# GW - 107

# REPORTS

# YEAR(S):

1996 - 1994

# JAL No. 4

# GROUNDWATER DELINEATION REPORT



**October 14, 1996**

***Prepared For***

## El Paso Natural Gas Company
## El Paso, Texas

**Project 14683**

***Prepared By***

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# 1. INTRODUCTION

Philip Environmental Services Corporation (Philip) has completed the Phase II Site Assessment for the former El Paso Natural Gas (EPNG) Jal No. 4 Gas Plant (the site) located approximately 10 miles north of Jal, New Mexico on Highway 18. This report details the installation of three monitoring wells to aid in further delineating the extent of saltwater impacts to the groundwater from a release of plant production water from the site. Additionally, two recovery wells were installed in areas of high total dissolved solids (TDS) and chlorides for purposes of remediation of the groundwater.

As per our Phase II Site Assessment Workplan dated April 16, 1996, Philip field personnel were on-site June 17 through July 3, 1996, to oversee the installation of the three monitor wells at the site. In addition to the workplan, EPNG requested the installation of two recovery wells at the site and the removal of two monitoring wells: one located at the Lea County Sheriff's Office at 400 South Highway 18 in Jal, New Mexico; and the second located at the former EPNG laboratory in Jal. Both are former EPNG properties.

# 2. PROJECT BACKGROUND

The Jal No. 4 gas plant was built by EPNG in 1952 and operated as a gasoline plant, purification plant, dehydration plant and compressor facility. The plant is currently owned and operated by Christie Gas. An investigation was initiated in 1989 at the request of the New Mexico Oil Conservation Division (NMOCD) following the discovery of a leak in the pond liner. A total of seventeen monitoring wells had been installed prior to this investigation.

# 3. SUBSURFACE INVESTIGATION

Philip installed three monitoring wells (ACW-12 to ACW-14) to depths of 171, 174, and 177 feet below ground level (bgl) respectively, using a water rotary drilling method. The borings were completed at the top of the red-clay contact. No soil samples were collected from these borings due to the distance of the borings from the initial release.

Subsurface conditions were similar in the five monitoring/recovery wells installed (**Appendix A** - Boring Logs). The surface material to a depth of about 25 feet bgl is composed of a tan/red fine grained sand intermixed with some limestone fragments and clay. From 25 feet to approximately 70 feet bgl a tan/red fine grain sand with limestone, sandstone, and some clay intermixed was observed. From 70 feet to approximately 145 feet bgl is composed of red sandstone intermixed with some clay and limestone fragments. From 145 feet to the bottom of the borings a red sandstone with an increasing amount of clay and a decreasing amount of sandstone occurs. Each of the monitoring/recovery wells were completed at the red-clay bed interval approximately 170 to 180 feet bgl.

The three monitoring wells (ACW-12 to ACW-14) were constructed of 4-inch diameter schedule 40 PVC casing with 0.02-inch factory slotted well screen (**Appendix B** - Monitoring Well Completion). Twenty feet of screen was placed at the bottom of each boring. A sand pack was then installed from the bottom of each boring to approximately 2 feet above the casing/screen junction. A clean silica sand with a grain size larger than the well screen (sieve size 8 to 16) was used as the sand pack in the annular space between the casing and borehole. Above the sand pack, a 5-foot bentonite plug was installed in the annulus. Above the bentonite plug, a non-shrinking grout with 3 to 5% bentonite was installed in the annulus to two feet bgl. The remaining two feet to the surface was completed with cement. The surface completion for the three wells included an eight inch diameter steel surface riser, a four-foot by four-foot by four-inch thick concrete pad, and a locking cap on the outer protective casing.

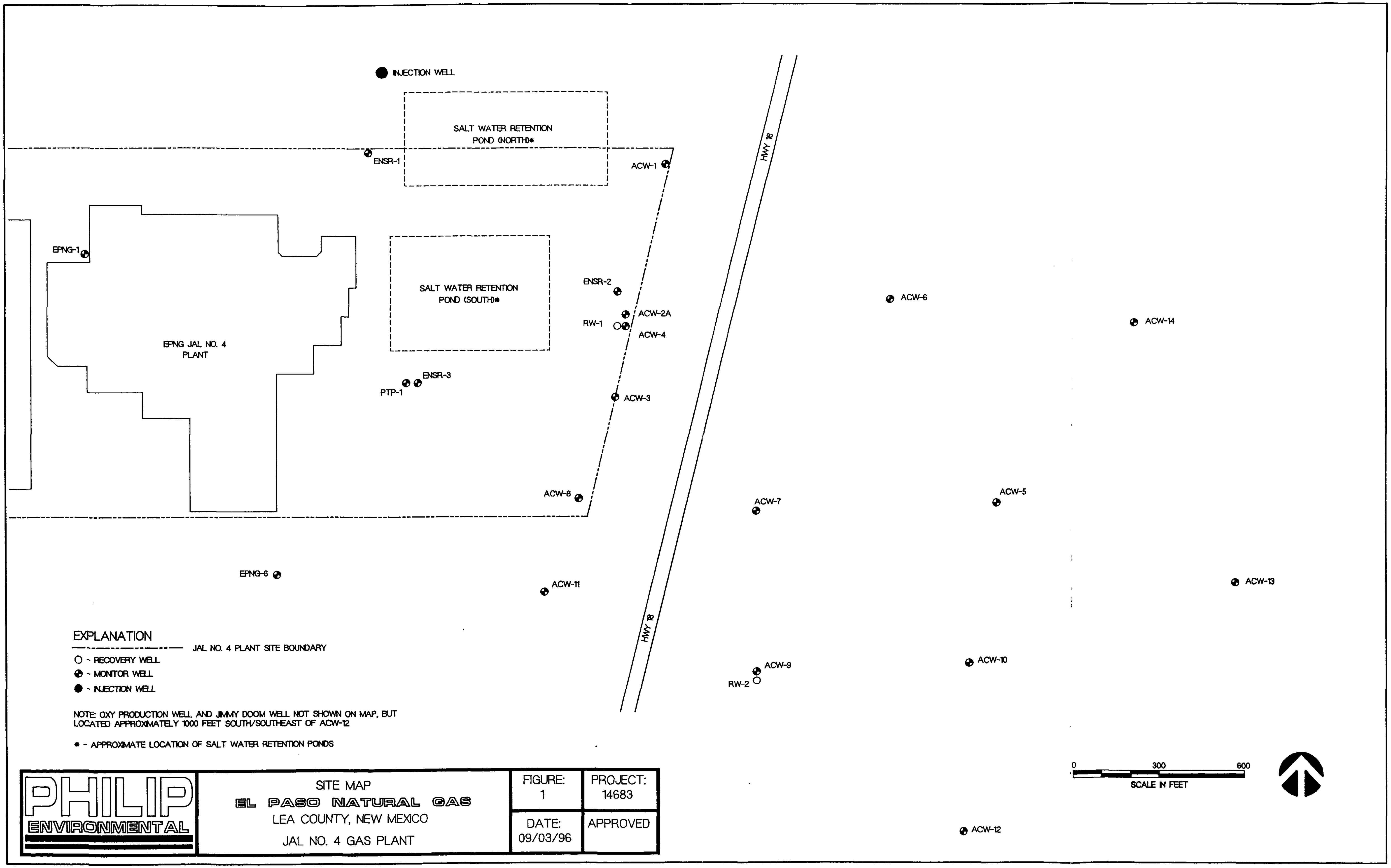
The two recovery wells (RW-1 and RW-2) were completed at depths of 180 and 177 feet bgl respectively, at the top of the red-clay contact. Recovery well RW-1 was installed approximately 10 feet west of ACW-4, and recovery well RW-2 was installed approximately 40 feet south of ACW-11 (**Figure 1**). Since these recovery wells were installed in close proximity to other existing monitoring wells which had subsequently been sampled, no soil samples were collected or analyzed from the two recovery wells.

The two recovery wells (RW-1 and RW-2) were constructed of 10-inch inside diameter schedule 160 PVC casing with 0.035-inch factory slotted well screen. Seventy feet of screen was placed at the bottom of the boring. A sand pack was then installed from the bottom of each boring to approximately 2 feet above the casing/screen junction. A clean silica sand with a grain size larger than the well screen (sieve size 8 to 16) was used as the sand pack in the annular space between the casing and borehole. Above the sand pack, a 5-foot bentonite plug was installed in the annulus. Above the bentonite plug, a non-shrinking grout with 3 to 5% bentonite was installed in the annulus to two feet bgl. The remaining two feet to the surface was completed with cement.

Due to the close proximity to the chemical loading rack and the high amount of vehicle traffic in the area, the electrical and water lines to be connected to recovery well RW-1 will need to be buried during installation of the remediation system (**Appendix C** - Photographs). As such, surface completion of recovery well RW-1 will be completed after installation of the remediation system.

The surface of recovery well RW-2 was completed with a fourteen inch inside diameter steel surface riser, a four-feet by four-feet by four-inch thick concrete pad, and a locking cap on the outer protective casing.

Since water rotary was used to drill, the exact location at which groundwater was encountered in the monitoring borings was unknown, but is approximately 100 feet bgl based on previous wells installed at the site. Twenty-four hours after installation, the three monitoring




SITE MAP
EL PASO NATURAL GAS
LEA COUNTY, NEW MEXICO
JAL NO. 4 GAS PLANT

| FIGURE: 1 | PROJECT: 14683 |
|---|---|
| DATE: 09/03/96 | APPROVED |

wells and two recovery wells were gauged and developed by EPNG personnel by removing at least four well volumes. A four-inch Grundfos pump was lowered into recovery wells RW-1 and RW-2. Approximately 17,280 gallons of water (12 gallons per minute) was removed over a twenty-four hour period from RW-1 and pumped into the south brine pit at the Christie gas plant. Approximately 14,400 gallons of water (10 gallons per minute) was removed over a twenty-four hour period from RW-2 and temporarily stored in a 20,000 gallon frac tank. The frac tank was pumped out and the contents placed in the southern brine pit at Christie Gas.

### *3.1. GROUNDWATER GRADIENT*

On August 13, 1996, EPNG field personnel were on-site to gauge nine (9) of the 22 monitor wells. The groundwater gradient at the site is to the southeast (**Figure 2**). This is consistent with previous gauging events at the site

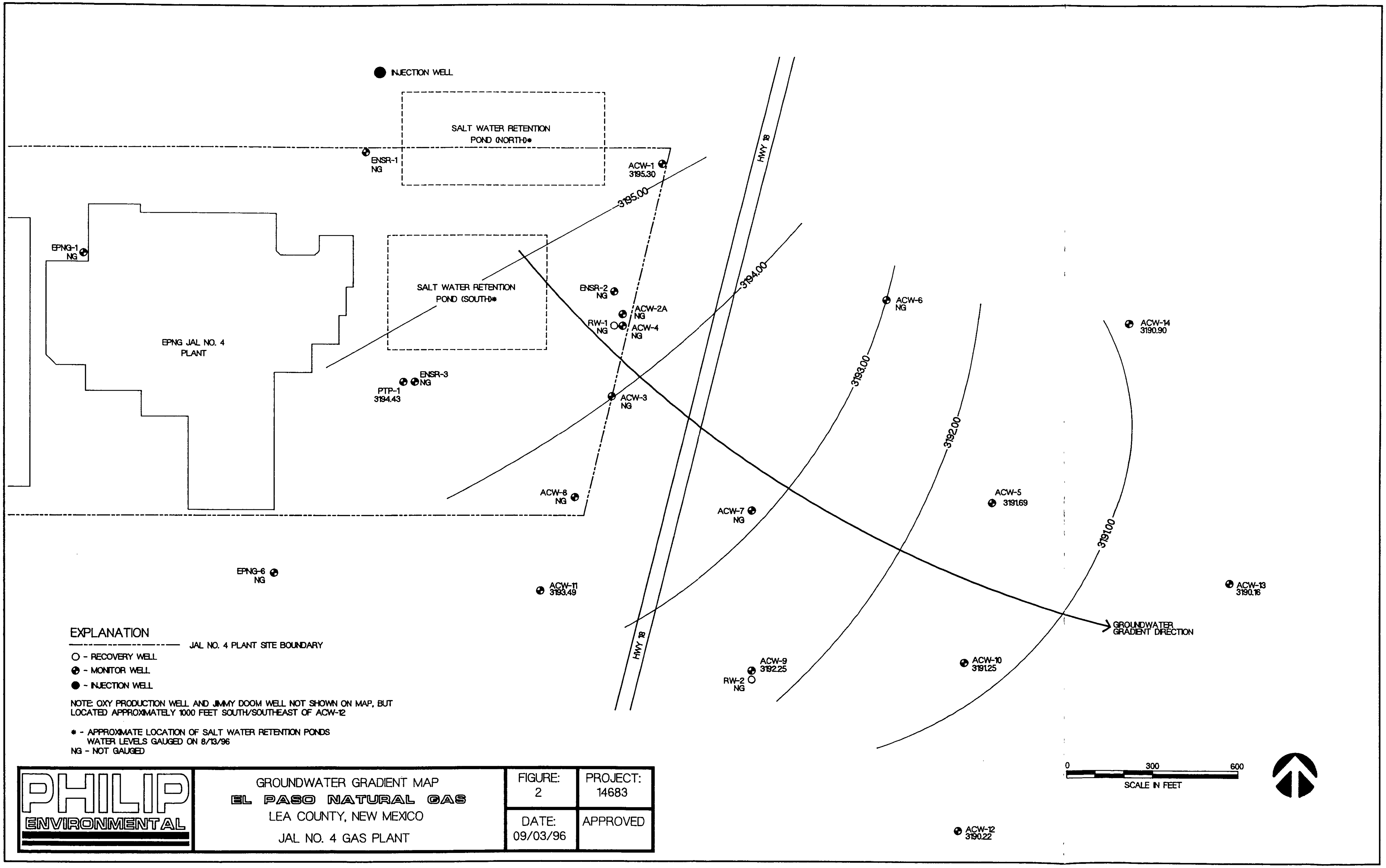
## 4. ANALYTICAL RESULTS

On August 13, 14, and 15, 1996, EPNG field personnel collected groundwater samples from the three newly installed monitor wells, seven (7) on-site monitor wells, and two (2) off-site wells for laboratory analysis of benzene, toluene, ethylbenzene, xylenes (BTEX) using EPA method 8020; specific conductance using EPA method 120.1; total dissolved solids (TDS) using EPA method 160.1; and total metals using EPA method SW846-6010 (**Table 1**). No groundwater samples were collected or analyzed for TDS in recovery wells RW-1 and RW-2 since the wells are installed adjacent to two wells (ACW-4 and ACW-9) with known saltwater-impacts.

Analytical results indicate that the site and adjacent property to the southeast has been impacted with a high salinity and chloride concentrations (**Figure 3**). TDS results (in excess of 10,000 parts per million (ppm)) are highest at monitor wells ACW-2A, ACW-3, ACW-4, ACW-8, and ACW-11 located downgradient and south to southeast of the original source release. A decrease in concentration (ranging from 1,700 to 7,920 ppm) occurs in downgradient monitor wells ACW-5, ACW-6, ACW-7, ACW-9, ACW-10, and ACW-12 located on the east-southeast side of Highway 18. The furthest downgradient wells sampled, the Oxy Production well and the Jimmy Doom well, are outside the salinity plume boundary. Although not on the map, these wells are located approximately 1,500 feet downgradient and southeast of ACW-12. In addition, the samples were analyzed for total metals and BTEX. Sample analytical results indicated that the following analytes are above current New Mexico Water Quality Control Commission Regulations for groundwater of less than 10,000 mg/l TDS concentration: 1) fluoride in monitor wells ACW-1, ACW-6, ACW-13, ACW-14 and ACW-14 Dup; 2) sulfate in monitor well ACW-5; 3) iron in monitor well ACW-6; and 4) manganese in monitor well ACW-9. (**Appendix D** - Laboratory Analytical).

### *4.1. CLEANUP STANDARDS*

In an agreement between Mr. William Olsen, of the NMOCD and EPNG, the cleanup standards for the site is 1,000



INJECTION WELL
SALT WATER RETENTION POND (NORTH)*
ENSR-1 NG
ACW-1 3195.30
3195.00
HWY 18
EPNG-1 NG
EPNG JAL NO. 4 PLANT
SALT WATER RETENTION POND (SOUTH)*
ENSR-2 NG
ACW-2A NG
RW-1 NG
ACW-4 NG
3194.00
ACW-6 NG
ACW-14 3190.90
ENSR-3 NG
PTP-1 3194.43
ACW-3 NG
3193.00
3192.00
3191.00
ACW-8 NG
ACW-7 NG
ACW-5 3191.69
EPNG-6 NG
ACW-11 3193.49
ACW-13 3190.16
GROUNDWATER GRADIENT DIRECTION
HWY 18
ACW-9 3192.25
RW-2 NG
ACW-10 3191.25
ACW-12 3190.22
EXPLANATION
JAL NO. 4 PLANT SITE BOUNDARY
- RECOVERY WELL
- MONITOR WELL
- INJECTION WELL
NOTE: OXY PRODUCTION WELL AND JIMMY DOOM WELL NOT SHOWN ON MAP, BUT LOCATED APPROXIMATELY 1000 FEET SOUTH/SOUTHEAST OF ACW-12
* - APPROXIMATE LOCATION OF SALT WATER RETENTION PONDS
WATER LEVELS GAUGED ON 8/13/96
NG - NOT GAUGED
0 300 600
SCALE IN FEET
PHILIP ENVIRONMENTAL
GROUNDWATER GRADIENT MAP
EL PASO NATURAL GAS
LEA COUNTY, NEW MEXICO
JAL NO. 4 GAS PLANT
FIGURE: 2
PROJECT: 14683
DATE: 09/03/96
APPROVED

ppm TDS. As of August 13, 1996, 15 of the 22 monitor/recovery wells (ACW-1, ACW-2A, ACW-3, ACW-4, ACW-5, ACW-6, ACW-7, ACW-8, ACW-9, ACW-10, ACW-11, ACW-12, RW-1, RW-2, and ENSR-2) exceed the cleanup limits (Figure 2). Several of the above mentioned monitor wells also have levels of iron, manganese, and sulfate that exceed the New Mexico State cleanup standards and can be remediated in concurrence with the TDS. The high levels of fluoride found in monitor wells ACW-1, ACW-6, ACW-13, ACW-14 and ACW-14 Duplicate are probably naturally occurring in the vicinity and do not warrant any cleanup.

## 5. PLUME DELINEATION

As of August 13, 1996, the delineation of the TDS plume boundary has not been completed to the north or south of the Jal No. 4 gas plant (**Figure 3**). The furthest upgradient monitor well, ACW-1, is impacted with 7,400 ppm TDS, while the furthest downgradient monitor wells, ACW-11 and ACW-12, have a TDS of 10,000 and 1,700 ppm TDS respectively. With the installation of ACW-13 (490 ppm TDS) and ACW-14 (570 ppm TDS), the eastern extent of the plume has been identified. The western extent of the plume is defined by monitor well PTP-1 (910 ppm TDS). However, since data was not collected from monitor well ENSR-1 during this sampling event, a west to northwest boundary relative to ACW-1 has not been established.

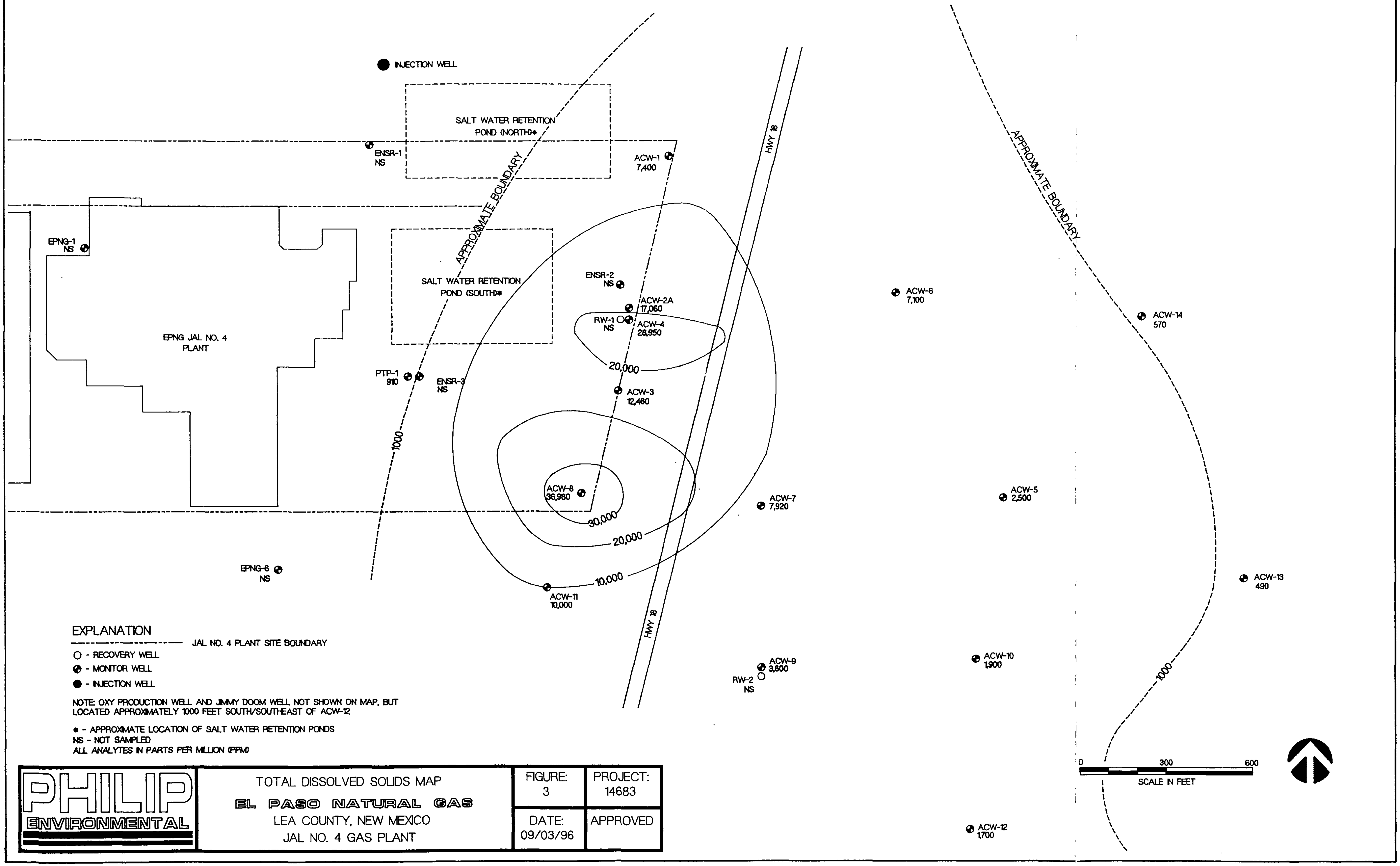
## 6. WASTE DISPOSAL AND DISPOSITION

The soils generated during drilling activities were spread out adjacent to the monitor/recovery wells since no hydrocarbon impacts were found during this or previous investigations at the site.

The development water generated from the monitor/recovery wells was placed in the southern saltwater retention pond at the Christie Jal No. 4 gas plant.

## 7. MONITOR WELL REMOVAL

On July 2, 1996, two monitoring wells (one located at the Lea County Sheriff's Office and the second located on the sidewalk of the entrance to the former EPNG laboratory building located across A Street and south of the Sheriff's Office) were permanently removed from the ground. The surface concrete and monitoring well coverings were removed using pickaxes. After removal of the surface concrete, an attempt was made to overdrill the two 35 foot deep monitoring wells and extract the piping from the ground in one piece. However, due to the nature of the grout, approximately five (5) feet of the pipe was extracted from each of the two wells. The two wells were grouted to within a foot of the surface using a bentonite/grout slurry mix consisting of three parts grout and one part bentonite. Concrete was utilized to bring the extracted monitor wells up to surface grade.




EXPLANATION

JAL NO. 4 PLANT SITE BOUNDARY

- RECOVERY WELL
- MONITOR WELL
- INJECTION WELL

NOTE: OXY PRODUCTION WELL AND JIMMY DOOM WELL NOT SHOWN ON MAP, BUT LOCATED APPROXIMATELY 1000 FEET SOUTH/SOUTHEAST OF ACW-12

* - APPROXIMATE LOCATION OF SALT WATER RETENTION PONDS
NS - NOT SAMPLED
ALL ANALYTES IN PARTS PER MILLION (PPM)

| | | | |
|---|---|---|---|
| PHILIP ENVIRONMENTAL | TOTAL DISSOLVED SOLIDS MAP<br>EL PASO NATURAL GAS<br>LEA COUNTY, NEW MEXICO<br>JAL NO. 4 GAS PLANT | FIGURE: 3 | PROJECT: 14683 |
| | | DATE: 09/03/96 | APPROVED |

TABLE 1 (continued)

GROUNDWATER ANALYTICAL RESULTS

EPNG JAL NO. 4 GAS PLANT

LEA COUNTY, NEW MEXICO

| ANALYSIS | UNITS | MONITOR WELL NUMBER | | | | | | | New Mexico Water |
|---|---|---|---|---|---|---|---|---|---|
| | | ACW-12 | ACW-13 | ACW-14 | ACW-14 DUP | PTP-1 | Oxy Prod. Well | Jimmy Doom Well | Quality Control Regs. |
| Specific Conductance | (umho) | 2200.00 | 720.00 | 880.00 | 860.00 | 910.00 | 710.00 | 650.00 | NA |
| Total Dissolved Solids | (mg/l) | 1700.00 | 490.00 | 570.00 | 550.00 | 590.00 | 510.00 | 460.00 | 1000.00 |
| Benzene | (ug/l) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 10.00 |
| Toluene | (ug/l) | <1.0 | <1.0 | 1.20 | <1.0 | <1.0 | <1.0 | <1.0 | 750.00 |
| Ethylbenzene | (ug/l) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 750.00 |
| Xylenes | (ug/l) | <1.0 | <1.0 | 6.90 | <1.0 | <1.0 | <1.0 | <1.0 | 620.00 |
| Nitrate | (mg/l) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 10.00 |
| Nitrate and Nitrite | (mg/l) | 0.051 | 1.40 | 1.30 | 1.30 | 0.12 | 0.88 | 1.40 | 10.00 |
| Fluoride | (mg/l) | 1.20 | 1.70 | 2.00 | 2.00 | 0.91 | 1.20 | 1.10 | 1.60 |
| Bromide | (mg/l) | 0.70 | 0.42 | 0.88 | 0.57 | 0.41 | 0.60 | 0.29 | NA |
| Sulfate | (mg/l) | 140.00 | 97.00 | 96.00 | 94.00 | 79.00 | 55.00 | 82.00 | 600.00 |
| Chloride | (mg/l) | 520.00 | 57.00 | 110.00 | 100.00 | 66.00 | 85.00 | 32.00 | 250.00 |
| Aluminum | (mg/l) | <0.033 | 0.064 | 0.12 | 0.05 | <0.033 | <0.033 | <0.033 | 5.00 |
| Barium | (mg/l) | 0.16 | 0.058 | 0.055 | 0.05 | 0.11 | 0.088 | 0.04 | 1.00 |
| Berylium | (mg/l) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | NA |
| Cadmium | (mg/l) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.01 |
| Calcium | (mg/l) | 170.00 | 44.00 | 36.00 | 32.00 | 47.00 | 58.00 | 44.00 | NA |
| Chromium | (mg/l) | <1.0 | 0.005 | <1.0 | 0.006 | <1.0 | <1.0 | <1.0 | 0.05 |
| Cobalt | (mg/l) | <0.011 | <0.011 | <0.011 | <0.011 | <0.011 | <0.011 | <0.011 | 0.05 |
| Copper | (mg/l) | <0.006 | 0.012 | <0.006 | <0.006 | <0.006 | 0.13 | <0.006 | 1.00 |
| Iron | (mg/l) | 0.075 | 0.13 | 0.13 | 0.05 | 2.30 | 0.50 | 0.12 | 1.00 |
| Lead | (mg/l) | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | 0.05 |
| Magnesium | (mg/l) | 64.00 | 15.00 | 16.00 | 16.00 | 24.00 | 17.00 | 15.00 | NA |
| Manganese | (mg/l) | 0.095 | 0.015 | 0.009 | <0.007 | 0.078 | 0.015 | <0.007 | 0.20 |
| Molybdenum | (mg/l) | 0.014 | <0.011 | 0.016 | 0.015 | <0.011 | <0.011 | <0.011 | 1.00 |
| Nickel | (mg/l) | <0.011 | <0.011 | <0.011 | <0.011 | <0.011 | <0.011 | <0.011 | 0.20 |
| Phosphorus | (mg/l) | 0.57 | 0.17 | 0.40 | 0.16 | 0.23 | 0.22 | 0.14 | NA |
| Potassium | (mg/l) | 13.00 | 8.00 | 18.00 | 20.00 | 5.50 | 4.40 | 4.10 | NA |
| Silver | (mg/l) | <0.011 | <0.011 | <0.011 | <0.011 | <0.011 | <0.011 | <0.011 | 0.05 |
| Sodium | (mg/l) | 130.00 | 82.00 | 110.00 | 98.00 | 91.00 | 57.00 | 66.00 | NA |
| Thallium | (mg/l) | <0.066 | <0.066 | <0.066 | <0.066 | <0.066 | <0.066 | <0.066 | NA |
| Vanadium | (mg/l) | 0.018 | 0.038 | 0.037 | 0.037 | <0.006 | 0.045 | 0.05 | NA |
| Zinc | (mg/l) | 0.02 | 0.049 | 0.018 | 0.024 | 0.05 | 0.12 | 0.054 | 10.00 |
| Hardness (as CaCO3) | (mg/l) | 690.00 | 170.00 | 160.00 | 150.00 | 210.00 | 210.00 | 170.00 | NA |

Monitor/Recovery Wells RW-1, RW-2, ENSR-1, ENSR-2, and ENSR-3, not sampled. NA-Not Available NS-Not Sampled

Above NM Water Quality Control Regulations

TABLE 1

GROUNDWATER ANALYTICAL RESULTS

EPNG JAL NO. 4 GAS PLANT

LEA COUNTY, NEW MEXICO

| ANALYSIS | UNITS | MONITOR WELL NUMBER | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ACW-1 | ACW-2A | ACW-3 | ACW-4 | ACW-5 | ACW-6 | ACW-7 | ACW-8 | ACW-9 | ACW-10 | ACW-11 |
| Specific Conductance | (umho) | 12000.00 | 28230.00 | 19420.00 | 14600.00 | 3400.00 | 11000.00 | 12990.00 | 44500.00 | 4400.00 | 2400.00 | 12000.00 |
| Total Dissolved Solids | (mg/l) | 7400.00 | 17060.00 | 12460.00 | 28950.00 | 2500.00 | 7100.00 | 7920.00 | 36980.00 | 3600.00 | 1900.00 | 10000.00 |
| Benzene | (ug/l) | 3.50 | NA | <1.0 | NA | <1.0 | 4.20 | NA | NA | 1.40 | <1.0 | 7.90 |
| Toluene | (ug/l) | 1.20 | NA | <1.0 | NA | 1.20 | 2.60 | NA | NA | 1.60 | <1.0 | 2.20 |
| Ethylbenzene | (ug/l) | <1.0 | NA | <1.0 | NA | <1.0 | <2.0 | NA | NA | <1.0 | <1.0 | <1.0 |
| Xylenes | (ug/l) | <1.0 | NA | <3.0 | NA | <1.0 | <2.0 | NA | NA | <1.0 | <1.0 | <1.0 |
| Nitrate | (mg/l) | <1.0 | NA | NA | NA | <1.0 | <1.0 | NA | NA | <1.0 | <1.0 | <1.0 |
| Nitrate and Nitrite | (mg/l) | <1.0 | NA | NA | NA | 5.40 | <1.0 | NA | NA | 0.13 | 0.58 | 0.18 |
| Fluoride | (mg/l) | 4.90 | NA | NA | NA | 0.70 | 21.00 | NA | NA | 1.40 | 1.40 | 1.00 |
| Bromide | (mg/l) | 1.90 | NA | NA | NA | 1.00 | 1.80 | NA | NA | 1.20 | 0.82 | 2.00 |
| Sulfate | (mg/l) | 270.00 | NA | NA | NA | 710.00 | 88.00 | NA | NA | 180.00 | 160.00 | 230.00 |
| Chloride | (mg/l) | 3500.00 | 9450.00 | 7610.00 | 16920.00 | 500.00 | 2900.00 | 3990.00 | 14750.00 | 1200.00 | 560.00 | 4200.00 |
| Aluminum | (mg/l) | <0.033 | NA | NA | NA | 0.04 | 3.10 | NA | NA | 0.38 | 0.04 | <0.033 |
| Barium | (mg/l) | 0.27 | NA | NA | NA | 0.03 | 0.64 | NA | NA | 0.12 | 0.09 | 0.23 |
| Berylium | (mg/l) | <1.0 | NA | NA | NA | <1.0 | <1.0 | NA | NA | <1.0 | <1.0 | <1.0 |
| Cadmium | (mg/l) | <1.0 | NA | NA | NA | <1.0 | <1.0 | NA | NA | <1.0 | <1.0 | <1.0 |
| Calcium | (mg/l) | 110.00 | NA | NA | NA | 200.00 | 85.00 | NA | NA | 490.00 | 210.00 | 540.00 |
| Chromium | (mg/l) | <1.0 | NA | NA | NA | 0.03 | 0.01 | NA | NA | 0.01 | <1.0 | <1.0 |
| Cobalt | (mg/l) | <0.011 | NA | NA | NA | <0.011 | <0.011 | NA | NA | <0.011 | <0.011 | <0.011 |
| Copper | (mg/l) | 0.02 | NA | NA | NA | <0.006 | <0.006 | NA | NA | <0.006 | <0.006 | 0.01 |
| Iron | (mg/l) | 0.68 | NA | NA | NA | 0.02 | 4.50 | NA | NA | 0.66 | 0.14 | 0.28 |
| Lead | (mg/l) | <0.022 | NA | NA | NA | <0.022 | <0.022 | NA | NA | <0.022 | <0.022 | <0.022 |
| Magnesium | (mg/l) | 100.00 | NA | NA | NA | 28.00 | 23.00 | NA | NA | 160.00 | 71.00 | 190.00 |
| Manganese | (mg/l) | 0.08 | NA | NA | NA | <0.007 | 0.13 | NA | NA | 0.65 | 0.02 | 0.06 |
| Molybdenum | (mg/l) | <0.011 | NA | NA | NA | <0.011 | 0.05 | NA | NA | <0.011 | <0.011 | <0.011 |
| Nickel | (mg/l) | <0.011 | NA | NA | NA | <0.011 | 0.02 | NA | NA | <0.011 | <0.011 | <0.011 |
| Phosphorus | (mg/l) | 2.80 | NA | NA | NA | 0.42 | 1.20 | NA | NA | 1.00 | 0.50 | 1.00 |
| Potassium | (mg/l) | 8.60 | NA | NA | NA | 6.30 | 3.40 | NA | NA | 13.00 | 7.00 | 24.00 |
| Silver | (mg/l) | <0.011 | NA | NA | NA | <0.011 | <0.011 | NA | NA | <0.011 | <0.011 | <0.011 |
| Sodium | (mg/l) | 2400.00 | NA | NA | NA | 520.00 | 2900.00 | NA | NA | 730.00 | 140.00 | 1700.00 |
| Thallium | (mg/l) | <0.066 | NA | NA | NA | <0.066 | <0.066 | NA | NA | <0.066 | <0.066 | <0.066 |
| Vanadium | (mg/l) | <0.006 | NA | NA | NA | 0.01 | 0.02 | NA | NA | 0.01 | 0.03 | 0.01 |
| Zinc | (mg/l) | 0.01 | NA | NA | NA | 0.03 | 0.02 | NA | NA | 0.03 | 0.04 | 0.12 |
| Hardness (as CaCO3) | (mg/l) | 690.00 | 264.00 | 702.00 | 253.00 | 620.00 | 310.00 | 361.00 | 568.00 | 1900.00 | 810.00 | 2100.00 |

Monitor/Recovery Wells RW-1, RW-2, ENSR-1, ENSR-2, and ENSR-3, not sampled. NA-Not Available NS-Not Sampled

Above NM Water Quality Control Regulations

## 8. CONCLUSIONS AND RECOMMENDATIONS

The groundwater at the Jal No. 4 gas plant has been impacted with high concentrations of TDS (including chlorides) from a former release from the on-site retention ponds. Fifteen of the 22 on-site monitor/recovery wells (ACW-1, ACW-2A, ACW-3, ACW-4, ACW-5, ACW-6, ACW-7, ACW-8, ACW-9, ACW-10, ACW-11, ACW-12, RW-1, RW-2, and ENSR-2) currently exceed the site cleanup standard of 1,000 ppm TDS. In addition, the following analytes are also above the New Mexico Water Quality Control Commission Regulations: 1) fluoride in monitor wells ACW-1, ACW-6, ACW-13, ACW-14; 2) sulfate in monitor well ACW-5; 3) iron in monitor well ACW-6; and 4) manganese in ACW-9.

As of August 13, 1996, the extent of the TDS plume to the north and south of the existing monitoring wells at the Jal No. 4 gas plant has not been identified. The furthest upgradient wells ACW-1 and ACW-6 (7,400 ppm and 7,100 ppm TDS, respectively) and the furthest downgradient wells ACW-11 and ACW-12 (10,000 ppm and 1,700 ppm TDS, respectively) currently exceed the standard. The plume boundary to the east has been identified with the installation and sampling of monitor wells ACW-13 and ACW-14 (490 ppm and 570 ppm TDS respectively). Based on analysis from monitor well PTP-1 (910 ppm TDS), the western boundary of the plume has been delineated.

In order to complete the delineation of the TDS plume at the Jal No. 4 gas plant, Philip recommends the following:

1) installation of two monitoring wells to the north of ACW-1 and ACW-6;
2) installation of two monitor wells to the south of ACW-11 and ACW-12; and
3) sample and analyze monitor well ENSR-1 for TDS (the analysis will determine if the well is inside or outside the plume boundary).

In addition, Philip recommends performing a 24 hour pump test or a slug test on several of the on-site wells in order to determine the aquifer characteristics. This information will be beneficial in determining the placement and design of future recovery wells and remediation systems at the site.

# APPENDIX A
# BORING/DRILLER'S LOGS

**PHILIP ENVIRONMENTAL**

# RECORD OF SUBSURFACE EXPLORATION

Page 1 of 5
Borehole No. ACW-12
Well No. ACW-12

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 17, 1996 at 1400 Date/Time Completion(s): June 18, 1996 at 1600
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| | | | | Tan/red fine grain sand | | | |
| 5 | | | | | | SP | |
| 10 | | | | | | | |
| 15 | | | | | 15 | | |
| | | | | Tan/red fine grain sand intermixed with limestone fragments | | | |
| 20 | | | | | | SP | |
| 25 | | | | | 25 | | |
| | | | | Tan/red fine grain sand intermixed with sandstone | | SP | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | 40 | | |

*Comments:*

Geologist Signature Jeffrey Kindley

**PHILIP ENVIRONMENTAL**

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. ACW-12
Well No ACW-12.

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 17, 1996 at 1400 Date/Time Completion(s): June 18, 1996 at 1600
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| | | | | Tan/red fine grain sand | | SP | |
| 45 | | | | | 45 | | |
| | | | | Tan/red fine grain sand with sandstones | | SP | |
| 50 | | | | | 50 | | |
| 55 | | | | | | | |
| 60 | | | | Tan/red fine grain sand with limestone fragments | | SP | |
| 65 | | | | | | | |
| 70 | | | | | 70 | | |
| 75 | | | | Tan/red fine grain sand intermixed with sandstone and limestone fragments | | SP | |
| 80 | | | | | 80 | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP
ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. ACW-12
Well No ACW-12.

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 16, 1996 at 1400 Date/Time Completion(s): June 18, 1996 at 1600
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 85 | | | | | | | |
| 90 | | | | Red sandstone fragments intermixed with fine grain silty sand | | SS | |
| 95 | | | | | | | |
| 100 | | | | | 100 | | |
| 105 | | | | | | | |
| 110 | | | | Red sandstone Fragments | | SS | |
| 115 | | | | | | | |
| 120 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

# RECORD OF SUBSURFACE EXPLORATION

PHILIP ENVIRONMENTAL


Borehole No. ACW-12
Well No ACW-12.

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 17, 1996 at 1400 Date/Time Completion(s): June 18, 1996 at 1600
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 165 | | | | | | | |
| | | | | | 168 | | |
| 170 | | | | Red clay with high plasticity (Red Bed) | | CH | |
| | | | | | 171 | | |
| | | | | Boring terminated at 171 feet | | | |
| 175 | | | | | | | |
| 180 | | | | | | | |
| 185 | | | | | | | |
| 190 | | | | | | | |
| 195 | | | | | | | |
| 200 | | | | | | | |

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# RECORD OF SUBSURFACE EXPLORATION


Borehole No. ACW-12
Well No. ACW-12.

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 17, 1996 at 1400 Date/Time Completion(s): June 18, 1996 at 1600
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 125 | | | | | | | |
| 130 | | | | | | | |
| 135 | | | | | 135 | | |
| 140 | | | | Red sandstone with fine grain sand | | SS | |
| 145 | | | | | 145 | | |
| 150 | | | | | | | |
| | | | | Tan/brown fine grain clayey sand intermixed with sandstone fragments | | SC | |
| 155 | | | | | | | |
| 160 | | | | | | | |

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Geologist Signature Jeffrey Kindley

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# RECORD OF SUBSURFACE EXPLORATION


Borehole No. ACW-13
Well No. ACW-13.

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 19, 1996 at 0900 Date/Time Completion(s): June 20, 1996 at 1600
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 45 | | | | | | | |
| 50 | | | | | | | |
| | | | | Tan/red fine grain sand with limestone fragments | | SP | |
| 55 | | | | | | | |
| 60 | | | | | | | |
| 65 | | | | | | | |
| 70 | | | | | 70 | | |
| | | | | Red fine grain sandstone intermixed with fine grain sand and limestone fragments | | SP | |
| 75 | | | | | 75 | | |
| | | | | Tan fine grain sand intermixed with sandstone and limestone fragments | | SS | |
| 80 | | | | | | | |

*Comments:*

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# RECORD OF SUBSURFACE EXPLORATION


Borehole No. ACW-13
Well No. ACW-13.

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 19, 1996 at 0900 Date/Time Completion(s): June 20, 1996 at 1600
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 85 | | | | | 85 | | |
| 90 | | | | | | | |
| 95 | | | | | | | |
| 100 | | | | Red sandstone intermixed with fine grain sand | | SS | |
| 105 | | | | | | | |
| 110 | | | | | | | |
| 115 | | | | | | | |
| 120 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. ACW-13
Well No ACW-13.

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 19, 1996 at 0900 Date/Time Completion(s): June 20, 1996 at 1600
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| --125 | | | | | 125 | | |
| | | | | Red sandstone intermixed with white/tan silty clay | | SS | |
| --130 | | | | | | | |
| --135 | | | | decreasing amount of sandstone | | | |
| --140 | | | | increasing amount of clay | | | |
| --145 | | | | | | | |
| --150 | | | | | | | |
| --155 | | | | | | | |
| --160 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. ACW-13
Well No. ACW-13

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 19, 1996 at 0900 Date/Time Completion(s): June 20, 1996 at 1600
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 165 | | | | | | | |
| 170 | | | | | 170 | | |
| | | | | Tan/Red sandy silty clay | | CL | |
| | | | | | 172 | | |
| | | | | Red clay with high plasticity (Red Bed) | | CH | |
| 175 | | | | | 175 | | |
| | | | | Boring terminated at 175 feet | | | |
| 180 | | | | | | | |
| 185 | | | | | | | |
| 190 | | | | | | | |
| 195 | | | | | | | |
| 200 | | | | | | | |

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# RECORD OF SUBSURFACE EXPLORATION

PHILIP ENVIRONMENTAL

Page 1 of 5
Borehole No. ACW-14
Well No. ACW-14

Project Name: El Paso Natural Gas Jal No. 4 — Project No. 14683
Borehole Location: Christie Jal No. 4 — Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling — Drilling/Rig Methods: Water Rotary
Date/Time Started: June 24, 1996 at 1930 — Date/Time Completion(s): June 25, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 5 | | | | Tan/red fine grain sand | | SP | |
| 10 | | | | | 10 | | |
| | | | | Tan/red fine grain clayey sand | | SP | |
| 15 | | | | | 15 | | |
| | | | | Tan/red fine grain clayey sand intermixed with limestone fragments | | SP | |
| 20 | | | | | 20 | | |
| | | | | Tan/red fine grain sand intermixed with limestone and gravel | | SP | |
| 25 | | | | | 25 | | |
| | | | | Tan/red fine grained sand intermixed with sandstone fragments | | SP | |
| 30 | | | | | 30 | | |
| 35 | | | | Tan fine grain clayey sand intermixed with limestone fragments | | SC | |
| 40 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. ACW-14
Well No. ACW-14.

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 24, 1996 at 0930 Date/Time Completion(s): June 25, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 45 | | | | | | | |
| 50 | | | | | | | |
| 55 | | | | | 55 | | |
| | | | | Tan fine grain clayey sand intermixed with sandstone fragments | | SC | |
| 60 | | | | | 60 | | |
| 65 | | | | | | | |
| | | | | Tan fine grain sand intermixed with sandstone fragments | | SP | |
| 70 | | | | | | | |
| 75 | | | | | 75 | | |
| | | | | Red sandstone with some fine grain sand and limestone fragments | | SS | |
| 80 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. ACW-14
Well No. ACW-14.

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 24, 1996 at 0930 Date/Time Completion(s): June 25, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 85 | | | | | | | |
| 90 | | | | | 90 | | |
| 95 | | | | | | | |
| 100 | | | | | | | |
| | | | | Red sandstone intermixed with fine grain sandy clay | | SS | |
| 105 | | | | | | | |
| | | | | Clay decreases | | | |
| 110 | | | | | | | |
| 115 | | | | | | | |
| 120 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

**PHILIP ENVIRONMENTAL**

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. ACW-14
Well No. ACW-14.

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 24, 1996 at 0930 Date/Time Completion(s): June 25, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 125 | | | | | | | |
| 130 | | | | | 130 | | |
| 135 | | | | Tan medium grain sand intermixed with gravel and limestone | | SP | |
| 140 | | | | | 140 | | |
| 145 | | | | Tan fine/medium grain sand intermixed with gravel, limestone and sandstone fragments | | SP | |
| 150 | | | | | 150 | | |
| 155 | | | | Tan fine/medium grain clayey sand with some sandstone fragments | | SC | |
| 160 | | | | | | | |

*Comments:*

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PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. ACW-14
Well No. ACW-14.

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 24, 1996 at 0930 Date/Time Completion(s): June 25, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 165 | | | | Decreasing amount of clay and increasing amount of sandstone | | SC | |
| 170 | | | | | | | |
| 175 | | | | | 179 | | |
| 180 | | | | Tan fine to medium grain clayey sand with gravel | 181 | SP | |
| | | | | Red clay of high plasticity (Red Bed) | 182 | CH | |
| 185 | | | | Boring terminated at 182 feet | | | |
| 190 | | | | | | | |
| 195 | | | | | | | |
| 200 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. RW-1
Well No RW-1

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 21, 1996 at 1330 Date/Time Completion(s): June 23, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| | | | | Calich gravel (Backfill) | 2 | | |
| 5 | | | | Tan/red well sorted medium grain sand | | SW | |
| 10 | | | | | 10 | | |
| 15 | | | | Tan/red well sorted medium grain clayey sand intermixed with limestone fragments | | SW | |
| 20 | | | | | 20 | | |
| 25 | | | | Tan/red fine grain clayey sand with limestone fragments | | SP | |
| 30 | | | | | 30 | | |
| 35 | | | | Tan fine grain silty clayey sand | | SP | |
| 40 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. RW-1
Well No. RW-1

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 24, 1996 at 0930 Date/Time Completion(s): June 25, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| | | | | | 42 | | |
| 45 | | | | | | | |
| 50 | | | | | | | |
| | | | | Tan silty clayey sand with sandstone fragments | | SC | |
| 55 | | | | | | | |
| 60 | | | | | 60 | | |
| 65 | | | | | | | |
| | | | | Red sandstone intermixed with silty clay and gravel | | SS | |
| 70 | | | | | | | |
| 75 | | | | | | | |
| 80 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. RW-1
Well No RW-1

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 21, 1996 at 1330 Date/Time Completion(s): June 23, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 85 | | | | | | | |
| 90 | | | | | 90 | | |
| 95 | | | | | | | |
| 100 | | | | Tan/red medium grain well sorted sand with sandstone fragments | | SP | |
| 105 | | | | | | | |
| 110 | | | | | | | |
| 115 | | | | Red to Black hydrocarbon stain medium grain sand with sandstone fragments | | SP | |
| 120 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. RW-1
Well No. RW-1

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 21, 1996 at 1330 Date/Time Completion(s): June 23, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 125 | | | | | | | |
| 130 | | | | | | | |
| 135 | | | | | | | |
| | | | | Red to black hydrocarbon stained medium grain sand | | SP | |
| 140 | | | | | | | |
| 145 | | | | | | | |
| 150 | | | | | | | |
| 155 | | | | | | | |
| 160 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. RW-1
Well No RW-1

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 21, 1996 at 1330 Date/Time Completion(s): June 23, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| --165 | | | | | | | |
| --170 | | | | | 170 | | |
| | | | | Brown/black silty sandy clay | | CL | |
| --175 | | | | | | | |
| | | | | | 177 | | |
| | | | | Red clay with high plasticity | | CH | |
| | | | | | 178 | | |
| --180 | | | | Boring terminated at 178 feet | | | |
| --185 | | | | | | | |
| --190 | | | | | | | |
| --195 | | | | | | | |
| --200 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

**PHILIP ENVIRONMENTAL**

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. RW-2
Well No. RW-2

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 27, 1996 at 0800 Date/Time Completion(s): June 30, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 5 | | | | Tan/red fine grain sand | | SP | |
| 10 | | | | | 10 | | |
| 15 | | | | Tan/red fine grain sand with limestone fragments | | SP | |
| 20 | | | | | 20 | | |
| 25 | | | | | | | |
| 30 | | | | Tan/red fine grain clayey sand with limestone fragments | | SC | |
| 35 | | | | | | | |
| 40 | | | | | 40 | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. RW-2
Well No. RW-2

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 27, 1996 at 0800 Date/Time Completion(s): June 30, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 45 | | | | Tan clayey sand with limestone and sandstone fragments | | SC | |
| 50 | | | | | 50 | | |
| | | | | Tan clayey sand with sandstone | | SC | Sandstone easily pulverized by hand |
| 55 | | | | | | | |
| 60 | | | | Clay lense at 60 feet | | | |
| 65 | | | | | | | |
| 70 | | | | | | | |
| 75 | | | | | | | |
| 80 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. RW-2
Well No RW-2

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 27, 1996 at 0800 Date/Time Completion(s): June 30, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| 85 | | | | | 85 | | |
| 90 | | | | Tan/red fine grain clayey sand with sandstone fragments | | SC | |
| 95 | | | | | | | |
| 100 | | | | | | | |
| 105 | | | | | 105 | | |
| 110 | | | | Tan/red fine grain sandy clay with sandstone fragments | | CL | |
| 115 | | | | | | | |
| 120 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

PHILIP ENVIRONMENTAL

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. RW-2
Well No. RW-2

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 27, 1996 at 0800 Date/Time Completion(s): June 30, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| --125 | | | | | | | |
| --130 | | | | | | | |
| --135 | | | | Decreasing sandstone and increasing amount of clay | | CL | |
| --140 | | | | | | | |
| --145 | | | | | | | |
| --150 | | | | | | | |
| --155 | | | | | | | |
| --160 | | | | | 160 | | |

*Comments:*

Geologist Signature Jeffrey Kindley

**PHILIP**
**ENVIRONMENTAL**

# RECORD OF SUBSURFACE EXPLORATION


Borehole No. RW-2
Well No. RW-2

Project Name: El Paso Natural Gas Jal No. 4 Project No. 14683
Borehole Location: Christie Jal No. 4 Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling Drilling/Rig Methods: Water Rotary
Date/Time Started: June 27, 1996 at 0800 Date/Time Completion(s): June 30, 1996 at 1700
Air Monitoring Type: Not Applicable

| Depth (feet) | Sample Number | Sample Interval | Sample Type | Sample Description | Depth Change (feet) | USCS Symbol | Comments |
|---|---|---|---|---|---|---|---|
| | | | | Red sandy clay with sandstone fragments | | CL | |
| 165 | | | | | 165 | | |
| | | | | Red sandy clay with gravel | | CL | |
| 170 | | | | | | | |
| | | | | | 174 | | |
| 175 | | | | Red clay with some gravel. Clay is of high Plasticity (Red Bed) | | CH | |
| | | | | | 177 | | |
| | | | | Boring terminated at 177 feet | | | |
| 180 | | | | | | | |
| 185 | | | | | | | |
| 190 | | | | | | | |
| 195 | | | | | | | |
| 200 | | | | | | | |

*Comments:*

Geologist Signature Jeffrey Kindley

Revised June 1972

STATE ENGINEER OFFICE

# WELL RECORD

## Section 1. GENERAL INFORMATION

(A) Owner of well El Paso Natural Gas Co. Owner's Well No. ACW-12
Street or Post Office Address 100 N. Stanton
City and State El Paso, TX 79901

Well was drilled under Permit No. ______ and is located in the: Christie Jal No.4 Plant 10 mi N of Jal, New Mexico, on Highway 18

a. ____ ¼ ____ ¼ ____ ¼ ____ ¼ of Section ____ Township ____ Range ____ N.M.P.M.

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

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

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

(B) Drilling Contractor Scarborough Drilling, Inc. License No. WD-1188

Address 122 N. 24th, Lamesa, TX 79331

Drilling Began 6-17-96 Completed 6-18-96 Type tools rotary Size of hole 8 in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 170 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 109.4 ft.

## Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet | | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| From | To | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet | | Length (feet) | Type of Shoe | Perforations | |
|---|---|---|---|---|---|---|---|---|
| | | | Top | Bottom | | | From | To |
| 4 | pvc | | + 3 | 170 | 173 | | .020 150 | 170 |
| | | | | | | | | |
| | | | | | | | | |

## Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet | | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| From | To | | | | |
| 170 | 148 | 8 | 4.5 of 8-16 frac sand | | pumped |
| 148 | 143 | 8 | 100# bentonite chips | | " |
| 143<br>2 | 2<br>0 | 8 | | 22 sx cem/bent<br>concrete | "<br>poured |

## Section 5. PLUGGING RECORD

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

______
State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ______ FWL ______ FSL ______

File No. ______ Use ______ Location No. ______

Section 6. LOG OF HOLE

| Depth in Feet | | Thickness in Feet | Color and Type of Material Encountered |
|---|---|---|---|
| From | To | | |
| 0 | 15 | 15 | tan red fine grained sand |
| 15 | 25 | 10 | " w/limestone fragments |
| 25 | 40 | 15 | " w/sandstone |
| 40 | 45 | 5 | " |
| 45 | 50 | 5 | " w/sandstone |
| 50 | 70 | 20 | " w/limestone |
| 70 | 80 | 10 | " w/sandstone & limestone fragments |
| 80 | 100 | 20 | red sandstone frags w/fine grained silty sand |
| 100 | 135 | 35 | red sandstone fragments |
| 135 | 145 | 10 | red sandstone w/fine grained sand |
| 145 | 168 | 23 | tan/brn fine grained clayey sand w/sandstone frags |
| 168 | 170 | 2 | red clay (red bed) |
| | | | |
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Section 7. REMARKS AND ADDITIONAL INFORMATION

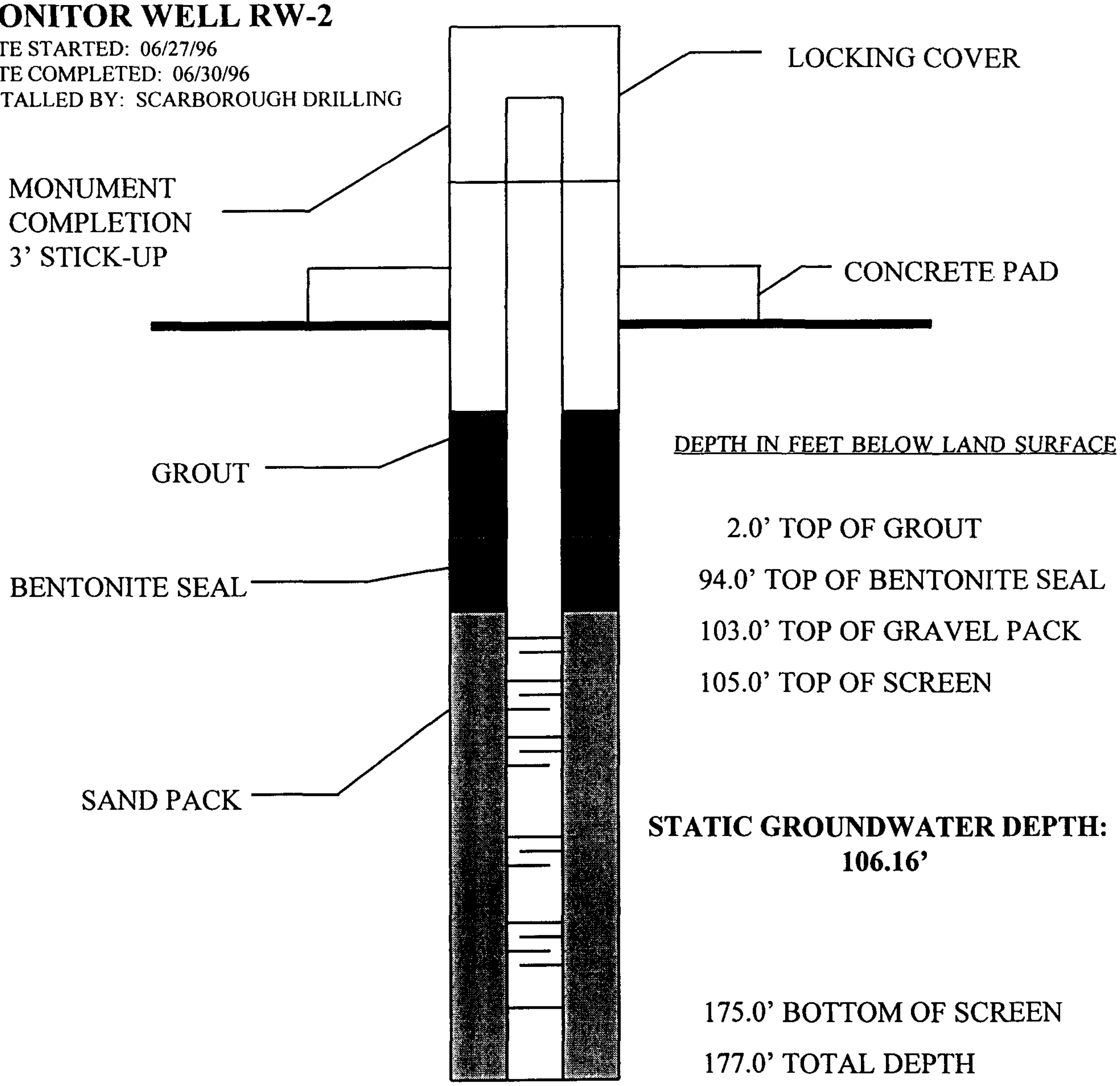
The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Lane Scarborough Driller

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

## MONITOR WELL RW-2

DATE STARTED: 06/27/96
DATE COMPLETED: 06/30/96
INSTALLED BY: SCARBOROUGH DRILLING




CASING TYPE: 10" SCH. 160 PVC
SCREEN TYPE: SCH. 160 PVC 0.35 SLOT
GRAVEL PACK: 08/16 VOLUME SILICA SAND

| PHILIP ENVIRONMENTAL SERVICES CORPORATION |
| --- |
| **Monitor Well Installation Diagram** |
| EL PASO NATURAL GAS JAL #4 PLANT<br>LEA COUNTY, NEW MEXICO<br>PROJECT NUMBER 14683 |

Revised June 1972

STATE ENGINEER OFFICE

# WELL RECORD

## Section 1. GENERAL INFORMATION

(A) Owner of well El Paso Natural Gas Co. Owner's Well No. ACW-13

Street or Post Office Address 100 N. Stanton

City and State El Paso, TX 79901

Well was drilled under Permit No. ______ and is located in the: Christie Jal No 4 Plant 10 mi N of Jal, NM on Hwy 18

a. ____ ¼ ____ ¼ ____ ¼ ____ ¼ of Section ____ Township ____ Range ____ N.M.P.M.

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

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

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

(B) Drilling Contractor Scarborough Drilling, Inc. License No. WD-1188

Address 122 N. 24th Lamesa, TX 79331

Drilling Began 6-19-96 Completed 6-20-96 Type tools rotary Size of hole 8 in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 173 ft.

Completed well is [X] shallow [ ] artesian. Depth to water upon completion of well 99.71 ft.

## Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet | | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| From | To | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet | | Length (feet) | Type of Shoe | Perforations | |
|---|---|---|---|---|---|---|---|---|
| | | | Top | Bottom | | | From | To |
| 4 | pvc | | + 3 | 173 | 176 | | 153 .020 | 173 |
| | | | | | | | | |
| | | | | | | | | |

## Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet | | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| From | To | | | | |
| 173 | 151 | 8 | 4.5 of 8-16 frac sand | | pumped |
| 151 | 146 | 8 | 100# bentonite chips | | " |
| 146 2 | 2 0 | 8 | | 18 sx cem/bent concrete | " poured |

## Section 5. PLUGGING RECORD

Plugging Contractor ____

Address ____

Plugging Method ____

Date Well Plugged ____

Plugging approved by:

____
State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ____ FWL ____ FSL ____

File No. ____ Use ____ Location No. ____

Section 6. LOG OF HOLE

| Depth in Feet | | Thickness in Feet | Color and Type of Material Encountered |
|---|---|---|---|
| From | To | | |
| 0 | 10 | 10 | red fine grained sand |
| 10 | 20 | 10 | " w/limestone frags |
| 20 | 35 | 15 | tan red fine grained sand w/limestone & sandstone frags |
| 35 | 70 | 35 | " " |
| 70 | 75 | 5 | red fine grained sandstone w/some fg sand & limestone frags |
| 75 | 85 | 10 | tan fg sand w/sandstone & limestone frags |
| 85 | 125 | 40 | red sandstone fragments w/fg sand |
| 125 | 170 | 45 | red sandstone w/white tan silty clay |
| 170 | 172 | 2 | tan red sandy silty clay |
| 172 | 173 | 1 | red/brn clay (red bed) |

Section 7. REMARKS AND ADDITIONAL INFORMATION

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

Lane Scarborough Driller

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

Revised June 1972

STATE ENGINEER OFFICE

# WELL RECORD

## Section 1. GENERAL INFORMATION

(A) Owner of well El Paso Natural Gas Co. Owner's Well No. ACW-14

Street or Post Office Address 100 N. Stanton

City and State El Paso, TX 79901

Well was drilled under Permit No. ______ and is located in the: Christie Jal No 4 Plant 10 mi N of Jal, NM on Hwy 18

a. ____ ¼ ____ ¼ ____ ¼ ____ ¼ of Section ____ Township ____ Range ____ N.M.P.M.

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

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

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

(B) Drilling Contractor Scarborough Drilling, Inc. License No. WD-1188

Address 122 N. 24th, Lamesa, TX 79331

Drilling Began 6-24-96 Completed 6-25-96 Type tools rotary Size of hole 8 in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 177 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 101.28 ft.

## Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet | | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| From | To | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet | | Length (feet) | Type of Shoe | Perforations | |
|---|---|---|---|---|---|---|---|---|
| | | | Top | Bottom | | | From | To |
| 4 | pvc | | + 3 | 177 | 180 | | 157 .020 | 177 |
| | | | | | | | | |
| | | | | | | | | |

## Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet | | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| From | To | | | | |
| 155 | 177 | 8 | 6 sx of 8-16 frac sand | | pumped |
| 155 | 150 | 8 | 100# bentonite chips | | " |
| 150<br>2 | 2<br>0 | 8 | | 21 sx cem/bent<br>concrete | "<br>poured |

## Section 5. PLUGGING RECORD

Plugging Contractor ____

Address ____

Plugging Method ____

Date Well Plugged ____

Plugging approved by:

____

State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ____ FWL ____ FSL ____

File No. ____ Use ____ Location No. ____

Section 6. LOG OF HOLE

| Depth in Feet From | Depth in Feet To | Thickness in Feet | Color and Type of Material Encountered |
|---|---|---|---|
| 0 | 10 | 10 | lt red/brn fg sand |
| 10 | 15 | 5 | " w/clay |
| 15 | 20 | 5 | " w/limestone fragments |
| 20 | 25 | 5 | tan fg sand mixed w/limestone & gravel |
| 25 | 30 | 5 | " w/sandstone frags |
| 30 | 55 | 25 | tan fg clayey sand w/limestone frags |
| 55 | 60 | 5 | " w/sandstone frags |
| 60 | 75 | 15 | tan fg sand w/sandstone frags |
| 75 | 90 | 15 | red sandstone w/some fg sand & limestone grags |
| 90 | 130 | 40 | red sandstone w/fg sandy clay |
| 130 | 140 | 10 | tan mg sand w/some gravel & limestone |
| 140 | 150 | 10 | fg sand w/gravel, limestone & sandstone grags |
| 150 | 177 | 27 | tan fine to medium grained clayey sand w/sandstone frags |
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Section 7. REMARKS AND ADDITIONAL INFORMATION

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

Lane Scarborough Driller

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

Revised June 1972

STATE ENGINEER OFFICE

# WELL RECORD

## Section 1. GENERAL INFORMATION

(A) Owner of well El Paso Natural Gas Co. Owner's Well No. RW-1
Street or Post Office Address 100 N. Stanton
City and State El Paso, TX 79901

Well was drilled under Permit No. ______ and is located in the: Christie Jal No 4 Plant
10 mi N of Jal, NM on Hwy 18
a. ____ ¼ ____ ¼ ____ ¼ ____ ¼ of Section ____ Township ____ Range ____ N.M.P.M.

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

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

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

(B) Drilling Contractor Scarborough Drilling, Inc. License No. WD-1188

Address 122 N. 24th, Lamesa, TX 79331

Drilling Began 6-21-96 Completed 6-23-96 Type tools rotary Size of hole 15 in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 179 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 106.16 ft.

## Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet | | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| From | To | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet | | Length (feet) | Type of Shoe | Perforations | |
|---|---|---|---|---|---|---|---|---|
| | | | Top | Bottom | | | From | To |
| 10 | pvc | | + 2 | 179 | 181 | | 109 .035 | 179 |
| | | | | | | | | |
| | | | | | | | | |

## Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet | | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| From | To | | | | |
| 107 | 179 | 15 | 35 sx 8-16 frac sand | | pumped |
| 102 | 107 | 15 | 300# bentonite chips | | " |
| 102<br>2 | 2<br>0 | 15 | | 41 sx cem/bent<br>concrete | "<br>poured |

## Section 5. PLUGGING RECORD

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

____
State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ____ FWL ____ FSL ____

File No. ____ Use ____ Location No. ____

Section 6. LOG OF HOLE

| Depth in Feet | | Thickness in Feet | Color and Type of Material Encountered |
|---|---|---|---|
| From | To | | |
| 0 | 2 | 2 | caliche/gravel |
| 2 | 10 | 8 | lt red/brn mediem grained sand |
| 10 | 20 | 10 | " w/some clay & limestone frags |
| 20 | 30 | 10 | lt red fg clayey sand w/limestone frags |
| 30 | 42 | 12 | lt tan fg silty sand w/clay |
| 42 | 60 | 18 | tan silty clayey sand w/sandstone frags |
| 60 | 90 | 30 | lt red/brn sandstone w/silty clay & gravel |
| 90 | 105 | 15 | red/brn mg sand w/some sandstone frags |
| 105 | 130 | 25 | red to blk hydrocarbon stained mg sand w/sandstone frags |
| 130 | 170 | 40 | " |
| 170 | 177 | 7 | brn/black silty sandy clay |
| 177 | 179 | 2 | red clay w/high plasticity |
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Section 7. REMARKS AND ADDITIONAL INFORMATION

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

Lane Scarborough Driller

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

Revised June 1972

STATE ENGINEER OFFICE

# WELL RECORD

## Section 1. GENERAL INFORMATION

(A) Owner of well El Paso Natural Gas Co. Owner's Well No. RW-2
Street or Post Office Address 100 N. Stanton
City and State El Paso, TX 79901

Well was drilled under Permit No. ______ and is located in the Christie Jal No 4 Plant 10 mi N of Jal, NM on Hwy 18

a. ____ ¼ ____ ¼ ____ ¼ ____ ¼ of Section ____ Township ____ Range ____ N.M.P.M.

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

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

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

(B) Drilling Contractor Scarborough Drilling, Inc. License No. WD-1188

Address 122 N. 24th, Lamesa, TX 79331

Drilling Began 6-27-96 Completed 6-29-96 Type tools rotary Size of hole 15 in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 175 ft.

Completed well is [X] shallow [ ] artesian. Depth to water upon completion of well 106.16 ft.

## Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet | | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| From | To | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet | | Length (feet) | Type of Shoe | Perforations | |
|---|---|---|---|---|---|---|---|---|
| | | | Top | Bottom | | | From | To |
| 10 | pvc | | + 3 | 175 | 178 | | 105 | .035<br>175 |
| | | | | | | | | |
| | | | | | | | | |

## Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet | | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| From | To | | | | |
| 103 | 175 | 15 | 37 sx 8-16 frac sand | | pumped |
| 94 | 103 | 15 | 300# bentonite chips | | " |
| 2<br>2 | 94<br>0 | 15 | | 43 sx cem/bentonite<br>concrete | "<br>poured |

## Section 5. PLUGGING RECORD

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

____
State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ____ FWL ____ FSL ____

File No. ____ Use ____ Location No. ____

Section 6. LOG OF HOLE

| Depth in Feet | | Thickness in Feet | Color and Type of Material Encountered |
|---|---|---|---|
| From | To | | |
| 0 | 10 | 10 | red/brn fg sand |
| 10 | 20 | 10 | " w/limestone frags |
| 20 | 40 | 20 | tan/red fg clayey sand w/limestone frags |
| 40 | 50 | 10 | tan clayey sand w/limestone & sandstone frags |
| 50 | 85 | 35 | " w/sandstone |
| 85 | 105 | 20 | tan to red fg clayey sand w/sandstone frags |
| 105 | 160 | 55 | tan to red fg sandy clay w/sandstone frags |
| 160 | 165 | 5 | red clay w/some sand & sandstone frags |
| 165 | 170 | 5 | red sandy clay w/gravel |
| 170 | 175 | 5 | red clay (redbed) w/gravel |

Section 7. REMARKS AND ADDITIONAL INFORMATION

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

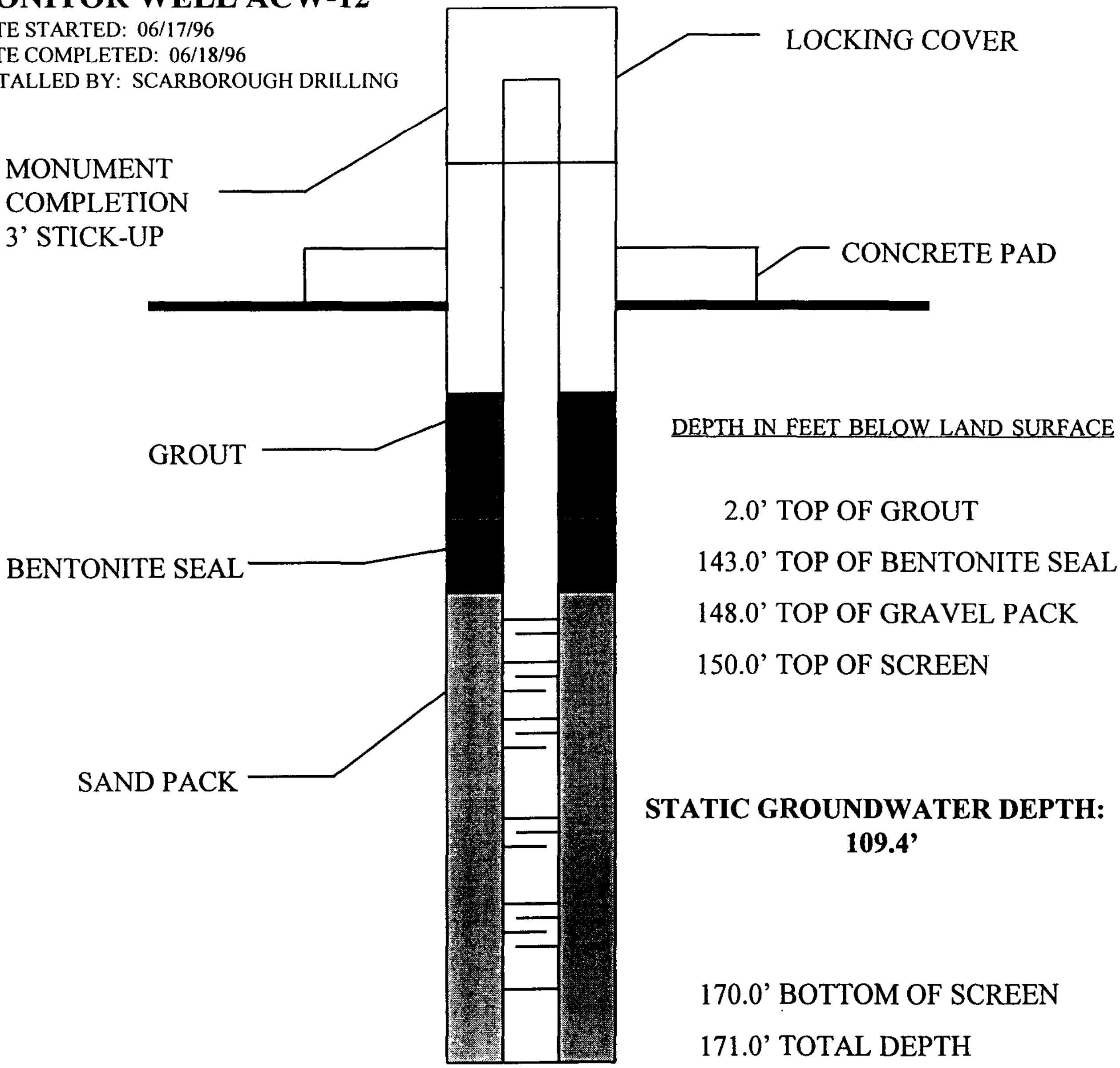
Lane Scarborough Driller

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

# APPENDIX B
# MONITOR WELL COMPLETION

## MONITOR WELL ACW-12

DATE STARTED: 06/17/96
DATE COMPLETED: 06/18/96
INSTALLED BY: SCARBOROUGH DRILLING




CASING TYPE: 4" SCH. 40 PVC
SCREEN TYPE: SCH. 40 PVC 0.20 SLOT
GRAVEL PACK: 08/16 VOLUME SILICA SAND

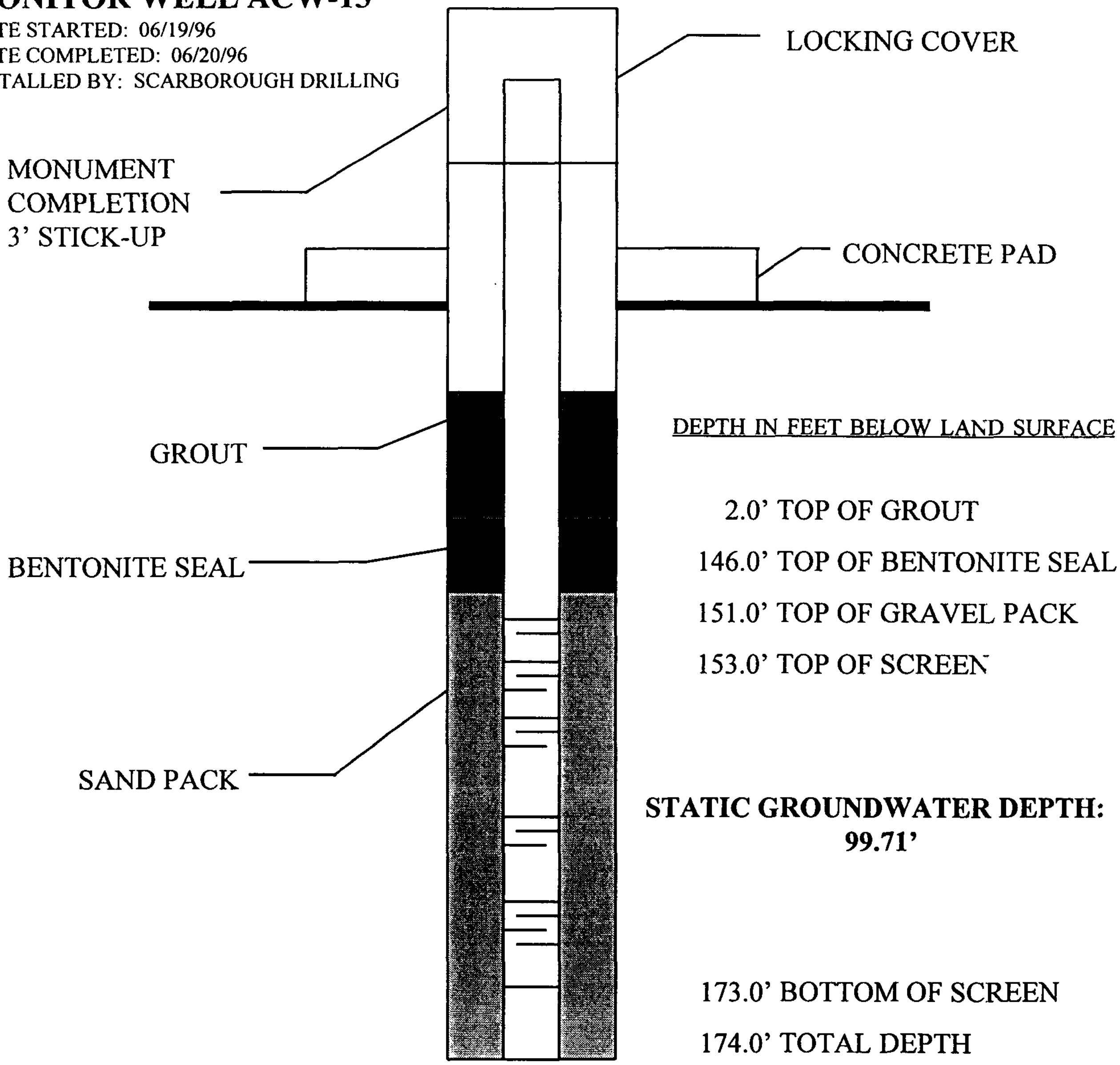
**PHILIP ENVIRONMENTAL SERVICES CORPORATION**

**Monitor Well Installation Diagram**

EL PASO NATURAL GAS JAL #4 PLANT
LEA COUNTY, NEW MEXICO
PROJECT NUMBER 14683

## MONITOR WELL ACW-13

DATE STARTED: 06/19/96
DATE COMPLETED: 06/20/96
INSTALLED BY: SCARBOROUGH DRILLING




CASING TYPE: 4" SCH. 40 PVC
SCREEN TYPE: SCH. 40 PVC 0.20 SLOT
GRAVEL PACK: 08/16 VOLUME SILICA SAND

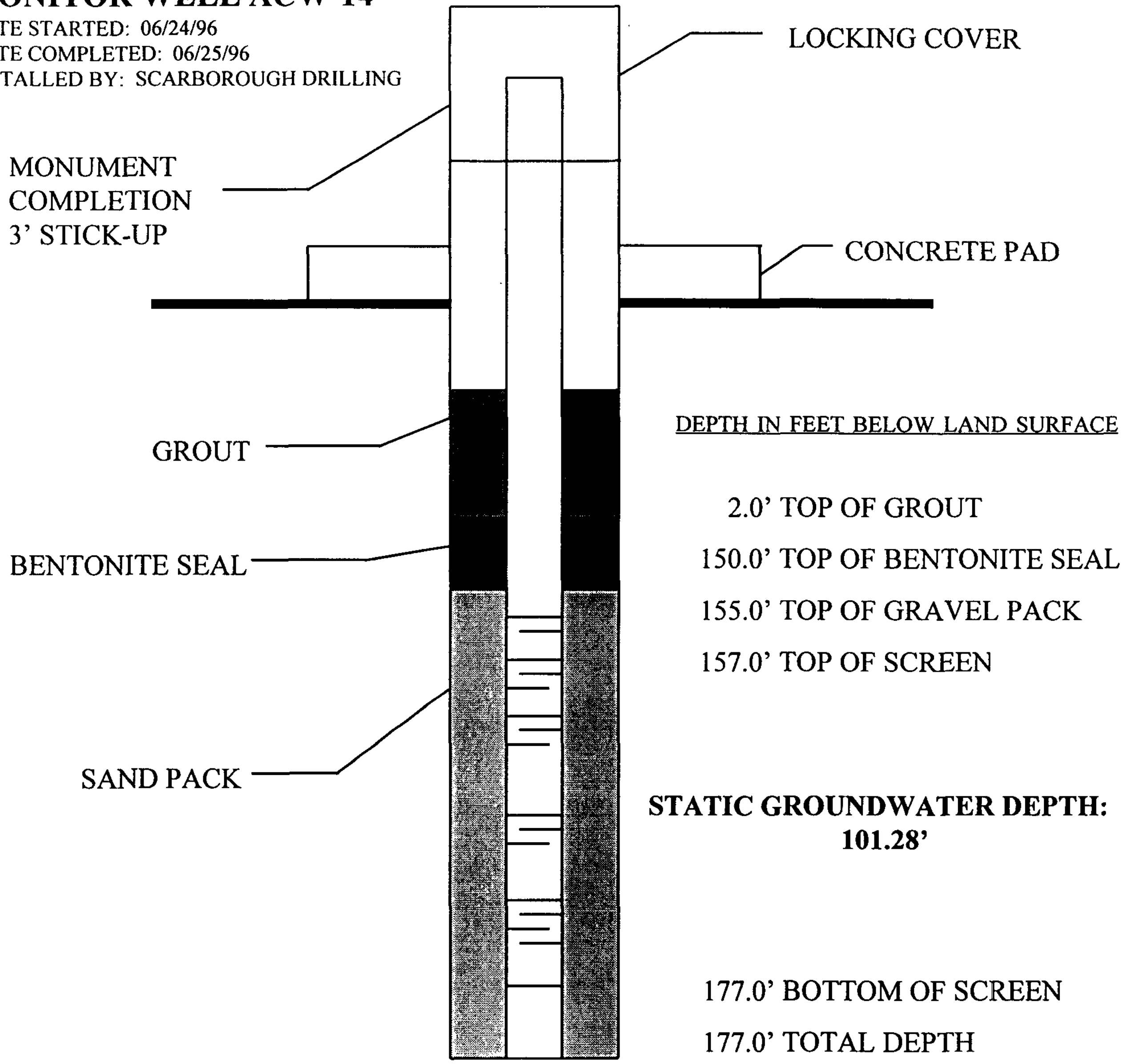
**PHILIP ENVIRONMENTAL SERVICES CORPORATION**

**Monitor Well Installation Diagram**

EL PASO NATURAL GAS JAL #4 PLANT
LEA COUNTY, NEW MEXICO
PROJECT NUMBER 14683

## MONITOR WELL ACW-14

DATE STARTED: 06/24/96
DATE COMPLETED: 06/25/96
INSTALLED BY: SCARBOROUGH DRILLING




CASING TYPE: 4" SCH. 40 PVC
SCREEN TYPE: SCH. 40 PVC 0.20 SLOT
GRAVEL PACK: 08/16 VOLUME SILICA SAND

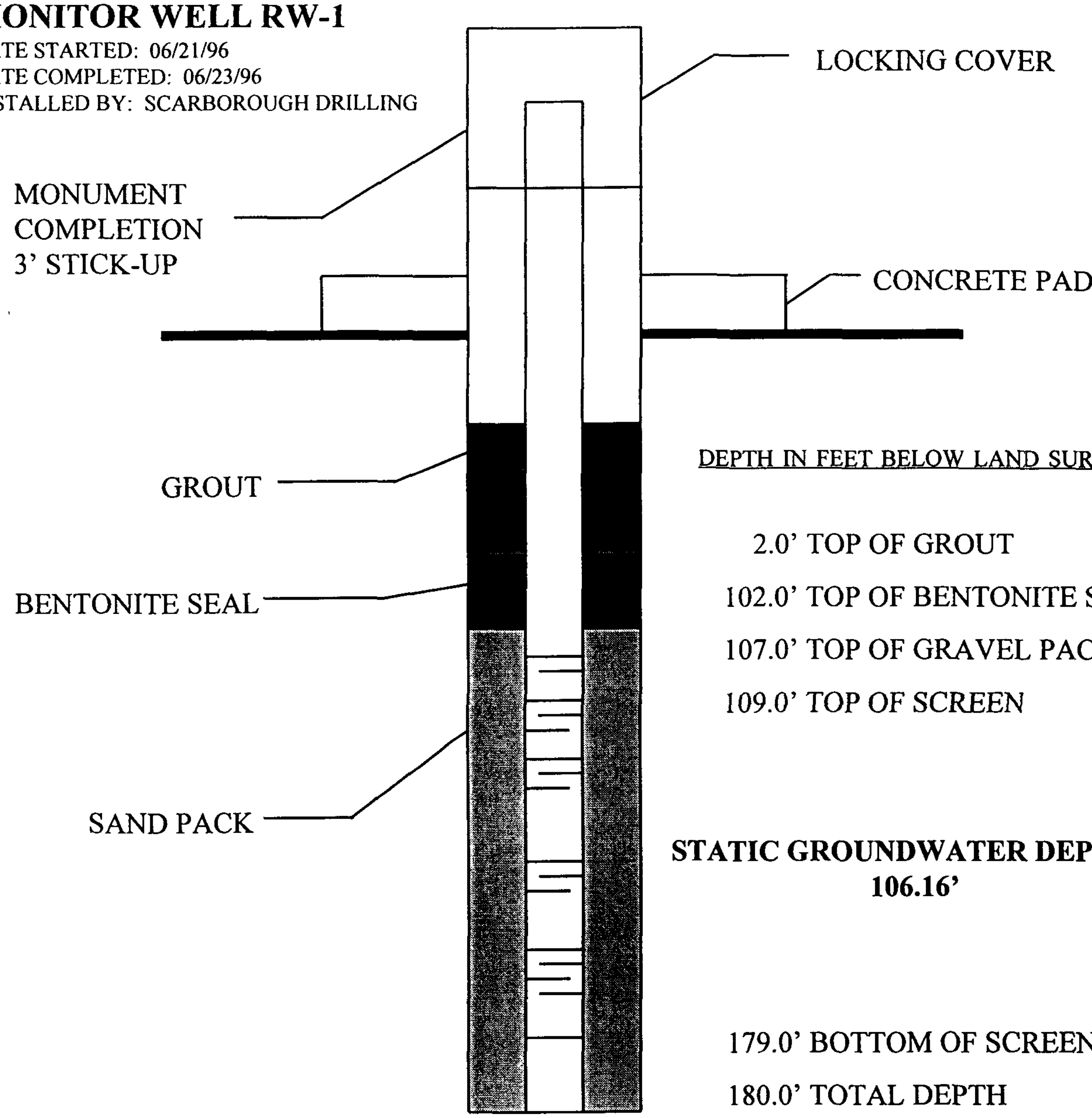
**PHILIP ENVIRONMENTAL SERVICES CORPORATION**

**Monitor Well Installation Diagram**

EL PASO NATURAL GAS JAL #4 PLANT
LEA COUNTY, NEW MEXICO
PROJECT NUMBER 14683

## MONITOR WELL RW-1

DATE STARTED: 06/21/96
DATE COMPLETED: 06/23/96
INSTALLED BY: SCARBOROUGH DRILLING




DEPTH IN FEET BELOW LAND SURFACE

2.0' TOP OF GROUT
102.0' TOP OF BENTONITE SEAL
107.0' TOP OF GRAVEL PACK
109.0' TOP OF SCREEN

**STATIC GROUNDWATER DEPTH: 106.16'**

179.0' BOTTOM OF SCREEN
180.0' TOTAL DEPTH

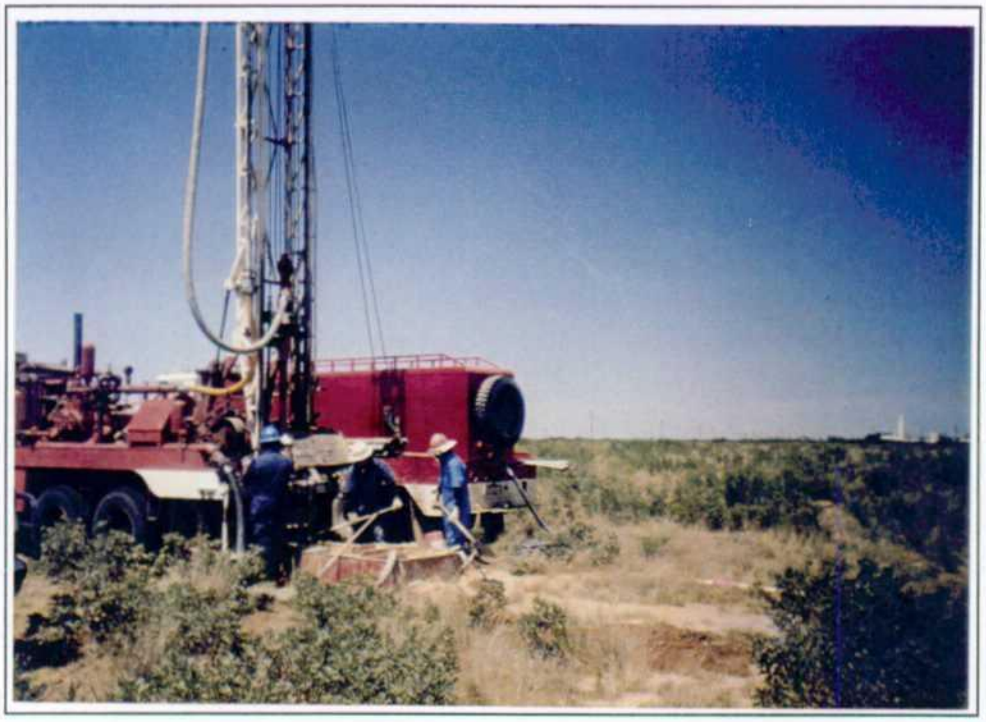
CASING TYPE: 10" SCH. 160 PVC
SCREEN TYPE: SCH. 160 PVC 0.35 SLOT
GRAVEL PACK: 08/16 VOLUME SILICA SAND

**PHILIP ENVIRONMENTAL SERVICES CORPORATION**

**Monitor Well Installation Diagram**

EL PASO NATURAL GAS JAL #4 PLANT
LEA COUNTY, NEW MEXICO
PROJECT NUMBER 14683

# APPENDIX C
# SITE PHOTOGRAPHS



Drilling of ACW-12

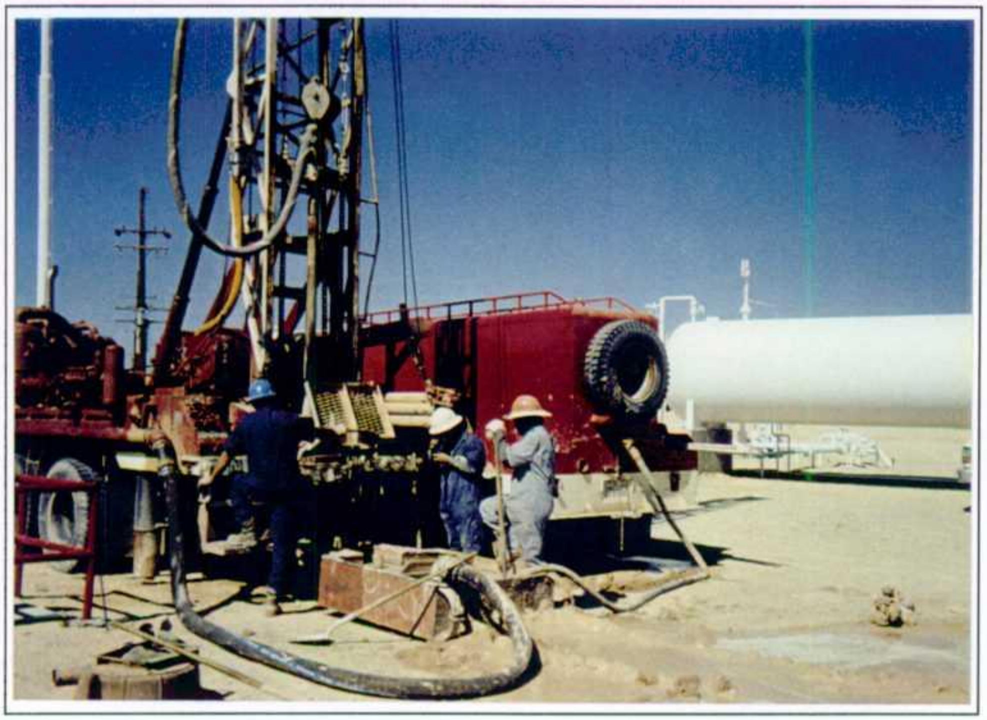
Installation of 4" piping in ACW-12

Drilling of ACW-13

Installation of 4" piping in ACW-13

Drilling of ACW-14

Installation of 4" piping in ACW-14



Drilling of RW-1

Installation of piping for RW-1

Development of RW-1 with Grundfos Pump

Development water from RW-1 pumped to southern brine pit

Drilling of RW-2

Installation of piping for RW-2


Development of RW-2 with a Grundfos pump

21,000 gallon frac tank used to store RW-2 development water

Monitor Well located on Christie Gas property to south of Sheriff's Department

Removal of monitor well on Christie Property

Completed removal of monitor well on Christie Gas property

Removal of monitor well in parking lot of Sheriff's Department property

Completed removal of monitor well on Sheriff's Department propety

Completed monitor well ACW-12

Completed monitor well ACW-13

Completed monitoring well ACW-14

Recovery well RW-1 to be completed after installation of remediation system

Completed recovery well RW-2

# APPENDIX D
# LABORATORY ANALYTICAL

ZENON LABORATORIES

5555 North Service Road
Burlington, Ontario, Canada L7L 5H7
Tel: (905) 332-8788
Fax: (905) 332-9169

# Certificate of Analysis

**CLIENT INFORMATION**

| | |
|---|---|
| **Attention:** | Darrell Campbell |
| **Client Name:** | El Paso Natural Gas Company |
| **Project:** | |
| **Project Desc:** | |
| **Address:** | 8645 Railroad Drive<br>El Paso, TX<br>79904 |
| **Fax Number:** | 915-759-2335 |
| **Phone Number:** | 915-759-2228 |

**LABORATORY INFORMATION**

| | |
|---|---|
| **Contact:** | Ada Blythe, B.Sc , C Chem. |
| **Project:** | AN960104 |
| **Date Received:** | 96/08/17 |
| **Date Reported:** | 96/08/30 |
| **Submission No.:** | 6H0446 |
| **Sample No.:** | 032000-032020 |

NOTES: *'-' = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available*
*LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33*
*Solids data is based on dry weight except for biota analyses.*
*Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)*

Methods used by Zenon are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Seventeenth Edition. Other methods are based on the principles of MISA or EPA methodologies.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at Zenon for a period of three weeks from receipt of data or as per contract.

COMMENTS:

"*" = Suspect chloride interference on silver recovery

Please note that for sample 032008 96 no vials were received, therefore this sample was taken from a plastic bottle with headspace.

*Certified by:*



A division of PHILIP Analytical Services Corporation

# FLOW MAP

| ACW | S.I | TOC |
|---|---|---|
| 1 – | ~~110-130~~ | 3,300.87 |
| 5 – | 105-115 | 3,254.75 |
| 6 – | 110-120 | 3,300.53 |
| 9 – | 140-160 | 3,302.47 |
| 10 – | 140-160 | 3,297.57 |
| 11 – | " -" | 3,299.33 |

OTHER

| | | |
|---|---|---|
| ACW -2A | 98-118 | 3,300.88 |
| " -3 | 112-132 | 3,300.34 |
| " -4 | 154-169 | 3,299.48 |
| " -7 | 105-115 | 3,295.36 |
| " -8 | 140-173 | 3,297.27 |
| RNSR-1 | 123-148 | 3,305.40 |
| " -2 | 121-148 | 3,301.60 |
| " -3 | 123-148 | 3,303.80 |
| PTP-1 | 110-130 | 3,304.41 |

**SAMPLE KEY**

SAMPLE NUMBER: S96-0320 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: FIELD BLANK
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 07:45 SAMPLE DATE: 08/13/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0321 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #6
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 09:35 SAMPLE DATE: 08/14/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0322 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #~~15~~ 14
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:23 SAMPLE DATE: 08/14/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0323 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #~~15~~ 14 DUPLICATE
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:23 SAMPLE DATE: 08/14/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0324 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: EMP #3 MIDDLE OF PURGING WELLS
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:50 SAMPLE DATE: 08/14/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0325 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: BAILER BLANK MIDDLE OF SAMPLING
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:15 SAMPLE DATE: 08/14/96

SAMPLE KEY

SAMPLE NUMBER: S96-0326 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #9
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:55 SAMPLE DATE: 08/14/96

SAMPLE KEY

SAMPLE NUMBER: S96-0327 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #10
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 17:20 SAMPLE DATE: 08/14/96

SAMPLE KEY

SAMPLE NUMBER: S96-0328 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: PRODUCTION WELL #1
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 09:52 SAMPLE DATE: 08/15/96

SAMPLE KEY

SAMPLE NUMBER: S96-0329 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #12
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:04 SAMPLE DATE: 08/15/96

SAMPLE KEY

SAMPLE NUMBER: S96-0330 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: OXY PRODUCTION WELL
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:40 SAMPLE DATE: 08/15/96

SAMPLE KEY

SAMPLE NUMBER: S96-0376 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: JIMMY DOOM PRODUCTION WELL
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:25 SAMPLE DATE: 08/15/96

# Zenon Environmental Laboratories - Certificate of Analysis



| Component | MDL | Units | S96-0321 | S96-0322 | S96-0323 | S96-0325 | S96-0324 | S96-0326 | S96-0327 |
|---|---|---|---|---|---|---|---|---|---|
| Zenon ID: | | | 032007 96 | 032008 96 | 032009 96 | 032010 96 | 032011 96 | 032012 96 | 032013 96 |
| Date Sampled: | | | 96/08/14 | 96/08/14 | 96/08/14 | 96/08/14 | 96/08/14 | 96/08/14 | 96/08/14 |
| Benzene | 1.0 | ug/L | 4.2 | < | < | < | < | 1.4 | < |
| Toluene | 1.0 | " | 2.6 | 1.2 | < | < | 1.9 | 1.6 | < |
| Ethylbenzene | 1.0 | " | <2.0 | < | < | < | < | < | < |
| m&p-Xylene | 1.0 | " | <2.0 | 5.5 | < | < | 1.2 | < | < |
| o-Xylene | 1.0 | " | <2.0 | 1.4 | < | < | < | < | < |
| Surrogate Recoveries | | % | | | | | | | |
| d4-1,2-Dichloroethane | | | 92 | 76 | 94 | 94 | 102 | 95 | 99 |
| d8-Toluene | | | 88 | 87 | 91 | 92 | 87 | 98 | 90 |
| Bromofluorobenzene | | | 96 | 94 | 99 | 98 | 93 | 98 | 100 |

# Zenon Environmental Laboratories - Certificate of Analysis



| Component | MDL | Units | S96-0328 | S96-0329 | S96-0329 | S96-0329 | S96-0329 | S96-0329 | S96-0330 |
|---|---|---|---|---|---|---|---|---|---|
| Zenon ID: | | | 032014 96 | 032015 96 | 032015 96 | 032015 96 | 032015 96 | 032015 96 | 032016 96 |
| Date Sampled: | | | 96/08/15 | 96/08/15 | 96/08/15 | 96/08/15 | 96/08/15 | 96/08/15 | 96/08/15 |
| | | | | | M. Spike | MS % Rec. | MS Dup | MSD % Rec. | |
| Benzene | 1.0 | ug/L | < | < | 54 | 110 | 54 | 110 | < |
| Toluene | 1.0 | " | < | < | 53 | 110 | 54 | 110 | < |
| Ethylbenzene | 1.0 | " | < | < | 54 | 110 | 55 | 110 | < |
| m&p-Xylene | 1.0 | " | < | < | 110 | 110 | 100 | 100 | < |
| o-Xylene | 1.0 | " | < | < | 53 | 110 | 55 | 110 | < |
| Surrogate Recoveries | | % | | | | | | | |
| d4-1,2-Dichloroethane | | | 93 | 94 | 101 | 101 | 104 | 104 | 99 |
| d8-Toluene | | | 89 | 92 | 95 | 95 | 100 | 100 | 88 |
| Bromofluorobenzene | | | 101 | 102 | 98 | 98 | 101 | 101 | 104 |

# *Zenon Environmental Laboratories - Certificate of Analysis*



| | | | | | | |
|---|---|---|---|---|---|---|
| | ***Client ID:*** | | S96-0376 | S96-0377 | S96-0378 | S96-0379 |
| | ***Zenon ID:*** | | 032017.96 | 032018 96 | 032019 96 | 032020 96 |
| | ***Date Sampled:*** | | 96/08/15 | 96/08/15 | 96/08/15 | 96/08/15 |
| **Component** | **MDL** | **Units** | | | | |
| Benzene | 1.0 | ug/L | < | < | < | 1.0 |
| Toluene | 1.0 | " | < | < | 2.0 | 1.5 |
| Ethylbenzene | 1.0 | " | < | < | < | < |
| m&p-Xylene | 1.0 | " | < | < | < | 1.3 |
| o-Xylene | 1.0 | " | < | < | < | < |
| Surrogate Recoveries | | % | | | | |
| d4-1,2-Dichloroethane | | | 81 | 88 | 98 | 86 |
| d8-Toluene | | | 109 | 86 | 92 | 91 |
| Bromofluorobenzene | | | 85 | 95 | 107 | 89 |

SAMPLE KEY

SAMPLE NUMBER: S96-0377 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #13
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 17:21 SAMPLE DATE: 08/15/96

SAMPLE KEY

SAMPLE NUMBER: S96-0378 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: BAILER BLANK AFTER SAMPLING
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 17:52 SAMPLE DATE: 08/15/96

SAMPLE KEY

SAMPLE NUMBER: S96-0379 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: EMP #3 AFTER PURGING WELLS
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 18:00 SAMPLE DATE: 08/15/96

SAMPLE KEY

SAMPLE NUMBER: S96-0381 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #1
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:45 SAMPLE DATE: 08/13/96

SAMPLE KEY

SAMPLE NUMBER: S96-0382 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: BAILER BLANK BEFORE SAMPLING
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 07:50 SAMPLE DATE: 08/13/96

SAMPLE KEY

SAMPLE NUMBER: S96-0383 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #11
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:55 SAMPLE DATE: 08/13/96

## SAMPLE KEY

SAMPLE NUMBER: S96-0384  LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: EMP #3 BEFORE PURGING
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 08:00  SAMPLE DATE: 08/13/96

## SAMPLE KEY

SAMPLE NUMBER: S96-0385  LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #5
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 17:30  SAMPLE DATE: 08/13/96

# Zenon Environmental Laboratories - Certificate of Analysis

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Client ID:* | | Method Blank | S96-0320 | S96-0381 | S96-0382 | S96-0383 | S96-0384 | S96-0385 |
| | *Zenon ID:* | | 032000 96 | 032001 96 | 032002 96 | 032003 96 | 032004 96 | 032005 96 | 032006 96 |
| | *Date Sampled:* | | 96/08/13 | 96/08/13 | 96/08/13 | 96/08/13 | 96/08/13 | 96/08/13 | 96/08/13 |
| **Component** | **MDL** | **Units** | | | | | | | |
| Benzene | 1.0 | ug/L | < | < | 3.5 | < | 7.9 | 1.3 | < |
| Toluene | 1.0 | " | < | < | 1.2 | < | 2.2 | 1.9 | 1.2 |
| Ethylbenzene | 1.0 | " | < | < | < | < | < | < | < |
| m&p-Xylene | 1.0 | " | < | < | < | < | 1.0 | < | < |
| o-Xylene | 1.0 | " | < | < | < | < | < | < | < |
| Surrogate Recoveries | | % | | | | | | | |
| d4-1,2-Dichloroethane | | | 95 | 97 | 93 | 97 | 94 | 92 | 93 |
| d8-Toluene | | | 91 | 93 | 91 | 93 | 92 | 90 | 91 |
| Bromofluorobenzene | | | 99 | 101 | 94 | 101 | 95 | 99 | 97 |

| | | | | | |
|---|---|---|---|---|---|
| *Client ID:* | | | Method Blank | Blank Spike | Blank Spike |
| *Zenon ID:* | | | 032000 96 | 032000 96 | 032000 96 |
| *Date Sampled:* | | | 96/08/13 | 96/08/13 | 96/08/13 |
| **Component** | **MDL** | **Units** | | | % Recovery |
| pH (20 DEG C) | | | - | - | - |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | - | - |
| Alkalinity (as CaCO3) | 1.0 | " | < | - | - |
| Conductivity | 4.2 | uS/cm | < | - | - |
| TDS (180 °C) | 11 | mg/L | < | - | - |
| Nitrite (as N) | 0.050 | mg/L | < | - | - |
| Nitrate and Nitrite (as N) | 0.0500 | " | < | - | - |
| Fluoride (probe) | 0.03 | mg/L | 0.03 | - | - |
| Bromide | 0.010 | mg/L | < | - | - |
| Sulphate (as SO4) | 0.10 | " | < | - | - |
| Chloride | 0.50 | " | < | - | - |
| Aluminum | 0.030 | mg/L | <0.033 | 2.2 | 100 |
| Barium | 0.001 | " | < | 1.1 | 100 |
| Beryllium | 0.001 | " | < | 0.55 | 100 |
| Cadmium | 0.002 | " | < | 0.55 | 99 |
| Calcium | 0.20 | " | <0.22 | 11 | 100 |
| Chromium | 0.004 | " | < | 1.1 | 100 |
| Cobalt | 0.010 | " | <0.011 | 1.2 | 110 |
| Copper | 0.005 | " | <0.006 | 1.1 | 100 |
| Iron | 0.010 | " | <0.011 | 14 | 110 |
| Lead | 0.020 | " | <0.022 | 1.1 | 110 |
| Magnesium | 0.050 | " | <0.055 | 12 | 99 |
| Manganese | 0.006 | " | <0.007 | 1.1 | 100 |
| Molybdenum | 0.010 | " | <0.011 | 0.55 | 100 |
| Nickel | 0.010 | " | <0.011 | 0.58 | 110 |
| Phosphorus | 0.060 | " | 0.075 | 5.7 | 110 |
| Potassium | 1.000 | " | <1.1 | 11 | 100 |
| Silver | 0.010 | " | <0.011 | 0.57 | 100 |
| Sodium | 0.100 | " | <0.11 | 11 | 100 |
| Thallium | 0.060 | " | <0.066 | 1.1 | 100 |
| Vanadium | 0.005 | " | <0.006 | 0.57 | 100 |
| Zinc | 0.005 | " | <0.006 | 2.2 | 100 |
| Hardness (as CaCO3) | 1.0 | " | - | - | - |

| Component | MDL | Units | S96-0320<br>032001 96<br>96/08/13 | S96-0320<br>032001 96<br>96/08/13<br>Duplicate | S96-0320<br>032001 96<br>96/08/13<br>M Spike | S96-0320<br>032001 96<br>96/08/13<br>MS % Rec |
|---|---|---|---|---|---|---|
| *Client ID:* / *Zenon ID:* / *Date Sampled:* | | | | | | |
| pH (20 DEG C) | | | 5.41 | 5.42 | - | - |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | < | - | - |
| Alkalinity (as CaCO3) | 1.0 | " | < | < | 99 | 99 |
| Conductivity | 4.2 | uS/cm | < | - | - | - |
| TDS (180 °C) | 11 | mg/L | < | < | - | - |
| Nitrite (as N) | 0.050 | mg/L | < | < | 0.44 | 110 |
| Nitrate and Nitrite (as N) | 0.0500 | " | < | < | 2.0 | 100 |
| Fluoride (probe) | 0.03 | mg/L | 0.03 | 0.03 | 0.56 | 110 |
| Bromide | 0.010 | mg/L | < | < | 5.1 | 100 |
| Sulphate (as SO4) | 0.10 | " | 0.38 | 0.29 | 47 | 94 |
| Chloride | 0.50 | " | < | - | - | - |
| Aluminum | 0.030 | mg/L | <0.033 | - | - | - |
| Barium | 0.001 | " | 0.004 | - | - | - |
| Beryllium | 0.001 | " | < | - | - | - |
| Cadmium | 0.002 | " | < | - | - | - |
| Calcium | 0.20 | " | 0.33 | - | - | - |
| Chromium | 0.004 | " | < | - | - | - |
| Cobalt | 0.010 | " | <0.011 | - | - | - |
| Copper | 0.005 | " | <0.006 | - | - | - |
| Iron | 0.010 | " | <0.011 | - | - | - |
| Lead | 0.020 | " | <0.022 | - | - | - |
| Magnesium | 0.050 | " | 0.11 | - | - | - |
| Manganese | 0.006 | " | <0.007 | - | - | - |
| Molybdenum | 0.010 | " | <0.011 | - | - | - |
| Nickel | 0.010 | " | <0.011 | - | - | - |
| Phosphorus | 0.060 | " | 0.20 | - | - | - |
| Potassium | 1.000 | " | <1.1 | - | - | - |
| Silver | 0.010 | " | <0.011 | - | - | - |
| Sodium | 0.100 | " | 0.30 | - | - | - |
| Thallium | 0.060 | " | <0.066 | - | - | - |
| Vanadium | 0.005 | " | <0.006 | - | - | - |
| Zinc | 0.005 | " | <0.006 | - | - | - |
| Hardness (as CaCO3) | 1.0 | " | 1.3 | - | - | - |

| Component | MDL | Units | S96-0321 | S96-0322 | S96-0322 |
|---|---|---|---|---|---|
| *Client ID:* | | | S96-0321 | S96-0322 | S96-0322 |
| *Zenon ID:* | | | 032007 96 | 032008 96 | 032008 96 |
| *Date Sampled:* | | | 96/08/14 | 96/08/14 | 96/08/14 |
| | | | | | Duplicate |
| pH (20 DEG C) | | | 7.87 | 8.05 | - |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | < | - |
| Alkalinity (as CaCO3) | 1.0 | " | 1400 | 160 | - |
| Conductivity | 4.2 | uS/cm | 11000 | 880 | 880 |
| TDS (180 °C) | 11 | mg/L | 7100 | 570 | - |
| Nitrite (as N) | 0.050 | mg/L | < | < | - |
| Nitrate and Nitrite (as N) | 0.0500 | " | < | 1.3 | - |
| Fluoride (probe) | 0.03 | mg/L | 21 | 2.0 | - |
| Bromide | 0.010 | mg/L | 1.8 | 0.88 | - |
| Sulphate (as SO4) | 0.10 | " | 88 | 96 | - |
| Chloride | 0.50 | " | 2900 | 110 | - |
| Aluminum | 0.030 | mg/L | 3.1 | 0.12 | - |
| Barium | 0.001 | " | 0.64 | 0.055 | - |
| Beryllium | 0.001 | " | < | < | - |
| Cadmium | 0.002 | " | < | < | - |
| Calcium | 0.20 | " | 85 | 36 | - |
| Chromium | 0.004 | " | 0.005 | < | - |
| Cobalt | 0.010 | " | <0.011 | <0.011 | - |
| Copper | 0.005 | " | <0.006 | <0.006 | - |
| Iron | 0.010 | " | 4.5 | 0.13 | - |
| Lead | 0.020 | " | <0.022 | <0.022 | - |
| Magnesium | 0.050 | " | 23 | 16 | - |
| Manganese | 0.006 | " | 0.13 | 0.009 | - |
| Molybdenum | 0.010 | " | 0.047 | 0.016 | - |
| Nickel | 0.010 | " | 0.024 | <0.011 | - |
| Phosphorus | 0.060 | " | 1.2 | 0.40 | - |
| Potassium | 1.000 | " | 3.4 | 18 | - |
| Silver | 0.010 | " | <0.011 | <0.011 | - |
| Sodium | 0.100 | " | 2900 | 110 | - |
| Thallium | 0.060 | " | <0.066 | <0.066 | - |
| Vanadium | 0.005 | " | 0.018 | 0.037 | - |
| Zinc | 0.005 | " | 0.024 | 0.018 | - |
| Hardness (as CaCO3) | 1.0 | " | 310 | 160 | - |

| Component | MDL | Units | Client ID: S96-0323 / Zenon ID: 032009 96 / Date Sampled: 96/08/14 | S96-0323 / 032009 96 / 96/08/14 Duplicate | S96-0323 / 032009 96 / 96/08/14 M Spike | S96-0323 / 032009 96 / 96/08/14 MS % Rec. |
|---|---|---|---|---|---|---|
| pH (20 DEG C) | | | 8.05 | - | - | - |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | - | - | - |
| Alkalinity (as CaCO3) | 1.0 | " | 150 | - | - | - |
| Conductivity | 4.2 | uS/cm | 860 | - | - | - |
| TDS (180 °C) | 11 | mg/L | 550 | - | - | - |
| Nitrite (as N) | 0.050 | mg/L | < | - | - | - |
| Nitrate and Nitrite (as N) | 0.0500 | " | 1.3 | - | - | - |
| Fluoride (probe) | 0.03 | mg/L | 2.0 | - | - | - |
| Bromide | 0.010 | mg/L | 0.57 | - | - | - |
| Sulphate (as SO4) | 0.10 | " | 94 | - | - | - |
| Chloride | 0.50 | " | 100 | - | - | - |
| Aluminum | 0.030 | mg/L | 0.051 | 0.034 | 2.3 | 100 |
| Barium | 0.001 | " | 0.051 | 0.050 | 1.2 | 100 |
| Beryllium | 0.001 | " | < | < | 0.56 | 100 |
| Cadmium | 0.002 | " | < | < | 0.55 | 100 |
| Calcium | 0.20 | " | 32 | 32 | 43 | 96 |
| Chromium | 0.004 | " | 0.006 | < | 1.1 | 100 |
| Cobalt | 0.010 | " | <0.011 | <0.011 | 1.1 | 100 |
| Copper | 0.005 | " | <0.006 | <0.006 | 1.1 | 100 |
| Iron | 0.010 | " | 0.050 | 0.039 | 14 | 100 |
| Lead | 0.020 | " | <0.022 | <0.022 | 1.1 | 100 |
| Magnesium | 0.050 | " | 16 | 16 | 27 | 96 |
| Manganese | 0.006 | " | <0.007 | <0.007 | 1.1 | 100 |
| Molybdenum | 0.010 | " | 0.015 | 0.017 | 0.57 | 100 |
| Nickel | 0.010 | " | <0.011 | <0.011 | 0.57 | 100 |
| Phosphorus | 0.060 | " | 0.16 | 0.18 | 5.8 | 100 |
| Potassium | 1.000 | " | 20 | 19 | 30 | 97 |
| Silver | 0.010 | " | <0.011 | <0.011 | 0.11 | *20 |
| Sodium | 0.100 | " | 98 | 99 | 110 | 94 |
| Thallium | 0.060 | " | <0.066 | <0.066 | 1.2 | 110 |
| Vanadium | 0.005 | " | 0.037 | 0.037 | 0.59 | 100 |
| Zinc | 0.005 | " | 0.024 | 0.014 | 2.2 | 100 |
| Hardness (as CaCO3) | 1.0 | " | 150 | 150 | - | - |

| Component | MDL | Units | S96-0323<br>032009 96<br>96/08/14<br>MS Dup | S96-0323<br>032009 96<br>96/08/14<br>MSD % Rec |
|---|---|---|---|---|
| | **Client ID:** | | S96-0323 | S96-0323 |
| | **Zenon ID:** | | 032009 96 | 032009 96 |
| | **Date Sampled:** | | 96/08/14 | 96/08/14 |
| pH (20 DEG C) | | | - | - |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | - | - |
| Alkalinity (as CaCO3) | 1.0 | " | - | - |
| Conductivity | 4.2 | uS/cm | - | - |
| TDS (180 °C) | 11 | mg/L | - | - |
| Nitrite (as N) | 0.050 | mg/L | - | - |
| Nitrate and Nitrite (as N) | 0.0500 | " | - | - |
| Fluoride (probe) | 0.03 | mg/L | - | - |
| Bromide | 0.010 | mg/L | - | - |
| Sulphate (as SO4) | 0.10 | " | - | - |
| Chloride | 0.50 | " | - | - |
| Aluminum | 0.030 | mg/L | 2.3 | 100 |
| Barium | 0.001 | " | 1.2 | 100 |
| Beryllium | 0.001 | " | 0.56 | 100 |
| Cadmium | 0.002 | " | 0.56 | 100 |
| Calcium | 0.20 | " | 43 | 97 |
| Chromium | 0.004 | " | 1.2 | 100 |
| Cobalt | 0.010 | " | 1.2 | 100 |
| Copper | 0.005 | " | 1.2 | 110 |
| Iron | 0.010 | " | 14 | 110 |
| Lead | 0.020 | " | 1.1 | 100 |
| Magnesium | 0.050 | " | 27 | 98 |
| Manganese | 0.006 | " | 1.1 | 100 |
| Molybdenum | 0.010 | " | 0.57 | 100 |
| Nickel | 0.010 | " | 0.58 | 110 |
| Phosphorus | 0.060 | " | 5.9 | 100 |
| Potassium | 1.000 | " | 30 | 100 |
| Silver | 0.010 | " | 0.069 | *13 |
| Sodium | 0.100 | " | 110 | 97 |
| Thallium | 0.060 | " | 1.2 | 100 |
| Vanadium | 0.005 | " | 0.60 | 100 |
| Zinc | 0.005 | " | 2.3 | 100 |
| Hardness (as CaCO3) | 1.0 | " | - | - |

| Component | *Client ID:*<br>*Zenon ID:*<br>*Date Sampled:*<br>MDL | Units | S96-0325<br>032010 96<br>96/08/14 | S96-0325<br>032010 96<br>96/08/14<br>Duplicate | S96-0325<br>032010 96<br>96/08/14<br>M Spike | S96-0325<br>032010 96<br>96/08/14<br>MS % Rec |
|---|---|---|---|---|---|---|
| pH (20 DEG C) | | | 5.84 | 5.73 | - | - |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | < | - | - |
| Alkalinity (as CaCO3) | 1.0 | " | < | < | 100 | 100 |
| Conductivity | 4.2 | uS/cm | < | - | - | - |
| TDS (180 °C) | 11 | mg/L | < | < | - | - |
| Nitrite (as N) | 0.050 | mg/L | < | < | 0.49 | 120 |
| Nitrate and Nitrite (as N) | 0.0500 | " | < | < | 2.1 | 100 |
| Fluoride (probe) | 0.03 | mg/L | < | < | 0.56 | 110 |
| Bromide | 0.010 | mg/L | < | < | 5.0 | 100 |
| Sulphate (as SO4) | 0.10 | " | 0.13 | 0.13 | 47 | 94 |
| Chloride | 0.50 | " | < | - | - | - |
| Aluminum | 0.030 | mg/L | <0.033 | - | - | - |
| Barium | 0.001 | " | < | - | - | - |
| Beryllium | 0.001 | " | < | - | - | - |
| Cadmium | 0.002 | " | < | - | - | - |
| Calcium | 0.20 | " | <0.22 | - | - | - |
| Chromium | 0.004 | " | < | - | - | - |
| Cobalt | 0.010 | " | <0.011 | - | - | - |
| Copper | 0.005 | " | <0.006 | - | - | - |
| Iron | 0.010 | " | <0.011 | - | - | - |
| Lead | 0.020 | " | <0.022 | - | - | - |
| Magnesium | 0.050 | " | <0.055 | - | - | - |
| Manganese | 0.006 | " | <0.007 | - | - | - |
| Molybdenum | 0.010 | " | <0.011 | - | - | - |
| Nickel | 0.010 | " | <0.011 | - | - | - |
| Phosphorus | 0.060 | " | <0.066 | - | - | - |
| Potassium | 1.000 | " | <1.1 | - | - | - |
| Silver | 0.010 | " | <0.011 | - | - | - |
| Sodium | 0.100 | " | <0.11 | - | - | - |
| Thallium | 0.060 | " | <0.066 | - | - | - |
| Vanadium | 0.005 | " | <0.006 | - | - | - |
| Zinc | 0.005 | " | 0.006 | - | - | - |
| Hardness (as CaCO3) | 1.0 | " | < | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Client ID:* | | S96-0324 | S96-0326 | S96-0327 | S96-0328 |
| | *Zenon ID:* | | 032011 96 | 032012 96 | 032013 96 | 032014 96 |
| | *Date Sampled:* | | 96/08/14 | 96/08/14 | 96/08/14 | 96/08/15 |
| **Component** | **MDL** | **Units** | | | | |
| pH (20 DEG C) | | | 8.34 | 7.36 | 7.58 | 7.70 |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | < | < | < |
| Alkalinity (as CaCO3) | 1.0 | " | 160 | 220 | 170 | 300 |
| Conductivity | 4.2 | uS/cm | 770 | 4400 | 2400 | 910 |
| TDS (180 °C) | 11 | mg/L | 520 | 3600 | 1900 | 590 |
| Nitrite (as N) | 0.050 | mg/L | < | < | < | < |
| Nitrate and Nitrite (as N) | 0.0500 | " | 0.35 | 0.13 | 0.58 | 0.12 |
| Fluoride (probe) | 0.03 | mg/L | 1.9 | 1.4 | 1.4 | 0.91 |
| Bromide | 0.010 | mg/L | 0.70 | 1.2 | 0.82 | 0.41 |
| Sulphate (as SO4) | 0.10 | " | 53 | 180 | 160 | 79 |
| Chloride | 0.50 | " | 110 | 1200 | 560 | 66 |
| Aluminum | 0.030 | mg/L | <0.033 | 0.38 | 0.041 | <0.033 |
| Barium | 0.001 | " | 0.067 | 0.12 | 0.089 | 0.11 |
| Beryllium | 0.001 | " | < | < | < | < |
| Cadmium | 0.002 | " | < | < | < | < |
| Calcium | 0.20 | " | 53 | 490 | 210 | 47 |
| Chromium | 0.004 | " | < | 0.005 | < | < |
| Cobalt | 0.010 | " | <0.011 | <0.011 | <0.011 | <0.011 |
| Copper | 0.005 | " | <0.006 | <0.006 | <0.006 | <0.006 |
| Iron | 0.010 | " | 0.37 | 0.66 | 0.14 | 2.3 |
| Lead | 0.020 | " | <0.022 | <0.022 | <0.022 | <0.022 |
| Magnesium | 0.050 | " | 14 | 160 | 71 | 24 |
| Manganese | 0.006 | " | 0.032 | 0.65 | 0.019 | 0.078 |
| Molybdenum | 0.010 | " | <0.011 | <0.011 | <0.011 | <0.011 |
| Nickel | 0.010 | " | <0.011 | <0.011 | <0.011 | <0.011 |
| Phosphorus | 0.060 | " | 0.19 | 1.0 | 0.50 | 0.23 |
| Potassium | 1.000 | " | 4.6 | 13 | 7.0 | 5.5 |
| Silver | 0.010 | " | <0.011 | <0.011 | <0.011 | <0.011 |
| Sodium | 0.100 | " | 80 | 730 | 140 | 91 |
| Thallium | 0.060 | " | <0.066 | <0.066 | <0.066 | <0.066 |
| Vanadium | 0.005 | " | 0.019 | 0.007 | 0.025 | <0.006 |
| Zinc | 0.005 | " | 0.034 | 0.027 | 0.037 | 0.048 |
| Hardness (as CaCO3) | 1.0 | " | 190 | 1900 | 810 | 210 |

