 5 Y 4/4, minor fine to coarse sand.
20			0	5	18	23			CL	30'-30.5' Sand as above (0'-28'), no gravel.
25			3	6	23	28			SC	6" clay to 31' grading to v fine sand at 33' olive gray, 5 Y 3/2.
30			5	7	28	33			CL	33'-36' Silty Sandy Clay, moderate olive brn, 5 Y 4/4, approx. 33% clay, 33% sand, 33% silt.
35			0	8	33	38			SW	36'-37' as above only stained, olive gray, 5 Y 3/2. Fine to coarse sand interval 37' to 37-1/2' then to silty clay olive gray, 5 Y 3/2.
40			2	9	38	43			CL	37'-1/2-39' Silty clay, olive gray 5 Y 3/2.
45			0	10	43	48			SH	39'-40' Silty sand, olive gray, 5 Y 3/2 unconsol., MW sorted.
50			3	11	48	52			CL	40'-41.5' Clay, mottled, mod yllsh brn, 10 YR 5/4 - olive gray. 5 YR 3/2.
									SW	41.5'-42.5' Sand. mod. olive brn 5 Y 4/4, f-m sand, unconsol., MW sorted.
									SC	42.5'-43.5' Sandy clay, mod brn, 5 YR 4/4.
									SW	43'-50' Sand, mod yllsh brn, 10 YR 5/4, fine to med sand. unconsol. MW sorted, saturated
									NA	50'-51.5' mudstone/claystone, dusky yellow 5 Y 6/4 to light olive brn, 5 Y 5/6 mod well consolidated, carbonaceous shale present, weathered, shale present.
									NA	51.5'-52' Sandstone, dusky yellow, 5 Y 6/4 to light olive brn, 5 Y 5/6, fine to med grained, well consolidated, well sorted.

BOREHOLE LOG (SOIL)

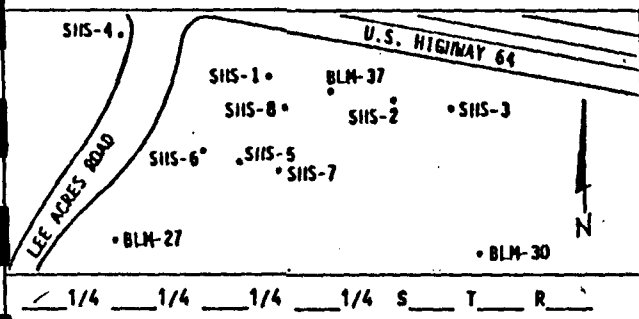
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SITE ID: Lee Acres Community LOCATION ID: SHS-2
 SITE COORDINATES (ft.): Coordinates are local to GBR
N 9854.92 E 11609.55
 GROUND ELEVATION (ft. MSL): Approx. 5382
 STATE: New Mexico COUNTY: San Juan
 DRILLING METHOD: Hollow Stem Auger
 DRILLING CONTR.: Western Technology
 DATE STARTED: 8/2/89 DATE COMPLETED: 8/2/89
 FIELD REP.: M. Nee
 COMMENTS: _____

LOCATION DESCRIPTION: South of Giants Bloomfield Refinery on NMSR 64 right of way, 100 ft east of BLM-37

DEPTH	LITH.	R E C	S A M	RUN		SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.		
0				1	0	3.5			0-1' <u>Soil</u> , Silty sand w/organics, mod. yllsh, brn 10 YR 5/4, 40% silt, 60% f sand, unconsolidated, mod well sorted, sub angular to sub rounded.
			3.5	2	3.5	3.5			
5			2	3	8.5	13.5			1'-26' <u>Gravelly Sand</u> , Dark yellowish orange, 10 YR 6/6, 90% v fine - fine pred. quartz, unconsol., well sorted, sub ang to sub rounded, 10% gravel is fine to coarse pebble gravel, rounded.
10			3	4	13.5	18.5			26'-30' <u>Sandy gravel</u> , Dark yllsh orange, 10 YR 6/6, unconsol., rounded, pebble gravel to cobbles.
15			3	5	18.5	23.5			30'-33.5' <u>Clayey Silty Sand</u> , mod yllsh brn, 10 YR 5/4. Clay to fine sand, unconsol. poorly sorted.
20			3	6	23.5	28.5			33.5'-36' <u>Sand</u> , mod yllsh brn, 10 YR 5/4, fine to mod sand, unconsol. sub ang to sub rounded, mod well.
25			0	7	28.5	33.5			36'-37' <u>Clayey Silt</u> , dark yllsh brn, 10 YR 4/4, unconsol. MW sorted.
30			0	8	33.5	38.5			37'-39.5' <u>Gravelly Sand</u> , dark yllsh brn, 10 YR 4/2, to olive black, 5 Y 2/1, at 38.5'.
35			2.5	9	38.5	43.5			80% fine sand, 20% small cobbles, ps, unconsol. sand is sub ang to sub rounded, cobbles are rounded.
40			5	10	43.5	48.5			39.5'-40.5' <u>Sandstone</u> , olive black 5 Y 2/1, MW consolidated, stained, appears to be Neclamento.
45			5	11	48.5	53.5			40.5'-40.8' <u>Claystone</u> , olive gray, 5 Y 4/1, mod well consolidated.
50			5						40.8'-41.1' <u>Sandstone</u> , dark yllsh orange, 10 YR 6/6, med sand, MW sorted, unconsolidated.
									41.1'-41.3' <u>Claystone</u> , olive gray, 5 Y 4/1, mod well consolidated.
									41.8'-42' <u>Sandstone</u> , grayish orange, 10 YR 7/4, med sand, mod consol., subang, calcium cement, moist.

BOREHOLE LOG (SOIL)

Page 1 of 2

SITE ID: OFFSITE GIANT LOCATION ID: SHS-3
 SITE COORDINATES (ft.): _____
 N _____ E _____
 GROUND ELEVATION (ft. MSL): _____
 STATE: NEW MEXICO COUNTY: SAN JUAN
 DRILLING METHOD: HOLLOW STEM AUGER
 DRILLING CONTR.: WESTERN TECHNOLOGIES INC.
 DATE STARTED: 11/29/89 DATE COMPLETED: 11/30/89
 FIELD REP.: LINLEY
 COMMENTS: _____

LOCATION DESCRIPTION: _____

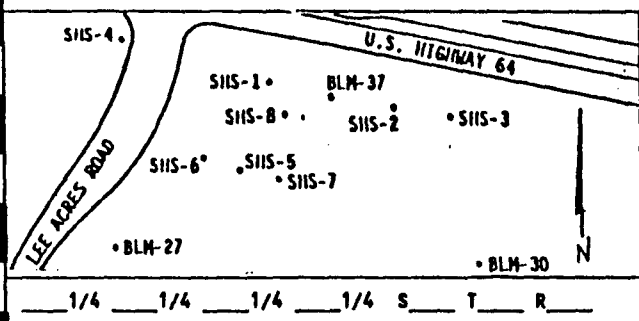
DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0									SW	0-6' <u>SAND</u> : Yelsh orange (10 YR 6/6) fn to med fn grained, uncons, mod poorly sorted, sbang to sbrndd, fill.
5									SM	6-8' <u>CLAYEY SAND</u> : Dark yelsh brn (10 YR 4/2) v fn to fn grained, uncons, mod poorly sorted, sbang to sbrndd.
10									SW	8-35' <u>SAND</u> : Dark yelsh orange (10 YR 6/6) fn to med grained, uncons, mod sorted, sbang to sbrndd. At 25' BGL cobbles (intbd w/depth). Clay fraction <10%, Grv fraction =15% to 25%.
15										
20										
25										
30										
35									SW	35-38' <u>SAND</u> : (v lgy wthd Sst), mod redsh brn (10 R 4/6) to dk yelsh orange (10 YR 6/6), fn to med sand, mod sorting, semiconsol, fri, sbang to sbrndd. (v dns) Clay fraction incr w/depth to =20%.
40									Pt	38-38.5' <u>COAL</u> : Blk (N1), flaky to leaf like layering, fri, consol.
45									GM	38.5-39.5' <u>GRAVELLY SANDY CLAY</u> : Gnsh gry (5 GY 6/1) to dk yelsh orange (10 YR 6/6) v fn to med grained, poorly sorted, semiconsol, sbang to sbrndd. Grv fraction =10-15% & up to 1/8" diam. Sand fraction =20-25%.
50									GM	39.5-44' <u>GRAVELLY SAND</u> : Dk yel orange (10 YR 6/6) med to crs grained, uncons, poorly sorted, sbang to sbrndd, wet.

(Continued)

LOCATION ID: SHS-3

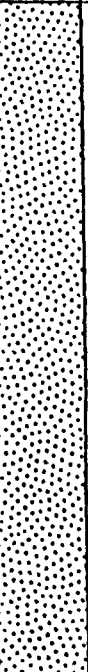
[illegible]

BOREHOLE LOG (SOIL)



SITE ID: OFFSITE GIANT LOCATION ID: SHS-4
SITE COORDINATES (ft.): _____
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECHNOLOGIES INC.
DATE STARTED: 11/27/89 DATE COMPLETED: 11/28/89
FIELD REP.: LINLEY
COMMENTS:

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION	
				#	FROM	TO	I.D.	TYPE			
0									SW	0-27' <u>SAND</u> : Grysh orange (10 YR 7/4): v fn to med fn grained, sbang to sbrndd, uncons, mod sorted, moist at =15' BGL. 20-21' BGL Grv horizon, well rndd, =0.5" diam. Overall grain size incr w/depth to med-med crs sand. Grv fraction incr in Lith at =25' BGL.	
5											
10											
15											
20											
25									GM	27-32' <u>GRAVELLY CLAYEY SAND</u> : Grysh orange (10 YR 7/4) v fn to crs grained, poorly sorted, sbang to sbrndd, semi to uncons, moist. Grv content =10-15%, clay fraction =25-30%.	
30											
35											
40											
45											
50										GC	32-37' <u>GRAVELLY SANDY CLAY</u> : As above w/color change to grysh orange (10 YR 7/4) to mod yelsh brn (10 YR 5/4). Grv fraction decr w/depth to =5%, clay fraction =50% incr w/depth to =75%, Grv fraction 0% at 37' BGL.
										SC	37-44' <u>SANDY CLAY</u> : Grysh orange (10 YR 7/4) v fn to med fn grained, poorly sorted, semiconsol, sbang to sbrndd, moist. Sand fraction =20-25% & decr w/depth to 15-20% & bcm fn grained.
										SH	44-45' <u>CLAYEY SAND</u> : Grysh orange (10 YR 7/4) to mod yelsh brn (10 YR 5/4). V fn to med fn grained, uncons, sbang to sbrndd, poorly sorted, moist.
										SC	45-50' <u>SANDY CLAY</u> : Grysh orange (10 YR 7/4) to mod yelsh brn (10 YR 5/4) v fn to med grained, poorly sorted, sbang to sbrndd, semiconsol, moist. Sand fraction =20% incr w/depth to =30-35% at 48' BGL, then decr to =15% & bcm fn grained. Grv horizon at 47-49' BGL.

BOREHOLE LOG (SOIL)

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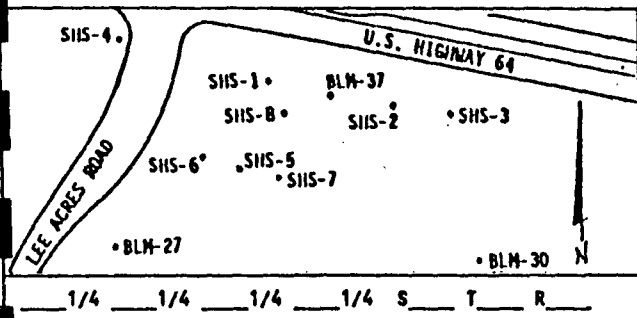
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LOCATION ID: SHS-4

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
50									ML	50-60' <u>SHALE</u> : Lt olv (10 Y 5/4) to dk gnsh yel (10 Y 6/6) v fn grained, consol, well sorted, sbrndd to rndd.
55										
60										
65										
70										
75										
80										
85										
90										
95										
100										
105										
110										
115										

BOREHOLE LOG (SOIL)

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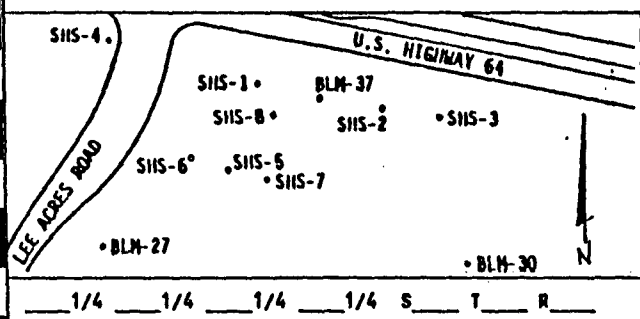
SITE ID: OFFSITE GIANT LOCATION ID: SHS-5
 SITE COORDINATES (ft.): _____
 N _____ E _____
 GROUND ELEVATION (ft. MSL): _____
 STATE: NEW MEXICO COUNTY: SAN JUAN
 DRILLING METHOD: HOLLOW STEM AUGER
 DRILLING CONTR.: WESTERN TECHNOLOGIES INC.
 DATE STARTED: 1/7/90 DATE COMPLETED: 1/8/90
 FIELD REP.: LINLEY
 COMMENTS: _____

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0		100%	1	1	0	3'			SW	0-31' SAND: Grysh orange (10 YR 7/4), v fn to med fn sand, poorly sorted, uncons, sbang to sbrndd, abd rootlets. Cobbles at 10' BGL -up to 4" diam, sbrndd #1' thick at 13-14' BGL -at #18' BGL 6" thick lens of clayey silt -intbd Grv through depth up to 1" diam sbang to sbrndd.
		0%	2	2	3	8'				
5										
		4%	3	3	8	14'				
10										
		40%	4	4	14	18'				
15										
		0%	5	5	18	23'				31-32' CLAYEY SILT: Mod yelsh brn (10 YR 5/4) v fn to fn med sorting uncons to semiconsol, sbang to sbrndd.
20										
		75%	6	6	23	27'				
25										
		100%	7	7	27	33'				
30										32-38' SILTY SAND: Grysh orange (10 YR 7/4), fn to med fn grained semi to uncons sbang to sbrndd, mod poorly sorted incr grain size w/depth to med sand.
		100%	8	8	33	38'			SC	
35									SH	38-42' SAND: Pale yelsh orange (10 YR 8/6) fn to med crs, poorly sorted, uncons sbang to sbrndd, v moist.
		30%	9	9	38	42'				
40									SP	42-43' CLAYEY SILT: Pale yelsh brn (10 YR 6/2) v fn to fn, mod sorted, semiconsol, sbang to sbrndd, sat.
		20%	10	10	42	47'				
45									SC	43-58' SAND: Pale yelsh brn (10 YR 6/2) fn to med crs sand, poorly sorted, uncons, sbang to sbrndd, sat.
		20%	11	11	47	52'				
50									SW	
		10%	12	12	52	57'				

BOREHOLE LOG (SOIL)

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SITE ID: OFFSITE GIANT LOCATION ID: SHS-7
 SITE COORDINATES (ft.): _____
 N _____ E _____
 GROUND ELEVATION (ft. MSL): _____
 STATE: NEW MEXICO COUNTY: SAN JUAN
 DRILLING METHOD: HOLLOW STEM AUGER
 DRILLING CONTR.: WESTERN TECHNOLOGIES INC.
 DATE STARTED: 01/06/90 DATE COMPLETED: 01/06/90
 FIELD REP.: LINLEY
 COMMENTS: _____

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0		100%	1	1	0	4'			SW	0-36' SAND: Dk yelsh orange (10 YR 6/6) fn to med fn grained, mod poorly sorted, uncons, sbang to sbrndd. Rootlets in upper 18", sand bcm more crs grained w/depth to a med to med crs grained, rootlets at 10-12' BGL, encountered cobbles at #16' BGL, cobbles at 26' BGL, med crs to crs sand, cobbles up to 5" diam, rootlets at 27' BGL. Grv up to 2.5" diam w/med crs sand at 30-35' BGL.
5		100%	2	2	4	9'				
10		50%	3	3	9	14'				
15		70%	4	4	14	18'				
20		0%	5	5	18	22'				
25		50%	6	6	22	27'				
30		60%	7	7	27	32'				
35		80%	8	8	32	37'				
40		30%	9	9	37	41'			SH	36-37' SAND SILT: Dk yelsh orange (10 YR 6/6) v fn to fn grained semiunconsol, sbang to sbrndd mod poorly sorted, clay fraction =15% sand fraction =30%, 37' BGL noted HC odor from drilling cuttings at 38' BGL noted (bottom of sampler) blk horizon w/HC odor noted H ₂ O at #42' BGL - cuttings have blk staining (?) w/HC odor. HC horizon _____.
45		40%	10	10	41	45'				
50		50%	11	11	45	50'			SC	37-40' CLAYEY SAND: Grysh olv, v fn to med crs, poorly sorted, semi to uncons sbang to sbrndd, sat. HC odor.
									SC	40-41' CLAYEY SILT: Grysh orange (10 YR 7/4) v fn to fn mod poorly sorted, semi to consol sbang to sbrndd, moist, no odor.

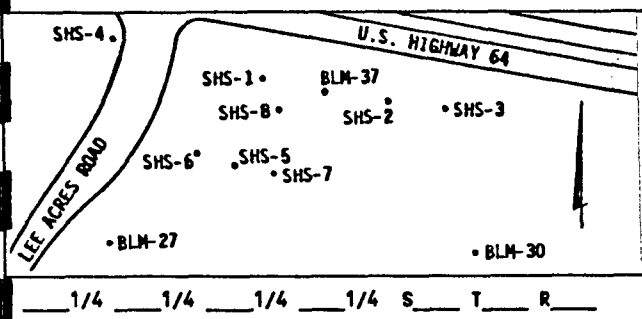
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LOCATION ID: SHS-7

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BOREHOLE LOG (SOIL)

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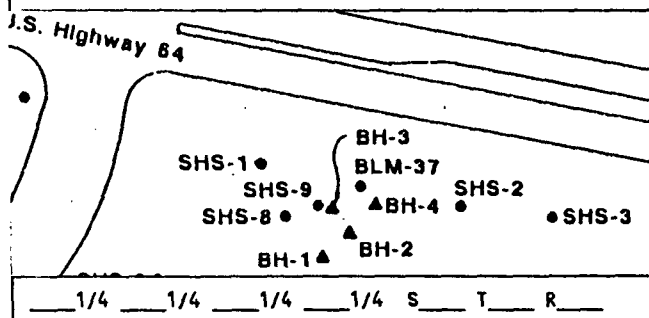


SITE ID: OFFSITE GIANT LOCATION ID: SHS-8
 SITE COORDINATES (ft.): _____
 N _____ E _____
 GROUND ELEVATION (ft. MSL): _____
 STATE: NEW MEXICO COUNTY: SAN JUAN
 DRILLING METHOD: HOLLOW STEM AUGER
 DRILLING CONTR.: WESTERN TECHNOLOGIES INC.
 DATE STARTED: 01/09/90 DATE COMPLETED: 01/09/90
 FIELD REP.: LINLEY
 COMMENTS: _____

LOCATION DESCRIPTION:

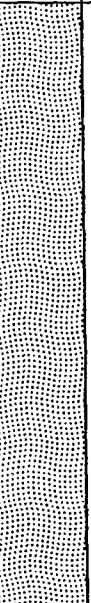
DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0		60%	1	1	0	4'			SM	0-6' <u>SANDY SILT</u> : Dk yelsh orange (10 YR 6/6) v fn to fn grained uncons, mod sorted, sbang to sbrndd, rootlets.
5		80%	2	2	4	9'			SW	6-15' <u>SAND</u> : Mod yelsh brn (10 YR 5/4) fn to med crs, poorly sorted, uncons sbang to sbrndd, Grv at =8' BGL and =1' thick, up to 1-2" diam, sbrndd to sbang, rootlets.
10		70%	3	3	9	14'				
15		30%	4	4	14	19'			SM	15-17' <u>SANDY SILT</u> : Pale yelsh brn (10 YR 6/2) v fn to med fn grained, poorly sorted semi to uncons, sbang to sbrndd.
20		60%	5	5	19	24'			SW	17-37' <u>SAND</u> : Mod yelsh brn (10 YR 5/4) fn to med crs, poorly sorted, uncons, sbang to sbrndd, moist, at =37' BGL noted blk stain in cuttings w/HC odor.
25		50%	6	6	24	29'				
30		70%	7	7	29	34'				
35		100%	8	8	34	39'				
40		70%	9	9	39	41'			SM	37-39' <u>SILTY SAND</u> : Dk gnsh gry (5 GY 4/1) to grysh blk (N 2) (HC staining ?) v fn to med fn sand, semi to uncons, mod poorly sorted, sbang to sbrndd, v moist, HC odor w/staining, HNu = 120, LEL = 74%.
45		0%	10	10	41	45'			SW	39-41' <u>SAND</u> : Dk gnsh gry (5 GY 4/1) fn to med grained, poorly sorted, uncons, sbang to sbrndd, sat.
50		10%	11	11	45	50'			SM	41-53' <u>SANDY SILT</u> : Gnsh gry (5 GY 6/1) v fn to fn grained, mod poorly sorted, semi to uncons, sbang to sbrndd, sat.
		20%	12	12	50	53'				

BOREHOLE LOG (SOIL)

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SITE ID: OFFSITE GIANT LOCATION ID: SHS-9
SITE COORDINATES (ft.): _____
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: ROTARY (AIR)
DRILLING CONTR.: MOTE
DATE STARTED: 04/25/90 DATE COMPLETED: 04/25/90
FIELD REP.: MARTIN NEE, KYLE SUMMERS
COMMENTS: _____

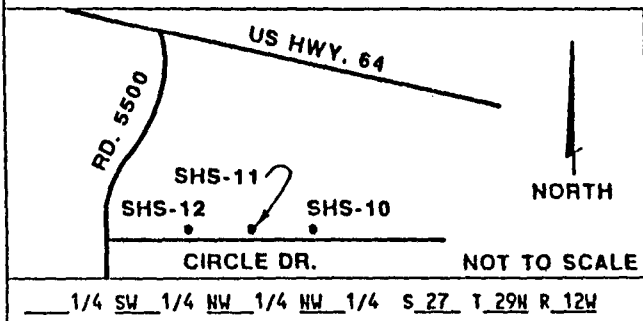
LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0							0-5'			<u>Backfill</u> , dark yllsh brn 10 YR 4/2, sand-80%, clay-20%, v. fine to med sand, subang, unconsolidated.
5							5-10'			<u>Sand</u> , mod yllsh brn 10 YR 5/4, clay-5%, sand-v. fine-med crs, subang., uncons.
10							10-25'			<u>Sand</u> , mod yllsh brn 10 YR 5/4, v. fine - medium, subang.
15										
20										
25							25-38'			<u>Sandy clay</u> , mod yllsh brn 10 YR 5/4 to dark yllsh brn 10 YR 4/2, v. fine-medium sand 40%, clay-60%, uncons, subang.
30										
35										
40							38-45'			<u>Sandy clay</u> , mod olive brn 5 Y 4/4, v. fine sand-10% clay-90%, some cobbles at 42-43', uncons., subang.
45							45-50'			<u>Claystone</u> , med blsh gray 5 B 5/1 to mod brn 5 YR 3/4, inter bedded with F. rich clays dk yllsh orange 10 YR 66.
50										

LITHOLOGIC LOG (SOIL)

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SITE ID: OFFSITE GIANT LOCATION ID: SHS-10
 SITE COORDINATES (ft.): 150' EAST of SHS-11
 N 9748.99 E 11415.36
 GROUND ELEVATION (ft. MSL): 5378.77
 STATE: NM COUNTY: SAN JUAN
 DRILLING METHOD: HOLLOW STEM AUGER
 DRILLING CONTR.: WESTERN TECHNOLOGIES
 DATE STARTED: 6/18/90 DATE COMPLETED: 6/20/90
 FIELD REP.: KYLE SUMMERS
 COMMENTS: _____



LOCATION DESCRIPTION:

Depth	Lith	Drilling Time Scale:	Sample Type and Interval	Org. Vap ppm	Lithologic Description / Remarks
			Soil headspace		
5			5-7'	0	0-10' Sand, Mod yelsh brn 10 YR 5/4, v fn to med crs mix, ang to sbang uncons, poorly sorted.
10			10-12'	0	10-15' Sand, Mod yelsh brn 10 YR 5/4 to dk yelsh orange 10 YR 6/6, v fn med grained, uncons, ang to sbang sand, poorly sorted.
15			15-17'	0	15-21' Sand, Mod yelsh brn 10 YR 5/4, v fn to med, uncons, ang to sbang sand, poorly sorted.
20			20-22'	0	22-22.5' Silty Sand, Mod olv brn 5 Y 4/4, Sltst-7 -partially consol, some clay =10%, sli Cbls, poorly sorted, some grading.
25			22-24.5'	0	22.5-24.5' Silty Sand, Lt olv brn 5 Y 5/6, fn to v fn sand - 80%, some semi-consol silt Intvls which are tight drilling, poorly sorted, some graded bedding.
30			30-32'	0	24.5-30' Silty Sand, Lt olv brn 5 Y 5/6, silt to med sand, occ Grv <1% tight but not consol, silt well sorted, some grading.
35			30-34.5'	0	30-34.5' Sand, Mod yelsh brn, 10 YR 5/4, to grysh orange 10 YR 7/4, v fn sand 10%, fn to med - 80-90% Qtz sand, fairly well sorted, some grading.
40			34.5-35.5'		34.5-35.5' Sand, Dk mod yelsh brn 10 YR 4/2 to lt olv brn 5 Y 5/6, clay 5% to med sand 90%, fairly well sorted, some grading.
45			35.5-36.5'	140	35.5-36.5' Sand, Lt olv brn 5 Y 5/6, v fn sand to med sand, v fn =10%, fairly well sorted
			36.5-38.5'	180	36.5-38.5' Clayey Sand, HC staining at 37' grysh blk, N2, to med gry, N5, v fn sand =20%, fn to med 70%, clay/silt =10%, sand is ang to sbang uncons clay layer at 38', fairly sorted, graded.
			38.5-40'		38.5-40' Sand, Lt olv brn 5 Y 5/6, v fn to med sand fairly drk uncons to semi consol, fairly well sorted, graded.
50			40-42'	40	40-42' Gravelly Sand, Lt olv brn 5 Y 5/6, to med dk gry, N 3, some Fe stains at 42' cobbles seem to be sbrndd = Sst and Qtz, poorly sorted.
			42-45'		42-45' Gravelly Sand, Dk yelsh orange 10 YR 6/6, lge Cbls, sand, poorly sorted.

LITHOLOGIC LOG (SOIL)

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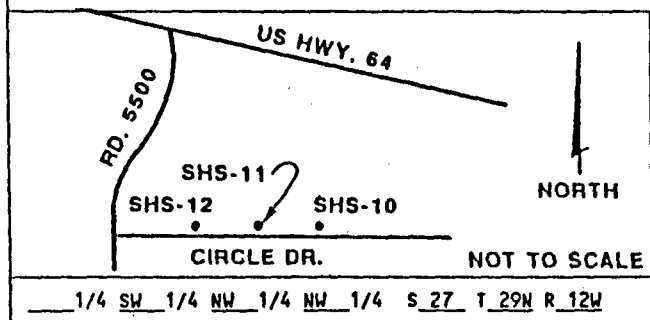
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Location ID SHS-10

Depth	Lith	Drilling Time Scale:	Sample Type and Interval	Org. Vap ppm	Lithologic Description / Remarks
50					45-48' No sample - plug in auger stem. 48' = TD
55					
60					
65					
70					
75					
80					
85					
90					
95					
100					
105					
110					
115					

LITHOLOGIC LOG (SOIL)

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SITE ID: M&A OFFSITE LOCATION ID: SHS-11

SITE COORDINATES (ft.): 150' WEST OF SHS-10

N 9763.57 E 11358.35

GROUND ELEVATION (ft. MSL): 5378.36

STATE: NM COUNTY: SAN JUAN

DRILLING METHOD: HOLLOW STEM AUGER

DRILLING CONTR.: WESTERN TECH.

DATE STARTED: 6/20/90 DATE COMPLETED: 6/21/90

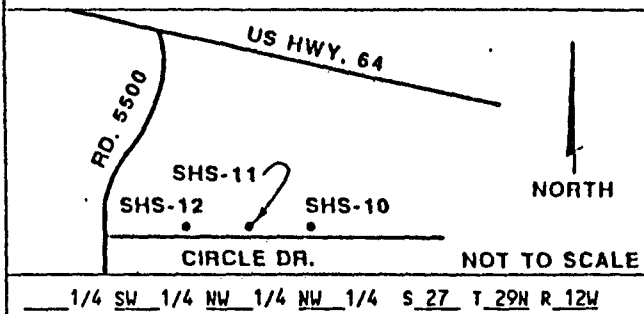
FIELD REP.: M. MOHORCICH

COMMENTS: T.D. AT 55', DRILLED FIRST W/ 7" AUGER THEN REAMED W/ 10".

LOCATION DESCRIPTION:

Depth	Lith	Drilling Time Scale:	Sample Type and Interval	Org. Vap ppm	Lithologic Description / Remarks
		1110	0-5'	0	0-5' Sand, mod yelsh brn 10 YR 4/2, med-crs, uncons.
5					
10			Soil headspace 10-12'	0	5-32' Sand, yelsh brn 10 YR 5/4, abdt qtz, subrnd, uncons, med-crs grn
15			15-17'	0	
20			20-22'		
25			25-27'	0	
30			30-32'	0	
35			35-37'	>30	32-33' Cobbly sand, sand as above w/ minor cobbles.
			37-39'	>30	33-41' Sand, olv gry 5 Y 3/2, med-crs grnd from 33-38' w/ noticed HC stain & odor at 36'. Noticably drkr HC stain from 38'-40'; with lighter dusky yel grn 5 GY 5/2 from 40-41'. H ₂ O at 38-40'.
40			39-41'	2	41-43' Cobbly sand, lght olv gry 5 Y 5/2, saturated, well sorted, crs grn sand w/ few 1" size cobbles, uncons.
45					43-45' Sand, lght olv gry 5 Y 5/2, saturated.
50					45-55' Cobbly sand, lght olv gry 5 Y 5/2, saturated same as above (SAA) w/ minor cobbles, uncons. Pulled out 7" bit & reamed w/ 10" flights.
					T.D. at 55'

LITHOLOGIC LOG (SOIL)

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SITE ID: OFFSITE GIANT M&A LOCATION ID: SHS-12
 SITE COORDINATES (ft.): 150' WEST OF SHS-11
N 9778.01 E 11300.38
 GROUND ELEVATION (ft. MSL): 5378.17
 STATE: NM COUNTY: SAN JUAN
 DRILLING METHOD: HOLLOW STEM AUGER
 DRILLING CONTR.: WESTERN TECHNOLOGIES
 DATE STARTED: 6/21/90 DATE COMPLETED: 6/22/90
 FIELD REP.: M. MOHORCICH
 COMMENTS: T.D. 55'

LOCATION DESCRIPTION:

Depth	Lith	Drilling Time Scale:	Sample Type and Interval	Org. Vap ppm	Lithologic Description / Remarks
0-15'			Soil headspace		<u>Sand</u> , lt olv brn 5 Y 5/6, med grain sand, sbrndd, prim uncons.
5					
10					
15					15-37' <u>Sand</u> , pale yellow orange 10 YR 8/6, med-coarse grain, uncons.
20					
25					
30					No split at 30-32', just pushing a rock w/spoon down through uncons sand. Lost sand downhole, cavity at ≈ 32'.
35			*35' HNU=Oppm	0	Sand seemed to get moist from 36-37' split.
40					37-39' <u>Gravelly, Clayey sand</u> , 10 YR 8/6, med-coarse qtz sand, 37-37.4' few 1/2-1" Grvl & minor amt of Cly at 37.2". No H ₂ O yet, maybe a bit more moist than above at 35'.
45					39-43' <u>Sand</u> , dusky yel 5 Y 6/4, med-crs gr, uncons, split from 40-42 gave H ₂ O at 41'.
50					43-43.8' <u>Clayey Sand</u> , dusky yel 5 Y 6/4, minor amt cly. 43.8-45' <u>Sand</u> , dusky yel 5 Y 6/4, unconsol.
					45-50' <u>Cobbly Sand</u> , SAA w/minor cobbles surfacing.
					50-55' <u>Sand</u> , SAA.

LITHOLOGIC LOG (SOIL)

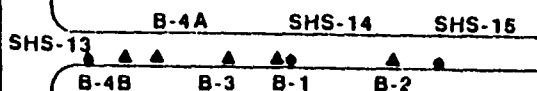
Page 2 of 2

(continued)

Location ID SHS-12

Depth	Lith	Drilling Time Scale:	Sample Type and Interval	Org. Vap ppm	Lithologic Description / Remarks
50					
55					T.D. 55' w/ 10" flights. Split 55-57' <u>Sand</u> , saa w/ cly zone from 56.6-57'.
60					
65					
70					
75					
80					
85					
90					
95					
100					
105					
110					
115					

BOREHOLE LOG (SOIL)

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SITE ID: OFFSITE GIANT LOCATION ID: SHS-13 Cty Rd 5468
SITE COORDINATES (ft.): _____
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: AIR/WATER ROTARY
DRILLING CONTR.: NOTE
DATE STARTED: 08/22/90 DATE COMPLETED: 08/22/90
FIELD REP.: M. MOHORCICH
COMMENTS: 37' east of Lee Acres Rd., 7 3/8" bit

1/4 SW 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12W

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500, HNU bkground = .04 ppm

[illegible]

BOREHOLE LOG (SOIL)

Page 1 of 1

SITE ID: OFFSITE GIANT LOCATION ID: SHS-14, Cty. Rd, 5468
 SITE COORDINATES (ft.): 250' E of LEE ACRES RD.
 N _____ E _____
 GROUND ELEVATION (ft. MSL): _____
 STATE: NEW MEXICO COUNTY: SAN JUAN
 DRILLING METHOD: HOLLOW STEM AUGER
 DRILLING CONTR.: WESTERN TECH INC.
 DATE STARTED: 08/16/90 DATE COMPLETED: 08/17/90
 FIELD REP.: M. MOHORCICH
 COMMENTS: South side of row, time 1400
 HNU background = .02 ppm

Cty. Rd. 5468
 (Meadow Lane)

B-4A SHS-14 SHS-15
 B-3 B-1 B-2

1/4 SW 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12W

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0							Split Spoon 0-4	HNU bkg = .02 ppm bkg	SM	Sand, mod yelsh brn 10 YR 5/4, poorly sorted, med gr, moist at 3' minor cobbles.
5							4-9	bkg	SM	drk yelsh brn 10 YR 4/2, f gr moist, poorly sorted unconsolidated.
10							9-14	bkg	SM	10 YR 4/2, slily moist, med gr incr in qtz gr, poorly sorted.
15							14-19	bkg	SC	Cobbly sand, same as above w/cobbles at 16-17, no odor or stain.
20							19-24	bkg	SM	Sand, same as above w/out cobbles, moist.
25							24-29	bkg		Sand, same as above
30							29-34	25		29-33, same as above. 34 HC stain, soil came up & gave borehole HNU of 25 ppm olv gry 5YR 3/2.
35							34-39	174		34-39, blk soil & H2O table. Open borehole of 12 ppm.
40							39-44	250	SM	Sand, olv gry 5Y 3/2. Stained & odor med gr sat sand.
45							44-49			Same as above, med gr sat.
50							49-54			Cobbly sand Felt & drilled like cobbles. Same as above w/ 2" cobbles. TD at 54'

BOREHOLE LOG (SOIL)

Page 1 of 1

SITE ID: OFFSITE GIANT LOCATION ID: SHS-16, Cty Rd 5470

SITE COORDINATES (ft.): 200' EAST OF LEE ACRES ROAD ROW

N _____ **E**

GROUND ELEVATION (ft. MSL):

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: AIR/H₂O ROTARY

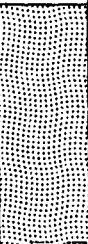
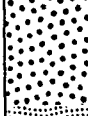
DRILLING CONTR.: MOTE

DATE STARTED: 08/21/90 DATE COMPLETED: 08/21/90

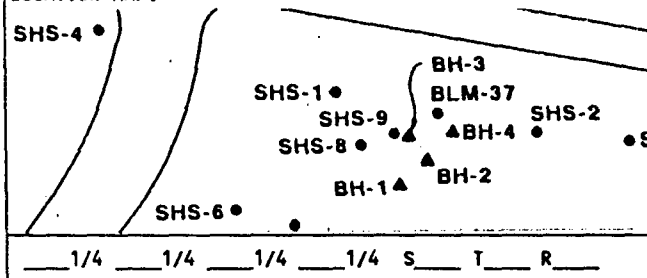
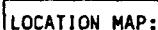
FIELD REP.: M. MOHORCICH

COMMENTS: Drilled 10' east of bore 6 at NE corner of
woodsided shed. T.D. 50'

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500, HNU Bkg = .04 ppm

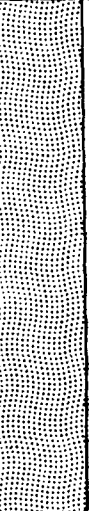
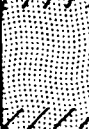
DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0							Split Spoon 0-9	HNU bkg = .04 ppm	SM	<u>Sand</u> , f-med gr, dusky yel 5Y 6/4, unconsolidated, slily moist, poorly sorted. Color change to drk yelsh brn 10 YR 4/2 at 12-16.
5										
10										
15										
20										
25							14-16	1.6	SC	<u>Clayey sand</u> , 24-29, clayey sand, drk yelsh brn 10 YR 4/2, sandy clay balls coming to surface.
30										
35										
40							19-21	1	SM	<u>Sand</u> , split 29-31 - med gr, dusky yel 5Y 6/4, poorly sorted w/ H ₂ O at 30'.
45										
50							24-26	1.6	SW	<u>Cobbly sand</u> , 35-40, med gr, 1/2-1" cobbles.
							29-31	1.4	SM	<u>Sand</u> , 40-50' med gr sand, dusky yel, 5Y 6/4, poorly sorted. T.D. at 50' Comment: HNU readings were taken at Bore 6- 5' east of SHS-16 w/ hollow stem auger split spoon.

BOREHOLE LOG (SOIL)

Page 1 of 1

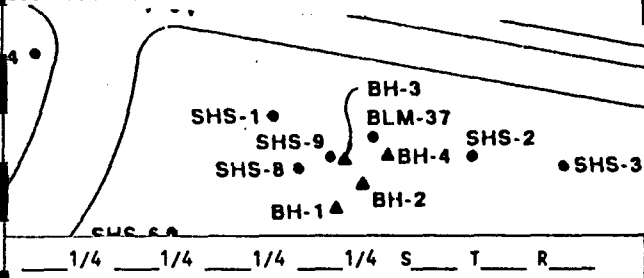
SITE ID: OFFSITE GIANT LOCATION ID: SHS-BH1
SITE COORDINATES (ft.): _____
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECH INC.
DATE STARTED: 04/23/90 DATE COMPLETED: 04/23/90
FIELD REP.: MARTIN NEE, KYLE SUMMERS
COMMENTS:

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0							3'			<u>Sand</u> , Dark yllsh brn 10 YR 4/2, v. fine to coarse sand, poorly sorted, unconsolidated, sub-angular, <10% fine pebble gravel.
5							6'-21'	<u>Sand</u> , Moderate yllsh brn, 10 YR 5/4, as above <5% clay, <10% v. fine to coarse pebble gravel.		
10										
15										
20								21'		<u>Clayey sand</u> , Dark yllsh brn 10 YR 4/2, clay to medium unconsolidated, poorly sorted, sub-angular sand, 40% clay, 60% sand.
25	24'-40'	<u>Sand</u> same as 6'-21', cobbles at 39' hard drilling.								
30										
35										
40		40'-44'	<u>Sand</u> , greyish black N2, same as 24' out of cobbles at 45', 10% fine to coarse pebble gravel, 10% clay.							
45		44'-45'	<u>Sandy claystone</u> , dark yllsh orange 10 YR 6/6, v. well consolidated. ≈10% v. fine sand.							
50				TD = 45'						

BOREHOLE LOG (SOIL)

LOCATION MAP:



Page 1 of 1

SITE ID: OFFSITE GIANT LOCATION ID: SHS-BH2
 SITE COORDINATES (ft.):
 N E
 GROUND ELEVATION (ft. MSL):
 STATE: NEW MEXICO COUNTY: SAN JUAN
 DRILLING METHOD: HOLLOW STEM AUGER
 DRILLING CONTR.: WESTERN TECH INC.
 DATE STARTED: 04/23/90 DATE COMPLETED: 04/23/90
 FIELD REP.: MARTIN NEE, KYLE SUMMERS
 COMMENTS:

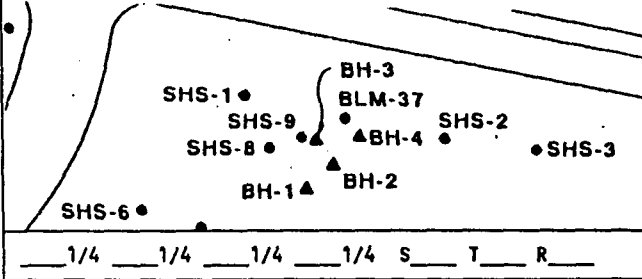
LOCATION DESCRIPTION: South of NM 64, East of County Road 5500

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0							0-5'			Sand, dark yllsh brn 10 YR 4/2 to mod yllsh brn 10 YR 5/4, unconsolidated, poorly sorted, sub-angular, v. fine to coarse. ≈10% clay, <5% gravel.
5							5-23'			Sand, moderate yllsh brn 10 YR 5/4, v. fine to coarse sand, poorly sorted, sub-angular to sub-rounded; minor fine pebble gravel, ≈10% mod to coarse pebble gravel at 13-20'.
10										
15										
20										
25							23-25'			Clayey sand, sand is dark yllsh brn 10 YR 4/2, clay is light olive gray 5 YR 5/2, sand is v. fine to coarse, poorly sorted, unconsolidated, sub-angular to sub-rounded.
30							25-36'			Clay, light olive gray 5 YR 5/2, mod consolidated.
35										
40							36-38'			Clay, olive black 5 YR 2/1, HC odor, 12-5 ppm from cuttings.
45							38-41.5'			Cobbles/sand - no cuttings.
50							41.5-43'			Claystone, moderate brown 5 YR 4/4-5 YR 3/4, mod well consolidated. TD = 43'

BOREHOLE LOG (SOIL)

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LOCATION MAP:



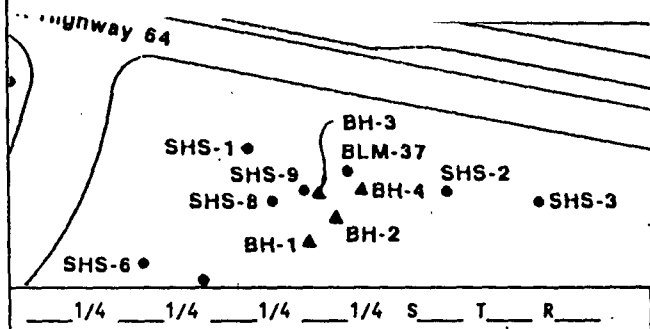
SITE ID: OFFSITE GIANT LOCATION ID: SHS-BH3
 SITE COORDINATES (ft.): _____
 N _____ E _____
 GROUND ELEVATION (ft. MSL): _____
 STATE: NEW MEXICO COUNTY: SAN JUAN
 DRILLING METHOD: HOLLOW STEM AUGER
 DRILLING CONTR.: WESTERN TECH INC.
 DATE STARTED: 04/23/90 DATE COMPLETED: 04/23/90
 FIELD REP.: MARTIN NEE, KYLE SUMMERS
 COMMENTS: _____

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0							0-3'			Backfill dark yllsh brn 10 YR 4/2, 80% clay, 20% v. fine to med sand, unconsolidated, sub-angular.
5							3-33'			Sand, mod yllsh brn 10 YR 5/4 - dk yllsh brn 10 YR 4/2, fine to med unconsolidated, sub-angular, sub-rounded gravel (sparse) at 15ft.
10										
15										
20										
25										
30										
35							33-36'			Clayey Sand, dk yllsh brn 10 YR 4/2, clay-40%, sand-60%, fine to med uncons., sub-angular sand.
40							36-38'			Sandy clay, olive grey 5 Y 3/2 - moderate olive brn 5 Y 4/4, fine to med uncons sand, sbang, clay-70%, sand-30%, sparse, rd - subrd gravel.
45							38-45.5'			Sandy clay, mod olive brn 5 Y 4/4, clay-80%, sand-20%.
50							45.5'			Silty claystone, med blsh grey 5 B 5/1, consolidated. TD = 45.5'

BOREHOLE LOG (SOIL)

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SITE ID: OFFSITE GIANT LOCATION ID: SHS-BH4
SITE COORDINATES (ft.): _____
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECH INC.
DATE STARTED: 04/23/90 DATE COMPLETED: 04/23/90
FIELD REP.: MARTIN NEE, KYLE SUMMERS
COMMENTS: _____

LOCATION DESCRIPTION: South of NM 64 East of County Road 5500

[illegible]

BOREHOLE LOG (SOIL)

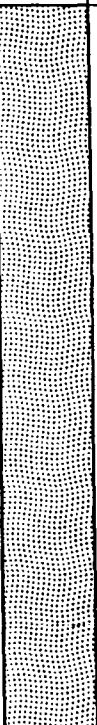
Page 1 of 1

SITE ID: OFFSITE GIANT LOCATION ID: BORE-1
SITE COORDINATES (ft.): 250' EAST OF LEE ACRES RD.
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECH. INC.
DATE STARTED: 08/13/90 DATE COMPLETED: 08/13/90
FIELD REP.: M. MOHORCICH
COMMENTS: County Road 5468, KNU background = 0 ppm

**B-4A SHS-14 SHS-15 Cty. Rd. 5468
(Meadow Lane)**

1/4 SW 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12W

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500, down gradient from SHS-11

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION	
				#	FROM	TO	I.D.	TYPE			
0							Split Spoon	HNU bkg = 0 ppm	SM	0-25' <u>Sand</u> , unconsolidated, 10YR 4/2, poorly sorted, f-med gr, at 10' slight increase in sorting, med gr 10YR 5/4.	
5							4-6	0			
10							9-11	0			
15							14-16	0			Increase in qtz grains, sub angular, w/ minor marble size pebbles.
20							19-21	0			
25							29-31	0			
30											
35						34-36	150	GM	33-34' <u>Cobbly sand</u> , at 33' Rig chattered & drk soil came up at 34' in minor cobbles. 34.4-35.5 blk MC stain in vry shrp contact in unconsolidated sand w/ H ₂ O at 35.5'. Drilled to 34'.		
40											
45											
50											

BOREHOLE LOG (SOIL)

Page 1 of 1

B-4A SHS-14 SHS-15 . . . City. Rd. 5468
(Meadow Lane)

1/4 SW 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12W

SITE ID: OFFSITE GIANT LOCATION ID: BORE 2

SITE COORDINATES (ft.): 100' EAST OF BORE 1

N _____ **E**

GROUND ELEVATION (ft. MSL):

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: HOLLOW STEM AUGER

DRILLING CONTR.: WESTERN TECH INC.

DATE STARTED: 08/13/90

FIELD REP.: M. MOHORCICH

COMMENTS: County Road 5468, HWU background = 0 ppm

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500

[illegible]

BOREHOLE LOG (SOIL)

Page 1 of 1

**B-4A SHS-14 SHS-15 City. Rd. 5468
(Meadow Lane)**

▲ ▲ ▲ ▲ ●

B-3 B-1 B-2

1/4 SW 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12W

SITE ID: OFFSITE GIANT LOCATION ID: BORE 3
SITE COORDINATES (ft.): 175' East of Lee Acres Rd.
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECH INC.
DATE STARTED: 08/14/90 DATE COMPLETED: 08/14/90
FIELD REP.: M. MOHORCICH
COMMENTS: County Road 5468; HNU bkg .04 ppm

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500

[illegible]

BOREHOLE LOG (SOIL)

Page 1 of 1

SITE ID: OFFSITE GIANT LOCATION ID: BORE 4A
SITE COORDINATES (ft.): _____
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECH INC.
DATE STARTED: 08/18/90 DATE COMPLETED: 08/18/90
FIELD REP.: M. MOHORCICH
COMMENTS: 100' east of Lee Acres Rd.

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500 on County Road 5468

[illegible]

BOREHOLE LOG (SOIL)

Page 1 of 1

B-4B SHS-14 SHS-15 City Rd. 5468
(Meadow Lane)

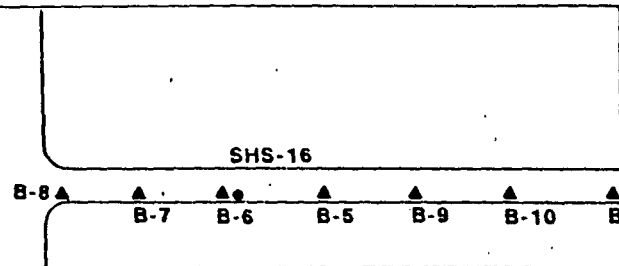
1/4 SW 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12W

SITE ID: OFFSITE GIANT LOCATION ID: BORE 4B
SITE COORDINATES (ft.): 75' east of Lee Acre Road
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECH INC.
DATE STARTED: 08/14/90 DATE COMPLETED: 08/14/90
FIELD REP.: M. MOHORCICH
COMMENTS: KNU background = .04 ppm

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500

[illegible]

BOREHOLE LOG (SOIL)

Page 1 of 1

SITE ID: OFFSITE GIANT LOCATION ID: BORE 5
SITE COORDINATES (ft.):
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECH INC.
DATE STARTED: 08/14/90 DATE COMPLETED: 08/14/90
FIELD REP.: M. MOHORCICH
COMMENTS: Down gradient from Bore 1, County Road 5470
KNU background = .04 ppm

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500, 290' East of Lee Acres Road

[illegible]

BOREHOLE LOG (SOIL)

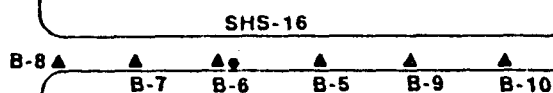
Page 1 of 1

SITE ID: OFFSITE GIANT LOCATION ID: BORE 6
SITE COORDINATES (ft.): _____
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECH INC.
DATE STARTED: 08/14/90 DATE COMPLETED: 08/14/90
FIELD REP.: M. MOHORCICH
COMMENTS: HMU bkg = .06 ppm

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500, 190' East of Lee Acres Road on County Road 5470

[illegible]

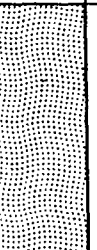
BOREHOLE LOG (SOIL)

Page 1 of 1

SITE ID: OFFSITE GIANT LOCATION ID: BORE 7
SITE COORDINATES (ft.): _____
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECH INC.
DATE STARTED: 08/14/90 DATE COMPLETED: 08/14/90
FIELD REP.: M. MOHORCICH
COMMENTS: HNU bkg = .06 ppm

1/4 SW 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12W

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500, 90' East from Lee Acres Rd.

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION					
				#	FROM	TO	I.D.	TYPE							
0							Split Spoon 4-6	HNU bkg= .06 ppm	SM	0-14 <u>Sand</u> , unconsolidated, moist, mod yelsh brn 10YR 5/4 poorly sorted.					
5							4-5 f gr. 5-6 med gr.								
10							4-6 moist, f gr, unconsolidated. Same as above color.								
15												9-11		SC	14.2-20.3 <u>Clayey sand</u> , mod consolidated. 15.5-15.8 <u>Clayey sand</u> , mod consolidated w/ rest as med gr sand.
20												19-21			19.4-20.3 <u>Clayey sand</u> , mod consolidated f gr sand. 10YR 4/2.
25												24-26	bkg	20.3-24.2 <u>Sand</u> , med gr sand 10YR 5/4.	
30												29-31	bkg	24.0-24.2 <u>Sand med.</u> 24.2-25.2 <u>Clayey sand</u> , w/ last 1" w/ brn 5YR 4/4 med brn organic.	
														25.2-29 <u>Sand</u> , med grnd.	
35							34-36	bkg	29.0-29.5 <u>Clayey sand</u> , fr gr, 10YR 4/2, moist. 29.5-34 <u>Sand</u> , dusky yel 5 YR 6/4. Abundant qtz, dry.						
40														SC SM	34-36 is wet, saturated. H ₂ O between 31-34. 34-34.5 <u>Clayey sand</u> 34.5-38 <u>Sand</u> , sand w/ interbedded clays, organic pale brn 5YR 5/2. T.D. 38'
45															
50															

BOREHOLE LOG (SOIL)

Page 1 of 1

SITE ID: OFFSITE GIANT LOCATION ID: BORE 8
SITE COORDINATES (ft.): _____
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECH INC.
DATE STARTED: 08/14/90 DATE COMPLETED: 08/14/90
FIELD REP.: M. MOHORCICH
COMMENTS: HNU bkg = .06 ppm

LOCATION DESCRIPTION: South of NM 64, Intersection of County Road 5500 and County Road 5470

[illegible]

BOREHOLE LOG (SOIL)

Page 1 of 1

SITE ID: OFFSITE GIANT LOCATION ID: BORE 9
SITE COORDINATES (ft.): _____
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: HOLLOW STEM AUGER
DRILLING CONTR.: WESTERN TECH INC.
DATE STARTED: 08/15/90 DATE COMPLETED: 08/15/90
FIELD REP.: M. MOHORCICH
COMMENTS: MNU bkg = .04 ppm

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500, 100' East of Bore 5

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION					
				#	FROM	TO	I.D.	TYPE							
0							Split Spoon 4-6	MNU bkg = .04 ppm	SM	0-10 <u>Sand</u> , mod yel brn 10YR 5/4, f gr, mod consolidated, poorly sorted, dry.					
5															
10												9-11		GC	10-11 <u>Cobbly sand</u> , drilling hit cobbles at 10-11 loose sand w/ 1" cobbles at 10, abundant qtz grains, med gr 5Y 6/4 dusky yel.
15												14-16		SM	11-19.7 <u>Sand</u> , 14.0-14.5 sand as above. 14.5-16 finer gr sand, moist, mod consolidation. no stain or odor.
20												19-21	bkg	SC	19.5-19.7 sand, med gr. 19.7-20.0 <u>Clayey sand</u> , moist, mod consolidated. 20-29.3 <u>Sand</u> , dusky yel 5Y 6/4 mod-coarse gr, dry. unconsolidated, no stain.
25												24-26	bkg		24.0-25 loose, mod yel brn 10YR 5/4, w/ cobbles at 25.0 25.0-26 dusky yel 5Y 6/4, possible smell to me?
30												29-31	bkg	SC	29.0-29.3 med gr sand. 29.3-29.6 <u>Clayey sand</u> 29.6-31 <u>Sand</u> , med-coarse gr 5Y 6/4. H ₂ O at 30.9' T.D. at 31'
35															
40															
45															
50															

BOREHOLE LOG (SOIL)

Page 1 of 1

City, Rd. 5470
(Sage Street)

SITE ID: OFFSITE GIANT LOCATION ID: BORE 10
 SITE COORDINATES (ft.):
 N _____ E _____
 GROUND ELEVATION (ft. MSL): _____
 STATE: NEW MEXICO COUNTY: SAN JUAN
 DRILLING METHOD: HOLLOW STEM AUGER
 DRILLING CONTR.: WESTERN TECH INC.
 DATE STARTED: 08/15/90 DATE COMPLETED: 08/15/90
 FIELD REP.: M. MOHORCICH
 COMMENTS: 100' East of Bore 9
HNU = .06 bkg

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500, on County Road 5470

[illegible]

BOREHOLE LOG (SOIL)

Page 1 of 1

Cly, Rd. 5470
(Sage Street)

SITE ID: OFFSITE GIANT LOCATION ID: BORE 11

SITE COORDINATES (ft.):

N _____ **E**

GROUND ELEVATION (ft. MSL):

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: HOLLOW STEM AUGER

DRILLING CONTR.: WESTERN TECH INC.

DATE STARTED: 08/16/90 DATE COMPLETED: 08/16/90

FIELD REP.: M. MOHORCICH

COMMENTS: HNU bkg = .04 ppm

Southwest corner of 5470 and County Road 5481

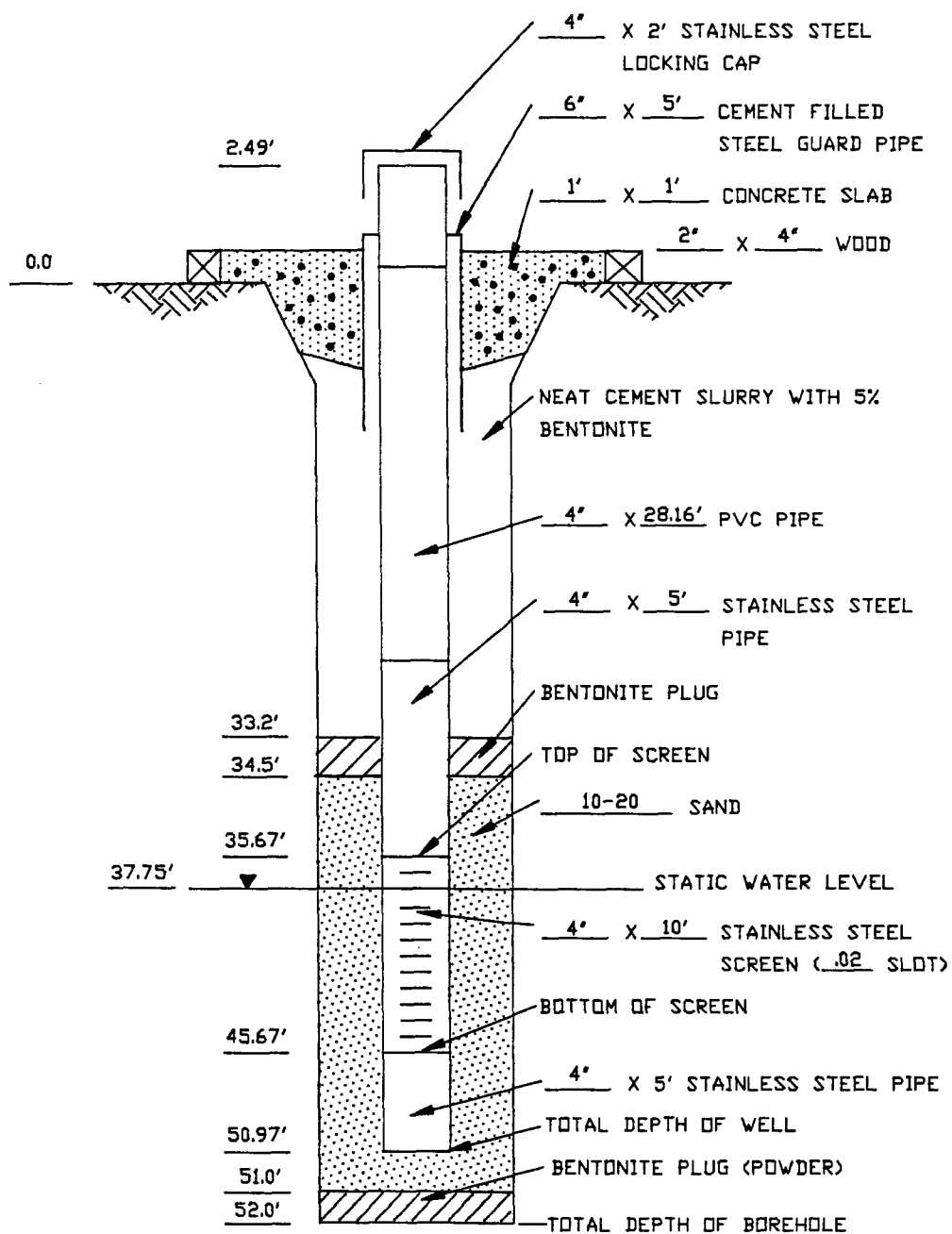
1/4 SW 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12W

LOCATION DESCRIPTION: South of NM 64, East of County Road 5500

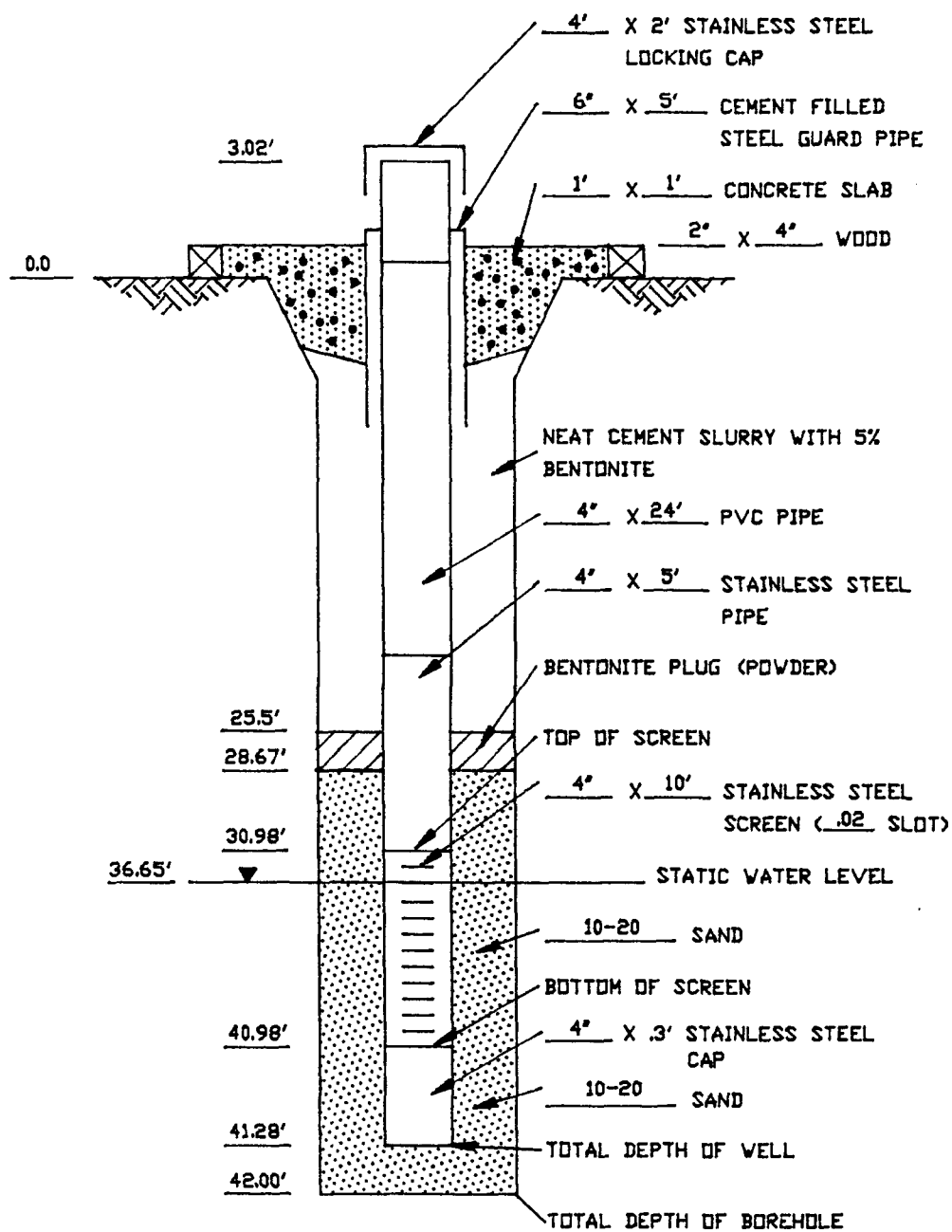
[illegible]

APPENDIX B

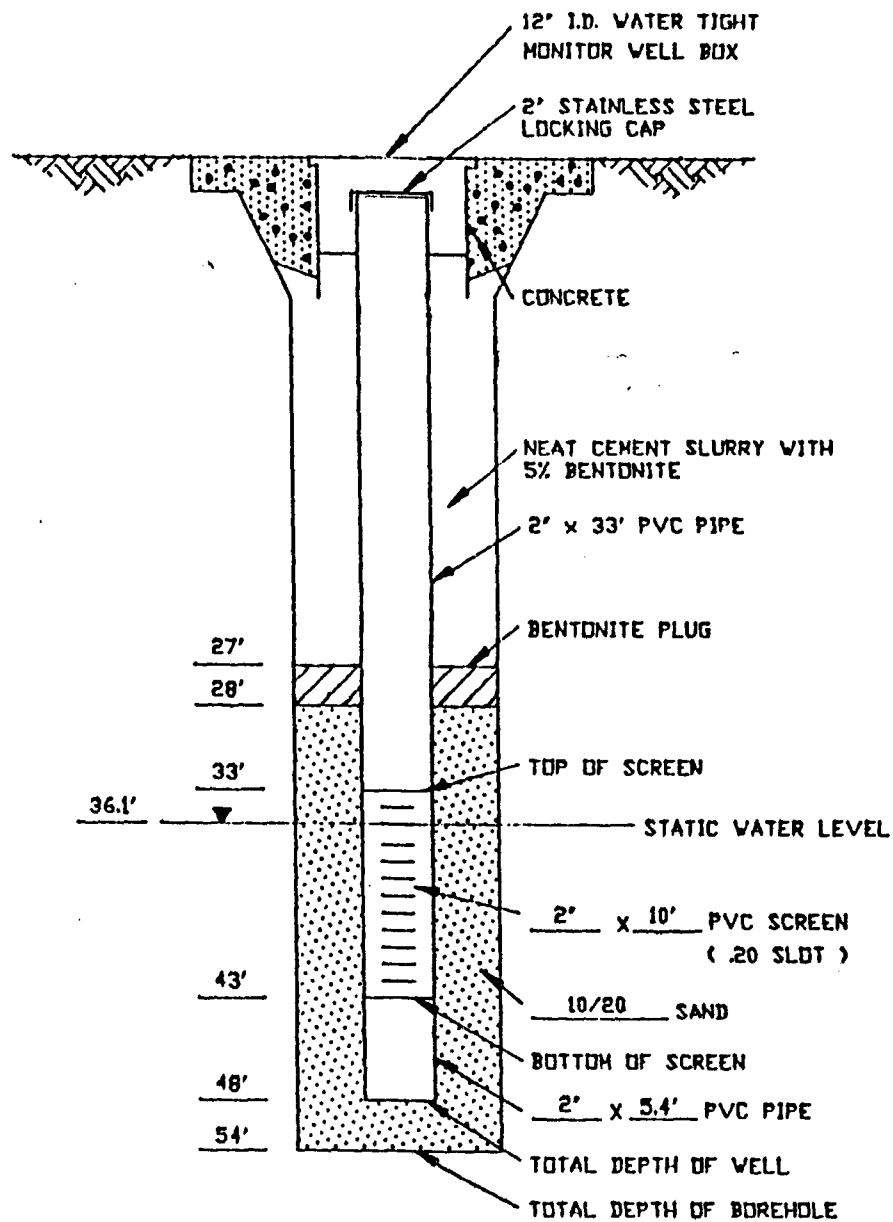
Completion Diagrams



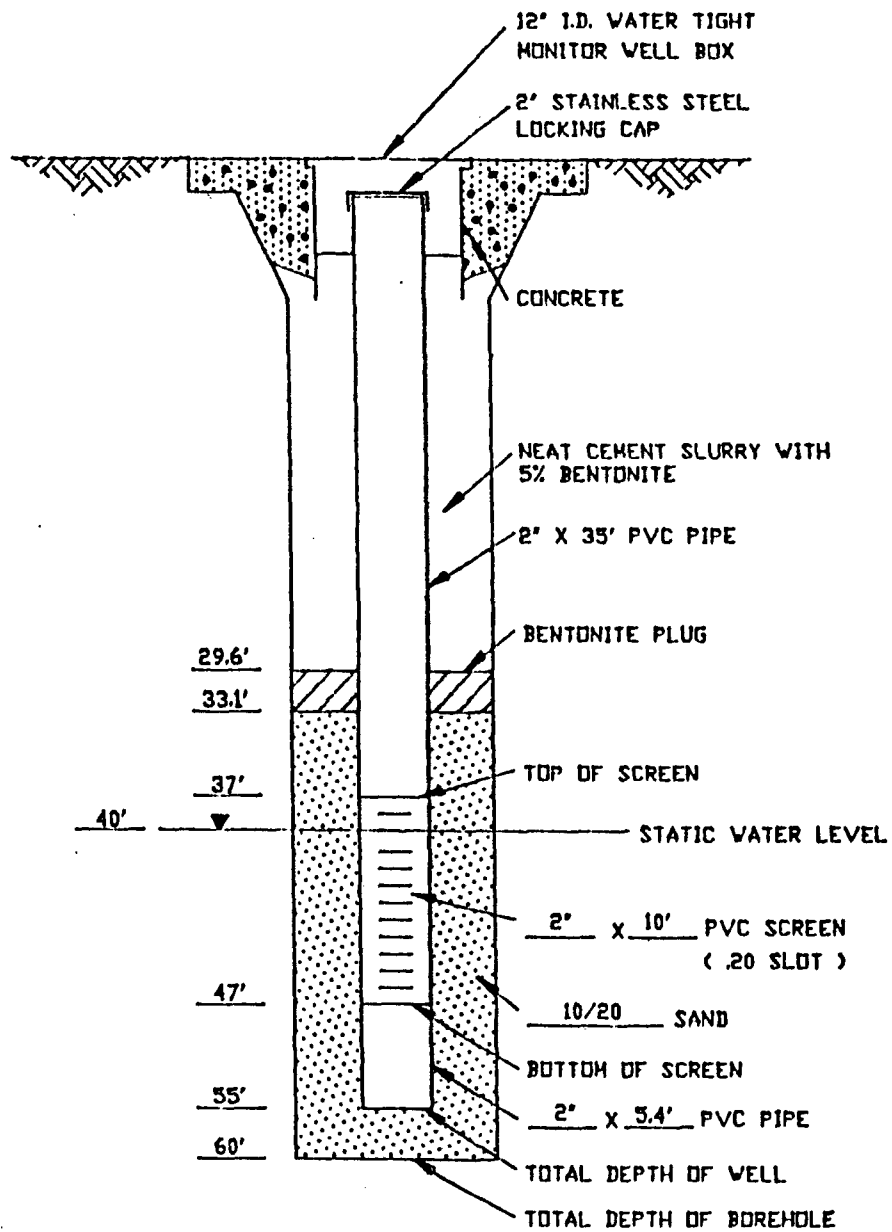
COMPLETION DIAGRAM SHS-1



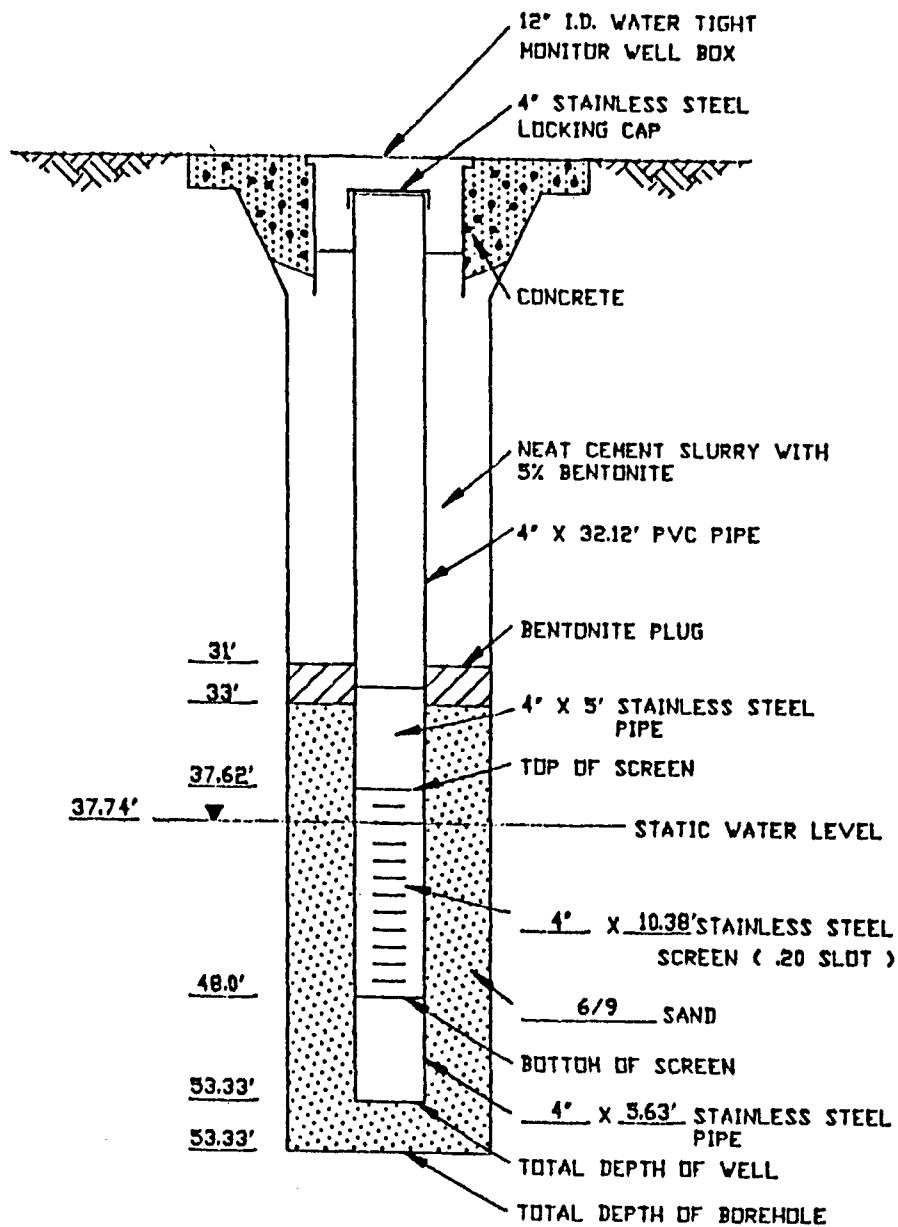
COMPLETION DIAGRAM SHS-2



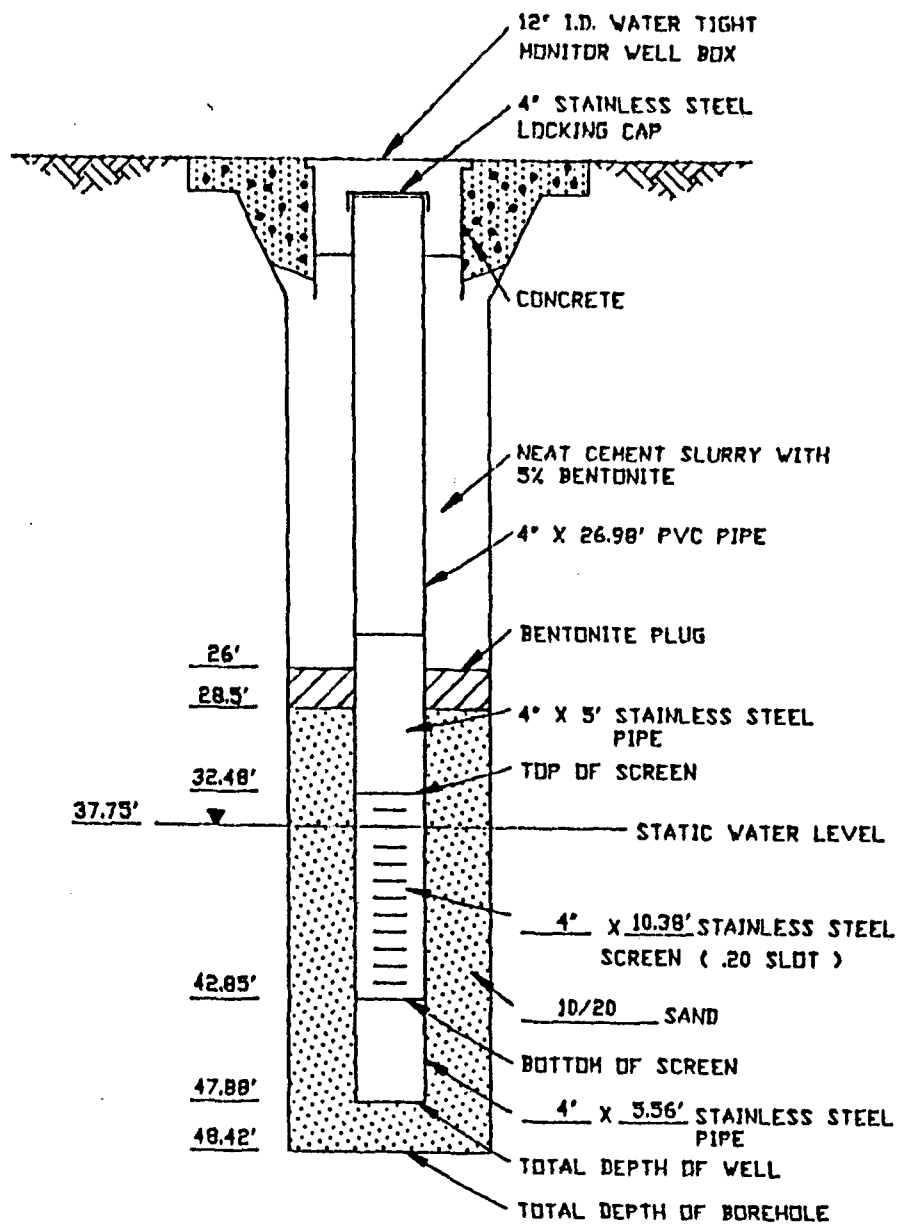
SUBGRADE COMPLETION DIAGRAM SHS-3



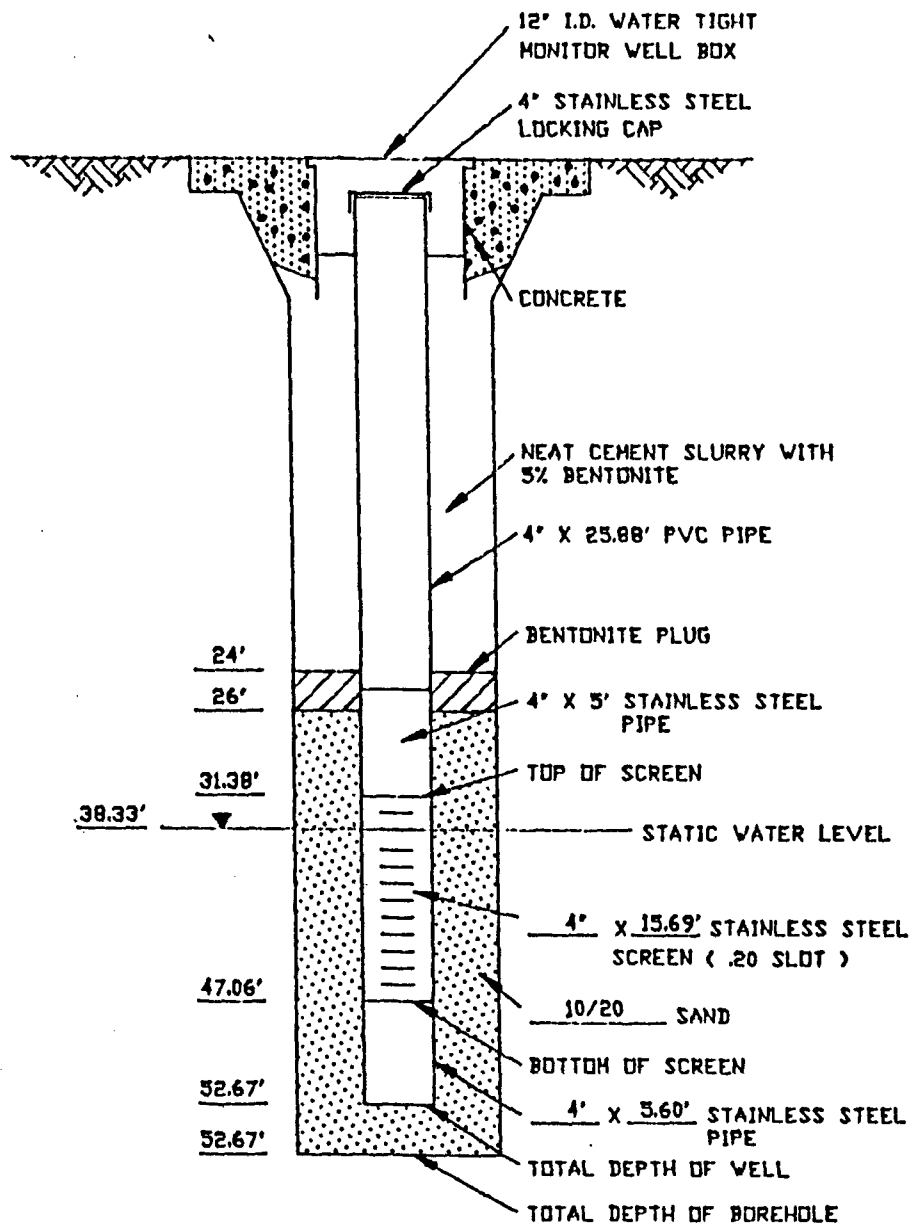
SUBGRADE COMPLETION DIAGRAM SHS-4



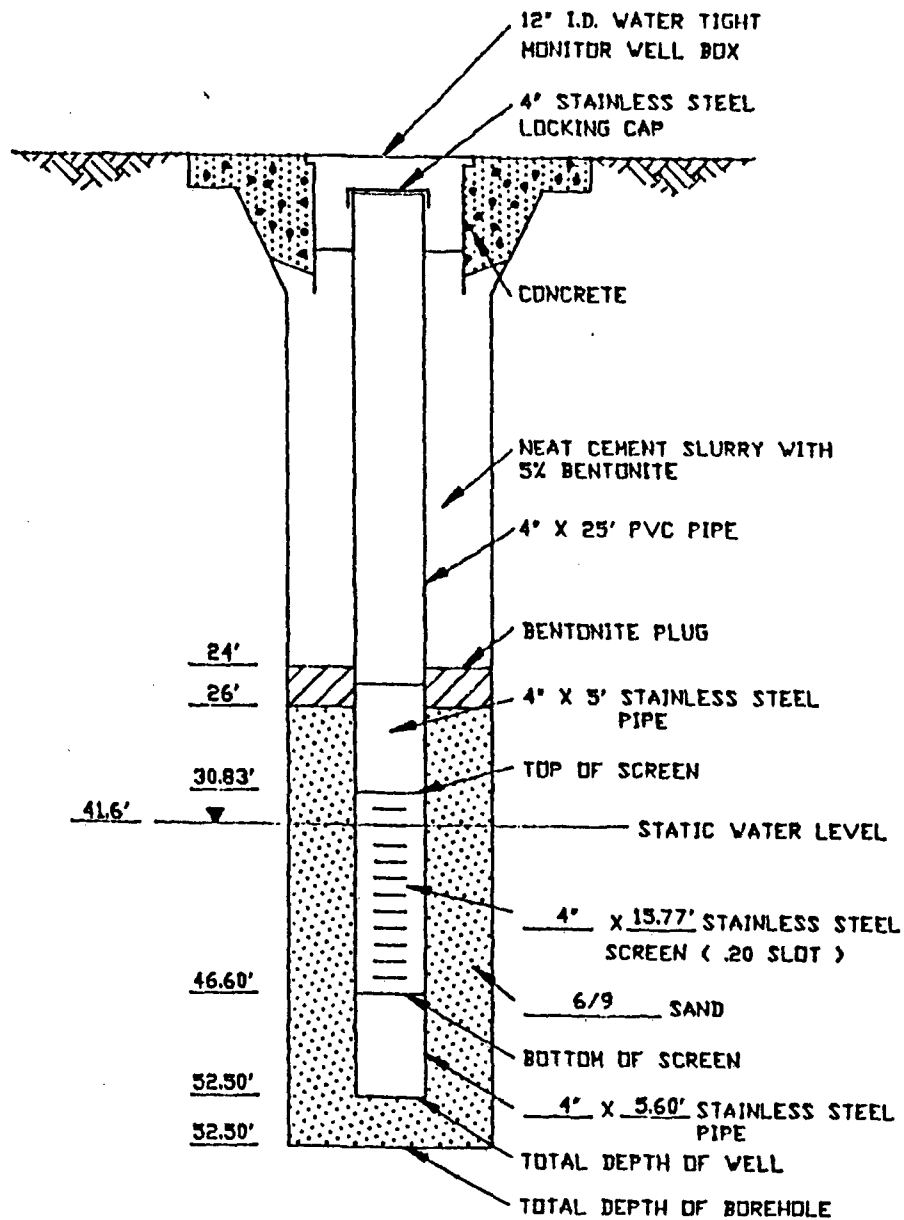
SUBGRADE COMPLETION DIAGRAM SHS-5



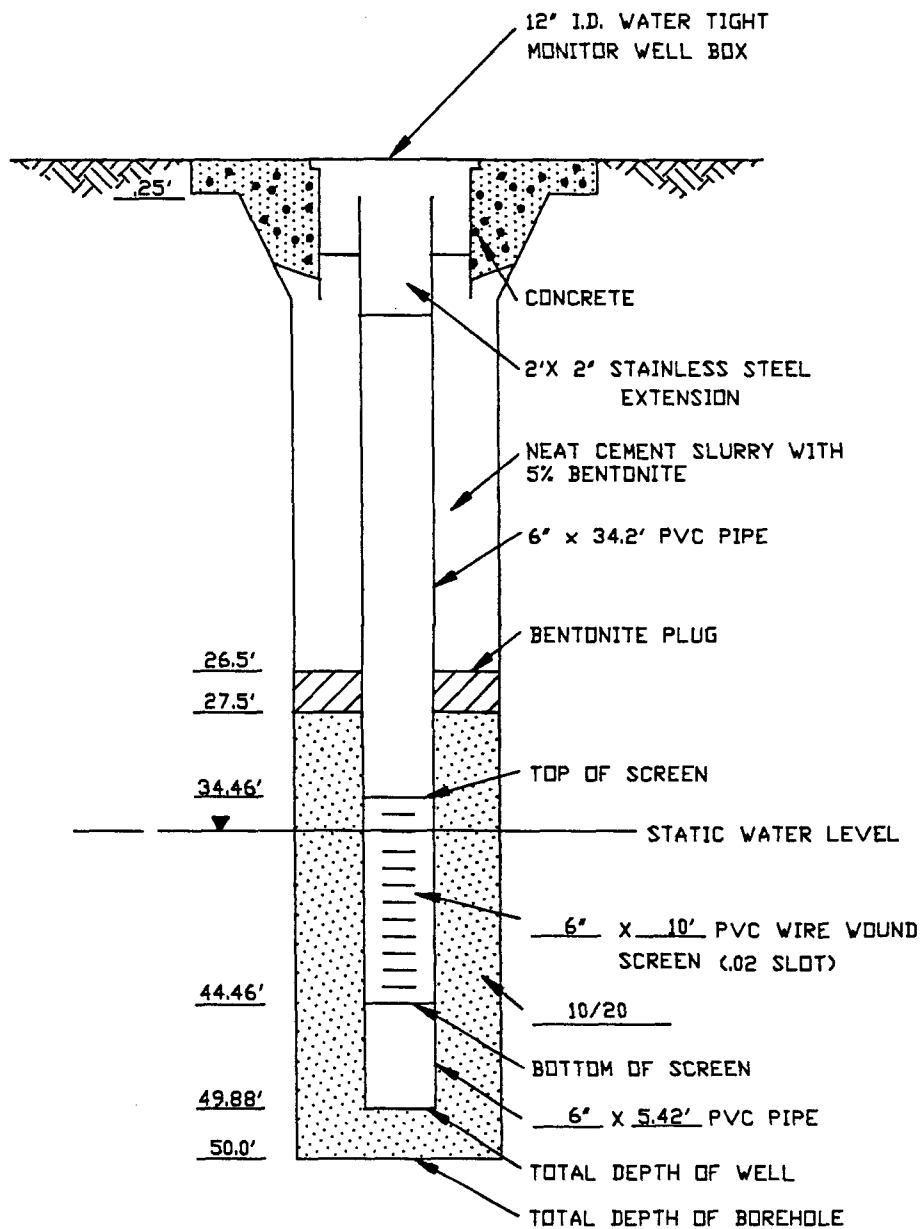
SUBGRADE COMPLETION DIAGRAM SHS-6



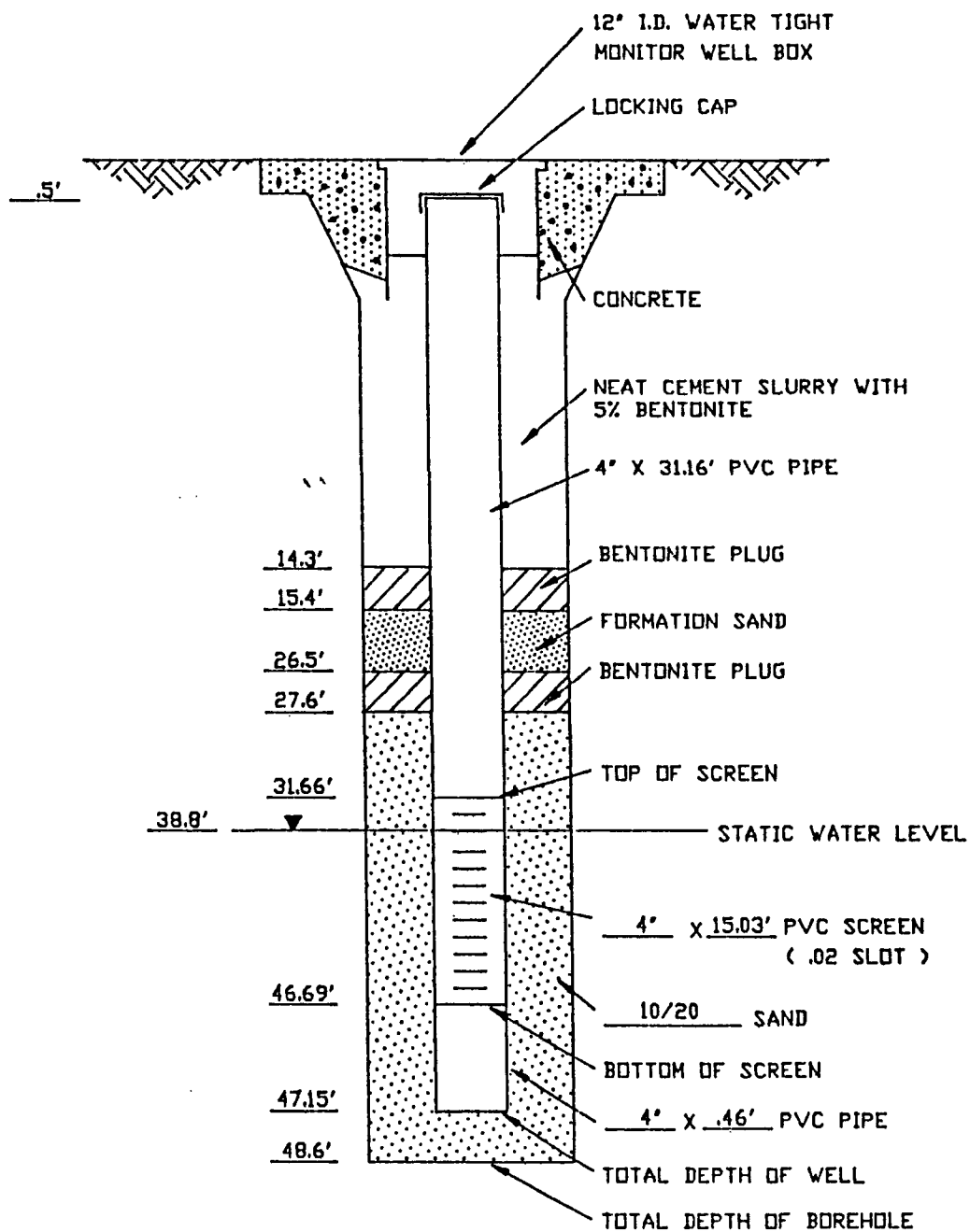
SUBGRADE COMPLETION DIAGRAM SHS-7



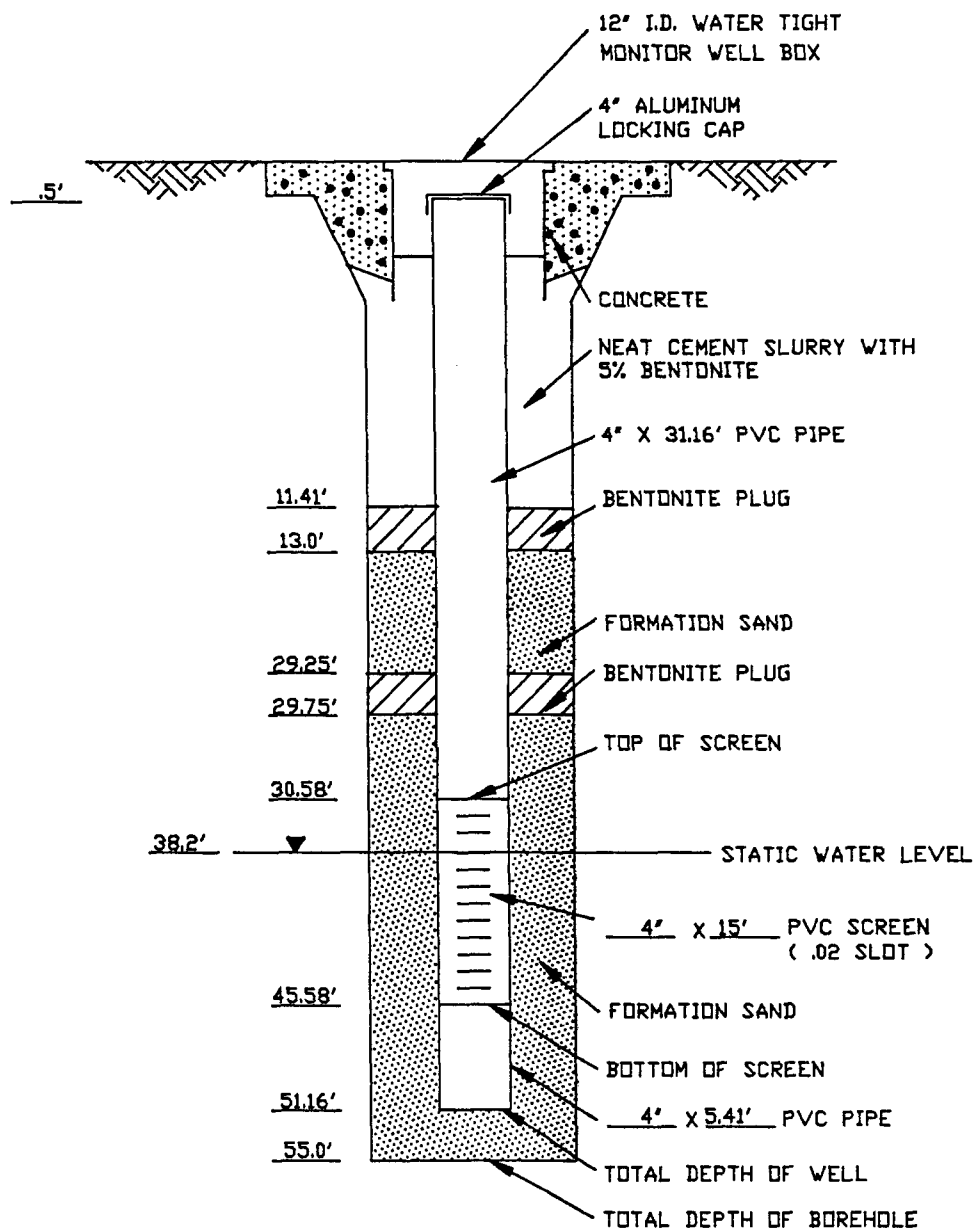
SUBGRADE COMPLETION DIAGRAM SHS-8



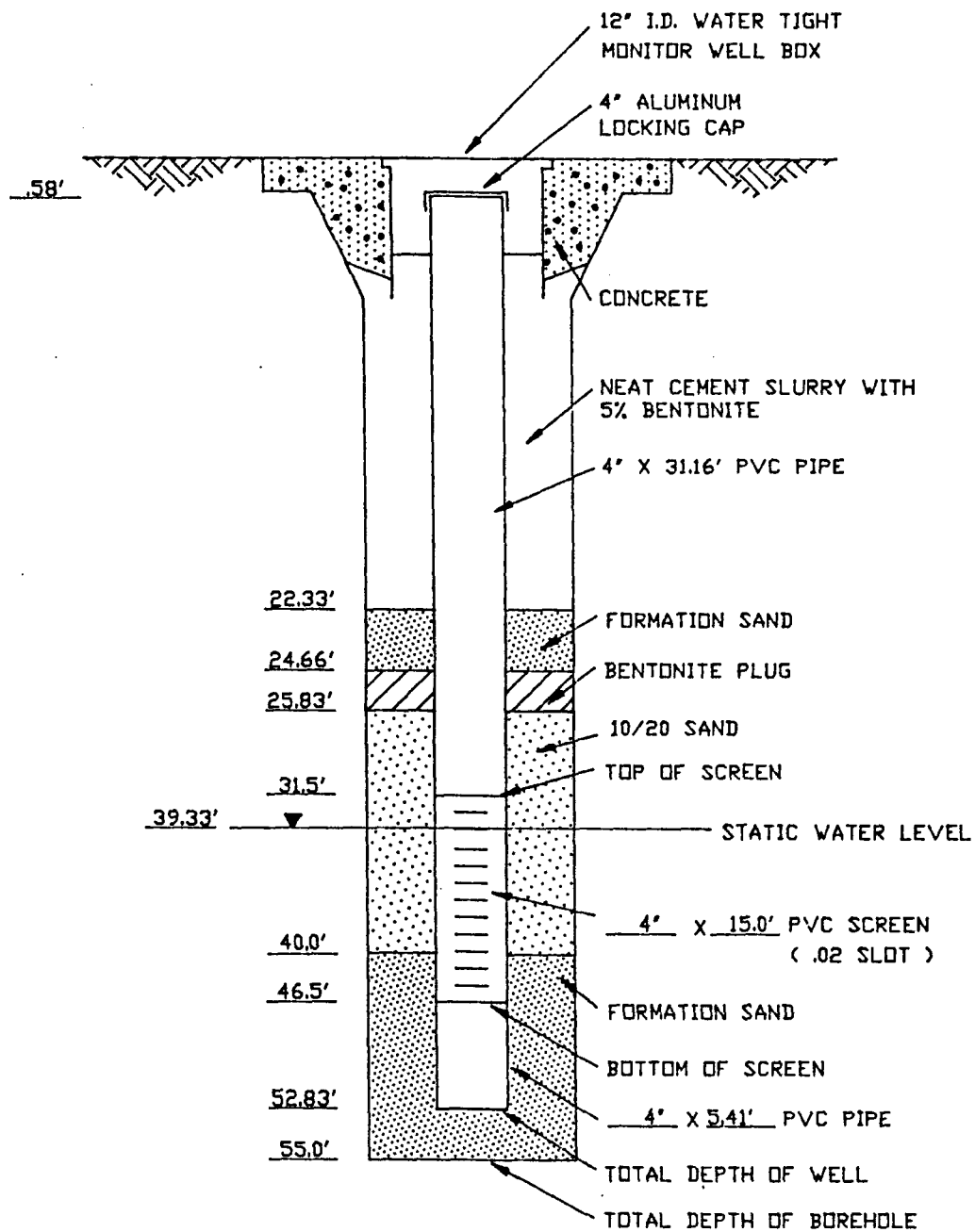
SUBGRADE COMPLETION DIAGRAM SHS-9



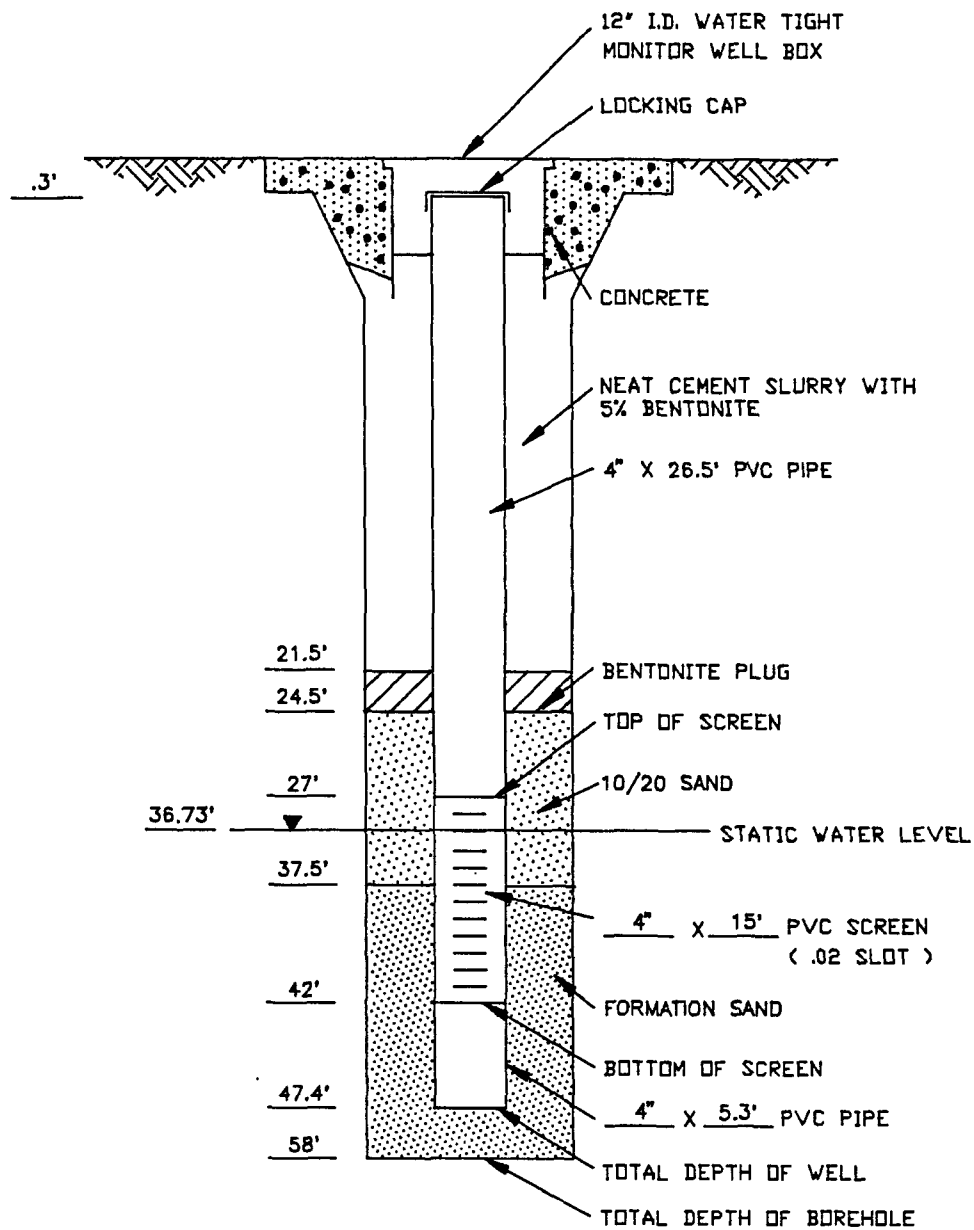
SUBGRADE COMPLETION DIAGRAM SHS-10



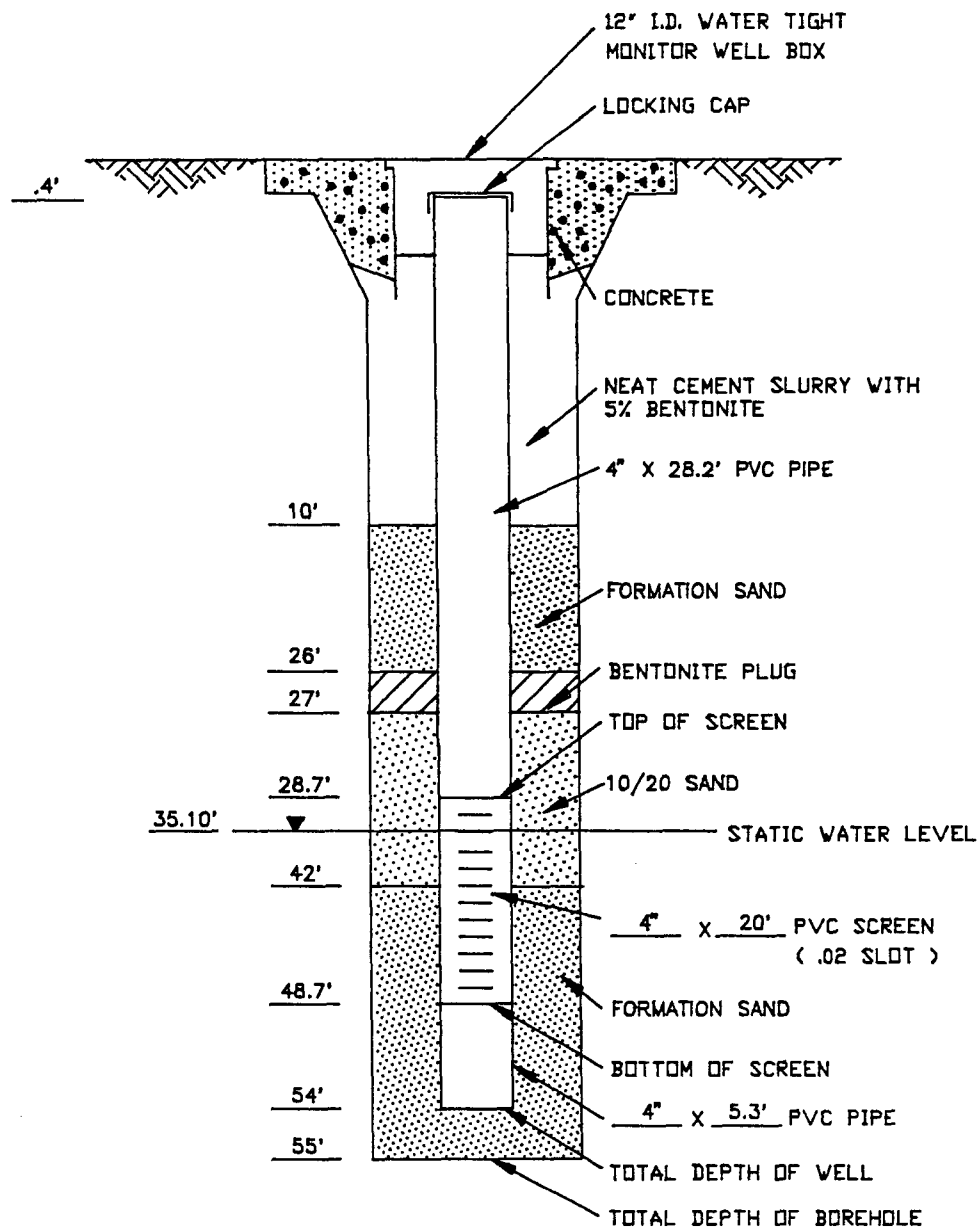
SUBGRADE COMPLETION DIAGRAM SHS-11



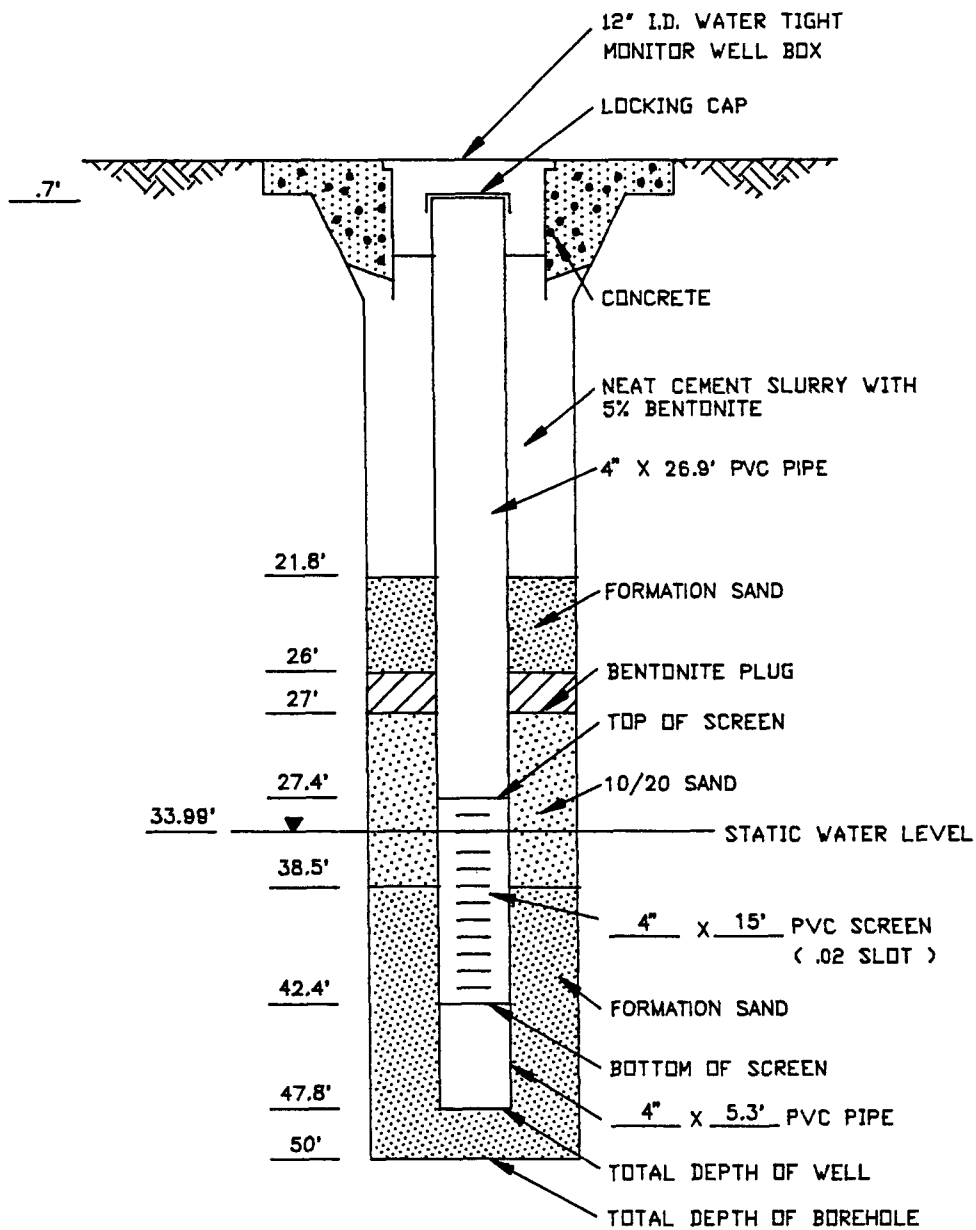
SUBGRADE COMPLETION DIAGRAM SHS-12



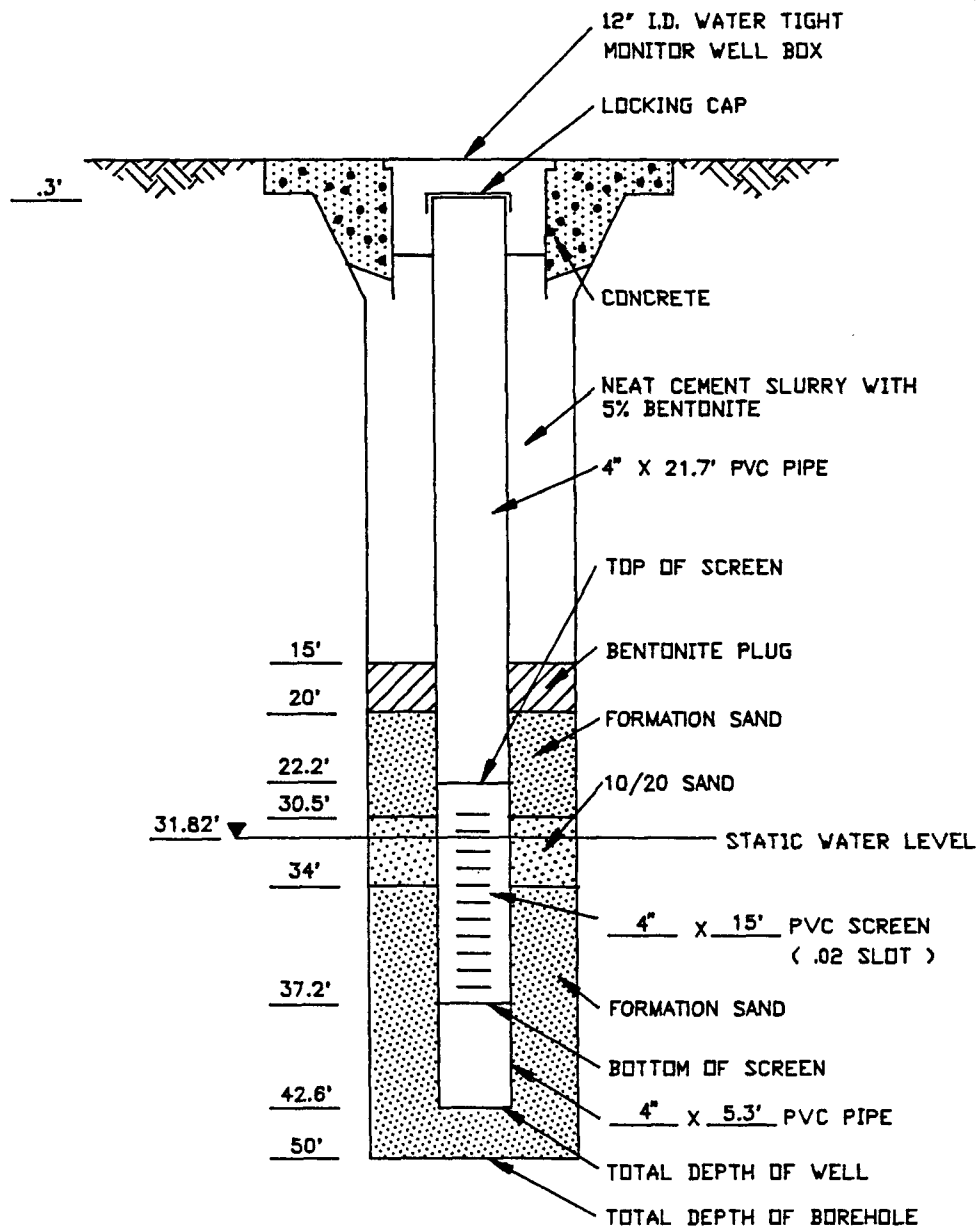
SUBGRADE COMPLETION DIAGRAM SHS-13



SUBGRADE COMPLETION DIAGRAM SHS-14



SUBGRADE COMPLETION DIAGRAM SHS-15



SUBGRADE COMPLETION DIAGRAM SHS-16

APPENDIX C

Analytical Results of Sampling

HALOGENATED

AND

AROMATIC

VOLATILES

Geoscience Consultants, Ltd.
☒ Albuquerque
500 Copper N.W.
Suite 200
Albuquerque, NM 87102
(505) 842-0001