| | | | Client ID: | S96-0329 | S96-0330 |
|---|---|---|---|---|---|
| | | | Zenon ID: | 032015 96 | 032016 96 |
| | | | Date Sampled: | 96/08/15 | 96/08/15 |
| Component | MDL | Units | | | |
| pH (20 DEG C) | | | | 7.79 | 7.91 |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | | < | < |
| Alkalinity (as CaCO3) | 1.0 | " | | 140 | 160 |
| Conductivity | 4.2 | uS/cm | | 2200 | 710 |
| TDS (180 °C) | 11 | mg/L | | 1700 | 510 |
| Nitrite (as N) | 0.050 | mg/L | | < | < |
| Nitrate and Nitrite (as N) | 0.0500 | " | | 0.051 | 0.88 |
| Fluoride (probe) | 0.03 | mg/L | | 1.2 | 1.2 |
| Bromide | 0.010 | mg/L | | 0.70 | 0.60 |
| Sulphate (as SO4) | 0.10 | " | | 140 | 55 |
| Chloride | 0.50 | " | | 520 | 85 |
| Aluminum | 0.030 | mg/L | | <0.033 | <0.033 |
| Barium | 0.001 | " | | 0.16 | 0.088 |
| Beryllium | 0.001 | " | | < | < |
| Cadmium | 0.002 | " | | < | < |
| Calcium | 0.20 | " | | 170 | 58 |
| Chromium | 0.004 | " | | < | < |
| Cobalt | 0.010 | " | | <0.011 | <0.011 |
| Copper | 0.005 | " | | <0.006 | 0.13 |
| Iron | 0.010 | " | | 0.075 | 0.50 |
| Lead | 0.020 | " | | <0.022 | <0.022 |
| Magnesium | 0.050 | " | | 64 | 17 |
| Manganese | 0.006 | " | | 0.095 | 0.015 |
| Molybdenum | 0.010 | " | | 0.014 | <0.011 |
| Nickel | 0.010 | " | | <0.011 | <0.011 |
| Phosphorus | 0.060 | " | | 0.57 | 0.22 |
| Potassium | 1.000 | " | | 13 | 4.4 |
| Silver | 0.010 | " | | <0.011 | <0.011 |
| Sodium | 0.100 | " | | 130 | 57 |
| Thallium | 0.060 | " | | <0.066 | <0.066 |
| Vanadium | 0.005 | " | | 0.018 | 0.045 |
| Zinc | 0.005 | " | | 0.020 | 0.12 |
| Hardness (as CaCO3) | 1.0 | " | | 690 | 210 |

| | Client ID: | | S96-0376 | S96-0376 | S96-0376 | S96-0376 |
|---|---|---|---|---|---|---|
| | Zenon ID: | | 032017 96 | 032017 96 | 032017 96 | 032017 96 |
| | Date Sampled: | | 96/08/15 | 96/08/15 | 96/08/15 | 96/08/15 |
| Component | MDL | Units | | Duplicate | M. Spike | MS % Rec |
| pH (20 DEG C) | | | 7.95 | - | - | - |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | - | - | - |
| Alkalinity (as CaCO3) | 1.0 | " | 190 | - | - | - |
| Conductivity | 4.2 | uS/cm | 650 | - | - | - |
| TDS (180 °C) | 11 | mg/L | 460 | - | - | - |
| Nitrite (as N) | 0.050 | mg/L | < | - | - | - |
| Nitrate and Nitrite (as N) | 0.0500 | " | 1.4 | - | - | - |
| Fluoride (probe) | 0.03 | mg/L | 1.1 | - | - | - |
| Bromide | 0.010 | mg/L | 0.29 | - | - | - |
| Sulphate (as SO4) | 0.10 | " | 82 | - | - | - |
| Chloride | 0.50 | " | 32 | 32 | 55 | 92 |
| Aluminum | 0.030 | mg/L | <0.033 | - | - | - |
| Barium | 0.001 | " | 0.041 | - | - | - |
| Beryllium | 0.001 | " | < | - | - | - |
| Cadmium | 0.002 | " | < | - | - | - |
| Calcium | 0.20 | " | 44 | - | - | - |
| Chromium | 0.004 | " | < | - | - | - |
| Cobalt | 0.010 | " | <0.011 | - | - | - |
| Copper | 0.005 | " | <0.006 | - | - | - |
| Iron | 0.010 | " | 0.12 | - | - | - |
| Lead | 0.020 | " | <0.022 | - | - | - |
| Magnesium | 0.050 | " | 15 | - | - | - |
| Manganese | 0.006 | " | <0.007 | - | - | - |
| Molybdenum | 0.010 | " | <0.011 | - | - | - |
| Nickel | 0.010 | " | <0.011 | - | - | - |
| Phosphorus | 0.060 | " | 0.14 | - | - | - |
| Potassium | 1.000 | " | 4.1 | - | - | - |
| Silver | 0.010 | " | <0.011 | - | - | - |
| Sodium | 0.100 | " | 66 | - | - | - |
| Thallium | 0.060 | " | <0.066 | - | - | - |
| Vanadium | 0.005 | " | 0.050 | - | - | - |
| Zinc | 0.005 | " | 0.054 | - | - | - |
| Hardness (as CaCO3) | 1.0 | " | 170 | - | - | - |

| Component | MDL | Units | Client ID: S96-0377<br>Zenon ID: 032018 96<br>Date Sampled: 96/08/15 | S96-0377<br>032018 96<br>96/08/15<br>Duplicate | S96-0378<br>032019 96<br>96/08/15 |
|---|---|---|---|---|---|
| pH (20 DEG C) | | | 7.98 | - | 5.11 |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | - | < |
| Alkalinity (as CaCO3) | 1.0 | " | 160 | - | < |
| Conductivity | 4.2 | uS/cm | 720 | 720 | < |
| TDS (180 °C) | 11 | mg/L | 490 | - | < |
| Nitrite (as N) | 0.050 | mg/L | < | - | < |
| Nitrate and Nitrite (as N) | 0.0500 | " | 1.4 | - | < |
| Fluoride (probe) | 0.03 | mg/L | 1.7 | - | 0.03 |
| Bromide | 0.010 | mg/L | 0.42 | - | < |
| Sulphate (as SO4) | 0.10 | " | 97 | - | < |
| Chloride | 0.50 | " | 57 | - | < |
| Aluminum | 0.030 | mg/L | 0.064 | - | 0.034 |
| Barium | 0.001 | " | 0.058 | - | < |
| Beryllium | 0.001 | " | < | - | < |
| Cadmium | 0.002 | " | < | - | < |
| Calcium | 0.20 | " | 44 | - | 0.26 |
| Chromium | 0.004 | " | 0.005 | - | < |
| Cobalt | 0.010 | " | <0.011 | - | <0.011 |
| Copper | 0.005 | " | 0.012 | - | <0.006 |
| Iron | 0.010 | " | 0.13 | - | <0.011 |
| Lead | 0.020 | " | <0.022 | - | <0.022 |
| Magnesium | 0.050 | " | 15 | - | 0.057 |
| Manganese | 0.006 | " | 0.015 | - | <0.007 |
| Molybdenum | 0.010 | " | <0.011 | - | <0.011 |
| Nickel | 0.010 | " | <0.011 | - | <0.011 |
| Phosphorus | 0.060 | " | 0.17 | - | <0.066 |
| Potassium | 1.000 | " | 8.0 | - | <1.1 |
| Silver | 0.010 | " | <0.011 | - | <0.011 |
| Sodium | 0.100 | " | 82 | - | 0.25 |
| Thallium | 0.060 | " | <0.066 | - | <0.066 |
| Vanadium | 0.005 | " | 0.038 | - | <0.006 |
| Zinc | 0.005 | " | 0.049 | - | 0.014 |
| Hardness (as CaCO3) | 1.0 | " | 170 | - | < |

| Component | MDL | Units | S96-0379 | S96-0379 | S96-0379 | S96-0379 |
|---|---|---|---|---|---|---|
| | | Client ID: | S96-0379 | S96-0379 | S96-0379 | S96-0379 |
| | | Zenon ID: | 032020 96 | 032020 96 | 032020 96 | 032020 96 |
| | | Date Sampled: | 96/08/15 | 96/08/15 | 96/08/15 | 96/08/15 |
| | | | | Duplicate | M. Spike | MS % Rec |
| pH (20 DEG C) | | | 8.17 | 8.13 | - | - |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | < | - | - |
| Alkalinity (as CaCO3) | 1.0 | " | 130 | 130 | 210 | 79 |
| Conductivity | 4.2 | uS/cm | 740 | - | - | - |
| TDS (180 °C) | 11 | mg/L | 460 | 450 | - | - |
| Nitrite (as N) | 0.050 | mg/L | < | - | - | - |
| Nitrate and Nitrite (as N) | 0.0500 | " | 0.12 | - | - | - |
| Fluoride (probe) | 0.03 | mg/L | 1.8 | 1.8 | 2.4 | 120 |
| Bromide | 0.010 | mg/L | 0.72 | 0.71 | 5.6 | 98 |
| Sulphate (as SO4) | 0.10 | " | 48 | 48 | 100 | 100 |
| Chloride | 0.50 | " | 110 | - | - | - |
| Aluminum | 0.030 | mg/L | <0.033 | - | - | - |
| Barium | 0.001 | " | 0.068 | - | - | - |
| Beryllium | 0.001 | " | < | - | - | - |
| Cadmium | 0.002 | " | < | - | - | - |
| Calcium | 0.20 | " | 46 | - | - | - |
| Chromium | 0.004 | " | < | - | - | - |
| Cobalt | 0.010 | " | <0.011 | - | - | - |
| Copper | 0.005 | " | <0.006 | - | - | - |
| Iron | 0.010 | " | 0.47 | - | - | - |
| Lead | 0.020 | " | <0.022 | - | - | - |
| Magnesium | 0.050 | " | 13 | - | - | - |
| Manganese | 0.006 | " | 0.046 | - | - | - |
| Molybdenum | 0.010 | " | <0.011 | - | - | - |
| Nickel | 0.010 | " | <0.011 | - | - | - |
| Phosphorus | 0.060 | " | 0.16 | - | - | - |
| Potassium | 1.000 | " | 4.3 | - | - | - |
| Silver | 0.010 | " | <0.011 | - | - | - |
| Sodium | 0.100 | " | 79 | - | - | - |
| Thallium | 0.060 | " | <0.066 | - | - | - |
| Vanadium | 0.005 | " | 0.008 | - | - | - |
| Zinc | 0.005 | " | 0.021 | - | - | - |
| Hardness (as CaCO3) | 1.0 | " | 170 | - | - | - |

| Component | MDL | Units | | | | |
|---|---|---|---|---|---|---|
| Client ID: | | | S96-0381 | S96-0381 | S96-0381 | S96-0381 |
| Zenon ID: | | | 032002 96 | 032002 96 | 032002 96 | 032002 96 |
| Date Sampled: | | | 96/08/13 | 96/08/13 | 96/08/13 | 96/08/13 |
| | | | | Duplicate | M Spike | MS % Rec |
| pH (20 DEG C) | | | 8.14 | - | - | - |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | - | - | - |
| Alkalinity (as CaCO3) | 1.0 | " | 730 | - | - | - |
| Conductivity | 4.2 | uS/cm | 12000 | - | - | - |
| TDS (180 °C) | 11 | mg/L | 7400 | - | - | - |
| Nitrite (as N) | 0.050 | mg/L | < | - | - | - |
| Nitrate and Nitrite (as N) | 0.0500 | " | < | - | - | - |
| Fluoride (probe) | 0.03 | mg/L | 4.9 | - | - | - |
| Bromide | 0.010 | mg/L | 1.9 | - | - | - |
| Sulphate (as SO4) | 0.10 | " | 270 | - | - | - |
| Chloride | 0.50 | " | 3500 | 3600 | 4100 | 110 |
| Aluminum | 0.030 | mg/L | <0.033 | - | - | - |
| Barium | 0.001 | " | 0.27 | - | - | - |
| Beryllium | 0.001 | " | < | - | - | - |
| Cadmium | 0.002 | " | < | - | - | - |
| Calcium | 0.20 | " | 110 | - | - | - |
| Chromium | 0.004 | " | < | - | - | - |
| Cobalt | 0.010 | " | <0.011 | - | - | - |
| Copper | 0.005 | " | 0.019 | - | - | - |
| Iron | 0.010 | " | 0.68 | - | - | - |
| Lead | 0.020 | " | <0.022 | - | - | - |
| Magnesium | 0.050 | " | 100 | - | - | - |
| Manganese | 0.006 | " | 0.078 | - | - | - |
| Molybdenum | 0.010 | " | <0.011 | - | - | - |
| Nickel | 0.010 | " | <0.011 | - | - | - |
| Phosphorus | 0.060 | " | 2.8 | - | - | - |
| Potassium | 1.000 | " | 8.6 | - | - | - |
| Silver | 0.010 | " | <0.011 | - | - | - |
| Sodium | 0.100 | " | 2400 | - | - | - |
| Thallium | 0.060 | " | <0.066 | - | - | - |
| Vanadium | 0.005 | " | <0.006 | - | - | - |
| Zinc | 0.005 | " | 0.008 | - | - | - |
| Hardness (as CaCO3) | 1.0 | " | 690 | - | - | - |

| | | | | | |
|---|---|---|---|---|---|
| | *Client ID:* | | S96-0382 | S96-0383 | S96-0384 |
| | *Zenon ID:* | | 032003 96 | 032004 96 | 032005 96 |
| | *Date Sampled:* | | 96/08/13 | 96/08/13 | 96/08/13 |
| Component | **MDL** | **Units** | | | |
| pH (20 DEG C) | | | 8.09 | 7.29 | 7.84 |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | < | < |
| Alkalinity (as CaCO3) | 1.0 | " | 180 | 160 | 150 |
| Conductivity | 4.2 | uS/cm | 1000 | 12000 | 790 |
| TDS (180 °C) | 11 | mg/L | 830 | 10000 | 540 |
| Nitrite (as N) | 0.050 | mg/L | < | < | < |
| Nitrate and Nitrite (as N) | 0.0500 | " | 1.5 | 0.18 | 0.39 |
| Fluoride (probe) | 0.03 | mg/L | 2.6 | 1.0 | 2.0 |
| Bromide | 0.010 | mg/L | 0.45 | 2.0 | 0.52 |
| Sulphate (as SO4) | 0.10 | " | 250 | 230 | 58 |
| Chloride | 0.50 | " | 57 | 4200 | 110 |
| Aluminum | 0.030 | mg/L | <0.033 | <0.033 | 0.57 |
| Barium | 0.001 | " | 0.037 | 0.23 | 0.076 |
| Beryllium | 0.001 | " | < | < | < |
| Cadmium | 0.002 | " | < | < | 0.003 |
| Calcium | 0.20 | " | 97 | 540 | 57 |
| Chromium | 0.004 | " | < | < | 0.005 |
| Cobalt | 0.010 | " | <0.011 | <0.011 | <0.011 |
| Copper | 0.005 | " | 0.010 | 0.013 | <0.006 |
| Iron | 0.010 | " | <0.011 | 0.28 | 0.58 |
| Lead | 0.020 | " | <0.022 | <0.022 | <0.022 |
| Magnesium | 0.050 | " | 35 | 190 | 16 |
| Manganese | 0.006 | " | <0.007 | 0.061 | 0.030 |
| Molybdenum | 0.010 | " | <0.011 | <0.011 | <0.011 |
| Nickel | 0.010 | " | <0.011 | <0.011 | <0.011 |
| Phosphorus | 0.060 | " | 0.69 | 1.0 | 0.37 |
| Potassium | 1.000 | " | 5.1 | 24 | 4.4 |
| Silver | 0.010 | " | <0.011 | <0.011 | <0.011 |
| Sodium | 0.100 | " | 80 | 1700 | 84 |
| Thallium | 0.060 | " | <0.066 | <0.066 | <0.066 |
| Vanadium | 0.005 | " | 0.032 | 0.011 | 0.026 |
| Zinc | 0.005 | " | 0.058 | 0.12 | 0.047 |
| Hardness (as CaCO3) | 1.0 | " | 380 | 2100 | 210 |

| Component | MDL | Units | Client ID: S96-0385<br>Zenon ID: 032006 96<br>Date Sampled: 96/08/13 | S96-0385<br>032006 96<br>96/08/13<br>Duplicate | S96-0385<br>032006 96<br>96/08/13<br>M Spike | S96-0385<br>032006 96<br>96/08/13<br>MS % Rec |
|---|---|---|---|---|---|---|
| pH (20 DEG C) | | | 7.28 | - | - | - |
| Phenolphthalein Alkalinity (as CaCO3) | 1.0 | mg/L | < | - | - | - |
| Alkalinity (as CaCO3) | 1.0 | " | 320 | - | - | - |
| Conductivity | 4.2 | uS/cm | 3400 | - | - | - |
| TDS (180 °C) | 11 | mg/L | 2500 | - | - | - |
| Nitrite (as N) | 0.050 | mg/L | < | - | - | - |
| Nitrate and Nitrite (as N) | 0.0500 | " | 5.4 | - | - | - |
| Fluoride (probe) | 0.03 | mg/L | 0.70 | - | - | - |
| Bromide | 0.010 | mg/L | 1.0 | - | - | - |
| Sulphate (as SO4) | 0.10 | " | 710 | 710 | 910 | 99 |
| Chloride | 0.50 | " | 500 | - | - | - |
| Aluminum | 0.030 | mg/L | 0.035 | - | - | - |
| Barium | 0.001 | " | 0.027 | - | - | - |
| Beryllium | 0.001 | " | < | - | - | - |
| Cadmium | 0.002 | " | < | - | - | - |
| Calcium | 0.20 | " | 200 | - | - | - |
| Chromium | 0.004 | " | 0.033 | - | - | - |
| Cobalt | 0.010 | " | <0.011 | - | - | - |
| Copper | 0.005 | " | <0.006 | - | - | - |
| Iron | 0.010 | " | 0.024 | - | - | - |
| Lead | 0.020 | " | <0.022 | - | - | - |
| Magnesium | 0.050 | " | 28 | - | - | - |
| Manganese | 0.006 | " | <0.007 | - | - | - |
| Molybdenum | 0.010 | " | <0.011 | - | - | - |
| Nickel | 0.010 | " | <0.011 | - | - | - |
| Phosphorus | 0.060 | " | 0.42 | - | - | - |
| Potassium | 1.000 | " | 6.3 | - | - | - |
| Silver | 0.010 | " | <0.011 | - | - | - |
| Sodium | 0.100 | " | 520 | - | - | - |
| Thallium | 0.060 | " | <0.066 | - | - | - |
| Vanadium | 0.005 | " | 0.014 | - | - | - |
| Zinc | 0.005 | " | 0.033 | - | - | - |
| Hardness (as CaCO3) | 1.0 | " | 620 | - | - | - |

| Batch Code: | 0819MSA1 | 0819MSA2 | 0819MSA3 |
|---|---|---|---|
| pH (20 DEG C) | 032001 96 | 032010 96 | 032020 96 |
| | 032002 96 | 032011 96 | |
| | 032003 96 | 032012 96 | |
| | 032004 96 | 032013 96 | |
| | 032005 96 | 032014 96 | |
| | 032006 96 | 032015 96 | |
| | 032007 96 | 032016 96 | |
| | 032008 96 | 032017 96 | |
| | 032009 96 | 032018 96 | |
| | | 032019 96 | |
| Date analysed | 96/08/19 | 96/08/19 | 96/08/19 |
| Date prepared | 96/08/19 | 96/08/19 | 96/08/19 |

| Batch Code: | 0819MSA1 | 0819MSA2 |
|---|---|---|
| Phenolphthalein Alkalinity (as CaCO3) | 032000 96 | 032010 96 |
| | 032001 96 | 032011 96 |
| | 032002 96 | 032012 96 |
| | 032003 96 | 032013 96 |
| | 032004 96 | 032014 96 |
| | 032005 96 | 032015 96 |
| | 032006 96 | 032016 96 |
| | 032007 96 | 032017 96 |
| | 032008 96 | 032018 96 |
| | 032009 96 | 032019 96 |
| | | 032020 96 |
| Date analysed | 96/08/19 | 96/08/19 |
| Date prepared | 96/08/19 | 96/08/19 |

| Batch Code: | 0819MSA1 | 0819MSA2 | 0819MSA3 |
|---|---|---|---|
| Alkalinity (as CaCO3) | 032000 96 | 032010 96 | 032020 96 |
| | 032001 96 | 032011 96 | |
| | 032002 96 | 032012 96 | |
| | 032003 96 | 032013 96 | |
| | 032004 96 | 032014 96 | |
| | 032005 96 | 032015 96 | |
| | 032006 96 | 032016 96 | |
| | 032007 96 | 032017 96 | |
| | 032008 96 | 032018 96 | |
| | 032009 96 | 032019 96 | |
| Date analysed | 96/08/19 | 96/08/19 | 96/08/19 |
| Date prepared | 96/08/19 | 96/08/19 | 96/08/19 |

# ZEL Summary of Analysis Pre. Dates



| Batch Code: | 0819SPA2 | 0819SPA3 | 0819SPA4 |
|---|---|---|---|
| Conductivity | 032000 96 | 032008 96 | 032018 96 |
| | 032001 96 | 032009 96 | 032019 96 |
| | 032002 96 | 032010 96 | 032020 96 |
| | 032003 96 | 032011 96 | |
| | 032004 96 | 032012 96 | |
| | 032005 96 | 032013 96 | |
| | 032006 96 | 032014 96 | |
| | 032007 96 | 032015 96 | |
| | | 032016 96 | |
| | | 032017 96 | |
| Date analysed | 96/08/19 | 96/08/19 | 96/08/19 |
| Date prepared | 96/08/19 | 96/08/19 | 96/08/19 |

| Batch Code: | 0819MSA1 | 0819MSA2 | 0819MSA3 |
|---|---|---|---|
| TDS (180 °C) | 032000 96 | 032010 96 | 032020 96 |
| | 032001 96 | 032011 96 | |
| | 032002 96 | 032012 96 | |
| | 032003 96 | 032013 96 | |
| | 032004 96 | 032014 96 | |
| | 032005 96 | 032015 96 | |
| | 032006 96 | 032016 96 | |
| | 032007 96 | 032017 96 | |
| | 032008 96 | 032018 96 | |
| | 032009 96 | 032019 96 | |
| Date analysed | 96/08/20 | 96/08/20 | 96/08/20 |
| Date prepared | 96/08/19 | 96/08/19 | 96/08/19 |

| Batch Code: | 0820DHA1 | 0820DHA2 |
|---|---|---|
| Nitrite (as N) | 032000 96 | 032010 96 |
| | 032001 96 | 032011 96 |
| | 032002 96 | 032012 96 |
| | 032003 96 | 032013 96 |
| | 032004 96 | 032014 96 |
| | 032005 96 | 032015 96 |
| | 032006 96 | 032016 96 |
| | 032007 96 | 032017 96 |
| | 032008 96 | 032018 96 |
| | 032009 96 | 032019 96 |
| | | 032020 96 |
| Date analysed | 96/08/20 | 96/08/20 |
| Date prepared | 96/08/20 | 96/08/20 |

# ZEL Summary of Analysis Pre. Dates



| | | | |
|---|---|---|---|
| **Batch Code:** | **0820DHA1** | **0820DHA2** | |
| Nitrate and Nitrite (as N) | 032000 96 | 032010 96 | |
| | 032001 96 | 032011 96 | |
| | 032002 96 | 032012 96 | |
| | 032003 96 | 032013 96 | |
| | 032004 96 | 032014 96 | |
| | 032005 96 | 032015 96 | |
| | 032006 96 | 032016 96 | |
| | 032007 96 | 032017 96 | |
| | 032008 96 | 032018 96 | |
| | 032009 96 | 032019 96 | |
| | | 032020 96 | |
| Date analysed | 96/08/20 | 96/08/20 | |
| Date prepared | 96/08/20 | 96/08/20 | |
| **Batch Code:** | **0821KRA1** | **0821KRA2** | **0821KRA3** |
| Fluoride (probe) | 032000 96 | 032010 96 | 032020 96 |
| | 032001 96 | 032011 96 | |
| | 032002 96 | 032012 96 | |
| | 032003 96 | 032013 96 | |
| | 032004 96 | 032014 96 | |
| | 032005 96 | 032015 96 | |
| | 032006 96 | 032016 96 | |
| | 032007 96 | 032017 96 | |
| | 032008 96 | 032018 96 | |
| | 032009 96 | 032019 96 | |
| Date analysed | 96/08/21 | 96/08/21 | 96/08/21 |
| Date prepared | 96/08/21 | 96/08/21 | 96/08/21 |
| **Batch Code:** | **0820DHA1** | **0820DHA2** | **0820DHA3** |
| Bromide | 032000 96 | 032010 96 | 032020 96 |
| | 032001 96 | 032011 96 | |
| | 032002 96 | 032012 96 | |
| | 032003 96 | 032013 96 | |
| | 032004 96 | 032014 96 | |
| | 032005 96 | 032015 96 | |
| | 032006 96 | 032016 96 | |
| | 032007 96 | 032017 96 | |
| | 032008 96 | 032018 96 | |
| | 032009 96 | 032019 96 | |
| Date analysed | 96/08/20 | 96/08/20 | 96/08/20 |
| Date prepared | 96/08/20 | 96/08/20 | 96/08/20 |

| Batch Code: | 0820DHA1 | 0821DHA1 | 0820DHA2 | 0820DHA3 |
|---|---|---|---|---|
| Sulphate (as SO4) | 032000 96 | 032006 96 | 032010 96 | 032020 96 |
| | 032001 96 | | 032011 96 | |
| | 032002 96 | | 032012 96 | |
| | 032003 96 | | 032013 96 | |
| | 032004 96 | | 032014 96 | |
| | 032005 96 | | 032015 96 | |
| | 032007 96 | | 032016 96 | |
| | 032008 96 | | 032017 96 | |
| | 032009 96 | | 032018 96 | |
| | | | 032019 96 | |
| Date analysed | 96/08/20 | 96/08/21 | 96/08/20 | 96/08/20 |
| Date prepared | 96/08/20 | 96/08/21 | 96/08/20 | 96/08/20 |

| Batch Code: | 0819MNA3 | 0820DHA1 | 0819MNA4 | 0819MNA5 |
|---|---|---|---|---|
| Chloride | 032000 96 | 032002 96 | 032008 96 | 032017 96 |
| | 032001 96 | 032004 96 | 032009 96 | 032018 96 |
| | 032003 96 | 032006 96 | 032010 96 | 032019 96 |
| | 032005 96 | 032007 96 | 032011 96 | 032020 96 |
| | | 032012 96 | 032014 96 | |
| | | 032013 96 | 032016 96 | |
| | | 032015 96 | | |
| Date analysed | 96/08/19 | 96/08/20 | 96/08/19 | 96/08/19 |
| Date prepared | 96/08/19 | 96/08/20 | 96/08/19 | 96/08/19 |

| Batch Code: | 0819MJA1 | 0820MJA1 | 0822AWA1 |
|---|---|---|---|
| Aluminum | 032000 96 | 032009 96 | 032012 96 |
| | 032001 96 | 032010 96 | |
| | 032002 96 | 032011 96 | |
| | 032003 96 | 032012 96 | |
| | 032004 96 | 032013 96 | |
| | 032005 96 | 032014 96 | |
| | 032006 96 | 032015 96 | |
| | 032007 96 | 032016 96 | |
| | 032008 96 | 032017 96 | |
| | | 032018 96 | |
| | | 032019 96 | |
| | | 032020 96 | |
| Date analysed | 96/08/21 | 96/08/21 | 96/08/22 |
| Date prepared | 96/08/19 | 96/08/20 | 96/08/22 |

| Batch Code: | 0819MJA1 | 0820MJA1 |
|---|---|---|
| Hardness (as CaCO3) | 032001 96 | 032009 96 |
| | 032002 96 | 032010 96 |
| | 032003 96 | 032011 96 |
| | 032004 96 | 032012 96 |
| | 032005 96 | 032013 96 |
| | 032006 96 | 032014 96 |
| | 032007 96 | 032015 96 |
| | 032008 96 | 032016 96 |
| | | 032017 96 |
| | | 032018 96 |
| | | 032019 96 |
| | | 032020 96 |
| Date analysed | 96/08/21 | 96/08/21 |
| Date prepared | 96/08/19 | 96/08/20 |

| Batch Code: | 0823SM02 | 0828SM02 | 0826SM02 | 0830SM02 |
|---|---|---|---|---|
| Benzene | 032000 96 | 032002 96 | 032011 96 | 032008 96 |
| | 032001 96 | 032007 96 | 032012 96 | |
| | 032003 96 | 032017 96 | 032016 96 | |
| | 032004 96 | 032018 96 | 032019 96 | |
| | 032005 96 | 032020 96 | | |
| | 032006 96 | | | |
| | 032009 96 | | | |
| | 032010 96 | | | |
| | 032013 96 | | | |
| | 032014 96 | | | |
| | 032015 96 | | | |
| Date analysed | 96/08/23 | 96/08/28 | 96/08/26 | 96/08/30 |
| Date prepared | 96/08/23 | 96/08/28 | 96/08/26 | 96/08/30 |

2 o

**El Paso** Natural Gas Company

MB - 32000.

# CHAIN OF CUSTODY RECORD

Page ______ of ______

| PROJECT NUMBER | PROJECT NAME | | | | | | | | CONTRACT LABORATORY P. O. NUMBER |
|---|---|---|---|---|---|---|---|---|---|
| | JAL #4 | | | | | | | | |
| SAMPLERS: (Signature) | | | DATE: 8/13/96 | | | | | | |
| LAB ID | DATE | TIME | MATRIX | SAMPLE NUMBER | TOTAL NUMBER OF CONTAINERS | COMPOSITE OR GRAB | REQUESTED ANALYSIS: SEE Attached | | REMARKS |
| 32001 | 8/13/96 | 0745 | $H_2O$ | S96-0320 | 5 | | X | | 1LPx2, 500P, 40VGx2 |
| 02 | 8/13/96 | 1245 | $H_2O$ | S96-0381 | 5 | | X | | |
| 03 | 8/13/96 | 0750 | $H_2O$ | S96-0382 | 5 | | X | | |
| 04 | 8/13/96 | 1455 | $H_2O$ | S96-0383 | 5 | | X | | |
| 05 | 8/13/96 | 0800 | $H_2O$ | S96-0384 | 5 | | X | | NO 40mL vials received |
| 06 | 8/13/96 | 1730 | $H_2O$ | S96-0385 | 5 | | X | | |
| 07 | 8/14/96 | 0935 | $H_2O$ | S96-0321 | 5 | | X | | No HCl added to BTEX samples |
| 08 | 8/14/96 | 1223 | $H_2O$ | S96-0322 | 5 | | X | | |
| 09 | 8/14/96 | 1223 | $H_2O$ | S96-0323 | 5 | | X | | |
| 10 | 8/14/96 | 1415 | $H_2O$ | S96-0325 | 5 | | X | | |
| 11 | 8/14/96 | 1250 | $H_2O$ | S96-0324 | 5 | | X | | |
| 12 | 8/14/96 | 1455 | $H_2O$ | S96-0326 | 6 | | X | | |

| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) |
|---|---|---|---|---|---|
| | 8/16/96 1100 | | | | |
| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED OF LABORATORY BY: (Signature) |
| | | | | 960817 12:15 | |

REQUESTED TURNAROUND TIME:
☐ ROUTINE ☐ RUSH

SAMPLE RECEIPT REMARKS

RESULTS & INVOICES TO:

TRANSMISSION OPERATIONS LABORATORY
EL PASO NATURAL GAS COMPANY
8645 RAILROAD DRIVE
EL PASO, TEXAS 79904

915-541-9228 FAX: 915-541-9335

CARRIER CO.

CHARGE CODE

BILL NO.:

White - Testing Laboratory Canary - EPNG Lab Pink - Field Sampler

FM-08-0566 (Rev

# Facsimile Cover Sheet

**To:** Jeff Kindley
**Company:** PHILLIP ENVIRONMENTAL
**Phone:** 915-563-0188
**Fax:** 915-563-9526

**From:** Mike Jacobs
**Company:** El Paso Natural Gas Company
**Phone:** (915) 541-2501
**Fax:** (915) 541-5946

**Date:** September 19, 1996
**Pages including this cover page:** 32

## Comments:

Jeff:
Here is the latest analytical, well ACW #15 is obviously #14, Production well no. 1 is the on-site well and not RW-1. Use ACW #4 and ACW#9 as being representative of the groundwater at these locations. Included is the Wells, screened intervals (S.I.) and top of casing elevations. The first batch of wells on the sheet are the ones that we use for flow determinations as per requirements from the state.

As always, live long and prosper

Mike Jacobs

El Paso Natural Gas Company

# CHAIN OF CUSTODY RECORD

Page ______ of ______

PROJECT NUMBER:
PROJECT NAME: Jal #4 M.W.'s
SAMPLERS: (Signature) [signature]
DATE: 8/14/96
CONTRACT LABORATORY P. O. NUMBER:

| LAB ID | DATE | TIME | MATRIX | SAMPLE NUMBER | TOTAL NUMBER OF CONTAINERS | COMPOSITE OR GRAB | REQUESTED ANALYSIS: SEE Attached | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32013 | 8/14/96 | 1720 | $H_2O$ | S96-0327 | 5 | | X | | | | | |
| 14 | 8/15/96 | 0952 | $H_2O$ | S96-0328 | 5 | | X | | | | | |
| 15 | 8/15/96 | 1204 | $H_2O$ | S96-0329 | 5 | | X | | | | | |
| 16 | 8/15/96 | 1240 | $H_2O$ | S96-0330 | 5 | | X | | | | | |
| 17 | 8/15/96 | 1425 | $H_2O$ | S96-0376 | 5 | | X | | | | | |
| 18 | 8/15/96 | 1721 | $H_2O$ | S96-0377 | 6 | | X | | | | | |
| 19 | 8/15/96 | 1752 | $H_2O$ | S96-0378 | 7 | | X | | | | | 500ml x 5, 40ml |
| 20 | 8/15/96 | 1800 | $H_2O$ | S96-0379 | 5 | | X | | | | | |

| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) |
|---|---|---|---|---|---|
| [signature] | 8/16/96 1100 | | | | |
| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED OF LABORATORY BY: (Signature) |
| | | | | 960817 12:15 | [signature] |

REQUESTED TURNAROUND TIME: ☐ ROUTINE ☐ RUSH

CARRIER CO.

BILL NO.:

SAMPLE RECEIPT REMARKS

CHARGE CODE

RESULTS & INVOICES TO:

TRANSMISSION OPERATIONS LABORATORY
EL PASO NATURAL GAS COMPANY
8645 RAILROAD DRIVE
EL PASO, TEXAS 79904

915-541-9228 FAX: 915-541-9335

White - Testing Laboratory Canary - EPNG Lab Pink - Field Sampler

# May 13, 1996

# ANALYTICAL REPORT

## Transmission Operations Engineering
## JAL#4 Monitor Wells
## Sample #'s S96-0250 to S96-0252, -0255, -0257 to -0263
## FSD Lab Sample #'s 960426 to 960436
## Sampled 5/06, 5/07 and 5/08/96
## Sampled by Steve Brisbin

**REMARKS:**
The samples were received cool and intact.

**Distribution:**

Darrell Campbell
Results Log Book

# May 17, 1996

# ANALYTICAL REPORT

## Transmission Operations Engineering
## JAL#4 Monitor Wells
## Sample #'s S96-0264 to S96-0266, -0268,
## FSD Lab Sample #'s 960449 to 960452
## Sampled 5/09/96
## Sampled by Steve Brisbin

**REMARKS:**
The samples were received cool and intact.

**Distribution:**
Darrell Campbell
Results Log Book

El Paso Natural Gas Company

# CHAIN OF CUSTODY RECORD

Page ____ of ____

PROJECT NUMBER:

PROJECT NAME: Jal #4 Plant

SAMPLERS: (Signature) [illegible signature]

DATE: 5/9/96

CONTRACT LABORATORY P. O. NUMBER:

| LAB ID | DATE | TIME | MATRIX | SAMPLE NUMBER | TOTAL NUMBER OF CONTAINERS | COMPOSITE OR GRAB | REQUESTED ANALYSIS: BTEX | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0449 | 5/9/96 | 1150 | $H_2O$ | 596-0264 | 2 | | X | | | | | | P.W. # 1 |
| 0450 | 5/9/96 | 1210 | $H_2O$ | 596-0265 | 2 | | X | | | | | | Bailer Blank - After sampling |
| 0451 | 5/9/96 | 1215 | $H_2O$ | 596-0266 | 2 | | X | | | | | | #3EMP After purging |
| 0452 | 5/9/96 | 1230 | $H_2O$ | 596-0268 | 2 | | X | | | | | | Field Blank |

| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) |
|---|---|---|---|---|---|
| [illegible signature] | 5/13/96 0800 | | | | |
| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED OF LABORATORY BY: (Signature) |
| | | | | | |

REQUESTED TURNAROUND TIME: ☐ ROUTINE ☐ RUSH

CARRIER CO.:

BILL NO.:

SAMPLE RECEIPT REMARKS:

CHARGE CODE: 108-47903 61-000-0014-11-2010

RESULTS & INVOICES TO:
TRANSMISSION OPERATIONS LABORATORY
EL PASO NATURAL GAS COMPANY
8645 RAILROAD DRIVE
EL PASO, TEXAS 79904
915-759-2229 FAX 915-759-2335

White - Testing Laboratory Canary - EPNG Lab Pink - Field Sampler

FM-08 0566 (Rev

El Paso Natural Gas Company

# CHAIN OF CUSTODY RECORD

Page ____ of ____

PROJECT NUMBER:
PROJECT NAME: JAL #4
SAMPLERS: (Signature) Stan Bustos
DATE: 5/6/96
CONTRACT LABORATORY P. O. NUMBER:

| LAB ID | DATE | TIME | MATRIX | SAMPLE NUMBER | TOTAL NUMBER OF CONTAINERS | COMPOSITE OR GRAB | REQUESTED ANALYSIS | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5/6/96 | 1425 | $H_2O$ | S96-0850 | 3 | | | | | | | | #3 EMP Before Purging |
| | 5/6/96 | 1435 | $H_2O$ | S96-0851 | 3 | | | | | | | | Bailer Blank Before Sampling |
| | 5/6/96 | 1440 | $H_2O$ | S96-0852 | 3 | | | | | | | | Field Blank |
| | 5/6/96 | 1800 | $H_2O$ | S96-0853 | 1 | | | | | | | | ACW #4 |
| | 5/6/96 | 1942 | $H_2O$ | S96-0854 | 1 | | | | | | | | ACW #2A |
| | 5/7/96 | 0900 | $H_2O$ | S96-0855 | 3 | | | | | | | | ACW #3 |
| | 5/7/96 | 1945 | $H_2O$ | S96-0856 | 1 | | | | | | | | Doons Water Well |
| | 5/8/96 | 0800 | $H_2O$ | S96-0857 | 3 | | | | | | | | ACW #6 |
| | 5/8/96 | 1015 | $H_2O$ | S96-0858 | 3 | | | | | | | | ACW #5 |
| | 5/8/96 | 1225 | $H_2O$ | S96-0859 | 3 | | | | | | | | ACW #9 |
| | 5/8/96 | 1225 | $H_2O$ | S96-0860 | 3 | | | | | | | | ACW #9 Dup. |
| | 5/8/96 | 1440 | $H_2O$ | S96-0861 | 4 | | | | | | | | ACW #10 |

| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) |
|---|---|---|---|---|---|
| | 5/13/96 0820 | | | 5/13/96 0820 | |
| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED OF LABORATORY BY: (Signature) |
| | | | | | |

REQUESTED TURNAROUND TIME: ☐ ROUTINE ☐ RUSH

CARRIER CO.

BILL NO.

SAMPLE RECEIPT REMARKS

CHARGE CODE

RESULTS & INVOICES TO:

TRANSMISSION OPERATIONS LABORATORY
EL PASO NATURAL GAS COMPANY
8645 RAILROAD DRIVE
EL PASO, TEXAS 79904

915-541-9228 FAX: 915-541-9335

White - Testing Laboratory Canary - EPNG Lab Pink - Field Sampler

FM-08-0566 (Rev

**El Paso Natural Gas Company**

# CHAIN OF CUSTODY RECORD

Page ______ of ______

PROJECT NUMBER:

PROJECT NAME: #4

SAMPLERS: (Signature)

DATE: 5/8/96

CONTRACT LABORATORY P. O. NUMBER:

| LAB ID | DATE | TIME | MATRIX | SAMPLE NUMBER | TOTAL NUMBER OF CONTAINERS | COMPOSITE OR GRAB | REQUESTED ANALYSIS | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5/8/96 | 1704 | $H_2O$ | 596-0262 | 3 | | | | | | | | ACW#11 |
| | 5/8/96 | 1820 | $H_2O$ | 596-0263 | 3 | | | | | | | | ACW#4 |
| | 5/9/96 | 1150 | $H_2O$ | 596-0264 | 3 | | | | | | | | P.W.#1 |
| | 5/9/96 | 1210 | $H_2O$ | 596-0265 | ~~3~~ 4 | | | | | | | | Bailer Blank - Middle of sampling; |
| | 5/9/96 | 1215 | $H_2O$ | 596-0266 | 4 | | | | | | | | #3EMP Middle of purging wells. |
| | 5/9/96 | 1415 | $H_2O$ | 596-0267 | ~~4~~ 2 | | | | | | | | ACW#7 |
| | 5/9/96 | 1553 | $H_2O$ | 596-0269 | 2 | | | | | | | | ACW#8 |

| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) |
|---|---|---|---|---|---|
| [signature] | 5/13/96 0820 | | | 5/13/96 0820 | [signature] |
| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED OF LABORATORY BY: (Signature) |
| | | | | | |

REQUESTED TURNAROUND TIME: ☐ ROUTINE ☐ RUSH

CARRIER CO.

BILL NO.

SAMPLE RECEIPT REMARKS

CHARGE CODE

RESULTS & INVOICES TO:

TRANSMISSION OPERATIONS LABORATORY
EL PASO NATURAL GAS COMPANY
8645 RAILROAD DRIVE
EL PASO, TEXAS 79904

915-541-9228 FAX. 915-541-9335

White - Testing Laboratory Canary - EPNG Lab Pink - Field Sampler

El Paso Natural Gas Company

# CHAIN OF CUSTODY RECORD

Page ____ of ____

PROJECT NUMBER: 

PROJECT NAME: JAL #4

SAMPLERS: (Signature) [signature] DATE: 5/7/96

CONTRACT LABORATORY P.O. NUMBER:

| LAB ID | DATE | TIME | MATRIX | SAMPLE NUMBER | TOTAL NUMBER OF CONTAINERS | COMPOSITE OR GRAB | BTEX | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5/6/96 | 1435 | $H_2O$ | 596-0950 96-C126 | 2 | | X | | | | | | #3 EMP Before Purging |
| | 5/6/96 | 1435 | $H_2O$ | 596-0951 96-C127 | 2 | | X | | | | | | Bailer Blank Before Sampling |
| | 5/6/96 | 1440 | $H_2O$ | 596-0952 96-C128 | 2 | | X | | | | | | Field Blank |
| | 5/7/96 | 0900 | $H_2O$ | 596-0955 96-C129 | 2 | | X | | | | | | Doris Water Well |
| | 5/8/96 | 0800 | $H_2O$ | 596-0957 96-C130 | 2 | | X | | | | | | ACW #6 No HCl added to samples. |
| | 5/8/96 | 1015 | $H_2O$ | 596-0958 96-C131 | 2 | | X | | | | | | ACW #5 |
| | 5/8/96 | 1225 | $H_2O$ | 596-0959 96-C132 | 2 | | X | | | | | | ACW #9 |
| | 5/8/96 | 1225 | $H_2O$ | 596-0960 96-C133 | 2 | | X | | | | | | ACW #9 Dup. |
| | 5/8/96 | 1440 | $H_2O$ | 596-0961 96-C134 | 2 | | X | | | | | | ACW #10 |
| | 5/8/96 | 1704 | $H_2O$ | 596-0962 96-C135 | 2 | | X | | | | | | ACW #11 |
| | 5/8/96 | 1820 | $H_2O$ | 596-0963 96-C136 | 2 | | X | | | | | | ACW #1 |

| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) |
|---|---|---|---|---|---|
| [signature] | 5/9/96 0700 | | | | |
| RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED BY: (Signature) | RELINQUISHED BY: (Signature) | DATE/TIME | RECEIVED OF LABORATORY BY: (Signature) |
| | | | | | |

REQUESTED TURNAROUND TIME: ☐ ROUTINE ☐ RUSH

CARRIER CO:

BILL NO:

SAMPLE RECEIPT REMARKS:

CHARGE CODE: 103-47903-61-0001-C-CH -11-2010

RESULTS & INVOICES TO:

TRANSMISSION OPERATIONS LABORATORY
EL PASO NATURAL GAS COMPANY
8645 RAILROAD DRIVE
EL PASO, TEXAS 79904
915 759 2229 FAX 915 759 2335

White - Testing Laboratory Canary - EPNG Lab Pink - Field Sampler

FM 06 0666 (Rev. 5.5)

SAMPLE KEY

SAMPLE NUMBER: S96-0250 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: EMP #3 BEFORE SAMPLING
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:25 SAMPLE DATE: 05/06/96

SAMPLE KEY

SAMPLE NUMBER: S96-0251 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: BAILER BLANK BEFORE SAMPLING
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:35 SAMPLE DATE: 05/06/96

SAMPLE KEY

SAMPLE NUMBER: S96-0252 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: FIELD BLANK
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:40 SAMPLE DATE: 05/06/96

SAMPLE KEY

SAMPLE NUMBER: S96-0253 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #4
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 18:00 SAMPLE DATE: 05/06/96

SAMPLE KEY

SAMPLE NUMBER: S96-0254 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #2A
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 19:42 SAMPLE DATE: 05/06/96

SAMPLE KEY

SAMPLE NUMBER: S96-0255 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: DOOMS WATER WELL
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: SAMPLE DATE: 05/07/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0256 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #3
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 19:45 SAMPLE DATE: 05/07/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0257 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #6
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 08:00 SAMPLE DATE: 05/08/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0258 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #5
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 10:15 SAMPLE DATE: 05/08/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0259 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #9
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:25 SAMPLE DATE: 05/08/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0260 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #9 DUPLICATE
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:25 SAMPLE DATE: 05/08/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0261 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #10
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:40 SAMPLE DATE: 05/08/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0262 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #11
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 17:04 SAMPLE DATE: 05/08/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0263 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #1
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: SAMPLE DATE: 05/08/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0264 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: PRODUCTION WELL #1
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 11:50 SAMPLE DATE: 05/09/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0265 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: BAILER BLANK, MIDDLE OF SAMPLING
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:10 SAMPLE DATE: 05/09/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0266 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: PUMP BLANK EMP #3, MIDDLE OF SAMPLING
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:15 SAMPLE DATE: 05/09/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0267 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #7
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:15 SAMPLE DATE: 05/09/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0268 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: FIELD BLANK
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 13:20 SAMPLE DATE: 05/09/96

**SAMPLE KEY**

SAMPLE NUMBER: S96-0269 LOCATION: JAL #4 PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL ACW #8
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 15:53 SAMPLE DATE: 05/09/96

TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0264 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: P.W. #1

SAMPLE DATE (MM/DD/YY): 05/09/96 TIME: 11:50

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | . |
| Chemical Oxygen Demand | . | Fluoride | . |
| Kjeldahl Nitrogen (N) | . | Iodide | . |
| Nitrate (N) | . | Odor | . |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 56. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | . |
| Cyanide, Free | . | Specific Conductance (umho) | 299. |
| Phenols | . | Sulfate | . |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | . | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | . | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | . | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | . | Lindane | . |
| Iron | . | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | . | 2,4-D | . |
| Manganese | . | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | . | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | . | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | . | Dibromochloromethane | . |
| pH | 8.23 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 82. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | . | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 31. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS:

ANALYST: John Bennett DATE: 6/21/96

EPFS

**EL PASO FIELD SERVICES**

# FIELD SERVICES LABORATORY
# ANALYTICAL REPORT

## SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960449 |
| SAMPLE NUMBER: | S96-0264 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/09/96 |
| SAMPLE TIME (Hrs): | 1150 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/14/96 |
| SAMPLE TYPE: | Water |

REMARKS: ______

## EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | <1.0 | |
| TOLUENE | <1.0 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 102 | Allowed Range 80 to 120 % |

NOTES:

Reported By: mh  Approved By: [signature]  Date: 5/16/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0265 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: Bailer Blank Middle of Sampling

SAMPLE DATE (MM/DD/YY): 05/09/96 TIME: 12:10

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | | Color | |
| Chemical Oxygen Demand | | Fluoride | <0.01 |
| Kjeldahl Nitrogen (N) | | Iodide | |
| Nitrate (N) | <1.25 | Odor | |
| Nitrite (N) | | Residue, Total | |
| Oil & Grease | | Residue, Filterable (TDS) | <10. |
| Organic Carbon | | Residue, Nonfilterable (TSS) | |
| Orthophosphate ($PO_4$) | | Residue, Settleable | |
| Phosphorus, Total (P) | | Residue, Volatile | |
| Cyanide, Total | | Silica | <1. |
| Cyanide, Free | | Specific Conductance (umho) | 1. |
| Phenols | | Sulfate | <12.5 |
| Antimony | | Sulfite | |
| Arsenic | | Surfactants-MBAS | |
| Barium | | Turbidity NTU | |
| Beryllium | | BHC Isomers | |
| Boron | <0.5 | Chlordane | |
| Cadmium | | DDT Isomers | |
| Calcium | <1. | Dieldrin | |
| Chromium, Total | | Endrin | |
| Chromium, VI | | Heptachlor | |
| Copper | <0.01 | Heptachlor Epoxide | |
| Hardness ($CaCO_3$) | <10. | Lindane | |
| Iron | <0.05 | Methoxychlor | |
| Lead | | Toxaphene | |
| Magnesium | <1. | 2,4-D | |
| Manganese | <0.05 | 2,4,5-TP-Silvex | |
| Mercury | | 2,4,5-T | |
| Nickel | | Sulfides | |
| Potassium | <1. | Bromoform | |
| Selenium | | Bromodichloromethane | |
| Silver | | Carbon Tetrachloride | |
| Sodium | <1. | Chloroform | |
| Thallium | | Chloromethane | |
| Zinc | <0.05 | Dibromochloromethane | |
| pH | 5.86 | Methylene Chloride | |
| Acidity, Total | | Tetrachloroethylene | |
| Alkalinity, Total ($CaCO_3$) | 4. | 1,1,1-Trichloroethane | |
| Alkalinity, Bicarbonate ($CaCO_3$) | | Trichloroethylene | |
| Bromide | <1.25 | Trihalomethanes | |
| Carbon Dioxide | | PCBs ( ) | |
| Chloride | <10. | Temperature (°C) | |
| Dissolved Oxygen | | Total Petroleum Hydrocarbons | |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

EPFS

**EL PASO FIELD SERVICES**

## FIELD SERVICES LABORATORY
## ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960450 |
| SAMPLE NUMBER: | S96-0265 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/09/96 |
| SAMPLE TIME (Hrs): | 1210 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/14/96 |
| SAMPLE TYPE: | Water |

Bailer Blank

REMARKS: ______________________

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | <1.0 | |
| TOLUENE | <1.0 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 103 | Allowed Range 80 to 120 % |

NOTES:

Reported By: mh

Approved By: John Lambdin

Date: 5/14/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0266 QA/QC GROUP NO.: Q96 0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: EMP #3 Middle of Sampling

SAMPLE DATE (MM/DD/YY): 05/09/96 TIME: 12:15

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | |
| Chemical Oxygen Demand | . | Fluoride | 0.5 |
| Kjeldahl Nitrogen (N) | . | Iodide | |
| Nitrate (N) | <1.25 | Odor | |
| Nitrite (N) | . | Residue, Total | |
| Oil & Grease | . | Residue, Filterable (TDS) | 174. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | |
| Phosphorus, Total (P) | . | Residue, Volatile | |
| Cyanide, Total | . | Silica | 62. |
| Cyanide, Free | . | Specific Conductance (umho) | 216. |
| Phenols | . | Sulfate | 18. |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | <0.5 | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | 12. | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | <0.01 | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | 68. | Lindane | . |
| Iron | 0.2 | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | 10. | 2,4-D | . |
| Manganese | <0.05 | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | 1. | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | 20. | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | <0.05 | Dibromochloromethane | . |
| pH | 9.09 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 4. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | 35. | Trichloroethylene | . |
| Bromide | <1.25 | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 29. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

EPFS

**EL PASO FIELD SERVICES**

## FIELD SERVICES LABORATORY
## ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960451 |
| SAMPLE NUMBER: | S96-0266 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/09/96 |
| SAMPLE TIME (Hrs): | 1215 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/14/96 |
| SAMPLE TYPE: | Water |

# 3 emp
After Purge

REMARKS:

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | 2.46 | |
| TOLUENE | 2.02 | |
| ETHYL BENZENE | 1.66 | |
| TOTAL XYLENES | < 3.0 | |
| SURROGATE % RECOVERY | 97.9 | Allowed Range 80 to 120 % |

NOTES:

Reported By: mh    Approved By: [signature]    Date: 5/16/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0267 QA/QC GROUP NO.: Q96 0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #7

SAMPLE DATE (MM/DD/YY): 05/09/96 TIME: 14:15

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | . |
| Chemical Oxygen Demand | . | Fluoride | . |
| Kjeldahl Nitrogen (N) | . | Iodide | . |
| Nitrate (N) | . | Odor | . |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 7920. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | . |
| Cyanide, Free | . | Specific Conductance (umho) | 12990. |
| Phenols | . | Sulfate | . |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | . | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | . | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | . | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | . | Lindane | . |
| Iron | . | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | . | 2,4-D | . |
| Manganese | . | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | . | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | . | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | . | Dibromochloromethane | . |
| pH | 7.22 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 361. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | . | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 3990. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS:

ANALYST: John Bennett DATE: 6/21/96

EPFS

**EL PASO FIELD SERVICES**

## FIELD SERVICES LABORATORY
## ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960452 |
| SAMPLE NUMBER: | S96-0268 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/09/96 |
| SAMPLE TIME (Hrs): | 1230 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/14/96 |
| SAMPLE TYPE: | Water |

Field Blank

REMARKS: ______

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | <1.0 | |
| TOLUENE | <1.0 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 104 | Allowed Range 80 to 120 % |

NOTES:

Reported By: mh

Approved By: [signature]

Date: 5/16/96

**TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT**

SAMPLE NO.: S96-0269 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #8

SAMPLE DATE (MM/DD/YY): 05/09/96 TIME: 15:53

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | . |
| Chemical Oxygen Demand | . | Fluoride | . |
| Kjeldahl Nitrogen (N) | . | Iodide | . |
| Nitrate (N) | . | Odor | . |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 36980. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | . |
| Cyanide, Free | . | Specific Conductance (umho) | 44500 |
| Phenols | . | Sulfate | . |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | . | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | . | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | . | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | . | Lindane | . |
| Iron | . | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | . | 2,4-D | . |
| Manganese | . | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | . | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | . | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | . | Dibromochloromethane | . |
| pH | 6.87 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 568. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | . | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 14750. | Temperature ($^{O}C$) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS:

ANALYST: John Barnett DATE: 6/21/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0250 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: EMP #3 Before Purging

SAMPLE DATE (MM/DD/YY): 05/06/96 TIME: 14:25

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | |
| Chemical Oxygen Demand | . | Fluoride | 0.72 |
| Kjeldahl Nitrogen (N) | . | Iodide | |
| Nitrate (N) | <1.25 | Odor | . |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 676. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | 45. |
| Cyanide, Free | . | Specific Conductance (umho) | 1001. |
| Phenols | . | Sulfate | 192. |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | <0.5 | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | 132. | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | <0.01 | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | 330. | Lindane | . |
| Iron | 0.3 | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | 21. | 2,4-D | . |
| Manganese | 0.05 | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | 6. | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | 72. | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | <0.05 | Dibromochloromethane | . |
| pH | 7.69 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 138. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | <1.25 | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 123. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

# EL PASO FIELD SERVICES

## FIELD SERVICES LABORATORY
## ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960426 |
| SAMPLE NUMBER: | S96-0250 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/06/96 |
| SAMPLE TIME (Hrs): | 1425 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/12/96 |
| SAMPLE TYPE: | Water |

REMARKS:

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | <1.0 | |
| TOLUENE | 1.14 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 100 | Allowed Range 80 to 120 % |

NOTES:

Reported By: mh Approved By: [illegible] Date: 5/13/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0251 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: Bailer Blank Before Sampling

SAMPLE DATE (MM/DD/YY): 05/06/96 TIME: 14:35

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | . |
| Chemical Oxygen Demand | . | Fluoride | <0.01 |
| Kjeldahl Nitrogen (N) | . | Iodide | . |
| Nitrate (N) | <1.25 | Odor | . |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | <10. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | <1. |
| Cyanide, Free | . | Specific Conductance (umho) | 1. |
| Phenols | . | Sulfate | <12.5 |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | <0.5 | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | <1. | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | <0.01 | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | <1. | Lindane | . |
| Iron | <0.05 | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | <1. | 2,4-D | . |
| Manganese | <0.05 | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | <1. | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | <1. | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | <0.05 | Dibromochloromethane | . |
| pH | 5.96 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 4. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | <1.25 | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | <10. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

EPFS

**EL PASO FIELD SERVICES**

## FIELD SERVICES LABORATORY
## ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960427 |
| SAMPLE NUMBER: | S96-0251 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/06/96 |
| SAMPLE TIME (Hrs): | 1435 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/12/96 |
| SAMPLE TYPE: | Water |

REMARKS:

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | <1.0 | |
| TOLUENE | <1.0 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 100 | Allowed Range 80 to 120 % |

NOTES:

Reported By: mh Approved By: [signature] Date: 5/13/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0252 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: Field Blank

SAMPLE DATE (MM/DD/YY): 05/06/96 TIME: 14:40

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | . |
| Chemical Oxygen Demand | . | Fluoride | <0.01 |
| Kjeldahl Nitrogen (N) | . | Iodide | . |
| Nitrate (N) | <1.25 | Odor | . |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | <10. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | <1. |
| Cyanide, Free | . | Specific Conductance (umho) | 1. |
| Phenols | . | Sulfate | <12.5 |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | <0.5 | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | <1. | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | <0.01 | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | <1. | Lindane | . |
| Iron | <0.05 | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | <1. | 2,4-D | . |
| Manganese | <0.05 | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | <1. | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | <1. | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | <0.05 | Dibromochloromethane | . |
| pH | 5.80 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 4. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | <1.25 | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | <10. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

EPFS

**EL PASO FIELD SERVICES**

## FIELD SERVICES LABORATORY
## ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960428 |
| SAMPLE NUMBER: | S96-0252 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/06/96 |
| SAMPLE TIME (Hrs): | 1440 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/12/96 |
| SAMPLE TYPE: | Water |

REMARKS:

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | <1.0 | |
| TOLUENE | 1.22 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 100 | Allowed Range 80 to 120 % |

NOTES:

Reported By: mh Approved By: [illegible signature] Date: 5/13/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0253 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #4

SAMPLE DATE (MM/DD/YY): 05/06/96 TIME: 18:00

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | | Color | |
| Chemical Oxygen Demand | | Fluoride | |
| Kjeldahl Nitrogen (N) | | Iodide | |
| Nitrate (N) | | Odor | |
| Nitrite (N) | | Residue, Total | |
| Oil & Grease | | Residue, Filterable (TDS) | 28950. |
| Organic Carbon | | Residue, Nonfilterable (TSS) | |
| Orthophosphate ($PO_4$) | | Residue, Settleable | |
| Phosphorus, Total (P) | | Residue, Volatile | |
| Cyanide, Total | | Silica | |
| Cyanide, Free | | Specific Conductance (umho) | 44600. |
| Phenols | | Sulfate | |
| Antimony | | Sulfite | |
| Arsenic | | Surfactants-MBAS | |
| Barium | | Turbidity NTU | |
| Beryllium | | BHC Isomers | |
| Boron | | Chlordane | |
| Cadmium | | DDT Isomers | |
| Calcium | | Dieldrin | |
| Chromium, Total | | Endrin | |
| Chromium, VI | | Heptachlor | |
| Copper | | Heptachlor Epoxide | |
| Hardness ($CaCO_3$) | | Lindane | |
| Iron | | Methoxychlor | |
| Lead | | Toxaphene | |
| Magnesium | | 2,4-D | |
| Manganese | | 2,4,5-TP-Silvex | |
| Mercury | | 2,4,5-T | |
| Nickel | | Sulfides | |
| Potassium | | Bromoform | |
| Selenium | | Bromodichloromethane | |
| Silver | | Carbon Tetrachloride | |
| Sodium | | Chloroform | |
| Thallium | | Chloromethane | |
| Zinc | | Dibromochloromethane | |
| pH | 7.19 | Methylene Chloride | |
| Acidity, Total | | Tetrachloroethylene | |
| Alkalinity, Total ($CaCO_3$) | 207. | 1,1,1-Trichloroethane | |
| Alkalinity, Bicarbonate ($CaCO_3$) | | Trichloroethylene | |
| Bromide | | Trihalomethanes | |
| Carbon Dioxide | | PCBs ( ) | |
| Chloride | 16920. | Temperature (°C) | |
| Dissolved Oxygen | | Total Petroleum Hydrocarbons | |

COMMENTS:

ANALYST: John Burnett DATE: 6/21/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0254 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #2A

SAMPLE DATE (MM/DD/YY): 05/06/96 TIME: 19:42

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | |
| Chemical Oxygen Demand | . | Fluoride | . |
| Kjeldahl Nitrogen (N) | . | Iodide | . |
| Nitrate (N) | . | Odor | . |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 17060. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | . |
| Cyanide, Free | . | Specific Conductance (umho) | 28230. |
| Phenols | . | Sulfate | . |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity | NTU |
| Beryllium | . | BHC Isomers | . |
| Boron | . | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | . | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | . | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | . | Lindane | . |
| Iron | . | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | . | 2,4-D | . |
| Manganese | . | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | . | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | . | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | . | Dibromochloromethane | . |
| pH | 9.05 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 264. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | 1860. | Trichloroethylene | . |
| Bromide | . | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 9450. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS:

ANALYST: John Bennett DATE: 6/21/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0255 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: Dooms Water Well

SAMPLE DATE (MM/DD/YY): 05/07/96 TIME: 09:00

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | . |
| Chemical Oxygen Demand | . | Fluoride | 0.52 |
| Kjeldahl Nitrogen (N) | . | Iodide | . |
| Nitrate (N) | 1.20 | Odor | . |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 436. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | 61. |
| Cyanide, Free | . | Specific Conductance (umho) | 619. |
| Phenols | . | Sulfate | 84. |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity ____NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | <0.5 | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | 43. | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | <0.01 | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | 175. | Lindane | . |
| Iron | 0.6 | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | 17. | 2,4-D | . |
| Manganese | <0.05 | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | 4. | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | 69. | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | <0.05 | Dibromochloromethane | . |
| pH | 7.73 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 192. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | <1.25 | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 33. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

# EPFS

## EL PASO FIELD SERVICES

### FIELD SERVICES LABORATORY
### ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960429 |
| SAMPLE NUMBER: | S96-0255 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/07/96 |
| SAMPLE TIME (Hrs): | 0900 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/12/96 |
| SAMPLE TYPE: | Water |

ACW-3

REMARKS:

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | <1.0 | |
| TOLUENE | <1.0 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 101 | Allowed Range 80 to 120 % |

NOTES:

Reported By: Approved By: Date: 5/13/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0256 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #3

SAMPLE DATE (MM/DD/YY): 05/09/96 TIME: 19:45

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | |
| Chemical Oxygen Demand | . | Fluoride | |
| Kjeldahl Nitrogen (N) | . | Iodide | |
| Nitrate (N) | . | Odor | |
| Nitrite (N) | . | Residue, Total | |
| Oil & Grease | . | Residue, Filterable (TDS) | 12460. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | |
| Cyanide, Free | . | Specific Conductance (umho) | 19420. |
| Phenols | . | Sulfate | |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity NTU | |
| Beryllium | . | BHC Isomers | . |
| Boron | . | Chlordane | . |
| Cadmium | . | DDT Isomers | |
| Calcium | . | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | . | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | . | Lindane | . |
| Iron | . | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | . | 2,4-D | . |
| Manganese | . | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | . | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | . | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | . | Dibromochloromethane | . |
| pH | 6.83 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 702. | 1,1,1 Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | . | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 7610. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS:

ANALYST: John Bennett DATE: 6/21/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0257 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #6

SAMPLE DATE (MM/DD/YY): 05/08/96 TIME: 08:00

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | . |
| Chemical Oxygen Demand | . | Fluoride | 6.4 |
| Kjeldahl Nitrogen (N) | . | Iodide | . |
| Nitrate (N) | <1.25 | Odor | . |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 6460. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | 40. |
| Cyanide, Free | . | Specific Conductance (umho) | 10620. |
| Phenols | . | Sulfate | 48. |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | 1.3 | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | 35. | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | 0.02 | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | 175. | Lindane | . |
| Iron | 4.1 | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | 21. | 2,4-D | . |
| Manganese | 0.14 | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | 4. | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | 2380. | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | <0.05 | Dibromochloromethane | . |
| pH | 7.69 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 1396. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | <1.25 | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 2880. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

# EPFS

## EL PASO FIELD SERVICES

### FIELD SERVICES LABORATORY
### ANALYTICAL REPORT

## SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960430 |
| SAMPLE NUMBER: | S96-0257 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/08/96 |
| SAMPLE TIME (Hrs): | 0800 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/12/96 |
| SAMPLE TYPE: | Water |

REMARKS: 

## EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | 4.08 | |
| TOLUENE | 1.58 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 101 | Allowed Range 80 to 120 % |

NOTES:

Reported By: [illegible] Approved By: [illegible] Date: 5/13/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0258 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #5

SAMPLE DATE (MM/DD/YY): 05/08/96 TIME: 10:15

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | |
| Chemical Oxygen Demand | . | Fluoride | 0.42 |
| Kjeldahl Nitrogen (N) | . | Iodide | |
| Nitrate (N) | 5.00 | Odor | |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 2460. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | |
| Cyanide, Total | . | Silica | 35. |
| Cyanide, Free | . | Specific Conductance (umho) | 3650. |
| Phenols | . | Sulfate | 653. |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | 0.8 | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | 167. | Dieldrin | |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | 0.01 | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | 515. | Lindane | . |
| Iron | 0.2 | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | 24. | 2,4-D | . |
| Manganese | <0.05 | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | 8. | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | 506. | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | <0.05 | Dibromochloromethane | . |
| pH | 7.15 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 190. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | 4.5 | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 519. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

EPFS

**EL PASO FIELD SERVICES**

## FIELD SERVICES LABORATORY
## ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960431 |
| SAMPLE NUMBER: | S96-0258 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/08/96 |
| SAMPLE TIME (Hrs): | 1015 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/12/96 |
| SAMPLE TYPE: | Water |

REMARKS:

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | <1.0 | |
| TOLUENE | <1.0 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 104 | Allowed Range 80 to 120 % |

NOTES:

5/12/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0259 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #9

SAMPLE DATE (MM/DD/YY):05/08/96 TIME: 12:25

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | . |
| Chemical Oxygen Demand | . | Fluoride | 0.35 |
| Kjeldahl Nitrogen (N) | . | Iodide | . |
| Nitrate (N) | <1.25 | Odor | . |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 4210. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | 60. |
| Cyanide, Free | . | Specific Conductance (umho) | 7530. |
| Phenols | . | Sulfate | 322. |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | <0.5 | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | 508. | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | 0.01 | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | 2020. | Lindane | . |
| Iron | 0.4 | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | 183. | 2,4-D | . |
| Manganese | 0.49 | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | 17. | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | 687. | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | <0.05 | Dibromochloromethane | . |
| pH | 6.78 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 209. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | 3.0 | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 2210. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

EPFS

**EL PASO FIELD SERVICES**

## FIELD SERVICES LABORATORY
## ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | **960432** |
| SAMPLE NUMBER: | **S96-0259** |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/08/96 |
| SAMPLE TIME (Hrs): | 1225 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/12/96 |
| SAMPLE TYPE: | Water |

REMARKS: ______

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | <1.0 | |
| TOLUENE | <1.0 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 102 | Allowed Range 80 to 120 % |

NOTES:

Reported By: mh Approved By: [signature] Date: 5/13/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0260 QA/QC GROUP NO.: Q96 0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #9 Duplicate

SAMPLE DATE (MM/DD/YY): 05/08/96 TIME: 12:25

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | | Color | |
| Chemical Oxygen Demand | | Fluoride | 0.29 |
| Kjeldahl Nitrogen (N) | | Iodide | |
| Nitrate (N) | <1.25 | Odor | |
| Nitrite (N) | | Residue, Total | |
| Oil & Grease | | Residue, Filterable (TDS) | 2360. |
| Organic Carbon | | Residue, Nonfilterable (TSS) | |
| Orthophosphate ($PO_4$) | | Residue, Settleable | |
| Phosphorus, Total (P) | | Residue, Volatile | |
| Cyanide, Total | | Silica | 35. |
| Cyanide, Free | | Specific Conductance (umho) | 3890. |
| Phenols | | Sulfate | 152. |
| Antimony | | Sulfite | |
| Arsenic | | Surfactants-MBAS | |
| Barium | | Turbidity NTU | |
| Beryllium | | BHC Isomers | |
| Boron | <0.5 | Chlordane | |
| Cadmium | | DDT Isomers | |
| Calcium | 245. | Dieldrin | |
| Chromium, Total | | Endrin | |
| Chromium, VI | | Heptachlor | |
| Copper | 0.02 | Heptachlor Epoxide | |
| Hardness ($CaCO_3$) | 1010. | Lindane | |
| Iron | 0.5 | Methoxychlor | |
| Lead | | Toxaphene | |
| Magnesium | 97. | 2,4-D | |
| Manganese | 0.73 | 2,4,5-TP-Silvex | |
| Mercury | | 2,4,5-T | |
| Nickel | | Sulfides | |
| Potassium | 8. | Bromoform | |
| Selenium | | Bromodichloromethane | |
| Silver | | Carbon Tetrachloride | |
| Sodium | 373. | Chloroform | |
| Thallium | | Chloromethane | |
| Zinc | <0.05 | Dibromochloromethane | |
| pH | 6.86 | Methylene Chloride | |
| Acidity, Total | | Tetrachloroethylene | |
| Alkalinity, Total ($CaCO_3$) | 220. | 1,1,1-Trichloroethane | |
| Alkalinity, Bicarbonate ($CaCO_3$) | | Trichloroethylene | |
| Bromide | <1.25 | Trihalomethanes | |
| Carbon Dioxide | | PCBs ( ) | |
| Chloride | 1090. | Temperature (°C) | |
| Dissolved Oxygen | | Total Petroleum Hydrocarbons | |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

# EPFS
## EL PASO FIELD SERVICES

### FIELD SERVICES LABORATORY
### ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960433 |
| SAMPLE NUMBER: | S96-0260 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/08/96 |
| SAMPLE TIME (Hrs): | 1225 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/12/96 |
| SAMPLE TYPE: | Water |

REMARKS: Field Duplicate

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | <1.0 | |
| TOLUENE | <1.0 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 101 | Allowed Range 80 to 120 % |

NOTES:

Reported By: mh Approved By: [signature] Date: 5/13/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0261 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #10

SAMPLE DATE (MM/DD/YY): 05/08/96 TIME: 14:40

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | |
| Chemical Oxygen Demand | . | Fluoride | 0.46 |
| Kjeldahl Nitrogen (N) | . | Iodide | |
| Nitrate (N) | 2.5 | Odor | |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 1290. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | 62. |
| Cyanide, Free | . | Specific Conductance (umho) | 2322. |
| Phenols | . | Sulfate | 190. |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | <0.5 | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | 206. | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | <0.01 | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | 893. | Lindane | . |
| Iron | 0.1 | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | 92. | 2,4-D | . |
| Manganese | <0.05 | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | 8. | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | 127. | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | <0.05 | Dibromochloromethane | . |
| pH | 7.17 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 137. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | 4.5 | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 603. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

EPFS

# EL PASO FIELD SERVICES

## FIELD SERVICES LABORATORY
## ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960434 |
| SAMPLE NUMBER: | S96-0261 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/08/96 |
| SAMPLE TIME (Hrs): | 1440 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/12/96 |
| SAMPLE TYPE: | Water |

REMARKS: Field Duplicate

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | 1.22 | |
| TOLUENE | <1.0 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 100 | Allowed Range 80 to 120 % |

NOTES:

5/13/96

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0262 QA/QC GROUP NO.: Q96-00__

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #11

SAMPLE DATE (MM/DD/YY): 05/08/96 TIME: 17:04

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | . |
| Chemical Oxygen Demand | . | Fluoride | 0.37 |
| Kjeldahl Nitrogen (N) | . | Iodide | . |
| Nitrate (N) | <1.25 | Odor | . |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 5080. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | 50. |
| Cyanide, Free | . | Specific Conductance (umho) | 9840. |
| Phenols | . | Sulfate | 206. |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants-MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | <0.5 | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | 484. | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | 0.02 | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | 2110. | Lindane | . |
| Iron | 0.3 | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | 220. | 2,4-D | . |
| Manganese | 0.09 | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | 29. | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | 1160. | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | <0.05 | Dibromochloromethane | . |
| pH | 7.25 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 111. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | <1.25 | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 3120. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

EPFS

**EL PASO FIELD SERVICES**

## FIELD SERVICES LABORATORY
## ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960435 |
| SAMPLE NUMBER: | S96-0262 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/08/96 |
| SAMPLE TIME (Hrs): | 1704 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/12/96 |
| SAMPLE TYPE: | Water |

REMARKS:

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | 6.76 | |
| TOLUENE | <1.0 | |
| ETHYL BENZENE | <1.0 | |
| TOTAL XYLENES | <3.0 | |
| SURROGATE % RECOVERY | 101 | Allowed Range 80 to 120 % |

NOTES:

# TRANSMISSION OPERATIONS LABORATORY SAMPLE REPORT

SAMPLE NO.: S96-0263 QA/QC GROUP NO.: Q96-0052

SAMPLE LOCATION: Jal #4 Plant

SAMPLE SITE DESCRIPTION: ACW #1

SAMPLE DATE (MM/DD/YY):05/08/96 TIME: 18:20

SAMPLE COLLECTED BY: Steve Brisbin

| | Analysis Results (mg/l) | | Analysis Results (mg/l) |
|---|---|---|---|
| Ammonia (N) | . | Color | . |
| Chemical Oxygen Demand | . | Fluoride | 2.2 |
| Kjeldahl Nitrogen (N) | . | Iodide | . |
| Nitrate (N) | <1.25 | Odor | |
| Nitrite (N) | . | Residue, Total | . |
| Oil & Grease | . | Residue, Filterable (TDS) | 8190. |
| Organic Carbon | . | Residue, Nonfilterable (TSS) | . |
| Orthophosphate ($PO_4$) | . | Residue, Settleable | . |
| Phosphorus, Total (P) | . | Residue, Volatile | . |
| Cyanide, Total | . | Silica | 54. |
| Cyanide, Free | . | Specific Conductance (umho) | 14620. |
| Phenols | . | Sulfate | 268. |
| Antimony | . | Sulfite | . |
| Arsenic | . | Surfactants MBAS | . |
| Barium | . | Turbidity NTU | . |
| Beryllium | . | BHC Isomers | . |
| Boron | 1.0 | Chlordane | . |
| Cadmium | . | DDT Isomers | . |
| Calcium | 93. | Dieldrin | . |
| Chromium, Total | . | Endrin | . |
| Chromium, VI | . | Heptachlor | . |
| Copper | 0.01 | Heptachlor Epoxide | . |
| Hardness ($CaCO_3$) | 718. | Lindane | . |
| Iron | 0.6 | Methoxychlor | . |
| Lead | . | Toxaphene | . |
| Magnesium | 118. | 2,4-D | . |
| Manganese | 0.09 | 2,4,5-TP-Silvex | . |
| Mercury | . | 2,4,5-T | . |
| Nickel | . | Sulfides | . |
| Potassium | 18. | Bromoform | . |
| Selenium | . | Bromodichloromethane | . |
| Silver | . | Carbon Tetrachloride | . |
| Sodium | 3070. | Chloroform | . |
| Thallium | . | Chloromethane | . |
| Zinc | <0.05 | Dibromochloromethane | . |
| pH | 8.15 | Methylene Chloride | . |
| Acidity, Total | . | Tetrachloroethylene | . |
| Alkalinity, Total ($CaCO_3$) | 310. | 1,1,1-Trichloroethane | . |
| Alkalinity, Bicarbonate ($CaCO_3$) | . | Trichloroethylene | . |
| Bromide | <1.25 | Trihalomethanes | . |
| Carbon Dioxide | . | PCBs ( ) | . |
| Chloride | 4130. | Temperature (°C) | . |
| Dissolved Oxygen | . | Total Petroleum Hydrocarbons | . |

COMMENTS: Nitrate as N

ANALYST: John Bennett DATE: 6/21/96

EPFS

# EL PASO FIELD SERVICES

## FIELD SERVICES LABORATORY
## ANALYTICAL REPORT

### SAMPLE IDENTIFICATION

| | |
|---|---|
| EPFS SAMPLE ID: | 960436 |
| SAMPLE NUMBER: | S96-0263 |
| SITE NAME: | JAL #4 |
| SAMPLE DATE: | 05/08/96 |
| SAMPLE TIME (Hrs): | 1820 |
| SAMPLED BY: | S. Brisbin |
| DATE OF BTEX ANALYSIS: | 05/12/96 |
| SAMPLE TYPE: | Water |

ACW-1

REMARKS: ______

### EPA Method 8020 (BTEX) RESULTS

| PARAMETER | RESULT PPB | QUALIFIER |
|---|---|---|
| BENZENE | 6.30 | |
| TOLUENE | 2.03 | |
| ETHYL BENZENE | < 1.0 | |
| TOTAL XYLENES | < 3.0 | |
| SURROGATE % RECOVERY | 203 | Allowed Range 80 to 120 % |

NOTES:
BFB surrogate recovery is outside acceptable range due to coelution of non-target analyte peak.
Recovery of a second surrogate, a,a,a-Trifluorotoluene, was acceptable at 118%.

Reported By: mh    Approved By: [illegible]    Date: [illegible]

EL PASO FIELD SERVICES LAB
QUALITY CONTROL REPORT
EPA METHOD 8020 - BTEX

Samples 960446, 960449 through 960452, and 960456 through 960462

ADDITIONAL ANALYTICAL BLANKS:

| SAMPLE ID AUTO BLANK | SOURCE | ug/L | STATUS |
|---|---|---|---|
| Benzene | Boiled Water | <1.0 | ACCEPTABLE |
| Toluene | Boiled Water | <1.0 | ACCEPTABLE |
| Ethyl benzene | Boiled Water | <1.0 | ACCEPTABLE |
| Total Xylenes | Boiled Water | <3.0 | ACCEPTABLE |

Narrative: Acceptable

| SAMPLE ID SOIL VIAL BLANK | SOURCE Lot MB1461 | ug/L | STATUS |
|---|---|---|---|
| Benzene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Toluene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Ethyl benzene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Total Xylenes | Vial + Boiled Water | <3.0 | ACCEPTABLE |

Narrative: Acceptable

| CONTAMINATION CARRYOVER CHECK | SOURCE | ug/L (Two analyzed with this set) | STATUS |
|---|---|---|---|
| Benzene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Toluene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Ethyl benzene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Total Xylenes | Vial + Boiled Water | <3.0 | ACCEPTABLE |

Narrative: Acceptable

| SAMPLE ID TRIP BLANK | SOURCE 05/14/96 | ug/L | STATUS |
|---|---|---|---|
| Benzene | Boiled Water | <1.0 | ACCEPTABLE |
| Toluene | Boiled Water | <1.0 | ACCEPTABLE |
| Ethyl benzene | Boiled Water | <1.0 | ACCEPTABLE |
| Total Xylenes | Boiled Water | <3.0 | ACCEPTABLE |

Narrative: Acceptable

| SAMPLE ID TRIP BLANK | SOURCE (960446) | ug/L | STATUS |
|---|---|---|---|
| Benzene | Boiled Water | <1.0 | ACCEPTABLE |
| Toluene | Boiled Water | <1.0 | ACCEPTABLE |
| Ethyl benzene | Boiled Water | <1.0 | ACCEPTABLE |
| Total Xylenes | Boiled Water | <3.0 | ACCEPTABLE |

Narrative: Acceptable

Reported By: mh　　Approved By: [signature]　　Date: 5/16/96

EL PASO FIELD SERVICES LAB
QUALITY CONTROL REPORT
EPA METHOD 8020 - BTEX

Samples 960446, 960449 through 960452, and 960456 through 960462

LABORATORY DUPLICATES:

| SAMPLE NUMBER 960449 | TYPE | SAMPLE RESULT ug/L | DUPLICATE RESULT ug/L | RPD | RANGE | ACCEPTABLE YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | Matrix Duplicate | <1.0 | <1.0 | 0 | +/- 35 % | X | |
| Toluene | Matrix Duplicate | <1.0 | <1.0 | 0 | +/- 35 % | X | |
| Ethyl benzene | Matrix Duplicate | <1.0 | <1.0 | 0 | +/- 35 % | X | |
| m & p - Xylene | Matrix Duplicate | <2.0 | <2.0 | 0 | +/- 35 % | X | |
| o - Xylene | Matrix Duplicate | <1.0 | <1.0 | 0 | +/- 35 % | X | |

Narrative Acceptable

LABORATORY DUPLICATES:

| SAMPLE NUMBER 960461 | TYPE | SAMPLE RESULT ug/L | DUPLICATE RESULT ug/L | RPD | RANGE | ACCEPTABLE YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | Matrix Duplicate | <1.0 | <1.0 | 0 | +/- 35 % | X | |
| Toluene | Matrix Duplicate | <1.0 | <1.0 | 0 | +/- 35 % | X | |
| Ethyl benzene | Matrix Duplicate | <1.0 | <1.0 | 0 | +/- 35 % | X | |
| m & p - Xylene | Matrix Duplicate | <2.0 | <2.0 | 0 | +/- 35 % | X | |
| o - Xylene | Matrix Duplicate | <1.0 | <1.0 | 0 | +/- 35 % | X | |

Narrative: Acceptable

LABORATORY SPIKES:

| SAMPLE NUMBER 960449 | SPIKE ADDED | SAMPLE RESULT | SPIKE SAMPLE RESULT | %R | RANGE | ACCEPTABLE YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | 50.0 | <1.0 | 49.8 | 99.6 | 75 - 125 % | X | |
| Toluene | 50.0 | <1.0 | 49.3 | 98.6 | 75 - 125 % | X | |
| Ethyl benzene | 50.0 | <1.0 | 49.1 | 98.2 | 75 - 125 % | X | |
| m & p - Xylene | 100.0 | <2.0 | 97.0 | 97.0 | 75 - 125 % | X | |
| o - Xylene | 50.0 | <1.0 | 50.8 | 101.6 | 75 - 125 % | X | |

Narrative: Acceptable.

LABORATORY SPIKES:

| SAMPLE NUMBER 960461 | SPIKE ADDED ug/L | SAMPLE RESULT ug/L | SPIKE SAMPLE RESULT ug/L | %R | RANGE | ACCEPTABLE YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | 50.0 | <1.0 | 49.3 | 98.6 | 75 - 125 % | X | |
| Toluene | 50.0 | <1.0 | 48.7 | 97.4 | 75 - 125 % | X | |
| Ethyl benzene | 50.0 | <1.0 | 48.3 | 96.6 | 75 - 125 % | X | |
| m & p - Xylene | 100.0 | <2.0 | 95.0 | 95.0 | 75 - 125 % | X | |
| o - Xylene | 50.0 | <1.0 | 48.4 | 96.8 | 75 - 125 % | X | |

Narrative: Acceptable

# EPFS

# EL PASO FIELD SERVICES

QUALITY CONTROL REPORT

EPA METHOD 8020 - BTEX

Samples: 960446, 960449 through 960452, and 960456 through 960462

QA/QC for 05/14/96 Sample Set

LABORATORY CALIBRATION CHECKS, LABORATORY CONTROL SAMPLES:

| SAMPLE NUMBER ICV LA-62588 60 ug/L | TYPE | EXPECTED RESULT ug/L | ANALYTICAL RESULT ug/L | %R | RANGE | ACCEPTABLE YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | Standard | 50.0 | 48.3 | 96.6 | 75 - 125 % | X | |
| Toluene | Standard | 50.0 | 48.4 | 96.8 | 75 - 125 % | X | |
| Ethyl benzene | Standard | 50.0 | 48.4 | 96.8 | 75 - 125 % | X | |
| m & p - Xylene | Standard | 100 | 96.7 | 96.7 | 75 - 125 % | X | |
| o - Xylene | Standard | 50.0 | 48.5 | 97.0 | 75 - 125 % | X | |

| SAMPLE NUMBER LCS LA 45476 25 ug/L | TYPE | EXPECTED RESULT ug/L | ANALYTICAL RESULT ug/L | %R | RANGE | ACCEPTABLE YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | Standard | 25.0 | 23.9 | 95.6 | 39 - 150 | X | |
| Toluene | Standard | 25.0 | 24.2 | 96.8 | 46 - 148 | X | |
| Ethyl benzene | Standard | 25.0 | 24.2 | 96.8 | 32 - 160 | X | |
| m & p - Xylene | Standard | 50.0 | 48.8 | 97.6 | Not Given | X | |
| o - Xylene | Standard | 25.0 | 24.4 | 97.6 | Not Given | X | |

| SAMPLE NUMBER CCV1 LA-62589 60 ug/L | TYPE | EXPECTED RESULT ug/L | ANALYTICAL RESULT ug/L | %R | RANGE | ACCEPTABLE YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | Standard | 50.0 | 49.1 | 98.2 | 75 - 125 % | X | |
| Toluene | Standard | 50.0 | 49.0 | 98.0 | 75 - 125 % | X | |
| Ethyl benzene | Standard | 50.0 | 48.8 | 97.6 | 75 - 125 % | X | |
| m & p - Xylene | Standard | 100 | 97.2 | 97.2 | 75 - 125 % | X | |
| o - Xylene | Standard | 50.0 | 48.9 | 97.8 | 75 - 125 % | X | |

| SAMPLE NUMBER CCV2 LA-52689 60 ug/L | TYPE | EXPECTED RESULT ug/L | ANALYTICAL RESULT ug/L | %R | RANGE | ACCEPTABLE YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | Standard | 50.0 | 49.3 | 98.6 | 75 - 125 % | X | |
| Toluene | Standard | 50.0 | 49.1 | 98.2 | 75 - 125 % | X | |
| Ethyl benzene | Standard | 50.0 | 48.9 | 97.8 | 75 - 125 % | X | |
| m & p - Xylene | Standard | 100 | 96.4 | 96.4 | 75 - 125 % | X | |
| o - Xylene | Standard | 50.0 | 48.9 | 97.8 | 75 - 125 % | X | |

| SAMPLE NUMBER CCV3 LA-62689 60 ug/L | TYPE | EXPECTED RESULT ug/L | ANALYTICAL RESULT ug/L | %R | RANGE | ACCEPTABLE YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | Standard | 50.0 | 49.2 | 98.4 | 75 - 125 % | X | |
| Toluene | Standard | 50.0 | 48.8 | 97.6 | 75 - 125 % | X | |
| Ethyl benzene | Standard | 50.0 | 48.5 | 97.0 | 75 - 125 % | X | |
| m & p - Xylene | Standard | 100 | 95.4 | 95.4 | 75 - 125 % | X | |
| o - Xylene | Standard | 50.0 | 48.6 | 97.2 | 75 - 125 % | X | |

Narrative: Acceptable

# EL PASO FIELD SERVICES LAB
# QUALITY CONTROL REPORT
# EPA METHOD 8020 - BTEX
**Samples: 960426 through 960436**

LABORATORY DUPLICATES:

| SAMPLE ID 960430 | TYPE | SAMPLE RESULT PPB | DUPLICATE RESULT PPB | RPD | ACCEPTABLE RANGE | YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | Matrix Duplicate | 4.08 | 4.10 | 0 | +/- 20 % | X | |
| Toluene | Matrix Duplicate | 1.58 | 1.6 | 3 | +/- 20 % | X | |
| Ethylbenzene | Matrix Duplicate | <1.0 | <1.0 | 0 | +/- 20 % | X | |
| m & p - Xylene | Matrix Duplicate | <2.0 | <2.0 | 0 | +/- 20 % | X | |
| o - Xylene | Matrix Duplicate | <1.0 | <1.0 | 0 | +/- 20 % | X | |

Narrative Acceptable

LABORATORY SPIKES:

| SAMPLE ID 2nd Analysis 960430 | SPIKE ADDED PPB | SAMPLE RESULT PPB | SPIKE SAMPLE RESULT PPB | %R | ACCEPTABLE RANGE | YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | 50 | 4.08 | 53.9 | 99.6 | 75 - 125 % | X | |
| Toluene | 50 | 1.58 | 51.2 | 99.2 | 75 - 125 % | X | |
| Ethylbenzene | 50 | <1.0 | 51.6 | 103 | 75 - 125 % | X | |
| m & p - Xylene | 100 | <2.0 | 102 | 102 | 75 - 125 % | X | |
| o Xylene | 50 | <1.0 | 52.3 | 105 | 75 - 125 % | X | |

Narrative: Acceptable.

ADDITIONAL ANALYTICAL BLANKS:

| AUTO BLANK | SOURCE | PPB | STATUS |
|---|---|---|---|
| Benzene | Boiled Water | <1.0 | ACCEPTABLE |
| Toluene | Boiled Water | <1.0 | ACCEPTABLE |
| Ethylbenzene | Boiled Water | <1.0 | ACCEPTABLE |
| Total Xylenes | Boiled Water | <3.0 | ACCEPTABLE |

Narrative: Acceptable.

| SOIL VIAL BLANK | SOURCE Lot MB1461 | PPB (Analyzed with this set) | STATUS |
|---|---|---|---|
| Benzene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Toluene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Ethylbenzene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Total Xylenes | Vial + Boiled Water | <3.0 | ACCEPTABLE |

Narrative: Acceptable.

| CONTAMINATION CARRYOVER CHECK | SOURCE | PPB (Two analyzed with this set) | STATUS |
|---|---|---|---|
| Benzene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Toluene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Ethylbenzene | Vial + Boiled Water | <1.0 | ACCEPTABLE |
| Total Xylenes | Vial + Boiled Water | <3.0 | ACCEPTABLE |

Narrative: Acceptable

Approved By: [signature] Date: 13 May-96

EL PASO FIELD SERVICES

QUALITY CONTROL REPORT
EPA METHOD 8020 - BTEX

Samples: 960426 through 960436

QA/QC for 05/12/96 Sample Set

LABORATORY CALIBRATION CHECKS / LABORATORY CONTROL SAMPLES:

| SAMPLE NUMBER ICV LA-52589 50 PPB | TYPE | EXPECTED RESULT PPB | ANALYTICAL RESULT PPB | %R | ACCEPTABLE RANGE | YES | NO |
|---|---|---|---|---|---|---|---|
| Benzene | Standard | 50.0 | 47 7 | 95.4 | 75 - 125 % | X | |
| Toluene | Standard | 50.0 | 48.2 | 96.4 | 75 - 125 % | X | |
| Ethylbenzene | Standard | 50.0 | 48.5 | 97.0 | 75 - 125 % | X | |
| m & p - Xylene | Standard | 100 | 97.0 | 97.0 | 75 - 125 % | X | |
| o - Xylene | Standard | 50.0 | 48.5 | 97.0 | 75 - 125 % | X | |
| **SAMPLE NUMBER LCS LA-45476 25 PPB** | **TYPE** | **EXPECTED RESULT PPB** | **ANALYTICAL RESULT PPB** | **%R** | **ACCEPTABLE RANGE** | **YES** | **NO** |
| Benzene | Standard | 25.0 | 23.9 | 95.6 | 39 - 150 | X | |
| Toluene | Standard | 25.0 | 24.4 | 97.6 | 46 - 148 | X | |
| Ethylbenzene | Standard | 25.0 | 24.4 | 97.6 | 32 - 160 | X | |
| m & p - Xylene | Standard | 50 | 49.3 | 98.6 | Not Given | X | |
| o - Xylene | Standard | 25.0 | 24.5 | 98.0 | Not Given | X | |
| **SAMPLE NUMBER CCV LA-52589 50 PPB** | **TYPE** | **EXPECTED RESULT PPB** | **ANALYTICAL RESULT PPB** | **%R** | **ACCEPTABLE RANGE** | **YES** | **NO** |
| Benzene | Standard | 50.0 | 50.3 | 101 | 75 - 125 % | X | |
| Toluene | Standard | 50.0 | 49.8 | 99.6 | 75 - 125 % | X | |
| Ethylenzene | Standard | 50.0 | 49.9 | 99.8 | 75 - 125 % | X | |
| m & p - Xylene | Standard | 100 | 98.7 | 98.7 | 75 - 125 % | X | |
| o - Xylene | Standard | 50.0 | 50.3 | 101 | 75 - 125 % | X | |
| **SAMPLE NUMBER CCV LA-52589 50 PPB** | **TYPE** | **EXPECTED RESULT PPB** | **ANALYTICAL RESULT PPB** | **%R** | **ACCEPTABLE RANGE** | **YES** | **NO** |
| Benzene | Standard | 50.0 | 50.2 | 100 | 75 - 125 % | X | |
| Toluene | Standard | 50.0 | 49.9 | 99.8 | 75 - 125 % | X | |
| Ethylbenzene | Standard | 50.0 | 49.6 | 99.2 | 75 - 125 % | X | |
| m & p - Xylene | Standard | 100 | 98.1 | 98.1 | 75 - 125 % | X | |
| o - Xylene | Standard | 50.0 | 49.8 | 99.6 | 75 - 125 % | X | |

Narative. Acceptable.

# EL PASO NATURAL GAS COMPANY

# JAL NO. 4 PLANT

# PHASE IV GROUNDWATER STUDY

June 1994

El Paso Natural Gas Company
100 N Stanton
El Paso, Texas 79901

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## EXECUTIVE SUMMARY

On June 14, 1993, El Paso Natural Gas Company (EPNG) initiated the Phase IV monitoring well installation program at the formerly owned Jal No. 4 Plant. This work was performed by Burlington Environmental Inc. (BEI). Jal No. 4 Plant is located approximately 10 miles north of Jal, New Mexico.

Previous investigations at the Plant indicate the presence of a high saline, plant production water plume that extends off site to the east southeast for approximately 1500 feet. New Mexico Water Quality Control Commission (NMWQCC) standards for arsenic, barium, fluoride, sulfate, chloride, and total dissolved solids have been exceeded in groundwater samples from existing monitoring wells.

According to a 1990 K. W. Brown report, the principle water-bearing unit at the site is the Tertiary Ogallala Formation. The Ogallala unconformably overlies water-bearing red-bed sediments of the Docum Group of the Chinle Formation.

Groundwater at the site is unconfined. Locally, the saturated thickness of the Ogallala is approximately 60 feet and the groundwater gradient is approximately 0.0025 ft/ft with a southeasterly flow direction.

BEI's previous investigations recommended the installation of additional monitoring wells to further define the configuration of a contaminant plume high in total dissolved solids (TDS) and inorganic compounds that are regulated by New Mexico Oil Conservation Division (NMOCD) which has jurisdiction over this site.

During June 1993, BEI installed four groundwater monitoring wells off-site to the east and southeast of the Jal No. 4 Plant. Groundwater samples were collected from both the new monitoring wells and on-site monitoring wells selected by EPNG. Depth-to-water measurements were collected and groundwater surface elevations determined.

Fine-grained sands, silty sands, caliche fragments, and interbedded sandstones were observed during monitoring well installation. Depth-to-water measurements indicate that the direction and gradient of the potentiometric surface is consistent with previously reported values. One or more NMWQCC standards were exceeded in all the groundwater samples from on-site and off-site wells, except the sample from upgradient Water Supply Well EPNG-1.

The June 1993 groundwater analytical results indicate both on-site and off-site impact above NMWQCC standards to the Ogallala aquifer for chloride, fluoride, sulfate, arsenic, barium and TDS. In addition, the groundwater sample from on-site Monitor Well ACW-4 exceeded NMWQCC standards for benzene and xylene. Groundwater sample results for June 1993 were generally similar to the groundwater sample results for the July 1992 sampling performed by BEI.

Since NMWQCC standards are exceeded in groundwater, BEI recommends that a remedial design be developed to contain, monitor, and remediate impacted groundwater at the Jal No. 4 Plant.

The remedial design should include the following elements.

- Initiation of a "pump and inject" on-site groundwater recovery and disposal system.
- Installation of two wells at the leading edge of the plume to monitor plume migration.
- Continued quarterly sampling.
- Evaluation of the recovery system following a one-year period of operation.

# JAL NO. 4 PLANT
# PHASE IV
# GROUNDWATER STUDY

## 1.0 INTRODUCTION

On June 14, 1993, El Paso Natural Gas Company (EPNG) initiated the Phase IV monitoring well installation program at the formerly owned Jal No. 4 Plant. This work was performed by Burlington Environmental Inc. (BEI). Jal No. 4 Plant is located approximately 10 miles north of Jal, New Mexico, as shown in Figure 1, Tab A.

EPNG began subsurface investigation at the request of the New Mexico Oil Conservation Division (NMOCD) in 1989 when a leak was discovered in the liner of one of the water-storage ponds that contained high salinity plant production water. Previous investigations at the Plant indicate the presence of a high saline, plant production water plume that extends off-site to the east southeast for approximately 1500 feet.

According to a 1990 K. W. Brown report, the principle water-bearing unit at the site is the Tertiary Ogallala Formatron. The Ogallala unconformably overlies water-bearing red-bed sediments of the Dockum Group of the Triassic Chinle Formation.

Groundwater at the site is unconfined. Locally, the saturated thickness of the Ogallala is approximately 60 feet. The groundwater gradient is approximately 0.0025 ft/ft with a southeasterly flow direction.

During June 1993 EPNG contracted BEI to implement the following scope of work:

**Task 1** Install four groundwater monitoring wells (ACW-8, ACW-9, ACW-10 and ACW-11) at locations specified by EPNG (Figure 2, Tab A), to be screened in the lower portion of the Ogallala Formation (Record of Subsurface Exploration is presented in Tab C and Monitoring Well Completion Diagrams are presented in Tab D);

**Task 2** Collect groundwater samples for constituents analyses presented in Table 1, Tab B ( Laboratory Analytical Reports presented in Tab E);

**Task 3** Collect groundwater elevation data; and

**Task 4** Determine the configuration of the plume based on data obtained during Tasks 1 through 3 and information from previous groundwater studies for the site.

## 2.0 METHODS OF INVESTIGATION

During June 1993, BEI installed four groundwater monitoring wells off-site to the east and southeast of Jal No. 4 Plant. Groundwater samples were collected from the new monitoring wells, existing off-site monitoring wells, on-site monitoring wells, and Water Supply Well EPNG-1. Depth-to-water measurements were collected on June 14, 1993, and groundwater surface elevations calculated for all monitoring wells.

## 3.0 RESULTS

Fine-grained sands, silty sands, caliche fragments, and interbedded sandstones were observed during monitoring well installation. In the saturated zone below 105 feet is an unconsolidated very fine to fine sand that is both well rounded and well sorted. NMWQCC standards were exceeded in several of the groundwater samples from on-site and off-site wells. The groundwater from upgradient Water Supply Well EPNG-1 did not exceed any NMWQCC standards.

The results of chemical analyses reported by the laboratory are presented in tables as follows:

- Table 2, Tab B — Analytical Results for Metal in Groundwater, June 1993;
- Table 3, Tab B — Analytical Results for Inorganic Constituents in Groundwater, June 1993;
- Table 4, Tab B — Analytical Results for Organic Constituents in Groundwater, June 1993.

Constituents detected above NMWQCC standards are shown shaded on the tables. Depth-to-water measurements, top-of-casing elevations, and screened intervals are present in Table 5, Tab B. Figure 3, Tab A, is a potentiometric surface map for the Jal No. 4 site.

## 4.0 CONCLUSIONS

The June 1993 groundwater analytical results indicate both on-site and off-site impact to the Ogallala aquifer above NMWQCC standards for inorganic parameters and TDS. In addition, the groundwater sample from on-site Monitor Well ACW-4 exceeded NMWQCC standards for benzene and xylene.

Groundwater samples having inorganic compounds detected above NMWQCC standards coincide with samples having elevated concentrations of TDS. Arsenic, barium, fluoride, sulfate, and chlorine exceed NMWQCC standards in one or more samples as shown shaded in Table 2, Tab B.

To examine the spatial relationship of the TDS within groundwater, two concentration contour maps were constructed as shown in Figures 4 and 5, Tab A. A cross section showing TDS concentrations is presented as Figure 6, Tab A.

Higher concentrations of TDS were observed in the groundwater from deeper portions of the aquifer at Monitoring Well ACW-4 than were observed at shallower screened Monitor Well ACW-2A. This is expected because groundwater with high TDS is more dense than groundwater with lower concentrations of TDS, therefore, it will tend to sink.

Downgradient of Monitor Wells ACW-4 and ACW-2A concentrations of all contaminants decline. This decline is most likely due to dilution and dispersion effects, or absorption of the contaminants into the soil.

BEI speculates shallow groundwater with lower concentrations of TDS is further downgradient than the deeper groundwater with higher concentrations of TDS. Higher concentrations of contaminants are observed closer to the source. The vertical distribution of contaminants is not well known in the peripheral areas of the plume. For this reason additional samples, collected from proposed off-site nested wells completed to different depths, are needed to more accurately evaluate contaminant distribution throughout the aquifer. This information would be needed to design an optimal remediation system.

Based on the configuration of the TDS plume and the spatial distribution of the other contaminants at the site, BEI believes groundwater pumping of the TDS contaminant plume will simultaneously mitigate all constituents currently in excess of NMQWCC standards.

## 5.0 RECOMMENDATIONS

Since NMWQCC standards are exceeded in groundwater, BEI recommends that a remedial design be developed to contain, monitor and remediate impacted groundwater at Jal No. 4 Plant. The remedial design should include the basic elements that follow.

- Initiation of on-site groundwater recovery as soon as possible in the vicinity of Monitoring Well ACW-4. Burlington recommends pumping groundwater from the entire saturated thickness at this location because impact is spread across the full saturated thickness of the aquifer. EPNG should investigate the feasibility of groundwater disposal through a permitted injection well.

- Installation of an additional two well cluster at the downgradient leading edge of the plume. One well should be screened in the upper portion and one in the lower ortion of the Ogallala. These wells will allow for a more concise determination of the plume configuration for remedial design and monitoring purposes.

- Monitoring of the groundwater from the proposed new well cluster and all existing wells. The collection of groundwater samples and subsequent chemical analysis for TDS and/or individual contaminants is also advised.

- Depth-to-water at all well locations should be monitored prior to and during initiation of remediation to determine the influence of the recovery operations on the aquifer.

- Depth-to-water measurements should be collected and the configuration of the potentiometric surface determined on a semi-annual basis.

- An evaluation of the effects of pumping should be conducted following a one year period of groundwater recovery.

# SITE MAPS

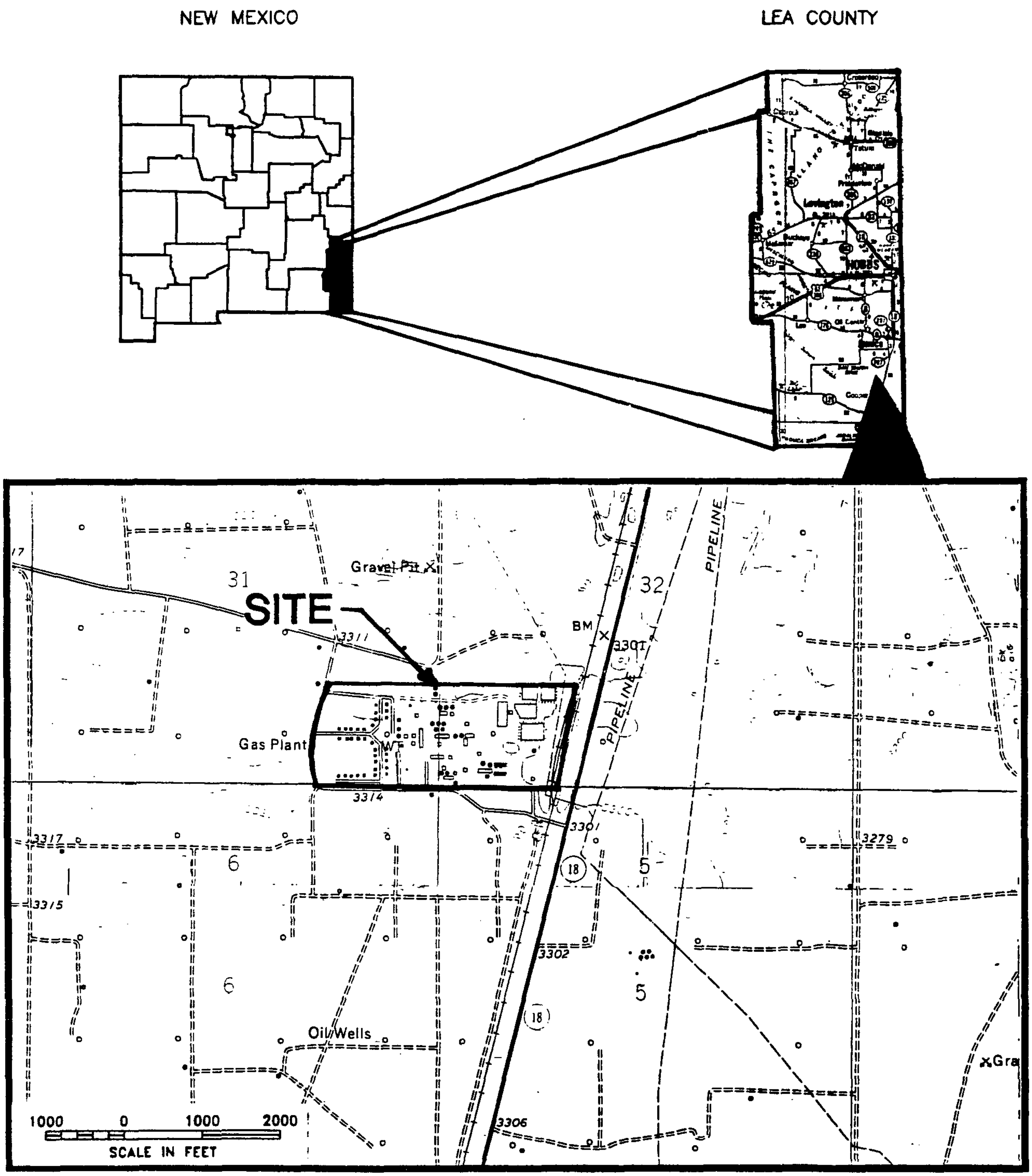
PROJECT MANAGER

DOCUMENT MANAGER

CHECKED BY

DRAWN BY

10191C-001
REV. DATE
9/28/93

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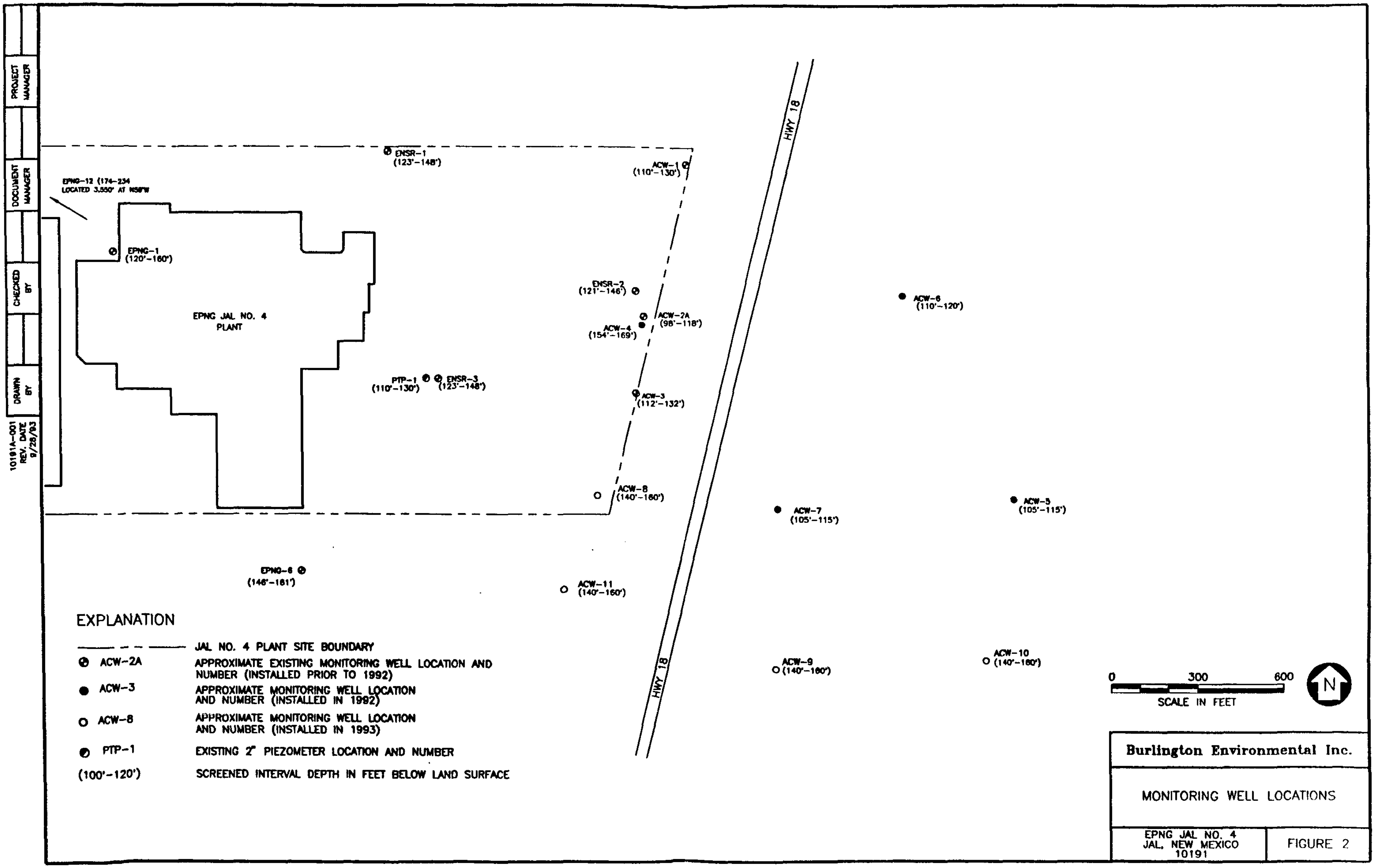
**Burlington Environmental Inc.**

SITE LOCATION MAP

EPNG JAL NO. 4
JAL, NEW MEXICO
10191

FIGURE 1

Modified from U.S. Geological Survey, Rattlesnake Canyon and Jal NW quadrangles, photorevised 1969

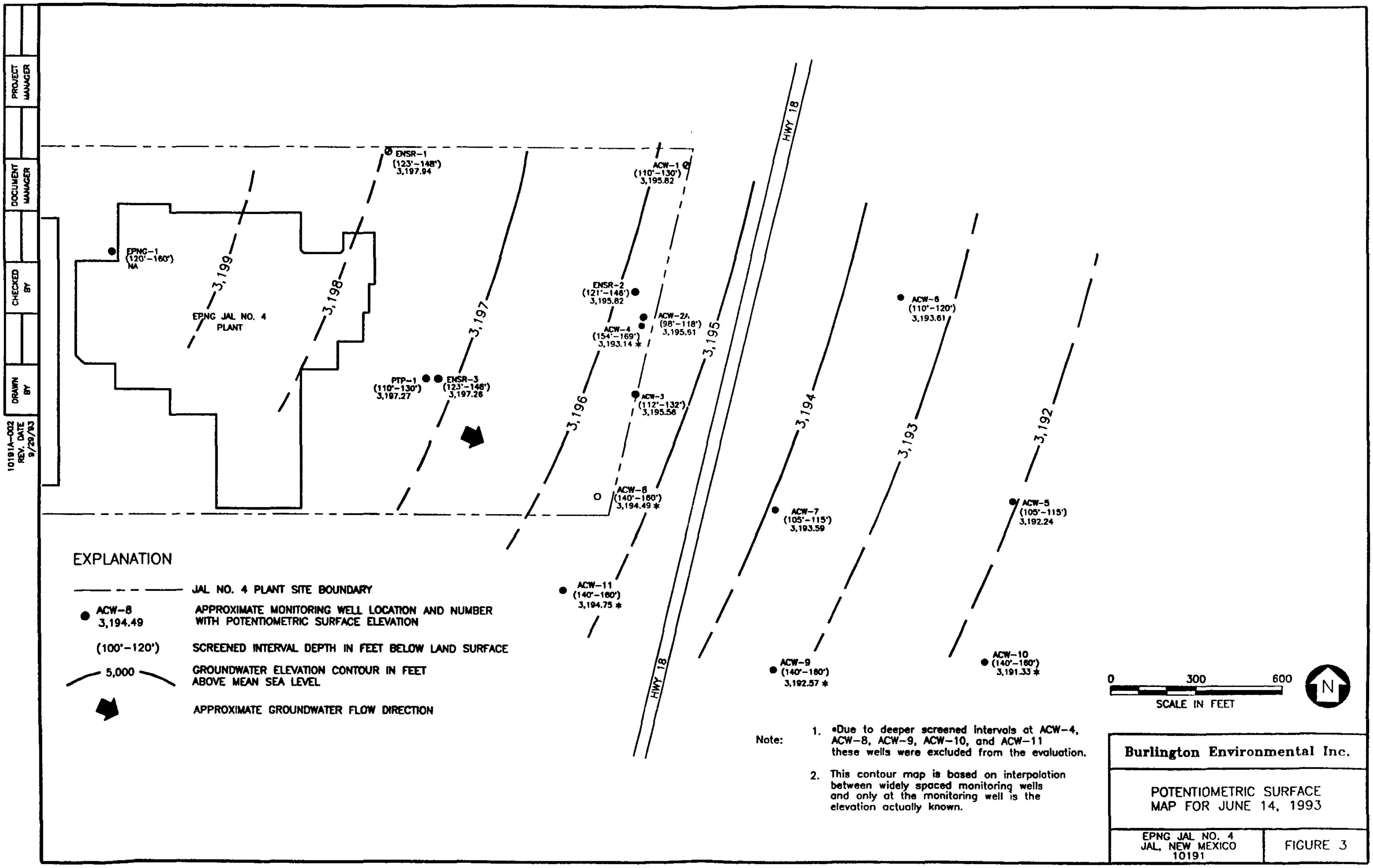



Burlington Environmental Inc.

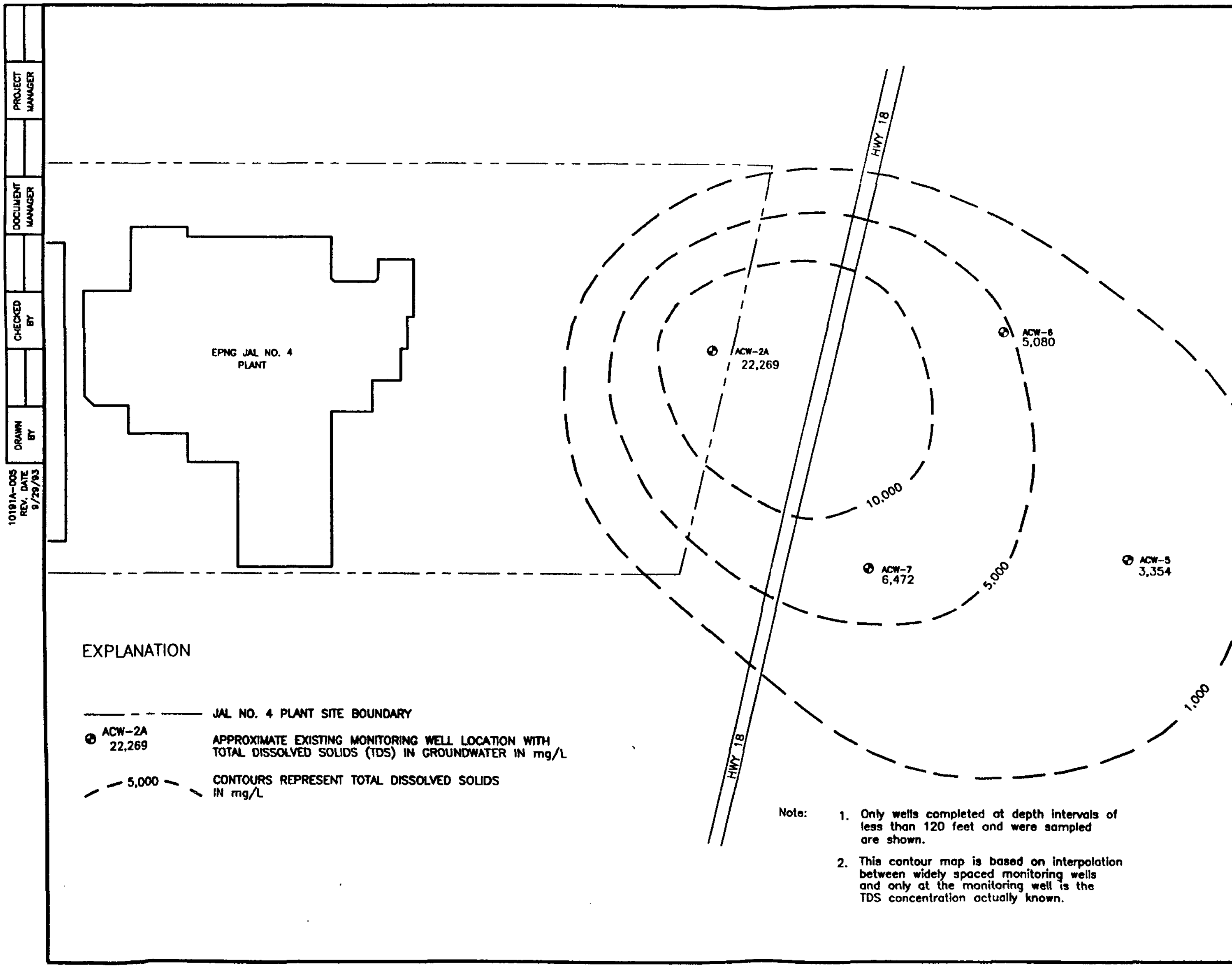
MONITORING WELL LOCATIONS

EPNG JAL NO. 4
JAL, NEW MEXICO
10191

FIGURE 2



ENSR-1 (123'-148') 3,197.94
ACW-1 (110'-130') 3,195.82
EPNG-1 (120'-160') NA
EPNG JAL NO. 4 PLANT
3,199
3,198
3,197
3,196
3,195
3,194
3,193
3,192
HWY 18
ENSR-2 (121'-148') 3,195.82
ACW-2A (98'-118') 3,195.61
ACW-4 (154'-169') 3,193.14 *
PTP-1 (110'-130') 3,197.27
ENSR-3 (123'-148') 3,197.26
ACW-3 (112'-132') 3,195.56
ACW-8 (140'-160') 3,194.49 *
ACW-11 (140'-160') 3,194.75 *
ACW-6 (110'-120') 3,193.61
ACW-7 (105'-115') 3,193.59
ACW-5 (105'-115') 3,192.24
ACW-9 (140'-160') 3,192.57 *
ACW-10 (140'-160') 3,191.33 *
EXPLANATION
JAL NO. 4 PLANT SITE BOUNDARY
ACW-8 3,194.49
APPROXIMATE MONITORING WELL LOCATION AND NUMBER WITH POTENTIOMETRIC SURFACE ELEVATION
(100'-120')
SCREENED INTERVAL DEPTH IN FEET BELOW LAND SURFACE
5,000
GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MEAN SEA LEVEL
APPROXIMATE GROUNDWATER FLOW DIRECTION
Note:
1. *Due to deeper screened intervals at ACW-4, ACW-8, ACW-9, ACW-10, and ACW-11 these wells were excluded from the evaluation.
2. This contour map is based on interpolation between widely spaced monitoring wells and only at the monitoring well is the elevation actually known.
0
300
600
SCALE IN FEET
N
Burlington Environmental Inc.
POTENTIOMETRIC SURFACE MAP FOR JUNE 14, 1993
EPNG JAL NO. 4
JAL, NEW MEXICO
10191
FIGURE 3
PROJECT MANAGER
DOCUMENT MANAGER
CHECKED BY
DRAWN BY
10191A-002
REV. DATE 9/29/93



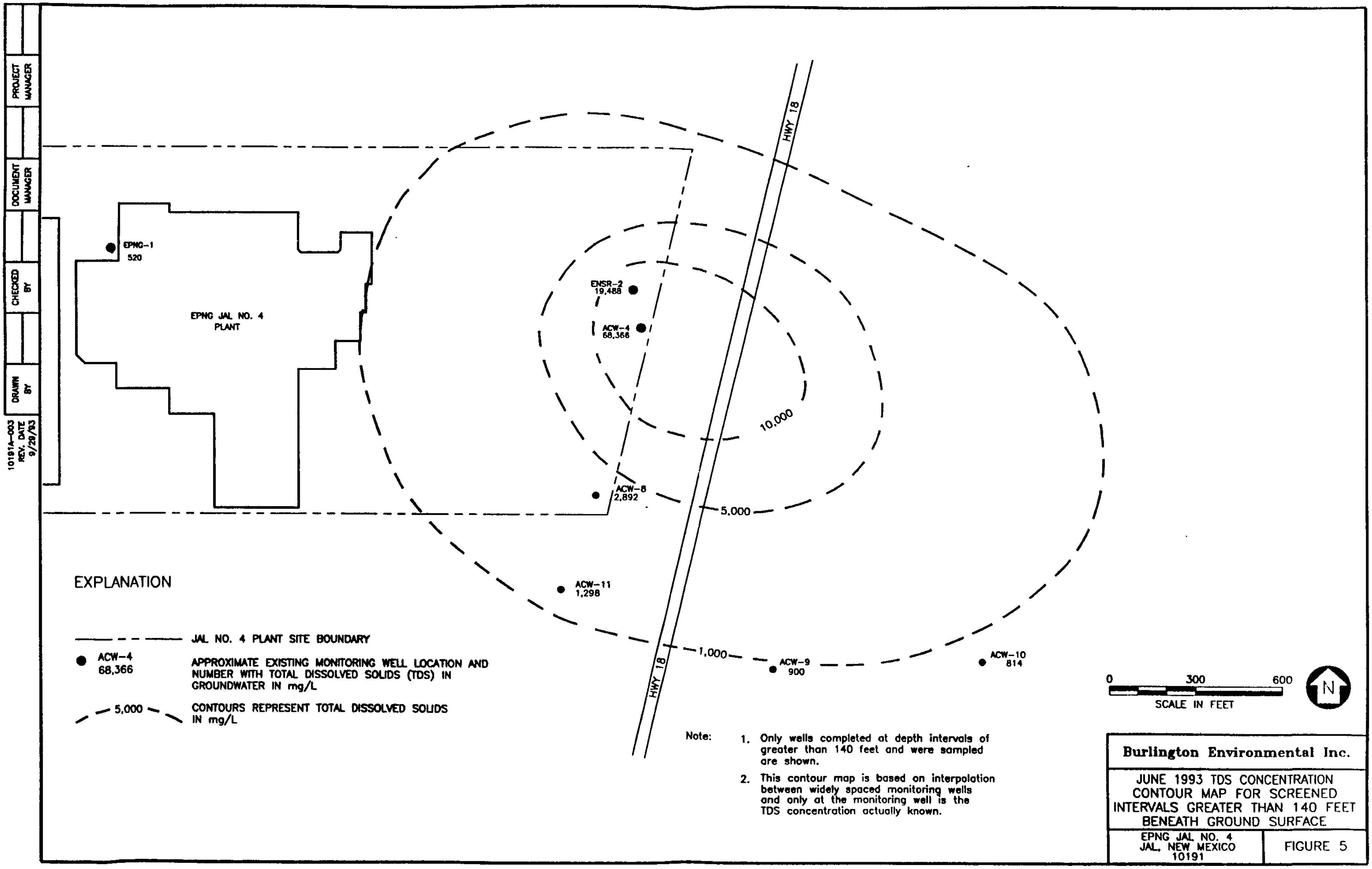

Note:

1. Only wells completed at depth intervals of less than 120 feet and were sampled are shown.
2. This contour map is based on interpolation between widely spaced monitoring wells and only at the monitoring well is the TDS concentration actually known.