☐ Silver Spring
1109 Spring St.
Suite 706
Silver Spring, MD 20910
(301) 587-2088

☐ Newport Beach
1400 Quail Street
Suite 140
Newport Beach, CA 92660
(714) 724-0536

☐ Las Cruces
P.O. Drawer MM
Las Cruces, NM 88004
(505) 524-5364

RECEIVED JUN 29 1995

No 3700

Chain of Custody

DATE 6-19-90 PAGE 1 OF 1

LAB NAME Radian
ADDRESS 10395 OLD Placeville Rd
Sacramento CA 95827
TELEPHONE 916 362 5332

SAMPLERS (SIGNATURE)
Mark J. M. M. GCL

SAMPLE NUMBER	MATRIX	LOCATION
9006191515	H ₂ O	SHS-4
9006191745	H ₂ O	SHS-1
9006201410	H ₂ O	SHS-5
9006201350	H ₂ O	SHS-6
9006201100	H ₂ O	SHS-2
9006200945	H ₂ O	SHS-3
Decon Blank		
Trip Blank		

ANALYSIS REQUEST														NUMBER OF CONTAINERS									
BASE/NEU/ACID COMPS	GC/MS/ 625/8270	VOLATILE COMPS	GC/MS/ 624/8240	PESTICIDES/PCB	608/8080	POLYNUCLEAR AROMATIC 610/8310	PHENOLS, SUB PHENOLS	604/8040	HALOGENATED VOLATILES 601/8010	AROMATIC VOLATILES 602/8020	TOTAL ORGANIC CARBON 415/9060	TOTAL ORGANIC HALIDES 9020	PETROLEUM HYDROCARBONS 418.1	TPH MODIFIED 8015	PRIORITY POLLUTANT METALS (13)	CAM METALS (18) TLIC/STLC	EP TOX METALS (8)	SDWA-INORGANICS PRIMARY/SECONDARY	HAZARDOUS WASTE PROFILE				5
						+			+	x													5
						x			+	x													5
						x			x	x													5
						x			x	x													5
						x			x	x													5
						x			x	x													5
																							8
																							8

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY		RELINQUISHED BY		RELINQUISHED BY	
PROJECT: <u>M + A offsite</u>	TOTAL NO. OF CONTAINERS <u>56</u>	CHAIN OF CUSTODY SEALS <u>Yes</u>	REC'D GOOD CONDITION/COLD <u>Yes</u>	CONFORMS TO RECORD <u>Yes</u>	LAB NO. <u>5006151</u>	RECEIVED BY (Signature) <u>Mark J. M. M.</u>	RECEIVED BY (Date) <u>6/20/90</u>	RECEIVED BY (Signature) <u>Mark J. M. M.</u>	RECEIVED BY (Date) <u>6/20/90</u>
PROJECT DIRECTOR <u>M. Nee</u>	CHARGE CODE NO. <u>459002</u>	SHIPPING ID NO. <u>7935932325</u>	VIA: <u>Fed X</u>						
SPECIAL INSTRUCTIONS/COMMENTS:									

RECEIVED AUG 29 1990

Analytical Report
08/16/90

Geoscience Consultants, Ltd.

Geoscience Consultants, Ltd.
500 Copper N.W. Ste 200
Albuquerque, NM., 87102
(505) 842-0595
Sample Manager

Customer Work Identification M & A Offsite COC#3700
Purchase Order Number 456002

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
10395 Old Placerville Road
Sacramento, CA 95827

916-362-5332

Client Services Coordinator: LWKELLY

Certified by:

Rand Hale

Previously Reported on 08/01/90.
First Reported on 07/19/90.

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-151

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:

9006191515

9006191745

9006201410

9006201350

Factor:

1

10

10

1

Results in:

ug/L

ug/L

ug/L

ug/L

Matrix:

water

water

water

water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Bromodichloromethane	ND	0.10	ND	1.0	ND	1.0	ND	0.10
Bromoform	ND	0.50	ND	5.0	ND	5.0	ND	0.50
Bromomethane	ND	1.2	ND	12	ND	12	ND	1.2
Carbon tetrachloride	ND	0.12	ND	1.2	ND	1.2	ND	0.12
Chlorobenzene	ND	0.25	ND	2.5	ND	2.5	ND	0.25
Chloroethane	ND	0.52	ND	5.2	ND	5.2	ND	0.52
2-Chloroethylvinyl ether	ND	0.50	ND	5.0	ND	5.0	ND	0.50
Chloroform	ND	0.10	ND	1.0	ND	1.0	ND	0.10
Chloromethane	ND	0.30	ND	3.0	ND	3.0	ND	0.30
Dibromochloromethane	ND	0.20	ND	2.0	ND	2.0	ND	0.20
1,2-Dichlorobenzene	ND	0.50	ND	5.0	ND	5.0	ND	0.50
1,3-Dichlorobenzene	ND	0.32	ND	3.2	ND	3.2	ND	0.32
1,4-Dichlorobenzene	ND	0.24	ND	2.4	ND	2.4	ND	0.24
1,1-Dichloroethane	ND	0.50	ND	5.0	ND	5.0	ND	0.50
1,2-Dichloroethane	ND	0.10	7.1 C	1.0	ND	1.0	ND	0.10
1,1-Dichloroethene	ND	0.20	ND	2.0	ND	2.0	ND	0.20
cis-1,2-Dichloroethene	ND	0.20	39 CI	2.0	14 CI	2.0	ND	0.20
trans-1,2-Dichloroethene	ND	0.20	ND	2.0	ND	2.0	ND	0.20
1,2-Dichloropropane	ND	0.10	ND	1.0	ND	1.0	ND	0.10
cis-1,3-Dichloropropene	ND	0.20	ND	2.0	ND	2.0	ND	0.20
trans-1,3-Dichloropropene	ND	0.34	ND	3.4	ND	3.4	ND	0.34
Methylene chloride	ND	0.40	ND	4.0	ND	4.0	ND	0.40
1,1,2,2-Tetrachloroethane	ND	0.15	ND	1.5	ND	1.5	ND	0.15
Tetrachloroethene	ND	0.10	1.2 Cl@	1.0	2.7 Cl@	1.0	0.42 X1@	0.10
1,1,1-Trichloroethane	ND	0.20	ND	2.0	ND	2.0	0.35 Ca	0.20
1,1,2-Trichloroethane	ND	0.20	ND	2.0	ND	2.0	ND	0.20
Trichloroethene	ND	0.20	2.9 Ca	2.0	3.0 Ca	2.0	ND	0.20
Trichlorofluoromethane	ND	0.20	ND	2.0	ND	2.0	ND	0.20
Vinyl chloride	ND	0.20	ND	2.0	ND	2.0	ND	0.20

ND Not detected at specified detection limit

C Confirmed on second column or by GC/MS

I Result differs from last report - see report narrative

@ Est. result less than 5 times detection limit

X See definition in report narrative

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-151

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:	9006191515	9006191745	9006201410	9006201350
------------	------------	------------	------------	------------

Factor:	1	10	10	1
Results in:	ug/L	ug/L	ug/L	ug/L
	01A	02A	03A	04A
Matrix:	water	water	water	water

	Result Det. Limit	Result Det. Limit	Result Det. Limit	Result Det. Limit
<u>Surrogate Recovery(%)</u>				
1-Bromo-4-fluorobenzene	114	117	132	134
Control Limits: 40 to 140				

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-151

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:	9006201100	9006200945	DECON BLANK	TRIP BLANK
Factor:	10	1	1	1
Results in:	ug/L	ug/L	ug/L	ug/L
	05A	06A	07A	08A
Matrix:	water	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Bromodichloromethane	ND	1.0	ND	0.10	ND	0.10	ND	0.10
Bromoform	ND	5.0	ND	0.50	ND	0.50	ND	0.50
Bromomethane	ND	12	ND	1.2	ND	1.2	ND	1.2
Carbon tetrachloride	ND	1.2	ND	0.12	ND	0.12	ND	0.12
Chlorobenzene	ND	2.5	ND	0.25	0.59 X@	0.25	ND	0.25
Chloroethane	ND	5.2	ND	0.52	ND	0.52	ND	0.52
2-Chloroethylvinyl ether	ND	5.0	ND	0.50	ND	0.50	ND	0.50
Chloroform	ND	1.0	ND	0.10	ND	0.10	ND	0.10
Chloromethane	ND	3.0	ND	0.30	ND	0.30	ND	0.30
Dibromochloromethane	ND	2.0	ND	0.20	ND	0.20	ND	0.20
1,2-Dichlorobenzene	ND	5.0	ND	0.50	ND	0.50	ND	0.50
1,3-Dichlorobenzene	ND	3.2	ND	0.32	ND	0.32	ND	0.32
1,4-Dichlorobenzene	ND	2.4	ND	0.24	ND	0.24	ND	0.24
1,1-Dichloroethane	ND	5.0	ND	0.50	ND	0.50	ND	0.50
1,2-Dichloroethane	ND	1.0	ND	0.10	ND	0.10	ND	0.10
1,1-Dichloroethene	ND	2.0	ND	0.20	ND	0.20	ND	0.20
cis-1,2-Dichloroethene	ND	2.0	ND	0.20	ND	0.20	ND	0.20
trans-1,2-Dichloroethene	ND	2.0	ND	0.20	ND	0.20	ND	0.20
1,2-Dichloropropane	ND	1.0	ND	0.10	ND	0.10	ND	0.10
cis-1,3-Dichloropropene	ND	2.0	ND	0.20	ND	0.20	ND	0.20
trans-1,3-Dichloropropene	ND	3.4	ND	0.34	ND	0.34	ND	0.34
Methylene chloride	ND	4.0	ND	0.40	ND	0.40	ND	0.40
1,1,2,2-Tetrachloroethane	ND	1.5	ND	0.15	ND	0.15	ND	0.15
Tetrachloroethene	2.1 C1@	1.0	ND	0.10	ND	0.10	ND	0.10
1,1,1-Trichloroethane	ND	2.0	ND	0.20	0.44 X@	0.20	0.33 X@	0.20
1,1,2-Trichloroethane	ND	2.0	ND	0.20	ND	0.20	ND	0.20
Trichloroethene	ND	2.0	ND	0.20	ND	0.20	ND	0.20
Trichlorofluoromethane	ND	2.0	ND	0.20	ND	0.20	ND	0.20
Vinyl chloride	ND	2.0	ND	0.20	ND	0.20	ND	0.20

ND Not detected at specified detection limit

I Result differs from last report - see report narrative

X See definition in report narrative

C Confirmed on second column or by GC/MS

@ Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-151

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:

9006201100

9006200945

DECON BLANK

TRIP BLANK

Factor:

10

1

1

1

Results in:

ug/L

ug/L

ug/L

ug/L

05A

06A

07A

08A

Matrix:

water

water

water

water

Result Det. Limit

Result Det. Limit

Result Det. Limit

Result Det. Limit

Surrogate Recovery(%)

1-Bromo-4-fluorobenzene

112

114

131

129

Control Limits: 40 to 140

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-151

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:

REAGENT BLANK

REAGENT BLANK

Factor:

1

1

Results in:

ug/L

ug/L

09A

09B

Matrix:

water

water

	Result	Det. Limit	Result	Det. Limit
Bromodichloromethane	ND	0.10	ND	0.10
Bromoform	ND	0.50	ND	0.50
Bromomethane	ND	1.2	ND	1.2
Carbon tetrachloride	ND	0.12	ND	0.12
Chlorobenzene	ND	0.25	ND	0.25
Chloroethane	ND	0.52	ND	0.52
2-Chloroethylvinyl ether	ND	0.50	ND	0.50
Chloroform	ND	0.10	ND	0.10
Chloromethane	ND	0.30	ND	0.30
Dibromochloromethane	ND	0.20	ND	0.20
1,2-Dichlorobenzene	ND	0.50	ND	0.50
1,3-Dichlorobenzene	ND	0.32	ND	0.32
1,4-Dichlorobenzene	ND	0.24	ND	0.24
1,1-Dichloroethane	ND	0.50	ND	0.50
1,2-Dichloroethane	ND	0.10	ND	0.10
1,1-Dichloroethene	ND	0.20	ND	0.20
cis-1,2-Dichloroethene	ND	0.20	ND	0.20
trans-1,2-Dichloroethene	ND	0.20	ND	0.20
1,2-Dichloropropane	ND	0.10	ND	0.10
cis-1,3-Dichloropropene	ND	0.20	ND	0.20
trans-1,3-Dichloropropene	ND	0.34	ND	0.34
Methylene chloride	ND	0.40	ND	0.40
1,1,2,2-Tetrachloroethane	ND	0.15	ND	0.15
Tetrachloroethene	ND	0.10	ND	0.10
1,1,1-Trichloroethane	ND	0.20	ND	0.20
1,1,2-Trichloroethane	ND	0.20	ND	0.20
Trichloroethene	ND	0.20	ND	0.20
Trichlorofluoromethane	ND	0.20	ND	0.20
Vinyl chloride	ND	0.20	ND	0.20

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-151

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:

REAGENT BLANK

REAGENT BLANK

Factor:

1

1

Results in:

ug/L

ug/L

09A

09B

Matrix:

water

water

Surrogate Recovery(%)

1-Bromo-4-fluorobenzene

Control Limits: 40 to 140

Result Det. Limit

126

Result Det. Limit

127

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: 50-06-151

Method: Aromatics by EPA 602 (1)

List: Complete analyte list

	4	1	5	6
Sample ID:	9006191515	9006191745	9006201410	9006201350
Factor:	1	10	10	1
Results in:	ug/L	ug/L	ug/L	ug/L
	01C	02C	03C	04C
Matrix:	water	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Benzene	ND	0.20	ND	2.0	ND	2.0	ND	0.20
Chlorobenzene	ND	0.20	4.4 G _a	2.0	ND	2.0	ND	0.20
1,2-Dichlorobenzene	ND	0.40	ND	4.0	ND	4.0	ND	0.40
1,3-Dichlorobenzene	ND	0.40	ND	4.0	ND	4.0	ND	0.40
1,4-Dichlorobenzene	ND	0.30	ND	3.0	ND	3.0	ND	0.30
Ethylbenzene	ND	0.20	57 C	2.0	ND	2.0	ND	0.20
Toluene	ND	0.20	ND	2.0	ND	2.0	ND	0.20
Xylenes (total)	ND	0.20	24 G	2.0	ND	2.0	ND	0.20
<u>Surrogate Recovery(%)</u>								
1-Bromo-4-fluorobenzene	102		98		102		98	
Control Limits: 40 to 140								

ND Not detected at specified detection limit

@ Est. result less than 5 times detection limit

G Indicates an estimated GC value due to interferences.

C Confirmed on second column or by GC/MS

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-151

Method: Aromatics by EPA 602 (1)

List: Complete analyte list

Sample ID:

9006201100

9006200945

DECON BLANK

TRIP BLANK

Factor:

10

1

1

1

Results in:

ug/L

ug/L

ug/L

ug/L

Matrix:

05C

06C

07C

08C

Matrix:

water

water

water

water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Benzene	5.4 C ^a	2.0	ND	0.20	ND	0.20	ND	0.20
Chlorobenzene	230 C	2.0	ND	0.20	ND	0.20	ND	0.20
1,2-Dichlorobenzene	ND	4.0	ND	0.40	ND	0.40	ND	0.40
1,3-Dichlorobenzene	ND	4.0	ND	0.40	ND	0.40	ND	0.40
1,4-Dichlorobenzene	ND	3.0	ND	0.30	ND	0.30	ND	0.30
Ethylbenzene	78 G	2.0	ND	0.20	ND	0.20	ND	0.20
Toluene	19 C	2.0	ND	0.20	ND	0.20	ND	0.20
Xylenes (total)	730 C	2.0	ND	0.20	ND	0.20	ND	0.20
Surrogate Recovery(%)								
1-Bromo-4-fluorobenzene	51		66		84		115	
Control Limits: 40 to 140								

C Confirmed on second column or by GC/MS

^a Est. result less than 5 times detection limit

ND Not detected at specified detection limit

G Indicates an estimated GC value due to interferences.

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-151

Method: Aromatics by EPA 602 (1)

List: Complete analyte list

Sample ID:

REAGENT BLANK

REAGENT BLANK

Factor:

1

1

Results in:

ug/L

ug/L

10A

10B

Matrix:

water

water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Benzene	ND	0.20	ND	0.20				
Chlorobenzene	ND	0.20	ND	0.20				
1,2-Dichlorobenzene	ND	0.40	ND	0.40				
1,3-Dichlorobenzene	ND	0.40	ND	0.40				
1,4-Dichlorobenzene	ND	0.30	ND	0.30				
Ethylbenzene	ND	0.20	ND	0.20				
Toluene	ND	0.20	ND	0.20				
Xylenes (total)	ND	0.20	ND	0.20				
<u>Surrogate Recovery(%)</u>								
1-Bromo-4-fluorobenzene	104		111					
Control Limits: 40 to 140								

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-151

Sample Identifications and Dates

Sample ID	9006191515	9006191745	9006201410	9006201350	9006201100	9006200945
Date Sampled	06/19/90	06/19/90	06/20/90	06/20/90	06/20/90	06/20/90
Date Received	06/21/90	06/21/90	06/21/90	06/21/90	06/21/90	06/21/90
Matrix	Water 01	Water 02	Water 03	Water 04	Water 05	Water 06
Halocarbons by EPA 601						
Prepared						
Analyzed	06/26/90	07/03/90	07/03/90	06/26/90	07/03/90	06/26/90
Analyst	BSJ	BSJ	BSJ	BSJ	BSJ	BSJ
File ID	DB06266	DB07034	DB07039	DB06269	DB07036	DB062611
Blank ID	QB06261	QB07031	QB07031	QB06261	QB07031	QB06261
Instrument	B	B	B	B	B	B
Report as	received	received	received	received	received	received
Aromatics by EPA 602						
Prepared						
Analyzed	06/26/90	07/03/90	07/03/90	06/26/90	07/03/90	06/26/90
Analyst	BSJ	BSJ	BSJ	BSJ	BSJ	BSJ
File ID	EB06266	EB07038	EB070310	EB06269	EB070311	EB062611
Blank ID	RB06261	RB07031	RB07031	RB06261	RB07031	RB06261
Instrument	B	B	B	B	B	B
Report as	received	received	received	received	received	received

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-151

Sample Identifications and Dates

Sample ID	DECON BLANK	TRIP BLANK	REAGENT BLANK	REAGENT BLANK
Date Sampled	06/20/90	06/20/90		
Date Received	06/21/90	06/21/90	06/21/90	06/21/90
Matrix	water	water	water	water
	07	08	09	10
Halocarbons by EPA 601				
Prepared				
Analyzed	06/26/90	06/26/90	06/26/90	
Analyst	BSJ	BSJ	BSJ	
File ID	DB062612	DB062613	QB06261	
Blank ID	QB06261	QB06261		
Instrument	B	B	B	
Report as	received	received	received	
Halocarbons by EPA 601				
Prepared				
Analyzed			07/03/90	
Analyst			BSJ	
File ID			QB07031	
Blank ID				
Instrument			B	
Report as			received	
Aromatics by EPA 602				
Prepared				
Analyzed	06/26/90	06/26/90		06/26/90
Analyst	BSJ	BSJ		BSJ
File ID	EB062612	EB062613		RB06261
Blank ID	RB06261	RB06261		
Instrument	B	B		B
Report as	received	received		received
Aromatics by EPA 602				
Prepared				
Analyzed				07/03/90
Analyst				BSJ
File ID				RB07031
Blank ID				
Instrument				B
Report as				received

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-151

General Comments

I=RESULT CORRECTED. RESULTS WITH THE I FLAG HAVE BEEN REVISED
BASED ON CORRECTED RESPONSE FACTORS FOR SELECTED ANALYTES FOR
GC INSTRUMENT B.

THE X FLAG MEANS NOT CONFIRMED BY ANALYSIS ON A SECOND COLUMN.

THERE WAS A HIGH LEVEL OF SAMPLE MATRIX INTERFERENCES OBSERVED IN SAMPLES
9006191745 AND 9006201100 DURING THE 602 ANALYSES.

ETHYLBENZENE WAS REPORTED AS AN ESTIMATED VALUE IN 602 SAMPLE
9006201100 DUE TO SAMPLE MATRIX INTERFERENCES. THE VALUE OBTAINED ON THE
CONFIRMATION COLUMN WAS 450 PPB.

CHLOROBENZENE AND XYLENE WERE REPORTED AS ESTIMATED VALUES IN 602 SAMPLE
9006191745 DUE TO SAMPLE MATRIX INTERFERENCES. THE VALUES OBTAINED ON THE
CONFIRMATION COLUMN WERE:

CHLOROBENZENE 16 PPB
XYLENE 77 PPB

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-151

- a** ALL METHODS EXCEPT CLP
The results which are less than five times the method specified detection limit.
EXPLANATION
Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.
- C** ORGANIC CLP
pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS.
OTHER ORGANIC METHODS
This analysis has been confirmed on a second column or by GC/MS.
EXPLANATION
Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.
- G** ALL ORGANIC GC METHODS EXCEPT CLP
Indicates an estimated GC value due to interferences.
- I** ALL METHODS EXCEPT CLP
This result has been modified since the last issue of this report.
EXPLANATION
The explanations are included in the report narrative.
- ND** ALL METHODS EXCEPT CLP
This flag is used to denote analytes which are not detected at or above the specified detection limit.
EXPLANATION
The value to the right of the < symbol is the method specified detection limit for the analyte.
- X** ALL METHODS EXCEPT INORGANIC CLP
This is a general purpose flag for those situations not covered by the standard flags. The specific definition of this flag is described in the Comments Summary and/or in the case narrative.

Geoscience Consultants, Ltd.
Radian Work Order: SO-06-151

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
ml/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

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Nº 3333

Chain of Custody

DATE 6-22-90 PAGE 1 OF 1

LAB NAME Radian Analytical
ADDRESS 10395 Old Placerville Rd
Sacramento CA 95827
TELEPHONE (916) 362-5332

SAMPLERS (SIGNATURE)
Kyle Summers

SAMPLE NUMBER	MATRIX	LOCATION
9006211545	H ₂ O	SHS-7
9006211730	H ₂ O	SHS-8
9006211130	H ₂ O	G82-9

ANALYSIS REQUEST

GC/MS/ 625/8270 BASE/NEU/ACID CMPDS.	GC/MS/ 624/8240 VOLATILE CMPDS.	PESTICIDES/PCB 608/8080	POLYNUCLEAR AROMATIC 610/8310	PHENOLS, SUB PHENOLS 604/8040	HALOGENATED VOLATILES 601/8010	AROMATIC VOLATILES 602/8020	TOTAL ORGANIC CARBON 415/9060	TOTAL ORGANIC HALIDES 9020	PETROLEUM HYDROCARBONS 418.1	TPH MODIFIED 8013	PRIORITY POLLUTANT METALS (13)	CAM METALS (18) TILC/STLC	EP TOX METALS (8)	SDWA-INORGANICS PRIMARY/SECONDARY	HAZARDOUS WASTE PROFILE	NUMBER OF CONTAINERS
			X		X	X										5
			X		X	X										5
			X		X	X							X			6

PROJECT INFORMATION	SAMPLE RECEIPT
PROJECT: <u>GIANT MHA</u> <u>offsite</u>	TOTAL NO. OF CONTAINERS
PROJECT DIRECTOR <u>M. NEE</u>	CHAIN OF CUSTODY SEALS
CHARGE CODE NO. <u>459002</u>	REC'D GOOD CONDITION/COLD
	CONFORMS TO RECORD
	LAB NO.

SHIPPING ID. NO. 2935932336
VIA FedX
SPECIAL INSTRUCTIONS/COMMENTS:
PNA Samples to Austin 6/25/90

RELINQUISHED BY	1.	2.	3.
(Signature)	<u>Kyle Summers</u>		
(Printed Name)	<u>KYLE SUMMERS</u>		
(Date)	<u>6/22</u>		
(Company)			
RECEIVED BY	1.	2.	3.
(Signature)			
(Printed Name)			
(Date)			
(Company)			
RECEIVED BY (LABORATORY)	1.	2.	3.
(Signature)			
(Printed Name)			
(Date)			
(Company)			

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Analytical Report
08/16/90

Geoscience Consultants, Ltd.

Geoscience Consultants, Ltd.
500 Copper N.W. Ste 200
Albuquerque, NM., 87102
(505) 842-0595
Sample Manager

Customer Work Identification M & A Offsite COC#3333
Purchase Order Number 456002

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
10395 Old Placerville Road
Sacramento, CA 95827

916-362-5332

Client Services Coordinator: LWKELLY

Certified by:

Paul H. Hale

Previously Reported on 07/16/90.

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-154

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:	7 9006211545	8 9006211730	9 9006211130	REAGENT BLANK
Factor:	1	5000	2000	1
Results in:	ug/L 01A	ug/L 02A	ug/L 03A	ug/L 04A
Matrix:	water	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Bromodichloromethane	2.5 X	0.10	ND	500	ND	200	ND	0.10
Bromoform	ND	0.50	ND	2500	ND	1000	ND	0.50
Bromomethane	ND	1.2	ND	5900	ND	2400	ND	1.2
Carbon tetrachloride	ND	0.12	ND	600	ND	240	ND	0.12
Chlorobenzene	ND	0.25	ND	1300	ND	500	ND	0.25
Chloroethane	ND	0.52	ND	2600	ND	1000	ND	0.52
2-Chloroethylvinyl ether	ND	0.50	ND	2500	ND	1000	ND	0.50
Chloroform	ND	0.10	ND	500	ND	200	ND	0.10
Chloromethane	ND	0.30	ND	1500	ND	600	ND	0.30
Dibromochloromethane	ND	0.20	ND	1000	ND	400	ND	0.20
1,2-Dichlorobenzene	ND	0.50	ND	2500	ND	1000	ND	0.50
1,3-Dichlorobenzene	ND	0.32	ND	1600	ND	640	ND	0.32
1,4-Dichlorobenzene	ND	0.24	ND	1200	ND	480	ND	0.24
1,1-Dichloroethane	2.2 C@	0.50	ND	2500	ND	1000	ND	0.50
1,2-Dichloroethane	5.2 C	0.10	ND	500	ND	200	ND	0.10
1,1-Dichloroethene	ND	0.20	ND	1000	ND	400	ND	0.20
cis-1,2-Dichloroethene	1.3 GI	0.20	ND	1000	ND	400	ND	0.20
trans-1,2-Dichloroethene	ND	0.20	ND	1000	ND	400	ND	0.20
1,2-Dichloropropane	ND	0.10	ND	500	ND	200	ND	0.10
cis-1,3-Dichloropropene	ND	0.20	ND	1000	ND	400	ND	0.20
trans-1,3-Dichloropropene	ND	0.34	ND	1700	ND	680	ND	0.34
Methylene chloride	ND	0.40	ND	2000	ND	800	ND	0.40
1,1,2,2-Tetrachloroethane	ND	0.15	ND	750	ND	300	ND	0.15
Tetrachloroethene	ND	0.10	ND	500	ND	200	ND	0.10
1,1,1-Trichloroethane	ND	0.20	ND	1000	ND	400	ND	0.20
1,1,2-Trichloroethane	ND	0.20	ND	1000	ND	400	ND	0.20
Trichloroethene	0.28 C@	0.20	3200 X@	1000	ND	400	ND	0.20
Trichlorofluoromethane	ND	0.20	ND	1000	ND	400	ND	0.20
Vinyl chloride	ND	0.20	ND	1000	ND	400	ND	0.20

X See definition in report narrative

C Confirmed on second column or by GC/MS

G Indicates an estimated GC value due to interferences.

ND Not detected at specified detection limit

@ Est. result less than 5 times detection limit

I Result differs from last report - see report narrative

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-154

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:	9006211545	9006211730	9006211130	REAGENT BLANK
Factor:	1	5000	2000	1
Results in:	ug/L	ug/L	ug/L	ug/L
	01A	02A	03A	04A
Matrix:	water	water	water	water

Surrogate Recovery(%)

1-Bromo-4-fluorobenzene

Control Limits: 40 to 140

Result Det. Limit

114

Result Det. Limit

114

Result Det. Limit

112

Result Det. Limit

116

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-154

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:

REAGENT BLANK

Factor:

1

Results in:

ug/L

04B

Matrix:

water

	Result	Det. Limit
Bromodichloromethane	ND	0.10
Bromoform	ND	0.50
Bromomethane	ND	1.2
Carbon tetrachloride	ND	0.12
Chlorobenzene	ND	0.25
Chloroethane	ND	0.52
2-Chloroethylvinyl ether	ND	0.50
Chloroform	ND	0.10
Chloromethane	ND	0.30
Dibromochloromethane	ND	0.20
1,2-Dichlorobenzene	ND	0.50
1,3-Dichlorobenzene	ND	0.32
1,4-Dichlorobenzene	ND	0.24
1,1-Dichloroethane	ND	0.50
1,2-Dichloroethane	ND	0.10
1,1-Dichloroethene	ND	0.20
cis-1,2-Dichloroethene	ND	0.20
trans-1,2-Dichloroethene	ND	0.20
1,2-Dichloropropane	ND	0.10
cis-1,3-Dichloropropene	ND	0.20
trans-1,3-Dichloropropene	ND	0.34
Methylene chloride	ND	0.40
1,1,2,2-Tetrachloroethane	ND	0.15
Tetrachloroethene	ND	0.10
1,1,1-Trichloroethane	ND	0.20
1,1,2-Trichloroethane	ND	0.20
Trichloroethene	ND	0.20
Trichlorofluoromethane	ND	0.20
Vinyl chloride	ND	0.20

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-154

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:

REAGENT BLANK

Factor:

1

Results in:

ug/L

04B

Matrix:

water

Surrogate Recovery(%)

1-Bromo-4-fluorobenzene

Control Limits: 40 to 140

Result Det. Limit

129

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-154

Method: Aromatics by EPA 602 (1)

List: Complete analyte list

Sample ID:	7 9006211545	8 9006211730	9 9006211130	REAGENT BLANK
Factor:	1	5000	2000	1
Results in:	ug/L	ug/L	ug/L	ug/L
	01C	02C	03C	05A
Matrix:	water	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Benzene	80 C	0.20	ND	1000	2400 C	400	ND	0.20
Chlorobenzene	4.0 C	0.20	ND	1000	1800 G ^a	400	ND	0.20
1,2-Dichlorobenzene	ND	0.40	ND	2000	ND	800	ND	0.40
1,3-Dichlorobenzene	ND	0.40	ND	2000	ND	800	ND	0.40
1,4-Dichlorobenzene	ND	0.30	ND	1500	ND	600	ND	0.30
Ethylbenzene	140 C	0.20	ND	1000	13000 C	400	ND	0.20
Toluene	1.1 G	0.20	ND	1000	1100 G ^a	400	ND	0.20
Xylenes (total)	27 C	0.20	3600 G ^a	1000	79000 G	400	ND	0.20
Surrogate Recovery(%)								
1-Bromo-4-fluorobenzene	95		105		72		110	
Control Limits: 40 to 140								

C Confirmed on second column or by GC/MS

G Indicates an estimated GC value due to interferences.

ND Not detected at specified detection limit

^a Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-154

Method/Analyte		Sample Identifications	
9006211130			
Matrix	06 water		
Mercury by SW7470	Result	Det. Limit	
Mercury	ND	mg/L 0.0002	
ND Not detected at specified detection limit			
(1) For a detailed description of flags and technical terms in this report refer to the glossary.			

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-154

Method/Analyte		Sample Identifications	
		REAGENT BLANK	
Matrix		07 water	
Mercury by SW7470 Mercury	Result	Det. Limit	
	ND	mg/L 0.0002	

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

Geoscience Consultants, Ltd.
 Radian Work Order: 50-06-154

Sample Identifications and Dates

Sample ID	9006211545	9006211730	9006211130	REAGENT BLANK	REAGENT BLANK	9006211130
Date Sampled	06/21/90	06/21/90	06/21/90			06/21/90
Date Received	06/23/90	06/23/90	06/23/90	06/23/90	06/23/90	06/23/90
Matrix	water	water	water	water	water	water
	01	02	03	04	05	06

Metals by SW6010

Prepared						07/09/90
Analyzed						07/10/90
Analyst						GE
File ID						S00615406A
Blank ID						S00700009
Instrument						JA
Report as						received

Halocarbons by EPA 601

Prepared					
Analyzed	07/05/90	07/06/90	07/06/90	07/05/90	
Analyst	MG	MG	MG	MG	
File ID	DB07054	DB07064	DB07065	QB07051	
Blank ID	QB07051	QB07061	QB07061		
Instrument	B	B	B	B	
Report as	received	received	received	received	

Halocarbons by EPA 601

Prepared					
Analyzed				07/06/90	
Analyst				MG	
File ID				QB07061	
Blank ID					
Instrument				B	
Report as				received	

Aromatics by EPA 602

Prepared					
Analyzed	07/06/90	07/06/90	07/06/90		07/06/90
Analyst	MG	MG	MG		MG
File ID	EB07069	EB07067	EB07068		RB07061
Blank ID	RB07061	RB07061	RB07061		
Instrument	B	B	B		B
Report as	received	received	received		received

Mercury by SW7470

Prepared						06/27/90
Analyzed						06/27/90
Analyst						MD
File ID						S00615406A
Blank ID						S00600027
Instrument						PE503
Report as						received

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-154

Sample Identifications and Dates

Sample ID REAGENT BLANK
Date Sampled
Date Received 06/23/90
Matrix water
07

Metals by SW6010

Prepared 07/09/90
Analyzed 07/10/90
Analyst GE
File ID S00700009
Blank ID
Instrument JA
Report as received

Mercury by SW7470

Prepared 06/27/90
Analyzed 06/27/90
Analyst MD
File ID S00600027
Blank ID
Instrument PE503
Report as received

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-154

General Comments

I = Result corrected. Results with the I flag have been revised based on corrected response factors for selected analytes for GC instrument B.

THE X FLAG MEANS NOT CONFIRMED BY ANALYSIS ON A SECOND COLUMN.

THERE WERE A HIGH LEVEL OF SAMPLE MATRIX INTERFERENCES IN THE SAMPLES DURING THE 602 ANALYSES.

TOLUENE WAS REPORTED AS AN ESTIMATED VALUE IN 602 SAMPLE 9006211545 DUE TO SAMPLE MATRIX INTERFERENCES. THE VALUE OBTAINED ON THE CONFIRMATION COLUMN WAS TOLUENE 6.7 PPB.

XYLENE WAS REPORTED AS AN ESTIMATED VALUE IN 602 SAMPLE 9006211730 DUE TO SAMPLE MATRIX INTERFERENCES. THE VALUE OBTAINED ON THE CONFIRMATION COLUMN WAS 42000 PPB.

CHLOROBENZENE, TOLUENE AND XYLENE WERE REPORTED AS ESTIMATED VALUES IN 602 SAMPLE 9006211130 DUE TO SAMPLE MATRIX INTERFERENCES. THE VALUES OBTAINED ON THE CONFIRMATION COLUMN WERE:

CHLOROBENZENE 4300 PPB
TOLUENE 2600 PPB
XYLENE 16000 PPB

CIS-1,3-DICHLOROPROPENE WAS REPORTED AS AN ESTIMATED VALUE IN 8010 SAMPLE 9006211545 DUE TO SAMPLE MATRIX INTERFERENCES. THE VALUE OBTAINED ON THE CONFIRMATION COLUMN WAS 0.37 PPB.

601 SAMPLES 9006211730 AND 9006211130 WERE ANALYZED OUT OF HOLD TIME. ALL OF THE 602 SAMPLES WERE ANALYZED OUT OF HOLD TIME. THIS WAS DUE TO HEAVY SAMPLE CONTAMINATION OF OUR EQUIPMENT.

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-154

a ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

c ORGANIC CLP

pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS.

OTHER ORGANIC METHODS

This analysis has been confirmed on a second column or by GC/MS.

EXPLANATION

Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.

G ALL ORGANIC GC METHODS EXCEPT CLP

Indicates an estimated GC value due to interferences.

I ALL METHODS EXCEPT CLP

This result has been modified since the last issue of this report.

EXPLANATION

The explanations are included in the report narrative.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

X ALL METHODS EXCEPT INORGANIC CLP

This is a general purpose flag for those situations not covered by the standard flags. The specific definition of this flag is described in the Comments Summary and/or in the case narrative.

Geoscience Consultants, Ltd.
Radian Work Order: SO-06-154

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
ml/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

Analytical Report
08/17/90

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Geoscience Consultants, Ltd.

Geoscience Consultants, Ltd.
500 Copper N.W. Ste 200
Albuquerque, NM., 87102
(505) 842-0595
Sample Manager

Customer Work Identification M & A Offsite, COC# 3492
Purchase Order Number 456-002

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
10395 Old Placerville Road
Sacramento, CA 95827

916-362-5332

Client Services Coordinator: LWKELLY

Certified by: *Rand N. Hale*

Previously Reported on 07/16/90.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-165

 Method: Metals by EPA 200.7 (1)
 List: EP Toxicity analyte list

Sample ID:	11 9006231245 SHS-11	12 9006231430 SHS-12	REAGENT BLANK
Factor:	1.00	1.00	1.00
Results in:	mg/L 06A	mg/L 07A	mg/L 08A
Matrix:	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Arsenic	ND	0.053	ND	0.053	ND	0.053
Barium	0.083	0.0020	0.36	0.0020	ND	0.0020
Cadmium	ND	0.0040	ND	0.0040	ND	0.0040
Chromium	ND	0.0070	0.025 a	0.0070	ND	0.0070
Lead	0.046 a	0.042	ND	0.042	ND	0.042
Selenium	ND	0.075	ND	0.075	ND	0.075
Silver	ND	0.0070	ND	0.0070	ND	0.0070

ND Not detected at specified detection limit

a Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: SO-06-165

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:	9006231400	9006231245	9006231430	REAGENT BLANK
	10	11	12	
Factor:	10	100	10	1
Results in:	ug/L	ug/L	ug/L	ug/L
	01A	02A	03A	04A
Matrix:	water	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Bromodichloromethane	ND	1.0	ND	10	ND	1.0	ND	0.10
Bromoform	ND	5.0	ND	50	ND	5.0	ND	0.50
Bromomethane	ND	12	ND	120	ND	12	ND	1.2
Carbon tetrachloride	ND	1.2	ND	12	ND	1.2	ND	0.12
Chlorobenzene	ND	2.5	ND	25	ND	2.5	ND	0.25
Chloroethane	ND	5.2	ND	52	ND	5.2	ND	0.52
2-Chloroethylvinyl ether	ND	5.0	ND	50	ND	5.0	ND	0.50
Chloroform	4.3 C ^a	1.0	ND	10	5.6 C	1.0	ND	0.10
Chloromethane	ND	3.0	ND	30	ND	3.0	ND	0.30
Dibromochloromethane	ND	2.0	ND	20	ND	2.0	ND	0.20
1,2-Dichlorobenzene	ND	5.0	ND	50	ND	5.0	ND	0.50
1,3-Dichlorobenzene	ND	3.2	ND	32	ND	3.2	ND	0.32
1,4-Dichlorobenzene	ND	2.4	ND	24	ND	2.4	ND	0.24
1,1-Dichloroethane	ND	5.0	ND	50	ND	5.0	ND	0.50
1,2-Dichloroethane	ND	1.0	ND	10	ND	1.0	ND	0.10
1,1-Dichloroethene	ND	2.0	ND	20	ND	2.0	ND	0.20
cis-1,2-Dichloroethene	ND	2.0	22 C ^a	20	10 C	2.0	ND	0.20
trans-1,2-Dichloroethene	ND	2.0	ND	20	ND	2.0	ND	0.20
1,2-Dichloropropane	ND	1.0	ND	10	ND	1.0	ND	0.10
cis-1,3-Dichloropropene	ND	2.0	ND	20	ND	2.0	ND	0.20
trans-1,3-Dichloropropene	ND	3.4	ND	34	ND	3.4	ND	0.34
Methylene chloride	ND	4.0	ND	40	ND	4.0	ND	0.40
1,1,2,2-Tetrachloroethane	5.5 C ^a	1.5	ND	15	ND	1.5	ND	0.15
Tetrachloroethene	ND I	1.0	ND	10	3.1 C ^a	1.0	ND	0.10
1,1,1-Trichloroethane	ND	2.0	ND	20	ND	2.0	ND	0.20
1,1,2-Trichloroethane	ND	2.0	ND	20	ND	2.0	ND	0.20
Trichloroethene	ND	2.0	ND	20	2.0 C ^a	2.0	ND	0.20
Trichlorofluoromethane	ND	2.0	ND	20	ND	2.0	ND	0.20
Vinyl chloride	ND	2.0	ND	20	ND	2.0	ND	0.20

ND Not detected at specified detection limit

^a Est. result less than 5 times detection limit

C Confirmed on second column or by GC/MS

I Result differs from last report - see report narrative

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: SO-06-165

Method: Halocarbons by EPA 601 (1)

List: Complete analyte list

Sample ID:	9006231400	9006231245	9006231430	REAGENT BLANK
Factor:	10	100	10	1
Results in:	ug/L	ug/L	ug/L	ug/L
	01A	02A	03A	04A
Matrix:	water	water	water	water

Surrogate Recovery(%)

1-Bromo-4-fluorobenzene

Control Limits: 40 to 140

Result Det. Limit

104

Result Det. Limit

103

Result Det. Limit

108

Result Det. Limit

129

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-165

Method: Aromatics by EPA 602 (1)

List: Complete analyte list

Sample ID:	9006231400 SHG-10	9006231245 SHG-11	9006231430 SHG-12	REAGENT BLANK
Factor:	10	100	10	1
Results in:	ug/L	ug/L	ug/L	ug/L
	01C	02C	03C	05A
Matrix:	water	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Benzene	ND	2.0	800 C	20	ND	2.0	ND	0.20
Chlorobenzene	3.0 X@	2.0	ND	20	ND	2.0	ND	0.20
1,2-Dichlorobenzene	ND	4.0	ND	40	ND	4.0	ND	0.40
1,3-Dichlorobenzene	ND	4.0	ND	40	ND	4.0	ND	0.40
1,4-Dichlorobenzene	ND	3.0	ND	30	ND	3.0	ND	0.30
Ethylbenzene	69 C	2.0	1100 C	20	ND	2.0	ND	0.20
Toluene	3.2 G@	2.0	ND	20	ND	2.0	ND	0.20
Xylenes (total)	150 G	2.0	5100 C	20	ND	2.0	ND	0.20
Surrogate Recovery(%)								
1-Bromo-4-fluorobenzene	90		102		100		110	
Control Limits: 40 to 140								

ND Not detected at specified detection limit

X See definition in report narrative

@ Est. result less than 5 times detection limit

C Confirmed on second column or by GC/MS

G Indicates an estimated GC value due to interferences.

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-165

Method/Analyte		Sample Identifications	
	9006231245		
Matrix	06 water		

	Result	Det. Limit	
Mercury by SW7470			
Mercury	ND	mg/L 0.0002	

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-165

Method/Analyte		Sample Identifications	
		9006231430	REAGENT BLANK
Matrix		07 water	08 water
Mercury by SW7470		Result	Det. Limit
Mercury		ND	mg/L 0.0002
		Result	Det. Limit
		ND	mg/L 0.0002
ND Not detected at specified detection limit.			
(1) For a detailed description of flags and technical terms in this report refer to the glossary.			

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-165

Sample Identifications and Dates

Sample ID	9006231400	9006231245	9006231430	REAGENT BLANK	REAGENT BLANK	9006231245
Date Sampled	06/23/90	06/23/90	06/23/90			06/23/90
Date Received	06/26/90	06/26/90	06/26/90	06/26/90	06/26/90	06/26/90
Matrix	water	water	water	water	water	water
	01	02	03	04	05	06

Metals by EPA 200.7

Prepared						07/06/90
Analyzed						07/09/90
Analyst						GE
File ID						S00616506A
Blank ID						S00700006
Instrument						JA
Report as						received

Halocarbons by EPA 601

Prepared					
Analyzed	07/06/90	07/06/90	07/06/90	07/06/90	
Analyst	MG	MG	MG	MG	
File ID	DB070615	DB070616	DB070617	QB07061	
Blank ID	QB07061	QB07061	QB07061		
Instrument	B	B	B	B	
Report as	received	received	received	received	

Aromatics by EPA 602

Prepared					
Analyzed	07/06/90	07/06/90	07/06/90		07/06/90
Analyst	MG	MG	MG		MG
File ID	EB070618	EB070619	EB070620		RB07061
Blank ID	RB07061	RB07061	RB07061		
Instrument	B	B	B		B
Report as	received	received	received		received

Mercury by SW7470

Prepared						06/27/90
Analyzed						06/27/90
Analyst						MD
File ID						S00616506A
Blank ID						S00600027
Instrument						PE503
Report as						received

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-165

Sample Identifications and Dates

Sample ID	9006231430	REAGENT BLANK
Date Sampled	06/23/90	
Date Received	06/26/90	06/26/90
Matrix	water	water
	07	08

Metals by EPA 200.7

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00616507A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Mercury by SW7470

Prepared	06/27/90	06/27/90
Analyzed	06/27/90	06/27/90
Analyst	MD	MD
File ID	S00616507A	S00600027
Blank ID	S00600027	
Instrument	PE503	PE503
Report as	received	received

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order: SO-06-165

General Comments

HIGH SODIUM IN FRACTION 06A MAY CAUSE SOME MATRIX INTERFERENCE

1 = Result corrected. Results with the 1 flag have been revised based on corrected response factors for selected analytes for GC instrument B.

THE X FLAG MEANS NOT CONFIRMED BY ANALYSIS ON A SECOND COLUMN.

TOLUENE AND XYLENE WERE REPORTED AS ESTIMATED VALUES IN 602 SAMPLE 9006231400 DUE TO SAMPLE MATRIX INTERFERENCES. THE VALUES OBTAINED ON THE CONFIRMATION COLUMN WERE:

TOLUENE 9.1 PPB
XYLENE 61 PPB

THERE WAS A LARGE AMOUNT OF SAMPLE MATRIX INTERFERENCES IN THESE SAMPLES DURING THE 602 ANALYSES. THE SAMPLES FORMED TWO LAYERS.

Geoscience Consultants, Ltd.
Radian Work Order: SO-06-165

- a** ALL METHODS EXCEPT CLP
The results which are less than five times the method specified detection limit.
EXPLANATION
Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.
- C** ORGANIC CLP
pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS.
OTHER ORGANIC METHODS
This analysis has been confirmed on a second column or by GC/MS.
EXPLANATION
Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.
- G** ALL ORGANIC GC METHODS EXCEPT CLP
Indicates an estimated GC value due to interferences.
- I** ALL METHODS EXCEPT CLP
This result has been modified since the last issue of this report.
EXPLANATION
The explanations are included in the report narrative.
- ND** ALL METHODS EXCEPT CLP
This flag is used to denote analytes which are not detected at or above the specified detection limit.
EXPLANATION
The value to the right of the < symbol is the method specified detection limit for the analyte.
- X** ALL METHODS EXCEPT INORGANIC CLP
This is a general purpose flag for those situations not covered by the standard flags. The specific definition of this flag is described in the Comments Summary and/or in the case narrative.

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 (714) 724-0536

☐ Las Cruces
 P.O. Drawer MM
 Las Cruces, NM 88004
 (505) 524-5364

Chain of Custody

DATE 8/23/90 PAGE 1 OF 1

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SAMPLE NUMBER	MATRIX	LOCATION	GC/MS/ 625/8270	GC/MS/ 624/8240	PESTICIDES/PCB	608/8080	POLYNUCLEAR	AROMATIC 610/8310	PHENOLS, SUB PHENOLS	604/8040	HALOGENATED	VOLATILES 601/8010	AROMATIC VOLATILES	602/8020	TOTAL ORGANIC	CARBON 415/9060	TOTAL ORGANIC	HALIDES 9020	PETROLEUM	HYDROCARBONS 418.1	TPH	MODIFIED 8015	PRIORITY POLLUTANT	CAM METALS (18)	TLC/STLC	EP TOX	METALS (8)	SDWA-INORGANICS	PRIMARY/SECONDARY	HAZARDOUS WASTE	PROFILE	NUMBER OF CONTAINERS																																																																																																																																																																																																																																				
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10/09/90

Geoscience Consultants, Ltd.

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(505) 842-0595
Sample Manager

Customer Work Identification M&A Offsite, COC #3501
Purchase Order Number 456002

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- 4 Notes and Definitions

Radian Analytical Services
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Geoscience Consultants, Ltd.
Radian Work Order: SO-08-222

Method: Halocarbons by SW8010 (1)
List: 8010 list with tot. 1,2DCE

Sample ID:	9008221106 SH- S-16	9008221400 SH- S-15	9008221915 SH- S-14	9008231030 SH- S-13
Factor:	1	1	10	1
Results in:	ug/L	ug/L	ug/L	ug/L
Matrix:	01A water	02A water	03A water	04A water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Benzyl chloride	ND	10	ND	10	ND	100	ND	10
Bromobenzene	ND	5.0	ND	5.0	ND	50	ND	5.0
Bromodichloromethane	ND	0.10	ND	0.10	ND	1.0	ND	0.10
Bromoform	ND	0.50	ND	0.50	ND	5.0	ND	0.50
Bromomethane	ND	1.2	ND	1.2	ND	12	ND	1.2
Carbon tetrachloride	ND	0.12	ND	0.12	ND	1.2	ND	0.12
Chlorobenzene	ND	0.25	ND	0.25	ND	2.5	ND	0.25
Chloroethane	ND	0.52	ND	0.52	ND	5.2	ND	0.52
2-Chloroethylvinylether	ND	0.50	ND	0.50	ND	5.0	ND	0.50
Chloroform	0.17 Y@	0.10	ND	0.10	ND	1.0	ND	0.10
1-Chlorohexane	ND	5.0	ND	5.0	ND	50	ND	5.0
bis-Chloroisopropylether	ND	10	ND	10	ND	100	ND	10
Chloromethane	ND	0.30	ND	0.30	ND	3.0	ND	0.30
Chlorotoluene (total)	ND	25	ND	25	ND	250	ND	25
Dibromochloromethane	ND	0.20	ND	0.20	ND	2.0	ND	0.20
Dibromomethane	ND	5.0	ND	5.0	ND	50	ND	5.0
1,2-Dichlorobenzene	ND	0.50	ND	0.50	ND	5.0	ND	0.50
1,3-Dichlorobenzene	ND	0.32	ND	0.32	ND	3.2	ND	0.32
1,4-Dichlorobenzene	ND	0.24	ND	0.24	ND	2.4	ND	0.24
1,1-Dichloroethane	ND	0.50	ND	0.50	ND	5.0	0.53 X@	0.50
1,2-Dichloroethane	ND	0.10	ND	0.10	ND	1.0	11 C	0.10
1,2-Dichloroethene (total)	0.34 Y@	0.20	ND	0.20	ND	2.0	0.28 C@	0.20
1,1-Dichloroethene	ND	0.20	ND	0.20	2.0 X@	2.0	ND	0.20
1,2-Dichloropropane	ND	0.10	ND	0.10	ND	1.0	ND	0.10
cis-1,3-Dichloropropene	ND	0.20	ND	0.20	ND	2.0	ND	0.20
trans-1,3-Dichloropropene	ND	0.34	ND	0.34	ND	3.4	ND	0.34
Methylene chloride	ND	0.40	ND	0.40	ND	4.0	ND	0.40
1,1,1,2-Tetrachloroethane	ND	5.0	ND	5.0	ND	50	ND	5.0
1,1,2,2-Tetrachloroethane	ND	0.15	ND	0.15	ND	1.5	ND	0.15
Tetrachloroethene	ND	0.10	0.40 X@	0.10	4.6 X@	1.0	0.34 X@	0.10

ND Not detected at specified detection limit

@ Est. result less than 5 times detection limit

C Confirmed on second column or by GC/MS

Y See definition in report narrative

X See definition in report narrative

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-08-222

 Method: Halocarbons by SW8010 (1)
 List: 8010 list with tot. 1,2DCE

Sample ID:	9008221106 SH- S-16	9008221400 SH- S-15	9008221915 SH- S-14	9008231030 SH- S-13
Factor:	1	1	10	1
Results in:	ug/L 01A	ug/L 02A	ug/L 03A	ug/L 04A
Matrix:	water	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
1,1,1-Trichloroethane	ND	0.20	ND	0.20	ND	2.0	ND	0.20
1,1,2-Trichloroethane	ND	0.20	ND	0.20	ND	2.0	ND	0.20
Trichloroethene	ND	0.20	ND	0.20	ND	2.0	0.26 X@	0.20
Trichlorofluoromethane	ND	0.20	ND	0.20	ND	2.0	ND	0.20
1,2,3-Trichloropropane	ND	5.0	ND	5.0	ND	50	ND	5.0
Vinyl chloride	ND	0.20	ND	0.20	ND	2.0	ND	0.20
Surrogate Recovery(%)								
1-Bromo-4-fluorobenzene	126		135		131		135	
Control Limits: 40 to 140								

ND Not detected at specified detection limit

X See definition in report narrative

@ Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-08-222

 Method: Halocarbons by SW8010 (1)
 List: 8010 list with tot. 1,2DCE

Sample ID:	REAGENT BLANK	REAGENT BLANK
Factor:	1	1
Results in:	ug/L	ug/L
	05A	05B
Matrix:	water	water

	Result	Det. Limit	Result	Det. Limit
Benzyl chloride	ND	10	ND	10
Bromobenzene	ND	5.0	ND	5.0
Bromodichloromethane	ND	0.10	ND	0.10
Bromoform	ND	0.50	ND	0.50
Bromomethane	ND	1.2	ND	1.2
Carbon tetrachloride	ND	0.12	ND	0.12
Chlorobenzene	ND	0.25	ND	0.25
Chloroethane	ND	0.52	ND	0.52
2-Chloroethylvinylether	ND	0.50	ND	0.50
Chloroform	ND	0.10	ND	0.10
1-Chlorohexane	ND	5.0	ND	5.0
bis-Chloroisopropylether	ND	10	ND	10
Chloromethane	ND	0.30	ND	0.30
Chlorotoluene (total)	ND	25	ND	25
Dibromochloromethane	ND	0.20	ND	0.20
Dibromomethane	ND	5.0	ND	5.0
1,2-Dichlorobenzene	ND	0.50	ND	0.50
1,3-Dichlorobenzene	ND	0.32	ND	0.32
1,4-Dichlorobenzene	ND	0.24	ND	0.24
1,1-Dichloroethane	ND	0.50	ND	0.50
1,2-Dichloroethane	ND	0.10	ND	0.10
1,2-Dichloroethene (total)	ND	0.20	ND	0.20
1,1-Dichloroethene	ND	0.20	ND	0.20
1,2-Dichloropropane	ND	0.10	ND	0.10
cis-1,3-Dichloropropene	ND	0.20	ND	0.20
trans-1,3-Dichloropropene	ND	0.34	ND	0.34
Methylene chloride	ND	0.40	ND	0.40
1,1,1,2-Tetrachloroethane	ND	5.0	ND	5.0
1,1,2,2-Tetrachloroethane	ND	0.15	ND	0.15
Tetrachloroethene	ND	0.10	ND	0.10

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-08-222

Method: Halocarbons by SW8010 (1)

List: 8010 list with tot. 1,2DCE

Sample ID:	REAGENT BLANK	REAGENT BLANK
Factor:	1	1
Results in:	ug/L	ug/L
	05A	05B
Matrix:	water	water

	Result	Det. Limit	Result	Det. Limit
1,1,1-Trichloroethane	ND	0.20	ND	0.20
1,1,2-Trichloroethane	ND	0.20	ND	0.20
Trichloroethene	ND	0.20	ND	0.20
Trichlorofluoromethane	ND	0.20	ND	0.20
1,2,3-Trichloropropane	ND	5.0	ND	5.0
Vinyl chloride	ND	0.20	ND	0.20
Surrogate Recovery(%)				
1-Bromo-4-fluorobenzene	250	Q	143	Q
Control Limits: 40 to 140				

ND Not detected at specified detection limit

Q Outside control limits

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-08-222

Method: Aromatics by SW8020 (1)

List: Complete analyte list

	16	15	14	13
Sample ID:	9088221106 SH-S-16	9008221400 SH-S-15	9008221915 SH-S-14	9008231030 SH-S-13
Factor:	1	1	10	1
Results in:	ug/L	ug/L	ug/L	ug/L
Matrix:	06A water	07A water	08A water	09A water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Benzene	ND	0.20	ND	0.20	11 C	2.0	ND	0.20
Chlorobenzene	ND	0.20	ND	0.20	ND	2.0	ND	0.20
1,2-Dichlorobenzene	ND	0.40	ND	0.40	ND	4.0	ND	0.40
1,3-Dichlorobenzene	ND	0.40	ND	0.40	ND	4.0	ND	0.40
1,4-Dichlorobenzene	ND	0.30	0.38 Xa	0.30	140 X	3.0	ND	0.30
Ethylbenzene	ND	0.20	0.24 Ca	0.20	77 C	2.0	ND	0.20
Toluene	ND	0.20	0.33 Ca	0.20	31 C	2.0	0.79 Ca	0.20
Xylenes (total)	ND	0.20	0.97 Ca	0.20	260 C	2.0	ND	0.20
Surrogate Recovery(%)								
1-Bromo-4-fluorobenzene	96		97		77		99	
Control Limits: 40 to 140								

ND Not detected at specified detection limit

X See definition in report narrative

a Est. result less than 5 times detection limit

C Confirmed on second column or by GC/MS

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-08-222

Method: Aromatics by SW8020 (1)

List: Complete analyte list

Sample ID:

REAGENT BLANK

REAGENT BLANK

Factor:

1

1

Results in:

ug/L

ug/L

10A

10B

Matrix:

water

water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Benzene	ND	0.20	ND	0.20				
Chlorobenzene	ND	0.20	ND	0.20				
1,2-Dichlorobenzene	ND	0.40	ND	0.40				
1,3-Dichlorobenzene	ND	0.40	ND	0.40				
1,4-Dichlorobenzene	ND	0.30	ND	0.30				
Ethylbenzene	ND	0.20	ND	0.20				
Toluene	ND	0.20	ND	0.20				
Xylenes (total)	ND	0.20	ND	0.20				
<u>Surrogate Recovery(%)</u>								
1-Bromo-4-fluorobenzene	96		98					
Control Limits: 40 to 140								

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-08-222

Sample Identifications and Dates

Sample ID	9008221106 SH- S-16	9008221400 SH- S-15	9008221915 SH- S-14	9008231030 SH- S-13	REAGENT BLANK	9088221106 SH- S-16
Date Sampled	08/22/90	08/22/90	08/22/90	08/23/90		08/22/90
Date Received	08/24/90	08/24/90	08/24/90	08/24/90	08/24/90	08/24/90
Matrix	water	water	water	water	water	water
	01	02	03	04	05	06

Halocarbons by SW8010

Prepared						
Analyzed	09/04/90	09/05/90	09/05/90	09/05/90	09/04/90	
Analyst	WKW	WKW	WKW	WKW	WKW	
File ID	DB09044	DB09056	DB09054	DB09055	QB09041	
Blank ID	QB09041	QB09051	QB09051	QB09051		
Instrument	B	B	B	B	B	
Report as	received	received	received	received	received	

Halocarbons by SW8010

Prepared						
Analyzed					09/05/90	
Analyst					WKW	
File ID					QB09051	
Blank ID						
Instrument					B	
Report as					received	

Aromatics by SW8020

Prepared						
Analyzed						09/04/90
Analyst						WKW
File ID						EB09044
Blank ID						RB09041
Instrument						B
Report as						received

Geoscience Consultants, Ltd.
 Radian Work Order: S0-08-222

Sample Identifications and Dates

Sample ID	9008221400 SH- S-15	9008221915 SH- S-14	9008231030 SH- S-13	REAGENT BLANK
Date Sampled	08/22/90	08/22/90	08/23/90	
Date Received	08/24/90	08/24/90	08/24/90	08/24/90
Matrix	water	water	water	water
	07	08	09	10

Aromatics by SW8020

Prepared				
Analyzed	09/05/90	09/05/90	09/05/90	09/04/90
Analyst	WKW	WKW	WKW	WKW
File ID	EB09056	EB09054	EB09055	RB09041
Blank ID	RB09051	RB09051	RB09051	
Instrument	B	B	B	B
Report as	received	received	received	received

Aromatics by SW8020

Prepared	
Analyzed	09/05/90
Analyst	WKW
File ID	RB09051
Blank ID	
Instrument	B
Report as	received

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order: S0-08-222

The X flag means that the presence of this analyte was not confirmed after analysis on a second column.

The Y flag means that due to a lab error no confirmation analysis was performed for this analyte.

The surrogate recoveries for the 8010 Reagent Blanks were out of QC limits.

Geoscience Consultants, Ltd.
Radian Work Order: S0-08-222

Q ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

C ORGANIC CLP

pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS.

OTHER ORGANIC METHODS

This analysis has been confirmed on a second column or by GC/MS.

EXPLANATION

Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

Q ALL METHODS EXCEPT CLP

This quality control standard is outside method or laboratory specified control limits.

EXPLANATION

This flag is applied to matrix spike, analytical QC spike, and surrogate recoveries; and to RPD(relative percent difference) values for duplicate analyses and matrix spike/matrix spike duplicate result.

X ALL METHODS EXCEPT INORGANIC CLP

This is a general purpose flag for those situations not covered by the standard flags. The specific definition of this flag is described in the Comments Summary and/or in the case narrative.

Y ALL METHODS EXCEPT INORGANIC CLP

This is a general purpose flag to be used after the X flag.

Geoscience Consultants, Ltd.
Radian Work Order: S0-08-222

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

EP TOX METALS

Geoscience Consultants, Ltd.
 Radian Work Order: 89-12-112

Method/Analyte	Sample Identifications				
	8912111150	8912111255	8912111520	8912121000	8912121410
Matrix	01 water	02 water	03 water	04 water	05 water
Silver by ICPEs					
Silver	<0.010 mg/L	<0.010 mg/L	<0.010 mg/L	<0.010 mg/L	<0.010 mg/L
Arsenic by GF - SW846					
Arsenic	0.048 mg/L	0.061 mg/L	0.030 mg/L	0.0048 * mg/L	0.024 mg/L
Barium by ICPEs					
Barium	0.75 mg/L	1.2 mg/L	0.22 mg/L	0.40 mg/L	0.24 mg/L
Cadmium by ICPEs					
Cadmium	<0.0050 mg/L	<0.0050 mg/L	<0.0050 mg/L	<0.0050 mg/L	<0.0050 mg/L
Chromium by ICPEs					
Chromium	0.11 mg/L	0.074 mg/L	0.037 * mg/L	<0.010 mg/L	<0.010 mg/L
Mercury by cold vapor					
Mercury	<0.0002 mg/L	<0.0002 mg/L	<0.0002 mg/L	<0.0002 mg/L	<0.0002 mg/L
Lead by GF - SW846					
Lead	0.046 mg/L	0.082 mg/L	3.10 mg/L	0.0045 * mg/L	0.030 mg/L
Selenium by GF - SW846					
Selenium	0.020 mg/L	0.0024 * mg/L	<0.0020 mg/L	<0.0020 mg/L	<0.0020 mg/L

* Est. result less than 5 times detection limit

For a detailed description of flags and technical terms in this report refer to the glossary.

Geoscience Consultants, Ltd.
 Radian Work Order: 89-12-112

Method/Analyte	Sample Identifications				
	METHOD BLANK	Reagent blank			
Matrix	19 water	22			
Silver by ICPEs					
Silver	<0.010 mg/L				
Arsenic by GF - SW846					
Arsenic	<0.0020 mg/L				
Barium by ICPEs					
Barium	<0.010 mg/L				
Cadmium by ICPEs					
Cadmium	<0.0050 mg/L				
Chromium by ICPEs					
Chromium	<0.010 mg/L				
Mercury by cold vapor					
Mercury	<0.0002 mg/L				
Lead by GF - SW846					
Lead	<0.0020 mg/L				
Selenium by GF - SW846					
Selenium	<0.0020 mg/L				

For a detailed description of flags and technical terms in this report refer to the glossary.

Geoscience Consultants, Ltd.
 Radian Work Order: 89-12-112

Sample Identifications and Dates

Sample ID	8912111150	8912111255	8912111520	8912121000	8912121410	8912121145E
Date Sampled	12/11/89	12/11/89	12/11/89	12/12/89	12/12/89	12/12/89
Date Received	12/14/89	12/14/89	12/14/89	12/14/89	12/14/89	12/14/89
Matrix	water	water	water	water	water	
	01	02	03	04	05	06

Silver by ICPEs

Prepared	12/18/89	12/18/89	12/18/89	12/18/89	12/18/89
Analyzed	12/18/89	12/18/89	12/18/89	12/18/89	12/18/89
Analyst	DES	DES	DES	DES	DES
File ID					
Blank ID					
Instrument					
Report as	received	received	received	received	received

Arsenic by GF - SW846

Prepared	12/18/89	12/18/89	12/18/89	12/18/89	12/18/89
Analyzed	12/28/89	12/29/89	12/28/89	12/28/89	12/28/89
Analyst	MXZ	RAA	MXZ	MXZ	MXZ
File ID					
Blank ID					
Instrument	3030N	3030N	3030N	3030N	3030N
Report as	received	received	received	received	received

Barium by ICPEs

Prepared	12/18/89	12/18/89	12/18/89	12/18/89	12/18/89
Analyzed	12/18/89	12/18/89	12/18/89	12/18/89	12/18/89
Analyst	DES	DES	DES	DES	DES
File ID					
Blank ID					
Instrument					
Report as	received	received	received	received	received

Cadmium by ICPEs

Prepared	12/18/89	12/18/89	12/18/89	12/18/89	12/18/89
Analyzed	12/18/89	12/18/89	12/18/89	12/18/89	12/18/89
Analyst	DES	DES	DES	DES	DES
File ID					
Blank ID					
Instrument					
Report as	received	received	received	received	received

Chromium by ICPEs

Prepared	12/18/89	12/18/89	12/18/89	12/18/89	12/18/89
Analyzed	12/18/89	12/18/89	12/18/89	12/18/89	12/18/89
Analyst	DES	DES	DES	DES	DES
File ID					
Blank ID					
Instrument					
Report as	received	received	received	received	received

Geoscience Consultants, Ltd.
 Radian Work Order: 89-12-112

Sample Identifications and Dates

Sample ID	8912111150	8912111255	8912111520	8912121000	8912121410	8912121145E
Date Sampled	12/11/89	12/11/89	12/11/89	12/12/89	12/12/89	12/12/89
Date Received	12/14/89	12/14/89	12/14/89	12/14/89	12/14/89	12/14/89
Matrix	water	water	water	water	water	
	01	02	03	04	05	06
Mercury by cold vapor						
Prepared	12/22/89	12/22/89	12/22/89	12/22/89	12/22/89	
Analyzed	12/22/89	12/22/89	12/22/89	12/22/89	12/22/89	
Analyst	MZ	MZ	MZ	MZ	MZ	
File ID						
Blank ID						
Instrument						
Report as	received	received	received	received	received	
Lead by GF - SWB46						
Prepared	12/18/89	12/18/89	12/18/89	12/18/89	12/18/89	
Analyzed	12/19/89	12/19/89	12/19/89	12/19/89	12/19/89	
Analyst	MXZ	MXZ	MXZ	MXZ	MXZ	
File ID						
Blank ID						
Instrument	3030N	3030N	3030N	3030N	3030N	
Report as	received	received	received	received	received	
Selenium by GF - SWB46						
Prepared	01/18/89	12/18/89	12/18/89	12/18/89	12/18/89	
Analyzed	12/20/89	12/21/89	12/20/89	12/20/89	12/20/89	
Analyst	MXZ	MXZ	MXZ	MXZ	MXZ	
File ID						
Blank ID						
Instrument	3030N	3030Z	3030N	3030N	3030	
Report as	received	received	received	received	received	

Method/Analyte			Sample Identification			
Matrix	9004061125 SHS 4 01 water	9004061235 SHS 3 02 water	REAGENT BLANK 03 water			
Silver by SW6010	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Silver	ND	mg/L 0.0070	ND	mg/L 0.0070	ND	mg/L 0.0070
Aluminum by SW6010	45	mg/L 0.045	210	mg/L 0.045	ND	mg/L 0.045
Aluminum	ND	mg/L 0.0060	ND	mg/L 0.0060	ND	mg/L 0.0060
Arsenic by SW7060	ND	mg/L 0.0020	ND	mg/L 0.0020	ND	mg/L 0.0020
Arsenic	0.93	mg/L 0.0020	3.7	mg/L 0.0020	ND	mg/L 0.0020
Barium by SW6010	0.41	mg/L 0.0060	0.31	mg/L 0.0060	ND	mg/L 0.0060
Barium	0.053	mg/L 0.0070	0.18	mg/L 0.0070	ND	mg/L 0.0070
Boron by SW6010	0.094	mg/L 0.0070	0.29	mg/L 0.0070	ND	mg/L 0.0070
Boron	0.12	mg/L 0.0060	0.67	mg/L 0.0060	0.006	mg/L 0.0060
Cobalt by SW6010	82	mg/L 0.0070	300	mg/L 0.014	ND	mg/L 0.0070
Cobalt	5.3	mg/L 0.0020	5.7	mg/L 0.0020	ND	mg/L 0.0020
Chromium by SW6010	ND	mg/L 0.0060	ND	mg/L 0.0060	ND	mg/L 0.0060
Chromium	0.047	mg/L 0.015	0.19	mg/L 0.015	ND	mg/L 0.015
Copper by SW6010	0.027	mg/L 0.0030	0.099	mg/L 0.0060	ND	mg/L 0.0060
Copper	ND	mg/L 0.0050	ND	mg/L 0.0050	ND	mg/L 0.0050
Iron by SW6010	0.19	mg/L 0.0020	0.82	mg/L 0.0020	ND	mg/L 0.0020
Iron						
Manganese by SW6010						
Manganese						
Molybdenum by SW6010						
Molybdenum						
Nickel by SW6010						
Nickel						
Lead by SW7421						
Lead						
Selenium by SW7740						
Selenium						
Zinc by SW6010						
Zinc						

Ⓢ Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

Giant Refining Company
Radian Work Order: 80-04-094

Method/Analyte		Sample Identification	
Matrix		REAGENT BLANK	
		DA	
		water	

	Result	Det. Limit		
Arsenic by SW7060				
Arsenic	ND	mg/L	0.0040	
Lead by SW7421				
Lead	ND	mg/L	0.0030	
Selenium by SW7740				
Selenium	ND	mg/L	0.0050	

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

Giant Refining Company
Radian Work Order: 50-04-094

Sample identifications and Dates

Sample ID	9004061125	9004061235	REAGENT BLANK	REAGENT BLANK
Date Sampled	04/06/90	04/06/90		
Date Received	04/09/90	04/09/90	04/09/90	04/09/90
Matrix	water	water	water	water
	01	02	03	04

Silver by SW6010

	04/09/90	04/09/90	04/09/90
Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/10/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

Aluminum by SW6010

	04/09/90	04/09/90	04/09/90
Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/10/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

Arsenic by SW7060

	04/09/90	04/09/90	04/09/90
Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/16/90	04/16/90	04/16/90
Analyst	PR	PR	PR
File ID	800409401B	800409402B	800400009
Blank ID	800400009	800400009	
Instrument	Z3030	Z3030	Z3030
Report as	received	received	received

Barium by SW6010

	04/09/90	04/09/90	04/09/90
Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/10/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

Boron by SW6010

	04/09/90	04/09/90	04/09/90
Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/10/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

Giant Refining Company
Radian Work Order: 80-04-094

Sample Identifications and Dates

Sample ID	9004061125 5454	9004061235 5453	REAGENT BLANK	REAGENT BLANK
Date Sampled	04/06/90	04/06/90		
Date Received	04/09/90	04/09/90	04/09/90	04/09/90
Matrix	Water	Water	Water	
	01	02	03	04

Cobalt by SW6010

	04/09/90	04/09/90	04/09/90
Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/10/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

Chromium by SW6010

	04/09/90	04/09/90	04/09/90
Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/10/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

Copper by SW6010

	04/09/90	04/09/90	04/09/90
Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/10/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

Iron by SW6010

	04/09/90	04/09/90	04/09/90
Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/12/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

Manganese by SW6010

	04/09/90	04/09/90	04/09/90
Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/10/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

Giant Refining Company
Radian Work Order: 80-04-094

Sample identifications and Dates

Sample ID	9004061125 545 4	9004061235 545 3	REAGENT BLANK	REAGENT BLANK
Date Sampled	04/06/90	04/06/90		
Date Received	04/09/90	04/09/90	04/09/90	04/09/90
Matrix	Water	Water	Water	Water
	01	02	03	04

Molybdenum by SW6010

Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/10/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

Nickel by SW6010

Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/10/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

Lead by SW7421

Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/18/90	04/18/90	04/18/90
Analyst	LS	LS	PR
File ID	800409401B	800409402B	800400009
Blank ID	800400009	800400009	
Instrument	Z3030	Z3030	Z3030
Report as	received	received	received

Selenium by SW7740

Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/17/90	04/17/90	04/17/90
Analyst	PR	PR	PR
File ID	800409401B	800409402B	800400009
Blank ID	800400009	800400009	
Instrument	Z3030	Z3030	Z3030
Report as	received	received	received

Zinc by SW6010

Prepared	04/09/90	04/09/90	04/09/90
Analyzed	04/10/90	04/10/90	04/10/90
Analyst	GE	GE	GE
File ID	800409401A	800409402A	800400009
Blank ID	800400009	800400009	
Instrument	JA	JA	JA
Report as	received	received	received

RECEIVED JAN 2 5 1990

Radian Work Order S0-01-085

Analytical Report
01/23/90

Geo Science

Geo Science
500 Copper N.W. Ste 200
Albuquerque, NM., 87102 (Fax)
(505) 842-0595
Sample Manager

Customer Work Identification M & A, C-of-C# 3316
Purchase Order Number 348-006

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
10395 Old Placerville Road
Sacramento, CA 95827

916-362-5332

Client Services Coordinator: WLBROWN

Certified by:

David H. Hale

Geo Science

Radian Work Order: S0-01-085

Method: Metals by SW6010 (1)

List: Priority pollutants list

Sample ID:	9001091521	9001091421	9001101430	9001101647
Factor:	1.00	1.00	1.00	1.00
Results in:	mg/L	mg/L	mg/L	mg/L
	01A	02A	03A	04A
Matrix:	water	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Antimony	0.045 *	0.034	0.067 *	0.034	0.059 *	0.034	0.045 *	0.034
Beryllium	0.003 *	0.0010	0.016	0.0010	0.007	0.0010	ND	0.0010
Cadmium	ND	0.0040	0.005 *	0.0040	ND	0.0040	ND	0.0040
Chromium	0.024 *	0.0070	0.20	0.0070	0.042	0.0070	0.009 *	0.0070
Copper	0.075	0.0060	0.19	0.0060	0.12	0.0060	0.036	0.0060
Nickel	0.16	0.015	0.24	0.015	0.26	0.015	0.13	0.015
Silver	ND	0.0070	ND	0.0070	ND	0.0070	ND	0.0070
Zinc	0.12	0.0020	0.75	0.0020	0.24	0.0020	0.20	0.0020

* Est. result less than 5 times detection limit

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geo Science

Radian Work Order: S0-01-085

Method: Metals by SW6010 (1)

List: Priority pollutants list

Sample ID: 9001110750

REAGENT BLANK

Factor: 1.00

1.00

Results in: mg/L

mg/L

05A

06A

Matrix: water

water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Antimony	0.066 *	0.034	ND	0.034				
Beryllium	0.012	0.0010	ND	0.0010				
Cadmium	0.009 *	0.0040	ND	0.0040				
Chromium	0.067	0.0070	ND	0.0070				
Copper	0.26	0.0060	ND	0.0060				
Nickel	0.36	0.015	ND	0.015				
Silver	0.035	0.0070	ND	0.0070				
Zinc	0.40	0.0020	ND	0.0020				

* Est. result less than 5 times detection limit

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Radian Work Order: S0-01-085

Method/Analyte	Sample Identifications					
	9001091521		9001091421		9001101430	
Matrix	01 Water		02 Water		03 Water	
	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Arsenic by SW7060						
Arsenic	ND	mg/L 0.0040	ND	mg/L 0.020	ND	mg/L 0.012
Mercury by SW7470						
Mercury	ND	mg/L 0.0002	ND	mg/L 0.0002	ND	mg/L 0.0002
Lead by SW7421						
Lead	0.028	mg/L 0.0030	0.058	mg/L 0.0030	0.039	mg/L 0.0030
Selenium by SW7740						
Selenium	ND	mg/L 0.0050	ND	mg/L 0.0050	ND	mg/L 0.0050
Thallium by SW7841						
Thallium	ND	mg/L 0.0050	ND	mg/L 0.0050	ND	mg/L 0.0050

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

Geo Science

Radian Work Order: S0-01-085

Sample Identifications and Dates

Sample ID	9001091521	9001091421	9001101430	9001101647	9001110750	REAGENT BLANK
Date Sampled	01/09/90	01/09/90	01/10/90	01/10/90	01/11/90	
Date Received	01/12/90	01/12/90	01/12/90	01/12/90	01/12/90	01/12/90
Matrix	water	water	water	water	water	water
	01	02	03	04	05	06

Metals by SW6010

Prepared	01/15/90	01/15/90	01/15/90	01/15/90	01/15/90	01/15/90
Analyzed	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90
Analyst	GE	GE	GE	GE	GE	GE
File ID	S00108501	S00108502	S00108503	S00108504	S00108505	S00108506
Blank ID	S00100015	S00100015	S00100015	S00100015	S00100015	S00100015
Instrument	JA	JA	JA	JA	JA	JA
Report as	received	received	received	received	received	received

Arsenic by SW7060

Prepared	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90
Analyzed	01/18/90	01/18/90	01/18/90	01/17/90	01/18/90	01/18/90
Analyst	LS	LS	LS	LS	LS	LS
File ID	S001085-01A	S001085-02A	S001085-03A	S001085-04A	S001085-05A	S001085-06AB
Blank ID	S001085-06AB	S001085-06AB	S001085-06AB	S001085-06AB	S001085-06AB	
Instrument	Z3030	Z3030	Z3030	Z3030	Z3030	Z3030
Report as	received	received	received	received	received	received

rcury by SW7470

Prepared	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90
Analyzed	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90
Analyst	MD	MD	MD	MD	MD	MD
File ID	S001085-01A	S001085-02A	S001085-03A	S001085-04A	S001085-05A	S001085-06AB
Blank ID	S001085-06AB	S001085-06AB	S001085-06AB	S001085-06AB	S001085-06AB	
Instrument	PE503	PE503	PE503	PE503	PE503	PE503
Report as	received	received	received	received	received	received

Lead by SW7421

Prepared	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90
Analyzed	01/17/90	01/17/90	01/17/90	01/17/90	01/17/90	01/17/90
Analyst	LS	LS	LS	LS	LS	LS
File ID	S001085-01A	S001085-02A	S001085-03A	S001085-04A	S001085-05A	S001085-06AB
Blank ID	S001085-06AB	S001085-06AB	S001085-06AB	S001085-06AB	S001085-06AB	
Instrument	Z3030	Z3030	Z3030	Z3030	Z3030	Z3030
Report as	received	received	received	received	received	received

lenium by SW7740

Prepared	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90	01/16/90
Analyzed	01/19/90	01/19/90	01/19/90	01/19/90	01/19/90	01/19/90
Analyst	LS	LS	LS	LS	LS	LS
File ID	S001085-01A	S001085-02A	S001085-03A	S001085-04A	S001085-05A	S001085-06AB
Blank ID	S001085-06AB	S001085-06AB	S001085-06AB	S001085-06AB	S001085-06AB	
Instrument	Z3030	Z3030	Z3030	Z3030	Z3030	Z3030
Report as	received	received	received	received	received	received

Appendix A

Comments, Notes and Definitions

Geo Science
Radian Work Order: S0-01-085

General Comments

Geo Science
Radian Work Order: S0-01-085

- A This flag indicates that a spike is an analytical and/or post-digestion spike. These spikes have not been subjected to the extraction or digestion step.
- B This flag indicates that the analyte was detected in the reagent blank but the sample results are not corrected for the amount in the blank.
- C Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation. The C flag indicates that the analyte has been confirmed by analysis on a second column.
- D This flag identifies all analytes identified in analysis at a secondary dilution factor. In an analysis some compounds can exceed the calibration range of the instrument. Therefore two analyses are performed, one at the concentration of the majority of the analytes, and a second with the sample diluted so that high concentration analyte(s) fall within the calibration range.
- E The reported value is estimated because of the presence of interference. The potential source of the interference is included in the report narrative.
- G This flag identifies a GC/MS result whose concentration exceeds the calibration range for that specific analysis. Usually if one or more compounds have a response greater than full scale, the sample or extract is diluted and re-analyzed.
- I This is a general purpose flag for those situations not covered by the standard flags. The specific definition of this flag is described in the Comments Summary or supplemental case narrative with the report.
- J Indicates an estimated value for GC/MS data. This flag is used either when estimating a concentration for tentatively identified compounds where a response factor of 1 is assumed, or when the mass spectral data indicate the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit.
- NA This analyte was not analyzed.
- NC Applies to RPD and spike recovery results. The relative percent difference (RPD) and spike recovery are not calculated when a result value is less than five times the detection limit or obvious matrix interferences are present. See * definition for further explanation of the unreliability of data near the detection limit. A spike recovery is not calculated when the sample result is greater than four times the spike added concentration because the spike added concentration is considered insignificant.

Geo Science

Radian Work Order: SO-01-085

- ND This flag (or <) is used to denote analytes which are not detected at or above the specified detection limit. The value to the right of the < symbol is the method specified detection limit for the sample.
- NR This analyte was not requested by the client.
- NS This analyte or surrogate was not added (spiked) to the sample for this analysis.
- N/A A result or value is not available for this parameter, usually a detection limit.
- P Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation. The P flag indicates that the analyte has been confirmed previously. This flag is applicable to analyses of samples arising from a regular sampling program as a specific sample source; for example, a quarterly well monitoring program.
- Q This quality control standard is outside method or laboratory specified control limits. This flag is applied to matrix spike, analytical QC spike, and surrogate recoveries; and to RPD(relative percent difference) values for duplicate analyses and matrix spike/matrix spike duplicate result.
- R This flag indicates that the analyte was detected in the reagent blank and the sample results are corrected for the amount in the blank.
- S This flag indicates that a specific result from a metals analysis has been obtained using the Method of Standard Addition.
- U Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation. The U flag indicates that second column was not requested.
- X Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation. The X flag indicates a second column confirmation was performed but the analyte was not confirmed and is likely a false positive.
- * The asterisk(*) is used to flag results which are less than five times the method specified detection limit. Studies have shown that the uncertainty of the analysis will increase exponentially as the method detection limit is approached. These results should be considered approximate.

Geo Science

Radian Work Order: S0-01-085

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/Kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/Kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

☒ Albuquerque
500 Copper N.W.
Suite 200
Albuquerque, NM 87102
(505) 842-0001

☐ Silver Spring
1103 Spring St.
Suite 706
Silver Spring, MD 20910
(301) 587-2088

☐ Newport Beach
1400 Quail Street
Suite 140
Newport Beach, CA 92660
(714) 724-0536

☐ Las Cruces
P.O. Drawer MM
Las Cruces, NM 88004
(505) 524-5364

N^o 3333

Chain of Custody

DATE 6-22-90 PAGE 1 OF 1

LAB NAME Radian Analytical
ADDRESS 10395 Old Placerville Rd
Sacramento, CA 95827
TELEPHONE (916) 362-5332

SAMPLERS SIGNATURE

Kyle Summers

SAMPLE NUMBER	MATRIX	LOCATION
9006211545	H ₂ O	SHS-7
9006211730	H ₂ O	SHS-8
9006211130	H ₂ O	SHS-9

ANALYSIS REQUEST

BASE/NEU/ACID CMPDS	GC/MS/ 625/8270	VOLATILE CMPDS	GC/MS/ 624/8240	PESTICIDES/PCB	608/8080	POLYNUCLEAR	AROMATIC 610/8310	PHENOLS, SUB PHENOLS	604/8040	HALOGENATED	VOLATILES 601/8010	AROMATIC VOLATILES	602/8020	TOTAL ORGANIC	CARBON 415/9060	TOTAL ORGANIC	HALIDES 9020	PETROLEUM	HYDROCARBONS 418.1	TPH	MODIFIED 8015	PRIORITY POLLUTANT	CAM METALS (18)	TTL/C/STLC	EP TOX	METALS (8)	SDWA-INORGANICS	PRIMARY/SECONDARY	HAZARDOUS WASTE	PROFILE	NUMBER OF CONTAINERS
							X				X	X	X																		5
							X				X	X	X																		5
							X				X	X	X												X						6

SAMPLE RECEIPT

PROJECT INFORMATION
PROJECT: GIANT PWA
offsite
PROJECT DIRECTOR: M. NEE
CHARGE CODE NO. 459002
SHIPPING ID. NO. 7935932336
VIA: FEDEX

LAB NO.

5006154

SPECIAL INSTRUCTIONS/COMMENTS:

PWA Samples to Austin 6/25/90

RELINQUISHED BY	1.	2.	3.
(Signature)	(Signature)	(Signature)	(Signature)
(Printed Name)	(Printed Name)	(Printed Name)	(Printed Name)
(Company)	(Company)	(Company)	(Company)
RECEIVED BY	1.	2.	3.
(Signature)	(Signature)	(Signature)	(Signature)
(Printed Name)	(Printed Name)	(Printed Name)	(Printed Name)
(Company)	(Company)	(Company)	(Company)

DISTRIBUTION: WHITE, CANARY - LABORATORY - PINK - GEOSCIENCE CONSULTANT

Geoscience Consultants, Ltd.
 Radian Work Order: SO-06-154

Method: Metals by SW6010 (1)

List: Ep Toxicity list

Sample ID: 9006211130

REAGENT BLANK

Factor: 1.00

1.00

Results in: mg/L

mg/L

06A

07A

Matrix: Water

Water

Result Det. Limit

Result Det. Limit

Arsenic

ND 0.053

ND 0.053

Barium

0.080 0.0020

ND 0.0020

Cadmium

ND 0.0040

ND 0.0040

Chromium

0.016 a 0.0070

ND 0.0070

Lead

0.27 0.042

ND 0.042

Selenium

ND 0.075

ND 0.075

Silver

ND 0.0070

ND 0.0070

ND Not detected at specified detection limit

a Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-154

Method/Analyte		Sample Identifications	
9006211130			
Matrix			
06 Water			
Mercury by SW7470	Result	Det. Limit	
Mercury	ND	mg/L 0.0002	
ND Not detected at specified detection limit			
(1) For a detailed description of flags and technical terms in this report refer to the glossary.			

RECEIVED JUL 16 1990

Giant Refining Company

Giant Refining Company
606 E. Highway 64
Farmington, NM 87401

Tim Kinney

Customer Work Identification REFINERY REMEDIATION
Purchase Order Number RFE-9834

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
10395 Old Placerville Road
Sacramento, CA 95827

916-362-5332

Client Services Coordinator: WLBROWN

Certified by:

Debbie Casagrande

Giant Refining Company
 Radian Work Order: SO-06-186

Method/Analyte	Sample Identifications					
	9006271300/ SHS-10 (SPLT)			REAGENT BLANK		REAGENT BLANK
	01 water	Matrix		02 water	03 water	
	Result	Det. Limit		Result	Det. Limit	Result Det. Limit
Silver by SW6010						
Silver	ND	mg/L 0.0070		ND	mg/L 0.0070	
Aluminum by SW6010						
Aluminum	1.0	mg/L 0.045		ND	mg/L 0.045	
Arsenic by SW7060						
Arsenic	ND	mg/L 0.0040				ND mg/L 0.0040
Barium by SW6010						
Barium	0.051	mg/L 0.0020		ND	mg/L 0.0020	
Boron by SW6010						
Boron	0.50	mg/L 0.0060		0.007 a	mg/L 0.0060	
Cobalt by SW6010						
Cobalt	ND	mg/L 0.0070		ND	mg/L 0.0070	
Chromium by SW6010						
Chromium	ND	mg/L 0.0070		ND	mg/L 0.0070	
Copper by SW6010						
Copper	ND	mg/L 0.0060		ND	mg/L 0.0060	
Iron by SW6010						
Iron	3.2	mg/L 0.0070		ND	mg/L 0.0070	
Manganese by SW6010						
Manganese	10	mg/L 0.0020		ND	mg/L 0.0020	
Molybdenum by SW6010						
Molybdenum	ND	mg/L 0.0080		ND	mg/L 0.0080	
Nickel by SW6010						
Nickel	ND	mg/L 0.015		ND	mg/L 0.015	
Lead by SW7421						
Lead	ND	mg/L 0.0030				ND mg/L 0.0030
Selenium by SW7740						
Selenium	ND	mg/L 0.0050				ND mg/L 0.0050
Zinc by SW6010						
Zinc	0.015	mg/L 0.0020		ND	mg/L 0.0020	

ND Not detected at specified detection limit

a Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

Giant Refining Company
 Radian Work Order: S0-06-186

Sample Identifications and Dates

Sample ID	9006271300/ SHS-10	REAGENT BLANK	REAGENT BLANK
Date Sampled	06/27/90		
Date Received	06/28/90	06/28/90	06/28/90
Matrix	water	water	water
	01	02	03

Silver by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Aluminum by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Arsenic by SW7060

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	LS	LS
File ID	S00618601B	S00700006
Blank ID	S00700006	
Instrument	Z3030	Z3030
Report as	received	received

Barium by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Boron by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Giant Refining Company
 Radian Work Order: S0-06-186

Sample Identifications and Dates

Sample ID	9006271300/ SHS-10	REAGENT BLANK	REAGENT BLANK
Date Sampled	06/27/90		
Date Received	06/28/90	06/28/90	06/28/90
Matrix	water	water	
	01	02	03

Cobalt by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Chromium by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Copper by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Iron by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Manganese by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Giant Refining Company
 Radian Work Order: S0-06-186

Sample Identifications and Dates

Sample ID	9006271300/ SHS-10	REAGENT BLANK	REAGENT BLANK
Date Sampled	06/27/90		
Date Received	06/28/90	06/28/90	06/28/90
Matrix	water	water	water
	01	02	03

Molybdenum by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Nickel by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Lead by SW7421

Prepared	07/06/90	07/06/90
Analyzed	07/10/90	07/10/90
Analyst	LS	LS
File ID	S00618601B	S00700006
Blank ID	S00700006	
Instrument	Z3030	Z3030
Report as	received	received

Selenium by SW7740

Prepared	07/06/90	07/06/90
Analyzed	07/10/90	07/10/90
Analyst	PR	PR
File ID	S00618601B	S00700006
Blank ID	S00700006	
Instrument	Z3030	Z3030
Report as	received	received

Zinc by SW6010

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00618601A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Appendix A

Comments, Notes and Definitions

Giant Refining Company
Radian Work Order: SO-06-186

@ ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

Giant Refining Company
Radian Work Order: 50-06-186

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

Analytical Report
08/17/90

RECEIVED AUG 29 1990

Geoscience Consultants, Ltd.

Geoscience Consultants, Ltd.
500 Copper N.W. Ste 200
Albuquerque, NM., 87102
(505) 842-0595
Sample Manager

Customer Work Identification M & A Offsite, COC# 3492
Purchase Order Number 456-002

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
10395 Old Placerville Road
Sacramento, CA 95827

916-362-5332

Client Services Coordinator: LWKELLY

Certified by: *Rand M. Kelly*

Previously Reported on 07/16/90.

Geoscience Consultants, Ltd.
 Radian Work Order: SO-06-165

 Method: Metals by EPA 200.7 (1)
 List: EP Toxicity analyte list

Sample ID:	9006231245	9006231430	REAGENT BLANK
Factor:	1.00	1.00	1.00
Results in:	mg/L	mg/L	mg/L
	06A	07A	08A
Matrix:	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Arsenic	ND	0.053	ND	0.053	ND	0.053
Barium	0.083	0.0020	0.36	0.0020	ND	0.0020
Cadmium	ND	0.0040	ND	0.0040	ND	0.0040
Chromium	ND	0.0070	0.025 a	0.0070	ND	0.0070
Lead	0.046 a	0.042	ND	0.042	ND	0.042
Selenium	ND	0.075	ND	0.075	ND	0.075
Silver	ND	0.0070	ND	0.0070	ND	0.0070

ND Not detected at specified detection limit

a Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
Radian Work Order: SO-06-165

Method/Analyte

Sample Identifications

9006231245

Matrix

06
water

Mercury by SW7470
Mercury

Result

Det. Limit

ND

mg/L

0.0002

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-165

Method/Analyte		Sample Identifications	
	12 9006231430	REAGENT BLANK	
Matrix	07 water	08 water	
Mercury by SW7470	Result	Det. Limit	Result
Mercury	ND	mg/L 0.0002	ND
			mg/L 0.0002
ND Not detected at specified detection limit			
(1) For a detailed description of flags and technical terms in this report refer to the glossary.			

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-165

Sample Identifications and Dates

Sample ID	9006231400	9006231245	9006231430	REAGENT BLANK	REAGENT BLANK	9006231245
Date Sampled	06/23/90	06/23/90	06/23/90			06/23/90
Date Received	06/26/90	06/26/90	06/26/90	06/26/90	06/26/90	06/26/90
Matrix	water	water	water	water	water	water
	01	02	03	04	05	06

Metals by EPA 200.7

Prepared						07/06/90
Analyzed						07/09/90
Analyst						GE
File ID						S00616506A
Blank ID						S00700006
Instrument						JA
Report as						received

Volocarbons by EPA 601

Prepared					
Analyzed	07/06/90	07/06/90	07/06/90	07/06/90	
Analyst	MG	MG	MG	MG	
File ID	DB070615	DB070616	DB070617	QB07061	
Blank ID	QB07061	QB07061	QB07061		
Instrument	B	B	B	B	
Report as	received	received	received	received	

Aromatics by EPA 602

Prepared					
Analyzed	07/06/90	07/06/90	07/06/90		07/06/90
Analyst	MG	MG	MG		MG
File ID	EB070618	EB070619	EB070620		RB07061
Blank ID	RB07061	RB07061	RB07061		
Instrument	B	B	B		B
Report as	received	received	received		received

Mercury by SW7470

Prepared						06/27/90
Analyzed						06/27/90
Analyst						MD
File ID						S00616506A
Blank ID						S00600027
Instrument						PE503
Report as						received

Geoscience Consultants, Ltd.
 Radian Work Order: S0-06-165

Sample Identifications and Dates

Sample ID	9006231430	REAGENT BLANK
Date Sampled	06/23/90	
Date Received	06/26/90	06/26/90
Matrix	water	water
	07	08

Metals by EPA 200.7

Prepared	07/06/90	07/06/90
Analyzed	07/09/90	07/09/90
Analyst	GE	GE
File ID	S00616507A	S00700006
Blank ID	S00700006	
Instrument	JA	JA
Report as	received	received

Mercury by SW7470

Prepared	06/27/90	06/27/90
Analyzed	06/27/90	06/27/90
Analyst	MD	MD
File ID	S00616507A	S00600027
Blank ID	S00600027	
Instrument	PE503	PE503
Report as	received	received

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order: SO-06-165

General Comments

HIGH SODIUM IN FRACTION 06A MAY CAUSE SOME MATRIX INTERFERENCE

I = Result corrected. Results with the I flag have been revised based on corrected response factors for selected analytes for GC instrument B.

THE X FLAG MEANS NOT CONFIRMED BY ANALYSIS ON A SECOND COLUMN.

TOLUENE AND XYLENE WERE REPORTED AS ESTIMATED VALUES IN 602 SAMPLE 9006231400 DUE TO SAMPLE MATRIX INTERFERENCES. THE VALUES OBTAINED ON THE CONFIRMATION COLUMN WERE:

TOLUENE 9.1 PPB
XYLENE 61 PPB

THERE WAS A LARGE AMOUNT OF SAMPLE MATRIX INTERFERENCES IN THESE SAMPLES DURING THE 602 ANALYSES. THE SAMPLES FORMED TWO LAYERS.

Geoscience Consultants, Ltd.
Radian Work Order: S0-06-165

a ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

C ORGANIC CLP

pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS.

OTHER ORGANIC METHODS

This analysis has been confirmed on a second column or by GC/MS.

EXPLANATION

Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.

G ALL ORGANIC GC METHODS EXCEPT CLP

Indicates an estimated GC value due to interferences.

I ALL METHODS EXCEPT CLP

This result has been modified since the last issue of this report.

EXPLANATION

The explanations are included in the report narrative.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

X ALL METHODS EXCEPT INORGANIC CLP

This is a general purpose flag for those situations not covered by the standard flags. The specific definition of this flag is described in the Comments Summary and/or in the case narrative.

Geoscience Consultants, Ltd.
Radian Work Order: SO-06-165

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

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Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt



Geoscience Consultants, Ltd.
☒ Albuquerque
500 Copper N.W.
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Albuquerque, NM 87102
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☐ Silver Spring
1109 Spring St.
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Silver Spring, MD 20910
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☐ Newport Beach
1400 Quail Street
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Newport Beach, CA 92660
(714) 724-0536

☐ Las Cruces
P.O. Drawer MM
Las Cruces, NM 88004
(505) 524-5364

Chain of Custody

No 3501

DATE 8/23/90 PAGE 1 OF 1

LAB NAME		Radian Analytical	
ADDRESS		10395 Old Placerville Rd. Sacramento, CA 95827	
TELEPHONE		916/362-5332	
SAMPLERS (SIGNATURE)		<i>Pinathy H. Kersh</i>	
SAMPLE NUMBER	MATRIX	LOCATION	
9008221106	Water	SHS-16	
9008221400	Water	SHS-15	
9008221915	Water	SHS-14	
9008230630	Water	SHS-13	
ANALYSIS REQUEST			
GC/MS/ 625/8270	VOLATILE CMPS.	GC/MS/ 624/8240	PESTICIDES/PCB
GC/MS/ 604/8080	POLYNUCLEAR	AROMATIC 610/8310	PHENOLS, SUB PHENOLS
604/8040	HALOGENATED	VOLATILES 601/8010	AROMATIC VOLATILES
602/8020	TOTAL ORGANIC	CARBON 415/9060	HALIDES 9020
PETROLEUM	HYDROCARBONS 418.1	TPH	MODIFIED 8015
PRIORITY POLLUTANT	METALS (13)	CAM METALS (18)	TTLIC/STLC
EP TOX	METALS (8)	SDWA-INORGANICS	PRIMARY/SECONDARY
HAZARDOUS WASTE	PROFILE		
NUMBER OF CONTAINERS			
6			
6			
6			
6			
SENT TO AUSTIN 8/24/90 CAP			
RECEIVED BY			
1. RELINQUISHED BY			
2. RELINQUISHED BY			
3. RELINQUISHED BY			
PROJECT INFORMATION			
PROJECT <i>M & A</i>			
PROJECT DIRECTORY <i>M. Nee-</i>			
CHARGE CODE NO. <i>456-002</i>			
SHIPPING ID NO. <i>7935933891</i>			
VIA <i>Fed-X</i>			
SPECIAL INSTRUCTIONS/COMMENTS:			
RECEIVED SEP 1 8 1990			
DISTRIBUTION: WHITE, CANARY - LABORATORY - PINK - GEOSCIENCE CONSULTANTS, LTD.			

RECEIVED OCT 10 1990

Analytical Report
10/09/90

Geoscience Consultants, Ltd.

Geoscience Consultants, Ltd.
500 Copper N.W. Ste 200
Albuquerque, NM., 87102
(505) 842-0595
Sample Manager

Customer Work Identification M&A Offsite, COC #3501
Purchase Order Number 456002

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
10395 Old Placerville Road
Sacramento, CA 95827

916-362-5332

Client Services Coordinator: RRMAY

Certified by:

Marilyn Melton

Geoscience Consultants, Ltd.
 Radian Work Order: S0-08-224

Method: Metals by SW6010 (1)

List: Ep Toxicity list

	16	15	14	13
Sample ID:	9008221106 SH-	9008221400 SH-	9008221915 SH-	9008231030 SH-
S-16		S-15	S-14	S-13
Factor:	1.00	1.00	1.00	1.00
Results in:	mg/L	mg/L	mg/L	mg/L
	01A	02A	03A	04A
Matrix:	Water	Water	Water	Water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Arsenic	ND	0.053	ND	0.053	ND	0.053	ND	0.053
Barium	0.13	0.0020	0.88	0.0020	1.1	0.0020	0.30	0.0020
Cadmium	ND	0.0040	0.004 @	0.0040	0.005 @	0.0040	0.004 @	0.0040
Chromium	0.009 @	0.0070	0.024 @	0.0070	0.029 @	0.0070	0.008 @	0.0070
Lead	ND	0.042	0.063 @	0.042	0.071 @	0.042	ND	0.042
Selenium	ND	0.075	ND	0.075	ND	0.075	ND	0.075
Silver	ND	0.0070	ND	0.0070	ND	0.0070	ND	0.0070

ND Not detected at specified detection limit

@ Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-08-224

Method: Metals by SW6010 (1)

List: Ep Toxicity list

Sample ID:

REAGENT BLANK

Factor:

1

Results in:

mg/L

05A

Matrix:

water

Arsenic

Result	Det. Limit
ND	0.053

Barium

Result	Det. Limit
ND	0.0020

Cadmium

Result	Det. Limit
ND	0.0040

Chromium

Result	Det. Limit
ND	0.0070

Lead

Result	Det. Limit
ND	0.042

Selenium

Result	Det. Limit
ND	0.075

Silver

Result	Det. Limit
ND	0.0070

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
Radian Work Order: SO-08-224

Method/Analyte		Sample Identifications					
		110		15		14	
	9008221106 SH-	9008221400 SH-		9008221915 SH-			
	S-16	S-15		S-14			
	01	02		03			
Matrix	water	water		water			

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Mercury by SW7470						
Mercury	ND	mg/L 0.0002	ND	mg/L 0.0002	ND	mg/L 0.0002

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-08-224

Method/Analyte		Sample Identifications	
	13 9008231030 SH- S-13	REAGENT BLANK	
Matrix	04 water	05 water	

	Result	Det. Limit	Result	Det. Limit
Mercury by SW7470	ND	mg/L 0.0002	ND	mg/L 0.0002

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

Geoscience Consultants, Ltd.
 Radian Work Order: S0-08-224

Sample Identifications and Dates

Sample ID	9008221106 SH- S-16	9008221400 SH- S-15	9008221915 SH- S-14	9008231030 SH- S-13	REAGENT BLANK
Date Sampled	08/22/90	08/22/90	08/22/90	08/23/90	
Date Received	08/24/90	08/24/90	08/24/90	08/24/90	08/24/90
Matrix	water	water	water	water	water
	01	02	03	04	05

Metals by SW6010

	9008221106 SH- S-16	9008221400 SH- S-15	9008221915 SH- S-14	9008231030 SH- S-13	REAGENT BLANK
Prepared	09/10/90	09/10/90	09/10/90	09/10/90	09/10/90
Analyzed	09/12/90	09/12/90	09/12/90	09/12/90	09/11/90
Analyst	GE	GE	GE	GE	GE
File ID	S00822401A	S00822402A	S00822403A	S00822404A	S00900010
Blank ID	S00900010	S00900010	S00900010	S00900010	
Instrument	JA	JA	JA	JA	JA
Report as	received	received	received	received	received

Mercury by SW7470

	9008221106 SH- S-16	9008221400 SH- S-15	9008221915 SH- S-14	9008231030 SH- S-13	REAGENT BLANK
Prepared	08/29/90	08/29/90	08/29/90	08/29/90	08/29/90
Analyzed	08/29/90	08/29/90	08/29/90	08/29/90	08/29/90
Analyst	MD	MD	MD	MD	MD
File ID	S00822401A	S00822402A	S00822403A	S00822404A	S00800029
Blank ID	S00800029	S00800029	S00800029	S00800029	
Instrument	PE503	PE503	PE503	PE503	PE503
Report as	received	received	received	received	received

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order: S0-08-224

Q ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

Geoscience Consultants, Ltd.
Radian Work Order: S0-08-224

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

GENERAL CHEMISTRY



Inter Mountain
Laboratories, Inc.