**Burlington Environmental Inc.**

JUNE 1993 TDS CONCENTRATION CONTOUR MAP FOR SCREENED INTERVALS LESS THAN 120 FEET BENEATH GROUND SURFACE

| | |
|---|---|
| EPNG JAL NO. 4<br>JAL, NEW MEXICO<br>10191 | FIGURE 4 |




EXPLANATION

JAL NO. 4 PLANT SITE BOUNDARY

ACW-4 68,366 — APPROXIMATE EXISTING MONITORING WELL LOCATION AND NUMBER WITH TOTAL DISSOLVED SOLIDS (TDS) IN GROUNDWATER IN mg/L

5,000 — CONTOURS REPRESENT TOTAL DISSOLVED SOLIDS IN mg/L

Note:

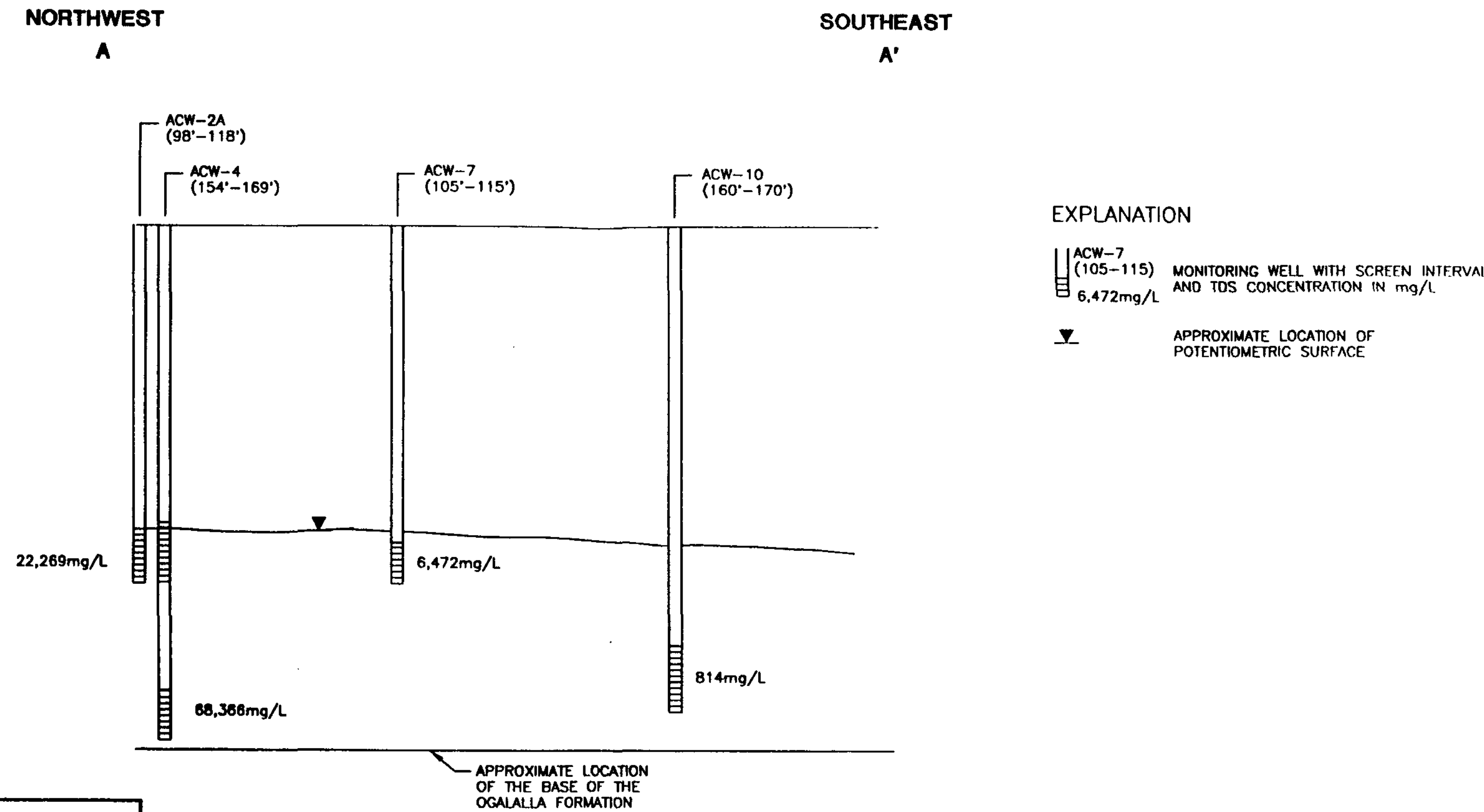
1. Only wells completed at depth intervals of greater than 140 feet and were sampled are shown.
2. This contour map is based on interpolation between widely spaced monitoring wells and only at the monitoring well is the TDS concentration actually known.

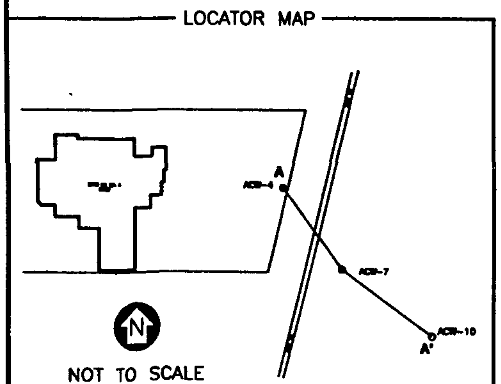
**Burlington Environmental Inc.**

JUNE 1993 TDS CONCENTRATION CONTOUR MAP FOR SCREENED INTERVALS GREATER THAN 140 FEET BENEATH GROUND SURFACE

EPNG JAL NO. 4
JAL, NEW MEXICO
10191

FIGURE 5




**Burlington Environmental Inc.**

CROSS SECTION OF JUNE 1993
TDS GROUNDWATER CONCENTRATIONS

| | |
|---|---|
| ENPG JAL NO. 4<br>JAL, NEW MEXICO<br>10191 | FIGURE 6 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PROJECT MANAGER | | DOCUMENT MANAGER | | CHECKED BY | | DRAWN BY | |

101918-001
REV. DATE
9/29/93

# ANALYTICAL DATA

Table 1

**Laboratory Analyses For Samples Collected During June at Jal No. 4 Plant, Jal NM**

| Monitoring Well Number | Analytes |
|---|---|
| EPNG-1 | Cl, TDS, and EC |
| ENSR-2 | Cl, TDS, EC, As, Ba, Cr, $CN^-$, $F^-$, Pb, $NO_3$, K, Na, and $SO_4$ |
| ACW-2A | Cl, TDS, EC, As, Ba, Cr, $CN^-$, $F^-$, Pb, $NO_3$, K, Na, and $SO_4$ |
| ACW-4 | Cl, TDS, EC, K, Na, BTEX, As, Ba, Cr, $CN^-$, $F^-$, Pb, $NO_3$, and $SO_4$ |
| ACW-5 | Same as ACW-4 |
| ACW-6 | Same as ACW-4 |
| ACW-7 | Same as ACW-4 |
| ACW-8 | Same as ACW-4 |
| ACW-9 | Same as ACW-4 |
| ACW-10 | Same as ACW-4 |
| ACW-11 | Same as ACW-4 |

| | | | |
|---|---|---|---|
| Cl | inorganic chloride; | As | arsenic; |
| TDS | total dissolved solids; | Ba | barium; |
| EC | electrical conductivity; | Cr | chromium; |
| K | potassium; | Pb | lead; |
| Na | sodium; | $CN^-$ | cyanide; |
| $NO_3$ | nitrate; | $F^-$ | fluoride; |
| $SO_4$ | sulfate; and | | |
| BTEX | benzene, toluene, ethylbenzene, xylene. | | |

## Table 2

## ANALYTICAL RESULTS FOR METALS IN GROUNDWATER, JUNE, 1993

## PHASE IV GROUNDWATER STUDY
## JAL NO. 4 PLANT

Sample Description (Name and Depth of Screened Interval)

| Parameter | Upgradient | On-Site Downgradient | | | Off-Site Downgradient | | | WQCC Standard |
|---|---|---|---|---|---|---|---|---|
| | EPNG-1 (120'-160') | ACW-2A (98'-118') | ENSR-2 (121'-146') | ACW-4 (154'-169') | ACW-6 (110'-120') | ACW-7 (105'-115') | ACW-5 (105'-115') | |
| Arsenic (µg/L) | NA | ND | 1,500 | ND | 71.8 | 18.8 | ND | 100 |
| Barium (µg/L) | NA | 1,030 | 152 | 606 | 492 | 1600 | 55.8 | 1000 |
| Chromium (µg/L) | NA | ND | ND | ND | 4.1 | 8.6 | 32.3 | 50 |
| Lead (µg/L) | NA | ND | ND | ND | ND | ND | ND | 50 |
| Potassium (µg/L) | NA | 27,000 | 29,600 | 196,000 | 6,530 | 7,570 | 9,400 | No Standard |
| Sodium (µg/L) | NA | 6,100,000 | 65,000,000 | 16,400,000 | 1,910,000 | 2,044,000 | 513,000 | No Standard |

µg/L Micrograms per Liter
NA Not Analyzed for this Parameter
ND Not Detected Above Reporting Limit
WQCC New Mexico Water Quality Control Commission
' Feet
Shadow indicates WQCC standard has been exceeded

9/93/10191/129a

## Table 2

## ANALYTICAL RESULTS FOR METALS IN GROUNDWATER, JUNE, 1993
## Continued

## PHASE IV GROUNDWATER STUDY
## JAL NO. 4 PLANT

Sample Description (Name and Depth of Screened Interval)

| Parameter | New Wells | | | | WQCC Standard |
|---|---|---|---|---|---|
| | ACW-8 (140'-160') | ACW-9 (140'-160') | ACW-10 (140'-160') | ACW-11 (140'-160') | |
| Arsenic (µg/L) | ND | ND | ND | ND | 100 |
| Barium (µg/L) | 79.7 | 90.0 | 126 | 94.2 | 1000 |
| Chromium (µg/L) | 24.8 | 8.0 | 10.2 | 5.9 | 50 |
| Lead (µg/L) | ND | ND | ND | ND | 50 |
| Potassium (µg/L) | 34,100 | 12,500 | 14,200 | 10,100 | No Standard |
| Sodium (µg/L) | 305,000 | 121,000 | 109,000 | 212,000 | No Standard |

µg/L Micrograms per Liter
ND Not Detected Above Reporting Limit
WQCC New Mexico Water Quality Control Commission
' Feet

## Table 3

## ANALYTICAL RESULTS FOR INORGANIC CONSTITUENTS IN GROUNDWATER, JUNE, 1993

## PHASE IV GROUNDWATER STUDY
## JAL NO. 4 PLANT

Sample Description (Name and Depth of Screened Interval)

| Parameter | Upgradient | On-Site Downgradient | | | Off-Site Downgradient | | | WQCC Standard |
|---|---|---|---|---|---|---|---|---|
| | EPNG-1 (120'-160') | ACW-2A (98'-118') | ENSR-2 (121'-146') | ACW-4 (154'-169') | ACW-6 (110'-120') | ACW-7 (105'-115') | ACW-5 (105'-115') | |
| Chloride (mg/L) | 86.1 | 10,916 | 9,943 | 48,226 | 2,205 | 3,351 | 815 | 250 |
| Total Cyanide (µg/L) | NA | ND | ND | ND | ND | ND | ND | 200 |
| Fluoride (mg/L) | NA | 53.1 | 40.3 | ND | 20.6 | 3.8 | ND | 1.6 |
| Nitrate (mg/L) | NA | ND | ND | ND | 8.3 | ND | 8.2 | 10 |
| Sulfate (mg/L) | NA | 3.7 | 340 | 1,547 | 194 | 88.5 | 1,091 | 600 |
| Conductance (µmhos/cm) | 746 | 28,639 | 29,964 | 92,033 | 8,082 | 9,733 | 3,995 | No Standard |
| Total Dissolved Solids (TDS) (mg/L) | 520 | 22,269 | 19,488 | 68,366 | 5,080 | 6,472 | 3,354 | 1,000 |

| | |
|---|---|
| mg/L | Milligrams per Liter |
| µg/L | Micrograms per Liter |
| NA | Not Analyzed for this parameter |
| ND | Not Detected Above Reporting Limit |
| µmhos/cm | Micromhos per centimeter |
| WQCC | New Mexico Water Quality Control Commission |
| ' | Feet |
| | Shadow indicates WQCC standard has been exceeded |

9/93/10191/129a

Table 3

**ANALYTICAL RESULTS FOR INORGANIC CONSTITUENTS IN GROUNDWATER, JUNE, 1993**
**Continued**

**PHASE IV GROUNDWATER STUDY**
**JAL NO. 4 PLANT**

Sample Description (Name and Depth of Screened Interval)

| Parameter | New Wells ACW-8 (140'-160') | ACW-9 (140'-160') | ACW-10 (140'-160') | ACW-11 (140'-160') | WQCC Standard |
|---|---|---|---|---|---|
| Chloride (mg/L) | 552 | 472 | 420 | 638 | 250 |
| Total Cyanide (µg/L) | ND | ND | ND | ND | 200 |
| Fluoride (mg/L) | 1.9 | 1.7 | 1.7 | 1.7 | 1.6 |
| Nitrate (mg/L) | 0.41 | ND | 0.63 | 0.56 | 10 |
| Sulfate (mg/L) | 150 | 81.0 | 82.1 | 79.4 | 600 |
| Conductance (µmhos/cm) | 1,973 | 1,097 | 964 | 1,727 | No Standard |
| Total Dissolved Solids (TDS) (mg/L) | 2,892 | 900 | 814 | 1,298 | 1,000 |

| | |
|---|---|
| mg/L | Milligrams per Liter |
| µg/L | Micrograms per Liter |
| ND | Not Detected Above Reporting Limit |
| µmhos/cm | Micromhos per centimeter |
| WQCC | New Mexico Water Quality Control Commission |
| ' | Feet |
| | Shadow indicates WQCC standard has been exceeded |

## Table 4

**ANALYTICAL RESULTS FOR ORGANIC CONSTITUENTS IN GROUNDWATER, JUNE, 1993**

**PHASE IV GROUNDWATER STUDY**
**JAL NO. 4 PLANT**

Sample Description (Name and Depth of Screened Interval)

| Parameter | Upgradient | On-Site Downgradient | | | Off-Site Downgradient | | | WQCC Standard |
|---|---|---|---|---|---|---|---|---|
| | EPNG-1 (120′-160′) | ACW-2A (98′-118′) | ENSR-2 (121′-146′) | ACW-4 (154′-169′) | ACW-6 (110′-120′) | ACW-7 (105′-115′) | ACW-5 (105′-115′) | |
| Benzene (µg/L) | NA | NA | NA | 85.6 | 4.6 | 3.2 | ND | 10 |
| Toluene (µg/L) | NA | NA | NA | 132 | 2.5 | 4.9 | ND | 750 |
| Ethylbenzene (µg/L) | NA | NA | NA | ND | 1.2 | 7.0 | ND | 750 |
| Xylenes (µg/L) | NA | NA | NA | 1,120 | 4.9 | 1.5 | ND | 620 |
| Total BTEX (µg/L) | NA | NA | NA | 1,337.6 | 13.2 | 16.6 | ND | No Standard |

| | |
|---|---|
| µg/L | Micrograms per Liter |
| NA | Not Analyzed for this Parameter |
| ND | Not Detected Above Reporting Limit |
| WQCC | New Mexico Water Quality Control Commission |
| ′ | Feet |
| (shaded box) | Shadow indicates WQCC standard has been exceeded |

## Table 4

## ANALYTICAL RESULTS FOR ORGANIC CONSTITUENTS IN GROUNDWATER, JUNE, 1993
## Continued

## PHASE IV GROUNDWATER STUDY
## JAL NO. 4 PLANT

Sample Description (Name and Depth of Screened Interval)

| Parameter | New Wells | | | | WQCC Standard |
|---|---|---|---|---|---|
| | ACW-8 (140'-160') | ACW-9 (140'-160') | ACW-10 (140'-160') | ACW-11 (140'-160') | |
| Benzene (µg/L) | 1.4 | ND | ND | ND | 10 |
| Toluene (µg/L) | 1.2 | ND | ND | ND | 750 |
| Ethylbenzene (µg/L) | ND | ND | ND | ND | 750 |
| Xylenes(µg/L) | ND | ND | 1.7 | ND | 620 |
| Total BTEX (µg/L) | 2.6 | ND | 1.7 | ND | No Standard |

| | |
|---|---|
| µg/L | Micrograms per Liter |
| ND | Not Detected Above Reporting Limit |
| WQCC | New Mexico Water Quality Control Commission |
| ' | Feet |

Table 5

## SUMMARY OF GROUNDWATER LEVEL DATA (JUNE 14, 1993)

## PHASE IV GROUNDWATER STUDY
## JAL NO. 4 PLANT

| Well Number | Top of Concrete Pad Elevation | Screened Interval Depth (Feet) | Measuring Point Elevation (Top of Casing) (Feet MSL) | Static Water Level (Depth to Water) (Feet) | Groundwater Elevation (Feet MSL) |
|---|---|---|---|---|---|
| ACW-1 | 3,298.29** | 110-130 | 3,300.87 | 105.05 | 3,195.82 |
| ACW-2A | 3,289.02 | 98-118 | 3,300.88 | 105.27 | 3,195.61 |
| ACW-3 | 3,298.75 | 112-132 | 3,300.34 | 104.78 | 3,195.56 |
| ACW-4 | 3,998.05 | 154-169 | 3,299.48 | 106.34 | 3,193.14 |
| ACW-5 | 3,293.23 | 105-115 | 3,294.75 | 102.51 | 3,192.24 |
| ACW-6 | 3,298.75 | 110-120 | 3,300.53 | 106.92 | 3,193.61 |
| ACW-7 | 3,293.76 | 105-115 | 3,295.41 | 101.82 | 3,193.59 |
| ENSR-1 | NA | 123-148 | 3,305.40 | 107.46 | 3,197.94 |
| ENSR-2 | NA | 121-146 | 3,301.60 | 105.78 | 3,195.82 |
| ENSR-3 | NA | 123-148 | 3,303.80 | 106.54 | 3,197.26 |
| PTP-1 | 3,302.10 | 110-130 | 3,304.41 | 107.14 | 3,197.27 |
| EPNG-1 | NA | 120-160 | NA | 109.22 | NA |
| ACW-8* | 3,296.04 | 140-160 | 3,297.27 | 102.78 | 3,194.49 |
| ACW-9* | 3,299.91 | 140-160 | 3,302.47 | 109.90 | 3,192.57 |
| ACW-10* | 3,295.05 | 140-160 | 3,297.57 | 106.24 | 3,191.33 |
| ACW-11* | 3,297.20 | 140-160 | 3,299.33 | 104.58 | 3,194.75 |

MSL Mean Sea Level
NA Elevation data not available
* Wells installed during Phase IV
** Elevation of ground surface next to well

# RECORD OF SUBSURFACE EXPLORATION

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-8
Well # ACW-8


Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

Elevation Top of Casing 3297.27
Borehole Location ACW-8
GWL Depth 102.78
Logged By Michael Watson
Drilled By L. Scarborough
Date/Time Started 6-14-93 / 1130
Date/Time Completed 6-15-93 / 0900

Well Logged By Michael Watson
Personnel On-Site Michael Watson
Contractors On-Site Scarborough Drilling
Client Personnel On-Site Steve Brisbin

Drilling Method Air Rotary
Air Monitoring Method HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | Red-brown fine SAND, dry. | SP | | 0 | 0 | 0 | |
| 5 | | | | Brown-red fine-medium SAND. | SP | 5 | 0 | 0 | 0 | |
| 10 | | | | Brown fine-medium clayey SAND. | SC | 10 | 0 | 0 | 0 | |
| 15 | | | | Brown fine-medium SAND with trace silt with limestone pieces (caliche). | SP | 15 | 0 | 0 | 0 | |
| 20 | | | | Brown fine-medium SAND with trace silt calcium carbonate fragments. | SP | | 0 | 0 | 0 | |
| 25 | | | | Lt. brown fine SAND with sandstone fragments. | SP | 25 | 0 | 0 | 0 | |
| 30 | | | | Lt. brown fine SAND with sandstone fragments. | SP | | 0 | 0 | 0 | |
| 35 | | | | Lt. brown fine SAND with trace silt and sandstone fragments. | SP | | 0 | 0 | 0 | |
| 40 | | | | | | | | | | |

Comments:

Geologist Signature

08/09/93 /ACW8.WK1

## RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-8
Well # ACW-8


Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

Elevation Top of Casing 3297.27
Borehole Location ACW-8
GWL Depth 102.78
Logged By Michael Watson
Drilled By L. Scarborough
Date/Time Started 6-14-93 / 1130
Date/Time Completed 6-15-93 / 0900

Well Logged By Michael Watson
Personnel On-Site Michael Watson
Contractors On-Site Scarborough Drilling
Client Personnel On-Site Steve Brisbin

Drilling Method Air Rotary
Air Monitoring Method HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 40 | | | | | | 40 | | | | |
| | | | | Lt. tan very fine SAND with trace silt. | SP | | 0 | 0 | 0 | |
| 45 | | | | Lt. tan fine SAND with trace silt. | SP | | 0 | 0 | 0 | |
| 50 | | | | | | | | | | |
| 55 | | | | | | 55 | | | | |
| | | | | Lt. brown fine SAND with sandstone fragments | SP | | 0 | 0 | 0 | |
| 60 | | | | Lt. brown fine SAND with sandstone fragments. | | | | | | |
| 65 | | | | | | 65 | | | | |
| | | | | Brown fine-medium SAND with sandstone fragments. Sandstone fragments very well cemented. | SP | | 0 | 0 | 0 | |
| 70 | | | | | | | | | | |
| 75 | | | | | | | | | | |
| 80 | | | | | | | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-8
Well # ACW-8


Project Name: EPNG - Jal #4
Project Number: 10191 Phase 77
Project Location: Jal, New Mexico

Elevation: Top of Casing 3297.27
Borehole Location: ACW-8
GWL Depth: 102.78
Logged By: Michael Watson
Drilled By: L. Scarborough
Date/Time Started: 6-14-93 / 1130
Date/Time Completed: 6-15-93 / 0900

Well Logged By: Michael Watson
Personnel On-Site: Michael Watson
Contractors On-Site: Scarborough Drilling
Client Personnel On-Site: Steve Brisbin

Drilling Method: Air Rotary
Air Monitoring Method: HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 80 | | | | | | | | | | |
| 85 | | | | Brown SAND with sandstone fragments. | SP | | 0 | 0 | 0 | |
| 90 | | | | | | | | | | |
| 95 | | | | Lt. brown fine SAND with some well cemented fragments. | SP | 95 | 0 | 0 | 0 | |
| 100 | | | | Lt. brown fine SAND with some well cemented sandstone fragments. | SP | | 0 | 0 | 0 | |
| 105 | | | | Brown-tan fine grain SAND with very well cemented sandstone fragments. | SP | 105 | 0 | 0 | 0 | |
| 110 | | | | Tan fine grain SAND, well sorted, well rounded. | SP | 110 | 0 | 0 | 0 | |
| 115 | | | | | | | | | | |
| 120 | | | | | | | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-8
Well # ACW-8


Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

Elevation Top of Casing 3297.27
Borehole Location ACW-8
GWL Depth 102.78
Logged By Michael Watson
Drilled By L. Scarborough
Date/Time Started 6-14-93 / 1130
Date/Time Completed 6-15-93 / 0900

Well Logged By Michael Watson
Personnel On-Site Michael Watson
Contractors On-Site Scarborough Drilling
Client Personnel On-Site Steve Brisbin

Drilling Method Air Rotary
Air Monitoring Method HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 120 | | | | Tan fine SAND, well sorted, well rounded. | SP | | 0 | 0 | 0 | |
| 125 | | | | | | | | | | |
| 130 | | | | Lt. brown very fine SAND. | SW | 130 | 0 | 0 | 0 | |
| 135 | | | | | | | | | | |
| 140 | | | | | | | | | | |
| 145 | | | | Lt. brown very fine SAND. | SW | | 0 | 0 | 0 | |
| 150 | | | | Lt. brown very fine SAND. | SW | | 0 | 0 | 0 | |
| 155 | | | | | | | | | | |
| 160 | | | | | | | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-8
Well # ACW-8


Project Name: EPNG - Jal #4
Project Number: 10191 Phase: 77
Project Location: Jal, New Mexico

Elevation: Top of Casing 3297.27
Borehole Location: ACW-8
GWL Depth: 102.78
Logged By: Michael Watson
Drilled By: L. Scarborough
Date/Time Started: 6-14-93 / 1130
Date/Time Completed: 6-15-93 / 0900

Well Logged By: Michael Watson
Personnel On-Site: Michael Watson
Contractors On-Site: Scarborough Drilling
Client Personnel On-Site: Steve Brisbin

Drilling Method: Air Rotary
Air Monitoring Method: HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 160 | | | | Brown very fine SAND with some sandstone fragments. | SP | 160 | 0 | 0 | 0 | |
| 165 | | | | Brown fine SAND with clay, sandstone fragments. | SP | | 0 | 0 | 0 | |
| 170 | | | | Brown fine SAND with sandstone fragments, clay, red clay. | SC | 170 | 0 | 0 | 0 | |
| | | | | 173' TERMINATION OF BORING | | | | | | |
| 175 | | | | | | | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-9
Well # ACW-9
Page 1 of 3

Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

Elevation Top of Casing 3302.47
Borehole Location ACW-9
GWL Depth 109.50
Logged By Michael Watson
Drilled By L. Scarborough
Date/Time Started 6-15-93 / 1445
Date/Time Completed 6-16-93 / 1315

Well Logged By Michael Watson
Personnel On-Site Michael Watson
Contractors On-Site Scarborough Drilling
Client Personnel On-Site Steve Brisbin

Drilling Method Mud Rotary / Air Rotary
Air Monitoring Method HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | Lt. brown-red fine SAND with trace clay, dry. | SP | | 0 | 0 | 0 | |
| | | | | | | 5 | | | | |
| | | | | Lt. brown fine SAND with trace clay with sandstone fragments. | | | 0 | 0 | 0 | |
| 10 | | | | | | | | | | |
| 20 | | | | | SP | | | | | |
| 30 | | | | Lt. brown fine-medium SAND with trace clay and limestone fragments. | | | 0 | 0 | 0 | |
| 40 | | | | | | | | | | |
| 50 | | | | | | 50 | | | | |
| | | | | Lt. brown-tan fine-medium SAND w/sandstone fragments very well cemented. | SP | | 0 | 0 | 0 | |
| 60 | | | | | | | | | | |
| 70 | | | | Lt. brown-tan fine-medium SAND w/sandstone fragments and some limestone fragments. | | | 0 | 0 | 0 | |
| 80 | | | | | | | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-9
Well # ACW-9


Project Name: EPNG - Jal #4
Project Number: 10191 Phase: 77
Project Location: Jal, New Mexico

Elevation: Top of Casing 3302.47
Borehole Location: ACW-9
GWL Depth: 109.90
Logged By: Michael Watson
Drilled By: L. Scarborough
Date/Time Started: 6-15-93 / 1445
Date/Time Completed: 6-16-93 / 1315

Well Logged By: Michael Watson
Personnel On-Site: Michael Watson
Contractors On-Site: Scarborough Drilling
Client Personnel On-Site: Steve Brisbin

Drilling Method: Mud Rotary / Air Rotary
Air Monitoring Method: HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 80 | | | | Lt. brown-tan fine-medium SAND with sandstone fragments. | SP | 80 | 0 | 0 | 0 | |
| 90 | | | | Lt. brown fine-medium SAND. | | 90 | 0 | 0 | 0 | |
| 100 | | | | | SP | | | | | |
| 110 | | | | Brown fine to medium SAND with sandstone fragments. | | 110 | 0 | 0 | 0 | |
| 120 | | | | | SP | | | | | |
| 130 | | | | Brown fine to medium SAND. | | | 0 | 0 | 0 | |
| 140 | | | | | | | | | | |
| 150 | | | | | | | | | | |
| 160 | | | | | | | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-9
Well # ACW-9


Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

Elevation Top of Casing 3302.47
Borehole Location ACW-9
GWL Depth 109.90
Logged By Michael Watson
Drilled By L. Scarborough
Date/Time Started 6-15-93 / 1445
Date/Time Completed 6-16-93 / 1315

Well Logged By Michael Watson
Personnel On-Site Michael Watson
Contractors On-Site Scarborough Drilling
Client Personnel On-Site Steve Brisbin

Drilling Method Mud Rotary / Air Rotary
Air Monitoring Method HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 160 | | | | | | | | | | |
| | | | | Brown fine-medium SAND with red clay, soft, medium plasticity. | SC | 168.5 | | | | |
| 170 | | | | Red CLAY with some sand and gravel, clay soft, medium plasticity. | CL | 171 | | | | |
| | | | | 171' - TERMINATION OF BORHOLE | | | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-10
Well # ACW-10


Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

Elevation Top of Casing 3297.57
Borehole Location ACW-10
GWL Depth 106.24
Logged By Michael Watson
Drilled By L. Scarborough
Date/Time Started 6-16-93 / 1530
Date/Time Completed 6-17-93 / 1200

Well Logged By Michael Watson
Personnel On-Site Michael Watson
Contractors On-Site Scarborough Drilling
Client Personnel On-Site Steve Brisbin

Drilling Method Water Rotary
Air Monitoring Method HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | Red brown fine SAND with trace silt, dry. | SP | | 0 | 0 | 0 | |
| | | | | | | 5 | | | | |
| | | | | Lt. brown-red medium-fine SAND with trace clay. | SP | | 0 | 0 | 0 | |
| 10 | | | | Red-brown fine-medium SAND with trace clay. | SP | | 0 | 0 | 0 | |
| 20 | | | | | | | | | | |
| 30 | | | | | | 30 | | | | |
| | | | | Tan fine SAND, trace silt and sandstone fragments. | | | 0 | 0 | 0 | |
| 40 | | | | | | | | | | |
| 50 | | | | | SP | | | | | |
| 60 | | | | Tan fine SAND with silt. | | | 0 | 0 | 0 | |
| 70 | | | | | | | | | | |
| 80 | | | | | | | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-10
Well # ACW-10


Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

Elevation Top of Casing 3297.57
Borehole Location ACW-10
GWL Depth 106.24
Logged By Michael Watson
Drilled By L. Scarborough
Date/Time Started 6-16-93 / 1530
Date/Time Completed 6-17-93 / 1200

Well Logged By Michael Watson
Personnel On-Site Michael Watson
Contractors On-Site Scarborough Drilling
Client Personnel On-Site Steve Brisbin

Drilling Method Water Rotary
Air Monitoring Method HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 80 | | | | Red-brown SAND with silt and clay and sandstone fragments. | SP | 80 | 0 | 0 | 0 | |
| 90 | | | | Tan fine-medium SAND with sandstone fragments. | | 90 | 0 | 0 | 0 | |
| 100 | | | | Tan medium SAND, well sorted. | SP | | 0 | 0 | 0 | |
| 110 | | | | | | | | | | |
| 120 | | | | Tan fine SAND with sandstone fragments. | | | 0 | 0 | 0 | |
| 130 | | | | | | | | | | |
| 140 | | | | | | | | | | |
| 150 | | | | | | | | | | |
| 160 | | | | | | | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-10
Well # ACW-10


Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

Elevation Top of Casing 3297.57
Borehole Location ACW-10
GWL Depth 106.24
Logged By Michael Watson
Drilled By L. Scarborough
Date/Time Started 6-16-93 / 1530
Date/Time Completed 6-17-93 / 1200

Well Logged By Michael Watson
Personnel On-Site Michael Watson
Contractors On-Site Scarborough Drilling
Client Personnel On-Site

Drilling Method Water Rotary
Air Monitoring Method HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 160 | | | | | | | | | | |
| | | | | | | 165 | | | | |
| | | | | Medium-fine brown SAND with red clay and sandstone fragments. | SP | 169 | 0 | 0 | 0 | |
| 170 | | | | Red clay. | CL | | | | | |
| | | | | 172' - TERMINATION OF BORHOLE | | | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-11
Well # ACW-11


Project Name: EPNG - Jal #4
Project Number: 10191 Phase 77
Project Location: Jal, New Mexico

Elevation: Top of Casing 3299.33
Borehole Location: ACW-11
GWL Depth: 104.58
Logged By: Michael Watson
Drilled By: L. Scarborough
Date/Time Started: 6-17-93 / 1615
Date/Time Completed: 6-18-93 / 0815

Well Logged By: Michael Watson
Personnel On-Site: Michael Watson
Contractors On-Site: Scarborough Drilling
Client Personnel On-Site: Steve Brisbin

Drilling Method: Water Rotary
Air Monitoring Method: HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | Brown-red fine SAND with some silt, dry. | SP | | | | | |
| | | | | Brown-red medium-fine SAND with silt. | | | 0 | 0 | 0 | |
| 10 | | | | Brown-red medium-fine clayey SAND. | SC | 10 | 0 | 0 | 0 | |
| 20 | | | | Brown-red medium-fine clayey SAND with well cemented sandstone pieces. | | | 0 | 0 | 0 | |
| 30 | | | | Tan medium-fine SAND with some clay and sandstone pieces. | SW | 30 | 0 | 0 | 0 | |
| 40 | | | | Lt. brown medium SAND well sorted, some sandstone fragments. | SP | 40 | 0 | 0 | 0 | |
| 50 | | | | Tan medium SAND well sorted with limestone (caliche?) pieces. | SP | 50 | 0 | 0 | 0 | |
| 60 | | | | | | | | | | |
| 70 | | | | | | | | | | |
| 80 | | | | | | 80 | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388



Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

Elevation Top of Casing 3299.33
Borehole Location ACW-11
GWL Depth 104.58
Logged By Michael Watson
Drilled By L. Scarborough
Date/Time Started 6-17-93 / 1615
Date/Time Completed 6-18-93 / 0815

Well Logged By Michael Watson
Personnel On-Site Michael Watson
Contractors On-Site Scarborough Drilling
Client Personnel On-Site Steve Brisbin

Drilling Method Water Rotary
Air Monitoring Method HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 80 | | | | Tan-brown medium SAND well sorted. | SP | 80 | 0 | 0 | 0 | |
| 90 | | | | Tan-brown medium SAND well sorted with well cemented sandstone pieces. | | | 0 | 0 | 0 | |
| 100 | | | | | | | | | | |
| 110 | | | | Brown medium SAND well sorted. | | 110 | 0 | 0 | 0 | |
| 120 | | | | SAND. | | | | | | |
| 130 | | | | | SP | | 0 | 0 | 0 | |
| 140 | | | | SAND. | | | | | | |
| 150 | | | | | | | 0 | 0 | 0 | |
| 160 | | | | | | | | | | |

Comments:

Geologist Signature

# RECORD OF SUBSURFACE EXPLORATION

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-11
Well # ACW-11


Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

Elevation Top of Casing 3299.33
Borehole Location ACW-11
GWL Depth 104.58
Logged By Michael Watson
Drilled By L. Scarborough
Date/Time Started 6-17-93 / 1615
Date/Time Completed 6-18-93 / 0815

Well Logged By Michael Watson
Personnel On-Site Michael Watson
Contractors On-Site Scarborough Drilling
Client Personnel On-Site Steve Brisbin

Drilling Method Water Rotary
Air Monitoring Method HNU

| Depth (Feet) | Sample Interval | Sample Number | Sample Type & Recovery (inches) | Sample Description Classification System: USCS | USCS Symbol | Depth Lithology Change (feet) | Air Monitoring Units: NDU BZ | BH | S | Drilling Conditions & Blow Counts |
|---|---|---|---|---|---|---|---|---|---|---|
| 160 | | | | | | | | | | |
| | | | | | | 167 | | | | |
| | | | | Brown SAND with red clay, clay soft, medium plasticity. | SC | | 0 | 0 | 0 | |
| 170 | | | | | | 170 | | | | |
| | | | | Red CLAY with brown-tan sand, some gravel. 170' - TERMINATION OF BOREHOLE | | | 0 | 0 | 0 | |

Comments:

Geologist Signature

# MONITORING WELL COMPLETION DIAGRAMS

# MONITORING WELL INSTALLATION RECORD

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-11
Well # ACW-11

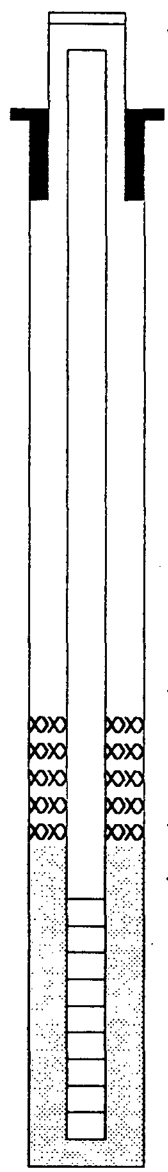

Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

| | |
|---|---|
| Elevation | Top of Casing 3299.33 |
| Well Location | ACW-11 |
| GWL Depth | 104.58 |
| Installed By | Scarborough Drilling |
| Date/Time Started | 6/18/93 |
| Date/Time Completed | 6/18/93 |

| | |
|---|---|
| On-Site Geologist | Michael Watson |
| Personnel On-Site | Michael Watson |
| Contractors On-Site | Scarborough Drilling |
| Client Personnel On-Site | Steve Brisbin |

## Depths in Reference to Ground Surface

| Item | Material | Depth (feet) |
|---|---|---|
| Top of Protective Casing | | + 2.70 |
| Bottom of Protective Casing | | - 2.30 |
| Top of Permanent Borehole Casing | | |
| Bottom of Permanent Borehole Casing | | |
| Top of Concrete | | + 0.30 |
| Bottom of Concrete | | - 1.00 |
| Top of Grout | | - 1.00 |
| Bottom of Grout | | - 131.00 |
| Top of Well Riser | 4" Sch 40 PVC | + 2.20 |
| Bottom of Well Riser | | - 140.00 |
| Top of Well Screen | 4" .010 slotted, Sch 40 PVC | - 140.00 |
| Bottom of Well Screen | | - 160.00 |
| Top of Peltonite Seal | | - 131.00 |
| Bottom of Peltonite Seal | | - 138.00 |
| Top of Gravel Pack | 12 - 20 Silica | - 138.00 |
| Bottom of Gravel Pack | | - 160.50 |
| Top of Natural Cave-In | | |
| Bottom of Natural Cave-In | | |
| Top of Groundwater | | -104.58 |
| Total Depth of Borehole | | - 170.00 |



| | |
|---|---|
| Top of Protective Casing | +2.7 |
| Top of Riser | +2.2 |
| Ground Surface | |
| Top of Seal | -131.0 |
| Top of Gravel Pack | -138.0 |
| Top of Screen | -140.0 |
| Bottom of Screen | -160.0 |
| Bottom of Borehole | -170.0 |

Comments: Boring was backfilled with bentonite from 170 - 160.5.

Geologist Signature

# MONITORING WELL INSTALLATION RECORD

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-10
Well # ACW-10
Page 1 of 1

Project Name: EPNG - Jal #4
Project Number: 10191 Phase 77
Project Location: Jal, New Mexico

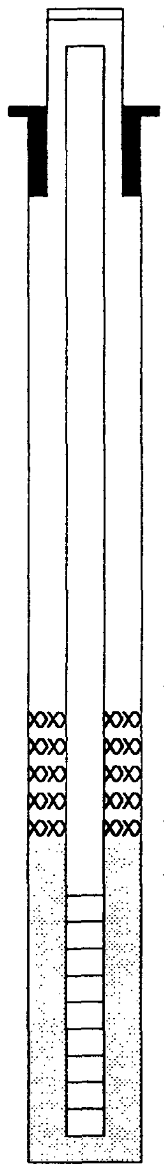
Elevation: Top of Casing 3297.57
Well Location: ACW-10
GWL Depth: 106.24
Installed By: Scarborough Drilling

On-Site Geologist: Michael Watson
Personnel On-Site: Michael Watson
Contractors On-Site: Scarborough Drilling
Client Personnel On-Site: Steve Brisbin

Date/Time Started: 6/17/93
Date/Time Completed: 6/17/93

Depths in Reference to Ground Surface

| Item | Material | Depth (feet) |
|---|---|---|
| Top of Protective Casing | | + 3.00 |
| Bottom of Protective Casing | | - 2.00 |
| Top of Permanent Borehole Casing | | |
| Bottom of Permanent Borehole Casing | | |
| Top of Concrete | | + 3.00 |
| Bottom of Concrete | | - 1.00 |
| Top of Grout | | - 1.00 |
| Bottom of Grout | | - 131.00 |
| Top of Well Riser | 4" Sch 40 PVC | + 2.50 |
| Bottom of Well Riser | | - 140.00 |
| Top of Well Screen | 4" .010 slotted, Sch 40 PVC | - 140.00 |
| Bottom of Well Screen | | - 160.00 |
| Top of Peltonite Seal | | - 131.00 |
| Bottom of Peltonite Seal | | - 138.00 |
| Top of Gravel Pack | 12 - 20 Silica | - 138.00 |
| Bottom of Gravel Pack | | - 160.50 |
| Top of Natural Cave-In | | |
| Bottom of Natural Cave-In | | |
| Top of Groundwater | | -106.24 |
| Total Depth of Borehole | | - 172.00 |



- Top of Protective Casing: +3.00
- Top of Riser: +2.50
- Ground Surface:
- Top of Seal: -131.0
- Top of Gravel Pack: -138.0
- Top of Screen: -140.0
- Bottom of Screen: -160.0
- Bottom of Borehole: -172.0

Comments: Boring was backfilled with bentonite from 172 - 160.5.

Geologist Signature

# MONITORING WELL INSTALLATION RECORD

**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # ACW-9
Well # ACW-9


Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

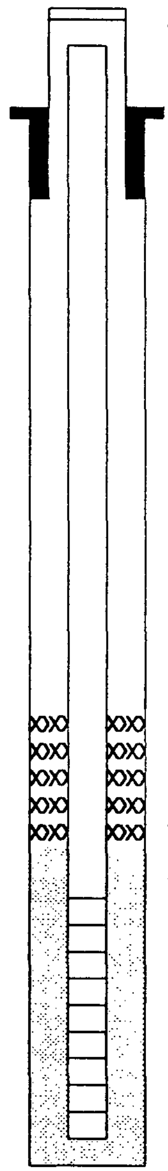
Elevation: Top of Casing 3302.47
Well Location: ACW-9
GWL Depth: 109.90
Installed By: Scarborough Drilling

On-Site Geologist: Michael Watson
Personnel On-Site: Michael Watson
Contractors On-Site: Scarborough Drilling
Client Personnel On-Site: Steve Brisbin

Date/Time Started: 6/16/93
Date/Time Completed: 6/16/93

## Depths in Reference to Ground Surface

| Item | Material | Depth (feet) |
|---|---|---|
| Top of Protective Casing | | + 3.00 |
| Bottom of Protective Casing | | - 2.00 |
| Top of Permanent Borehole Casing | | |
| Bottom of Permanent Borehole Casing | | |
| Top of Concrete | | + 3.00 |
| Bottom of Concrete | | - 1.00 |
| Top of Grout | | - 1.00 |
| Bottom of Grout | | - 131.00 |
| Top of Well Riser | 4" Sch 40 PVC | + 3.00 |
| Bottom of Well Riser | | - 140.00 |
| Top of Well Screen | 4" .010 slotted, Sch 40 PVC | - 140.00 |
| Bottom of Well Screen | | - 160.00 |
| Top of Peltonite Seal | | - 131.00 |
| Bottom of Peltonite Seal | | - 138.00 |
| Top of Gravel Pack | 12 - 20 Silica | - 138.00 |
| Bottom of Gravel Pack | | - 160.50 |
| Top of Natural Cave-In | | |
| Bottom of Natural Cave-In | | |
| Top of Groundwater | | -109.90 |
| Total Depth of Borehole | | - 171.00 |




Comments: Boring was backfilled with bentonite from 171 - 160.5.

Geologist Signature

# MONITORING WELL INSTALLATION RECORD


**Burlington Environmental Inc.**
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388


Borehole # ACW-8
Well # ACW-8
Page 1 of 1

Project Name EPNG - Jal #4
Project Number 10191 Phase 77
Project Location Jal, New Mexico

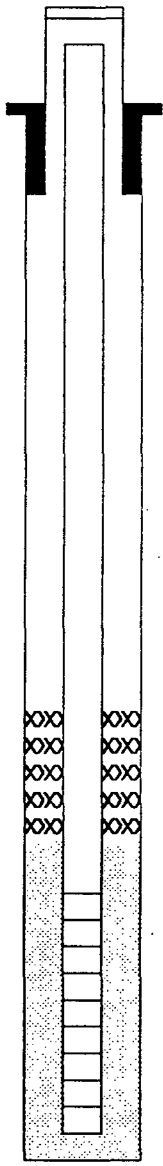
Elevation Top of Casing 3297.27
Well Location ACW-8
GWL Depth 102.78
Installed By Scarborough Drilling

Date/Time Started 6/15/93
Date/Time Completed 6/15/93

On-Site Geologist Michael Watson
Personnel On-Site Michael Watson
Contractors On-Site Scarborough Drilling
Client Personnel On-Site Steve Brisbin

## Depths in Reference to Ground Surface

| Item | Material | Depth (feet) |
|---|---|---|
| Top of Protective Casing | | + 1.50 |
| Bottom of Protective Casing | | - 3.20 |
| Top of Permanent Borehole Casing | | |
| Bottom of Permanent Borehole Casing | | |
| Top of Concrete | | + 0.30 |
| Bottom of Concrete | | - 1.00 |
| Top of Grout | | - 1.00 |
| Bottom of Grout | | - 125.00 |
| Top of Well Riser | 4" Sch 40 PVC | + 1.50 |
| Bottom of Well Riser | | - 140.00 |
| Top of Well Screen | 4" .010 slotted, Sch 40 PVC | - 140.00 |
| Bottom of Well Screen | | - 160.00 |
| Top of Peltonite Seal | | - 125.00 |
| Bottom of Peltonite Seal | | - 138.00 |
| Top of Gravel Pack | 12 - 20 Silica | - 138.00 |
| Bottom of Gravel Pack | | - 160.50 |
| Top of Natural Cave-In | | |
| Bottom of Natural Cave-In | | |
| Top of Groundwater | | -102.78 |
| Total Depth of Borehole | | - 173.00 |



| | |
|---|---|
| Top of Protective Casing | +1.5 |
| Top of Riser | +1.5 |
| Ground Surface | |
| Top of Seal | -125.0 |
| Top of Gravel Pack | -138.0 |
| Top of Screen | -140.0 |
| Bottom of Screen | -160.0 |
| Bottom of Borehole | -173.0 |

Comments: Boring was backfilled with bentonite from 173 - 160.5.

Geologist Signature

# LABORATORY ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY RECORDS

**BURLINGTON ENVIRONMENTAL**

210 West Sand Bank Road
P.O Box 330
Columbia, IL 62236-0330
618/281-7173
618/281-5120 FAX

# CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. [illegible]

PROJECT NAME: JAL #4
PROJECT NUMBER: 10191 — MAJOR TASK: 77
SAMPLERS: Robert Thompson
LAB DESTINATION: ATAS

LM 6/1[illegible] BA-[illegible] IE2

| SAMPLE NO. | DATE | TIME | COMP | GRAB | SAMPLE LOCATION | NO. OF CONTAINERS | BTEX 8020 | As, Ba, Cr, Pb K, Na | CL, FL, SO4 | Nitrate ($H_2SO_4$) | CYANIDE | TDS, EC Cond | CL | ICED | CHEMICALS ADDED | REMARKS (CHEMICAL ANALYSIS REQUEST FORM NUMBER IF APPLICABLE) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ACW-#8 | 6-16-93 | 1455 | | ✓ | Monitor Well ACW-8 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | | ✓ | SEE CONTAINER | K, Na USE US EPA 6010 7005. |
| ENSR-2 | 6-16-93 | 1532 | | ✓ | Monitor Well ENSR-2 | 5 | | 1 | 1 | 1 | 1 | 1 | | ✓ | | |
| ACW-4 | 6-15-93 | 1135 | | ✓ | Monitor Well ACW-4 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | | ✓ | | Inorganic Chloride by STAND Method |
| ACW-2a | 6-15-93 | 1626 | | ✓ | Monitor Well ACW-2a | 5 | | 1 | 1 | 1 | 1 | 1 | | ✓ | | 407B |
| EPNG-1 | 6-16-93 | 1622 | | ✓ | Monitor Well EPNG-1 | 2 | | | | | | 1 | 1 | ✓ | | |

| RELINQUISHED BY — SIGNATURE | DATE | TIME | RECEIVED BY — SIGNATURE | DATE | TIME |
|---|---|---|---|---|---|
| Robert Thompson | 6.16.93 | 1700 | Walter Watson | 6/17/93 | 0910 |

SHIPPING NOTES

LAB NOTES

# BURLINGTON ENVIRONMENTAL

210 West Sand Bank Road
P.O. Box 330
Columbia, IL 62236-0330
618/281-7173
618/281-5120 FAX

## CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. ______

PROJECT NAME EPNG - JAL #4
PROJECT NUMBER 10191 MAJOR TASK 77
SAMPLERS Robert Thompson
LAB DESTINATION ATAS

REMARKS (CHEMICAL ANALYSIS REQUEST FORM NUMBER IF APPLICABLE) WD 6/22/93 1E3-265 BA

| SAMPLE NO. | DATE | TIME | COMP | GRAB | SAMPLE LOCATION | NO. OF CONTAINERS | BTEX 8020 | As, Ba, Cr, Pb, K, Na | CL, FL, SO4 | Nitrate | CYANIDE | TDS, EC | | ICED | CHEMICALS ADDED | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ACW-10 | 6·18·93 | 1430 | | ✓ | Monitor Well ACW-10 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | | ✓ | SEE BOTTLE | K, Na by USEPA 6010 7035 01 |
| ACW-6 | 6·18·93 | 1400 | | ✓ | Monitor Well ACW-6 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | | ✓ | | 02 |
| ACW-7 | 6·17·93 | 1740 | | ✓ | Monitor Well ACW-7 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | | ✓ | | Inorganic chloride by STANDARD 03 |
| ACW-5 | 6·17·93 | 1700 | | ✓ | Monitor Well ACW-5 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | | ✓ | | Method 407B. 04 |
| ACW-9 | 6·17·93 | 1615 | | ✓ | Monitor Well ACW-9 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | | ✓ | | 05 |
| ACW-11 | 6·19·93 | 0945 | | ✓ | Monitor Well ACW-11 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | | ✓ | | 06 |

| RELINQUISHED BY SIGNATURE | DATE | TIME | RECEIVED BY SIGNATURE | DATE | TIME |
|---|---|---|---|---|---|
| Michael Watson | 6·21·93 | 1230 | Walter Watson | 6/22/93 | 0855 |

SHIPPING NOTES

LAB NOTES

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 700505MT(173)

DATE : 07-08-93

SAMPLE MATRIX : WATER
ATAS # : 7005.05
DATE SUBMITTED: 06-17-93
PROJECT : #10191/77 - JAL #4
SAMPLE ID : EPNG-1

| PARAMETER | REPORTING LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| | | INORGANICS | | | |
| TDS | 20 | mg/L | 520 | 07-08-93 | EPA 160.1 |
| CONDUCTANCE | 2 | umhos/cm | 746 | 07-07-93 | SM 205 |
| INORGANIC CHLORIDE | 0.2 | mg/L | 86.1 | 06-19-93 | SM 407B |

mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 700502MT(173)

DATE : 07-08-93

SAMPLE MATRIX : WATER
ATAS # : 7005.02
DATE SUBMITTED: 06-17-93
PROJECT : #10191/77 - JAL #4
SAMPLE ID : ENSR-2

| PARAMETER | REPORTING LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| | | | **INORGANICS** | | |
| TDS | 20 | mg/L | 19488 | 07-08-93 | EPA 160.1 |
| CONDUCTANCE | 2 | umhos/cm | 29964 | 07-07-93 | SM 205 |
| INORGANIC CHLORIDE | 20.0 | mg/L | 9943 | 06-20-93 | SM 407B |
| TOTAL CYANIDE | 10.0 | ug/L | ND | 06-25-93 | SM 412D |
| FLUORIDE | 0.2 | mg/L | 40.3 | 06-19-93 | EPA 300.0 |
| NITRATE-SPEC. | 0.10 | mg/L | ND | 07-02-93 | SM 4188 |
| SULFATE | 2.0 | mg/L | 340 | 06-19-93 | EPA 300.0 |
| | | | **METALS** | | |
| ARSENIC | 500.0 | ug/L | 1500 | 06-30-93 | SW 6010 |
| BARIUM | 50.0 | ug/L | 152 | 06-30-93 | SW 6010 |
| CHROMIUM | 50.0 | ug/L | ND | 06-30-93 | SW 6010 |
| LEAD | 300.0 | ug/L | ND | 06-30-93 | SW 6010 |
| POTASSIUM | 5000.0 | ug/L | 29600 | 06-30-93 | SW 6010 |
| SODIUM | 5000.0 | ug/L | 65000000 | 06-30-93 | SW 6010 |

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 700504MT(173)

DATE : 07-08-93

SAMPLE MATRIX : WATER
ATAS # : 7005.04
DATE SUBMITTED: 06-17-93
PROJECT : #10191/77 - JAL #4
SAMPLE ID : ACW-2A

| PARAMETER | REPORTING LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| | | INORGANICS | | | |
| TDS | 29 | mg/L | 22269 | 07-08-93 | EPA 160.1 |
| CONDUCTANCE | 2 | umhos/cm | 28639 | 07-07-93 | SM 205 |
| INORGANIC CHLORIDE | 200.0 | mg/L | 10916 | 06-20-93 | SM 407B |
| TOTAL CYANIDE | 10.0 | ug/L | ND | 06-25-93 | SM 412D |
| FLUORIDE | 0.2 | mg/L | 53.1 | 06-19-93 | EPA 300.0 |
| NITRATE-SPEC. | 0.10 | mg/L | ND | 07-02-93 | SM 4188 |
| SULFATE | 0.2 | mg/L | 3.7 | 06-19-93 | EPA 300.0 |
| | | METALS | | | |
| ARSENIC | 500.0 | ug/L | ND | 06-30-93 | SW 6010 |
| BARIUM | 50.0 | ug/L | 1030 | 06-30-93 | SW 6010 |
| CHROMIUM | 50.0 | ug/L | ND | 06-30-93 | SW 6010 |
| LEAD | 300.0 | ug/L | ND | 06-30-93 | SW 6010 |
| POTASSIUM | 5000.0 | ug/L | 27000 | 06-30-93 | SW 6010 |
| SODIUM | 5000.0 | ug/L | 6100000 | 06-30-93 | SW 6010 |

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 700503MT(173)

DATE : 07-08-93

SAMPLE MATRIX : WATER
ATAS # : 7005.03
DATE SUBMITTED: 06-17-93
PROJECT : #10191/77 - JAL #4
SAMPLE ID : ACW-4

| PARAMETER | REPORTING LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| | | | **INORGANICS** | | |
| TDS | 20 | mg/L | 68366 | 07-08-93 | EPA 160.1 |
| CONDUCTANCE | 2 | umhos/cm | 92033 | 07-07-93 | SM 205 |
| INORGANIC CHLORIDE | 200.0 | mg/L | 48226 | 06-20-93 | SM 407B |
| TOTAL CYANIDE | 10.0 | ug/L | ND | 06-25-93 | SM 412D |
| FLUORIDE | 0.2 | mg/L | ND | 06-19-93 | EPA 300.0 |
| NITRATE-SPEC. | 0.10 | mg/L | ND | 07-02-93 | SM 4188 |
| SULFATE | 20.0 | mg/L | 1547 | 06-19-93 | EPA 300.0 |
| | | | **METALS** | | |
| ARSENIC | 500.0 | ug/L | ND | 06-30-93 | SW 6010 |
| BARIUM | 5.0 | ug/L | 606 | 06-30-93 | SW 6010 |
| CHROMIUM | 5.0 | ug/L | ND | 06-30-93 | SW 6010 |
| LEAD | 300.0 | ug/L | ND | 06-30-93 | SW 6010 |
| POTASSIUM | 5000.0 | ug/L | 196000 | 06-30-93 | SW 6010 |
| SODIUM | 5000.0 | ug/L | 16400000 | 06-30-93 | SW 6010 |