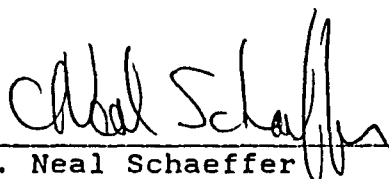
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9006191745 SHS-1
SITE: SHS-1
LAB NO: F4493

DATE REPORTED: 06/27/90
DATE RECEIVED: 06/20/90
DATE COLLECTED: 06/19/90

Lab pH (s.u.).....	7.93
Lab conductivity, umhos/cm.....	5034
Lab resistivity, ohm-m.....	1.9865
Total dissolved solids (180), mg/l..	3344
Total dissolved solids (calc), mg/l.	3227
Total alkalinity as CaCO ₃ , mg/l.....	687.60
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	1174.68
Sodium absorption ratio.....	8.99

	mg/l	meq/l
Bicarbonate as HCO ₃	838.9	13.75
Carbonate as CO ₃	0.0	0.00
Chloride.....	685.3	19.33
Sulfate.....	983.5	20.49
Calcium.....	373.5	18.64
Magnesium.....	59.1	4.86
Potassium.....	4.7	0.12
Sodium.....	708.5	30.82
Major cations.....		54.43
Major anions.....		53.57
Cation/anion difference.....		0.79 %


C. Neal Schaeffer
Lab Director



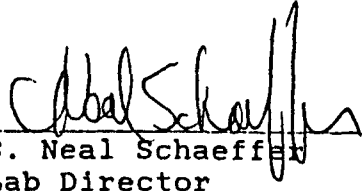
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9006201100 SHS-2
SITE: SHS-2
LAB NO: F4494

DATE REPORTED: 06/27/90
DATE RECEIVED: 06/20/90
DATE COLLECTED: 06/20/90

Lab pH (s.u.).....	7.92
Lab conductivity, umhos/cm.....	4440
Lab resistivity, ohm-m.....	2.2523
Total dissolved solids (180), mg/l..	3394
Total dissolved solids (calc), mg/l.	3009
Total alkalinity as CaCO ₃ , mg/l.....	773.55
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	1194.76
Sodium absorption ratio.....	7.44

	mg/l	meq/l
Bicarbonate as HCO ₃	943.7	15.47
Carbonate as CO ₃	0.0	0.00
Chloride.....	380.7	10.74
Sulfate.....	1150.6	23.97
Calcium.....	317.3	15.83
Magnesium.....	98.1	8.06
Potassium.....	6.8	0.17
Sodium.....	591.0	25.71
Major cations.....		49.78
Major anions.....		50.18
Cation/anion difference.....		0.41 %


C. Neal Schaeffer
Lab Director



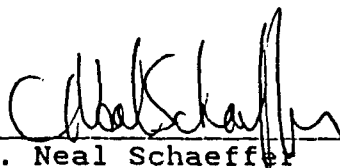
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9006200945
SITE: SHS-3
LAB NO: F4495

DATE REPORTED: 06/27/90
DATE RECEIVED: 06/20/90
DATE COLLECTED: 06/20/90

Lab pH (s.u.).....	7.76
Lab conductivity, umhos/cm.....	4710
Lab resistivity, ohm-m.....	2.1231
Total dissolved solids (180), mg/l..	3952
Total dissolved solids (calc), mg/l.	3798
Total alkalinity as CaCO ₃ , mg/l.....	238.75
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	1827.28
Sodium absorption ratio.....	4.80

	mg/l	meq/l
Bicarbonate as HCO ₃	291.3	4.77
Carbonate as CO ₃	0.0	0.00
Chloride.....	279.2	7.88
Sulfate.....	2221.3	46.28
Calcium.....	578.3	28.86
Magnesium.....	93.5	7.69
Potassium.....	10.7	0.27
Sodium.....	471.6	20.51
Major cations.....		57.33
Major anions.....		58.93
Cation/anion difference.....		1.37 %


C. Neal Schaeffer
Lab Director



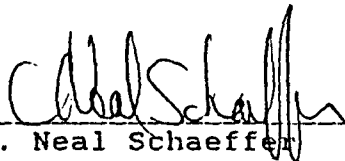
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9006191515
SITE: SHS-4
LAB NO: F4496

DATE REPORTED: 06/27/90
DATE RECEIVED: 06/20/90
DATE COLLECTED: 06/19/90

Lab pH (s.u.)..... 8.11
Lab conductivity, umhos/cm..... 3284
Lab resistivity, ohm-m..... 3.0451
Total dissolved solids (180), mg/l.. 2806
Total dissolved solids (calc), mg/l. 2626
Total alkalinity as CaCO₃, mg/l..... 162.35
Total acidity as CaCO₃, mg/l..... 0.00
Total hardness as CaCO₃, mg/l..... 1365.44
Sodium absorption ratio..... 3.36

	mg/l	meq/l
Bicarbonate as HCO ₃	198.1	3.25
Carbonate as CO ₃	0.0	0.00
Chloride.....	25.4	0.72
Sulfate.....	1764.5	36.76
Calcium.....	297.2	14.83
Magnesium.....	151.7	12.48
Potassium.....	4.5	0.12
Sodium.....	285.2	12.41
Major cations.....		39.83
Major anions.....		40.72
Cation/anion difference.....		1.11 %


C. Neal Schaeffer
Lab Director

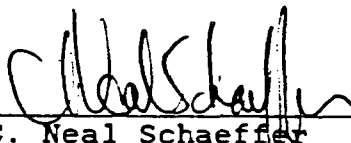


2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9006191515
SITE: SHS-4 L/S
LAB NO: F4499

DATE REPORTED: 06/27/90
DATE RECEIVED: 06/20/90
DATE COLLECTED: 06/19/90

Lab pH (s.u.).....		8.12
Lab conductivity, umhos/cm.....		3273
Lab resistivity, ohm-m.....		3.0553
Total dissolved solids (180), mg/l..		2806
Total dissolved solids (calc), mg/l.		2660
Total alkalinity as CaCO ₃ , mg/l.....		171.90
Total acidity as CaCO ₃ , mg/l.....		0.00
Total hardness as CaCO ₃ , mg/l.....		1395.56
Sodium absorption ratio.....		3.32
	mg/l	meq/l
Bicarbonate as HCO ₃	209.7	3.44
Carbonate as CO ₃	0.0	0.00
Chloride.....	46.2	1.30
Sulfate.....	1762.0	36.71
Calcium.....	305.2	15.23
Magnesium.....	154.2	12.68
Potassium.....	4.6	0.12
Sodium.....	285.0	12.40
Major cations.....		40.43
Major anions.....		41.45
Cation/anion difference.....		1.25 %


C. Neal Schaeffer
Lab Director



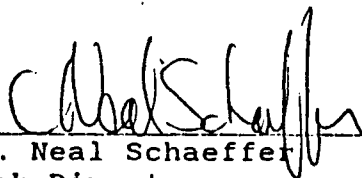
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9006201410
SITE: SHS-5
LAB NO: F4497

DATE REPORTED: 06/27/90
DATE RECEIVED: 06/20/90
DATE COLLECTED: 06/20/90

Lab pH (s.u.)..... 8.09
Lab conductivity, umhos/cm..... 3911
Lab resistivity, ohm-m..... 2.5569
Total dissolved solids (180), mg/l.. 2804
Total dissolved solids (calc), mg/l. 2656
Total alkalinity as CaCO₃, mg/l..... 315.15
Total acidity as CaCO₃, mg/l..... 0.00
Total hardness as CaCO₃, mg/l..... 1044.16
Sodium absorption ratio..... 6.70

	mg/l	meq/l
Bicarbonate as HCO ₃	384.5	6.30
Carbonate as CO ₃	0.0	0.00
Chloride.....	356.8	10.06
Sulfate.....	1272.4	26.51
Calcium.....	208.8	10.42
Magnesium.....	127.2	10.46
Potassium.....	3.9	0.10
Sodium.....	497.6	21.64
Major cations.....		42.63
Major anions.....		42.87
Cation/anion difference.....		0.29 %


C. Neal Schaeffer
Lab Director



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Laboratories, Inc.

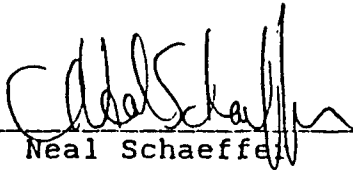
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9006201350
SITE: SHS-6
LAB NO: F4498

DATE REPORTED: 06/27/90
DATE RECEIVED: 06/20/90
DATE COLLECTED: 06/20/90

Lab pH (s.u.).....	7.84
Lab conductivity, umhos/cm.....	3306
Lab resistivity, ohm-m.....	3.0248
Total dissolved solids (180), mg/l..	2572
Total dissolved solids (calc), mg/l.	2480
Total alkalinity as CaCO ₃ , mg/l.....	276.95
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	1124.48
Sodium absorption ratio.....	4.42

	mg/l	meq/l
Bicarbonate as HCO ₃	337.9	5.54
Carbonate as CO ₃	0.0	0.00
Chloride.....	126.9	3.58
Sulfate.....	1408.2	29.34
Calcium.....	397.6	19.84
Magnesium.....	32.2	2.65
Potassium.....	8.0	0.20
Sodium.....	340.8	14.82
Major cations.....		37.52
Major anions.....		38.46
Cation/anion difference.....		1.23 %


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Lab Director

Chain of Custody

DATE 6-22-93 PAGE 1 OF 1

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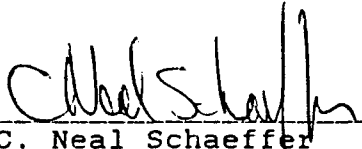
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9006211545
SITE: SHS-7
LAB NO: F4511

DATE REPORTED: 06/28/90
DATE RECEIVED: 06/22/90
DATE COLLECTED: 06/21/90

Lab pH (s.u.).....	7.84
Lab conductivity, umhos/cm.....	4120
Lab resistivity, ohm-m.....	2.4272
Total dissolved solids (180), mg/l..	2280
Total dissolved solids (calc), mg/l.	2216
Total alkalinity as CaCO ₃ , mg/l.....	1069.60
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	632.52
Sodium absorption ratio.....	11.12

	mg/l	meq/l
Bicarbonate as HCO ₃	1304.9	21.39
Carbonate as CO ₃	0.0	0.00
Chloride.....	570.8	16.10
Sulfate.....	133.3	2.78
Calcium.....	180.7	9.02
Magnesium.....	44.2	3.63
Potassium.....	2.2	0.06
Sodium.....	642.8	27.96
Major cations.....		40.67
Major anions.....		40.27
Cation/anion difference.....		0.49 %


C. Neal Schaeffer
Lab Director



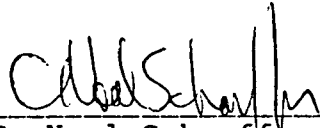
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9006211730
SITE: SHS-8
LAB NO: F4512

DATE REPORTED: 06/28/90
DATE RECEIVED: 06/22/90
DATE COLLECTED: 06/21/90

Lab pH (s.u.).....	7.68
Lab conductivity, umhos/cm.....	4590
Lab resistivity, ohm-m.....	2.1786
Total dissolved solids (180), mg/l..	2734
Total dissolved solids (calc), mg/l.	2720
Total alkalinity as CaCO ₃ , mg/l.....	735.35
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	883.52
Sodium absorption ratio.....	9.70

	mg/l	meq/l
Bicarbonate as HCO ₃	897.1	14.71
Carbonate as CO ₃	0.0	0.00
Chloride.....	614.9	17.35
Sulfate.....	653.5	13.61
Calcium.....	329.3	16.43
Magnesium.....	15.1	1.24
Potassium.....	3.6	0.09
Sodium.....	662.8	28.83
Major cations.....		46.59
Major anions.....		45.67
Cation/anion difference.....		1.00 %


C. Neal Schaeffer
Lab Director



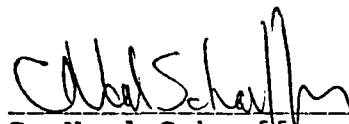
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9006211130
SITE: GBR-9
LAB NO: F4513

DATE REPORTED: 06/28/90
DATE RECEIVED: 06/22/90
DATE COLLECTED: 06/21/90

Lab pH (s.u.).....	7.83
Lab conductivity, umhos/cm.....	4266
Lab resistivity, ohm-m.....	2.3441
Total dissolved solids (180), mg/l..	2742
Total dissolved solids (calc), mg/l.	2746
Total alkalinity as CaCO ₃ , mg/l.....	764.00
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	993.96
Sodium absorption ratio.....	7.86

	mg/l	meq/l
Bicarbonate as HCO ₃	932.1	15.28
Carbonate as CO ₃	0.0	0.00
Chloride.....	430.2	12.14
Sulfate.....	899.5	18.74
Calcium.....	357.4	17.84
Magnesium.....	24.9	2.04
Potassium.....	5.8	0.15
Sodium.....	570.0	24.79
Major cations.....		44.82
Major anions.....		46.16
Cation/anion difference.....		1.47 %

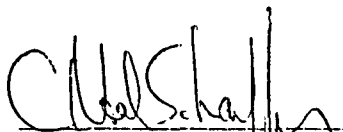

C. Neal Schaeffer
Lab Director

CLIENT: GBR
ID: 9006271300
SITE: SHS-10
LAB NO: F4524

DATE REPORTED: 07/03/90
DATE RECEIVED: 06/27/90
DATE COLLECTED: 06/27/90

✓ Lab pH (s.u.)..... 6.83
✓ Lab conductivity, umhos/cm..... 2923
✓ Lab resistivity, ohm-m..... 3.4211
✓ Total dissolved solids (180), mg/l.. 2078★
✓ Total dissolved solids (calc), mg/l. 2033
✓ Total alkalinity as CaCO₃, mg/l..... 187.18
✓ Total acidity as CaCO₃, mg/l..... 0.00
✓ Total hardness as CaCO₃, mg/l..... 911.63
✓ Sodium absorption ratio..... 4.13

	mg/l	meq/l
✓ Bicarbonate as HCO ₃	228.4	3.74
✓ Carbonate as CO ₃	0.0	0.00
✓ Chloride.....	83.9	2.37
✓ Sulfate.....	1197.5	24.95★
✓ Calcium.....	297.2	14.83
✓ Magnesium.....	41.4	3.40
✓ Potassium.....	14.4	0.37
✓ Sodium.....	286.8	12.47
✓ Major cations.....		31.07
✓ Major anions.....		31.06
✓ Cation/anion difference.....		0.03 %


C. Neal Schaeffer
Lab Director

Geoscience Consultants, Ltd.
 XX Albuquerque 500 Copper N.W. Suite 200 Albuquerque, NM 87102 (505) 842-0001
☐ Silver Spring 1108 Spring St. Suite 706 Silver Spring, MD 20910 (301) 587-2088

☐ Newport Beach 1400 Quail Street Suite 140 Newport Beach, CA 92660 (714) 724-0536
☐ Las Cruces P.O. Drawer MM Las Cruces, NM 88004 (505) 524-5364

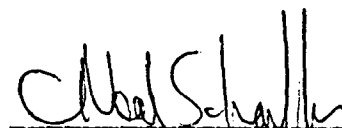
LAB NAME <u>InterMountain Laboratories</u> ADDRESS <u>2506 West Main Street</u> <u>Farmington, NM 87401</u> TELEPHONE <u>505-326-4737</u>		ANALYSIS REQUEST BASE/NEU/ACID CMPDS. GC/MS/ 625/8270 VOLATILE CMPDS. GC/MS/ 624/8240 PESTICIDES/PCB 608/8080 POLYNUCLEAR AROMATIC 610/8310 PHENOLS, SUB PHENOLS 604/8040 HALOGENATED VOLATILES 601/8010 AROMATIC VOLATILES 602/8020 TOTAL ORGANIC CARBON 415/9060 TOTAL ORGANIC HALIDES 9020 PETROLEUM HYDROCARBONS 418.1 TPH MODIFIED 8015 PRIORITY POLLUTANT METALS (13) CAM METALS (18) TLLC/STLC EP TOX METALS (8) SDWA-INORGANICS PRIMARY/SECONDARY HAZARDOUS WASTE PROFILE 6+1999 6+1999		NUMBER OF CONTAINERS 1 1
SAMPLE NUMBER 9006231245 9006231430		MATRIX H ₂ O H ₂ O	LOCATION SHS-11 SHS-12	
SAMPLERS (SIGNATURE) <i>Kyle Summers</i>				
PROJECT INFORMATION PROJECT: <u>GRANT MEA OFFSITE DRILLING</u> PROJECT DIRECTOR <u>MNEE</u> CHARGE CODE NO. <u>456-002</u> SHIPPING ID. NO. <u>7935932340</u> VIA: <u>FEDEX</u>		SAMPLE RECEIPT TOTAL NO. OF CONTAINERS CHAIN OF CUSTODY SEALS REC'D GOOD CONDITION/COLD CONFORMS TO RECORD LAB NO.		
SPECIAL INSTRUCTIONS/COMMENTS:		RELINQUISHED BY 1. <u>Kyle Summers</u> 16:30 (Signature) (Date) 2. <u>FEDEX</u> 0945 (Signature) (Date) 3. (Signature) (Date)		
RECEIVED BY 1. <u>Kyle Summers</u> 6/23/90 (Signature) (Date) 2. <u>FEDEX</u> 0945 (Signature) (Date) 3. (Signature) (Date)		RECEIVED BY (LABORATORY) 1. <u>Kyle Summers</u> 0945 (Signature) (Date) 2. <u>FEDEX</u> 0945 (Signature) (Date) 3. (Signature) (Date)		

CLIENT: GCL
ID: 9006231245
SITE: SHS-11
LAB NO: F4515

DATE REPORTED: 07/03/90
DATE RECEIVED: 06/26/90
DATE COLLECTED: 06/23/90

11 Lab pH (s.u.)..... 7.23
6 Lab conductivity, umhos/cm..... 5106
13 Lab resistivity, ohm-m..... 1.9585
19 Total dissolved solids (180), mg/l.. 3298*
20 Total dissolved solids (calc), mg/l. 3300
18 Total alkalinity as CaCO₃, mg/l..... 802.20
17 Total acidity as CaCO₃, mg/l..... 0.00
21 Total hardness as CaCO₃, mg/l..... 1275.08
15 Sodium absorption ratio..... 7.90

	mg/l	meq/l
1 Bicarbonate as HCO ₃	978.7	16.04
3 Carbonate as CO ₃	0.0	0.00
5 Chloride.....	624.3	17.61*
16 Sulfate.....	1065.8	22.20*
2 Calcium.....	421.7	21.04
7 Magnesium.....	54.2	4.46
12 Potassium.....	4.1	0.11
14 Sodium.....	648.4	28.20
9 Major cations.....		53.81
8 Major anions.....		55.86
4 Cation/anion difference.....		1.87 %


C. Neal Schaeffer
Lab Director



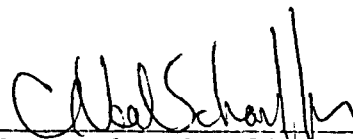
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9006231430
SITE: SHS-12
LAB NO: F4516

DATE REPORTED: 07/03/90
DATE RECEIVED: 06/26/90
DATE COLLECTED: 06/23/90

11 Lab pH (s.u.).....	7.73	
6 Lab conductivity, umhos/cm.....	3325	
13 Lab resistivity, ohm-m.....	3.0075	
14 Total dissolved solids (180), mg/l..	2296*	
20 Total dissolved solids (calc), mg/l.	2172	
18 Total alkalinity as CaCO ₃ , mg/l.....	276.95	
17 Total acidity as CaCO ₃ , mg/l.....	0.00	
21 Total hardness as CaCO ₃ , mg/l.....	923.68	
15 Sodium absorption ratio.....	5.62	
	mg/l	meq/l
1 Bicarbonate as HCO ₃	337.9	5.54
2 Carbonate as CO ₃	0.0	0.00
5 Chloride.....	288.6	8.14*
16 Sulfate.....	997.5	20.78*
3 Calcium.....	249.0	12.42
7 Magnesium.....	73.6	6.05
12 Potassium.....	4.6	0.12
14 Sodium.....	392.4	17.07
9 Major cations.....		35.66
8 Major anions.....		34.46
4 Cation/anion difference.....		1.71 %

10 - NA


C. Neal Schaeffer
Lab Director

☒ Albuquerque
500 Copper N.W.
Suite 200
Albuquerque, NM 87102
(505) 842-0001

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☐ Newport Beach
1400 Quail Street
Suite 140
Newport Beach, CA 92660
(714) 724-0536

☐ Las Cruces
P.O. Drawer MM
Las Cruces, NM 88004
(505) 524-5364

No 3269

Chain of Custody

DATE 8/23/90 PAGE 1 OF 1

LAB NAME IML
ADDRESS 2506 West Main Street
Farmingington, New Mexico
TELEPHONE 505-326-4737

SAMPLERS (SIGNATURE)

Penelope H. Kersh

SAMPLE NUMBER	MATRIX	LOCATION
9008221104	water	SHS-16
9008221400	water	SHS-15
9008221915	water	SHS-14
9008230030	water	SHS-13

ANALYSIS REQUEST

GC/MS/ 625/8270	GC/MS/ 624/8240	PESTICIDES/PCB	608/8080	POLYNUCLEAR	AROMATIC 610/8310	PHENOLS, SUB PHENOLS	HALOGENATED	VOLATILES 601/8010	AROMATIC VOLATILES	602/8020	TOTAL ORGANIC	CARBON 415/9060	TOTAL ORGANIC	HALIDES 9020	PETROLEUM	HYDROCARBONS 418.1	TPH	MODIFIED 8015	PRIORITY POLLUTANT	METALS (13)	CAM METALS (18)	TTLG/STLC	EP TOX	METALS (8)	SDWA-INORGANICS	PRIMARY/SECONDARY	HAZARDOUS WASTE	PROFILE	GENERIC	NUMBER OF CONTAINERS

PROJECT INFORMATION

PROJECT: M & A Meridian

PROJECT DIRECTOR: M. N. J. Kersh

CHARGE CODE NO. 456-002

SHIPPING ID. NO. Hand Delivered

VIA: Hand Delivered

SPECIAL INSTRUCTIONS/COMMENTS:

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS

CHAIN OF CUSTODY SEALS

REC'D GOOD CONDITION/COLD

CONFORMS TO RECORD

LAB NO.

RELINQUISHED BY

Tim Kersh

(Signature)

Tim Kersh 8/23/90

(Printed Name)

(Date)

(Company)

RELINQUISHED BY

(Signature)

(Time)

(Date)

(Printed Name)

(Company)

RELINQUISHED BY

(Signature)

(Time)

(Date)

(Printed Name)

(Company)

RECEIVED BY

(Signature)

(Time)

(Date)

(Printed Name)

(Company)

RECEIVED BY

(Signature)

(Time)

(Date)

(Printed Name)

(Company)

RECEIVED BY (LABORATORY)

(Signature)

(Time)

(Date)

(Printed Name)

(Company)

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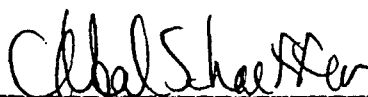
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9008231030
SITE: SHS-13
LAB NO: F4810

DATE REPORTED: 09/05/90
DATE RECEIVED: 08/23/90
DATE COLLECTED: 08/23/90

Lab pH (s.u.).....	7.82
Lab conductivity, umhos/cm.....	3090
Lab resistivity, ohm-m.....	3.2362
Total dissolved solids (180), mg/l..	1790
Total dissolved solids (calc), mg/l.	1773
Total alkalinity as CaCO ₃ , mg/l.....	439.30
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	582.32
Sodium absorption ratio.....	7.99

	mg/l	meq/l
Bicarbonate as HCO ₃	535.9	8.79
Carbonate as CO ₃	0.0	0.00
Chloride.....	402.9	11.37
Sulfate.....	455.1	9.48
Calcium.....	159.0	7.94
Magnesium.....	45.1	3.71
Potassium.....	4.3	0.11
Sodium.....	443.2	19.28
Major cations.....		31.03
Major anions.....		29.63
Cation/anion difference.....		2.31 %


C. Neal Schaeffer
Lab Director



Inter-Mountain
Laboratories, Inc.

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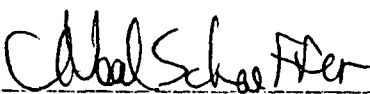
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9008221915
SITE: SHS-13 L/S
LAB NO: F4814

DATE REPORTED: 09/05/90
DATE RECEIVED: 08/23/90
DATE COLLECTED: 08/22/90

Lab pH (s.u.).....	7.94
Lab conductivity, umhos/cm.....	2556
Lab resistivity, ohm-m.....	3.9124
Total dissolved solids (180), mg/l..	2082
Total dissolved solids (calc), mg/l.	2046
Total alkalinity as CaCO ₃ , mg/l.....	305.60
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	1255.00
Sodium absorption ratio.....	2.01

	mg/l	meq/l
Bicarbonate as HCO ₃	372.8	6.11
Carbonate as CO ₃	0.0	0.00
Chloride.....	46.2	1.30
Sulfate.....	1181.8	24.62
Calcium.....	413.6	20.64
Magnesium.....	54.2	4.46
Potassium.....	3.7	0.10
Sodium.....	163.5	7.11
Major cations.....		32.31
Major anions.....		32.04
Cation/anion difference.....		0.42 %


C. Neal Schaeffer
Lab Director

RECEIVED SEP 10 1990



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9008221915
SITE: SHS-14
LAB NO: F4811

DATE REPORTED: 09/05/90
DATE RECEIVED: 08/23/90
DATE COLLECTED: 08/22/90

Lab pH (s.u.).....	7.45
Lab conductivity, umhos/cm.....	2556
Lab resistivity, ohm-m.....	3.9124
Total dissolved solids (180), mg/l..	2078
Total dissolved solids (calc), mg/l.	2013
Total alkalinity as CaCO ₃ , mg/l.....	271.22
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	1144.56
Sodium absorption ratio.....	2.13

	mg/l	meq/l
Bicarbonate as HCO ₃	330.9	5.42
Carbonate as CO ₃	0.0	0.00
Chloride.....	46.2	1.30
Sulfate.....	1179.4	24.57
Calcium.....	449.8	22.44
Magnesium.....	5.4	0.45
Potassium.....	3.7	0.10
Sodium.....	166.0	7.22
Major cations.....		30.21
Major anions.....		31.30
Cation/anion difference.....		1.77 %

A handwritten signature in dark ink, appearing to read 'C. Neal Schaeffer', is written over a horizontal line.

C. Neal Schaeffer
Lab Director

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iml
Inter-Mountain
Laboratories, Inc.

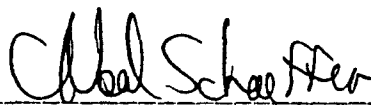
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9008221400
SITE: SHS-15
LAB NO: F4812

DATE REPORTED: 09/05/90
DATE RECEIVED: 08/23/90
DATE COLLECTED: 08/22/90

Lab pH (s.u.).....	7.91
Lab conductivity, umhos/cm.....	2778
Lab resistivity, ohm-m.....	3.5997
Total dissolved solids (180), mg/l..	2432
Total dissolved solids (calc), mg/l.	2309
Total alkalinity as CaCO ₃ , mg/l.....	202.46
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	1425.68
Sodium absorption ratio.....	2.04

	mg/l	meq/l
Bicarbonate as HCO ₃	247.0	4.05
Carbonate as CO ₃	0.0	0.00
Chloride.....	33.6	0.95
Sulfate.....	1469.9	30.62
Calcium.....	397.6	19.84
Magnesium.....	105.5	8.67
Potassium.....	3.1	0.08
Sodium.....	177.5	7.72
Major cations.....		36.31
Major anions.....		35.62
Cation/anion difference.....		0.97 %



C. Neal Schaeffer
Lab Director

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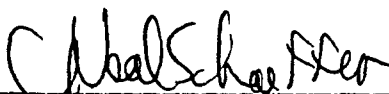
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9008221106
SITE: SHS-16
LAB NO: F4813

DATE REPORTED: 09/05/90
DATE RECEIVED: 08/23/90
DATE COLLECTED: 08/22/90

Lab pH (s.u.).....	7.91
Lab conductivity, umhos/cm.....	3090
Lab resistivity, ohm-m.....	3.2362
Total dissolved solids (180), mg/l..	2714
Total dissolved solids (calc), mg/l.	2511
Total alkalinity as CaCO ₃ , mg/l.....	229.20
Total acidity as CaCO ₃ , mg/l.....	0.00
Total hardness as CaCO ₃ , mg/l.....	1425.68
Sodium absorption ratio.....	2.72

	mg/l	meq/l
Bicarbonate as HCO ₃	279.6	4.58
Carbonate as CO ₃	0.0	0.00
Chloride.....	42.0	1.18
Sulfate.....	1626.2	33.88
Calcium.....	301.2	15.03
Magnesium.....	164.0	13.48
Potassium.....	3.6	0.09
Sodium.....	236.0	10.27
Major cations.....		38.87
Major anions.....		39.65
Cation/anion difference.....		0.99 %


C. Neal Schaeffer
Lab Director

POLYNUCLEAR AROMATICS

Analytical Report
08/01/90

RECEIVED AUG 2 1990

Geoscience Consultants, Ltd.

Geoscience Consultants, Ltd.
500 Copper NW
Suite 200
Albuquerque, NM 87102
Sample Manager

Customer Work Identification M & A Offsite, COC 3700
Purchase Order Number

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
8501 Mo-Pac Boulevard
P. O. Box 201088
Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: LWKELLY

Certified by:

Clifford Mayen

Geoscience Consultants, Ltd.
 Radian Work Order: 90-06-256

Method: SW8310 PAHs by HPLC (1)

List: 8310 Method analytes

Sample ID:	9006191515	9006191745	9006201410	9006201350
	SHS 4	SHS 1	SHS 5	SHS 6
Factor:	1	5	1	1
Results in:	ug/L	ug/L	ug/L	ug/L
	01A	02A	03A	04A
Matrix:	water	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Acenaphthene	ND	1.8	ND	9.0	ND	1.8	ND	1.8
Acenaphthylene	ND	2.3	ND	12	ND	2.3	ND	2.3
Anthracene	ND	0.66	ND	3.3	ND	0.66	ND	0.66
Benzo(a)anthracene	ND	0.013	0.60	0.065	ND	0.013	ND	0.013
Benzo(a)pyrene	ND	0.023	0.14 @	0.12	ND	0.023	ND	0.023
Benzo(b)fluoranthene	ND	0.018	0.44 @	0.090	ND	0.018	ND	0.018
Benzo(g,h,i)perylene	ND	0.076	0.52 @	0.38	ND	0.076	ND	0.076
Benzo(k)fluoranthene	ND	0.017	ND	0.085	ND	0.017	ND	0.017
Chrysene	ND	0.15	3.9	0.75	ND	0.15	ND	0.15
Dibenzo(a,h)anthracene	ND	0.030	ND	0.15	ND	0.030	ND	0.030
Fluoranthene	ND	0.21	ND	1.0	ND	0.21	ND	0.21
Fluorene	ND	0.21	5.2	1.0	ND	0.21	ND	0.21
Indeno(1,2,3-cd)pyrene	ND	0.043	ND	0.22	ND	0.043	ND	0.043
Naphthalene	ND	1.8	ND	9.0	ND	1.8	ND	1.8
Phenanthrene	ND	0.64	11 @	3.2	ND	0.64	ND	0.64
Pyrene	ND	0.27	ND	1.4	ND	0.27	ND	0.27
Surrogate Recovery(%)								
Terphenyl-d14	99		82		96		74	
Control Limits: 24 to 146								

ND Not detected at specified detection limit

@ Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-06-256

Method: SW8310 PAHs by HPLC (1)

List: 8310 Method analytes

Sample ID:	9006201100	9006200945	REAGENT BLANK
	SHS 2	SHS 3	
Factor:	50	1	1
Results in:	ug/L	ug/L	ug/L
	05A	06A	07A
Matrix:	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Acenaphthene	ND	D	180	ND	1.8	ND	1.8	
Acenaphthylene	ND	D	230	ND	2.3	ND	2.3	
Anthracene	ND		33	ND	0.66	ND	0.66	
Benzo(a)anthracene	1.4 @		0.65	ND	0.013	ND	0.013	
Benzo(a)pyrene	ND		1.2	ND	0.023	ND	0.023	
Benzo(b)fluoranthene	ND		0.90	ND	0.018	ND	0.018	
Benzo(g,h,i)perylene	ND		3.8	ND	0.076	ND	0.076	
Benzo(k)fluoranthene	ND		0.85	ND	0.017	ND	0.017	
Chrysene	9.3 @		7.5	ND	0.15	ND	0.15	
Dibenzo(a,h)anthracene	ND		1.5	ND	0.030	ND	0.030	
Fluoranthene	ND		10	ND	0.21	ND	0.21	
Fluorene	64 D@		21	ND	0.21	ND	0.21	
Indeno(1,2,3-cd)pyrene	ND	D	4.3	ND	0.043	ND	0.043	
Naphthalene	230 D@		180	ND	1.8	ND	1.8	
Phenanthrene	150 @		32	ND	0.64	ND	0.64	
Pyrene	ND		14	ND	0.27	ND	0.27	
Surrogate Recovery(%)								
Terphenyl-d14	196 Q			78			97	
Control Limits: 24 to 146								

ND Not detected at specified detection limit

D Sample dilution necessary for this analyte

@ Est. result less than 5 times detection limit

Q Outside control limits

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-06-256

 Method: SW8310 PAHs by HPLC (1)
 List: Matrix Spike Analyte List

Sample ID:	RECOVERY CHECK	RECOVERY CHECK
		K DUP
Factor:	1	1
Results in:	% recvry	% recvry
	08A	09A
Matrix:	water	water

	Result	Det. Limit	Result	Det. Limit
Acenaphthene	14		64	
Acenaphthylene	18		82	
Anthracene	47		87	
Benzo(k)fluoranthene	58		126	
Dibenzo(a,h)anthracene	63		100	
Fluorene	39		98	
Naphthalene	15		89	
Phenanthrene	64		95	
<u>Surrogate Recovery(%)</u>				
Terphenyl-d14	72		94	
Control Limits: 24 to 146				

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-06-256

Sample Identifications and Dates

Sample ID	9006191515	9006191745	9006201410	9006201350	9006201100	9006200945
	SHS 4	SHS 1	SHS 5	SHS 6	SHS 2	SHS 3
Date Sampled	06/19/90	06/19/90	06/20/90	06/20/90	06/20/90	06/20/90
Date Received	06/22/90	06/22/90	06/22/90	06/22/90	06/22/90	06/22/90
Matrix	water	water	water	water	water	water
	01	02	03	04	05	06
SW8310 PAHs by HPLC						
Prepared	06/24/90	06/24/90	06/24/90	06/24/90	06/24/90	06/24/90
Analyzed	07/22/90	07/24/90	07/22/90	07/22/90	07/22/90	07/22/90
Analyst	TLS	TLS	TLS	TLS	TLS	TLS
File ID	89	110	91	92 & 111	93 & 112	95
Blank ID	84	84	84	84	84	84
Instrument	HPLC 2	HPLC 2	HPLC 2	HPLC 2	HPLC 2	HPLC 2
Report as	received	received	received	received	received	received

Geoscience Consultants, Ltd.
 Radian Work Order: 90-06-256

Sample Identifications and Dates

Sample ID	REAGENT BLANK	RECOVERY CHECK	RECOVERY CHECK K DUP
Date Sampled			
Date Received	06/22/90	06/22/90	06/22/90
Matrix	water	water	water
	07	08	09

SW8310 PAHs by HPLC

Prepared	06/24/90				
Analyzed	07/22/90				
Analyst	TLS				
File ID	84				
Blank ID	84				
Instrument	HPLC 2				
Report as	received				

SW8310 PAHs by HPLC

Prepared	06/24/90	06/24/90		
Analyzed	07/30/90	07/22/90		
Analyst	TLS	TLS		
File ID	8	88		
Blank ID	84	84		
Instrument	HPLC 2	HPLC 2		
Report as	received	received		

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order: 90-06-256

Q ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

D ORGANICS METHODS

This flag identifies all analytes analyzed at a secondary dilution factor.

EXPLANATION

In an analysis some compounds can exceed the calibration range of the instrument. Therefore, two analyses are performed, one at the concentration of the majority of the analytes and a second with the sample diluted so that high concentration analyte(s) fall within the calibration range.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

Q ALL METHODS EXCEPT CLP

This quality control standard is outside method or laboratory specified control limits.

EXPLANATION

This flag is applied to matrix spike, analytical QC spike, and surrogate recoveries; and to RPD(relative percent difference) values for duplicate analyses and matrix spike/matrix spike duplicate result.

Geoscience Consultants, Ltd.
Radian Work Order: 90-06-256

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt



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(301) 587-2088

☐ Newport Beach
1400 Quail Street
Suite 140
Newport Beach, CA 92660
(714) 724-0536

☐ Las Cruces
P.O. Drawer MM
Las Cruces, NM 88004
(505) 524-5364

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DATE 6-22-90 PAGE 1 OF 1

LAB NAME Radian Analytical
ADDRESS 10395 Old Placer Ville Rd
Sacramento, CA 95827
TELEPHONE (916) 362-5332

SAMPLERS (SIGNATURE)

Kyle Summers

SAMPLE NUMBER	MATRIX	LOCATION
9006211545	H ₂ O	SHS-7
9006211730	H ₂ O	SHS-8
9006211130	H ₂ O	GRR-9

ANALYSIS REQUEST

BASE/NEU/ACID CMPDS.	GC/MS/ 625/8270	VOLATILE CMPDS.	GC/MS/ 624/8240	PESTICIDES/PCB	608/8080	POLYNUCLEAR	AROMATIC 610/8310	PHENOLS, SUB PHENOLS	604/8040	HALOGENATED	VOLATILES 601/8010	AROMATIC VOLATILES	602/8020	TOTAL ORGANIC	CARBON 415/9060	TOTAL ORGANIC	HALIDES 9020	PETROLEUM	HYDROCARBONS 418.1	TPH	MODIFIED 8015	PRIORITY POLLUTANT	CAM METALS (18)	TLC/STLC	EP TOX	METALS (8)	SOWA-INORGANICS	PRIMARY/SECONDARY	HAZARDOUS WASTE	PROFILE	NUMBER OF CONTAINERS
							X			X	X	X	X																		5
							X			X	X	X	X																		5
							X			X	X	X	X												X						6

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY		RELINQUISHED BY		RELINQUISHED BY	
PROJECT: <u>GIANT MHA</u>	<u>offsite</u>	TOTAL NO. OF CONTAINERS		(Signature)	(Time)	(Signature)	(Time)	(Signature)	(Time)
PROJECT DIRECTOR <u>M. NEE</u>		CHAIN OF CUSTODY SEALS		(Printed Name)	(Date)	(Printed Name)	(Date)	(Printed Name)	(Date)
CHARGE CODE NO. <u>459002</u>		REC'D GOOD CONDITION/COLD		(Signature)	(Time)	(Signature)	(Time)	(Signature)	(Time)
SHIPPING ID NO. <u>2935932336</u>		CONFORMS TO RECORD		(Printed Name)	(Date)	(Printed Name)	(Date)	(Printed Name)	(Date)
VIA: <u>FEAT</u>		LAB NO. <u>5006154</u>		(Company)		(Company)		(Company)	
SPECIAL INSTRUCTIONS/COMMENTS: <u>PH Samples to Austin 6/25/90</u>				RECEIVED BY		RECEIVED BY		RECEIVED BY (LABORATORY)	
				1.		1.		1.	
				(Signature)		(Signature)		(Signature)	
				(Time)		(Time)		(Time)	
				(Printed Name)		(Printed Name)		(Printed Name)	
				(Date)		(Date)		(Date)	
				(Company)		(Company)		(Company)	

Analytical Report
08/01/90

RECEIVED AUG 2 1990

Geoscience Consultants, Ltd.

Geoscience Consultants, Ltd.
500 Copper NW
Suite 200
Albuquerque, NM 87102
Sample Manager

Customer Work Identification M & A Offsite, COC #3333
Purchase Order Number 456-002

Contents:

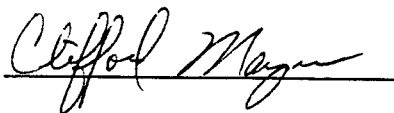
- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
8501 Mo-Pac Boulevard
P. O. Box 201088
Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: LWKELLY

Certified by:



Geoscience Consultants, Ltd.
Radian Work Order: 90-06-292

SHS
7

SHS
8

Method: SW8310 PAHs by HPLC (1)

List: 8310 Method analytes

Sample ID:	9006211545	9006211730	REAGENT BLANK
Factor:	5	100	1
Results in:	ug/L	ug/L	ug/L
	01A	02A	04A
Matrix:	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Acenaphthene	19 @	9.0	ND	180	ND	1.8
Acenaphthylene	ND	12	ND	230	ND	2.3
Anthracene	ND	3.3	ND	66	ND	0.66
Benzo(a)anthracene	ND	0.065	8.4	1.3	ND	0.013
Benzo(a)pyrene	ND	0.12	2.8 @	2.3	ND	0.023
Benzo(b)fluoranthene	ND	0.090	7.4 @	1.8	ND	0.018
Benzo(g,h,i)perylene	ND	0.38	10.9 @	7.6	ND	0.076
Benzo(k)fluoranthene	ND	0.085	ND	1.7	ND	0.017
Chrysene	ND	0.75	65 @	15	ND	0.15
Dibenzo(a,h)anthracene	ND	0.15	9.4 @	3.0	ND	0.030
Fluoranthene	ND	1.0	107 @	42	ND	0.21
Fluorene	3.6 @	1.0	91 @	21	ND	0.21
Indeno(1,2,3-cd)pyrene	ND	0.22	ND	4.3	ND	0.043
Naphthalene	20 @	9.0	320 @	180	ND	1.8
Phenanthrene	ND	3.2	510	64	ND	0.64
Pyrene	ND	1.4	31 @	27	ND	0.27
Surrogate Recovery(%)						
Terphenyl-d14	104		NC		108	
Control Limits: 24 to 146						

@ Est. result less than 5 times detection limit
NC Not calculated

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-06-292

Method: SW8310 PAHs by HPLC (1)

List: Matrix Spike Analyte List

Sample ID:	RECOVERY CHECK	RECOVERY CHECK K DUP
Factor:	1	1
Results in:	% recvry	% recvry
	05A	06A
Matrix:	water	water

	Result	Det. Limit	Result	Det. Limit
Acenaphthene	56		61	
Acenaphthylene	72		76	
Anthracene	84		85	
Benzo(k)fluoranthene	126		123	
Dibenzo(a,h)anthracene	101		99	
Fluorene	92		89	
Naphthalene	95		92	
Phenanthrene	89		86	
 Surrogate Recovery(%)				
Terphenyl-d14	102		97	
Control Limits: 24 to 146				

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-06-292

Sample Identifications and Dates

Sample ID	9006211545	9006211730	REAGENT BLANK	RECOVERY CHECK	RECOVERY CHECK- K DUP
Date Sampled	06/21/90	06/21/90			
Date Received	06/26/90	06/26/90	06/26/90	06/26/90	06/26/90
Matrix	water	water	water	water	water
	01	02	04	05	06

SW8310 PAHs by HPLC

Prepared	06/27/90	06/27/90	06/27/90
Analyzed	07/30/90	07/24/90	07/23/90
Analyst	TLS	TLS	TLS
File ID	9	115	97
Blank ID	97	97	97
Instrument	HPLC 2	HPLC 2	HPLC 2
Report as	received	received	received

SW8310 PAHs by HPLC

Prepared	06/27/90	06/27/90
Analyzed	07/23/90	07/23/90
Analyst	TLS	TLS
File ID	98	99
Blank ID	97	97
Instrument	HPLC 2	HPLC 2
Report as	received	received

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order: 90-06-292

Q ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

NC ALL METHODS EXCEPT CLP

The relative percent difference (RPD) and spike recovery are not calculated when a result value is less than five times the detection limit or obvious matrix interferences are present or a surrogate concentration is not calculated due to dilution.

EXPLANATION

See Q definition for data near the detection limit. A spike recovery is not calculated when the sample result is greater than four times the spike added concentration because the spike added concentration is insignificant. Surrogate recoveries are not calculated due to dilution to allow analyte quantitation.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

Geoscience Consultants, Ltd.
Radian Work Order: 90-06-292

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

RECEIVED AUG 21 1990

Analytical Report
08/17/90

Geoscience Consultants, Ltd.

Geoscience Consultants, Ltd.
500 Copper NW
Suite 200
Albuquerque, NM 87102
Sample Manager

Customer Work Identification M & A Offsite
Purchase Order Number

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
8501 Mo-Pac Boulevard
P. O. Box 201088
Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: LWKELLY

Certified by:

Clifford Meyer

Geoscience Consultants, Ltd.
 Radian Work Order: 90-07-078

Method: SW8310 PAHs by HPLC (1)

List: 8310 Method analytes

Sample ID:	9007061040 SH-	9007061205 SH-	REAGENT BLANK
	S-9	S-11	
Factor:	24	38	1
Results in:	ug/L	ug/L	ug/L
	01A	02A	03A
Matrix:	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Acenaphthene	ND D	170	ND D	340	ND	1.8
Acenaphthylene	ND D	220	ND D	440	ND	2.3
Anthracene	ND	16	ND	25	ND	0.66
Benzo(a)anthracene	ND	0.31	ND	0.49	ND	0.013
Benzo(a)pyrene	ND	0.55	ND	0.87	ND	0.023
Benzo(b)fluoranthene	ND	0.43	ND	0.68	ND	0.018
Benzo(g,h,i)perylene	ND	1.8	ND	2.9	ND	0.076
Benzo(k)fluoranthene	ND	0.41	ND	0.65	ND	0.017
Chrysene	ND	3.6	ND	5.7	ND	0.15
Dibenzo(a,h)anthracene	ND	0.72	ND	1.1	ND	0.030
Fluoranthene	23 @	5.0	22 @	8.0	ND	0.21
Fluorene	74 D@	20	85 D@	40	ND	0.21
Indeno(1,2,3-cd)pyrene	ND D	4.0	ND D	8.2	ND	0.043
Naphthalene	210 D@	170	540 D@	340	ND	1.8
Phenanthrene	190	15	230	24	ND	0.64
Pyrene	68	6.5	67	10	ND	0.27
Surrogate Recovery(%)						
Terphenyl-d14	173 Q		110		102	
Control Limits: 24 to 146						

ND Not detected at specified detection limit

D Sample dilution necessary for this analyte

@ Est. result less than 5 times detection limit

Q Outside control limits

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-07-078

Sample Identifications and Dates

Sample ID	9007061040 SH-	9007061205 SH-	REAGENT BLANK
	S-9	S-11	
Date Sampled	07/06/90	07/06/90	
Date Received	07/10/90	07/10/90	07/10/90
Matrix	water	water	water
	01	02	03

SW8310 PAHs by HPLC

Prepared	07/10/90	07/10/90	07/10/90
Analyzed	08/13/90	08/13/90	07/29/90
Analyst	TLS	TLS	TLS
File ID	12 & 38	10 & 32	112 & 113
Blank ID	112 & 113	112 & 113	112 & 113
Instrument	HPLC 3	HPLC 3	HPLC 3
Report as	received	received	received

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order: 90-07-078

Q ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

D ORGANICS METHODS

This flag identifies all analytes analyzed at a secondary dilution factor.

EXPLANATION

In an analysis some compounds can exceed the calibration range of the instrument. Therefore, two analyses are performed, one at the concentration of the majority of the analytes and a second with the sample diluted so that high concentration analyte(s) fall within the calibration range.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

Q ALL METHODS EXCEPT CLP

This quality control standard is outside method or laboratory specified control limits.

EXPLANATION

This flag is applied to matrix spike, analytical QC spike, and surrogate recoveries; and to RPD(relative percent difference) values for duplicate analyses and matrix spike/matrix spike duplicate result.

Geoscience Consultants, Ltd.
Radian Work Order: 90-07-078

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

Geoscience Consultants, Ltd.

Albuquerque
500 Copper N.W.
Suite 200
Albuquerque, NM
(505) 842-0001

**Silver Spring
1109 Spring St.
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(301) 587-2088**

Newport Beach
1400 Quail Street
Suite 140
Newport Beach, CA 92660
(714) 724-0536

Las Cruces
P.O. Drawer MM
Las Cruces, NM 88004
(505) 524-5364

Chain of Custody

DATE 6-23-90 PAGE 1 OF 1

LAB NAME Radian Analytical
ADDRESS 10395 Old Placerville Rd.
Sacramento, CA 95827
TELEPHONE 916/362-5332

SIGNATURES (SIGNATURE)

NO.	SAMPLE NUMBER	MATRIX	LOCATION
1	9006231400	H ₂ O	SHS-10
2	9006231245	H ₂ O	SHS-11
3	9006231430	H ₂ O	SHS-12
4			
5			
6			
7			
8			
9			
10			

ANALYSIS REQUEST		NUMBER OF CONTAINERS					
		7	9	9	9	9	7
BASE /NEU/ACID CMPDS.	GC/MS/ 625/8270						
VOLATILE CMPDS.	GC/MS/ 624/8240						
PESTICIDES/PCB	608/8080						
POLYNUCLEAR	AROMATIC 610/8310		X	X			
PHENOLS, SUB PHENOLS	604/8040						
HALOGENATED	VOLATILES 601/8010	X	X	X			
AROMATIC VOLATILES	602/8020	X	X	X			
TOTAL ORGANIC	CARBON 415/9060						
TOTAL ORGANIC	HALIDES 9020						
PETROLEUM	HYDROCARBONS 418.1						
	TPH						
	MODIFIED 8015						
PRIORITY POLLUTANT	METALS (13)						
	CAM METALS (18)						
	TTL/C/STLC						
	EP TOX		X	X			
	METALS (8)		X				
SDWA-INORGANICS	PRIMARY/SECONDARY						
HAZARDOUS WASTE	PROFILE						

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY	1.	RELINQUISHED BY	2.	RELINQUISHED BY	3.
PROJECT: GIANI AREA OFFICE BUILDING		TOTAL NO. OF CONTAINERS	16	(Signature)	16:20	(Signature)	(Time)	(Signature)	(Time)
PROJECT DIRECTOR M. NEE		CHAIN OF CUSTODY SEALS	78	KYLE SUMMERS		(Printed Name)	(Date)	(Printed Name)	(Date)
CHARGE CODE NO. 456-002		REC'D GOOD CONDITION/COLD	YOS	GCL		(Company)		(Company)	
SHIPPING ID NO. 2935932351		CONFORMS TO RECORD	YES			(Company)			
VIA: FedEx		LAB NO.	5006185	RECEIVED BY	1.	RECEIVED BY	2.	RECEIVED BY (LABORATORY)	3.
SPECIAL INSTRUCTIONS/COMMENTS: 3C		(Signature)	(Time)	(Signature)	(Time)	(Signature)	(Time)	(Signature)	(Time)
		(Printed Name)	(Date)	(Printed Name)	(Date)	(Printed Name)	(Date)	(Printed Name)	(Date)
		(Company)		(Company)		(Company)		(Company)	

Analytical Report
08/01/90

RECEIVED AUG 2 1990

Geoscience Consultants, Ltd.

Geoscience Consultants, Ltd.
500 Copper NW
Suite 200
Albuquerque, NM 87102
Sample Manager

Customer Work Identification Giant M & A, COC 3492
Purchase Order Number

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
8501 Mo-Pac Boulevard
P. O. Box 201088
Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: LWKELLY

Certified by:

Clifford Meyer

Geoscience Consultants, Ltd.
 Radian Work Order: 90-06-299

Method: SW8310 PAHs by HPLC (1)

List: 8310 Method analytes

Sample ID: 9006231430

SHS-12

Factor: 1

Results in: ug/L

02A

Matrix: water

	Result	Det. Limit		
Acenaphthene	ND	1.8		
Acenaphthylene	ND	2.3		
Anthracene	ND	0.66		
Benzo(a)anthracene	ND	0.013		
Benzo(a)pyrene	ND	0.023		
Benzo(b)fluoranthene	ND	0.018		
Benzo(g,h,i)perylene	ND	0.076		
Benzo(k)fluoranthene	ND	0.017		
Chrysene	ND	0.15		
Dibenzo(a,h)anthracene	ND	0.030		
Fluoranthene	ND	0.21		
Fluorene	ND	0.21		
Indeno(1,2,3-cd)pyrene	ND	0.043		
Naphthalene	ND	1.8		
Phenanthrene	ND	0.64		
Pyrene	ND	0.27		
<u>Surrogate Recovery(%)</u>				
Terphenyl-d14	54			
Control Limits: 24 to 146				

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
Radian Work Order: 90-06-299

Sample Identifications and Dates

Sample ID 9006231430

Date Sampled 06/23/90

Date Received 06/27/90

Matrix water

02

SW8310 PAHs by HPLC

Prepared 06/27/90

Analyzed 07/23/90

Analyst TLS

File ID 103

Blank ID 97

Instrument HPLC 2

Report as received

Analytical Report
09/26/90

Giant Refining Co.

Giant Refining Co.
606 E. Highway 64
Farmington, NH 87401

Tim Kinney

Customer Work Identification 8310
Purchase Order Number RFE-9834

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
8501 Mo-Pac Boulevard
P. O. Box 201088
Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: RRMAY

Certified by:

Clifford Mayen

Giant Refining Co.
 Radian Work Order: 90-06-333

Method: SW8310 PAHs by HPLC (1)

List: 8310 Method analytes

Sample ID:

9006271300

REAGENT BLANK

SHS-10

Factor:

0.94

1

Results in:

ug/L

ug/L

01A

02A

Matrix:

water

water

	Result	Det. Limit	Result	Det. Limit
Acenaphthene	ND D	0.17	ND	0.17
Acenaphthylene	ND D	0.22	ND	0.22
Anthracene	ND	0.62	ND	0.62
Benzo(a)anthracene	ND	0.012	ND	0.012
Benzo(a)pyrene	ND	0.022	ND	0.022
Benzo(b)fluoranthene	ND	0.017	ND	0.017
Benzo(g,h,i)perylene	ND	0.071	ND	0.071
Benzo(k)fluoranthene	ND	0.018	ND	0.017
Chrysene	ND	0.16	ND	0.16
Dibenzo(a,h)anthracene	ND	0.028	ND	0.028
Fluoranthene	ND	0.30	ND	0.30
Fluorene	2.2 D*	0.01	ND	0.01
Indeno(1,2,3-cd)pyrene	ND D	0.10	ND	0.043
Naphthalene	ND D	0.17	ND	0.17
Phenanthrene	0.84 *	0.50	ND	0.50
Pyrene	ND	0.29	ND	0.29

Surrogate Recovery(%)

Terphenyl-d14

70

89

Control Limits: 24 to 146

ND Not detected at specified detection limit

D Sample diluted for this analyte

* Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Giant Refining Co.
Radian Work Order: 90-06-333

Sample Identifications and Dates

Sample ID	9006271300	REAGENT BLANK
	SHS-10	
Date Sampled	06/27/90	
Date Received	06/29/90	06/29/90
Matrix	water	water
	01	02

SW8310 PAHs by HPLC

Prepared	06/29/90	08/29/90
Analyzed	07/31/90	07/24/90
Analyst	TLB	TLB
File ID	12 & 11	117
Blank ID	117	117
Instrument	HPLC 2	HPLC 2
Report as	received	received

Appendix A

Comments, Notes and Definitions

Giant Refining Co.
Radian Work Order: 90-06-333

- D This flag identifies all analytes identified in analysis at a secondary dilution factor. In an analysis some compounds can exceed the calibration range of the instrument. Therefore two analyses are performed, one at the concentration of the majority of the analytes, and a second with the sample diluted so that high concentration analyte(s) fall within the calibration range.
- ND This flag (or <) is used to denote analytes which are not detected at or above the specified detection limit. The value to the right of the < symbol is the method specified detection limit for the sample.
- * The asterisk(*) is used to flag results which are less than five times the method specified detection limit. Studies have shown that the uncertainty of the analysis will increase exponentially as the method detection limit is approached. These results should be considered approximate.

Giant Refining Co.
Radian Work Order: 90-06-333

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CROLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to factor, below)

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Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microsiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chlorophyllate salts

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order: 90-06-299

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

Geoscience Consultants, Ltd.
Radian Work Order: 90-06-299

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

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Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

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Chain of Custody

3501

DATE 8/7/90 PAGE 1 OF 1

LAB NAME Radian Analytical
 ADDRESS 10395 Old Placerville Rd.
Sacramento, CA 95827
 TELEPHONE 916/362-5332

SAMPLERS (SIGNATURE)
Timothy H. Kersh

SAMPLE NUMBER	MATRIX	LOCATION
9008221106	Water	SHS-16
9008221400	Water	SHS-15
9008221915	Water	SHS-14
9008221630	Water	SHS-14

ANALYSIS REQUEST

NUMBER OF CONTAINING	6	6	6	6																											
HAZARDOUS WASTE PROFILE																															
SDWA-INORGANICS PRIMARY/SECONDARY																															
EP TOX METALS (8)	X	X	X	X																											
CAM METALS (18) TTLC/STLC																															
PRIORITY POLLUTANT METALS (13)																															
TPH MODIFIED 8015																															
PETROLEUM HYDROCARBONS 418.1																															
TOTAL ORGANIC HALIDES 9020																															
TOTAL ORGANIC CARBON 415/9060																															
AROMATIC VOLATILES 602/8020	X	X	X	X																											
HALOGENATED VOLATILES 601/8010	X	X	X	X																											
PHENOLS, SUB PHENOLS 604/8040																															
POLYNUCLEAR AROMATIC 610/8310	X	X	X	X																											
PESTICIDES/PCB 608/8080																															
VOLATILE CMPDS. GC/MS/ 624/8240																															
GC/MS/ 625/8270																															
BASE/NEU/ACID CMPDS.																															

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY		RELINQUISHED BY		RECEIVED BY	
PROJECT: <u>139 & A</u>	TOTAL NO. OF CONTAINERS	RELINQUISHED BY (Signature)	RELINQUISHED BY (Time)	1. RELINQUISHED BY (Signature)	1. RELINQUISHED BY (Time)	2. RELINQUISHED BY (Signature)	2. RELINQUISHED BY (Time)	3. RELINQUISHED BY (Signature)	3. RELINQUISHED BY (Time)
PROJECT DIRECTOR: <u>M. Lee</u>	CHAIN OF CUSTODY SEALS	RELINQUISHED BY (Printed Name)	RELINQUISHED BY (Date)	1. RELINQUISHED BY (Signature)	1. RELINQUISHED BY (Time)	2. RELINQUISHED BY (Signature)	2. RELINQUISHED BY (Time)	3. RELINQUISHED BY (Signature)	3. RELINQUISHED BY (Time)
CHARGE CODE NO. <u>456-002</u>	REC'D GOOD CONDITION/COLD	RELINQUISHED BY (Company)	RELINQUISHED BY (Date)	1. RELINQUISHED BY (Signature)	1. RELINQUISHED BY (Time)	2. RELINQUISHED BY (Signature)	2. RELINQUISHED BY (Time)	3. RELINQUISHED BY (Signature)	3. RELINQUISHED BY (Time)
SHIPPING ID. NO. <u>7935933891</u>	CONFORMS TO RECORD	RELINQUISHED BY (Company)	RELINQUISHED BY (Date)	1. RELINQUISHED BY (Signature)	1. RELINQUISHED BY (Time)	2. RELINQUISHED BY (Signature)	2. RELINQUISHED BY (Time)	3. RELINQUISHED BY (Signature)	3. RELINQUISHED BY (Time)
VIA: <u>Fed-X</u>	LAB NO.	RELINQUISHED BY (Company)	RELINQUISHED BY (Date)	1. RELINQUISHED BY (Signature)	1. RELINQUISHED BY (Time)	2. RELINQUISHED BY (Signature)	2. RELINQUISHED BY (Time)	3. RELINQUISHED BY (Signature)	3. RELINQUISHED BY (Time)
SPECIAL INSTRUCTIONS/COMMENTS:									

DISTRIBUTION: WHITE, CANARY - LABORATORY • PINK - GEOSCIENCE CONSULTANTS, LTD.

RECEIVED OCT 08 1990

Radian Work Order 90-08-357

Analytical Report
09/28/90

Geoscience Consultants, Ltd.

Geoscience Consultants, Ltd.
500 Copper NW
Suite 200
Albuquerque, NM 87102
Sample Manager

Customer Work Identification M&A COC 3501
Purchase Order Number 456-002

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
8501 Mo-Pac Boulevard
P. O. Box 201088
Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: LWKELLY

Certified by:

Clifford Meyer

Geoscience Consultants, Ltd.
 Radian Work Order: 90-08-357

Method: SW8310 PAHs by HPLC (1)

List: 8310 Method analytes

Sample ID:	10 9008221106	15 9008221400	14 9008221915	13 9008231030
------------	------------------	------------------	------------------	------------------

Factor:	0.95	0.94	4.8	0.95
---------	------	------	-----	------

Results in:	ug/L	ug/L	ug/L	ug/L
-------------	------	------	------	------

	01A	02A	03A	04A
--	-----	-----	-----	-----

Matrix:	water	water	water	water
---------	-------	-------	-------	-------

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Acenaphthene	ND	1.7	ND	1.7	ND	8.6	ND	1.7
Acenaphthylene	ND	2.2	ND	2.2	ND	11	7.9 @	2.2
Anthracene	ND	0.63	ND	0.62	ND	3.2	ND	0.63
Benzo(a)anthracene	ND	0.012	ND	0.012	ND	0.062	ND	0.012
Benzo(a)pyrene	ND	0.022	ND	0.022	ND	0.11	ND	0.022
Benzo(b)fluoranthene	ND	0.017	ND	0.017	ND	0.086	ND	0.017
Benzo(g,h,i)perylene	ND	0.072	ND	0.071	ND	0.36	ND	0.072
Benzo(k)fluoranthene	ND	0.016	ND	0.016	ND	0.082	ND	0.016
Chrysene	ND	0.14	ND	0.14	ND	0.72	ND	0.14
Dibenzo(a,h)anthracene	ND	0.028	ND	0.028	ND	0.14	ND	0.028
Fluoranthene	ND	0.20	ND	0.20	1.2 @	1.0	ND	0.20
Fluorene	0.77 @	0.20	0.23 @	0.20	3.6 @	1.0	0.56 @	0.20
Indeno(1,2,3-cd)pyrene	ND	0.041	ND	0.040	ND	0.21	ND	0.041
Naphthalene	ND	1.7	ND	1.7	48	8.6	12	1.7
Phenanthrene	ND	0.61	ND	0.60	8.0 @	3.1	2.8 @	0.61
Pyrene	ND	0.26	ND	0.25	1.8 @	1.3	ND	0.26
Surrogate Recovery(%)								
Terphenyl-d14	83		88		74		84	
Control Limits: 24 to 146								

ND Not detected at specified detection limit

@ Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-08-357

Method: SW8310 PAHs by HPLC (1)

List: 8310 Method analytes

Sample ID:

Reagent Blank

Factor:

1

Results in:

ug/L

05A

Matrix:

water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Acenaphthene	ND	1.8						
Acenaphthylene	ND	2.3						
Anthracene	ND	0.66						
Benzo(a)anthracene	ND	0.013						
Benzo(a)pyrene	ND	0.023						
Benzo(b)fluoranthene	ND	0.018						
Benzo(g,h,i)perylene	ND	0.076						
Benzo(k)fluoranthene	ND	0.017						
Chrysene	ND	0.15						
Dibenzo(a,h)anthracene	ND	0.030						
Fluoranthene	ND	0.21						
Fluorene	ND	0.21						
Indeno(1,2,3-cd)pyrene	ND	0.043						
Naphthalene	ND	1.8						
Phenanthrene	ND	0.64						
Pyrene	ND	0.27						
Surrogate Recovery(%)								
Terphenyl-d14		100						
Control Limits: 24 to 146								

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-08-357

Sample Identifications and Dates

Sample ID	9008221106	9008221400	9008221915	9008231030	Reagent Blank
Date Sampled	08/22/90	08/22/90	08/22/90	08/23/90	
Date Received	08/25/90	08/25/90	08/25/90	08/25/90	08/25/90
Matrix	water	water	water	water	water
	01	02	03	04	05

SW8310 PAHs by HPLC

	9008221106	9008221400	9008221915	9008231030	Reagent Blank
Prepared	08/28/90	08/28/90	08/28/90	08/28/90	08/28/90
Analyzed	09/10/90	09/10/90	09/10/90	09/10/90	09/06/90
Analyst	TLS	TLS	TLS	TLS	TLS
File ID	6	7	8	10	236 & 306
Blank ID	236 & 306	236 & 306	236 & 306	236 & 306	236 & 306
Instrument	HPLC 2	HPLC 2	HPLC 2	HPLC 2	HPLC 2
Report as	received	received	received	received	received

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order: 90-08-357

@ ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

Geoscience Consultants, Ltd.
Radian Work Order: 90-08-357

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

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Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

Analytical Report
09/26/90

Giant Refining Co.

Giant Refining Co.
606 E. Highway 64
Farmington, NM 87401

Tim Kinney

Customer Work Identification 8310
Purchase Order Number RFE-9834

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
8501 Mo-Pac Boulevard
P. O. Box 201088
Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: RRMAY

Certified by:

Clifford Meyer

Giant Refining Co.
 Radian Work Order: 90-06-333

Method: SW8310 PAHs by HPLC (1)

List: 8310 Method analytes

Sample ID:	9006271300	REAGENT BLANK
	SHS-10	
Factor:	0.94	1
Results in:	ug/L	ug/L
	01A	02A
Matrix:	water	water

	Result	Det. Limit	Result	Det. Limit
Acenaphthene	ND D	17	ND	1.8
Acenaphthylene	ND D	22	ND	2.3
Anthracene	ND	0.62	ND	0.66
Benzo(a)anthracene	ND	0.012	ND	0.013
Benzo(a)pyrene	ND	0.022	ND	0.023
Benzo(b)fluoranthene	ND	0.017	ND	0.018
Benzo(g,h,i)perylene	ND	0.071	ND	0.076
Benzo(k)fluoranthene	ND	0.016	ND	0.017
Chrysene	ND	0.14	ND	0.15
Dibenzo(a,h)anthracene	ND	0.028	ND	0.030
Fluoranthene	ND	0.20	ND	0.21
Fluorene	2.2 D*	2.0	ND	0.21
Indeno(1,2,3-cd)pyrene	ND D	0.40	ND	0.043
Naphthalene	ND D	17	ND	1.8
Phenanthrene	0.84 *	0.60	ND	0.64
Pyrene	ND	0.25	ND	0.27

Surrogate Recovery(%)

Terphenyl-d14

Control Limits: 24 to 146

70

89

ND Not detected at specified detection limit

D Sample diluted for this analyte

* Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Giant Refining Co.
 Radian Work Order: 90-06-333

Sample Identifications and Dates

Sample ID	9006271300	REAGENT BLANK
	SHS-10	
Date Sampled	06/27/90	
Date Received	06/29/90	06/29/90
Matrix	water	water
	01	02

SW8310 PAHs by HPLC

Prepared	06/29/90	08/29/90
Analyzed	07/31/90	07/24/90
Analyst	TLS	TLS
File ID	12 & 11	117
Blank ID	117	117
Instrument	HPLC 2	HPLC 2
Report as	received	received

Appendix A

Comments, Notes and Definitions

Giant Refining Co.
Radian Work Order: 90-06-333

- D This flag identifies all analytes identified in analysis at a secondary dilution factor. In an analysis some compounds can exceed the calibration range of the instrument. Therefore two analyses are performed, one at the concentration of the majority of the analytes, and a second with the sample diluted so that high concentration analyte(s) fall within the calibration range.
- ND This flag (or <) is used to denote analytes which are not detected at or above the specified detection limit. The value to the right of the < symbol is the method specified detection limit for the sample.
- * The asterisk(*) is used to flag results which are less than five times the method specified detection limit. Studies have shown that the uncertainty of the analysis will increase exponentially as the method detection limit is approached. These results should be considered approximate.

Giant Refining Co.
Radian Work Order: 90-06-333

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

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Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

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ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

ANALYTICAL RESULTS FOR SOIL SAMPLES
FROM BORINGS
B1, B3, AND B4

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY		RELINQUISHED BY	
PROJECT:	TOTAL NO. OF CONTAINERS	CHAIN OF CUSTODY SEALS	REC'D GOOD CONDITION/COLD	CONFORMS TO RECORD	LAB NO.	RECEIVED BY	RECEIVED BY (LABORATORY)
MTA offsite	76	✓	✓	✓	5008131	RECEIVED BY	RECEIVED BY (LABORATORY)
PROJECT DIRECTOR M. Lee						(Signature)	(Signature)
CHARGE CODE NO. 432002						(Date)	(Date)
LABORATORY NO. 457915124						(Signature)	(Signature)
Felix						(Date)	(Date)
SPECIAL INSTRUCTIONS/COMMENTS:							
Sample IDs w/ * in front per all other samples returned							
WORK - 8/16/90 id							

SAMPLE NUMBER	MATRIX	LOCATION	ANALYSIS REQUEST												NUMBER OF CONTAINERS										
			BASE/NEU/ACID CMPS	DCMSA 825/8270	VOLATILE CMPS	GD/MS/ 824/8240	PESTICIDES/PCB	608/60802	POLYNUCLEAR AROMATIC 910/8310	PHENOLIC 601/840	HALOGENATED VOLATILES 601/8510	AROMATIC VOLATILES 602/8020	TOTAL ORGANIC CARBON 415/8060	TOTAL ORGANIC HALIDES 9020		PETROLEUM HYDROCARBONS 418.1	TPH	MODIFIED 8015	PRIORITY POLLUTANT METALS (13)	CAM METALS (18)	TLC/STLC	EP TOX METALS (8)	SDWA-INORGANICS PRIMARY/SECONDARY	HAZARDOUS WASTE PROFILE	
9008131230	soil	Bore 1																							2
9008131230	soil	Bore 1																							2
9008151030	soil	Bore 9																							2
9008151030	soil	Bore 9																							2
9008141000	soil	Bore 3																							2
9008141000	soil	Bore 3																							2
9008141620	soil	Bore 6																							2
9008141620	soil	Bore 6																							2

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Las Cruces, NM 88004
(505) 524-5364

N^o 3723

Chain of Custody

DATE 8-15 PAGE 2 OF 2

[illegible]

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Analytical Report
09/04/90

RECEIVED SEP 7 1990

Geoscience Consultants, Ltd.

Geoscience Consultants, Ltd.

500 Copper NW

Suite 200

Albuquerque, NM 87102

Sample Manager

Customer Work Identification M & A COC# 3722
Purchase Order Number 456002

Contents:

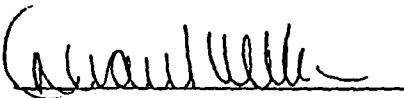
- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
8501 Mo-Pac Boulevard
P. O. Box 201088
Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: LUKELLY

Certified by:



Geoscience Consultants, Ltd.
 Radlan Work Order: 90-08-306

Method: Halocarbons by SW8010 (1)

List: SW8010

Sample ID:	9008131230	9008141000	9008141150	Reagent blank
Factor:	12.5	12.5	12.5	12.5
Results In:	ug/kg	ug/kg	ug/kg	ug/kg
	01A	02A	03A	04A
Matrix:	solid	solid	solid	solid

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Bromodichloromethane	ND	1.2	ND	1.2	ND	1.2	ND	1.2
Bromoform	ND	6.2	ND	6.2	ND	6.2	ND	6.2
Bromomethane	ND	15	ND	15	ND	15	ND	15
Carbon Tetrachloride	ND	1.5	ND	1.5	ND	1.5	ND	1.5
Chlorobenzene	ND	3.1	ND	3.1	ND	3.1	ND	3.1
Chloroethane	ND	6.5	ND	6.5	ND	6.5	ND	6.5
2-Chloroethylvinylether	ND	6.2	ND	6.2	ND	6.2	ND	6.2
Chloroform	ND	1.2	ND	1.2	ND	1.2	ND	1.2
Chloromethane	ND	3.8	ND	3.8	ND	3.8	ND	3.8
Dibromochloromethane-(2)	ND	2.5	ND	2.5	ND	2.5	ND	2.5
1,2-Dichlorobenzene	ND	6.2	ND	6.2	ND	6.2	ND	6.2
1,3-Dichlorobenzene	ND	4.0	ND	4.0	ND	4.0	ND	4.0
1,4-Dichlorobenzene	ND	3.0	ND	3.0	ND	3.0	ND	3.0
1,1-Dichloroethane	ND	6.2	ND	6.2	ND	6.2	ND	6.2
1,2-Dichloroethane	ND	1.2	ND	1.2	ND	1.2	ND	1.2
1,1-Dichloroethene	ND	2.5	ND	2.5	ND	2.5	ND	2.5
trans-1,2-Dichloroethene	ND	2.5	ND	2.5	ND	2.5	ND	2.5
1,2-Dichloropropane	ND	1.2	ND	1.2	ND	1.2	ND	1.2
cis-1,3-Dichloropropene-(2)	ND	3.8	ND	3.8	ND	3.8	ND	3.8
trans-1,3-Dichloropropene	ND	4.2	ND	4.2	ND	4.2	ND	4.2
Methylene Chloride	ND	5.0	ND	5.0	ND	5.0	ND	5.0
1,1,2,2-Tetrachloroethane-(3)	ND	1.9	ND	1.9	ND	1.9	ND	1.9
Tetrachloroethene-(3)	ND	1.2	ND	1.2	ND	1.2	ND	1.2
1,1,2-Trichloroethane-(2)	ND	2.5	ND	2.5	ND	2.5	ND	2.5
1,1,1-Trichloroethane	2.8 @	2.5	3.9 @	2.5	4.2 @	2.5	ND	2.5
Trichloroethene	ND	2.5	ND	2.5	ND	2.5	ND	2.5
Trichlorofluoromethane	ND	2.5	ND	2.5	ND	2.5	ND	2.5
Vinyl Chloride	ND	2.5	ND	2.5	ND	2.5	ND	2.5

ND Not detected at specified detection limit

@ Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

(2) Dibromochloromethane, 1,1,2-trichloroethane, and cis-1,3-dichloropropene coelute. Quantitated as Dibromochloromethane unless otherwise noted.

(3) Tetrachloroethene and 1,1,2,2-tetrachloroethane coelute. Quantitated as tetrachloroethene unless otherwise noted.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-08-306

Method: Halocarbons by SW8010 (1)

List: SW8010

Sample ID:	9008131230	9008141000	9008141150	Reagent blank
Factor:	12.5	12.5	12.5	12.5
Results (n):	ug/kg	ug/kg	ug/kg	ug/kg
	01A	02A	03A	04A
Matrix:	solid	solid	solid	solid

	Result Det. Limit	Result Det. Limit	Result Det. Limit	Result Det. Limit
<u>Surrogate Recovery(%)</u>				
1-Bromo-4-fluorobenzene	90	92	94	95
Control Limits: 76 to 140				

- (1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.
- (2) Dibromochloromethane, 1,1,2-trichloroethane, and cis-1,3-dichloropropene coelute. Quantitated as dibromochloromethane unless otherwise noted.
- (3) Tetrachloroethene and 1,1,2,2-tetrachloroethane coelute. Quantitated as tetrachloroethene unless otherwise noted.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-08-306

Method/Vol: aromatics by SW8020 (1)

List: SW8020

Sample ID:	9008131230	9008141000	9008141150	Reagent blank
Factor:	12500	250	12.5	12.5
Result in:	ug/kg	ug/kg	ug/kg	ug/kg
	01B	02B	03B	04A
Matrix:	solid	solid	solid	solid

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Benzene	ND	2500	ND	50	ND	2.5	ND	2.5
Chlorobenzene	ND	2500	ND	50	ND	2.5	ND	2.5
1,2-Dichlorobenzene	ND	5000	ND	100	ND	5.0	ND	5.0
1,3-Dichlorobenzene	ND	5000	ND	100	ND	5.0	ND	5.0
1,4-Dichlorobenzene	ND	3800	ND	75	ND	3.8	ND	3.8
Ethylbenzene	16000	2900	490	50	3.3 a	2.5	ND	2.5
Toluene	ND	2500	120 B	50	15 B	2.5	7.5 a	2.5
Total xylenes	32000	2500	1400	50	23	2.5	ND	2.9
Surrogate Recovery(X)								
1-Bromo-4-fluorobenzene	115		70 a		86		86	
Control Limits: 76 to 140								

ND Not detected at specified detection limit

a Est. result less than 5 times detection limit

B Inorg CLP-result < CRDL but > than IDL/Org-detected in blank

a Outside control limits

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-08-306

Method/Analyte	Sample Identifications					
	9008131230		900814100		9008141150	
Matrix	01		02		03	
	solid		solid		solid	
Percent Moisture, CLP	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Percent moisture	7.0	% moistu	17	% moistu	17	% moistu

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

Geoscience Consultants, Ltd.
 Radian Work Order: 90-08-306

Sample Identifications and Dates

Sample ID	9008131230	9008141000	9008141150	Reagent blank
Date Sampled	08/13/90	08/14/90	08/14/90	
Date Received	08/23/90	08/23/90	08/23/90	08/23/90
Matrix	solid	solid	solid	solid
	01	02	03	04

Halocarbons by SW8010

Prepared				
Analyzed	08/24/90	08/24/90	08/24/90	08/24/90
Analyst	BH	BH	BH	JL
File ID	dg08249	dg082410	dg082411	dg08246
Blank ID				
Instrument	g	g	g	g
Report as	received	received	received	received

Vol. aromatics by SW8020

Prepared				
Analyzed	08/26/90	08/26/90	08/26/90	08/26/90
Analyst	BH	BH	BH	BH
File ID	dd08267	dd08269	dd082612	dd08266
Blank ID				
Instrument	d	d	d	d
Report as	received	received	received	received

Percent Moisture, CLP

Prepared			
Analyzed	08/24/90	08/24/90	08/24/90
Analyst	JL	JL	JL
File ID	9008306	9008306	9008306
Blank ID			
Instrument	oven	oven	oven
Report as	received	received	received

Appendix A

Comments, Notes and Definitions

Geoscience Consultants, Ltd.
Radian Work Order# 90-08-306

Q ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

B INORGANIC CLP

This flag indicates that a reported value is less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit (IDL).

ORGANIC METHODS

This flag indicates that an analyte is found in the associated blank, but the sample results are not corrected for the amount in the blank.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

Q ALL METHODS EXCEPT CLP

This quality control standard is outside method or laboratory specified control limits.

EXPLANATION

This flag is applied to matrix spike, analytical QC spike, and surrogate recoveries; and to RPD(relative percent difference) values for duplicate analyses and matrix spike/matrix spike duplicate result.

Geoscience Consultants, Ltd.
Radian Work Order: 90-08-306

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CROLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian Identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microsiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

APPENDIX D

Slug Test Analysis From TLP And Plotted Data

3HS-7 SLUG IN TEST

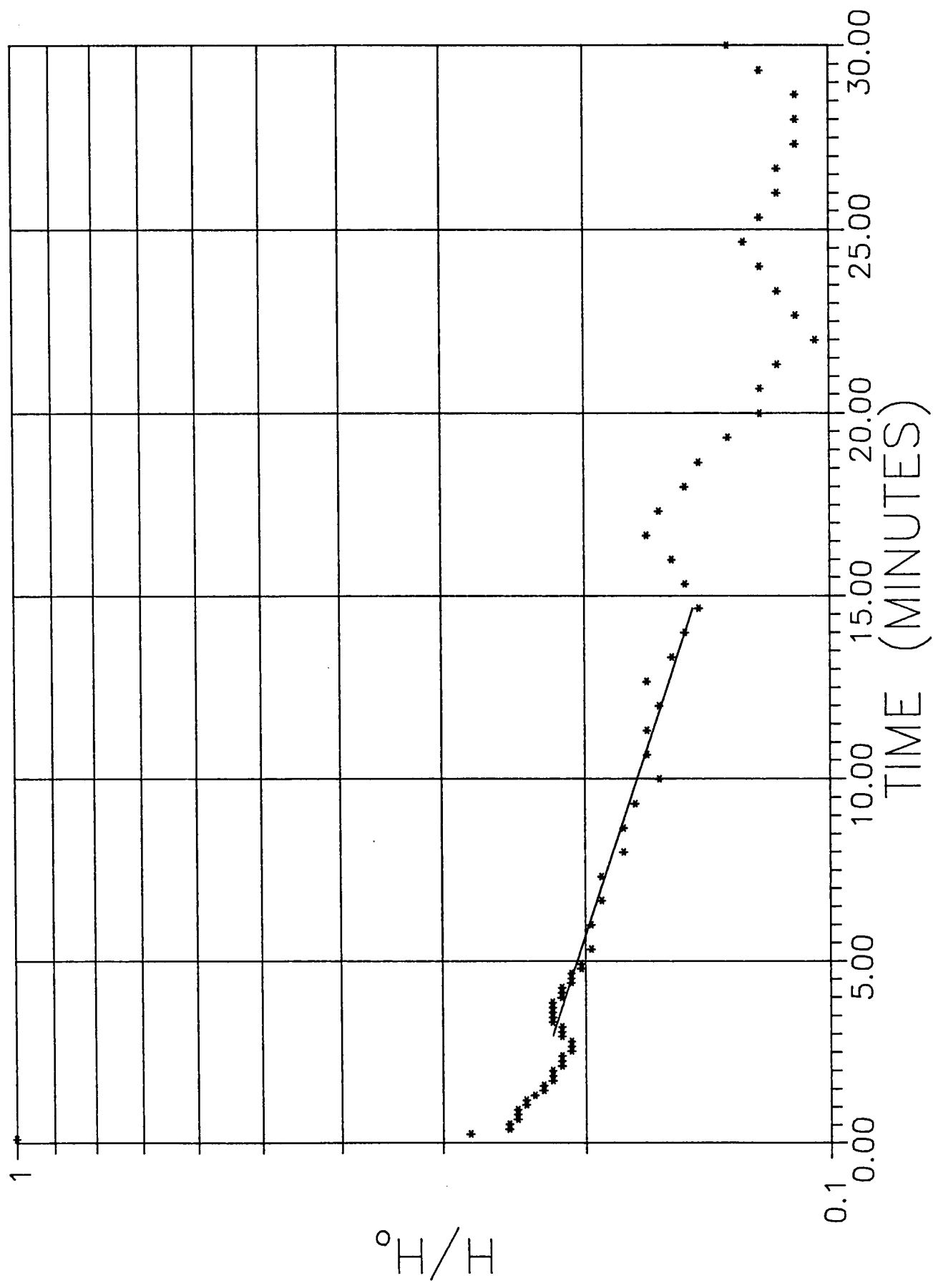
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
175.45	38.58	-0.37	.2138722
183.29	38.58	-0.37	.2138722
191.37	38.58	-0.37	.2138722
199.45	38.57	-0.38	.2196542
207.29	38.57	-0.38	.2196542
215.37	38.57	-0.38	.2196542
223.45	38.57	-0.38	.2196542
231.29	38.57	-0.38	.2196542
239.37	38.58	-0.37	.2138722
247.46	38.58	-0.37	.2138722
255.29	38.58	-0.37	.2138722
263.38	38.59	-0.36	.2080938
271.22	38.59	-0.36	.2080938
279.3	38.59	-0.36	.2080938
287.38	38.6	-0.35	.2023135
295.46	38.6	-0.35	.2023135
319.22	38.61	-0.34	.1965315
359.34	38.61	-0.34	.1965315
399.23	38.62	-0.33	.1907531
439.34	38.62	-0.33	.1907531
479.22	38.64	-0.31	.1791926
519.36	38.64	-0.31	.1791926
559.2301	38.65	-0.30	.1734106
599.37	38.67	-0.28	.1618519
639.2496	38.66	-0.29	.1676304
679.38	38.66	-0.29	.1676304
719.2698	38.67	-0.28	.1618519
759.42	38.66	-0.29	.1676304
799.2996	38.68	-0.27	.1560699
839.4498	38.69	-0.26	.1502915
879.3499	38.7	-0.25	.1445094

UNCONFINED AQUIFER

$K = 0.7E-04$ cm/sec
 $= 1.5$ gpd/ft²
 $= 0.2E-05$ ft/sec
 $= 0.2$ ft/day

REGRESSION COEFFICIENT = -.9831801

WELL SHS-7 SLUG IN TEST RESULTS



SHS-7 SLUG OUT TEST

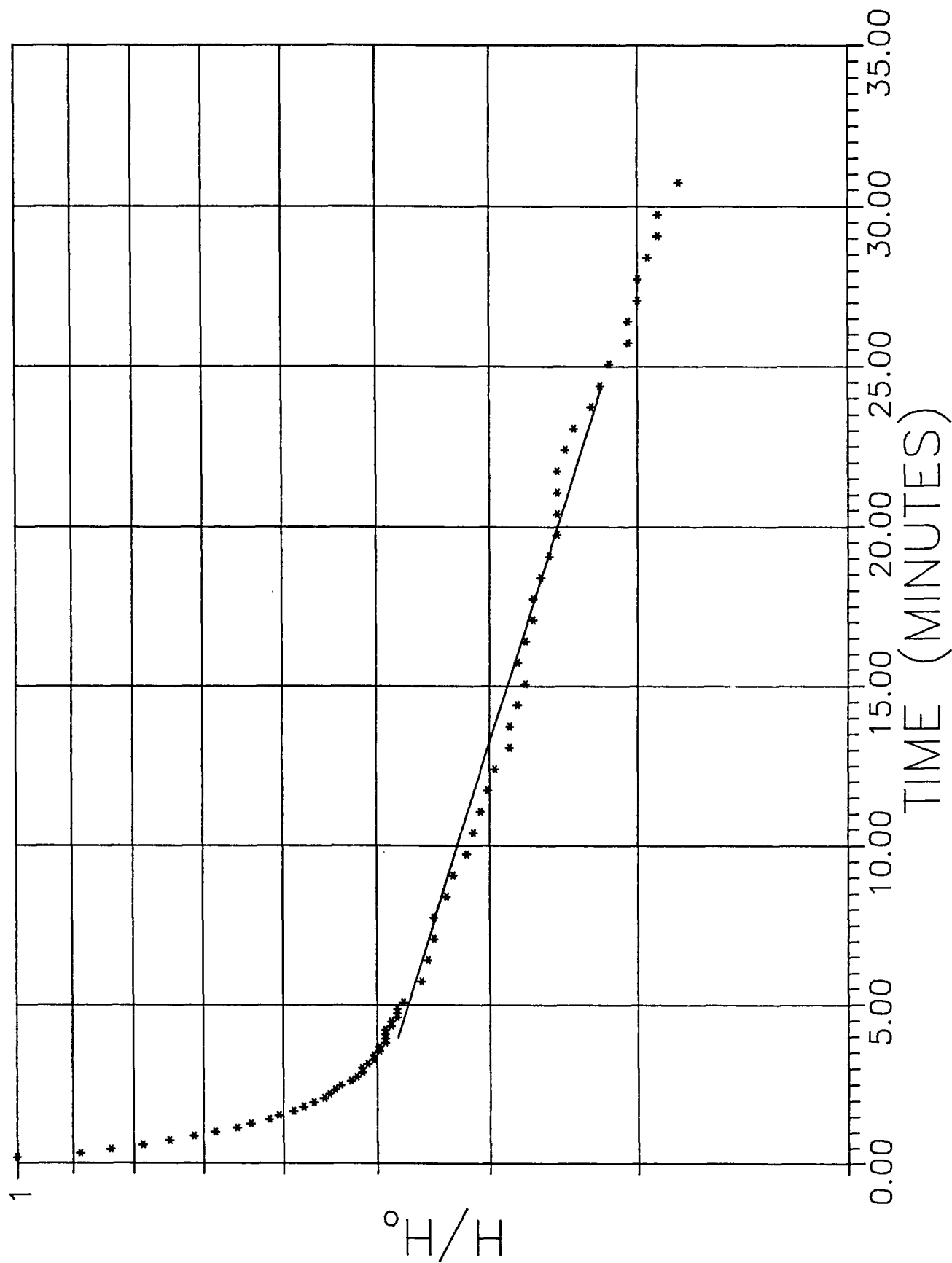
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
236.26	39.82	0.87	.4915256
244.34	39.82	0.87	.4915256
252.42	39.82	0.87	.4915256
260.25	39.81	0.86	.485876
268.34	39.81	0.86	.485876
276.42	39.8	0.85	.4802246
284.25	39.8	0.85	.4802246
292.33	39.8	0.85	.4802246
304.33	39.79	0.84	.4745767
344.45	39.76	0.81	.4576261
384.31	39.75	0.80	.4519765
424.43	39.74	0.79	.4463287
464.31	39.74	0.79	.4463287
504.42	39.72	0.77	.4350277
544.3	39.71	0.76	.429378
584.4301	39.69	0.74	.418077
624.3096	39.68	0.73	.4124292
664.44	39.67	0.72	.4067778
704.34	39.66	0.71	.4011299
744.2298	39.65	0.70	.3954803
784.3698	39.63	0.68	.3841811
824.2698	39.63	0.68	.3841811
864.3996	39.62	0.67	.3785297
904.29	39.61	0.66	.3728801
944.4301	39.62	0.67	.3785297
984.3198	39.61	0.66	.3728801
1024.46	39.6	0.65	.3672305
1064.36	39.6	0.65	.3672305
1104.25	39.59	0.64	.3615808
1144.38	39.58	0.63	.355933
1184.28	39.57	0.62	.3502816
1224.43	39.57	0.62	.3502816
1264.32	39.57	0.62	.3502816
1304.22	39.57	0.62	.3502816
1344.38	39.56	0.61	.344632
1384.28	39.55	0.60	.3389824
1424.45	39.53	0.58	.3276831
1464.35	39.52	0.57	.3220335

UNCONFINED AQUIFER

K = 0.4E-04 cm/sec
= 0.9 gpd/ft²
= 0.1E-05 ft/sec
= 0.1 ft/day

REGRESSION COEFFICIENT = -.9874457

WELL SHS-7 SLUG OUT TEST RESULTS



SHS-8 SLUG IN TEST

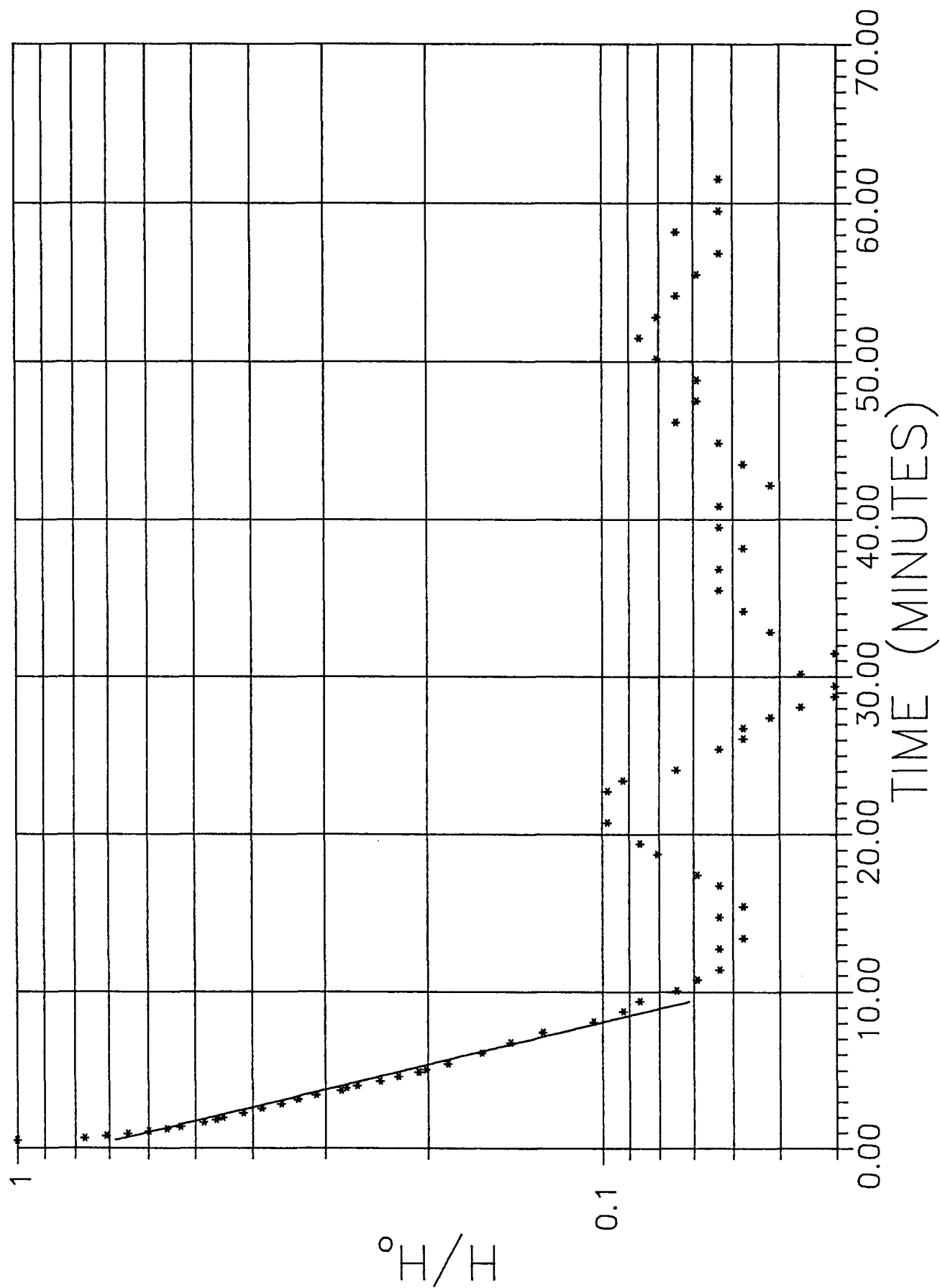
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
31.86	37.08	-1.74	1
40.56	37.48	-1.34	.7701155
49.24998	37.59	-1.23	.7068982
57.94998	37.69	-1.13	.649428
66.64998	37.78	-1.04	.597703
75.36	37.85	-0.97	.5574738
84.06	37.9	-0.92	.5287351
101.45	37.98	-0.84	.4827608
110.16	38.02	-0.80	.4597709
118.87	38.04	-0.78	.4482768
136.28	38.1	-0.72	.4137947
153.7	38.15	-0.67	.3850578
171.11	38.2	-0.62	.3563226
188.53	38.24	-0.58	.3333328
205.95	38.28	-0.54	.3103465
223.38	38.33	-0.49	.2816095
232.08	38.34	-0.48	.2758625
240.8	38.36	-0.46	.2643685
258.23	38.4	-0.42	.2413786
275.64	38.43	-0.39	.2241393
293.05	38.46	-0.36	.2068982
302.41	38.47	-0.35	.2011494
324.64	38.5	-0.32	.1839083
364.64	38.54	-0.28	.1609203
404.65	38.57	-0.25	.1436792
444.66	38.6	-0.22	.1264381
484.66	38.64	-0.18	.10345
524.66	38.66	-0.16	9.195416E-02
564.68	38.67	-0.15	8.620894E-02

UNCONFINED AQUIFER

$K = 0.5E-03$ cm/sec
= 11.4 gpd/ft²
= $0.2E-04$ ft/sec
= 1.5 ft/day

REGRESSION COEFFICIENT = -.9872713

WELL SHS-8 SLUG IN TEST RESULTS



SHS-8 SLUG OUT TEST

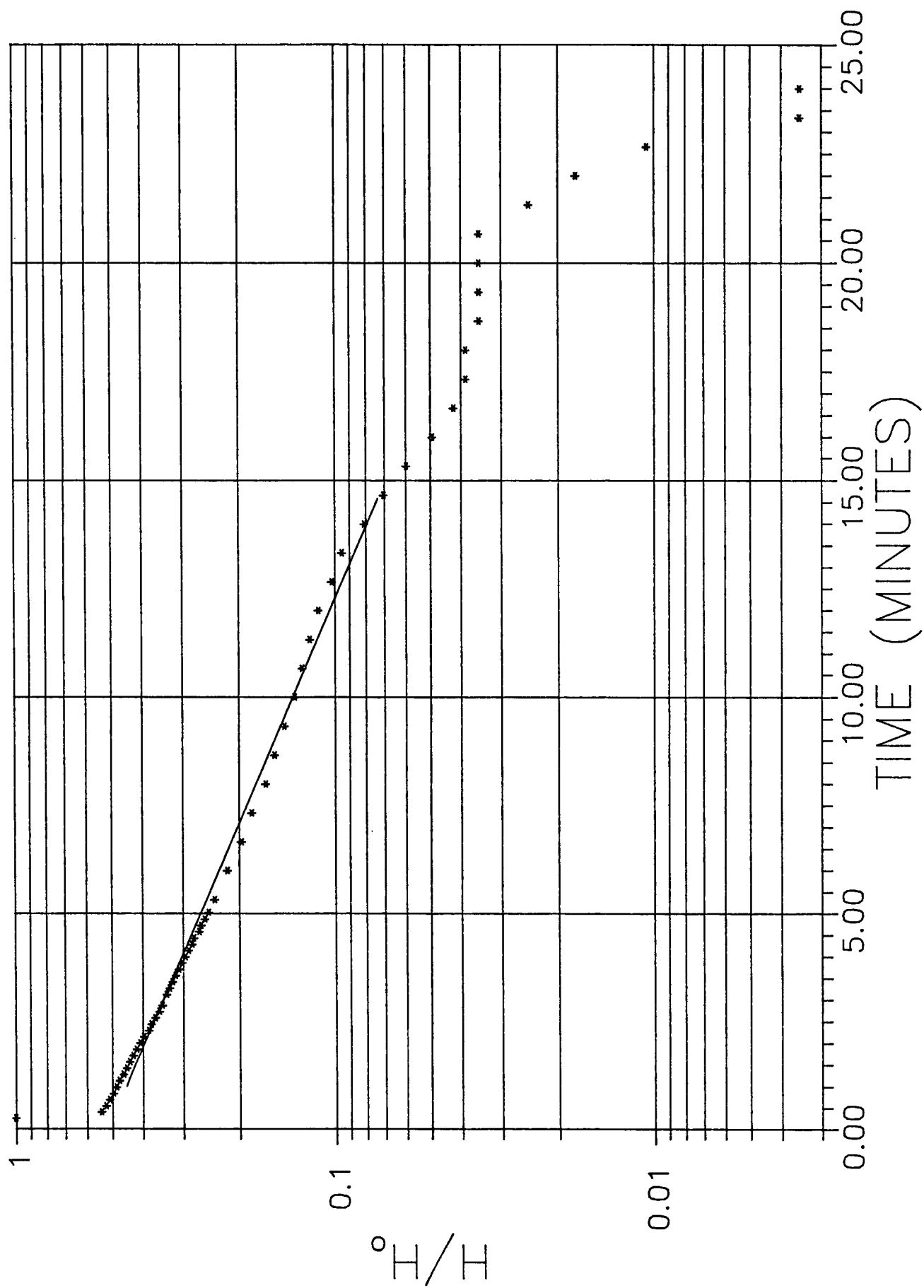
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
58.98	40.2	1.94	.5689156
67.68996	40.17	1.91	.5601171
76.38996	40.13	1.87	.5483881
85.08	40.1	1.84	.5395896
93.78	40.07	1.81	.5307921
102.48	40.04	1.78	.5219947
111.21	40.01	1.75	.5131962
119.91	39.98	1.72	.5043988
128.62	39.95	1.69	.4956022
137.33	39.91	1.65	.4838713
146.04	39.89	1.63	.4780063
154.74	39.86	1.60	.4692088
163.45	39.83	1.57	.4604113
172.16	39.81	1.55	.4545463
187.4	39.78	1.52	.4457479
196.11	39.76	1.50	.4398829
204.82	39.74	1.48	.4340188
213.53	39.72	1.46	.4281529
222.25	39.7	1.44	.4222879
230.96	39.68	1.42	.4164229
239.68	39.66	1.40	.4105579
248.39	39.64	1.38	.404692
257.11	39.62	1.36	.398827
265.82	39.61	1.35	.3958945
274.53	39.58	1.32	.3870979
283.24	39.57	1.31	.3841645
291.96	39.55	1.29	.3782995
301.32	39.53	1.27	.3724345
319.54	39.5	1.24	.363637
359.57	39.44	1.18	.3460412
399.59	39.38	1.12	.3284462
439.61	39.34	1.08	.3167162
479.64	39.29	1.03	.3020537
519.6601	39.26	1.00	.2932553
559.69	39.23	0.97	.2844578
599.73	39.2	0.94	.2756603
639.4998	39.18	0.92	.2697953
679.5396	39.16	0.90	.2639303
719.58	39.14	0.88	.2580644
759.6	39.11	0.85	.2492678
799.6296	39.09	0.83	.2434019
839.6598	39.05	0.79	.2316719
879.6601	39.02	0.76	.2228744

UNCONFINED AQUIFER

K = 0.1E-03 cm/sec
= 3.0 gpd/ft²
= 0.5E-05 ft/sec
= 0.4 ft/day

REGRESSION COEFFICIENT = -.9821691

WELL SHS-8 SLUG OUT TEST RESULTS



PHASE 9 SLUG IN TEST

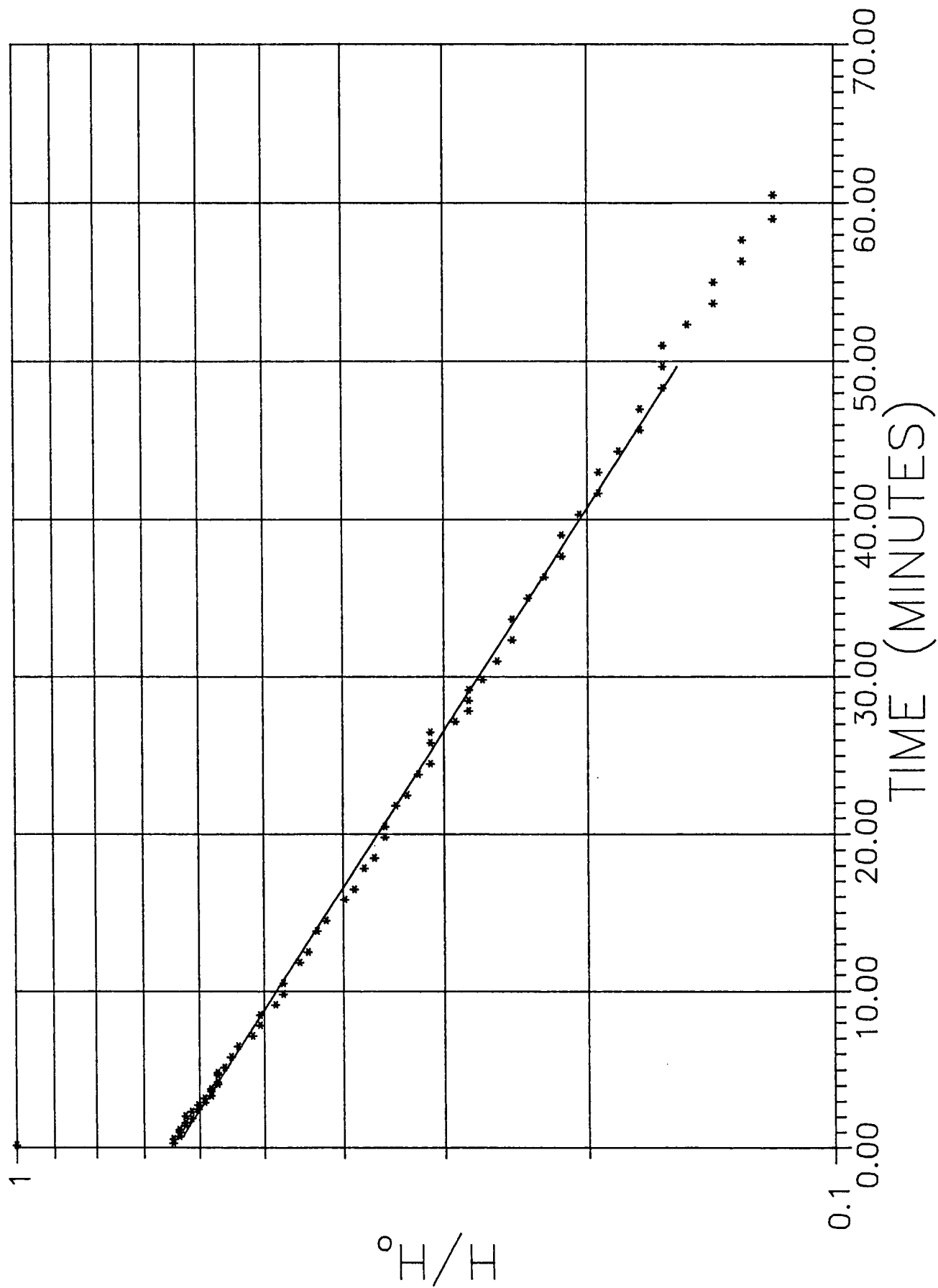
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
45.72	37.51	-0.59	.6344093
63.10998	37.51	-0.59	.6344093
71.80998	37.51	-0.59	.6344093
89.22	37.52	-0.58	.6236535
97.90998	37.52	-0.58	.6236535
115.32	37.53	-0.57	.612901
124.03	37.52	-0.58	.6236535
141.44	37.53	-0.57	.612901
150.15	37.54	-0.56	.6021485
167.57	37.54	-0.56	.6021485
176.28	37.55	-0.55	.5913961
193.69	37.55	-0.55	.5913961
202.41	37.56	-0.54	.5806402
219.83	37.56	-0.54	.5806402
228.54	37.56	-0.54	.5806402
245.97	37.57	-0.53	.5698911
254.68	37.57	-0.53	.5698911
280.8	37.57	-0.53	.5698911
289.5	37.57	-0.53	.5698911
309.32	37.58	-0.52	.5591352
349.32	37.59	-0.51	.5483861
389.34	37.6	-0.50	.5376337
429.34	37.62	-0.48	.5161287
469.34	37.63	-0.47	.5053729
509.35	37.63	-0.47	.5053729
549.36	37.65	-0.45	.483868
589.37	37.66	-0.44	.4731155
629.3796	37.66	-0.44	.4731155
709.41	37.68	-0.42	.4516105
749.4396	37.69	-0.41	.4408614
829.2198	37.7	-0.40	.4301056
869.25	37.71	-0.39	.4193531
949.2798	37.73	-0.37	.3978482
989.2999	37.74	-0.36	.3870923
1069.37	37.75	-0.35	.3763432
1109.41	37.76	-0.34	.3655908
1189.23	37.77	-0.33	.3548349
1229.27	37.77	-0.33	.3548349
1309.34	37.78	-0.32	.3440858
1349.39	37.79	-0.31	.33333
1429.23	37.8	-0.30	.3225809
1469.28	37.81	-0.29	.311825
1549.33	37.81	-0.29	.311825
1589.35	37.81	-0.29	.311825
1629.36	37.83	-0.27	.2903201
1669.38	37.84	-0.26	.2795676
1709.39	37.84	-0.26	.2795676
1749.4	37.84	-0.26	.2795676
1789.41	37.85	-0.25	.2688185
1859.38	37.86	-0.24	.2580627
1939.22	37.87	-0.23	.2473102
2019.3	37.87	-0.23	.2473102
2099.39	37.88	-0.22	.2365577
2179.23	37.89	-0.21	.2258053
2259.33	37.9	-0.20	.2150494
2339.43	37.9	-0.20	.2150494
2419.29	37.91	-0.19	.2043003
2499.39	37.92	-0.18	.1935479
2579.23	37.92	-0.18	.1935479
2659.34	37.93	-0.17	.1827954
2739.22	37.94	-0.16	.1720429
2819.35	37.94	-0.16	.1720429
2899.23	37.95	-0.15	.1612871
2979.37	37.95	-0.15	.1612871