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703504MT(172)
DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.04
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-5

| PARAMETER | REPORTING LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| | | | **INORGANICS** | | |
| INORGANIC CHLORIDE | 20.0 | mg/L | 815 | 06-23-93 | SM 407B |
| TOTAL CYANIDE | 10.0 | ug/L | ND | 06-30-93 | SM 412D |
| FLUORIDE | 0.2 | mg/L | ND | 06-23-93 | EPA 300.0 |
| NITRATE | 1.0 | mg/L | 8.2 | 07-02-93 | SM 418B |
| SULFATE | 20.0 | mg/L | 1091 | 06-23-93 | EPA 300.0 |
| CONDUCTANCE | 2 | umhos/cm | 3995 | 06-23-93 | SM 205 |
| TDS | 20 | mg/L | 3354 | 07-07-93 | EPA 160.1 |
| | | | **METALS** | | |
| ARSENIC | 10.0 | ug/L | ND | 07-05-93 | SW 7060 |
| BARIUM | 5.0 | ug/L | 55.8 | 07-01-93 | SW 6010 |
| CHROMIUM | 1.0 | ug/L | 32.3 | 07-01-93 | SW 7191 |
| LEAD | 3.0 | ug/L | ND | 06-30-93 | SW 7421 |
| POTASSIUM | 500 | ug/L | 9400 | 07-01-93 | SW 6010 |
| SODIUM | 500 | ug/L | 513000 | 07-01-93 | SW 6010 |

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703502MT(172)

DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.02
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-6

| PARAMETER | REPORTING LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| | | **INORGANICS** | | | |
| INORGANIC CHLORIDE | 20.0 | mg/L | 2205 | 06-23-93 | SM 407B |
| TOTAL CYANIDE | 10.0 | ug/L | ND | 06-30-93 | SM 412D |
| FLUORIDE | 0.2 | mg/L | 20.6 | 06-23-93 | EPA 300.0 |
| NITRATE | 1.0 | mg/L | 8.3 | 07-02-93 | SM 418B |
| SULFATE | 0.2 | mg/L | 194 | 06-23-93 | EPA 300.0 |
| CONDUCTANCE | 2 | umhos/cm | 8082 | 06-23-93 | SM 205 |
| TDS | 20 | mg/L | 5080 | 07-07-93 | EPA 160.1 |
| | | **METALS** | | | |
| ARSENIC | 10.0 | ug/L | 71.8 | 07-05-93 | SW 7060 |
| BARIUM | 5.0 | ug/L | 492 | 07-01-93 | SW 6010 |
| CHROMIUM | 1.0 | ug/L | 4.1 | 07-01-93 | SW 7191 |
| LEAD | 3.0 | ug/L | ND | 06-30-93 | SW 7421 |
| POTASSIUM | 500 | ug/L | 6530 | 07-01-93 | SW 6010 |
| SODIUM | 5000 | ug/L | 1910000 | 07-02-93 | SW 6010 |

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703503MT(172)

DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.03
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-7

| PARAMETER | REPORTING LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| | | | **INORGANICS** | | |
| INORGANIC CHLORIDE | 20.0 | mg/L | 3351 | 06-23-93 | SM 407B |
| TOTAL CYANIDE | 10.0 | ug/L | ND | 06-30-93 | SM 412D |
| FLUORIDE | 0.2 | mg/L | 3.8 | 06-23-93 | EPA 300.0 |
| NITRATE | 0.10 | mg/L | ND | 07-02-93 | SM 418B |
| SULFATE | 0.2 | mg/L | 88.5 | 06-23-93 | EPA 300.0 |
| CONDUCTANCE | 2 | umhos/cm | 9733 | 06-23-93 | SM 205 |
| TDS | 20 | mg/L | 6472 | 07-07-93 | EPA 160.1 |
| | | | **METALS** | | |
| ARSENIC | 10.0 | ug/L | 18.8 | 07-05-93 | SW 7060 |
| BARIUM | 5.0 | ug/L | 1600 | 07-01-93 | SW 6010 |
| CHROMIUM | 1.0 | ug/L | 8.6 | 07-01-93 | SW 7191 |
| LEAD | 3.0 | ug/L | ND | 06-30-93 | SW 7421 |
| POTASSIUM | 500 | ug/L | 7570 | 07-01-93 | SW 6010 |
| SODIUM | 5000 | ug/L | 2044000 | 07-02-93 | SW 6010 |

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 700501MT(173)

DATE : 07-08-93

SAMPLE MATRIX : WATER
ATAS # : 7005.01
DATE SUBMITTED: 06-17-93
PROJECT : #10191/77 - JAL #4
SAMPLE ID : ACW-#8

| PARAMETER | REPORTING LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| | | | **INORGANICS** | | |
| TDS | 40 | mg/L | 2892 | 07-08-93 | EPA 160.1 |
| CONDUCTANCE | 2 | umhos/cm | 1973 | 07-07-93 | SM 205 |
| INORGANIC CHLORIDE | 2.0 | mg/L | 552 | 06-19-93 | SM 407B |
| TOTAL CYANIDE | 10.0 | ug/L | ND | 06-25-93 | SM 412D |
| FLUORIDE | 0.2 | mg/L | 1.9 | 06-19-93 | EPA 300.0 |
| NITRATE-SPEC. | 0.10 | mg/L | 0.41 | 07-02-93 | SM 4188 |
| SULFATE | 2.0 | mg/L | 150 | 06-19-93 | EPA 300.0 |
| | | | **METALS** | | |
| ARSENIC | 50.0 | ug/L | ND | 06-30-93 | SW 6010 |
| BARIUM | 5.0 | ug/L | 79.7 | 06-30-93 | SW 6010 |
| CHROMIUM | 5.0 | ug/L | 24.8 | 06-30-93 | SW 6010 |
| LEAD | 30.0 | ug/L | ND | 06-30-93 | SW 6010 |
| POTASSIUM | 500.0 | ug/L | 34100 | 06-30-93 | SW 6010 |
| SODIUM | 500.0 | ug/L | 305000 | 06-30-93 | SW 6010 |

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703505MT(172)

DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.05
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-9

| PARAMETER | REPORTING LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| | | | **INORGANICS** | | |
| INORGANIC CHLORIDE | 20.0 | mg/L | 472 | 06-23-93 | SM 407B |
| TOTAL CYANIDE | 10.0 | ug/L | ND | 06-30-93 | SM 412D |
| FLUORIDE | 0.2 | mg/L | 1.7 | 06-23-93 | EPA 300.0 |
| NITRATE | 1.0 | mg/L | ND | 07-02-93 | SM 418B |
| SULFATE | 0.2 | mg/L | 81.0 | 06-23-93 | EPA 300.0 |
| CONDUCTANCE | 2 | umhos/cm | 1097 | 06-23-93 | SM 205 |
| TDS | 30 | mg/L | 900 | 07-07-93 | EPA 160.1 |
| | | | **METALS** | | |
| ARSENIC | 10.0 | ug/L | ND | 07-05-93 | SW 7060 |
| BARIUM | 5.0 | ug/L | 90.0 | 07-01-93 | SW 6010 |
| CHROMIUM | 1.0 | ug/L | 8.0 | 07-01-93 | SW 7191 |
| LEAD | 3.0 | ug/L | ND | 06-30-93 | SW 7421 |
| POTASSIUM | 500 | ug/L | 12500 | 07-01-93 | SW 6010 |
| SODIUM | 500 | ug/L | 121000 | 07-01-93 | SW 6010 |

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703501MT(172)

DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.01
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-10

| PARAMETER | REPORTING LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| | | | **INORGANICS** | | |
| INORGANIC CHLORIDE | 20.0 | mg/L | 420 | 06-23-93 | SM 407B |
| TOTAL CYANIDE | 10.0 | ug/L | ND | 06-30-93 | SM 412D |
| FLUORIDE | 0.2 | mg/L | 1.7 | 06-23-93 | EPA 300.0 |
| NITRATE | 0.10 | mg/L | 0.63 | 07-02-93 | SM 418B |
| SULFATE | 0.2 | mg/L | 82.1 | 06-23-93 | EPA 300.0 |
| CONDUCTANCE | 2 | umhos/cm | 964 | 06-23-93 | SM 205 |
| TDS | 20 | mg/L | 814 | 07-07-93 | EPA 160.1 |
| | | | **METALS** | | |
| ARSENIC | 10.0 | ug/L | ND | 07-05-93 | SW 7060 |
| BARIUM | 5.0 | ug/L | 126 | 07-01-93 | SW 6010 |
| CHROMIUM | 1.0 | ug/L | 10.2 | 07-01-93 | SW 7191 |
| LEAD | 3.0 | ug/L | ND | 06-30-93 | SW 7421 |
| POTASSIUM | 500 | ug/L | 14200 | 07-01-93 | SW 6010 |
| SODIUM | 500 | ug/L | 109000 | 07-01-93 | SW 6010 |

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703506MT(172)

DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.06
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-11

| PARAMETER | REPORTING LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| | | | **INORGANICS** | | |
| INORGANIC CHLORIDE | 20.0 | mg/L | 638 | 06-23-93 | SM 407B |
| TOTAL CYANIDE | 10.0 | ug/L | ND | 06-30-93 | SM 412D |
| FLUORIDE | 0.2 | mg/L | 1.7 | 06-23-93 | EPA 300.0 |
| NITRATE | 1.0 | mg/L | 0.56 | 07-02-93 | SM 418B |
| SULFATE | 0.2 | mg/L | 79.4 | 06-23-93 | EPA 300.0 |
| CONDUCTANCE | 2 | umhos/cm | 1727 | 06-23-93 | SM 205 |
| TDS | 20 | mg/L | 1298 | 07-07-93 | EPA 160.1 |
| | | | **METALS** | | |
| ARSENIC | 10.0 | ug/L | ND | 07-05-93 | SW 7060 |
| BARIUM | 5.0 | ug/L | 94.2 | 07-01-93 | SW 6010 |
| CHROMIUM | 1.0 | ug/L | 5.9 | 07-01-93 | SW 7191 |
| LEAD | 3.0 | ug/L | ND | 06-30-93 | SW 7421 |
| POTASSIUM | 500 | ug/L | 10100 | 07-01-93 | SW 6010 |
| SODIUM | 500 | ug/L | 212000 | 07-01-93 | SW 6010 |

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

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CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 700503BX(173)

DATE : 07-08-93

SAMPLE MATRIX : WATER
ATAS # : 7005.03
DATE SUBMITTED: 06-17-93
PROJECT : #10191/77 - JAL #4
SAMPLE ID : ACW-4

| PARAMETER | REPORTING LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| GAS CHROMATOGRAPHY | | | | | |
| BENZENE | 20.0 | ug/L | 85.6 | 06-21-93 | SW 8020 |
| TOLUENE | 20.0 | ug/L | 132 | 06-21-93 | SW 8020 |
| ETHYLBENZENE | 20.0 | ug/L | ND | 06-21-93 | SW 8020 |
| XYLENES | 20.0 | ug/L | 1120 | 06-21-93 | SW 8020 |
| TOTAL BTEX | | ug/L | 1337.6 | | |

**QA/QC SURROGATE RECOVERY**

BROMOFLUOROBENZENE (65-135%) 724 % *

* = OUTSIDE QC LIMIT ON BOTH ORIGINAL AND RERUN - COELUTING PEAKS
ND = NOT DETECTED ABOVE REPORTING LIMIT
ug/L = PARTS PER BILLION(PPB)

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CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703504BX(174)

DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.04
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-5

| PARAMETER | REPORTING LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| GAS CHROMATOGRAPHY | | | | | |
| BENZENE | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| TOLUENE | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| ETHYLBENZENE | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| XYLENES | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| TOTAL BTEX | | ug/L | ND | | |

## QA/QC SURROGATE RECOVERY

BROMOFLUOROBENZENE (65-135%) 209 % *

* = OUTSIDE QC LIMIT ON BOTH ORIGINAL AND RERUN
ND = NOT DETECTED ABOVE REPORTING LIMIT
ug/L = PARTS PER BILLION(PPB)

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CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703502BX(174)

DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.02
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-6

| PARAMETER | REPORTING LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| GAS CHROMATOGRAPHY | | | | | |
| BENZENE | 1.0 | ug/L | 4.6 | 06-25-93 | SW 8020 |
| TOLUENE | 1.0 | ug/L | 2.5 | 06-25-93 | SW 8020 |
| ETHYLBENZENE | 1.0 | ug/L | 1.2 | 06-25-93 | SW 8020 |
| XYLENES | 1.0 | ug/L | 4.9 | 06-25-93 | SW 8020 |
| TOTAL BTEX | | ug/L | 13.2 | | |

**QA/QC SURROGATE RECOVERY**

BROMOFLUOROBENZENE (65-135%) 199 % *

* = OUTSIDE QC LIMIT ON BOTH ORIGINAL AND RERUN
ND = NOT DETECTED ABOVE REPORTING LIMIT
ug/L = PARTS PER BILLION(PPB)

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CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703503BX(174)

DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.03
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-7

| PARAMETER | REPORTING LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| <u>GAS CHROMATOGRAPHY</u> | | | | | |
| BENZENE | 1.0 | ug/L | 3.2 | 06-25-93 | SW 8020 |
| TOLUENE | 1.0 | ug/L | 4.9 | 06-25-93 | SW 8020 |
| ETHYLBENZENE | 1.0 | ug/L | 7.0 | 06-25-93 | SW 8020 |
| XYLENES | 1.0 | ug/L | 1.5 | 06-25-93 | SW 8020 |
| TOTAL BTEX | | ug/L | 16.6 | | |

**QA/QC SURROGATE RECOVERY**

BROMOFLUOROBENZENE (65-135%) 214 % *

* = OUTSIDE QC LIMIT ON BOTH ORIGINAL AND RERUN
ND = NOT DETECTED ABOVE REPORTING LIMIT
ug/L = PARTS PER BILLION(PPB)

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| | | | |
|---|---|---|---|
| CLIENT: | BURLINGTON ENVIRONMENTAL, INC. | REPORT: | 700501BX(173) |
| | 210 WEST SAND BANK ROAD P.O. BOX 330 | | |
| | COLUMBIA, IL 62236-0330 | DATE : | 07-08-93 |
| | ATTN: KATHY BLAINE | | |

SAMPLE MATRIX : WATER
ATAS # : 7005.01
DATE SUBMITTED: 06-17-93
PROJECT : #10191/77 - JAL #4
SAMPLE ID : ACW-#8

| PARAMETER | REPORTING LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| GAS CHROMATOGRAPHY | | | | | |
| BENZENE | 1.0 | ug/L | 1.4 | 06-21-93 | SW 8020 |
| TOLUENE | 1.0 | ug/L | 1.2 | 06-21-93 | SW 8020 |
| ETHYLBENZENE | 1.0 | ug/L | ND | 06-21-93 | SW 8020 |
| XYLENES | 1.0 | ug/L | ND | 06-21-93 | SW 8020 |
| TOTAL BTEX | | ug/L | 2.6 | | |

**QA/QC SURROGATE RECOVERY**

BROMOFLUOROBENZENE (65-135%) 104 %

* = OUTSIDE QC LIMIT ON BOTH ORIGINAL AND RERUN
ND = NOT DETECTED ABOVE REPORTING LIMIT
ug/L = PARTS PER BILLION(PPB)

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CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703505BX(174)
DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.05
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-9

| PARAMETER | REPORTING LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| GAS CHROMATOGRAPHY | | | | | |
| BENZENE | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| TOLUENE | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| ETHYLBENZENE | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| XYLENES | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| TOTAL BTEX | | ug/L | ND | | |

## QA/QC SURROGATE RECOVERY

BROMOFLUOROBENZENE (65-135%) 109 %

* = OUTSIDE QC LIMIT ON BOTH ORIGINAL AND RERUN
ND = NOT DETECTED ABOVE REPORTING LIMIT
ug/L = PARTS PER BILLION(PPB)

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CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703501BX(174)

DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.01
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-10

| PARAMETER | REPORTING LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| GAS CHROMATOGRAPHY | | | | | |
| BENZENE | 1.0 | ug/L | ND | 06-24-93 | SW 8020 |
| TOLUENE | 1.0 | ug/L | ND | 06-24-93 | SW 8020 |
| ETHYLBENZENE | 1.0 | ug/L | ND | 06-24-93 | SW 8020 |
| XYLENES | 1.0 | ug/L | 1.7 | 06-24-93 | SW 8020 |
| TOTAL BTEX | | ug/L | 1.7 | | |

## QA/QC SURROGATE RECOVERY

BROMOFLUOROBENZENE (65-135%) 103 %

* = OUTSIDE QC LIMIT ON BOTH ORIGINAL AND RERUN
ND = NOT DETECTED ABOVE REPORTING LIMIT
ug/L = PARTS PER BILLION(PPB)

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CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: 703506BX(174)

DATE : 07-14-93

SAMPLE MATRIX : WATER
ATAS # : 7035.06
DATE SUBMITTED: 06-22-93
PROJECT : #10191 - EPNG-JAL#4
SAMPLE ID : ACW-11

| PARAMETER | REPORTING LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---|---|---|---|---|---|
| GAS CHROMATOGRAPHY | | | | | |
| BENZENE | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| TOLUENE | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| ETHYLBENZENE | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| XYLENES | 1.0 | ug/L | ND | 06-25-93 | SW 8020 |
| TOTAL BTEX | | ug/L | ND | | |

**QA/QC SURROGATE RECOVERY**

BROMOFLUOROBENZENE (65-135%) 98 %

* = OUTSIDE QC LIMIT ON BOTH ORIGINAL AND RERUN
ND = NOT DETECTED ABOVE REPORTING LIMIT
ug/L = PARTS PER BILLION(PPB)

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## LABORATORY QUALITY CONTROL SEQUENCE

METHOD : EPA 8020 QA SEQUENCE NO: 2B592
INSTRUMENT ID : 2B

### LABORATORY BLANK

MATRIX : W ATAS NO. : B1
SAMPLE ID : BLANK
SAMPLE AMOUNT : 5.0 G DILUTION FACTOR : 1.00
ANALYSIS DATE : 06-24-93
ANALYSIS TIME : 13:38

| COMPOUND | QUANTITATION LIMIT (PPB) | AMOUNT FOUND (PPB) |
|---|---|---|
| BENZENE | 1.0 | ND |
| TOLUENE | 1.0 | ND |
| ETHYLBENZENE | 1.0 | ND |
| TOTAL XYLENES | 1.0 | ND |

SURROGATE RECOVERY (BROMOFLUOROBENZENE): 98 %

### MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

| COMPOUND | SPIKE CONC. (PPB) | 7017.06 SAMPLE CONC. (PPB) | 7017.06 MS MATRIX SPIKE CONC.(PPB) | PERCENT RECOVERY |
|---|---|---|---|---|
| BENZENE | 20.0 | ND | 20.6 | 102.8 % |
| TOLUENE | 20.0 | ND | 20.3 | 101.5 % |
| ETHYLBENZENE | 20.0 | ND | 20.0 | 100.2 % |
| TOTAL XYLENES | 40.0 | ND | 39.9 | 99.8 % |

| | 7017.06 MSD MATRIX SPIKE DUP. CONC.(PPB) | PERCENT RECOVERY | RELATIVE PERCENT DIFFERENCE |
|---|---|---|---|
| BENZENE | 19.9 | 99.4 % | 3.36 % |
| TOLUENE | 19.9 | 99.3 % | 2.29 % |
| ETHYLBENZENE | 19.6 | 97.8 % | 2.37 % |
| TOTAL XYLENES | 39.0 | 97.5 % | 2.33 % |

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## LABORATORY QUALITY CONTROL SEQUENCE

METHOD : EPA 8020
INSTRUMENT ID : 1B

**LABORATORY BLANK**

MATRIX : W
SAMPLE ID : BLANK
SAMPLE AMOUNT : 5.0 G
ANALYSIS DATE : 06-25-93
ANALYSIS TIME : 14:33

ATAS NO. : B1

DILUTION FACTOR : 1.00

| COMPOUND | QUANTITATION LIMIT (PPB) | AMOUNT FOUND (PPB) |
|---|---|---|
| BENZENE | 1.0 | ND |
| TOLUENE | 1.0 | ND |
| ETHYLBENZENE | 1.0 | ND |
| TOTAL XYLENES | 1.0 | ND |

SURROGATE RECOVERY (BROMOFLUOROBENZENE): 102 %

**MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS**

NO MS/MSD RESULTS

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: QC0630MT(173)

DATE : 07-08-93

**QA/QC**

| DESCRIPTION | | PARAMETER | RESULTS | |
|---|---|---|---|---|
| METHOD BLANK | 06-30-92 | BARIUM | <5.0 | ug/L |
| METHOD BLANK | 06-30-92 | ARSENIC | <50.03 | ug/L |
| METHOD BLANK | 06-30-92 | CHROMIUM | <5.0 | ug/L |
| METHOD BLANK | 06-30-92 | LEAD | <30.0 | ug/L |
| METHOD BLANK | 06-30-92 | POTASSIUM | <500.0 | ug/L |
| METHOD BLANK | 06-30-92 | SODIUM | <500.0 | ug/L |
| METHOD BLANK | 06-20-92 | CHLORIDE | <0.2 | mg/L |
| METHOD BLANK | 06-20-92 | SULFATE | <0.2 | mg/L |
| METHOD BLANK | 06-19-92 | CHLORIDE | <0.2 | mg/L |
| METHOD BLANK | 06-19-92 | FLUORIDE | <0.2 | mg/L |
| METHOD BLANK | 06-19-92 | SULFATE | <0.2 | mg/L |
| METHOD BLANK | 07-02-92 | NITRATE | <0.10 | mg/L |
| METHOD BLANK | 06-25-92 | TOTAL CYANIDE | <10.0 | ug/L |
| BLANK SPIKE | 06-30-92 | ARSENIC | 99 % | RECOVERY |
| BLANK SPIKE | 06-30-92 | BARIUM | 99 % | RECOVERY |
| BLANK SPIKE | 06-30-92 | CHROMIUM | 105 % | RECOVERY |
| BLANK SPIKE | 06-30-92 | LEAD | 103 % | RECOVERY |
| BLANK SPIKE | 06-30-92 | POTASSIUM | 99 % | RECOVERY |
| BLANK SPIKE | 06-30-92 | SODIUM | 97 % | RECOVERY |
| BLANK SPIKE | 06-20-92 | CHLORIDE | 98 % | RECOVERY |
| BLANK SPIKE | 06-20-92 | SULFATE | 94 % | RECOVERY |
| BLANK SPIKE | 06-19-92 | FLUORIDE | 98 % | RECOVERY |
| BLANK SPIKE | 06-19-92 | CHLORIDE | 100 % | RECOVERY |
| BLANK SPIKE | 06-19-92 | SULFATE | 96 % | RECOVERY |
| BLANK SPIKE | 07-02-92 | NITRATE | 102 % | RECOVERY |
| BLANK SPIKE | 06-25-92 | TOTAL CYANIDE | 102 % | RECOVERY |

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CLIENT: BURLINGTON ENVIRONMENTAL, INC.
210 WEST SAND BANK ROAD P.O. BOX 330
COLUMBIA, IL 62236-0330
ATTN: KATHY BLAINE

REPORT: QC0623MT(172)

DATE : 07-14-93

QA/QC

| DESCRIPTION | | PARAMETER | RESULTS | |
|---|---|---|---|---|
| METHOD BLANK | 06-23-93 | FLOURIDE | <0.2 | mg/L |
| METHOD BLANK | 06-23-93 | CHLORIDE | <0.2 | mg/L |
| METHOD BLANK | 06-28-93 | SULFATE | <0.2 | mg/L |
| METHOD BLANK | 07-02-93 | NITRATE | <0.10 | mg/L |
| METHOD BLANK | 06-30-93 | TOTAL CYANIDE | <10.0 | ug/L |
| METHOD BLANK | 06-30-93 | LEAD | <3.0 | ug/L |
| METHOD BLANK | 07-01-93 | BARIUM | <5.0 | ug/L |
| METHOD BLANK | 07-01-93 | SODIUM | <500 | ug/L |
| METHOD BLANK | 07-01-93 | POTASSIUM | <500 | ug/L |
| METHOD BLANK | 07-02-93 | CHROMIUM | <1.0 | ug/L |
| METHOD BLANK | 07-05-93 | ARSENIC | <10.0 | ug/L |
| METHOD BLANK | 07-02-93 | NITRATE | <0.10 | ug/L |
| BLANK SPIKE | 06-23-93 | FLOURIDE | 103 % | RECOVERY |
| BLANK SPIKE | 06-23-93 | CHLORIDE | 98 % | RECOVERY |
| BLANK SPIKE | 06-23-93 | SULFATE | 94 % | RECOVERY |
| BLANK SPIKE | 07-02-93 | NITRATE | 102 % | RECOVERY |
| BLANK SPIKE | 06-30-93 | TOTAL CYANIDE | 92 % | RECOVERY |
| BLANK SPIKE | 06-30-93 | LEAD | 118 % | RECOVERY |
| BLANK SPIKE | 07-01-93 | BARIUM | 100 % | RECOVERY |
| BLANK SPIKE | 07-01-93 | SODIUM | 100 % | RECOVERY |
| BLANK SPIKE | 07-01-93 | POTASSIUM | 102 % | RECOVERY |
| BLANK SPIKE | 07-02-93 | CHROMIUM | 93 % | RECOVERY |
| BLANK SPIKE | 07-05-93 | ARSENIC | 92 % | RECOVERY |
| BLANK SPIKE | 07-02-93 | NITRATE | 102 % | RECOVERY |

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**LABORATORY QUALITY CONTROL SEQUENCE**

METHOD : EPA 8020
INSTRUMENT ID : 2B

**LABORATORY BLANK**

MATRIX : W
SAMPLE ID : BLANK
SAMPLE AMOUNT : 5.0 G
ANALYSIS DATE : 06-21-93
ANALYSIS TIME : 10:59

ATAS NO. : B1
DILUTION FACTOR : 1.00

| COMPOUND | QUANTITATION LIMIT (PPB) | AMOUNT FOUND (PPB) |
|---|---|---|
| BENZENE | 1.0 | ND |
| TOLUENE | 1.0 | ND |
| ETHYLBENZENE | 1.0 | ND |
| TOTAL XYLENES | 1.0 | ND |

RROGATE RECOVERY (BROMOFLUOROBENZENE): 98 %

**MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS**

| COMPOUND | SPIKE CONC. (PPB) | 6994.08 SAMPLE CONC. (PPB) | 6994.08 MS MATRIX SPIKE CONC.(PPB) | PERCENT RECOVERY |
|---|---|---|---|---|
| BENZENE | 20.0 | ND | 19.1 | 96 % |
| TOLUENE | 20.0 | 1.7 | 20.7 | 95 % |
| ETHYLBENZENE | 20.0 | ND | 20.8 | 104 % |
| TOTAL XYLENES | 40.0 | 1.1 | 42.6 | 104 % |

| | 6994.08 MSD MATRIX SPIKE DUP. CONC.(PPB) | PERCENT RECOVERY | RELATIVE PERCENT DIFFERENCE |
|---|---|---|---|
| BENZENE | 18.1 | 90 % | 6.4 % |
| TOLUENE | 19.4 | 89 % | 6.5 % |
| ETHYLBENZENE | 19.8 | 99 % | 4.9 % |
| TOTAL XYLENES | 40.5 | 98 % | 5.9 % |

INTERFERENCE AT BENZENE

**EXPANDED HYDROGEOLOGY STUDY FOR THE EL PASO NATURAL GAS COMPANY JAL 4 FACILITY: PHASE 2**



*prepared for*

El Paso Natural Gas Company
El Paso, Texas

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January 1991

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# 1.0 INTRODUCTION

In August 1990, K. W. Brown & Associates, Inc. (KWB&A) prepared a report (KWB&A, 1990) that addressed the hydrogeologic setting of the El Paso Natural Gas Company (EPNG) Jal 4 facility (Jal 4). In addition to presenting the hydrogeologic setting, the report offered information on the regional and local geology as well as the climatic setting. Since this information is fully discussed in the Phase 1 report, it will not be repeated here. Rather, this report will focus on events that have transpired since the submittal of the Phase 1 report.

Events conducted under the Phase 2 effort include installing four monitoring wells and one piezometer, conducting a pump test to empirically determine hydraulic conductivity, storativity, and transmissivity of the aquifer, and calibrating the model which was used in Phase 1 with site specific data gathered during the Phase 2 investigation. Although four monitoring wells were installed, only three are functional. A full discussion on the monitoring well installation is presented in Section 3.1.

## 2.0 REVIEW OF PHASE 1 REPORT—PERTINENT POINTS

The Phase 1 effort indicated Jal 4 is situated over the Ogallala aquifer. Water quality in the area upgradient of Jal 4, characterized by EPNG well 12 (EPNG 12), was relatively good as compared to water retrieved from downgradient wells. Depth to water at the site was approximately 100 to 110 feet and the groundwater was found to exist under unconfined conditions. The hydraulic gradient was determined to be 0.0018 ft/ft and the flow direction was determined to be to the southeast.

It was also determined that the area receives an average annual precipitation of 8 inches and the surface soils are of a sandy texture. Texture of the underlying sediments varies from sandy to cemented sandstones and caliche.

Analytical results for groundwater samples collected from on-site monitoring wells illustrated a large concentration of saline water in the area where old-wastewater ponds were once located. The configuration of the saline plume was determined to trend from the northwest to the southeast along the axis of the groundwater flow direction. In addition to identifying the presence of "saltwater", several organic constituents, including but not limited to BETX, naphthalenes, and phenols were identified in the Phase 1 investigation.

Groundwater data known and assumed about the site were used to predict the configuration of the plume identified. Since firm data for each of the hydrologic parameters were not available during Phase 1, reasonable estimates were made. The computer simulation illustrated the plume extended from Jal 4 to the southeast, under Highway 18, for a distance of approximately 300 feet.

## 3.0 WELL INSTALLATION, DEVELOPMENT, AND SURVEY

Information presented in this section describes the installation and completion of the monitoring wells installed by KWB&A during the Phase 2 investigation.

### 3.1 WELL INSTALLATION

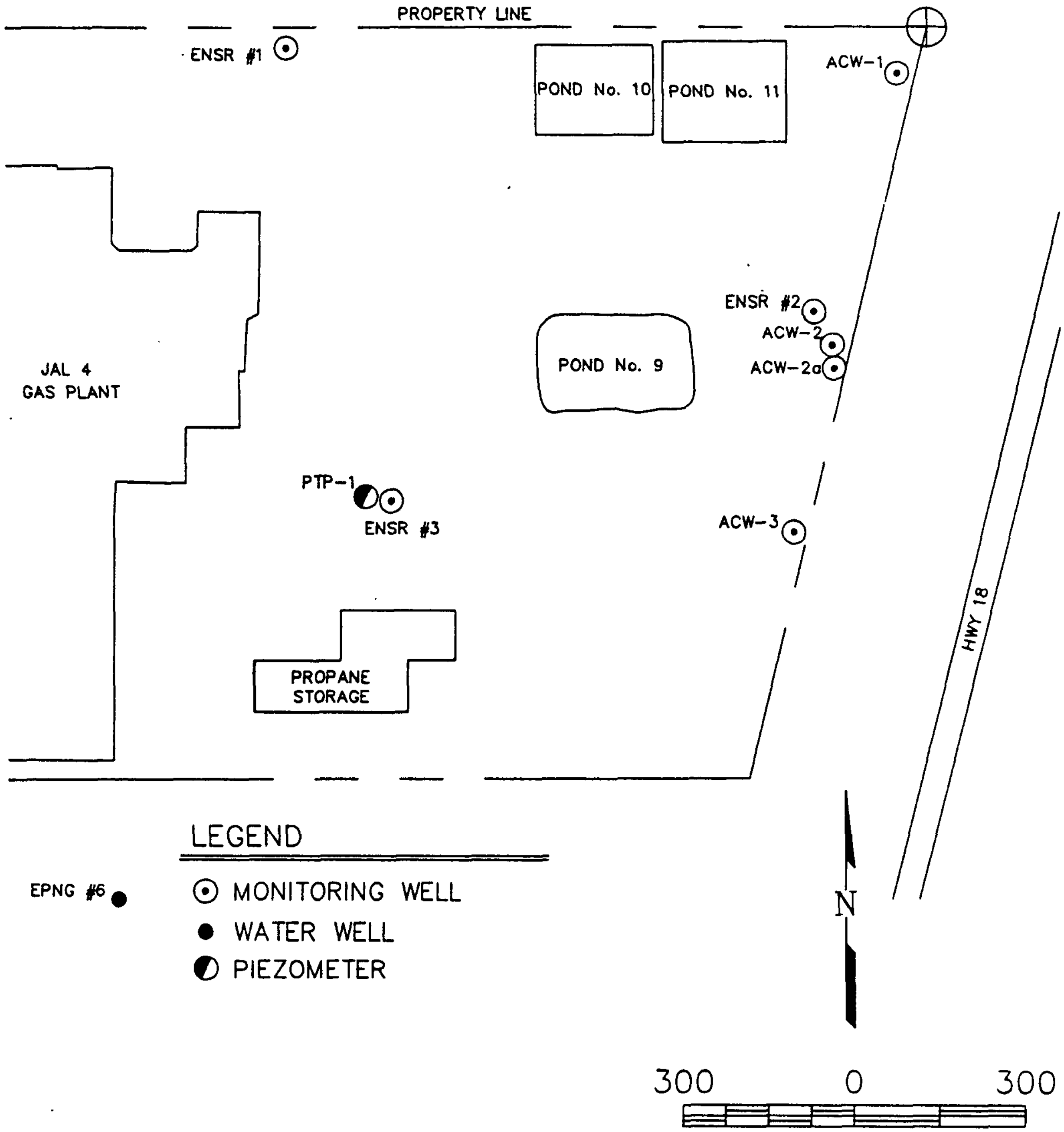
A total of four monitoring wells and one piezometer were installed during the Phase 2 field activities. It was originally intended that three monitoring wells would be installed, however, one of the wells could not be developed properly and it was necessary to install a replacement well. The locations of all monitoring wells are illustrated on Figure 1; the ACW-series wells were installed during the Phase 2 effort. Locations for the ACW wells were selected so they would be perpendicular to axis of the documented groundwater plume. Additionally, they were placed to the east as far as possible, while remaining on EPNG property, in an effort to further define the downgradient configuration of the plume.

Each of the wells, and the piezometer, were installed by West Texas Water Well Service. The drill rig used was a Badger 2000 rotary that could drill either on air or using water/mud. Each of the wells at the site was drilled using the rotary mud wash and completed using 4-inch schedule 40 PVC flush-thread casing with 0.010 machine slot screens. Stainless-steel centralizers were used to hold the PVC screen in the center of the bore hole during completion. An 8/16 Brady sand was tremmied in place around the screen and a bentonite seal was placed above the sand. The thickness of the seal ranged from 2 feet to 11 feet. A standard neat cement was used to seal the annular space from the bentonite seal to the ground surface. The well head assembly consists of a locking steel casing and a 4'x4'x4" concrete pad. Construction details and the geologic logs are included in Appendix A.

During the first field trip, conducted November 12-17, 1990, two of the three monitoring wells and the piezometer were successfully installed. One of the wells, ACW-2, would not produce sufficient water to allow the well to be developed. Therefore, the decision was made to install a replacement well. The replacement well is designated as ACW-2a and was installed on December 10, 1990.

### 3.2 WELL DEVELOPMENT

Upon completion, a 4-inch submersible pump was used to purge water from each of the wells. During purging, the pH, electrical conductivity (EC), and the temperature of the well was monitored. As these values stabilized and the turbidity of the purged water cleared, the well was considered completely developed and ready for sampling. As part of the well development




**El Paso**
Natural Gas Company

LOCATION OF MONITORING WELLS.

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: 637090006 115 (EPJAL2) | | | LOCATION: LEA COUNTY, NM | | |
| K.W. BROWN & ASSOCIATES, INC. | | | | | DATE: 01/28/91 |
| APPR: | S.J.L | S.A. Johnson | DRAWN BY: | RMM | SCALE: 1"=300' |
| DATE: | 1.21.91 | 1-29-91 | DATE: | 11/27/90 | FIGURE: 1 |

procedure, a surge block was used to dislodge loose particles from the screened portion of the formation and the well screen. As mentioned previously, it was not possible to develop ACW-2 due to the low yield of the well. Therefore, ACW-2a was installed. ACW-2a's development was consistent with the development of the other wells. Table 1 lists the final values for the parameters monitored during the development of the wells.

Table 1. Parameters Monitored During Well Development.

| Parameter | ACW-1 | ACW-2a | ACW-3 |
|---|---|---|---|
| Purged volume (gallons) | 967 | 538 | 800 |
| Stable pH (S.U.) | 9.71 | 7.78 | 6.64 |
| Stable EC (μmhos/cm) | 22,000 | 16,500 | 35,000 |
| Stable temperature (Celsius) | 18.9 | 16.6 | 19.5 |

3.3 WELL SAMPLING

Each of the completed monitoring wells installed by KWB&A during the Phase 2 effort was sampled to determine local groundwater quality. Upon completion of the well development, a dedicated disposable bailer was lowered into each well to retrieve samples. Once retrieved, samples were placed into appropriate containers with the appropriate preservatives. Each sample was logged in on a chain-of-custody form and placed on ice in the field to preserve the integrity of the samples. Upon completing the sampling, the ice chests containing the samples were sealed and shipped via Federal Express to Analytical Technologies in Tempe, Arizona.

3.4 SAMPLE ANALYSIS AND DISCUSSION OF RESULTS

During the Phase 1 effort, a large list of organic and inorganic constituents were selected for analysis. Based on the Phase 1 analytical results, the list of constituents selected for the Phase 2 analysis was reduced. The analytical parameters selected for Phase 2 are listed in Table 2.

Table 2. Analytical Parameters and Test Methods.

| Parameter | Method |
|---|---|
| Total phenols | 420.2 (Reference 1) |
| Total dissolved solids | 160.1 (Reference 1) |
| Benzene | 8020M (Reference 2) |
| Toluene | 8020M (Reference 2) |
| Ethylbenzene | 8020M (Reference 2) |
| Xylene | 8020M (Reference 2) |

Reference 1: Methods for Chemical Analysis of Water and Wastes, March 1983 EPA-600 4-79-020.
Reference 2: SW 846, 3rd Edition.

Analytical results for the samples indicate the presence of benzene in each of the three wells; the remaining volatiles appear in one or more of the wells. With the exception of the presence of 36 μg/L benzene in ACW-2a, all concentrations for volatiles are below the standards established by the New Mexico Water Quality Control Commission (WQCC). Phenols, as measured by an analytical method to quantify "total phenols", is above the 0.005 mg/L standard. Figure 2 graphically illustrates the concentrations of constituents noted in the ACW wells. For comparison purposes, values from the ENSR wells obtained during the Phase 1 report have been included to illustrate the concentrations of constituents present in the ENSR wells. In addition to the relative concentrations of organic constituents, the figure presents concentrations of some inorganic indicators.

Without exception, the total dissolved solid (TDS) content of the groundwater extracted from the ACW wells is above the upper WQCC limit for usable water. However, as was discussed in the Phase 1 report, groundwater being sampled by the monitoring wells is from an area which is impacted by past wastewater disposal practices at Jal 4. Therefore, the high TDS of the water is not representative of background water quality.

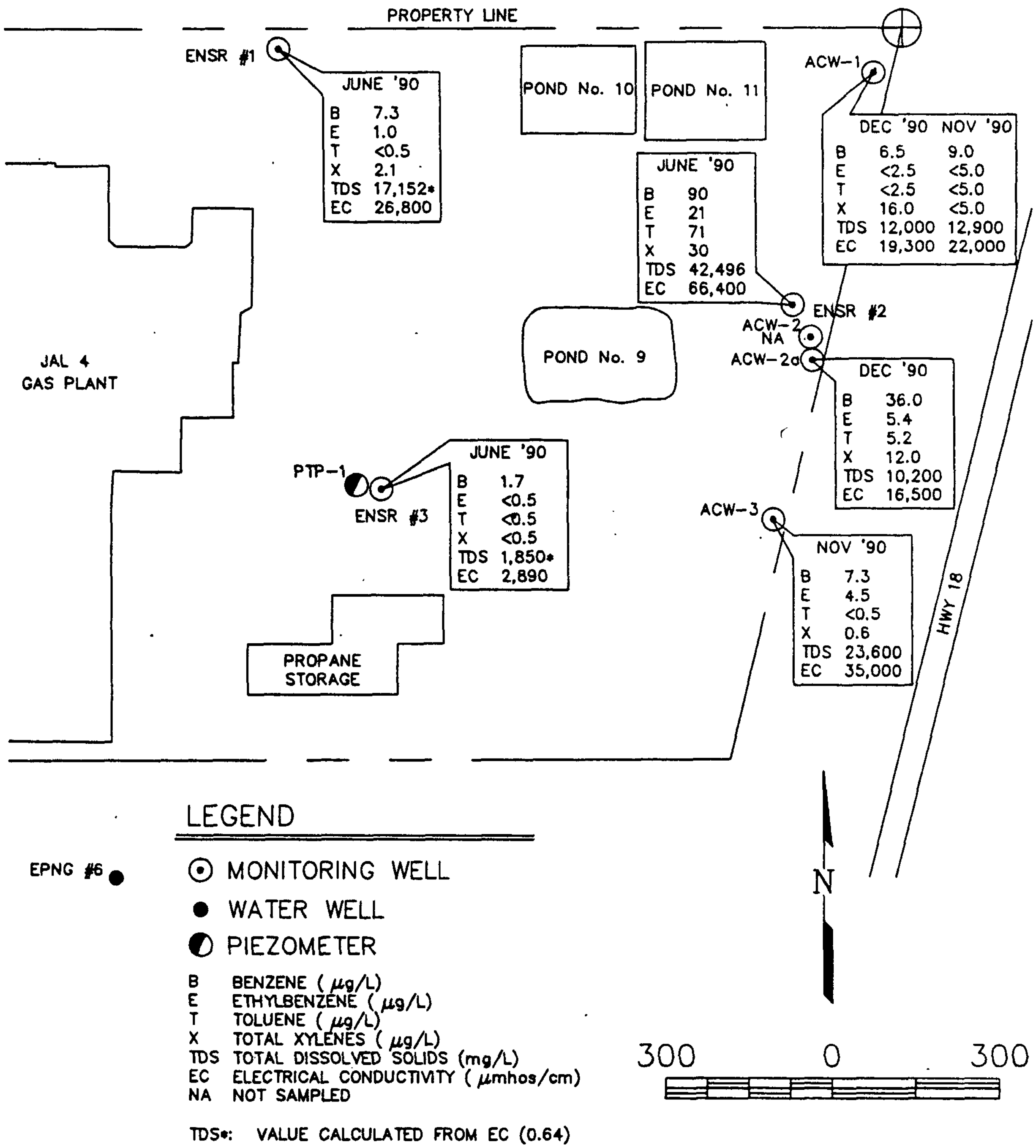
The quality of the local groundwater was established during Phase 1 by sampling EPNG well 12, which is located upgradient of the facility. A complete discussion on the water quality for this well is presented in Section 3.3 of the Phase 1 report. In general terms, however, it can be stated that the water quality from EPNG 12, as determined by major cations and anions, is considerably better than that measured in monitoring wells. Furthermore, the disparity in water quality can be illustrated by comparing EC values for EPNG 12 (background) and the ACW wells (downgradient). EPNG 12 has an EC value of 695 μmhos/cm, whereas the average EC value for the three ACW wells is 24,500 μmhos/cm.

Comparison of the EC values measured during Phase 2 with those gathered during Phase 1, indicate the configuration of the plume, as it was presented on Figure 4 of the Phase 1 report, were reasonably accurate. Specifically, the concentrations noted in the ACW wells fall within the predicted EC isopleths.

Numerical values for organic and inorganic parameters from Phase 2 are presented in Table 3 and Appendix B.

### 3.5 WELL SURVEY

Each of the ACW monitoring wells, and the piezometer, were surveyed by KWB&A field personnel. Although the survey can't be certified, the locations and elevations are considered to be accurate. The elevations for the ACW wells were established by back-sighting on ENSR 2. The elevation of ENSR 2 was then used as a benchmark to calculate the elevation of the well. Likewise, ENSR 3 was used as a benchmark for the survey of the piezometer. Table 4 lists the




| El Paso Natural Gas Company | CONSTITUENTS DETECTED IN MONITORING WELLS. | | | | |
|---|---|---|---|---|---|
| PROJECT: 637090006 115 (EPJAL2) | | | LOCATION: LEA COUNTY, NM | | |
| K.W. BROWN & ASSOCIATES, INC. | | | | | DATE: 01/28/91 |
| APPR: | St.C | SA Lehman | DRAWN BY: | RMM | SCALE: 1"=300' |
| DATE: | 1.28.91 | 1-29-91 | DATE: | 11/27/90 | FIGURE: 2 |

casing elevations established for the wells and the piezometer; ENSR wells and EPNG wells are included for completeness.

Table 3. Laboratory Results.

| Parameter | WQCC Standard | ACW-1 11/16/90 | ACW-1 12/14/90 | ACW-2a 12/13/90 | ACW-3 11/16/90 |
|---|---|---|---|---|---|
| Total phenols (mg/L) | 0.005 | 0.15 | 0.07 | 0.24 | 0.10 |
| Total dissolved solids (mg/L) | 1,000 lower, 10,000 upper | 12,900 | 12,000 | 10,200 | 23,600 |
| Electrical conductivity (µmhos/cm) | No standard | 22,000 | 19,300 | 16,500 | 35,000 |
| Benzene (µg/L) | 10 | 9.0 | 6.5 | 36 | 7.3 |
| Ethylbenzene (µg/L) | 750 | <5.0 | <2.5 | 5.4 | 4.5 |
| Toluene (µg/L) | 750 | <5.0 | <2.5 | 5.2 | <0.5 |
| Total xylenes (µg/L) | 620 | <5.0 | 16 | 12 | 0.6 |

Table 4. Well Elevations.

| Well Identification | Casing Elevation (ft. above MSL) |
|---|---|
| ACW-1 | 3,300.87 |
| ACW-2 | 3,301.07 |
| ACW-2a | 3,300.88 |
| ACW-3 | 3,300.34 |
| PTP-1 (Piezometer) | 3,304.41 |
| ENSR 1 | 3,305.40 |
| ENSR 2 | 3,301.60 |
| ENSR 3 | 3,303.80 |
| EPNG 1 | 3,308.60 |
| EPNG 5 | 3,308.90 |
| EPNG 6 | 3,305.30 |
| EPNG 12 | 3,324.90 |

## 4.0 AQUIFER CHARACTERISTICS

The primary focus of the Phase 2 effort was to gather accurate data for physical aquifer characteristics needed to predict the migration of the plume at the site. To this end, a piezometer was installed near ENSR 3 for the sole purpose of conducting a pump test. The piezometer was designated as PTP-1 (Pump Test Piezometer). The completion detail for this piezometer is included in Appendix A. Data from the pump test was used in conjunction with analytical data from the monitoring wells.

### 4.1 PUMP TEST

By pumping a well and observing the behavior of adjacent wells screened at similar depths, one can calculate the transmissivity[1] and storage coefficient[2] of the aquifer by the application of an appropriate method of analysis. These numbers define the geometry of the cone-of-depression surrounding a pumping well. For example, an aquifer having high transmissivity will have a very broad cone-of-depression, extending for, in some cases, miles in all directions away from the pumping well. Conversely, an aquifer possessing a low value for transmissivity will have a cone-of-depression that is tightly wrapped around the pumping well. Additionally, an aquifer with a low storage coefficient, for a given rate of pumpage, will generate more drawdown[3] than an aquifer having a higher storage coefficient (Freeze and Cherry, 1979). By having these hydraulic descriptors available, it is possible to model the hydraulics of an aquifer system.

On November 12, 1990, the first of two separate pump tests was conducted. This pump test, however, did not continue to a satisfactory conclusion. Approximately 52 minutes into the test, the pump failed in such a manner that it could not be repaired in the field. An attempt was made to analyze the data collected during this "brief" pump test to determine whether or not useful data could be extracted. It was decided that the test was simply too short to offer credible data. Therefore, a decision was made to repeat the test at a later date.

The second pump test was conducted during December. The methods and results presented in the following sections are from the second pump test.

---

1 Transmissivity is defined as the rate at which water of prevailing kinematic viscosity is transmitted through a unit width of aquifer under a unit hydraulic gradient (Todd, 1980).

2 Storage coefficient is defined as the volume of water that an aquifer releases from or takes into storage per unit surface area of aquifer per unit change in the component of hydraulic head oriented normal to that surface (Todd, 1980).

3 Drawdown is simply the numerical difference between pumping and nonpumping water levels in an aquifer.

#### 4.1.1 Pump Test Methods

Pretest conceptual modeling demonstrated that a sufficiently-high pumping rate (i.e., 20 GPM) could be maintained in the pumping well (ENSR-3) for inducing drawdown in the piezometer, without the generation of excessive drawdown in the pumping well. For the pump test, an Aeromotor A20B-75 submersible pump was used to withdraw water from ENSR-3. A gate valve and flow meter were used to control and determine the pumping rate during the test.

A two-channel data logger (SE1000B), manufactured by In-Situ, Inc. (Laramie, Wyoming), was used to collect readings of water levels via pressure transducer in both the pumping and observation well. This device was programmed to sample the transducers on a logarithmic interval for the first few minutes of the test, where it then assumed an arithmetic, or linear, sampling rate. By having values of water levels on a logarithmic schedule initially, it is possible to evaluate the effects of pumping during the early portion of the test. The SE1000B records readings from a pressure transducer placed below the expected level of drawdown. For the observation well, the pressure transducer was placed at a depth within the screened interval of the casing. The pressure transducer for the pumping well was placed at the top of the pump, below the static water level.

#### 4.1.2 Pump Test Procedure

Water level measurements were taken in the pumping well prior to initiation of the pump test. This procedure was performed to obtain a baseline value for the pre-pumping water level in each well and to calibrate the data logger.

The pump test began at 11:38 am and ended at 5:28 pm on December 11, 1990. From the start of the test, the gate valve was fully opened to obtain the highest pumping rate possible. An average pump rate of 13.37 GPM was maintained during the test.

#### 4.1.3 Results of Pump Test

The variation in drawdown vs time for the observation well is presented in Figure 3. The figure shows that during pumping, the recorded drawdown in the observation well ranged from 0 to 1.1 feet. Figure 3 also shows the recovery curve for the observation well. The recorded recovery in the observation well ranged from 1.1 to 0.09 feet.

The raw data obtained by the data logger for the pumping and recovery periods are available in Appendix C. The recovery portion of the time/drawdown curve for PTP-1 was analyzed using the type curve solution of the Theis equation. The Theis equation assumes nonsteady, radial flow in a confined aquifer, without vertical leakage from overlying or underlying aquitards, and constant well discharge. Although it was determined that the aquifer was unconfined, the drawdown to saturated thickness ratio was acceptable to warrant application of the Theis method. Based upon the type curve solution of the recovery data, the values of transmissivity, storage coefficient, and hydraulic conductivity are given in Table 5.

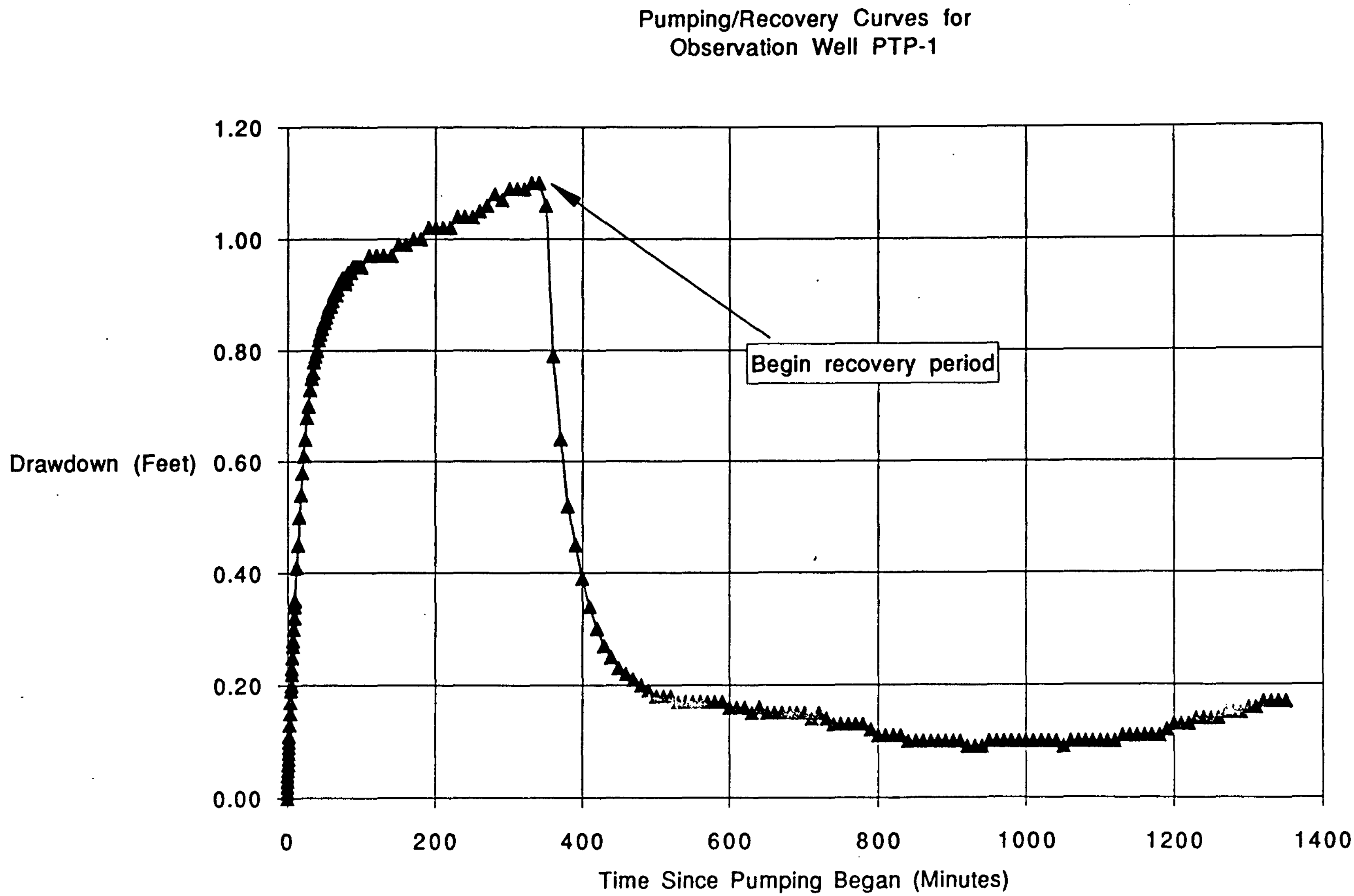


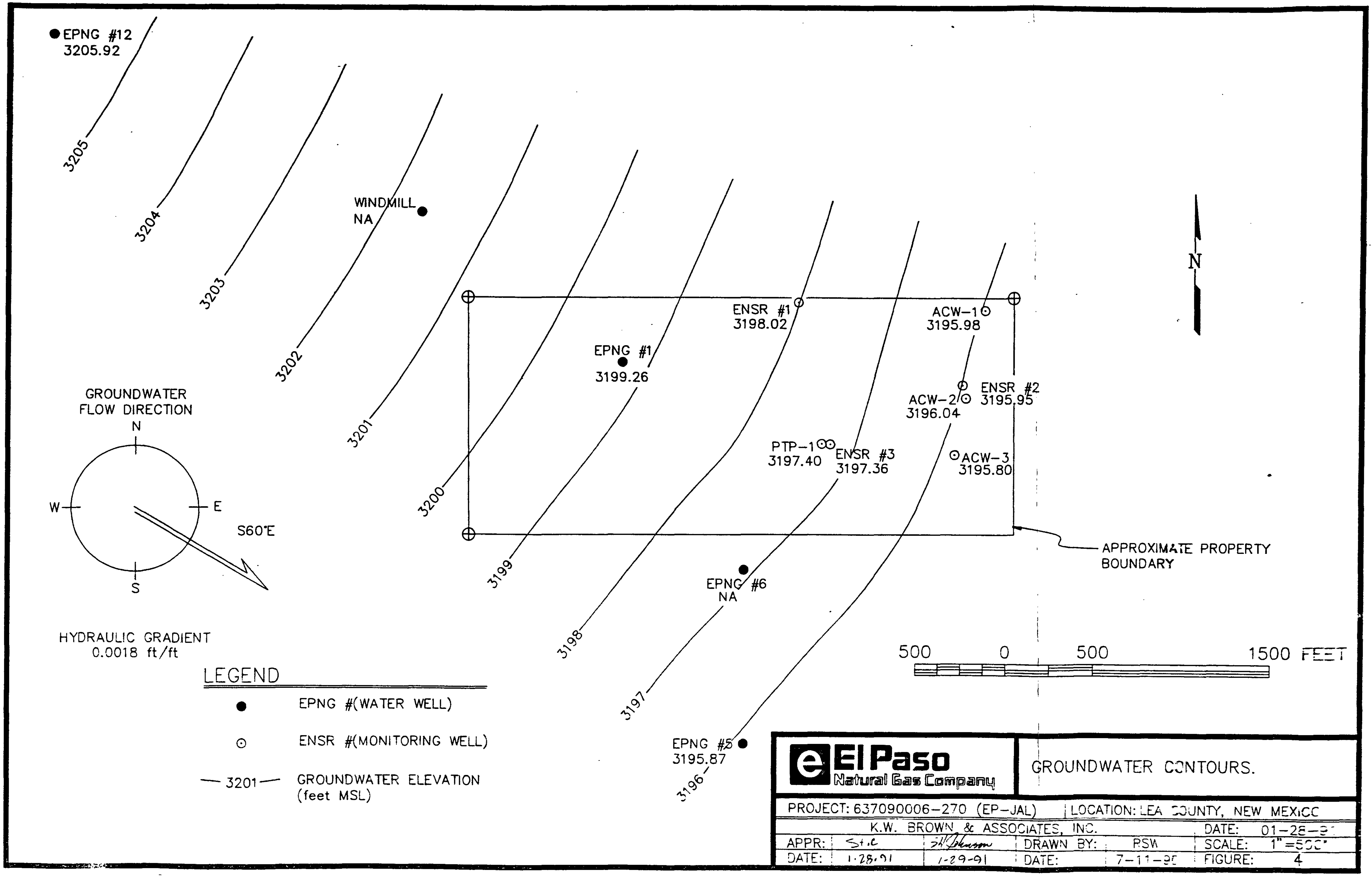

Figure 3. Pumping/Recovery Curves for Observation Well PTP-1.

Table 5. Results of Pump Test.

| Observation Well | Transmissivity | | Storage Coefficient | | Hydraulic Conductivity |
|---|---|---|---|---|---|
| PTP-1 | Theis Analysis: 6,128 GPD/FT | Theis Recovery: 3,800 GPD/FT | Theis Analysis: 0.0152 | Theis Recovery: Not Possible | 4.5 x$10^{-3}$ cm/sec |

## 4.2 HYDRAULIC GRADIENT AND FLOW DIRECTION

The hydraulic gradient and flow direction were established by Phase 1 data and were thoroughly explained in the Phase 1 report. It was determined during the Phase 2 effort that the hydraulic gradient was stable at 0.0018 ft/ft. Likewise, a southeast groundwater flow direction was again confirmed. In fact, the direction of groundwater flow did not differ from that presented in the Phase 1 report. The Phase 1 report documented a flow direction of N125°E (S55°E) and the Phase 2 data indicates a flow direction of N120°E (S60°E). Figure 4 illustrates the groundwater contours as determined by Phase 2 data. Methods used to make the Phase 2 determinations are consistent with the methods described in Section 4.3 of the Phase 1 report.

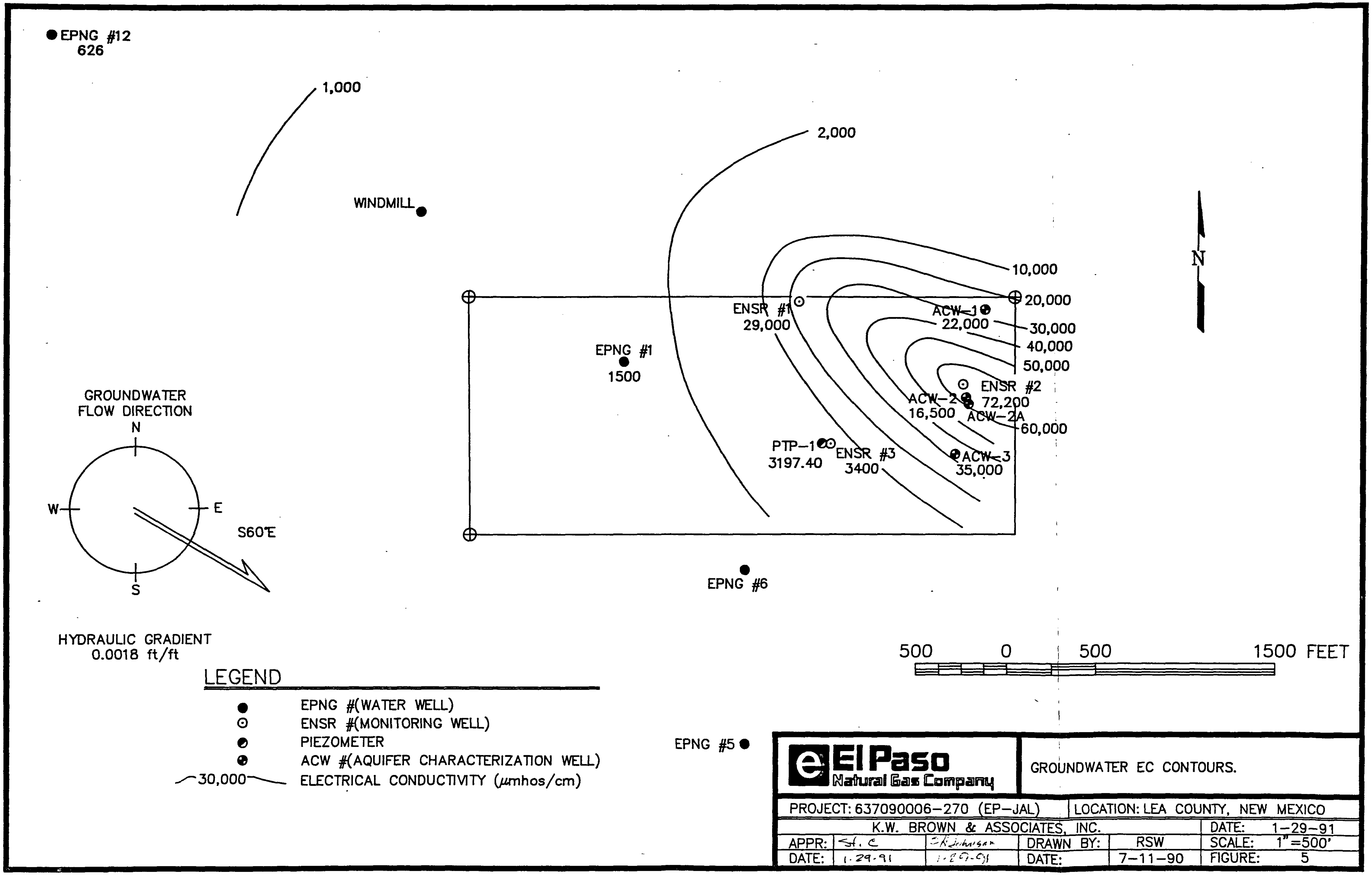

EPNG #12
3205.92
3205
3204
3203
3202
3201
3200
3199
3198
3197
3196
WINDMILL
NA
EPNG #1
3199.26
ENSR #1
3198.02
ACW-1
3195.98
ACW-2
3196.04
ENSR #2
3195.95
PTP-1
3197.40
ENSR #3
3197.36
ACW-3
3195.80
EPNG #6
NA
EPNG #5
3195.87
N
GROUNDWATER
FLOW DIRECTION
N
W
E
S
S60°E
HYDRAULIC GRADIENT
0.0018 ft/ft
APPROXIMATE PROPERTY
BOUNDARY
500 0 500 1500 FEET
LEGEND
EPNG #(WATER WELL)
ENSR #(MONITORING WELL)
3201 GROUNDWATER ELEVATION
(feet MSL)
El Paso
Natural Gas Company
GROUNDWATER CONTOURS.
PROJECT: 637090006-270 (EP-JAL)
LOCATION: LEA COUNTY, NEW MEXICO
K.W. BROWN & ASSOCIATES, INC.
DATE: 01-28-91
APPR:
DRAWN BY: RSW
SCALE: 1"=500'
DATE: 1-28-91
1-29-91
DATE: 7-11-95
FIGURE: 4

## 5.0 PLUME CONFIGURATION

The configuration of the plume as it was presented on Figure 4 and discussed in Section 4.5 of the Phase 1 report are considered to be reasonably accurate. This assessment is based on data collected for the ACW monitoring wells which support the predictions made by the Phase 1 report. Figure 5 collectively illustrates the EC data collected from the Phase 1 sampling effort and data from Phase 2. From this figure, it is apparent that the plume is oriented in a northwest to southeast position. Likewise, it is clearly evident that the plume is restricted to the area where wastewater ponds were previously located. Predictions of the southeast extent of the plume have been calculated using a contaminant transport model. Results of this effort are offered in Section 6.4.

The conclusion reached during Phase 1 that the groundwater quality beneath the area where the wastewater ponds were located has been impacted by past activities, was supported by Phase 2 data. Specifically, the electrical conductivity of groundwater in the area of the old ponds was drastically greater than background and trace levels of organic constituents were present. Additionally, each of the ACW wells exhibited a distinctive "propane" odor (i.e., mercaptans were present).

It is interesting to note the difference in water quality between ENSR-3 and ACW-3. ENSR-3 is relatively clean when compared to the other monitoring wells. However, ACW-3 yields water which contains trace levels of organic constituents and elevated levels of salts (as suggested by EC and TDS). The most plausible cause for the difference is their location relative to the now closed wastewater ponds. ENSR-3 is in an upgradient position of the ponds (e.g., Ponds 6 and 7) and ACW-3 is in a downgradient position.


EPNG #12
626
1,000
2,000
WINDMILL
10,000
20,000
30,000
40,000
50,000
60,000
N
ENSR #1
29,000
ACW-1
22,000
EPNG #1
1500
ENSR #2
72,200
ACW-2
16,500
ACW-2A
PTP-1
3197.40
ENSR #3
3400
ACW-3
35,000
EPNG #6
EPNG #5
GROUNDWATER
FLOW DIRECTION
N
W
E
S
S60°E
HYDRAULIC GRADIENT
0.0018 ft/ft
500 0 500 1500 FEET
LEGEND
EPNG #(WATER WELL)
ENSR #(MONITORING WELL)
PIEZOMETER
ACW #(AQUIFER CHARACTERIZATION WELL)
30,000 ELECTRICAL CONDUCTIVITY (µmhos/cm)
El Paso Natural Gas Company
GROUNDWATER EC CONTOURS.
PROJECT: 637090006-270 (EP-JAL)
LOCATION: LEA COUNTY, NEW MEXICO
K.W. BROWN & ASSOCIATES, INC.
DATE: 1-29-91
APPR:
DRAWN BY: RSW
SCALE: 1"=500'
DATE: 1-29-91 1-29-91
DATE: 7-11-90
FIGURE: 5

# 6.0 GROUNDWATER MODELING

A thorough discussion of the model used to predict the configuration of the plume is presented in the Phase 1 report (Section 4.6). Moreover, predictions on the configuration and "character" of the plume were also presented in the Phase 1 report. However, the Phase 1 modeling effort was hampered because site-specific data were not available concerning the physical characteristics of the aquifer. Also, the locations of the ENSR monitoring wells (those used for the Phase 1 work) were not optimum for predicting plume configuration and migration. Hence, the Phase 2 effort was undertaken to better position monitoring wells and to collect accurate values for physical aquifer characteristics.

Unlike the previous sections of this report, where the reader is referred back to the Phase 1 report for information, this section on groundwater modeling has been extracted from the first report in its entirety. This was done because the modeling effort is the keystone of the Phase 2 effort and a complete discussion is warranted even though it is, in many respects, redundant with the Phase 1 report. In reading this section, it will become apparent that much of the text is identical; however, the numerical values have been revised to reflect Phase 2 data.

## 6.1 DESCRIPTION OF THE MODEL

The mathematical model used to simulate groundwater flow and solute transport in the uppermost aquifer at the Jal 4 site is a two-dimensional finite-difference model that computes values of hydraulic head (sum of pressure and elevation heads) and reactive or nonreactive solute concentration on a rectangular grid having equal spacing between nodes. The model was written by Konikow and Bredehoeft (1978), and is typically referred to as the USGS Method of Characteristics (MOC) model. The program is capable of generating transient or steady-state solutions for the hydraulic head field.

In a review of mathematical models for the U.S. Nuclear Regulatory Agency (NRC), Thomas et al. (1982) state that MOC "... is a well-tested and well-documented code that would be well-suited for solving single-aquifer problems. Its high degree of acceptance makes it stand out among solute transport codes ..."

The model has undergone verification by comparison with several analytical models and has demonstrated excellent comparisons (Thomas et al., 1982). Field validation has been carried out for chloride movement at the Rocky Mountain Arsenal (Konikow, 1977), and for radionuclide transport at the National Reactor Testing Station (Robertson, 1974).

## 6.2 MODEL ASSUMPTIONS

In order to effect a practical solution to complex hydrogeologic problems, a number of simplifying assumptions have been invoked by the model authors (Konikow and Bredehoeft, 1978); the following is a synopsis of those assumptions

1. Darcy's Law is valid and hydraulic head gradients are the only significant driving mechanism for fluid flow.
2. The porosity and hydraulic conductivity of the aquifer are constant in time, and porosity is uniform in space.
3. Gradients of fluid density, viscosity, and temperature do not affect the velocity distribution.
4. Ionic and molecular diffusion are negligible contributors to the total dispersive flux.
5. Vertical variations in head and concentration are negligible (i.e., computed values of head and concentration are averaged over the thickness of the aquifer).
6. The aquifer is homogeneous and isotropic with respect to the coefficients of longitudinal and transverse dispersivity.

There are no reasons to believe that Darcy's Law is not valid for description of the flow system at Jal 4. Factors governing the validity of Darcy's Law are: (a) fluid density, (b) pore fluid velocity, (c) average pore (grain size) diameter, and (d) dynamic fluid viscosity. Readers trained in the field of fluid mechanics will recognize these factors as those variables that define the Reynolds Number:

$$N_R = \frac{\rho V D}{\mu} \qquad (1)$$

Where: $N_R$ = Reynolds Number

$\rho$ = fluid density

$V$ = pore fluid velocity

$D$ = average pore (grain size) diameter

$\mu$ = dynamic fluid viscosity

Most agree that the upper limit for the validity of Darcy's Law is when the $N_R$ rises above the range 1 to 10. Thus, given the prevailing conditions at Jal 4, it is asserted that assumption (1) is met at both waste management areas.

Obviously, porosity and hydraulic conductivity are spatially-varying quantities for naturally-occurring aquifers. Without extensive field and laboratory measurements, the spatial distribution of the parameters remains unknown. The assignment of point estimates for porosity represents a significant departure from reality, and the application of assumption (2) is questionable. Given the limitations constraining the study, however, the approximation of some variables by point estimates and supplementing these estimates with site-specific values is deemed acceptable.

The high levels of EC in the groundwater beneath Jal 4 (i.e., up to 70,000 μmhos/cm), suggest a significant concentration of dissolved salts. It is possible that the groundwater contains salt levels in sufficient quantities to affect its density and viscosity. Although groundwater temperature may remain fairly constant throughout the year, density and viscosity will probably vary as a function of position (laterally and vertically) within the aquifer, and assumption (3) may not be valid.

The dispersion coefficient is generally defined as follows (Freeze and Cherry, 1979):

$$D_l = \alpha_l v_l + D^* \quad \text{(2)}$$

Where: $D_l$ = coefficient of hydrodynamic dispersion
$\alpha_l$ = dispersivity along flow path l
$v_l$ = average linear groundwater velocity
$D^*$ = coefficient of molecular diffusion

For assumption (4) to be met, the first term in equation (2) must overshadow the second term; a quick calculation shows this to be the case:

Let $\alpha_l$ = 100 feet (selected through trial and error)
$v_l$ = 9 feet/year (based on field data)
$D^*$ = $5 \times 10^{-9}$ ft$^2$/sec (Freeze and Cherry, 1979)
$\alpha_l v_l$ = $2.9 \times 10^{-5}$ ft$^2$/sec

Thus, the first term dominates the expression by four orders-of-magnitude, and the contribution to the dispersion coefficient by the diffusion coefficient is negligible.

With regard to assumption (5), where vertical gradients are absent, the variation of hydraulic head with depth is nonexistent. That is to say that, along a vertical line, the total head is constant, and this portion of assumption (5) is valid. The vertical variation of solute concentration with depth is much less known, and the viability of assumption (5) in this regard is in question. However, the small aquifer thickness at Jal 4 should aid in uniform mixing of solute.

Finally, it is generally recognized that dispersivity is a scale-dependent quantity. Molz et al. (1983) summarized the problematic nature of dispersivity measurement as follows: "... the greater the travel distance in a tracer test used to measure dispersivity, the larger the dispersivity value that is calculated." This phenomenon is largely attributed to vertical variations in aquifer hydraulic conductivity. Thus, at the current level of knowledge regarding dispersivity, precise spatial distributions for this parameter are very difficult to determine. Assumption (6) is considered to be reasonable in light of the absence of concrete methods with which to measure field values of longitudinal and transverse dispersivity.

## 6.3 INPUT REQUIREMENTS

The principal data required by the model to generate a solution are given in Table 6. Table 7 lists all of the parameter values used during the model runs. The model runs illustrate calibration of the model (Run 1) and recovery of impacted groundwater. The calculations are discussed below and the computer output is included as Appendix D.

### Model Calibration

Hydraulic head contours were generated from water level measurements made in the monitoring wells on-site. These wells included ENSR-1, -2, -3, ACW-1, -2a, -3 and EPNG-1.

The primary constituent focused on during calibration was EC. EC was used as the "contaminant" in the model, and the assumption was made that no adsorption processes would be simulated. That is, the modeled contaminant would move at the velocity of the groundwater.

The procedure generally involved identifying parameters with the least-known values, and utilizing those as the parameters that would be varied throughout the trial-and-error procedure. For this analysis, pond water EC, pond leakage rate, and longitudinal and transverse dispersivity were the most-unknown parameters available.

The remainder of the parameters, such as transmissivity, aquifer recharge, and porosity were estimated by the modelers based on experience and knowledge of the site, or were determined empirically through field testing.

It was assumed that the ponds had leaked at a constant rate, with constant pond water EC, for a period of 30 years. Thus, Run 1 extended from 1961 through 1990. Figure 6 is a graph of observed versus computed EC. For a good calibration, these data points should lie on a 45-degree line. As is apparent from an examination of this figure, all data points lie on a 45-degree line, or deviate slightly. ACW-2a is the only well that does not fit well. EC is overpredicted at this location, suggesting that perhaps this well would need to be pumped for an additional time to achieve steady-state conditions. The configuration of the plume at the end of the calibration run is illustrated in Figure 7.

## 6.4 GROUNDWATER MODELING RESULTS

Information presented in this section is intended to provided qualitative predictions on the status of groundwater conditions at the site. Because it was necessary to make assumptions to supplement the available site-specific data, the numerical values presented are not offered

Table 6. Input Requirements for the USGS MOC Solute Transport Model.

| Parameter | Spatially[1] Varying? | Temporally[2] Varying? |
|---|---|---|
| Number of time steps | N/A | Yes |
| Simulation duration (Years) | N/A | N/A |
| Number of nodes in X-direction | N/A | No |
| Number of nodes in Y-direction | N/A | No |
| X-direction nodal spacing (Feet) | No | No |
| Y-direction nodal spacing (Feet) | No | No |
| Number of pumping or injection wells | Yes | N/A |
| Flow rate of pumping or injection wells (Ft3/sec) | Yes | Yes |
| Effective porosity | No | No |
| Longitudinal dispersivity (Feet) | No | No |
| Transverse dispersivity (Feet) | No | No |
| X-direction transmissivity (Ft2/sec) | Yes | No |
| Y-direction transmissivity (Ft2/sec) | Yes | No |
| Storage coefficient | No | No |
| Distribution coefficient (cm3/g) | No | No |
| Aquifer bulk density (g/cm3) | No | No |
| Half-life of solute (Seconds) | N/A | N/A |
| Saturated thickness of aquifer (Feet) | Yes | No |
| Diffuse discharge/recharge (Ft/sec) | Yes | No |
| Initial water table or piezometric surface elevation (Feet) | Yes | N/A |
| Initial solute concentration in aquifer (mg/L) | Yes | N/A |
| Vertical hydraulic conductivity of confining layer (Ft/sec) | Yes | No |
| Thickness of confining layer (Feet) | Yes | No |
| Source dimensions (Feet) | Yes | No |
| Source concentrations (mg/L) | Yes | No |
| Constant head boundaries (Feet) | Yes | No |
| No-flow boundaries | Yes | No |

[1] Does the quantity vary in a horizontal plane?

[2] Does the quantity vary in time?

Table 7. Input Data–USGS MOC Groundwater Flow/Contaminant Transport Model.

| Parameter | Calibration Value |
|---|---|
| Number of columns | 20 |
| Number of rows | 20 |
| Column width (Feet) | 200 |
| Row height (Feet) | 200 |
| Max. no time steps | 30 |
| Duration (Years) | 30 |
| Storage coefficient | 0 |
| Porosity | 0.2 |
| Longitudinal dispersivity (Feet) | 100 |
| Transverse dispersivity (Feet) | 30 |
| Transmissivity (Feet^2/day) | 9.48E-03 |
| Distribution coefficient (cm^3/g) | 0 |
| Aquifer thickness (Feet) | 65 |
| Hydraulic conductivity (cm/sec.) | 4.45E-03 |
| Aquifer recharge (In./Yr.) | 0.1 |
| Pond 1; Cell 3 leakage rate (Feet/year) | 20.5 |
| Pond 7; Cell 2 leakage rate (Feet/year) | 12.6 |
| Pond 7; Cell 4 leakage rate (Feet/year) | 11.0 |
| Pond 11; Cell 5 leakage rate (Feet/year) | 14.2 |
| Pond 1; Cell 3 water EC (mmhos/cm) | 150 |
| Pond 7; Cell 2 water EC (mmhos/cm) | 75 |
| Pond 7; Cell 4 water EC (mmhos/cm) | 40 |
| Pond 11; Cell 5 water EC (mmhos/cm) | 120 |

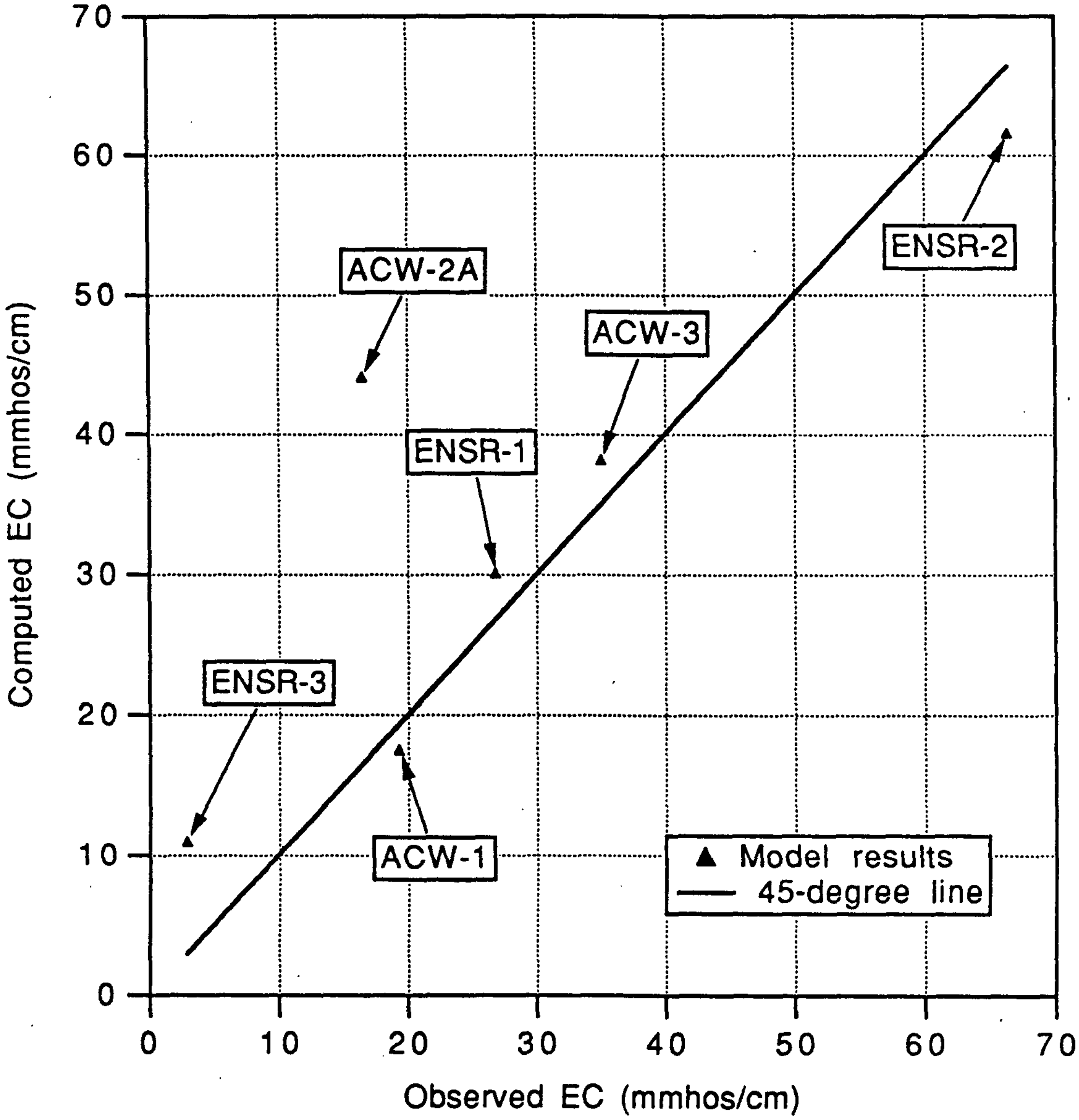
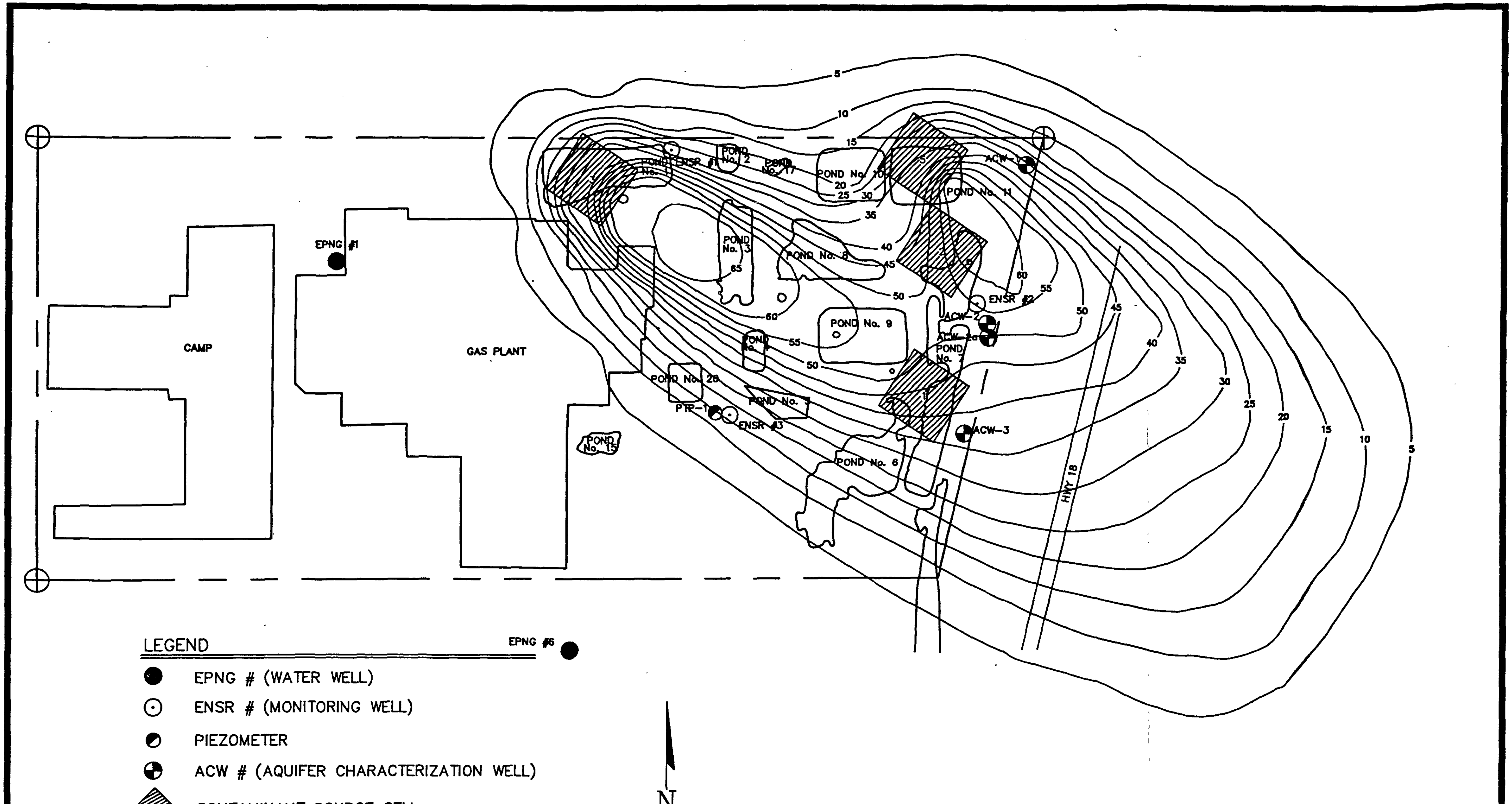



**Figure 6. Correlation of Observed and Computed EC.**




**El Paso Natural Gas Company**

COMPUTED EC PLUME (mmhos/cm) AT END OF CALIBRATION RUN (1990)

| | | | | |
|---|---|---|---|---|
| PROJECT: 637090006-270 (ECPLUME1) | | LOCATION: LEA COUNTY, NEW MEXICO | | |
| K.W. BROWN & ASSOCIATES, INC. | | | | DATE: 01-29-91 |
| APPR: | S.C | SHthomson | DRAWN BY: RMM | SCALE: 1" = 300' |
| DATE: | 1-29-91 | 1-29-91 | DATE: 01-23-91 | FIGURE: 7 |

as quantitatively-precise results. Nevertheless, the modeling results are considered to be representative of future conditions at the site.

Results from the groundwater modeling exercise indicate that the axis of the plume is oriented from the northwest to the southeast along the prevailing groundwater flow direction. The area affected by the plume encompasses the majority of the plant which at one time was occupied by wastewater ponds as well as an area to the southeast of the EPNG eastern property line. The lateral extent of the plume, as predicted by the model, extends to the east beyond Highway 18 for a distance of approximately 1,100 feet. This 1,100-foot distance corresponds with the 5,000 µmhos EC contour (roughly equivalent to a TDS of 3,200 mg/L). These EC and TDS values do not represent "background" conditions. Rather, they approximate the lower range for livestock use. Table 8 illustrates the recommended TDS drinking water values for livestock.

Table 8. Total Dissolved Solids in Drinking Water for Livestock.

| Animal Type | TDS (mg/L) |
|---|---|
| Small Animals | 3,000 |
| Poultry | 5,000 |
| Other Animals | 7,000 |

Source: Freeze and Cherry, 1979.

## 7.0 REMEDIATION

Remediation alternatives presented in the Phase 1 report were limited to a pump-and-treat scenario. Limiting remediation to this type of option is based on two factors: the high concentration of salt in the plume and the low levels of organics present. This situation does not warrant *in situ* treatment to deal with the organic constituents. In fact, the low concentrations and the high salinity would ensure that treatment would be costly and largely ineffective. Additionally, the pump-and-treat remedial approach was suggested because it is believed that the New Mexico Oil Conservation Division will require this type of remediation, if remediation is required.

One option which was not suggested in Phase 1, but which may need to be considered, is the "do nothing" option. Although a plume has been documented, and the source of the plume is most certainly from EPNG operations, it is not known what the overall surrounding water quality is like. The Phase 1 effort documented that the water upgradient from the facility is relatively good. However, the area around Jal 4 is clearly an oil and gas producing area and these areas are notorious for impacting groundwater. Therefore, it is possible that although Jal 4 is situated on "good" water, it may be that on a regional scale the groundwater quality has been degraded. If indeed this is the case, OCD may be receptive to a "do nothing" approach. The "do nothing" approach would further be strengthened if EPNG can demonstrate that there are no receptors in a downgradient location.

Since no one can predict the stance to be adopted by OCD, a remedial action plan which calls for the withdrawal and injection of groundwater has been developed. A total of eight pumping configurations were explored to determine the optimum approach. Options investigated ranged from a single pumping well to an entire well field consisting of 17 pumping wells located across the entire plume. Table 9 lists the characteristics of each pump-and-treat option and a qualitative assessment of the effectiveness of each design. Of the eight configurations, three are discussed in the following sections to illustrate the range of pump-and-treat scenarios. *[For the purpose of this exercise, the μmhos/cm concentrations of the groundwater were converted to mmhos/cm (example: 10,000 μmhos/cm = 10 mmhos/cm).]*

In reviewing these options it will be important to note that they will require the installation of wells on property not owned by EPNG. As such, special consideration may be warranted.

Table 9. Summary of Pump-and-Treat Options.

| Pump-and-Treat Option | No. Prod. Wells (Rate) | No. Inj. Wells (Rate) | Net Pumpage (GPM) | Duration (Years) | Remarks | Results |
|---|---|---|---|---|---|---|
| 1 | 3 (10 GPM) | 0 | 30 | 5 (1990 - 1995) | Wells spotted in plume "hot spots." | Poor |
| 2 | 4 (10 GPM) | 6 (6.67 GPM) | 0 | 5 (1990 - 1995) | Same as #1 with addition of six injection wells and one additional pumping well. Net pumpage is 0 (soil flushing problem). | Poor |
| 3 | 4 (10 GPM) | 8 (5 GPM) | 0 | 5 (1990 - 1995) | Net pumpage is 0. | Fair |
| 4 | 4 (10 GPM) | 8 (4 GPM) | 8 | 5 (1990 - 1995) | Same as #3 except injection well pump rate is decreased to 4 GPM, yielding a net pumpage of 8 GPM. | Fair |
| 5 | 4 (10 GPM) | 8 (4 GPM) | 8 | 5 (1990 - 1995) | Same as #4 except injection wells are shut in after five years. Pumping wells are allowed to pump for an additional five years. | Excellent. Plume has, been split, however and a portion remains across Highway 18. |
| | 4 (10 GPM) | 0 | 40 | 5 (1995-2000) | | |
| 6 | 1 (20 GPM) | 0 | 20 | 5 (1990 - 1995) | Only one production well is specified in this option. | Poor |
| 7 | 1 (20 GPM) | 0 | 20 | 5 (1990 - 2000) | Same as #6 except duration is increased to 10 years. | Poor |
| 8 | 17 (5 GPM) | 0 | 85 | 5 (1990 - 1995) | Wells are spotted on 400-foot centers and are located within the 10 mmhos/cm contour. | Fair |
| | 13 (5 & 20 GPM) | 0 | 110 | 5 (1995 - 2000) | Four production wells are shut-in after five years. Pump rate of three centerline wells is increased to 20 GPM. | Excellent |

## 7.1 PUMP-AND-TREAT REMEDIAL OPTIONS

As stated previously, three of the eight pump-and-treat remedial options were selected to illustrate the range of alternatives. The following text highlights the main components of these options.

**Option #1: Three pumping wells in the plume "hot spots."**

This option consisted of locating a pumping well within each of the highest EC concentrations in the plume. Figure 8 illustrates the location of each of the three pumping wells. Based on firsthand knowledge of the aquifer, these wells were pumped at 10 gallons per minute (GPM). It is doubtful that a pumping rate in excess of this value can be sustained for a significant period of time. Net pumpage was 30 GPM.

A simulation duration of five years was chosen. The simulation was initiated at the end of the calibration period, and extended from 1990 to 1995. As is obvious upon examination of Figure 8, there has been some progress toward remediating the plume, but a significant mass of salt remains in the aquifer.

**Option #5: Eight injection wells and four production wells**

This option consisted of a total of eight injection wells and four pumping wells, all located within the property boundary of Jal 4. Figure 9 shows the location of each well. Each injection well injected water at an EC level of 0 mmhos/cm and at a rate of 4 GPM. Each production well was pumped at 10 GPM, yielding a net withdrawal of groundwater from the aquifer of 8 GPM. This option also spanned the period 1990-1995.

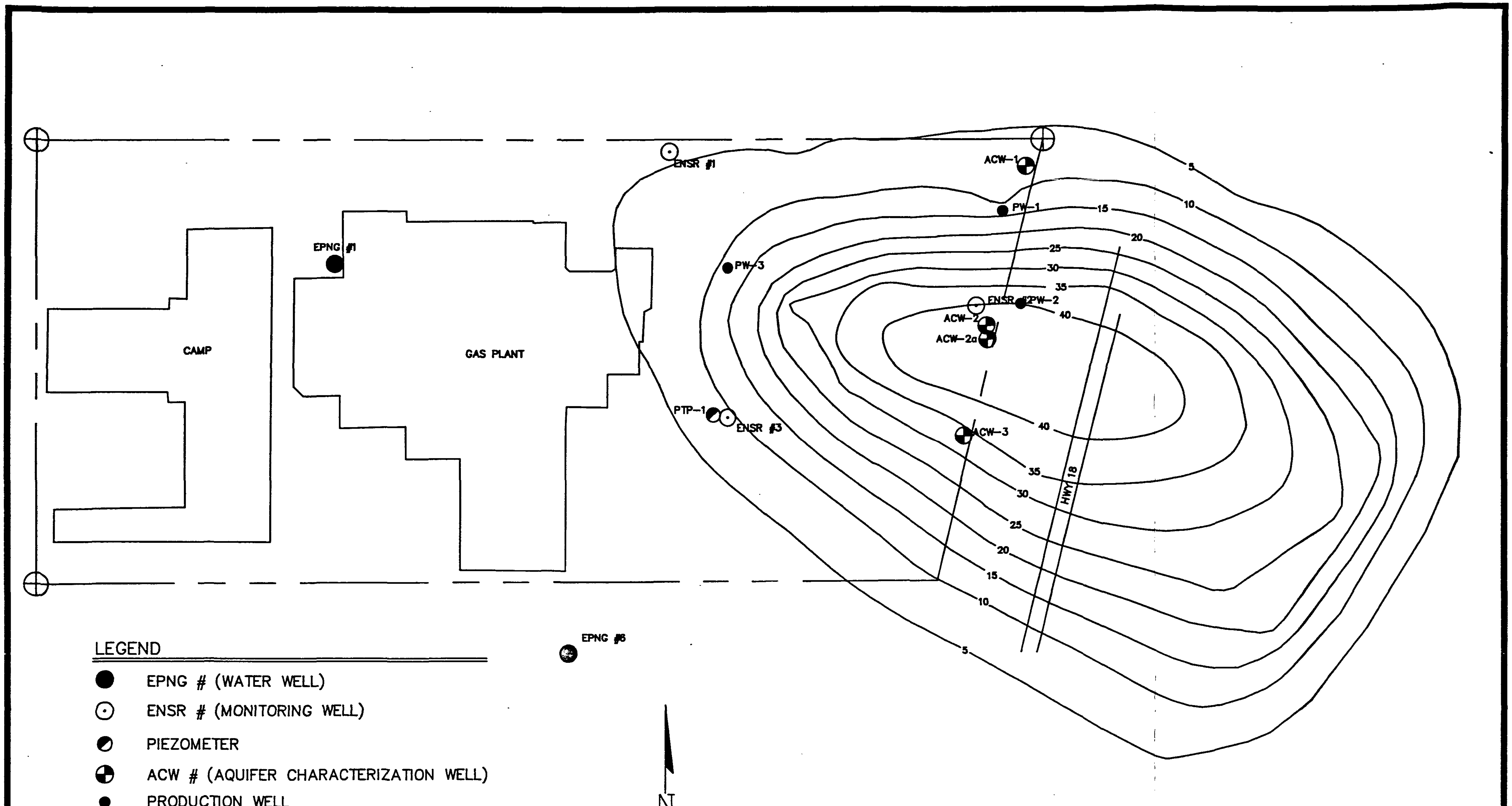
After five years, the injection wells were shut-in, and the recovery wells were allowed to pump for an additional five years (1995-2000) at 10 GPM.

As shown by Figure 9, the portion of the plume on EPNG property has been remediated to below 5 mmhos/cm. But, the portion of the plume that has migrated offsite, located to the east of Highway 18, remains at EC levels as high as 30 mmhos/cm, indicating the need for pumping/injection in this area.

**Option #8: Well field**

This option employs 17 pumping wells spotted throughout the plume. The intent of this option was to determine the maximum effort that would have to be expended to most effectively diminish EC levels of the groundwater beneath Jal 4.

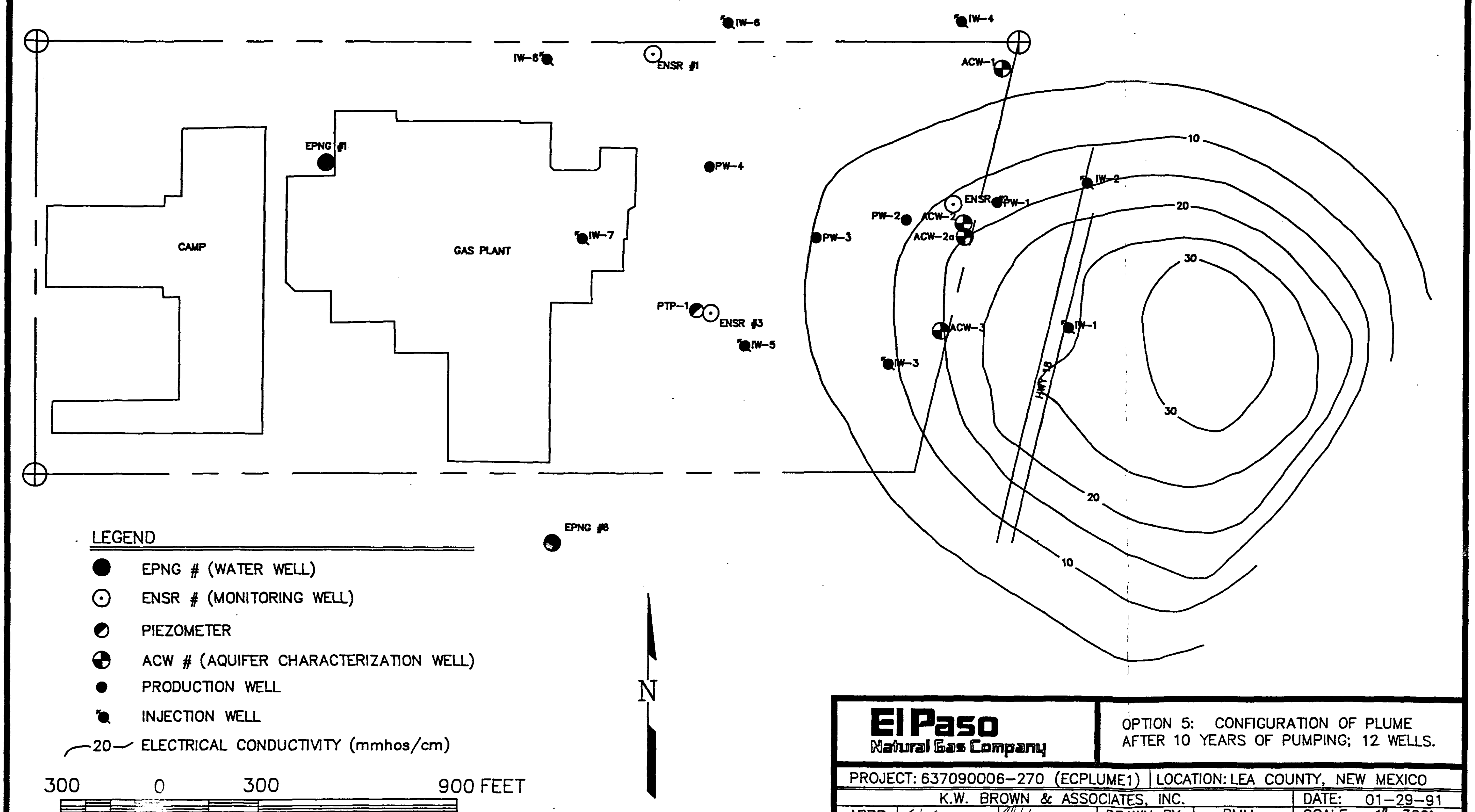
The well field was designed by locating wells on 400-foot centers within the 10 mmhos/cm contour, as defined by the EC distribution at the end of the calibration period. Each well was pumped at 5 GPM for five years (1990-1995). After five years, four production wells were shut-in, and the three wells that were located on the centerline of the plume at that time were in-




El Paso Natural Gas Company

OPTION 1: CONFIGURATION OF PLUME AFTER 5 YEARS OF PUMPING; 3 WELLS.

| | | | | |
|---|---|---|---|---|
| PROJECT: 637090006–270 (ECPLUME1) | | LOCATION: LEA COUNTY, NEW MEXICO | | |
| K.W. BROWN & ASSOCIATES, INC. | | | | DATE: 01–29–91 |
| APPR: | SHC | SHVickerson | DRAWN BY: RMM | SCALE: 1"=300' |
| DATE: | 1-21-91 | 1-29-91 | DATE: 01–23–91 | FIGURE: 8 |




| El Paso Natural Gas Company | OPTION 5: CONFIGURATION OF PLUME AFTER 10 YEARS OF PUMPING; 12 WELLS. | | | | |
|---|---|---|---|---|---|
| PROJECT: 637090006-270 (ECPLUME1) | | | LOCATION: LEA COUNTY, NEW MEXICO | | |
| K.W. BROWN & ASSOCIATES, INC. | | | | DATE: | 01-29-91 |
| APPR: | St. C | Stephenson | DRAWN BY: RMM | SCALE: | 1"=300' |
| DATE: | 1-21-91 | 1-29-91 | DATE: 01-23-91 | FIGURE: | 9 |

creased to 20 GPM. The balance of the wells was left to pump at 5 GPM. This segment extended from 1995-2000.

Figure 10 indicates that the highest computed EC contour is 8 mmhos/cm (5,120 mg/L TDS), a value that is below the computed upper WQCC standard of 15.6 mmhos/cm (10,000 mg/L TDS). Thus, Option #8 appears to be the most effective at moderating the groundwater contamination associated with Jal 4.

## 7.2 PUMP-AND-TREAT REMEDIAL COSTS

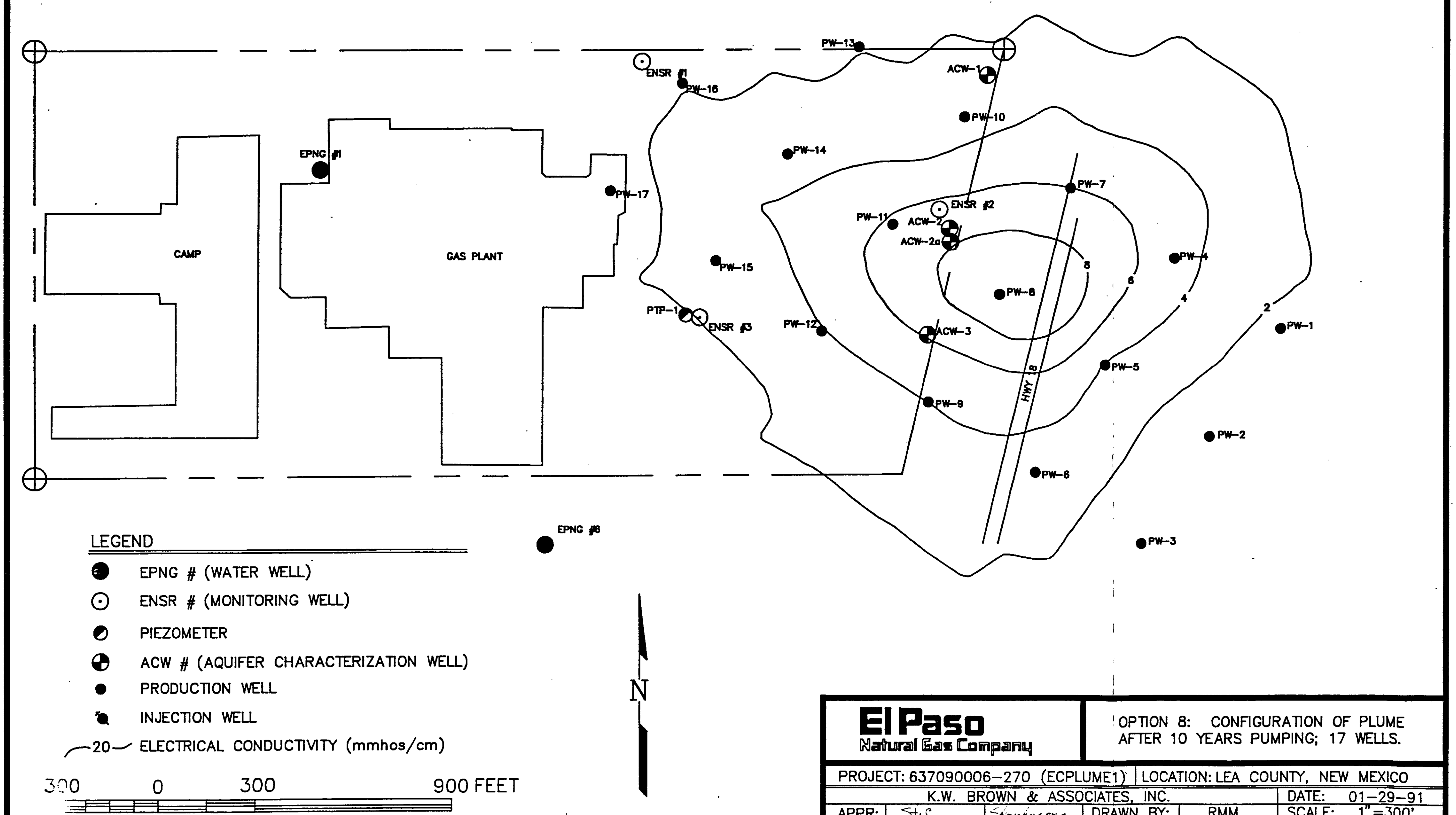
To calculate the costs of the three remedial options presented, unit costs were devised for each element. The primary element of the cost estimate is the installation of the wells and oversight of their installation. Disposal costs have not been included; it is assumed that EPNG will be able to use the EPNG injection well that is situated near the northern boundary of Jal 4. Ancillary costs associated with the wells include plumbing between the recovery wells and the disposal well, running electricity to each of the wells, and annual analytical requirements. Also, maintenance costs have been excluded since it is anticipated that EPNG personnel from the Jal Lab will be able to supervise the system. Table 10 presents the estimated costs for the remedial effort. These costs are offered for comparison purposes only. Itemized costs would be required prior to implementing any activities.

Table 10. Estimated Remedial Costs.

| Item | Option #1 | Option #5 | Option #8 |
|---|---|---|---|
| Wells required | 3 Pumping wells | 4 Pumping wells/ 8 Injection wells | 17 Pumping wells |
| Well installation and materials (3) | $18,000 | $41,000 | $95,000 |
| Electrical | $14,250 (1) | $18,250 (1) | $45,500 (2) |
| Plumbing | $1,200 (6) | $1,200 (6) | $3,200 (7) |
| Annual analytical (4) | $600 | $800 | $4,800 |
| Consulting costs (5) | $19,600 | $35,600 | $44,100 |
| Total cost | $53,650 | $96,850 | $192,600 |

Note 1: Assumes 1,500 feet of wire installed at $3.50/ft + pump savers.
Note 2: Assumes 7,000 feet of wire installed at $3.50/ft.
Note 3: Assumes a $5,000/well installation cost for pumping wells. Assumes a $2,000/well installation cost for injection wells.
Note 4: Assumes two samples per year for TDS,EC, BETX and total phenols. Two additional samples per year for EC and TDS. Annual cost per pumping well = $200.
Note 5: Costs associated with the installation of wells and field report at the completion of the project. Groundwater modeling would require additional costs.
Note 6: Assumes 2,000 feet of pipe installed at $0.60/ft.
Note 7: Assumes 8,000 feet of pipe installed at $0.60/ft.

From these cost estimates, it is clearly evident that effective remediation of the site will be costly. It is equally evident that remediation will only address a portion of the problem in that,




**El Paso Natural Gas Company**

OPTION 8: CONFIGURATION OF PLUME AFTER 10 YEARS PUMPING; 17 WELLS.

PROJECT: 637090006-270 (ECPLUME1) | LOCATION: LEA COUNTY, NEW MEXICO

| K.W. BROWN & ASSOCIATES, INC. | | | | | DATE: 01-29-91 |
|---|---|---|---|---|---|
| APPR: | St.C | Shenkman | DRAWN BY: | RMM | SCALE: 1"=300' |
| DATE: | 1-21-91 | 1-29-91 | DATE: | 01-23-91 | FIGURE: 10 |

although the groundwater quality is improved, it is not returned to background conditions. Also, the remediation will require time to be effective. During the remediation period, there will be a need for routine maintenance and monitoring. It is also conceivable that during the course of the remediation effort the data being collected will suggest that modifications to the system will be needed.

## 8.0 CONCLUSIONS AND RECOMMENDATION

Conclusions derived from the Phase 2 effort in many respects parallel those offered in the Phase 1 report. The presence of a groundwater contaminant plume whose origin is seemingly tied to the past operation of the wastewater ponds was confirmed. Likewise, the southeasterly groundwater flow direction and the low hydraulic gradient, as presented in Phase 1, were verified.

The waste constituents noted in the groundwater plume during Phase 2 were consistent with Phase 1 findings. Although the analytical list was drastically reduced for the second phase, the constituents noted included BETX, phenols, and elevated levels of salt (as determined by measuring TDS and EC). Interpretation of the Phase 1 and Phase 2 data clearly suggest a source of recharge to the aquifer which contained volatile hydrocarbons, phenolic compounds, naphthenes, and large quantities of salt.

Physical testing determined the aquifer had a hydraulic conductivity of 4.5 x 10-3 cm/sec, a transmissivity of 6,128 GPD/ft, and a storage coefficient of 0.0152. These values are appropriate for the type of aquifer documented at the site. Moreover, these values approximated the values assumed for the modeling effort conducted during Phase 1.

It is our assessment that only two options, or a variation between the two options, will be appropriate. These options are: (a) justify to OCD the "do nothing" approach or, (b) implement a pump-and-treat system. The merits of choosing either approach will focus on salts present in the groundwater, not organics. This position is warranted because the levels of organics are low and the current TDS of the water renders it unusable. Therefore, any remediation that may be required must deal with removal of salts. If the salts are removed, it is reasonable to predict that the organics will be addressed.

It is our recommendation that EPNG explore all aspects of the "do nothing" option prior to instigating additional work at the site. If the pump-and-treat option is ultimately required, our calculations predict that a minimum of 10 years will be required to remove just a portion of the plume. It will be possible to speed up the process by installing higher capacity wells, more wells, or both. Given the pump-and-treat option is based on the assumption that recovered water can be injected near the site, it will be important to determine the capacity of the injection well. Hence, prior to selecting a final well field design, it will be necessary to gain information on the performance of the injection well.

In the event recovery of the groundwater plume is required, and the injection well is deemed unsuitable, it will be necessary to explore options such as treating the water by reverse osmosis or trucking the water to a different disposal well. In either case, the costs for the project will increase dramatically.

## 9.0 REFERENCES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# APPENDIX A

Bore Logs/Well Completions

| Sym | Samp % Rec | Depth (MSL) | Depth (Feet) |
|---|---|---|---|
| | | | 10 |
| | | | 20 |
| | | | 30 |
| | | | 40 |
| | | | 50 |
| | | | 60 |
| | | | 70 |
| | | | 80 |
| | | | 90 |
| | | | 100 |
| | | | 110 |
| | | | 120 |
| | | | 130 |
| | | | 140 |
| | | | 150 |

# Geologic Description

5' SAND, dark orange brown, clay to medium-grained sand, poorly sorted, moderately consolidated.

10' SAND, light reddish brown, fine to medium-grained, moderately sorted, moderately consolidated.

15–30' SAND, light orange brown to tan, silt to medium grained sand, moderately sorted, moderately consolidated, slight Calcium Carbonate content.
Exceptions:
12' – well consolidated, high Calcium Carbonate content.
30' – moderately well sorted (very fine to fine-grained sand).

35–60' SAND, buff to tan, silt to medium grained sand, moderately to moderately well sorted, moderately consolidated, moderate Calcium Carbonate content.
Exceptions:
35–40' – well consolidated, high Calcium Carbonate content.
60' – poorly consolidated.

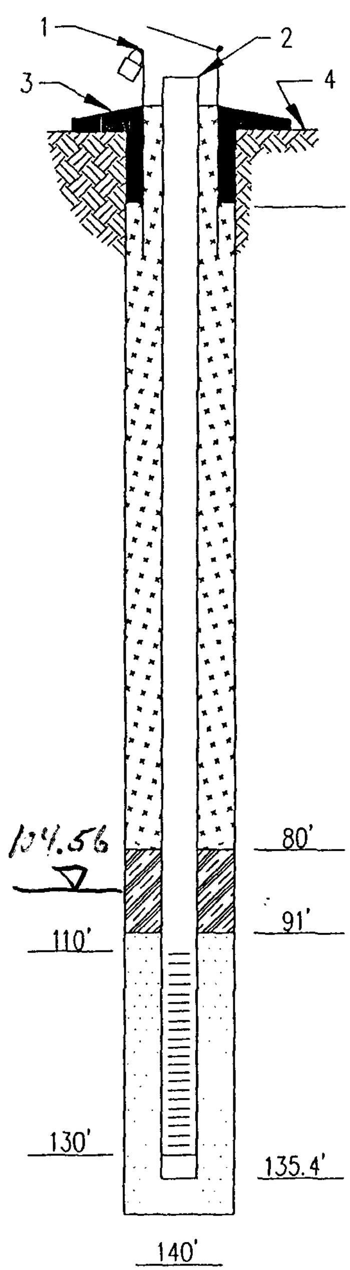
65–70' SAND, tan to light orange brown, silt to medium-grained sand, moderately sorted, well consolidated, high Calcium Carbonate content, Calcite fragments present.

75–140' SAND, light orange brown, silt to medium-grained sand, moderately well sorted (fine to fine-grained sand), poorly consolidated, slight Calcium Carbonate content, black Carboniferous(?) flecks below 100'.
Exceptions:
75–85' – moderately sorted, fine to medium grained sand.

Samples collected on 5ft intervals

ST=Shelby Tube | SS=Split Spoon | ☒ C=Cuttings

Monitoring Well
Piezometer ☒




Depths in Feet from Ground Surface (Not to Scale)

# Design Specifications

Elevations: (feet MSL) 1 N/A 2 3304.41 3 3302.10 4 3301.96

Coordinates: X N/A Y N/A

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐

Screen Slot: ☐ 0.008 ☒ 0.010 ☐

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐

Sand Pack: 8/16 Brady

Bentonite Seal: ☐ 1/2" Pellets ☒ Hole Plug ☐ Slurry ☐ 1/4" Pellets ☐

Grout Type: Portland Weight: ~12 lbs/gal

Bore Hole Diameter: 5" Ø

Drill Rig: ☐ Hollow Stem ☒ Rotary ☐

Drilled By: West Texas Water Well Service

Logged By: M. Sherrier

Completion Date: 11/13/90

| Date | D-T-W | MSL | Date | Field pH | Field EC |
|---|---|---|---|---|---|
| 11/16/90 | 107.08 | 3197.33 | | | |
| 11/17/90 | 106.88 | 3197.53 | | | |
| 11/18/90 | 107.01 | 3197.40 | | | |
| | | | | | |
| | | | | | |

Comments: Augered with air to 70'. Then switched to mud due to instability of the hole.

**PTP-1** (Pump Test Piezometer)

JAL 4 GAS PLANT

Project: EPNG 637090006
Location: Jal, New Mexico

K.W. BROWN & ASSOCIATES, INC.

| Sym | Samp % Rec | Depth (MSL) | Depth (Feet) |
|---|---|---|---|
| | | | 10 |
| | | | 20 |
| | | | 30 |
| | | | 40 |
| | | | 50 |
| | | | 60 |
| | | | 70 |
| | | | 80 |
| | | | 90 |
| | | | 100 |
| | | | 110 |
| | | | 120 |
| | | | 130 |
| | | | 140 |
| | | | 150 |

# Geologic Description

5' SAND, light grey brown, clay to medium-grained sand, poorly sorted, moderately consolidated.

10–20' SAND, light reddish brown, fine to medium-grained, moderately sorted, moderately consolidated to unconsolidated, slight Calcium Carbonate content.

25–60' SAND, buff to tan, fine to medium-grained, moderately sorted, moderately to well consolidated, moderate to high Calcium Carbonate content.
Exceptions:
55–60' – fine to medium grained sand and gravel, poorly to very poorly sorted.

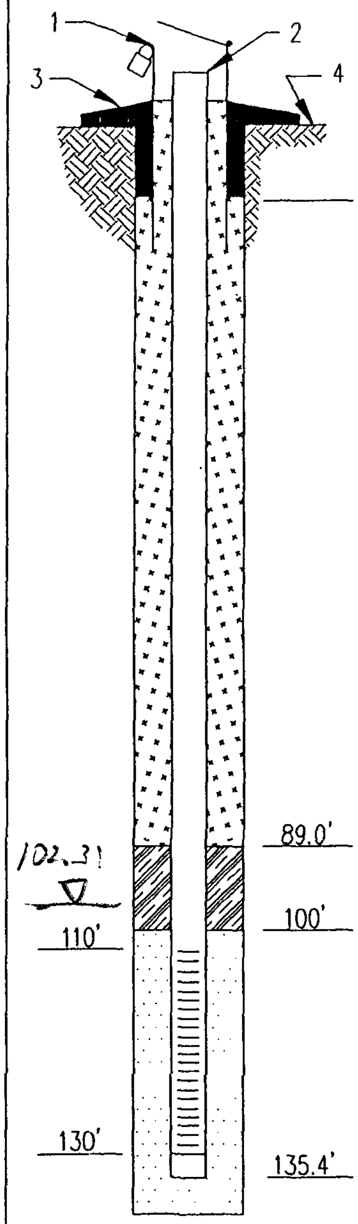
65–110' SAND, light orange to tan, silt to medium-grained sand, moderately to moderately well sorted (very fine to fine-grained), poorly consolidated, slight Calcium Carbonate content.
Exceptions:
65' – well consolidated, high Calcium Carbonate content, Calcite fragments present.

115–140' SAND, light greenish brown, very fine to fine-grained, moderately well sorted, poorly consolidated.

Samples collected on 5ft intervals

ST=Shelby Tube | SS=Split Spoon | ☒ C=Cuttings

☒ Monitoring Well
Piezometer




Depths in Feet from Ground Surface (Not to Scale)

# Design Specification

Elevations: (feet MSL) 1 3301.02 2 3300.87
3 N/A 4 3298.29
Coordinates: X N/A Y N/A
Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐
Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐
Screen Slot: ☐ 0.008 ☒ 0.010 ☐
Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐
Sand Pack: 8/16 Brady
Bentonite Seal: ☐ 1/2" Pellets ☒ Hole Plug ☐ Slurry ☐ 1/4" Pellets ☐
Grout Type: Portland Weight: ~12 lbs/gal
Bore Hole Diameter: 8"Ø
Drill Rig: ☐ Hollow Stem ☒ Rotary ☐
Drilled By: West Texas Water Well Service
Logged By: M. Sherrier
Completion Date: 11/12/90

| Date | D-T-W | MSL | Date | Field pH | Field EC |
|---|---|---|---|---|---|
| 11/16/90 | 104.86 | 3196.01 | 11/17/90 | 9.71 | 22000 |
| 11/18/90 | 104.89 | 3195.98 | | | |

Comments: Augered with air to 80', then switched to mud due to instability of the hole.

**ACW-1** (Aquifer Characterization Well)

JAL 4 GAS PLANT

Project: EPNG 637090006
Location: Jal, New Mexico

K.W. BROWN & ASSOCIATES, INC.

## Geologic Description

| Sym | Samp % Rec | Depth (MSL) | Depth (Feet) |
|---|---|---|---|
| | | | 10 |
| | | | 20 |
| | | | 30 |
| | | | 40 |
| | | | 50 |
| | | | 60 |
| | | | 70 |
| | | | 80 |
| | | | 90 |
| | | | 100 |
| | | | 110 |
| | | | 120 |
| | | | 130 |
| | | | 140 |
| | | | 150 |

5' SAND, dark gray brown, clay to medium-grained sand, poorly sorted, moderately consolidated.

10' SAND, light reddish brown, clay to medium-grained sand, moderately sorted, moderately consolidated, slight Calcium Carbonate content.

15–50' SAND, tan to light orange brown, silt to medium-grained sand, moderately to moderately well sorted (very fine to fine-grained sand), moderately consolidated, slight to moderate Calcium Carbonated content, black carboniferous (?) fleck at 40–45'.