UNCONFINED AQUIFER

K = 0.1E-03 cm/sec
 = 2.6 qpd/ft2
 = 0.4E-05 ft/sec
 = 0.4 ft/day

REGRESSION COEFFICIENT = -.9991147

WELL SHS-9 SLUG IN TEST RESULTS



SHS-9 SLUG OUT TEST

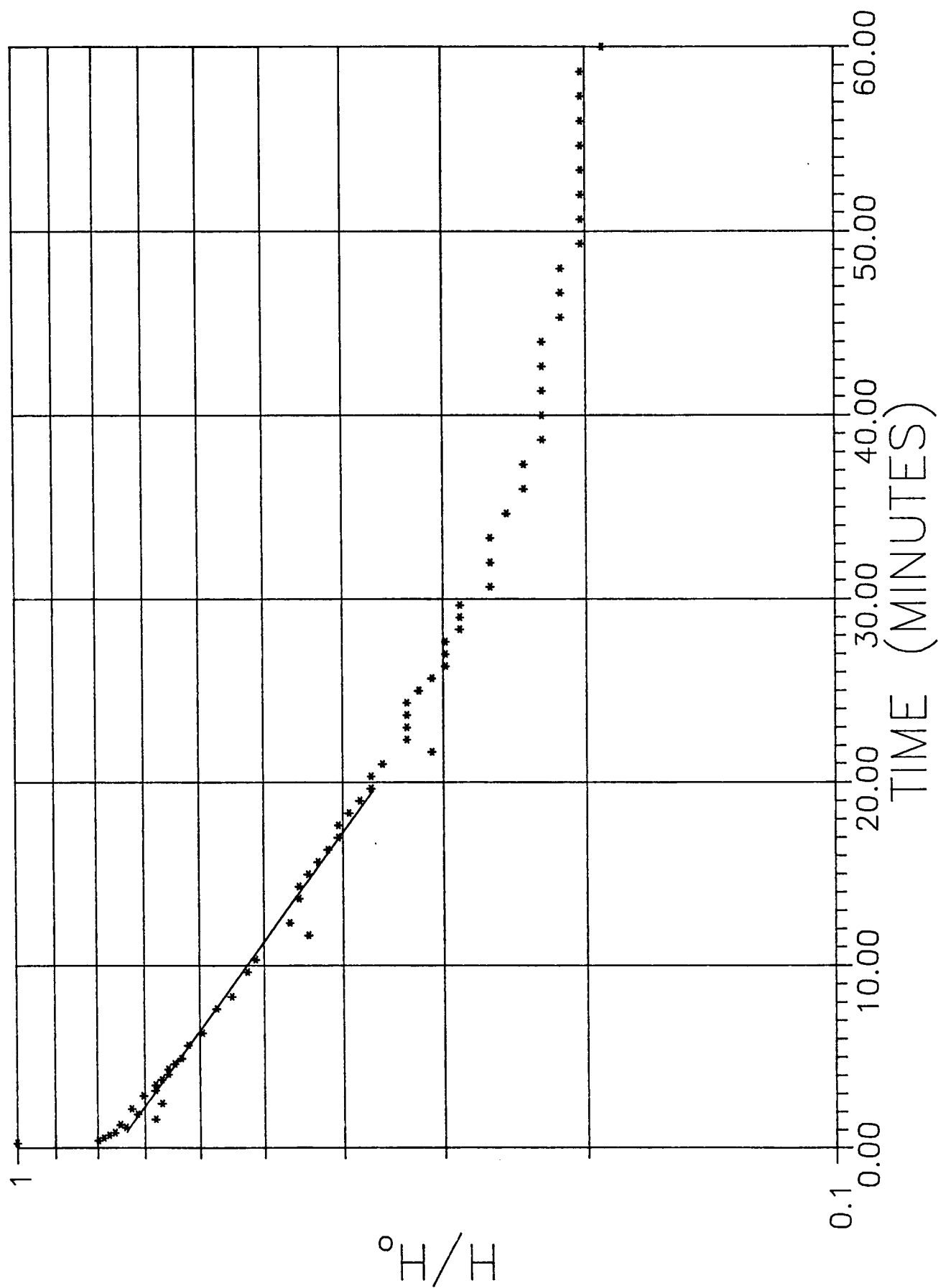
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
52.17996	38.74	0.64	.7619092
69.57996	38.72	0.62	.7381001
78.27996	38.73	0.63	.750001
95.67	38.67	0.57	.67857
113.1	38.7	0.60	.7142873
130.52	38.71	0.61	.7261919
147.93	38.66	0.56	.6666691
174.06	38.69	0.59	.7023791
191.47	38.67	0.57	.67857
208.9	38.67	0.57	.67857
226.33	38.66	0.56	.6666691
243.76	38.65	0.55	.6547646
261.18	38.65	0.55	.6547646
278.61	38.64	0.54	.6428564
296.03	38.63	0.53	.6309555
339.4	38.62	0.52	.6190473
379.42	38.6	0.50	.5952382
459.22	38.58	0.48	.5714328
499.24	38.56	0.46	.54762
579.3	38.54	0.44	.523811
619.3399	38.53	0.43	.5119064
699.3996	38.47	0.37	.4404792
739.4298	38.49	0.39	.4642883
819.2496	38.48	0.38	.4523837
859.2498	38.48	0.38	.4523837
899.2596	38.47	0.37	.4404792
939.2496	38.46	0.36	.4285709
979.2599	38.45	0.35	.4166701
1019.26	38.44	0.34	.4047618
1059.27	38.44	0.34	.4047618
1099.28	38.43	0.33	.3928573
1139.29	38.42	0.32	.3809528
1179.3	38.41	0.31	.3690482

UNCONFINED AQUIFER

K = 0.2E-03 cm/sec
= 3.4 gpd/ft²
= 0.5E-05 ft/sec
= 0.5 ft/day

REGRESSION COEFFICIENT = -.9925381

WELL SHS-9 SLUG OUT TEST RESULTS



SHS-10 SLUG IN TEST

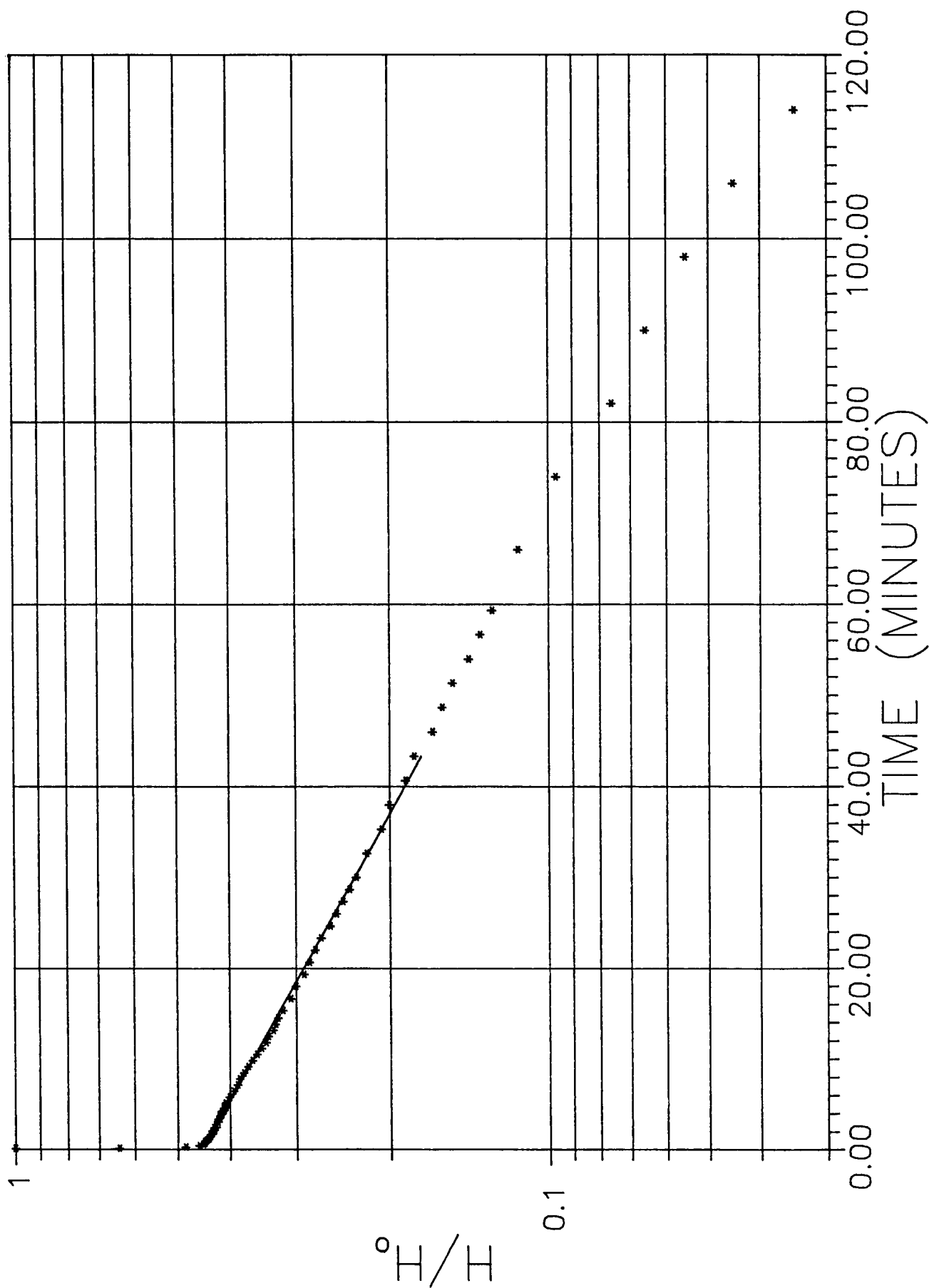
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/H ₀
54.54	35.83	-1.29	.4448275
63.21996	35.84	-1.28	.4413793
71.89998	35.85	-1.27	.4379321
80.58	35.85	-1.27	.4379321
89.25	35.86	-1.26	.4344828
106.61	35.87	-1.25	.4310346
123.98	35.87	-1.25	.4310346
132.67	35.88	-1.24	.4275864
150.04	35.89	-1.23	.4241382
167.41	35.89	-1.23	.4241382
184.78	35.9	-1.22	.4206889
202.16	35.9	-1.22	.4206889
210.85	35.91	-1.21	.4172417
236.92	35.92	-1.20	.4137935
245.6	35.92	-1.20	.4137935
254.3	35.92	-1.20	.4137935
262.99	35.93	-1.19	.4103453
271.68	35.93	-1.19	.4103453
280.36	35.94	-1.18	.4068971
289.05	35.94	-1.18	.4068971
297.74	35.94	-1.18	.4068971
309.57	35.94	-1.18	.4068971
349.61	35.96	-1.16	.4000007
389.67	35.98	-1.14	.3931042
429.71	36	-1.12	.3862067
469.51	36.01	-1.11	.3827596
509.56	36.03	-1.09	.3758621
549.62	36.05	-1.07	.3689656
589.67	36.07	-1.05	.3620692
629.7396	36.09	-1.03	.3551728
669.5496	36.11	-1.01	.3482753
709.62	36.13	-0.99	.3413788
749.6898	36.14	-0.98	.3379306
789.4998	36.16	-0.96	.3310342
829.56	36.17	-0.95	.3275871
869.64	36.18	-0.94	.3241377
919.5798	36.2	-0.92	.3172413
999.7297	36.23	-0.89	.3068967
1079.64	36.25	-0.87	.3000002
1159.56	36.28	-0.84	.2896556
1239.73	36.3	-0.82	.2827591
1319.65	36.32	-0.80	.2758616
1399.61	36.34	-0.78	.2689652
1479.55	36.37	-0.75	.2586205
1559.49	36.39	-0.73	.2517241
1639.7	36.41	-0.71	.2448277
1719.64	36.43	-0.69	.2379302
1799.59	36.45	-0.67	.2310337
1959.65	36.48	-0.64	.2206891
2119.78	36.52	-0.60	.2068962
2279.92	36.54	-0.58	.1999998
2439.93	36.58	-0.54	.1862058
2599.6	36.6	-0.52	.1793105

UNCONFINED AQUIFER

$K = 0.5E-04$ cm/sec
 $= 1.0$ gpd/ft²
 $= 0.2E-05$ ft/sec
 $= 0.1$ ft/day

REGRESSION COEFFICIENT = -.9992194

WELL SHS-10 SLUG IN TEST RESULTS



SHS-10 SLUG OUT TEST

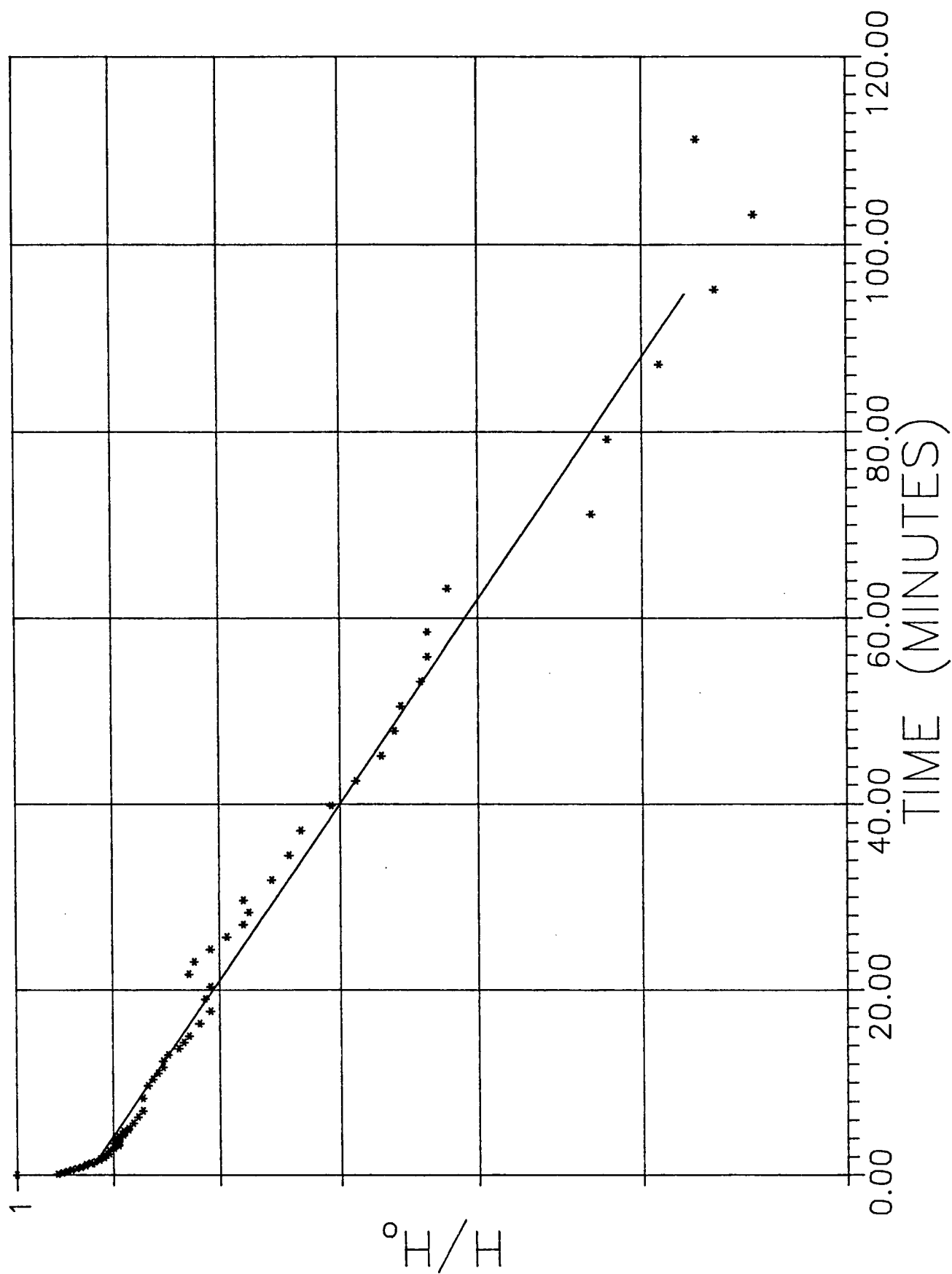
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
52.2	39.06	1.94	.9326936
61.2	39.05	1.93	.9278845
69.6	39.05	1.93	.9278845
78.6	39.04	1.92	.9230769
87	39.03	1.91	.9182679
96	39.02	1.90	.9134618
104.4	39.02	1.90	.9134618
112.8	39.01	1.89	.9086526
130.2	39.01	1.89	.9086526
139.2	39	1.88	.9038465
156.6	39	1.88	.9038465
174	38.99	1.87	.8990389
182.4	38.99	1.87	.8990389
191.4	38.98	1.86	.8942298
199.8	38.98	1.86	.8942298
208.8	38.99	1.87	.8990389
217.2	38.98	1.86	.8942298
226.2	38.98	1.86	.8942298
234.6	38.98	1.86	.8942298
243.6	38.98	1.86	.8942298
252	38.98	1.86	.8942298
261	38.97	1.85	.8894238
269.4	38.97	1.85	.8894238
278.4	38.97	1.85	.8894238
286.8	38.97	1.85	.8894238
295.8	38.96	1.84	.8846146
304.8	38.96	1.84	.8846146
339.6	38.95	1.83	.8798086
379.8	38.94	1.82	.8749994
419.4	38.93	1.81	.8701918
499.8	38.93	1.81	.8701918
579.6	38.92	1.80	.8653842
619.8	38.91	1.79	.8605766
660	38.9	1.78	.8557705
699.6	38.89	1.77	.8509614
739.8	38.89	1.77	.8509614
780	38.88	1.76	.8461539
819.6	38.86	1.74	.8365387
859.8	38.85	1.73	.8317296
900	38.84	1.72	.8269235
979.8	38.82	1.70	.8173083
1059.6	38.8	1.68	.8076916
1139.4	38.81	1.69	.8125006
1219.8	38.8	1.68	.8076916
1299.6	38.84	1.72	.8269235
1379.4	38.83	1.71	.8221158
1459.8	38.8	1.68	.8076916
1539.6	38.77	1.65	.7932703
1620	38.74	1.62	.7788475
1699.8	38.73	1.61	.7740384
1779.6	38.74	1.62	.7788475
1909.8	38.69	1.57	.7548065
2070	38.66	1.54	.7403852
2229.6	38.64	1.52	.7307685
2389.8	38.59	1.47	.7067305
2550	38.55	1.43	.6875001
2709.6	38.51	1.39	.6682682
2869.8	38.49	1.37	.6586545
3030	38.48	1.36	.653847
3189.6	38.45	1.33	.6394241
3349.2	38.44	1.32	.634615
3509.4	38.44	1.32	.634615
3790.2	38.41	1.29	.6201923
4269.6	38.22	1.10	.5288463
4749.6	38.2	1.08	.5192312
5229.6	38.14	1.02	.4903841
5709.6	38.08	0.96	.46154

UNCONFINED AQUIFER

$K = 0.1E-04$ cm/sec
 $= 0.3$ gpd/ft²
 $= 0.5E-06$ ft/sec
 $= 0.0$ ft/day

REGRESSION COEFFICIENT = -.9943041

WELL SHS-10 SLUG OUT TEST RESULT



TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
469.2	37.54	-0.72	.3272728
509.4	37.54	-0.72	.3272728
549.6	37.58	-0.68	.3090899
589.2	37.6	-0.66	.3000006
629.4	37.63	-0.63	.286363
669	37.65	-0.61	.2772723
709.2	37.67	-0.59	.2681829
749.4	37.69	-0.57	.2590922
789	37.7	-0.56	.2545454
829.2	37.72	-0.54	.2454532
869.3999	37.75	-0.51	.2318185
919.1999	37.76	-0.50	.2272731
999.6	37.78	-0.48	.2181824
1079.4	37.8	-0.46	.2090916
1159.2	37.83	-0.43	.1954541
1239.6	37.85	-0.41	.1863647
1319.4	37.88	-0.38	.1727272
1399.2	37.89	-0.37	.1681818
1479	37.92	-0.34	.1545457

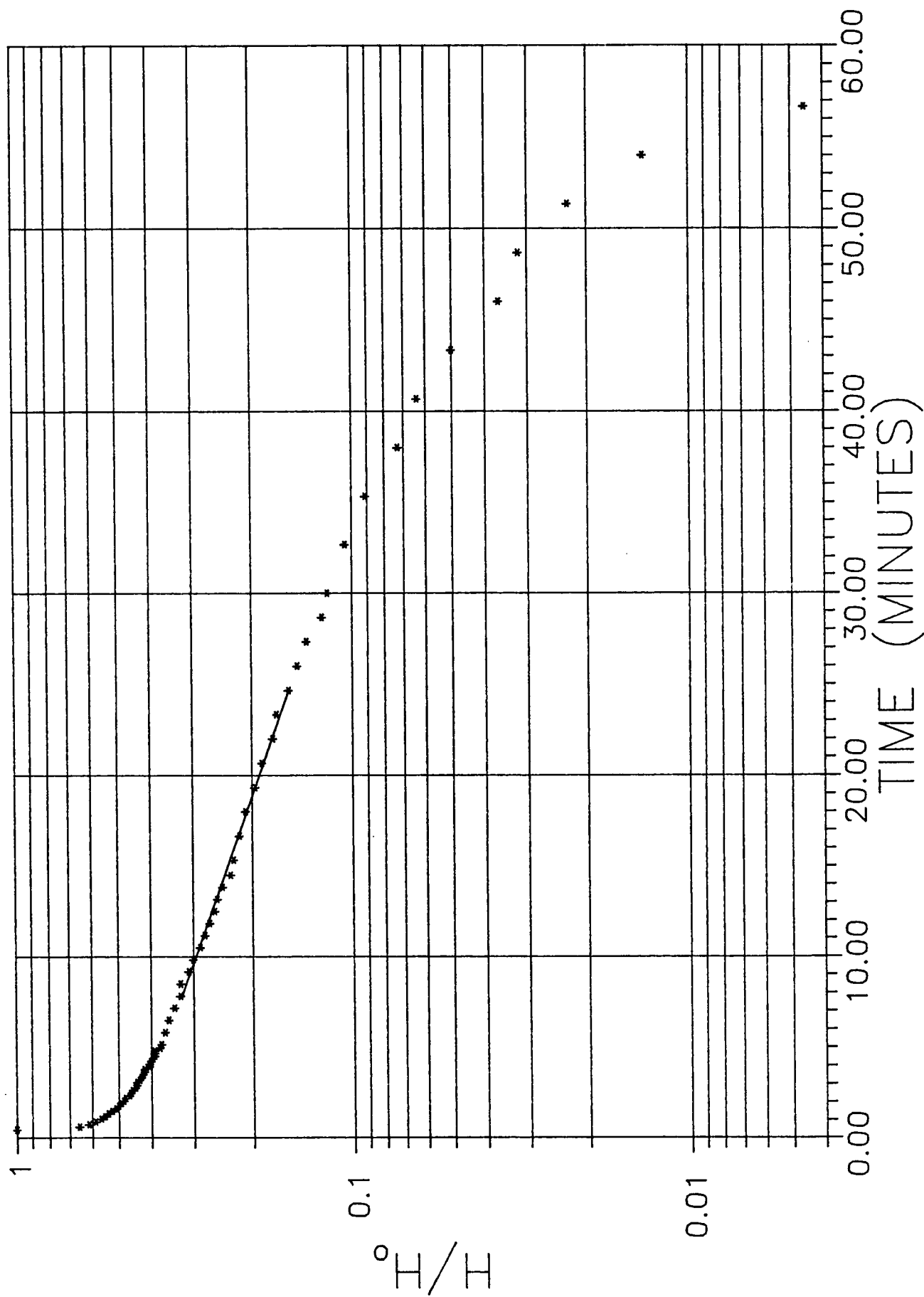
UNCONFINED AQUIFER

 $K = 0.9E-04$ cm/sec= 2.0 gpd/ft²= $0.3E-05$ ft/sec

= 0.3 ft/day

REGRESSION COEFFICIENT = -.9967884

WELL SHS-11 SLUG IN TEST RESULTS



SHS-11 SLUG OUT TEST

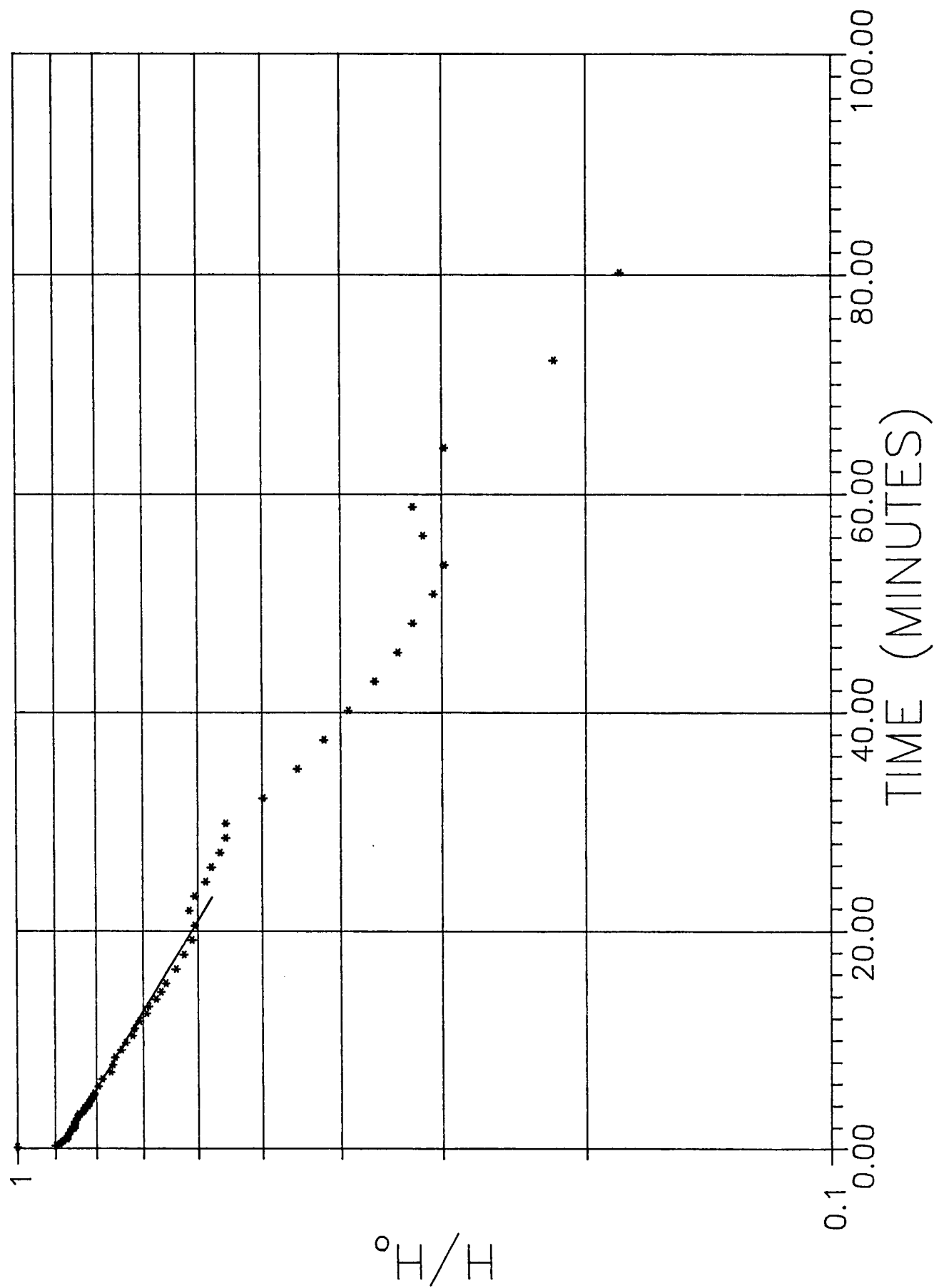
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
53.4	40.13	1.87	.8697684
61.8	40.13	1.87	.8697684
70.2	40.13	1.87	.8697684
79.20001	40.12	1.86	.8651159
87.60001	40.12	1.86	.8651159
96.6	40.11	1.85	.8604663
105	40.11	1.85	.8604663
114	40.09	1.83	.8511627
122.4	40.09	1.83	.8511627
131.4	40.09	1.83	.8511627
139.8	40.09	1.83	.8511627
148.8	40.09	1.83	.8511627
157.2	40.08	1.82	.8465131
166.2	40.08	1.82	.8465131
174.6	40.07	1.81	.8418606
183.6	40.07	1.81	.8418606
192	40.07	1.81	.8418606
201	40.05	1.79	.8325584
209.4	40.04	1.78	.8279073
218.4	40.04	1.78	.8279073
226.8	40.04	1.78	.8279073
235.8	40.02	1.76	.8186052
244.2	40.02	1.76	.8186052
253.2	40.02	1.76	.8186052
261.6	40.01	1.75	.8139526
270	40.01	1.75	.8139526
279	40	1.74	.8093031
287.4	40	1.74	.8093031
296.4	39.99	1.73	.804652
305.4	39.99	1.73	.804652
344.4	39.97	1.71	.7953498
384.6	39.95	1.69	.7860476
424.2	39.91	1.65	.7674419
464.4	39.9	1.64	.7627923
504	39.89	1.63	.7581398
544.2	39.86	1.60	.7441865
584.4	39.84	1.58	.7348844
624.6	39.81	1.55	.7209312
664.2	39.8	1.54	.7162786
704.4	39.78	1.52	.7069765
744.6	39.75	1.49	.6930233
784.2	39.74	1.48	.6883736
824.4	39.71	1.45	.674419
864.6	39.69	1.43	.6651154
909.6	39.67	1.41	.6558132
989.3999	39.63	1.37	.6372104
1069.2	39.6	1.34	.6232557
1149.6	39.57	1.31	.6093025
1229.4	39.56	1.30	.6046514
1309.2	39.58	1.32	.613955
1389.6	39.56	1.30	.6046514

UNCONFINED AQUIFER

K = 0.4E-04 cm/sec
= 0.8 gpd/ft²
= 0.1E-05 ft/sec
= 0.1 ft/day

REGRESSION COEFFICIENT = -.9944542

WELL SHS-11 SLUG OUT TEST RESULT



BHS-12 SLUG IN TEST

TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
54	38.18	-1.85	.9685853
71.4	38.18	-1.85	.9685853
80.4	38.19	-1.84	.9633498
97.8	38.19	-1.84	.9633498
106.2	38.2	-1.83	.9581143
123.6	38.2	-1.83	.9581143
132.6	38.21	-1.82	.9528788
141	38.21	-1.82	.9528788
150	38.22	-1.81	.9476432
158.4	38.22	-1.81	.9476432
167.4	38.23	-1.80	.9424078
175.8	38.23	-1.80	.9424078
184.8	38.23	-1.80	.9424078
193.2	38.23	-1.80	.9424078
202.2	38.23	-1.80	.9424078
210.6	38.24	-1.79	.9371706
219.6	38.24	-1.79	.9371706
228	38.25	-1.78	.9319368
237	38.25	-1.78	.9319368
245.4	38.25	-1.78	.9319368
254.4	38.25	-1.78	.9319368
262.8	38.25	-1.78	.9319368
271.8	38.26	-1.77	.9267012
280.2	38.26	-1.77	.9267012
288.6	38.27	-1.76	.9214658
297.6	38.27	-1.76	.9214658
309.6	38.28	-1.75	.9162302
349.2	38.28	-1.75	.9162302
389.4	38.3	-1.73	.9057592
429	38.31	-1.72	.9005221
469.2	38.31	-1.72	.9005221
509.4	38.32	-1.71	.8952882
549.6	38.33	-1.70	.8900511
589.2	38.35	-1.68	.8795817
629.4	38.36	-1.67	.8743445
669.6	38.38	-1.65	.8638736
709.2	38.39	-1.64	.858638
749.4	38.4	-1.63	.8534009
789	38.41	-1.62	.848167
829.2	38.43	-1.60	.837696
869.3999	38.45	-1.58	.8272233
919.1999	38.46	-1.57	.8219895
999.6	38.49	-1.54	.8062813
1079.4	38.51	-1.52	.795812
1159.2	38.55	-1.48	.7748683
1239.6	38.6	-1.43	.7486908
1319.4	38.65	-1.38	.7225115
1399.2	38.69	-1.34	.7015712
1479.6	38.71	-1.32	.6910985
1559.4	38.74	-1.29	.6753903
1639.2	38.78	-1.25	.65445
1719	38.8	-1.23	.6439789
1799.4	38.83	-1.20	.6282708
1959.6	38.87	-1.16	.6073287
2119.2	38.88	-1.15	.6020933
2279.4	38.92	-1.11	.5811512
2439.6	38.94	-1.09	.5706802
2599.8	38.98	-1.05	.5497382
2759.4	39.04	-0.99	.5183235
2919.6	39.07	-0.96	.502617

UNCONFINED AQUIFER

K = 0.3E-04 cm/sec

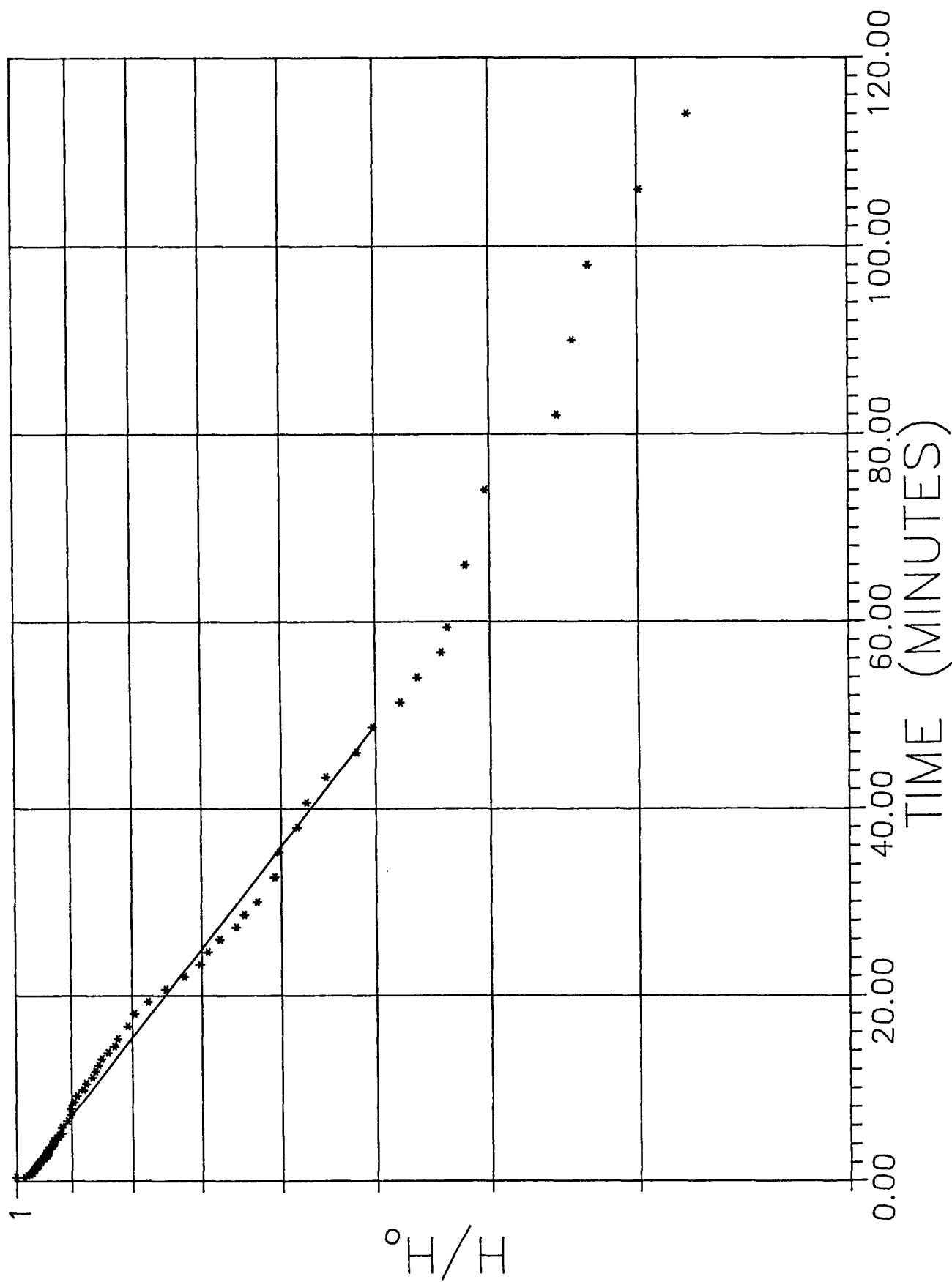
= 0.6 gpd/ft²

= 0.1E-05 ft/sec

= 0.1 ft/day

REGRESSION COEFFICIENT = -.9959792

WELL SHS-12 SLUG IN TEST RESULTS



SHS-13 SLUG IN TEST

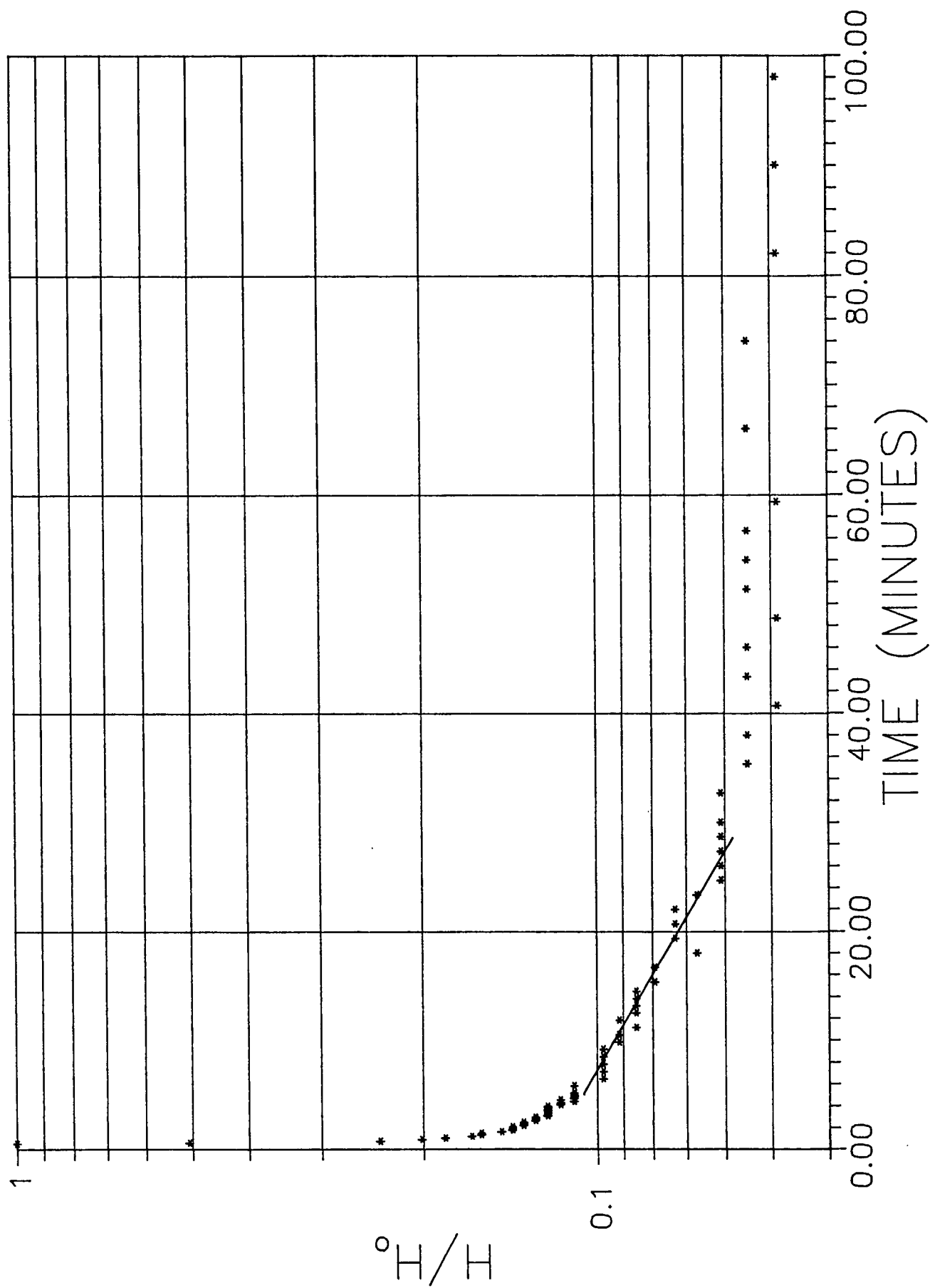
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/H0
297.6	36.75	-0.18	.1097561
309.6	36.75	-0.18	.1097561
349.8	36.75	-0.18	.1097561
389.4	36.77	-0.16	.0975593
429.6	36.77	-0.16	.0975593
469.8	36.77	-0.16	.0975593
509.4	36.77	-0.16	.0975593
549.6	36.77	-0.16	.0975593
589.2	36.78	-0.15	9.146375E-02
629.4	36.78	-0.15	9.146375E-02
669.6	36.79	-0.14	8.536439E-02
709.8	36.78	-0.15	9.146375E-02
750	36.79	-0.14	8.536439E-02
789.6	36.79	-0.14	8.536439E-02
829.8	36.79	-0.14	8.536439E-02
869.3999	36.79	-0.14	8.536439E-02
919.8	36.8	-0.13	7.926885E-02
999.6	36.8	-0.13	7.926885E-02
1079.4	36.82	-0.11	6.707202E-02
1159.8	36.81	-0.12	7.316948E-02
1239.6	36.81	-0.12	7.316948E-02
1319.4	36.81	-0.12	7.316948E-02
1399.8	36.82	-0.11	6.707202E-02
1479.6	36.83	-0.10	6.097457E-02
1559.4	36.83	-0.10	6.097457E-02
1639.8	36.83	-0.10	6.097457E-02
1719.6	36.83	-0.10	6.097457E-02

UNCONFINED AQUIFER

K = 0.5E-04 cm/sec
= 1.1 gpd/ft²
= 0.2E-05 ft/sec
= 0.2 ft/day

REGRESSION COEFFICIENT = -.9763559

WELL SHS-13 SLUG IN TEST RESULTS



SHS-14 SLUG IN TEST

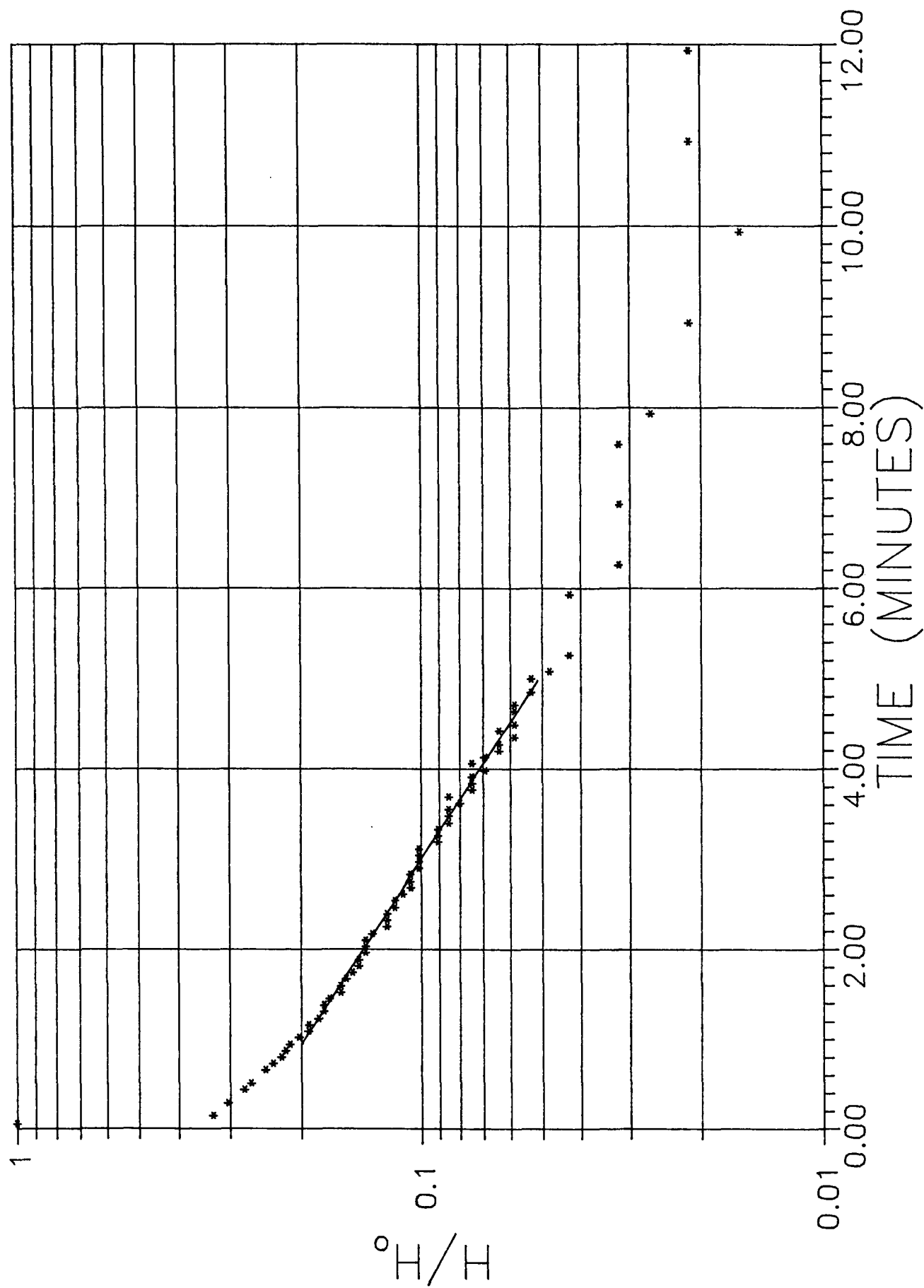
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
56.4	34.88	-0.40	.2127658
61.2	34.9	-0.38	.202126
65.4	34.92	-0.36	.1914895
69.6	34.92	-0.36	.1914895
73.8	34.94	-0.34	.1808514
78.6	34.95	-0.33	.1755307
82.8	34.95	-0.33	.1755307
87	34.96	-0.32	.1702133
91.2	34.98	-0.30	.1595735
95.4	34.98	-0.30	.1595735
100.2	34.99	-0.29	.1542544
104.4	35	-0.28	.1489354
108.6	35.01	-0.27	.143618
112.8	35.01	-0.27	.143618
117.6	35.02	-0.26	.1382972
121.8	35.02	-0.26	.1382972
126	35.02	-0.26	.1382972
130.2	35.03	-0.25	.1329782
135	35.05	-0.23	.1223401
139.2	35.05	-0.23	.1223401
143.4	35.05	-0.23	.1223401
147.6	35.06	-0.22	.1170193
152.4	35.06	-0.22	.1170193
156.6	35.07	-0.21	.1117019
160.8	35.08	-0.20	.1063812
165	35.08	-0.20	.1063812
169.8	35.08	-0.20	.1063812
174	35.09	-0.19	.1010638
178.2	35.09	-0.19	.1010638
182.4	35.09	-0.19	.1010638
186.6	35.09	-0.19	.1010638
191.4	35.11	-0.17	9.042402E-02
195.6	35.11	-0.17	9.042402E-02
199.8	35.11	-0.17	9.042402E-02
204	35.12	-0.16	8.510663E-02
208.8	35.12	-0.16	8.510663E-02
213	35.12	-0.16	8.510663E-02
217.2	35.13	-0.15	7.978591E-02
221.4	35.12	-0.16	8.510663E-02
226.2	35.14	-0.14	7.446685E-02
230.4	35.14	-0.14	7.446685E-02
234.6	35.14	-0.14	7.446685E-02
238.8	35.15	-0.13	6.914779E-02
243.6	35.14	-0.14	7.446685E-02
247.8	35.15	-0.13	6.914779E-02
252	35.16	-0.12	6.382872E-02
256.2	35.16	-0.12	6.382872E-02
261	35.17	-0.11	5.851133E-02
265.2	35.16	-0.12	6.382872E-02
269.4	35.17	-0.11	5.851133E-02
278.4	35.17	-0.11	5.851133E-02
282.6	35.17	-0.11	5.851133E-02
291	35.18	-0.10	5.319061E-02
300	35.18	-0.10	5.319061E-02

UNCONFINED AQUIFER

$K = 0.6E-03$ cm/sec
 $= 12.1$ gpd/ft²
 $= 0.2E-04$ ft/sec
 $= 1.6$ ft/day

REGRESSION COEFFICIENT = -.9968298

WELL SHS-14 SLUG IN TEST RESULTS



SHS-14 SLUG OUT TEST

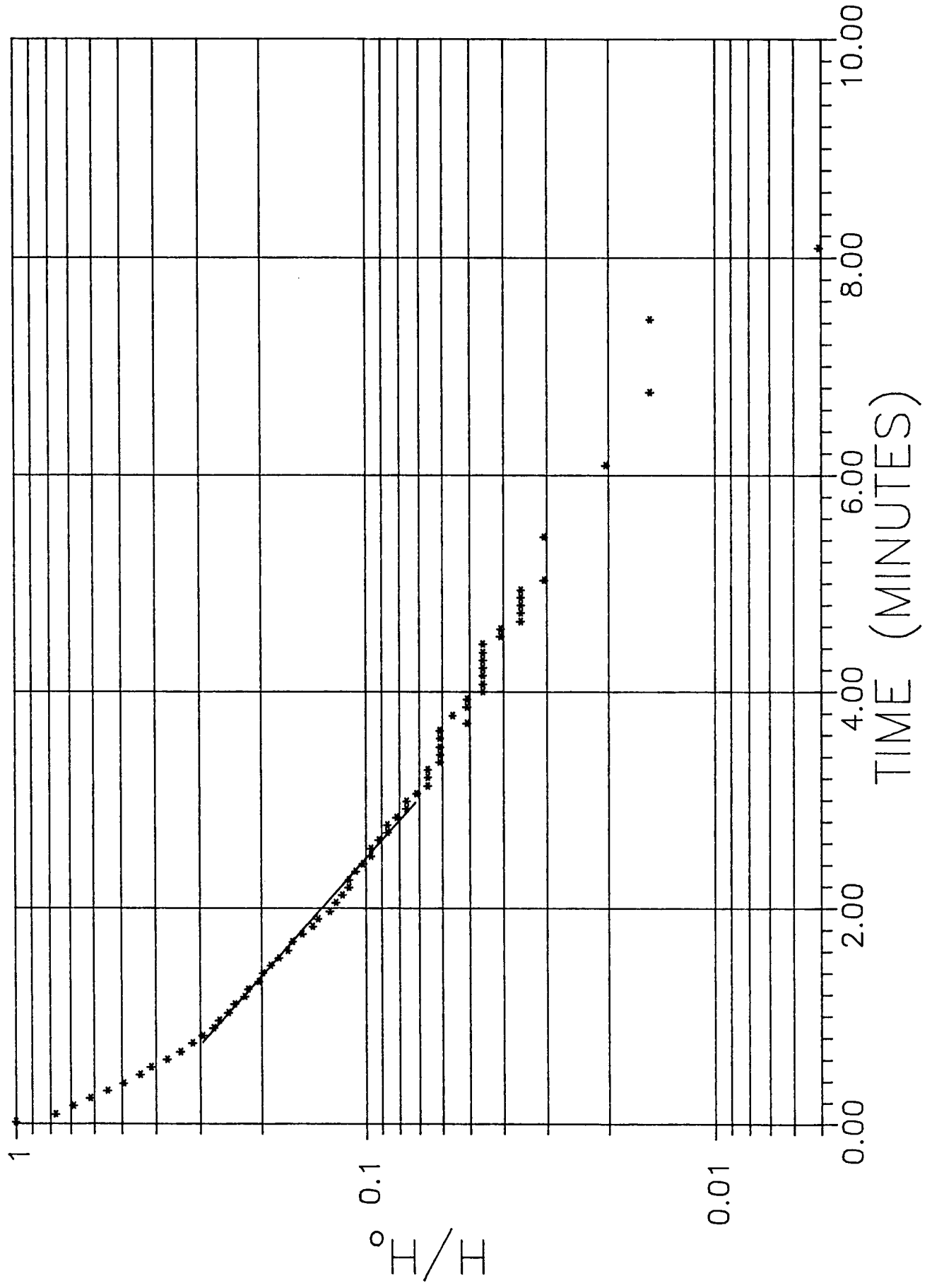
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
45	35.9	0.62	.3147228
49.2	35.86	0.58	.294417
53.4	35.82	0.54	.2741128
57.6	35.8	0.52	.2639592
61.8	35.77	0.49	.2487326
66.6	35.75	0.47	.2385789
70.8	35.72	0.44	.2233524
75	35.71	0.43	.2182747
79.20001	35.68	0.40	.2030466
84	35.67	0.39	.197969
88.20001	35.65	0.37	.1878184
92.39999	35.63	0.35	.1776664
96.6	35.61	0.33	.1675143
101.4	35.6	0.32	.1624366
105.6	35.58	0.30	.1522861
109.8	35.56	0.28	.142134
114	35.55	0.27	.1370564
118.2	35.53	0.25	.1269043
123	35.52	0.24	.1218283
127.2	35.51	0.23	.1167506
131.4	35.5	0.22	.1116762
135.6	35.5	0.22	.1116762
140.4	35.49	0.21	.1066001
144.6	35.48	0.20	.1015241
148.8	35.47	0.19	9.644804E-02
153	35.47	0.19	9.644804E-02
157.8	35.46	0.18	9.137041E-02
162	35.45	0.17	8.629595E-02
166.2	35.45	0.17	8.629595E-02
170.4	35.44	0.16	8.121832E-02
175.2	35.43	0.15	7.614386E-02
179.4	35.43	0.15	7.614386E-02

UNCONFINED AQUIFER

K = 0.1E-02 cm/sec
= 22.8 gpd/ft²
= 0.4E-04 ft/sec
= 3.0 ft/day

REGRESSION COEFFICIENT = -.9967432

WELL SHS-14 SLUG OUT TEST RESULT



SHS-15 SLUG IN TEST

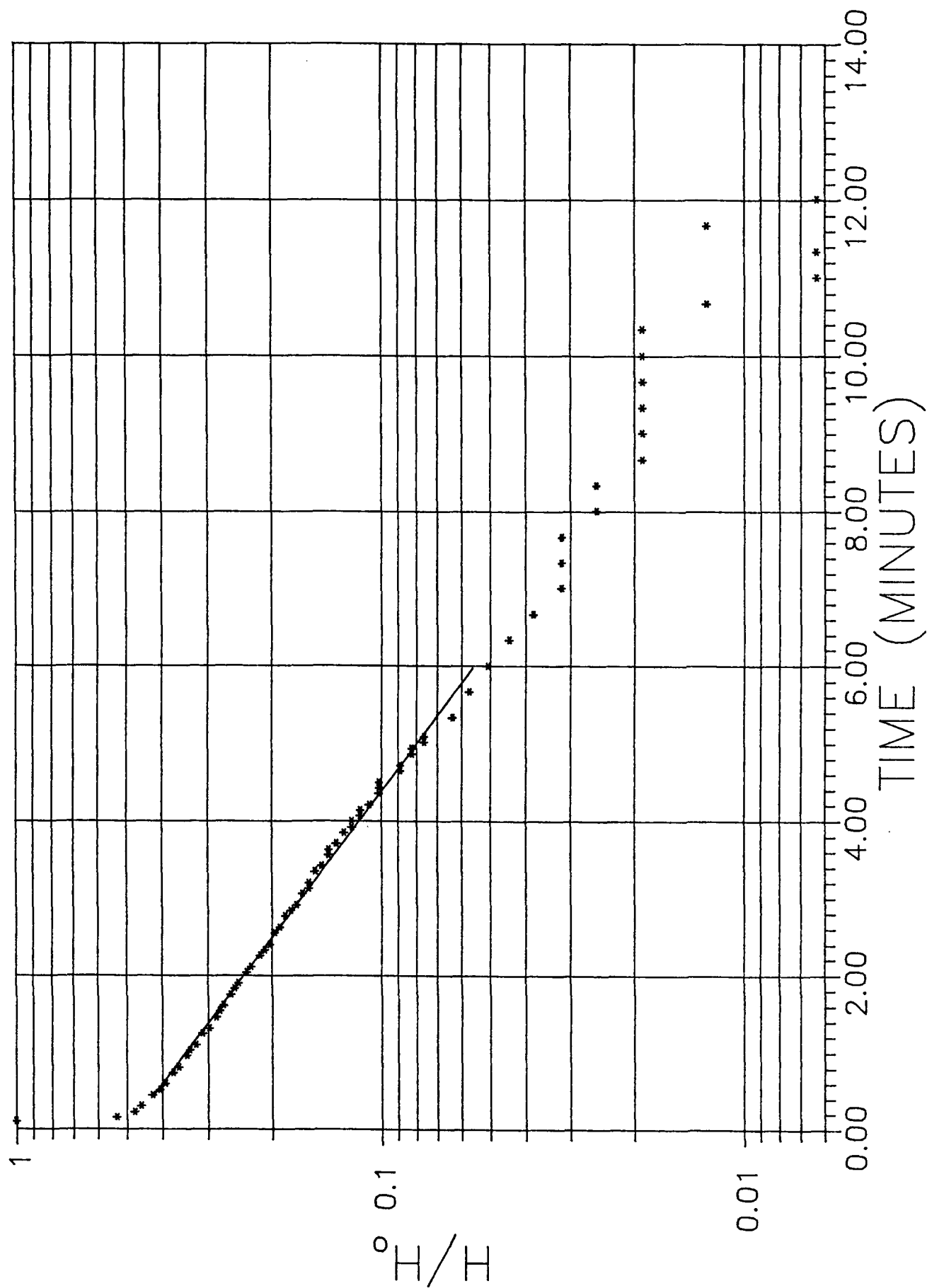
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/H0
27	33.52	-0.67	.424051
31.2	33.55	-0.64	.405064
36	33.57	-0.62	.392406
44.4	33.6	-0.59	.373419
48.6	33.62	-0.57	.360761
57.6	33.65	-0.54	.341772
61.8	33.66	-0.53	.335443
66	33.68	-0.51	.322785
75	33.7	-0.49	.310127
79.20001	33.72	-0.47	.297467
87.60001	33.74	-0.45	.284809
92.39999	33.75	-0.44	.278482
96.6	33.76	-0.43	.272153
105	33.78	-0.41	.259495
109.8	33.79	-0.40	.253164
114	33.8	-0.39	.246837
122.4	33.82	-0.37	.234177
126.6	33.83	-0.36	.227848
135.6	33.85	-0.34	.21519
139.8	33.86	-0.33	.208861
144	33.87	-0.32	.202532
153	33.88	-0.31	.196203
157.2	33.89	-0.30	.189874
166.2	33.9	-0.29	.183543
170.4	33.91	-0.28	.177216
174.6	33.92	-0.27	.170887
183.6	33.93	-0.26	.164558
187.8	33.94	-0.25	.158229
192	33.94	-0.25	.158229
201	33.95	-0.24	.151898
205.2	33.96	-0.23	.145571
213.6	33.97	-0.22	.13924
217.8	33.97	-0.22	.13924
222.6	33.98	-0.21	.132911
231	33.99	-0.20	.126582
235.2	34	-0.19	.120253
240	34	-0.19	.120253
244.2	34.01	-0.18	.113926
248.4	34.01	-0.18	.113926
252.6	34.02	-0.17	.107595
261.6	34.03	-0.16	.101266
265.8	34.03	-0.16	.101266
270	34.03	-0.16	.101266
279	34.05	-0.14	8.860799E-02
283.2	34.05	-0.14	8.860799E-02
292.2	34.06	-0.13	8.227701E-02
296.4	34.06	-0.13	8.227701E-02
301.2	34.07	-0.12	.07595
305.4	34.07	-0.12	.07595
320.4	34.09	-0.10	6.329001E-02
340.2	34.1	-0.09	5.696299E-02
360	34.11	-0.08	5.063201E-02

UNCONFINED AQUIFER

$K = 0.8E-03$ cm/sec
 $= 16.4$ gpd/ft²
 $= 0.3E-04$ ft/sec
 $= 2.2$ ft/day

REGRESSION COEFFICIENT = -.9982506

WELL SHS-15 SLUG IN TEST RESULTS



SHS-15 SLUG OUT TEST

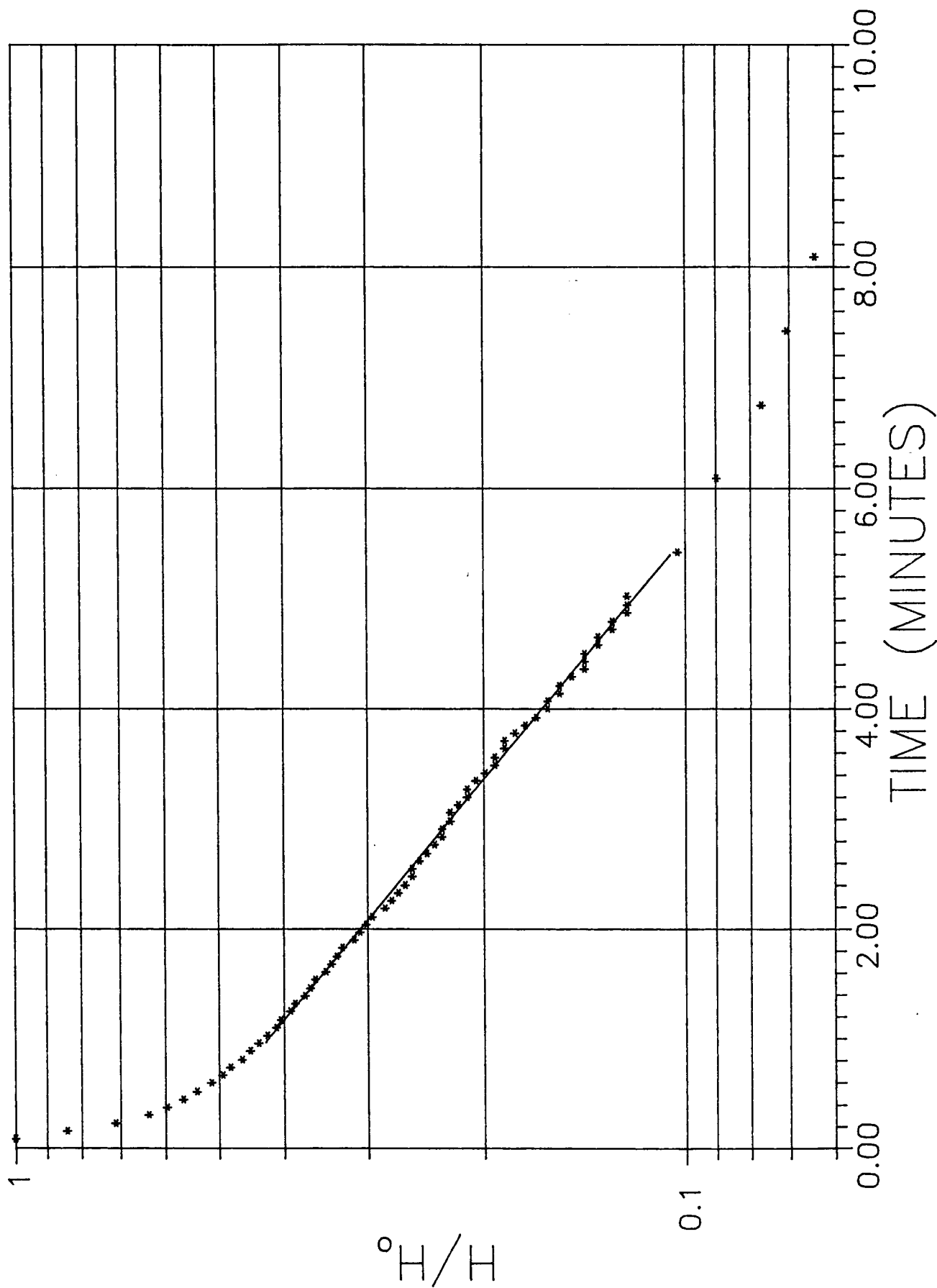
TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
57.6	34.87	0.68	.4358976
61.8	34.85	0.66	.4230773
66	34.83	0.64	.4102571
70.2	34.82	0.63	.4038469
75	34.8	0.61	.3910246
79.20001	34.79	0.60	.3846165
83.4	34.77	0.58	.3717962
87.60001	34.76	0.57	.3653841
92.39999	34.75	0.56	.3589739
96.6	34.73	0.54	.3461536
100.8	34.72	0.53	.3397455
105	34.71	0.52	.3333334
109.8	34.7	0.51	.3269232
114	34.68	0.49	.3141029
118.2	34.67	0.48	.3076908
122.4	34.66	0.47	.3012827
126.6	34.65	0.46	.2948725
131.4	34.63	0.44	.2820522
135.6	34.62	0.43	.2756401
139.8	34.61	0.42	.2692319
144	34.6	0.41	.2628198
148.8	34.59	0.40	.2564097
153	34.59	0.40	.2564097
157.2	34.58	0.39	.2500015
161.4	34.57	0.38	.2435894
166.2	34.56	0.37	.2371812
170.4	34.55	0.36	.2307691
174.6	34.55	0.36	.2307691
178.8	34.54	0.35	.2243589
183.6	34.54	0.35	.2243589
187.8	34.53	0.34	.2179488
192	34.52	0.33	.2115387
196.2	34.52	0.33	.2115387
201	34.51	0.32	.2051265
205.2	34.5	0.31	.1987184
209.4	34.49	0.30	.1923082
213.6	34.49	0.30	.1923082
218.4	34.48	0.29	.1858981
222.6	34.48	0.29	.1858981
226.8	34.47	0.28	.1794879
231	34.46	0.27	.1730758
235.2	34.45	0.26	.1666677
240	34.44	0.25	.1602555
244.2	34.44	0.25	.1602555
248.4	34.43	0.24	.1538474
252.6	34.43	0.24	.1538474
257.4	34.42	0.23	.1474353
261.6	34.41	0.22	.1410251
265.8	34.41	0.22	.1410251
270	34.41	0.22	.1410251
274.8	34.4	0.21	.134617
279	34.4	0.21	.134617
283.2	34.39	0.20	.1282048
287.4	34.39	0.20	.1282048
292.2	34.38	0.19	.1217967
296.4	34.38	0.19	.1217967
301.2	34.38	0.19	.1217967
325.2	34.35	0.16	.1025623

UNCONFINED AQUIFER

$K = 0.7E-03$ cm/sec
 $= 14.2$ qpd/ft²
 $= 0.2E-04$ ft/sec
 $= 1.9$ ft/day

REGRESSION COEFFICIENT = -.999109

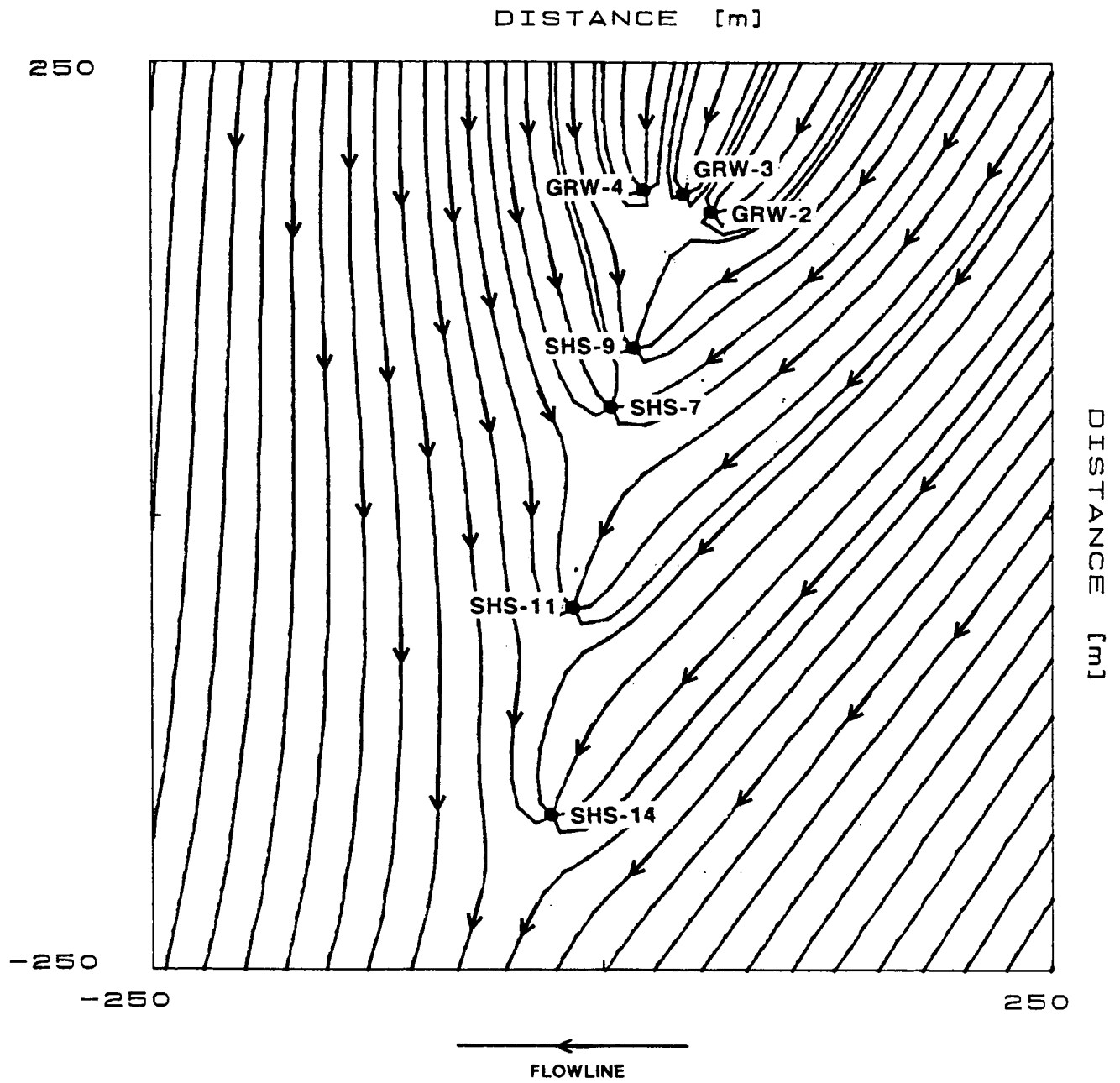
WELL SHS-15 SLUG OUT TEST RESULT



APPENDIX E

RESSQ Output

RESSQ PLOT: 310850.PLT



PRACTICAL SYSTEM OF UNITS IS USED

REGIONAL FLOW, PORE VELOCITY	=	4.48 M/YR
ORIENTATION OF REGIONAL FLOW	=	70.00 DEGREES
THICKNESS OF THE AQUIFER	=	19.05 METERS
POROSITY	=	30.00 PERCENT
PERIOD STUDIED	=	200.00 YEARS
INITIAL AQUIFER CONCENTRATION	=	0.000E-01
DEFAULT INJECTION CONCENTRATION	=	1.000E+02
STREAMLINE STEP LENGTH	=	5.00 METERS
ADSORPTION CAPACITY OF ROCK	=	00.00 PERCENT

37 INJECTION WELLS

WELL NAME	X METERS	Y METERS	FLOW-RATE M3/H	CONCENTRATION	RADIUS METERS	INDICATOR
SHS-11	-17.10	-50.40	0.23	1.00E+02	7.50E-02	-1
SHS-7	4.70	60.60	0.23	1.00E+02	7.50E-02	-1
SHS-9	17.60	92.90	0.23	1.00E+02	7.50E-02	-1
GRW-2	61.10	169.00	0.23	1.00E+02	7.50E-02	-1
GRW-3	45.70	179.20	0.23	1.00E+02	7.50E-02	-1
GRW-4	23.30	179.90	0.23	1.00E+02	7.50E-02	-1
ZQ1	-270.00	-270.00	0.00	1.00E+02	7.50E-02	0
ZQ2	-250.00	-277.20	0.00	1.00E+02	7.50E-02	0
ZQ3	-230.00	-284.00	0.00	1.00E+02	7.50E-02	0
ZQ4	-210.00	-292.00	0.00	1.00E+02	7.50E-02	0
ZQ5	-190.00	-299.00	0.00	1.00E+02	7.50E-02	0
ZQ6	-170.00	-306.00	0.00	1.00E+02	7.50E-02	0
ZQ7	-150.00	-313.00	0.00	1.00E+02	7.50E-02	0
ZQ8	-130.00	-320.00	0.00	1.00E+02	7.50E-02	0
ZQ9	-110.00	-328.00	0.00	1.00E+02	7.50E-02	0
ZQ10	-90.00	-335.00	0.00	1.00E+02	7.50E-02	0
ZQ11	-70.00	-342.00	0.00	1.00E+02	7.50E-02	0
ZQ12	-50.00	-349.00	0.00	1.00E+02	7.50E-02	0
ZQ13	-30.00	-356.00	0.00	1.00E+02	7.50E-02	0
ZQ14	-10.00	-364.00	0.00	1.00E+02	7.50E-02	0
ZQ15	10.00	-371.00	0.00	1.00E+02	7.50E-02	0
ZQ16	30.00	-378.00	0.00	1.00E+02	7.50E-02	0
ZQ17	50.00	-385.00	0.00	1.00E+02	7.50E-02	0
ZQ18	70.00	-392.00	0.00	1.00E+02	7.50E-02	0
ZQ19	90.00	-400.00	0.00	1.00E+02	7.50E-02	0
ZQ20	110.00	-407.00	0.00	1.00E+02	7.50E-02	0
ZQ21	130.00	-414.00	0.00	1.00E+02	7.50E-02	0
ZQ22	150.00	-421.00	0.00	1.00E+02	7.50E-02	0
ZQ23	170.00	-428.00	0.00	1.00E+02	7.50E-02	0
ZQ24	190.00	-435.00	0.00	1.00E+02	7.50E-02	0
ZQ25	-290.00	-263.00	0.00	1.00E+02	7.50E-02	0
ZQ26	-310.00	-256.00	0.00	1.00E+02	7.50E-02	0
ZQ27	-330.00	-248.00	0.00	1.00E+02	7.50E-02	0
ZQ28	-350.00	-241.00	0.00	1.00E+02	7.50E-02	0
ZQ29	-370.00	-234.00	0.00	1.00E+02	7.50E-02	0
ZQ30	-390.00	-227.00	0.00	1.00E+02	7.50E-02	0
SHS-14	-29.40	-165.00	0.23	1.00E+02	7.50E-02	-1

STREAMLINES DEPARTING FROM INJECTION WELL SHS-11

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	++++none++++	200.8 YEARS	0.0
2	++++none++++	200.8 YEARS	8.0
3	++++none++++	200.8 YEARS	16.0
4	++++none++++	200.8 YEARS	24.0
5	++++none++++	200.9 YEARS	32.0
6	++++none++++	200.1 YEARS	40.0
7	++++none++++	200.3 YEARS	48.0
8	++++none++++	200.6 YEARS	56.0
9	++++none++++	201.0 YEARS	64.0
10	++++none++++	200.5 YEARS	72.0
11	++++none++++	200.1 YEARS	80.0
12	++++none++++	200.1 YEARS	88.0
13	++++none++++	200.4 YEARS	96.0
14	++++none++++	200.4 YEARS	104.0
15	++++none++++	200.9 YEARS	112.0
16	++++none++++	200.3 YEARS	120.0
17	++++none++++	200.3 YEARS	128.0
18	++++none++++	200.7 YEARS	136.0
19	++++none++++	200.8 YEARS	144.0
20	++++none++++	200.2 YEARS	152.0
21	++++none++++	200.9 YEARS	160.0
22	++++none++++	200.7 YEARS	168.0
23	++++none++++	200.7 YEARS	176.0
24	++++none++++	200.7 YEARS	184.0
25	++++none++++	200.8 YEARS	192.0
26	++++none++++	200.0 YEARS	200.0
27	++++none++++	200.4 YEARS	208.0
28	++++none++++	200.9 YEARS	216.0
29	++++none++++	200.5 YEARS	224.0
30	++++none++++	200.6 YEARS	232.0
31	++++none++++	200.4 YEARS	240.0
32	++++none++++	200.9 YEARS	248.0
33	++++none++++	200.5 YEARS	256.0
34	++++none++++	200.5 YEARS	264.0
35	++++none++++	200.2 YEARS	272.0
36	++++none++++	200.4 YEARS	280.0
37	++++none++++	200.8 YEARS	288.0
38	++++none++++	200.4 YEARS	296.0
39	++++none++++	200.0 YEARS	304.0
40	++++none++++	200.7 YEARS	312.0
41	++++none++++	200.5 YEARS	320.0
42	++++none++++	200.3 YEARS	328.0
43	++++none++++	200.1 YEARS	336.0
44	++++none++++	201.0 YEARS	344.0
45	++++none++++	200.9 YEARS	352.0

STREAMLINES DEPARTING FROM INJECTION WELL SHS-7

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.3 YEARS	0.0
2	+++none+++	200.1 YEARS	8.0
3	+++none+++	201.0 YEARS	16.0
4	+++none+++	200.9 YEARS	24.0
5	+++none+++	200.8 YEARS	32.0
6	+++none+++	200.7 YEARS	40.0
7	+++none+++	200.8 YEARS	48.0
8	+++none+++	200.0 YEARS	56.0
9	+++none+++	200.6 YEARS	64.0
10	+++none+++	200.7 YEARS	72.0
11	+++none+++	200.2 YEARS	80.0
12	+++none+++	200.1 YEARS	88.0
13	+++none+++	200.1 YEARS	96.0
14	+++none+++	200.1 YEARS	104.0
15	+++none+++	200.2 YEARS	112.0
16	+++none+++	200.4 YEARS	120.0
17	+++none+++	200.5 YEARS	128.0
18	+++none+++	200.7 YEARS	136.0
19	+++none+++	201.0 YEARS	144.0
20	+++none+++	200.2 YEARS	152.0
21	+++none+++	200.4 YEARS	160.0
22	+++none+++	200.7 YEARS	168.0
23	+++none+++	201.0 YEARS	176.0
24	+++none+++	200.3 YEARS	184.0
25	+++none+++	200.7 YEARS	192.0
26	+++none+++	200.1 YEARS	200.0
27	+++none+++	200.6 YEARS	208.0
28	+++none+++	200.2 YEARS	216.0
29	+++none+++	201.0 YEARS	224.0
30	+++none+++	200.0 YEARS	232.0
31	+++none+++	200.7 YEARS	240.0
32	+++none+++	200.6 YEARS	248.0
33	+++none+++	200.3 YEARS	256.0
34	+++none+++	200.1 YEARS	264.0
35	+++none+++	200.3 YEARS	272.0
36	+++none+++	200.2 YEARS	280.0
37	+++none+++	200.4 YEARS	288.0
38	+++none+++	200.8 YEARS	296.0
39	+++none+++	200.3 YEARS	304.0
40	+++none+++	201.0 YEARS	312.0
41	+++none+++	200.6 YEARS	320.0
42	+++none+++	200.3 YEARS	328.0
43	+++none+++	201.0 YEARS	336.0
44	+++none+++	200.8 YEARS	344.0
45	+++none+++	200.5 YEARS	352.0

STREAMLINES DEPARTING FROM INJECTION WELL GRW-2

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.6 YEARS	0.0
2	+++none+++	200.5 YEARS	8.0
3	+++none+++	200.5 YEARS	16.0
4	+++none+++	200.5 YEARS	24.0
5	+++none+++	200.4 YEARS	32.0
6	+++none+++	200.4 YEARS	40.0
7	+++none+++	200.3 YEARS	48.0
8	+++none+++	200.3 YEARS	56.0
9	+++none+++	200.2 YEARS	64.0
10	+++none+++	200.1 YEARS	72.0
11	+++none+++	200.1 YEARS	80.0
12	+++none+++	200.0 YEARS	88.0
13	+++none+++	201.0 YEARS	96.0
14	+++none+++	200.9 YEARS	104.0
15	+++none+++	200.8 YEARS	112.0
16	+++none+++	200.8 YEARS	120.0
17	+++none+++	200.7 YEARS	128.0
18	+++none+++	200.7 YEARS	136.0
19	+++none+++	200.7 YEARS	144.0
20	+++none+++	200.7 YEARS	152.0
21	+++none+++	200.3 YEARS	160.0
22	+++none+++	200.4 YEARS	168.0
23	+++none+++	200.6 YEARS	176.0
24	+++none+++	200.4 YEARS	184.0
25	+++none+++	201.0 YEARS	192.0
26	+++none+++	200.4 YEARS	200.0
27	+++none+++	200.9 YEARS	208.0
28	+++none+++	200.3 YEARS	216.0
29	+++none+++	200.7 YEARS	224.0
30	+++none+++	200.9 YEARS	232.0
31	+++none+++	200.5 YEARS	240.0
32	+++none+++	200.3 YEARS	248.0
33	+++none+++	200.1 YEARS	256.0
34	+++none+++	200.0 YEARS	264.0
35	+++none+++	200.9 YEARS	272.0
36	+++none+++	200.9 YEARS	280.0
37	+++none+++	200.8 YEARS	288.0
38	+++none+++	200.8 YEARS	296.0
39	+++none+++	200.7 YEARS	304.0
40	+++none+++	200.7 YEARS	312.0
41	+++none+++	200.7 YEARS	320.0
42	+++none+++	200.7 YEARS	328.0
43	+++none+++	200.6 YEARS	336.0
44	+++none+++	200.6 YEARS	344.0
45	+++none+++	200.6 YEARS	352.0

STREAMLINES DEPARTING FROM INJECTION WELL SHS-9

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.5 YEARS	0.0
2	+++none+++	200.6 YEARS	8.0
3	+++none+++	200.6 YEARS	16.0
4	+++none+++	200.8 YEARS	24.0
5	+++none+++	201.0 YEARS	32.0
6	+++none+++	200.3 YEARS	40.0
7	+++none+++	200.8 YEARS	48.0
8	+++none+++	200.5 YEARS	56.0
9	+++none+++	201.0 YEARS	64.0
10	+++none+++	200.1 YEARS	72.0
11	+++none+++	200.0 YEARS	80.0
12	+++none+++	200.9 YEARS	88.0
13	+++none+++	200.3 YEARS	96.0
14	+++none+++	200.5 YEARS	104.0
15	+++none+++	200.6 YEARS	112.0
16	+++none+++	200.0 YEARS	120.0
17	+++none+++	200.7 YEARS	128.0
18	+++none+++	200.5 YEARS	136.0
19	+++none+++	200.3 YEARS	144.0
20	+++none+++	200.3 YEARS	152.0
21	+++none+++	200.2 YEARS	160.0
22	+++none+++	200.2 YEARS	168.0
23	+++none+++	200.3 YEARS	176.0
24	+++none+++	200.3 YEARS	184.0
25	+++none+++	200.4 YEARS	192.0
26	+++none+++	200.6 YEARS	200.0
27	+++none+++	200.7 YEARS	208.0
28	+++none+++	200.9 YEARS	216.0
29	+++none+++	200.2 YEARS	224.0
30	+++none+++	201.0 YEARS	232.0
31	+++none+++	200.0 YEARS	240.0
32	+++none+++	200.7 YEARS	248.0
33	+++none+++	200.9 YEARS	256.0
34	+++none+++	200.7 YEARS	264.0
35	+++none+++	200.8 YEARS	272.0
36	+++none+++	200.5 YEARS	280.0
37	+++none+++	200.3 YEARS	288.0
38	+++none+++	200.1 YEARS	296.0
39	+++none+++	201.0 YEARS	304.0
40	+++none+++	200.8 YEARS	312.0
41	+++none+++	200.7 YEARS	320.0
42	+++none+++	200.6 YEARS	328.0
43	+++none+++	200.6 YEARS	336.0
44	+++none+++	200.5 YEARS	344.0
45	+++none+++	200.5 YEARS	352.0

STREAMLINES DEPARTING FROM INJECTION WELL GRW-3

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.7 YEARS	0.0
2	+++none+++	200.7 YEARS	8.0
3	+++none+++	200.7 YEARS	16.0
4	+++none+++	200.8 YEARS	24.0
5	+++none+++	200.8 YEARS	32.0
6	+++none+++	200.8 YEARS	40.0
7	+++none+++	200.9 YEARS	48.0
8	+++none+++	200.9 YEARS	56.0
9	+++none+++	200.9 YEARS	64.0
10	+++none+++	200.9 YEARS	72.0
11	+++none+++	200.9 YEARS	80.0
12	+++none+++	200.9 YEARS	88.0
13	+++none+++	200.9 YEARS	96.0
14	+++none+++	200.9 YEARS	104.0
15	+++none+++	200.8 YEARS	112.0
16	+++none+++	200.8 YEARS	120.0
17	+++none+++	200.8 YEARS	128.0
18	+++none+++	200.7 YEARS	136.0
19	+++none+++	200.7 YEARS	144.0
20	+++none+++	200.7 YEARS	152.0
21	+++none+++	200.6 YEARS	160.0
22	+++none+++	200.6 YEARS	168.0
23	+++none+++	200.6 YEARS	176.0
24	+++none+++	200.6 YEARS	184.0
25	+++none+++	200.6 YEARS	192.0
26	+++none+++	200.7 YEARS	200.0
27	+++none+++	200.2 YEARS	208.0
28	+++none+++	200.4 YEARS	216.0
29	+++none+++	200.1 YEARS	224.0
30	+++none+++	200.8 YEARS	232.0
31	+++none+++	200.5 YEARS	240.0
32	+++none+++	200.4 YEARS	248.0
33	+++none+++	200.4 YEARS	256.0
34	+++none+++	200.7 YEARS	264.0
35	+++none+++	200.7 YEARS	272.0
36	+++none+++	200.1 YEARS	280.0
37	+++none+++	200.1 YEARS	288.0
38	+++none+++	200.3 YEARS	296.0
39	+++none+++	200.2 YEARS	304.0
40	+++none+++	200.1 YEARS	312.0
41	+++none+++	200.6 YEARS	320.0
42	+++none+++	200.6 YEARS	328.0
43	+++none+++	200.6 YEARS	336.0
44	+++none+++	200.6 YEARS	344.0
45	+++none+++	200.6 YEARS	352.0

STREAMLINES DEPARTING FROM INJECTION WELL GRW-4

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.8 YEARS	0.0
2	+++none+++	200.9 YEARS	3.0
3	+++none+++	200.9 YEARS	16.0
4	+++none+++	201.0 YEARS	24.0
5	+++none+++	201.0 YEARS	32.0
6	+++none+++	200.1 YEARS	40.0
7	+++none+++	200.1 YEARS	48.0
8	+++none+++	200.2 YEARS	56.0
9	+++none+++	200.3 YEARS	64.0
10	+++none+++	200.4 YEARS	72.0
11	+++none+++	200.4 YEARS	80.0
12	+++none+++	200.5 YEARS	88.0
13	+++none+++	200.6 YEARS	96.0
14	+++none+++	200.6 YEARS	104.0
15	+++none+++	200.7 YEARS	112.0
16	+++none+++	200.7 YEARS	120.0
17	+++none+++	200.8 YEARS	128.0
18	+++none+++	200.8 YEARS	136.0
19	+++none+++	200.9 YEARS	144.0
20	+++none+++	200.9 YEARS	152.0
21	+++none+++	200.9 YEARS	160.0
22	+++none+++	201.0 YEARS	168.0
23	+++none+++	201.0 YEARS	176.0
24	+++none+++	201.0 YEARS	184.0
25	+++none+++	200.0 YEARS	192.0
26	+++none+++	200.1 YEARS	200.0
27	+++none+++	200.1 YEARS	208.0
28	+++none+++	200.2 YEARS	216.0
29	+++none+++	200.2 YEARS	224.0
30	+++none+++	200.3 YEARS	232.0
31	+++none+++	200.5 YEARS	240.0
32	+++none+++	200.6 YEARS	248.0
33	+++none+++	200.9 YEARS	256.0
34	+++none+++	200.1 YEARS	264.0
35	+++none+++	201.0 YEARS	272.0
36	+++none+++	200.5 YEARS	280.0
37	+++none+++	200.2 YEARS	288.0
38	+++none+++	200.1 YEARS	296.0
39	+++none+++	200.8 YEARS	304.0
40	+++none+++	200.5 YEARS	312.0
41	+++none+++	200.7 YEARS	320.0
42	+++none+++	200.5 YEARS	328.0
43	+++none+++	200.4 YEARS	336.0
44	+++none+++	200.9 YEARS	344.0
45	+++none+++	200.8 YEARS	352.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ1

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.8 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ2

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.7 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ3

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.8 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ4

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.2 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ5

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.8 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ6

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.9 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ7

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.4 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ8

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.8 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ9

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.4 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ10

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.0 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ11

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.5 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ12

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.7 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ13

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.8 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ14

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.5 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ15

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.4 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ16

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.5 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ17

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.8 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ18

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.3 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ19

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.9 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ20

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.5 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ21

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.2 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ22

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	201.0 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ23

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.8 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ24

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.6 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ25

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.1 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ26

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.4 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ27

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.9 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ28

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.4 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL ZQ29

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.1 YEARS	0.0

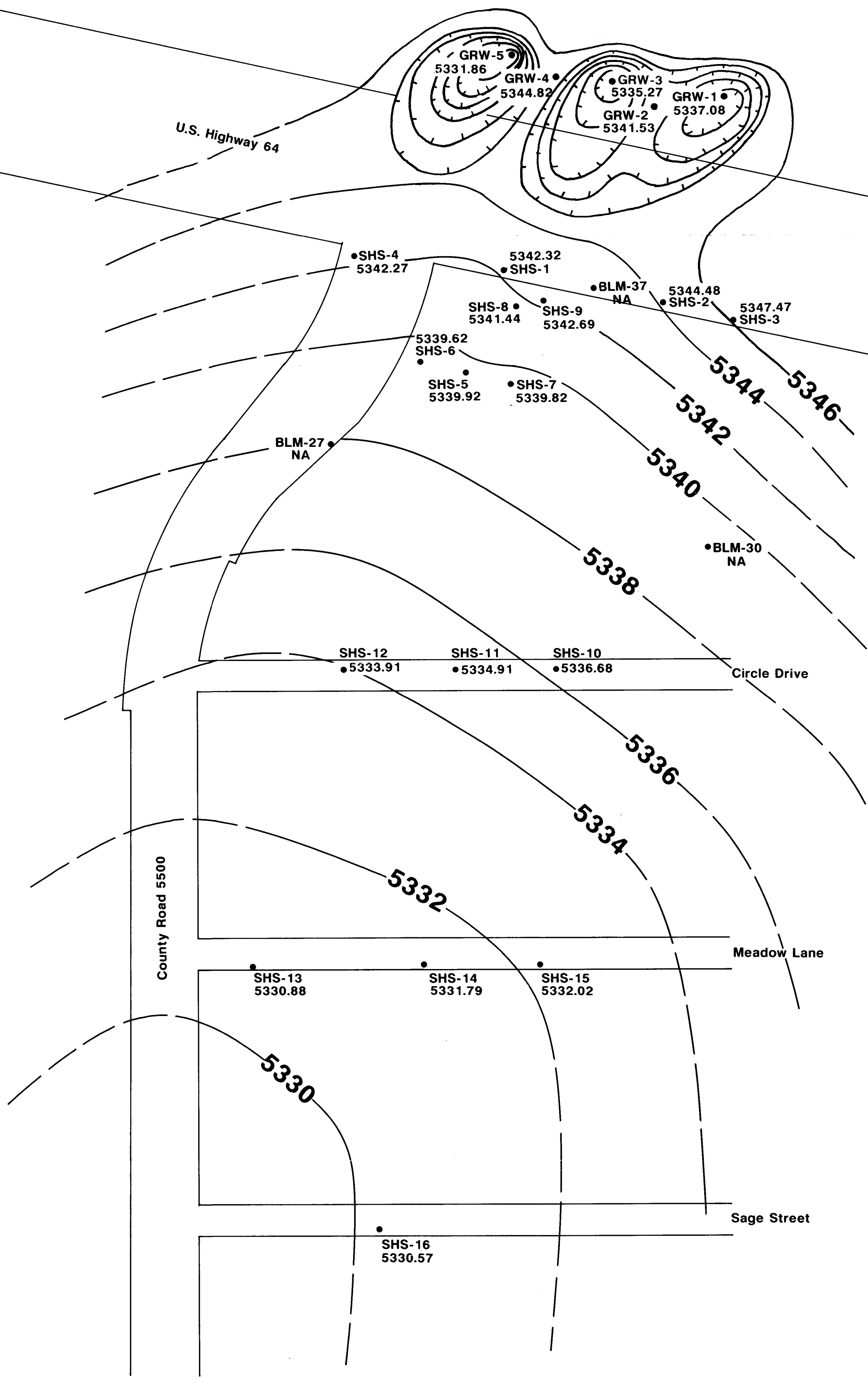
STREAMLINES DEPARTING FROM INJECTION WELL ZQ30

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.8 YEARS	0.0

STREAMLINES DEPARTING FROM INJECTION WELL SHS-14

NUMBER OF STREAMLINE	WELL REACHED	TIME OF ARRIVAL	ANGLE BETA IN DEGREES
1	+++none+++	200.4 YEARS	0.0
2	+++none+++	200.3 YEARS	8.0
3	+++none+++	200.2 YEARS	16.0
4	+++none+++	200.1 YEARS	24.0
5	+++none+++	200.1 YEARS	32.0
6	+++none+++	200.1 YEARS	40.0
7	+++none+++	200.1 YEARS	48.0
8	+++none+++	200.2 YEARS	56.0
9	+++none+++	200.3 YEARS	64.0
10	+++none+++	200.5 YEARS	72.0
11	+++none+++	200.7 YEARS	80.0
12	+++none+++	201.0 YEARS	88.0
13	+++none+++	200.3 YEARS	96.0
14	+++none+++	200.8 YEARS	104.0
15	+++none+++	200.3 YEARS	112.0
16	+++none+++	200.0 YEARS	120.0
17	+++none+++	200.9 YEARS	128.0
18	+++none+++	201.0 YEARS	136.0
19	+++none+++	200.5 YEARS	144.0
20	+++none+++	200.9 YEARS	152.0
21	+++none+++	200.4 YEARS	160.0
22	+++none+++	200.1 YEARS	168.0
23	+++none+++	200.0 YEARS	176.0
24	+++none+++	200.1 YEARS	184.0
25	+++none+++	200.8 YEARS	192.0
26	+++none+++	200.8 YEARS	200.0
27	+++none+++	200.1 YEARS	208.0
28	+++none+++	200.6 YEARS	216.0
29	+++none+++	200.6 YEARS	224.0
30	+++none+++	200.2 YEARS	232.0
31	+++none+++	201.0 YEARS	240.0
32	+++none+++	200.2 YEARS	248.0
33	+++none+++	200.7 YEARS	256.0
34	+++none+++	200.4 YEARS	264.0
35	+++none+++	200.0 YEARS	272.0
36	+++none+++	200.1 YEARS	280.0
37	+++none+++	200.3 YEARS	288.0
38	+++none+++	200.8 YEARS	296.0
39	+++none+++	200.3 YEARS	304.0
40	+++none+++	200.9 YEARS	312.0
41	+++none+++	200.6 YEARS	320.0
42	+++none+++	200.3 YEARS	328.0
43	+++none+++	200.0 YEARS	336.0
44	+++none+++	200.8 YEARS	344.0
45	+++none+++	200.6 YEARS	352.0

Giant Bloomfield Refinery



Legend

- SHS-5 - Monitor Well Location
- 5344.38 - Water Surface Elevation
- Contour Interval 2'
- GRW Water Levels Taken 9/5/90
- SHS Water Levels Taken 9/12/90

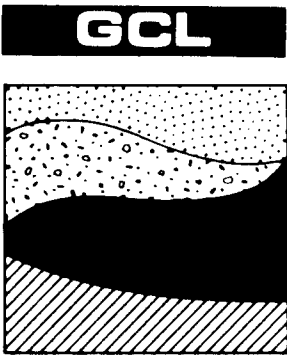
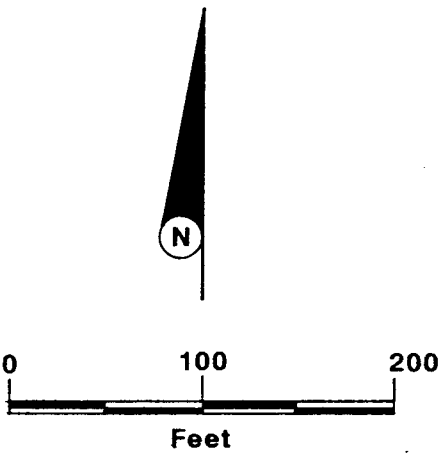


Plate 1	
Potentiometric Surface Contour Map	
CLIENT: Giant Industries Arizona Inc.	
DATE: October 17, 1990	
DRAWN BY: Mark Koson	
CHECKED BY: Martin Nee	
DWG. NO.	NOV 02 1990

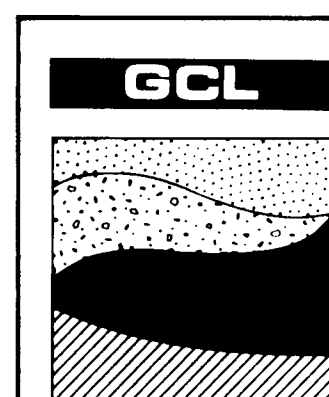
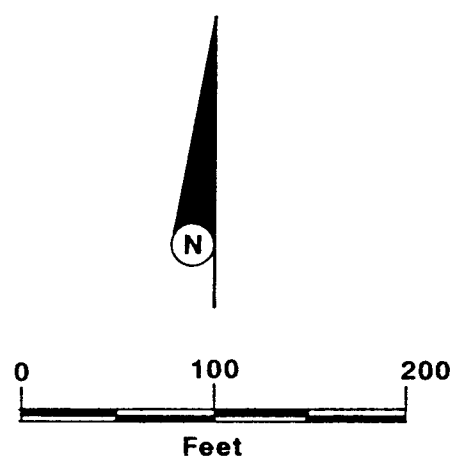
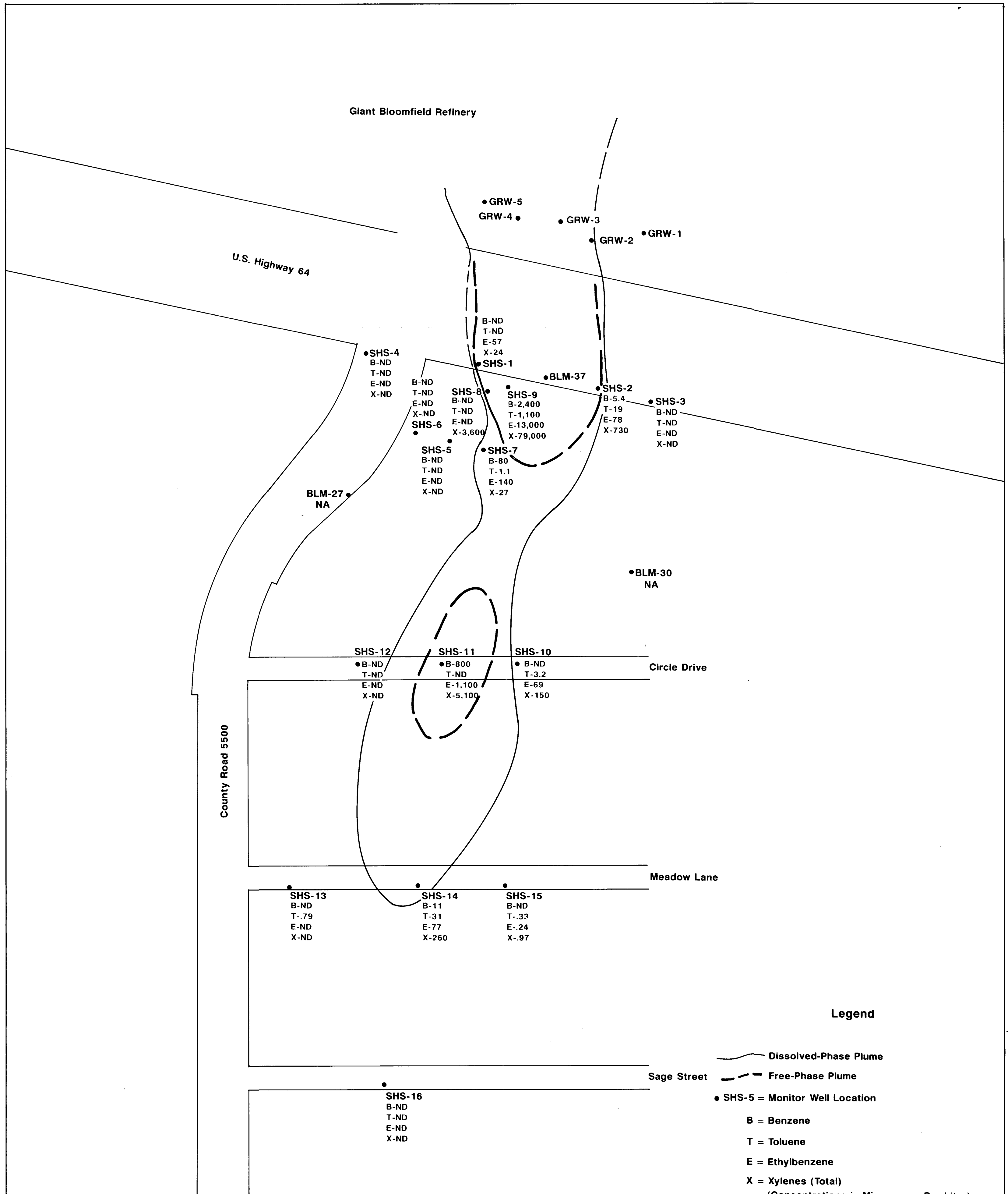
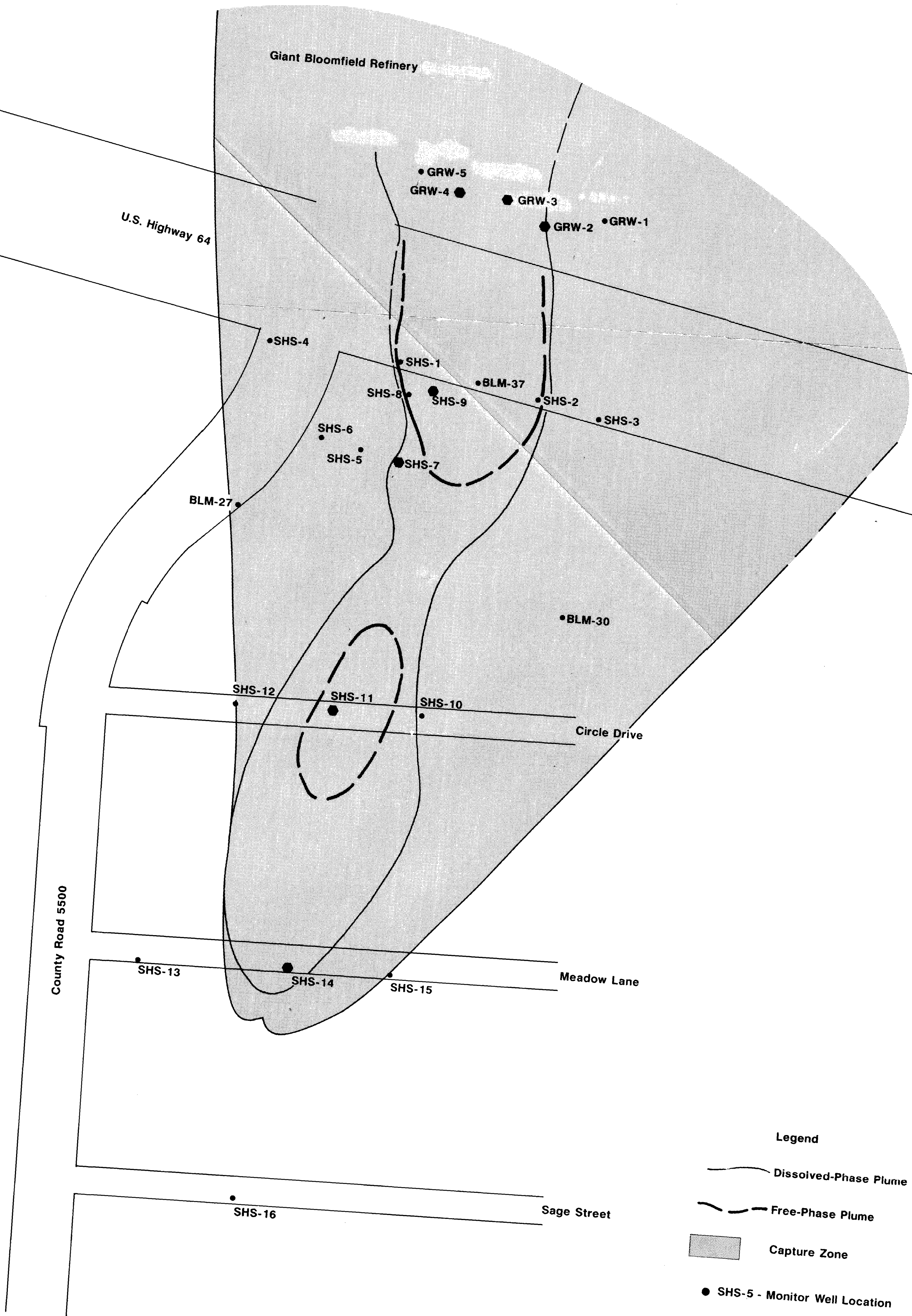


Plate 2
BTEX Concentration/Plume Boundary Map

CLIENT: Giant Industries Arizona Inc.
DATE: October 22, 1990
DRAWN BY: Mark Koson
CHECKED BY: Martin Nee
DWG. NO. NOV 02 1990



Legend

— Dissolved-Phase Plume

- - - Free-Phase Plume

■ Capture Zone

● SHS-5 - Monitor Well Location

● SHS-14 - Pumping Well Location

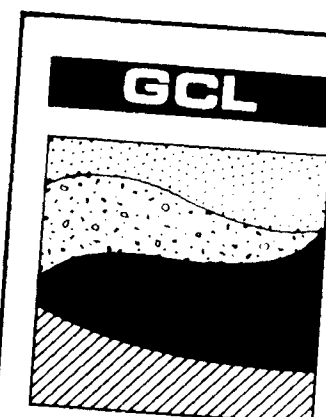
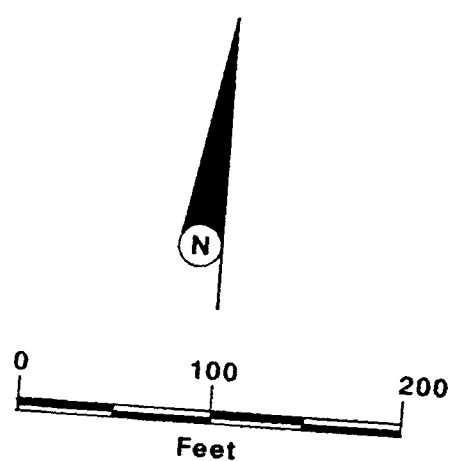


Plate 3 Predicted Capture Zone (RESSQ) With Four Additional Pumping Wells	
CLIENT: Giant Industries Arizona Inc.	
DATE: October 17, 1990	
DRAWN BY: Mark Koson	
CHECKED BY: Bruce Galtner	
DWG. NO. NOV 02 1990	