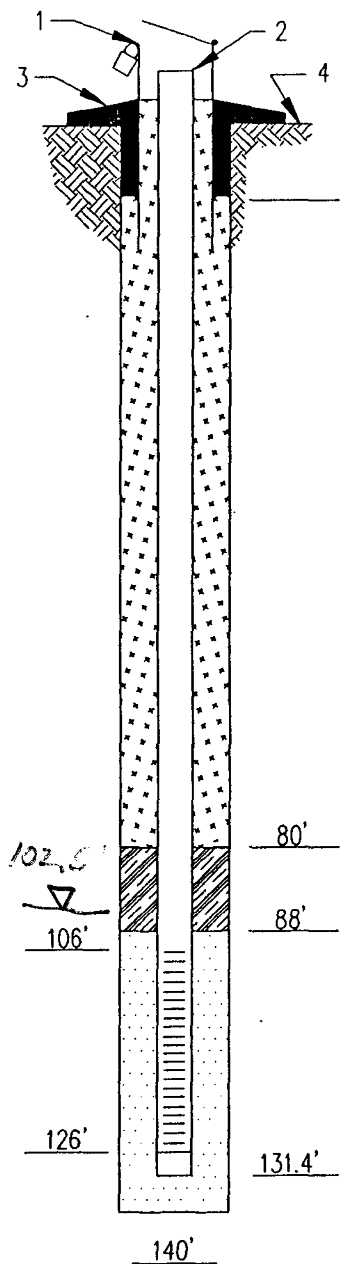
55–110' SAND, tan to buff, silt to medium grained sand, moderately to moderately well-sorted (very fine to fine-grained sand), poorly consolidated, slight Calcium Carbonate content, black carboniferous(?) flecks (up to 3.0mm) at 55' and below 75'.
Exceptions:
60' – well consolidated, high Calcium Carbonate content, Calcite fragments present.

115–140' SAND, light greenish brown, fine to medium-grained, moderately sorted, poorly consolidated, slight Calcium Carbonate content, black carboniferous(?) flecks throughout.
Exceptions:
115' – moderately well sorted (very fine to fine-grained sand).

Samples collected on 5ft intervals

ST=Shelby Tube | SS=Split Spoon | ☒ C=Cuttings

☒ Monitoring Well
Piezometer




Depths in Feet from Ground Surface (Not to Scale)

## Design Specifications

Elevations: (feet MSL) 1 3301.59 2 3301.07 3 3298.84 4 3298.55

Coordinates: X N/A Y N/A

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐

Screen Slot: ☐ 0.008 ☒ 0.010 ☐

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐

Sand Pack: 8/16 Brady

Bentonite Seal: ☐ 1/2" Pellets ☒ Hole Plug ☐ Slurry ☐ 1/4" Pellets ☐

Grout Type: Portland Weight: ~12 lbs/gal

Bore Hole Diameter: 8"Ø

Drill Rig: ☐ Hollow Stem ☒ Rotary ☐

Drilled By: West Texas Water Well Service

Logged By: M. Sherrier

Completion Date: 11/14/90

| Date | D-T-W | MSL | Date | Field pH | Field EC |
|---|---|---|---|---|---|
| 11/16/90 | 105.19 | 3195.88 | | | |
| 11/18/90 | 105.03 | 3196.04 | | | |

Comments: Drilled on air to 70', then switched to mud to keep hole open.

**ACW-2** (Aquifer Characterization Well)

JAL 4 GAS PLANT

Project: EPNG 637090006
Location: Jal, New Mexico

K.W. BROWN & ASSOCIATES, INC.

| Sym | Samp % Rec | Depth (MSL) | Depth (Feet) |
|---|---|---|---|
| | | | 10 |
| | | | 20 |
| | | | 30 |
| | | | 40 |
| | | | 50 |
| | | | 60 |
| | | | 70 |
| | | | 80 |
| | | | 90 |
| | | | 100 |
| | | | 110 |
| | | | 120 |
| | | | 130 |
| | | | 140 |
| | | | 150 |

## Geologic Description

5' SAND, dark gray brown, clay to medium-grained sand, poorly sorted, moderately consolidated.

10' SAND, light reddish brown, clay to medium-grained sand, moderately sorted, moderately consolidated, slight Calcium Carbonate content.

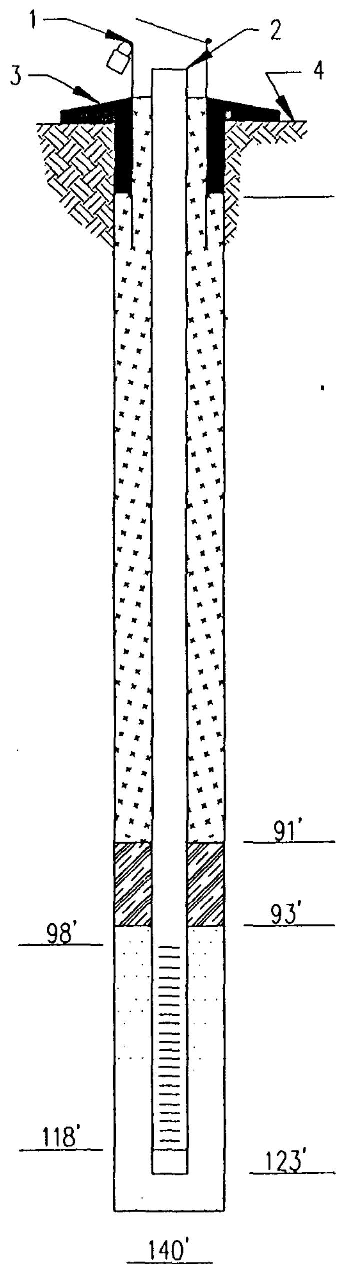
15–50' SAND, tan to light orange brown, silt to medium-grained sand, moderately to moderately well sorted (very fine to fine-grained sand), moderately consolidated, slight to moderate Calcium Carbonated content, black carboniferous (?) fleck at 40–45'.

55–110' SAND, tan to buff, silt to medium grained sand, moderately to moderately well-sorted (very fine to fine-grained sand), poorly consolidated, slight Calcium Carbonate content, black carboniferous(?) flecks (up to 3.0mm) at 55' and below 75'.
Exceptions:
60' – well consolidated, high Calcium Carbonate content, Calcite fragments present.

115–140' SAND, light greenish brown, fine to medium-grained, moderately sorted, poorly consolidated, slight Calcium Carbonate content, black carboniferous(?) flecks throughout.
Exceptions:
115' – moderately well sorted (very fine to fine-grained sand).

☐ ST=Shelby Tube ☐ SS=Split Spoon ☒ C=Cuttings

Monitoring Well ☒
Piezometer ☐




Depths in Feet from Ground Surface (Not to Scale)

## Design Specifications

Elevations: (feet MSL) 1 3299.39 2 3300.88 3 3297.02 4 3296.70

Coordinates: X N/A Y N/A

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐

Screen Slot: ☐ 0.008 ☒ 0.010 ☐

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐

Sand Pack: 8/16 Brady

Bentonite Seal: ☐ 1/2" Pellets ☒ Hole Plug ☐ Slurry ☐ 1/4" Pellets ☐

Grout Type: Portland Weight: ~12 lbs/gal

Bore Hole Diameter: 8"Ø

Drill Rig: ☐ Hollow Stem ☒ Rotary ☐

Drilled By: West Texas Water Well Service

Logged By: M. Sherrier

Completion Date: 12/10/90

| Date | D-T-W | MSL | Date | Field pH | Field EC |
|---|---|---|---|---|---|
| 12-11-90 | 100.87 | 3200.01 | 12-12-90 | 7.78 | 16,500 |
| 12-12-90 | 104.78 | 3196.10 | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Comments: Drilled with mud; backwashed hole and lost bottom 17 feet. Hole collapsed as the bentonite seal was set; a second seal was installed.

**ACW-2a** (Aquifer Characterization Well)

JAL 4 GAS PLANT

Project: EPNG 637090006
Location: Jal, New Mexico

K.W. BROWN & ASSOCIATES, INC.

# Geologic Description

| Sym | Samp % Rec | Depth (MSL) | Depth (Feet) |
|---|---|---|---|
| | | | 10 |
| | | | 20 |
| | | | 30 |
| | | | 40 |
| | | | 50 |
| | | | 60 |
| | | | 70 |
| | | | 80 |
| | | | 90 |
| | | | 100 |
| | | | 110 |
| | | | 120 |
| | | | 130 |
| | | | 140 |
| | | | 150 |

5' SAND, dark orange brown, clay to medium-grained sand, poorly sorted, moderately consolidated.

10' SAND, light orange brown, silt to medium-grained sand, poorly sorted, moderately consolidated, slight Calcium Carbonate content.

15' SAND, buff to yellowish buff, silt to medium-grained sand, moderately sorted, moderately well consolidated, moderate Calcium Carbonate content.

20–30' SAND, tan, very fine to medium-grained, moderately sorted (very fine to fine-grained sand), poorly to moderately consolidated, slight Calcium Carbonate content, black carboniferous(?) flecks at 30'.

35–55' SAND, tan to buff, very fine to medium-grained, moderately well sorted (very fine to fine grained sand), moderately well consolidated to well consolidated, high Calcium Carbonate content, Calcite fragments present at 35' and 55'.

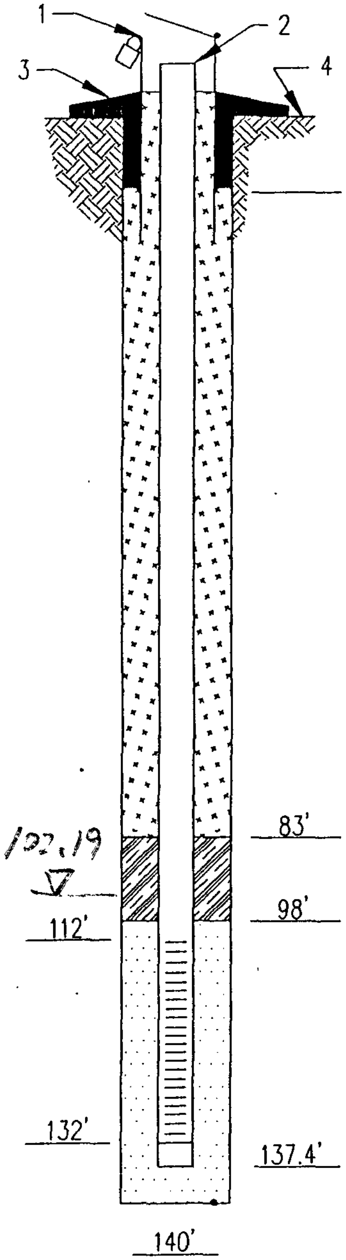
60–125' SAND, tan, very fine to medium-grained, moderately sorted to moderately well sorted (fine to very fine-grained sand), moderately consolidated, moderate Calcium Carbonate content.
Exceptions:
65' – well sorted (very fine grained), poorly consolidated.
75–80' and 90' – well consolidated, high Calcium Carbonate content, Calcite fragments present.

130–140' SAND, light greenish brown, very fine to medium grained, moderately well sorted (fine to very fine grained sand), poorly consolidated, slight Calcium Carbonate content.

Samples collected on 5ft intervals

ST=Shelby Tube | SS=Split Spoon | ☒ C=Cuttings

Monitoring Well ☒
Piezometer




Depths in Feet from Ground Surface (Not to Scale)

# Design Specifications

Elevations: (feet MSL) 1 3300.35 2 3300.34 3 3298.75 4 3298.14

Coordinates: X N/A Y N/A

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐

Screen Slot: ☐ 0.008 ☒ 0.010 ☐

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐

Sand Pack: 8/16 Brady

Bentonite Seal: ☐ 1/2" Pellets ☒ Hole Plug ☐ Slurry ☐ 1/4" Pellets ☐

Grout Type: Portland Weight: ~12 lbs/gal

Bore Hole Diameter: 8" Ø

Drill Rig: ☐ Hollow Stem ☒ Rotary ☐

Drilled By: West Texas Water Well Service

Logged By: M. Sherrier

Completion Date: 11/15/90

| Date | D-T-W | MSL | Date | Field pH | Field EC |
|---|---|---|---|---|---|
| 11/16/90 | 104.01 | 3196.33 | 11/16/90 | 6.64 | 35000 |
| 11/18/90 | 104.54 | 3195.80 | | | |

Comments: Drilled on air to 70', then drilled on mud due to instability of the hole.

**ACW-3** (Aquifer Characterization Well)

JAL 4 GAS PLANT

Project: EPNG 637090006
Location: Jal, New Mexico

K.W. BROWN & ASSOCIATES, INC.

# APPENDIX B

## Analytical Data

AnalyticalTechnologies,Inc. 2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 011731

December 11, 1990

K.W. Brown & Associates
500 Graham Road
College Station, TX 77845

Project Name/Number: EPNG-Jal 637090006-270

Attention: Sid Johnson

On 11/20/90, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

M. Barry
Michael G. Barry
Project Manager

Robert V. Woods
Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure

Analytical Technologies, Inc.

CLIENT : K.W. BROWN & ASSOCIATES
PROJECT # : 637090006-270
PROJECT NAME : EPNG-JAL

DATE RECEIVED : 11/20/90
REPORT DATE : 12/07/90

ATI I.D. : 011731

| ATI # | CLIENT DESCRIPTION | MATRIX | DATE COLLECTED |
|---|---|---|---|
| 01 | ACW-1 | AQUEOUS | 11/17/90 |
| 02 | ACW-3 | AQUEOUS | 11/16/90 |
| 03 | QC-1 | AQUEOUS | 11/17/90 |
| 04 | TRIP BLANK | AQUEOUS | 11/17/90 |

----- TOTALS -----

| MATRIX | # SAMPLES |
|---|---|
| AQUEOUS | 4 |

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

# GENERAL CHEMISTRY RESULTS

ATI I.D. : 011731

CLIENT : K.W. BROWN & ASSOCIATES
PROJECT # : 637090006-270
PROJECT NAME : EPNG-JAL

DATE RECEIVED : 11/20/90
REPORT DATE : 12/07/90

| PARAMETER | UNITS | 01 | 02 | 03 |
|---|---|---|---|---|
| PHENOLICS, TOTAL | MG/L | 0.15 | 0.1 | <0.02 |
| TOTAL DISSOLVED SOLIDS | MG/L | 12900 | 23600 | 10 |

Analytical Technologies, Inc.

# GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : K.W. BROWN & ASSOCIATES
PROJECT # : 637090006-270
PROJECT NAME : EPNG-JAL    ATI I.D. : 011731

| PARAMETER | UNITS | ATI I.D. | SAMPLE RESULT | DUP. RESULT | RPD | SPIKED SAMPLE | SPIKE CONC | % REC |
|---|---|---|---|---|---|---|---|---|
| PHENOLICS, TOTAL | MG/L | 01173103 | <0.02 | <0.02 | NA | 0.24 | 0.25 | 96 |
| PHENOLICS, TOTAL | MG/L | 01299903 | <0.02 | <0.02 | NA | 0.25 | 0.25 | 100 |
| TOTAL DISSOLVED SOLIDS | MG/L | 01169604 | 920 | 900 | 2 | NA | NA | NA |

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

# GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 01173101

TEST : BTEX (8020)

| | | | |
|---|---|---|---|
| CLIENT | : K.W. BROWN & ASSOCIATES | DATE SAMPLED | : 11/17/90 |
| PROJECT # | : 637090006-270 | DATE RECEIVED | : 11/20/90 |
| PROJECT NAME | : EPNG-JAL | DATE EXTRACTED | : N/A |
| CLIENT I.D. | : ACW-1 | DATE ANALYZED | : 11/26/90 |
| SAMPLE MATRIX | : AQUEOUS | UNITS | : UG/L |
| | | DILUTION FACTOR | : 10 |

| COMPOUNDS | RESULTS |
|---|---|
| BENZENE | 9.0 |
| TOLUENE | <5.0 |
| ETHYLBENZENE | <5.0 |
| TOTAL XYLENES | <5.0 |

SURROGATE PERCENT RECOVERIES

| | |
|---|---|
| BROMOFLUOROBENZENE (%) | 140 |

Analytical Technologies, Inc.

# GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 01173102

TEST : BTEX (8020)

| | | | |
|---|---|---|---|
| CLIENT | : K.W. BROWN & ASSOCIATES | DATE SAMPLED | : 11/16/90 |
| PROJECT # | : 637090006-270 | DATE RECEIVED | : 11/20/90 |
| PROJECT NAME | : EPNG-JAL | DATE EXTRACTED | : N/A |
| CLIENT I.D. | : ACW-3 | DATE ANALYZED | : 11/26/90 |
| SAMPLE MATRIX | : AQUEOUS | UNITS | : UG/L |
| | | DILUTION FACTOR | : 1 |

| COMPOUNDS | RESULTS |
|---|---|
| BENZENE | 7.3 |
| TOLUENE | <0.5 |
| ETHYLBENZENE | 4.5 |
| TOTAL XYLENES | 0.6 |

SURROGATE PERCENT RECOVERIES

| | |
|---|---|
| BROMOFLUOROBENZENE (%) | 189 |

Analytical Technologies, Inc.

# GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 01173103

TEST : BTEX (8020)

| | | | |
|---|---|---|---|
| CLIENT | : K.W. BROWN & ASSOCIATES | DATE SAMPLED | : 11/17/90 |
| PROJECT # | : 637090006-270 | DATE RECEIVED | : 11/20/90 |
| PROJECT NAME | : EPNG-JAL | DATE EXTRACTED | : N/A |
| CLIENT I.D. | : QC-1 | DATE ANALYZED | : 11/21/90 |
| SAMPLE MATRIX | : AQUEOUS | UNITS | : UG/L |
| | | DILUTION FACTOR | : 1 |

| COMPOUNDS | RESULTS |
|---|---|
| BENZENE | <0.5 |
| TOLUENE | <0.5 |
| ETHYLBENZENE | <0.5 |
| TOTAL XYLENES | <0.5 |

SURROGATE PERCENT RECOVERIES

| | |
|---|---|
| BROMOFLUOROBENZENE (%) | 117 |

Analytical**Technologies**, Inc.

# GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 01173104

TEST : BTEX (8020)

| | | | |
|---|---|---|---|
| CLIENT | : K.W. BROWN & ASSOCIATES | DATE SAMPLED | : 11/17/90 |
| PROJECT # | : 637090006-270 | DATE RECEIVED | : 11/20/90 |
| PROJECT NAME | : EPNG-JAL | DATE EXTRACTED | : N/A |
| CLIENT I.D. | : TRIP BLANK | DATE ANALYZED | : 11/21/90 |
| SAMPLE MATRIX | : AQUEOUS | UNITS | : UG/L |
| | | DILUTION FACTOR | : 1 |

| COMPOUNDS | RESULTS |
|---|---|
| BENZENE | <0.5 |
| TOLUENE | <0.5 |
| ETHYLBENZENE | <0.5 |
| TOTAL XYLENES | <0.5 |
| SURROGATE PERCENT RECOVERIES | |
| BROMOFLUOROBENZENE (%) | 116 |

AnalyticalTechnologies, inc.

# GAS CHROMATOGRAPHY - RESULTS

## REAGENT BLANK

TEST : BTEX (8020)

| | | | |
|---|---|---|---|
| | | ATI I.D. | : 011731 |
| CLIENT | : K.W. BROWN & ASSOCIATES | DATE EXTRACTED | : 11/26/90 |
| PROJECT # | : 637090006-270 | DATE ANALYZED | : 11/26/90 |
| PROJECT NAME | : EPNG-JAL | UNITS | : UG/L |
| CLIENT I.D. | : REAGENT BLANK | DILUTION FACTOR | : N/A |

| COMPOUNDS | RESULTS |
|---|---|
| BENZENE | <0.5 |
| TOLUENE | <0.5 |
| ETHYLBENZENE | <0.5 |
| TOTAL XYLENES | <0.5 |

SURROGATE PERCENT RECOVERIES

| | |
|---|---|
| BROMOFLUOROBENZENE (%) | 101 |

Analytical Technologies, Inc.

# GAS CHROMATOGRAPHY - RESULTS

## REAGENT BLANK

TEST : BTEX (8020)

| | | | |
|---|---|---|---|
| CLIENT | : K.W. BROWN & ASSOCIATES | ATI I.D. | : 011731 |
| PROJECT # | : 637090006-270 | DATE EXTRACTED | : 11/21/90 |
| PROJECT NAME | : EPNG-JAL | DATE ANALYZED | : 11/21/90 |
| CLIENT I.D. | : REAGENT BLANK | UNITS | : UG/L |
| | | DILUTION FACTOR | : N/A |

| COMPOUNDS | RESULTS |
|---|---|
| BENZENE | <0.5 |
| TOLUENE | <0.5 |
| ETHYLBENZENE | <0.5 |
| TOTAL XYLENES | <0.5 |

SURROGATE PERCENT RECOVERIES

| | |
|---|---|
| BROMOFLUOROBENZENE (%) | 116 |

Analytical Technologies, Inc.

# QUALITY CONTROL DATA

ATI I.D. : 011731

TEST : BTEX (8020)

CLIENT : K.W. BROWN & ASSOCIATES
PROJECT # : 637090006-270
PROJECT NAME : EPNG-JAL
REF I.D. : 01171502

DATE ANALYZED : 11/21/90
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

| COMPOUNDS | SAMPLE RESULT | CONC. SPIKED | SPIKED SAMPLE | % REC. | DUP. SPIKED SAMPLE | DUP. % REC. | RPD |
|---|---|---|---|---|---|---|---|
| BENZENE | <0.5 | 10 | 12 | 120 | 12 | 120 | 0 |
| TOLUENE | <0.5 | 10 | 11 | 110 | 11 | 110 | 0 |
| ETHYLBENZENE | <0.5 | 10 | 11 | 110 | 11 | 110 | 0 |
| XYLENES | <0.5 | 30 | 35 | 117 | 35 | 117 | 0 |

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

AnalyticalTechnologies, Inc.
Phoenix, Arizona

# Chain of Custody

DATE 11/16/90 PAGE 1 OF 1

PROJECT MANAGER: Sid Johnson

COMPANY: K.W. Brown & Assoc.
ADDRESS: 500 Graham Rd.
College Station, TX 77845

BILL TO: Same
COMPANY:
ADDRESS:

SAMPLERS: (Signature) SH Johnson
PHONE NUMBER (409) ~~846~~ 690-9280

ANALYSIS REQUEST: Petroleum Hydrocarbons (418.1); Total Phenols; (MOD 8015) Gas/Diesel; Diesel/Gasoline/BTXE (MOD 8015/8020); BTXE (8020); Chlorinated Hydrocarbons (601/8010); Aromatic Hydrocarbons (602/8020); MTBE; Pesticides/PCB (608/8080); Herbicides (615/8150); Base/Neutral/Acid Compounds GC/MS (625/8270); Volatile Organics GC/MS (624/8240); SDWA Primary Standards; SDWA Secondary Standards; SDWA Volatiles (502.1/503.1); The 13 Priority Pollutant Metals; The 8 EP Tox Metals by EP Tox Prep. (1310); The 8 EP Tox Metals by Total Digestion; The 8 EP Tox Metals by TCLP; TDS; NUMBER OF CONTAINERS

| SAMPLE ID | DATE | TIME | MATRIX | LAB ID | Total Phenols | BTXE (8020) | TDS | NUMBER OF CONTAINERS |
|---|---|---|---|---|---|---|---|---|
| ACW-1 | 11/17 | | $H_2O$ | 1 | X | X | X | 4 |
| ACW-~~4~~ 3 ~~4W~~ | 11/16 | | " | 2 | X | X | X | 4 |
| QC-1 | 11/17 | | " | 3 | X | X | X | 4 |
| Trip Blank | | | | 4 | | X | | 1 |

| PROJECT INFORMATION | |
|---|---|
| PROJECT NO.: | 637090006-270 |
| PROJECT NAME: | EPNG Jal |
| P.O. NO.: | 40909 |
| VIA: | |
| TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS | |

| SAMPLE RECEIPT | |
|---|---|
| TOTAL NO. OF CONTAINERS | 13 |
| CHAIN OF CUSTODY SEALS | N |
| INTACT? | Y |
| RECEIVED GOOD COND./COLD | Y |
| LAB NUMBER | 011731 |

SAMPLE DISPOSAL INSTRUCTIONS
☐ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:

| RELINQUISHED BY: 1. | RELINQUISHED BY: 2. | RELINQUISHED BY: 3. |
|---|---|---|
| Signature: SH Johnson Time: 5:06 | Signature: Time: | Signature: Time: |
| Printed Name: SH Johnson Date 11/19/90 | Printed Name: Date | Printed Name: Date |
| Company: KWB&A | Company: | Company: |

| RECEIVED BY: 1. | RECEIVED BY: 2. | RECEIVED BY: (LAB) 3. |
|---|---|---|
| Signature: Time: | Signature: Time: | Signature: [signature] Time: 9:40 |
| Printed Name: Date: | Printed Name: Date: | Printed Name: Linda Eshelman Date: 11/20/90 |
| Company: | Company: | Analytical Technologies, Inc. |

Analytical**Technologies,**Inc. 2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 012694

January 3, 1991

K.W. Brown & Associates
500 Graham Road
College Station, TX 77845

Project Name/Number: EPNG/JAL #4 637090006-270

Attention: Sid Johnson

On 12/14/90, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

For client sample ACW-1 approximately 14 ug/l of MTBE was detected; for client sample ACW-2A approximately 95 mg/l of MTBE was detected. Conductivity analyses were added on 12/17/90 per Sid Johnson. Due to the levels of heavy hydrocarbons in client's samples accurate surrogate recoveries could not be obtained.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Jane Humphress Foote

Jane Humphress Foote
Project Manager

Robert V. Woods

Robert V. Woods
Laboratory Manager

RVW:dkm
Enclosure

Analytical Technologies, Inc.

ACCESSION #: 012694

| PARAMETER | METHOD |
|---|---|
| Phenols, Total | 420.2[1] |
| TDS | 160.1[1] |
| BTEX | 8020M[2] |

Reference(s): [1] Methods for Chemical Analysis of Water and Waste EPA 600/4-79-020 Mar. 1983.

[2] SW 846, 3rd Edition

Analytical**Technologies**, Inc.

CLIENT : K.W. BROWN & ASSOCIATES
PROJECT # : 637090006-270
PROJECT NAME : EPNG/JAL #4

DATE RECEIVED : 12/14/90
REPORT DATE : 12/27/90

ATI I.D. : 012694

| ATI # | CLIENT DESCRIPTION | MATRIX | DATE COLLECTED |
|---|---|---|---|
| 01 | ACW-1 | AQUEOUS | 12/13/90 |
| 02 | ACW-2A | AQUEOUS | 12/13/90 |
| 03 | TRIP BLANK | AQUEOUS | 12/13/90 |

----- TOTALS -----

| MATRIX | # SAMPLES |
|---|---|
| AQUEOUS | 3 |

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from th date of this report. If an extended storage period is required, please contac our sample control department before the scheduled disposal date.

AnalyticalTechnologies, Inc.

# GENERAL CHEMISTRY RESULTS

ATI I.D. : 012694

CLIENT : K.W. BROWN & ASSOCIATES
PROJECT # : 637090006-270
PROJECT NAME : EPNG/JAL #4

DATE RECEIVED : 12/14/90
REPORT DATE : 12/27/90

| PARAMETER | UNITS | 01 | 02 |
|---|---|---|---|
| CONDUCTIVITY, (UMHOS/CM) | | 19300 | 16500 |
| PHENOLICS, TOTAL | MG/L | 0.07 | 0.24 |
| TOTAL DISSOLVED SOLIDS | MG/L | 12000 | 10200 |

Analytical Technologies, Inc.

# GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : K.W. BROWN & ASSOCIATES
PROJECT # : 637090006-270
PROJECT NAME : EPNG/JAL #4 ATI I.D. : 012694

| PARAMETER | UNITS | ATI I.D. | SAMPLE RESULT | DUP. RESULT | RPD | SPIKED SAMPLE | SPIKE CONC | % REC |
|---|---|---|---|---|---|---|---|---|
| CONDUCTIVITY(UMHOS/CM) | | 01269402 | 16500 | 16700 | 1 | NA | NA | NA |
| PHENOLICS, TOTAL | MG/L | 01269801 | <0.02 | <0.02 | NA | 0.26 | 0.25 | 104 |
| TOTAL DISSOLVED SOLIDS | MG/L | 01269402 | 10200 | 10200 | 0 | NA | NA | NA |

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

## GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 01269401

TEST : BTEX (8020)

| | | | |
|---|---|---|---|
| CLIENT | : K.W. BROWN & ASSOCIATES | DATE SAMPLED | : 12/13/90 |
| PROJECT # | : 637090006-270 | DATE RECEIVED | : 12/14/90 |
| PROJECT NAME | : EPNG/JAL #4 | DATE EXTRACTED | : N/A |
| CLIENT I.D. | : ACW-1 | DATE ANALYZED | : 12/20/90 |
| SAMPLE MATRIX | : AQUEOUS | UNITS | : UG/L |
| | | DILUTION FACTOR | : 5 |

| COMPOUNDS | RESULTS |
|---|---|
| BENZENE | 6.5 |
| TOLUENE | <2.5 |
| ETHYLBENZENE | <2.5 |
| TOTAL XYLENES | 16 |

SURROGATE PERCENT RECOVERIES

| | |
|---|---|
| BROMOFLUOROBENZENE (%) | 1400 * |

* Result out of limits due to sample matrix interference

Analytical Technologies, Inc.

# GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 01269402

TEST : BTEX (8020)

| | | | |
|---|---|---|---|
| CLIENT | : K.W. BROWN & ASSOCIATES | DATE SAMPLED | : 12/13/90 |
| PROJECT # | : 637090006-270 | DATE RECEIVED | : 12/14/90 |
| PROJECT NAME | : EPNG/JAL #4 | DATE EXTRACTED | : N/A |
| CLIENT I.D. | : ACW-2A | DATE ANALYZED | : 12/18/90 |
| SAMPLE MATRIX | : AQUEOUS | UNITS | : UG/L |
| | | DILUTION FACTOR | : 1 |

| COMPOUNDS | RESULTS |
|---|---|
| BENZENE | 36 |
| TOLUENE | 5.4 |
| ETHYLBENZENE | 5.2 |
| TOTAL XYLENES | 12 |

SURROGATE PERCENT RECOVERIES

| | |
|---|---|
| BROMOFLUOROBENZENE (%) | 451 * |

* Result out of limits due to sample matrix interference

Analytical Technologies, Inc.

## GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 01269403

TEST : BTEX (8020)

| | | | |
|---|---|---|---|
| CLIENT | : K.W. BROWN & ASSOCIATES | DATE SAMPLED | : 12/13/90 |
| PROJECT # | : 637090006-270 | DATE RECEIVED | : 12/14/90 |
| PROJECT NAME | : EPNG/JAL #4 | DATE EXTRACTED | : N/A |
| CLIENT I.D. | : TRIP BLANK | DATE ANALYZED | : 12/17/90 |
| SAMPLE MATRIX | : AQUEOUS | UNITS | : UG/L |
| | | DILUTION FACTOR | : 1 |

| COMPOUNDS | RESULTS |
|---|---|
| BENZENE | <0.5 |
| TOLUENE | <0.5 |
| ETHYLBENZENE | <0.5 |
| TOTAL XYLENES | <0.5 |

SURROGATE PERCENT RECOVERIES

| | |
|---|---|
| BROMOFLUOROBENZENE (%) | 97 |

Analytical Technologies, Inc.

# GAS CHROMATOGRAPHY - RESULTS

## REAGENT BLANK

TEST : BTEX (8020)

| | | | |
|---|---|---|---|
| CLIENT | : K.W. BROWN & ASSOCIATES | ATI I.D. | : 012694 |
| PROJECT # | : 637090006-270 | DATE EXTRACTED | : 12/18/90 |
| PROJECT NAME | : EPNG/JAL #4 | DATE ANALYZED | : 12/18/90 |
| CLIENT I.D. | : REAGENT BLANK | UNITS | : UG/L |
| | | DILUTION FACTOR | : N/A |

| COMPOUNDS | RESULTS |
|---|---|
| BENZENE | <0.5 |
| TOLUENE | <0.5 |
| ETHYLBENZENE | <0.5 |
| TOTAL XYLENES | <0.5 |

SURROGATE PERCENT RECOVERIES

| | |
|---|---|
| BROMOFLUOROBENZENE (%) | 95 |

Analytical Technologies, Inc.

# QUALITY CONTROL DATA

ATI I.D. : 012694

TEST : BTEX (8020)

CLIENT : K.W. BROWN & ASSOCIATES
PROJECT # : 637090006-270
PROJECT NAME : EPNG/JAL #4
REF I.D. : 01299906

DATE ANALYZED : 12/18/90
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

| COMPOUNDS | SAMPLE RESULT | CONC. SPIKED | SPIKED SAMPLE | % REC. | DUP. SPIKED SAMPLE | DUP. % REC. | RPD |
|---|---|---|---|---|---|---|---|
| BENZENE | <0.5 | 10 | 9.6 | 96 | 9.7 | 97 | 1 |
| TOLUENE | <0.5 | 10 | 9.6 | 96 | 9.7 | 97 | 1 |
| ETHYLBENZENE | <0.5 | 10 | 9.7 | 97 | 9.9 | 99 | 2 |
| XYLENES | <0.5 | 30 | 30 | 100 | 30 | 100 | 0 |

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

Analytical Technologies, Inc.
Phoenix, Arizona

# Chain of Custody

DATE 12-12-90 PAGE 1 OF 1

PROJECT MANAGER: SID JOHNSON

COMPANY: K.W. BROWN & ASSOCIATES, INC
ADDRESS: 500 GRAHAM ROAD
COLLEGE STATION, TEXAS 77845

BILL TO: SAME AS ABOVE
COMPANY:
ADDRESS:

SAMPLERS: (Signature)
PHONE NUMBER: (409) 690 9280

ANALYSIS REQUEST

| SAMPLE ID | DATE | TIME | MATRIX | LAB ID | TOTAL PHENOLICS | TDS | BTEX | NUMBER OF CONTAINERS |
|---|---|---|---|---|---|---|---|---|
| ACW-1 | 12/13 | | WATER | 1 | X | X | X | |
| ACW-2A | ✓ | | WATER | 2 | X | X | X | |
| TRIP BLANK | | | | | | | X | 1 |

| PROJECT INFORMATION | |
|---|---|
| PROJECT NUMBER: | 637090006-270 |
| PROJECT NAME: | EPNG / JAL #4 |
| PURCHASE ORDER NUMBER: | 41074 log in 902001 |
| VIA: | |
| TAT: | ☐ 24 HRS ☐ 48 HRS ☐ 1 WK ☒ 2 WKS |

| SAMPLE RECEIPT | |
|---|---|
| TOTAL NUMBER OF CONTAINERS | 8 |
| CHAIN OF CUSTODY SEALS | Y |
| INTACT? | Y |
| RECEIVED GOOD COND./COLD | Y |
| LAB NUMBER | 012694 |

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal @ $5.00 each ☐ Return ☐ Pickup (will call)

Comments:
Call verbals ASAP - fax report by ~~12-21~~ 12-31-90

RELINQUISHED BY: 1.
Signature: Mike Sherrier Time: 3:28 pm
Printed Name: Mike Sherrier Date: 12/13/90
Company:

RELINQUISHED BY: 2.
Signature: Time:
Printed Name: Date:
Company:

RELINQUISHED BY: 3.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: 1.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: 2.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: (LAB) 3.
Signature: [signature] Time:
Printed Name: [illegible] Date: 12/14
Analytical Technologies, Inc.

ATI Labs: San Diego (619) 458-9141 • Phoenix (602) 438-1530 • Seattle (206) 228-8335 • Pensacola (904) 474-1001 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

## APPENDIX C

Pump Test Data

EL PASO NATURAL GAS COMPANY
JAL #4 PLANT

Pump Test Calculations

Theis analysis:

From match point on graph:

$u = 10^{-3}$

$W(u) = 1$

$r^2 / t = 0.15\ Ft^2 / Min.$

$\Delta h = 0.25\ Feet$

$$T = \frac{Q}{4\pi\Delta h} W(u) \qquad \text{.......... (1)}$$

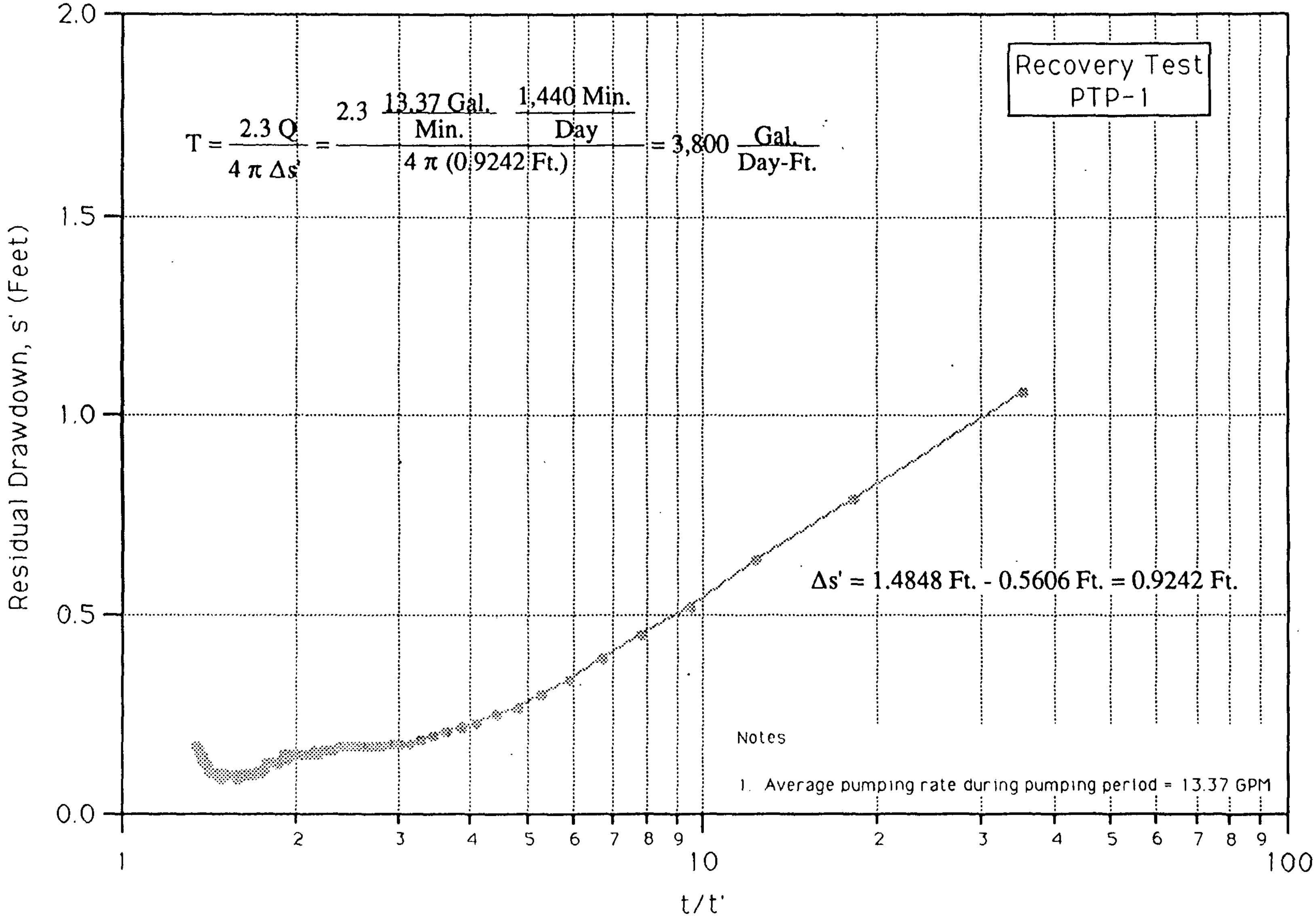
$$T = \frac{\left(13.37 \frac{Gal.}{Min.}\right)\left(1{,}440 \frac{Min.}{Day}\right)}{(4\pi)\,(0.25\ Feet)} (1) = 6{,}128\ Gal./Day/Ft.$$

$$S = \frac{4Tu}{r^2/t} \qquad \text{.......... (2)}$$

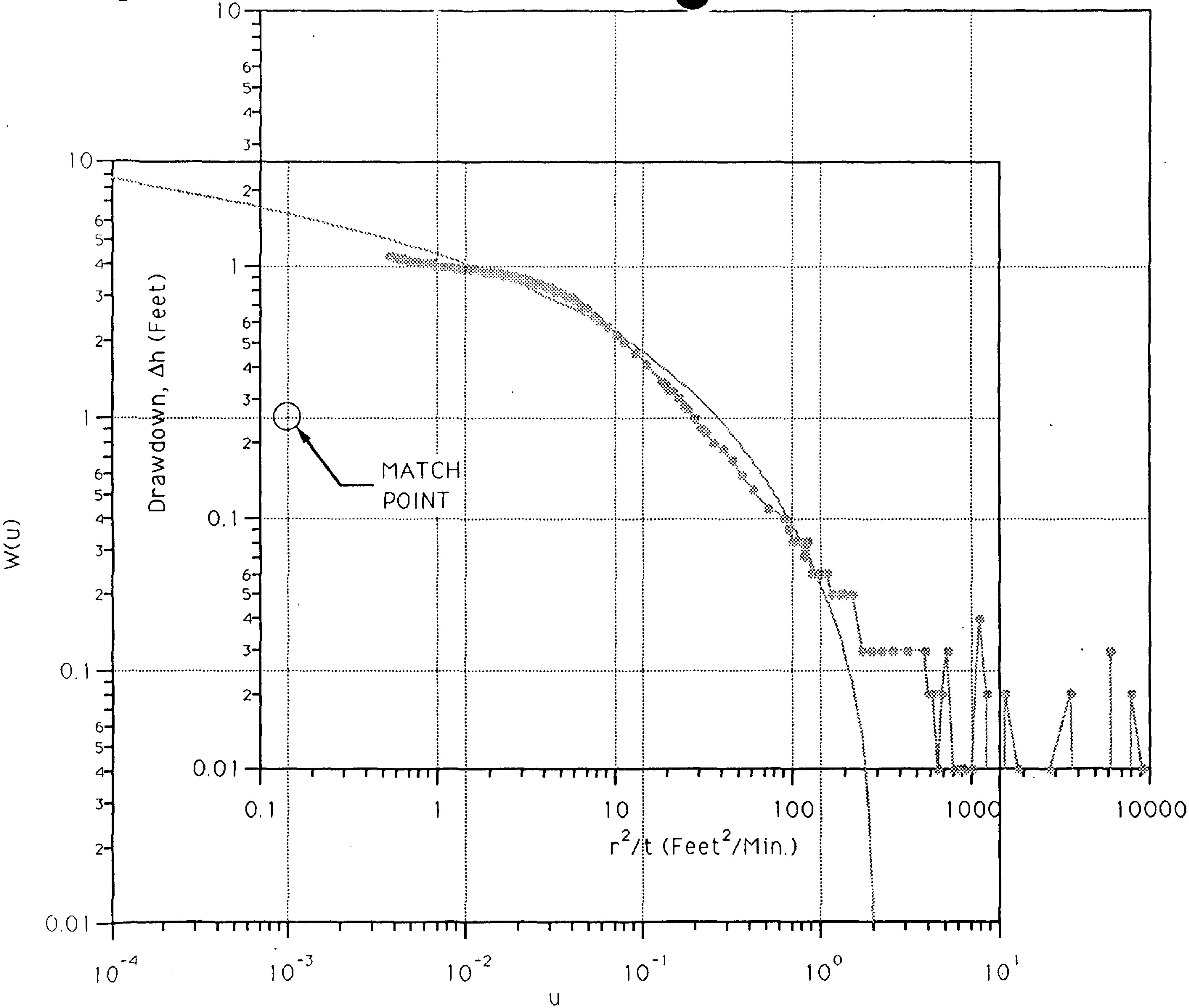
$$S = \frac{(4)\left(\frac{6{,}128\ Gal.}{Day\text{-}Ft.}\right)\left(\frac{Day}{1{,}440\ Min.}\right)\left(\frac{Ft^3}{7.48\ Gal.}\right)\left(10^{-3}\right)}{\left(\frac{0.15\ Ft.^2}{Min.}\right)} = 0.0152$$

$$T = 6{,}128 \frac{\text{Gal.}}{\text{Day-Ft.}}$$

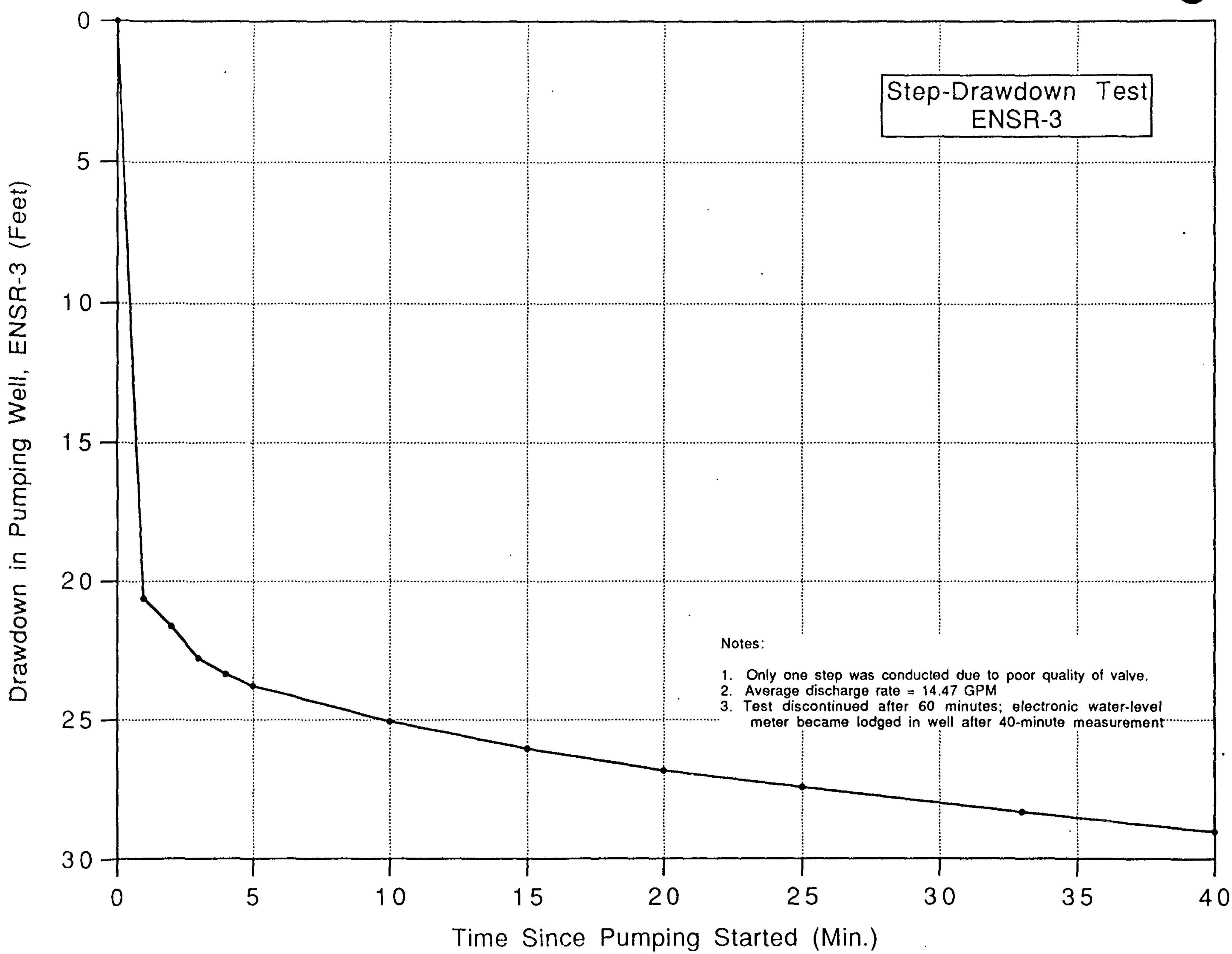
$$S = 0.0152$$



Recovery Test
PTP-1
$T = \frac{2.3\,Q}{4\pi\,\Delta s'} = \frac{2.3\ \frac{13.37\text{ Gal.}}{\text{Min.}}\ \frac{1{,}440\text{ Min.}}{\text{Day}}}{4\pi\,(0.9242\text{ Ft.})} = 3{,}800\ \frac{\text{Gal.}}{\text{Day-Ft.}}$
$\Delta s' = 1.4848$ Ft. - 0.5606 Ft. = 0.9242 Ft.
Notes
1. Average pumping rate during pumping period = 13.37 GPM
Residual Drawdown, s' (Feet)
t/t'
2.0
1.5
1.0
0.5
0.0
1
2
3
4
5
6
7
8
9
10
100



MATCH
POINT
Drawdown, Δh (Feet)
r²/t (Feet²/Min.)
W(u)
u



Step-Drawdown Test
ENSR-3
Notes:
1. Only one step was conducted due to poor quality of valve.
2. Average discharge rate = 14.47 GPM
3. Test discontinued after 60 minutes; electronic water-level meter became lodged in well after 40-minute measurement
Drawdown in Pumping Well, ENSR-3 (Feet)
Time Since Pumping Started (Min.)
0
5
10
15
20
25
30
35
40

SE1000B
Environmental Logger
12/19/90 11:44

Unit# 00705 Test# 0

INPUT 1: Level (F) TOC

| | |
|---|---|
| Reference | 0 |
| Scale factor | 19.99 |
| Offset | -0.03 |

Step# 0 12/11/90 11:38

| Elapsed Time | Value |
|---|---|
| 0 | 0.01 |
| 0.0033 | 0.01 |
| 0.0066 | 0.01 |
| 0.0099 | 0.01 |
| 0.0133 | 0.01 |
| 0.0166 | 0.01 |
| 0.02 | 0.01 |
| 0.0233 | 0.02 |
| 0.0266 | 0 |
| 0.03 | 0.03 |
| 0.0333 | 0 |
| 0.05 | 0.02 |
| 0.0666 | 0.01 |
| 0.0833 | 0 |
| 0.1 | 0.01 |
| 0.1166 | 0.02 |
| 0.1333 | 0 |
| 0.15 | 0.02 |
| 0.1666 | 0.04 |
| 0.1833 | 0.01 |
| 0.2 | 0.01 |
| 0.2166 | 0.01 |
| 0.2333 | 0.01 |
| 0.25 | 0.03 |
| 0.2666 | 0.02 |
| 0.2833 | 0.01 |
| 0.3 | 0.02 |
| 0.3166 | 0.02 |
| 0.3333 | 0.03 |
| 0.4167 | 0.03 |
| 0.5 | 0.03 |

| | |
|---|---|
| 0.5833 | 0.03 |
| 0.6667 | 0.03 |
| 0.75 | 0.03 |
| 0.8333 | 0.05 |
| 0.9167 | 0.05 |
| 1 | 0.05 |
| 1.0833 | 0.05 |
| 1.1667 | 0.06 |
| 1.25 | 0.06 |
| 1.3333 | 0.06 |
| 1.4166 | 0.06 |
| 1.5 | 0.08 |
| 1.5833 | 0.07 |
| 1.6667 | 0.08 |
| 1.75 | 0.08 |
| 1.8333 | 0.08 |
| 1.9167 | 0.09 |
| 2 | 0.1 |
| 2.5 | 0.11 |
| 3 | 0.13 |
| 3.5 | 0.15 |
| 4 | 0.17 |
| 4.5 | 0.19 |
| 5 | 0.2 |
| 5.5 | 0.22 |
| 6 | 0.23 |
| 6.5 | 0.25 |
| 7 | 0.27 |
| 7.5 | 0.28 |
| 8 | 0.3 |
| 8.5 | 0.32 |
| 9 | 0.32 |
| 9.5 | 0.34 |
| 10 | 0.35 |
| 12 | 0.41 |
| 14 | 0.45 |
| 16 | 0.5 |
| 18 | 0.54 |
| 20 | 0.58 |
| 22 | 0.61 |
| 24 | 0.64 |
| 26 | 0.68 |
| 28 | 0.7 |
| 30 | 0.73 |
| 32 | 0.75 |
| 34 | 0.76 |
| 36 | 0.78 |
| 38 | 0.79 |

| | |
|---|---|
| 40 | 0.8 |
| 42 | 0.82 |
| 44 | 0.83 |
| 46 | 0.84 |
| 48 | 0.85 |
| 50 | 0.85 |
| 52 | 0.86 |
| 54 | 0.87 |
| 56 | 0.88 |
| 58 | 0.88 |
| 60 | 0.89 |
| 62 | 0.9 |
| 64 | 0.9 |
| 66 | 0.9 |
| 68 | 0.91 |
| 70 | 0.92 |
| 72 | 0.92 |
| 74 | 0.93 |
| 76 | 0.93 |
| 78 | 0.92 |
| 80 | 0.93 |
| 82 | 0.94 |
| 84 | 0.94 |
| 86 | 0.94 |
| 88 | 0.95 |
| 90 | 0.95 |
| 92 | 0.95 |
| 94 | 0.95 |
| 96 | 0.95 |
| 98 | 0.95 |
| 100 | 0.95 |
| 110 | 0.97 |
| 120 | 0.97 |
| 130 | 0.97 |
| 140 | 0.97 |
| 150 | 0.99 |
| 160 | 0.99 |
| 170 | 1 |
| 180 | 1 |
| 190 | 1.02 |
| 200 | 1.02 |
| 210 | 1.02 |
| 220 | 1.02 |
| 230 | 1.04 |
| 240 | 1.04 |
| 250 | 1.04 |
| 260 | 1.05 |
| 270 | 1.06 |

| | |
|---|---|
| 280 | 1.08 |
| 290 | 1.07 |
| 300 | 1.09 |
| 310 | 1.09 |
| 320 | 1.09 |
| 330 | 1.1 |
| 340 | 1.1 |
| 350 | 1.06 |
| 360 | 0.79 |
| 370 | 0.64 |
| 380 | 0.52 |
| 390 | 0.45 |
| 400 | 0.39 |
| 410 | 0.34 |
| 420 | 0.3 |
| 430 | 0.27 |
| 440 | 0.25 |
| 450 | 0.23 |
| 460 | 0.22 |
| 470 | 0.21 |
| 480 | 0.2 |
| 490 | 0.19 |
| 500 | 0.18 |
| 510 | 0.18 |
| 520 | 0.18 |
| 530 | 0.17 |
| 540 | 0.17 |
| 550 | 0.17 |
| 560 | 0.17 |
| 570 | 0.17 |
| 580 | 0.17 |
| 590 | 0.17 |
| 600 | 0.16 |
| 610 | 0.16 |
| 620 | 0.16 |
| 630 | 0.15 |
| 640 | 0.16 |
| 650 | 0.15 |
| 660 | 0.15 |
| 670 | 0.15 |
| 680 | 0.15 |
| 690 | 0.15 |
| 700 | 0.15 |
| 710 | 0.14 |
| 720 | 0.15 |
| 730 | 0.14 |
| 740 | 0.13 |
| 750 | 0.13 |

| | |
|---|---|
| 760 | 0.13 |
| 770 | 0.13 |
| 780 | 0.13 |
| 790 | 0.12 |
| 800 | 0.11 |
| 810 | 0.11 |
| 820 | 0.11 |
| 830 | 0.11 |
| 840 | 0.1 |
| 850 | 0.1 |
| 860 | 0.1 |
| 870 | 0.1 |
| 880 | 0.1 |
| 890 | 0.1 |
| 900 | 0.1 |
| 910 | 0.1 |
| 920 | 0.09 |
| 930 | 0.09 |
| 940 | 0.09 |
| 950 | 0.1 |
| 960 | 0.1 |
| 970 | 0.1 |
| 980 | 0.1 |
| 990 | 0.1 |
| 1000 | 0.1 |
| 1010 | 0.1 |
| 1020 | 0.1 |
| 1030 | 0.1 |
| 1040 | 0.1 |
| 1050 | 0.09 |
| 1060 | 0.1 |
| 1070 | 0.1 |
| 1080 | 0.1 |
| 1090 | 0.1 |
| 1100 | 0.1 |
| 1110 | 0.1 |
| 1120 | 0.1 |
| 1130 | 0.11 |
| 1140 | 0.11 |
| 1150 | 0.11 |
| 1160 | 0.11 |
| 1170 | 0.11 |
| 1180 | 0.11 |
| 1190 | 0.12 |
| 1200 | 0.13 |
| 1210 | 0.13 |
| 1220 | 0.13 |
| 1230 | 0.14 |

| | |
|---|---|
| 1240 | 0.14 |
| 1250 | 0.14 |
| 1260 | 0.14 |
| 1270 | 0.15 |
| 1280 | 0.15 |
| 1290 | 0.15 |
| 1300 | 0.16 |
| 1310 | 0.16 |
| 1320 | 0.17 |
| 1330 | 0.17 |
| 1340 | 0.17 |
| 1350 | 0.17 |

SE1000B
Environmental Logger
12/19/90 11:48

Unit# 00705 Test# 0

INPUT 2: Level (F) TOC

| | |
|---|---|
| Reference | 0 |
| Scale factor | 10.18 |
| Offset | -0.11 |

Step# 0 12/11/90 11:38

| Elapsed Time | Value |
|---|---|
| 0 | 3.28 |
| 0.0033 | 1.39 |
| 0.0066 | -0.73 |
| 0.0099 | -0.26 |
| 0.0133 | 1.3 |
| 0.0166 | 1.93 |
| 0.02 | 1.47 |
| 0.0233 | 1.1 |
| 0.0266 | 1.46 |
| 0.03 | 2.08 |
| 0.0333 | 2.36 |
| 0.05 | 3.1 |
| 0.0666 | 3.95 |
| 0.0833 | 4.73 |
| 0.1 | 5.5 |
| 0.1166 | 6.23 |
| 0.1333 | 6.93 |
| 0.15 | 7.58 |
| 0.1666 | 8.21 |
| 0.1833 | 8.8 |
| 0.2 | 9.4 |
| 0.2166 | 9.96 |
| 0.2333 | 10.49 |
| 0.25 | 10.98 |
| 0.2666 | 11.47 |
| 0.2833 | 11.91 |
| 0.3 | 12.35 |
| 0.3166 | 12.75 |
| 0.3333 | 13.13 |
| 0.4167 | 14.7 |
| 0.5 | 15.75 |

| | |
|---|---|
| 0.5833 | 16.57 |
| 0.6667 | 17.34 |
| 0.75 | 18.02 |
| 0.8333 | 18.61 |
| 0.9167 | 19.14 |
| 1 | 19.63 |
| 1.0833 | 20.04 |
| 1.1667 | 20.38 |
| 1.25 | 20.69 |
| 1.3333 | 20.98 |
| 1.4166 | 21.26 |
| 1.5 | 21.54 |
| 1.5833 | 21.81 |
| 1.6667 | 22.06 |
| 1.75 | 22.29 |
| 1.8333 | 22.52 |
| 1.9167 | 22.72 |
| 2 | 22.92 |
| 2.5 | 23.57 |
| 3 | 23.57 |
| 3.5 | 23.57 |
| 4 | 23.57 |
| 4.5 | 23.57 |
| 5 | 23.57 |
| 5.5 | 23.57 |
| 6 | 23.57 |
| 6.5 | 23.57 |
| 7 | 23.57 |
| 7.5 | 23.57 |
| 8 | 23.57 |
| 8.5 | 23.57 |
| 9 | 23.57 |
| 9.5 | 23.57 |
| 10 | 23.57 |
| 12 | 23.57 |
| 14 | 23.54 |
| 16 | 23.54 |
| 18 | 23.55 |
| 20 | 23.55 |
| 22 | 23.58 |
| 24 | 23.59 |
| 26 | 23.59 |
| 28 | 23.59 |
| 30 | 23.58 |
| 32 | 23.59 |
| 34 | 23.59 |
| 36 | 23.59 |
| 38 | 23.59 |

| | |
|---|---|
| 40 | 23.58 |
| 42 | 23.59 |
| 44 | 23.59 |
| 46 | 23.59 |
| 48 | 23.58 |
| 50 | 23.59 |
| 52 | 23.58 |
| 54 | 23.58 |
| 56 | 23.58 |
| 58 | 23.59 |
| 60 | 23.58 |
| 62 | 23.58 |
| 64 | 23.58 |
| 66 | 23.58 |
| 68 | 23.58 |
| 70 | 23.58 |
| 72 | 23.58 |
| 74 | 23.59 |
| 76 | 23.58 |
| 78 | 23.58 |
| 80 | 23.58 |
| 82 | 23.58 |
| 84 | 23.58 |
| 86 | 23.58 |
| 88 | 23.58 |
| 90 | 23.58 |
| 92 | 23.58 |
| 94 | 23.58 |
| 96 | 23.58 |
| 98 | 23.57 |
| 100 | 23.58 |
| 110 | 23.57 |
| 120 | 23.57 |
| 130 | 23.56 |
| 140 | 23.56 |
| 150 | 23.55 |
| 160 | 23.55 |
| 170 | 23.54 |
| 180 | 23.54 |
| 190 | 23.54 |
| 200 | 23.53 |
| 210 | 23.53 |
| 220 | 23.53 |
| 230 | 23.53 |
| 240 | 23.53 |
| 250 | 23.52 |
| 260 | 23.52 |
| 270 | 23.52 |

| | |
|---|---|
| 280 | 23.52 |
| 290 | 23.51 |
| 300 | 23.51 |
| 310 | 23.51 |
| 320 | 23.5 |
| 330 | 23.5 |
| 340 | 23.5 |
| 350 | 12.82 |
| 360 | -1.08 |
| 370 | 25.22 |
| 380 | 25.22 |
| 390 | 25.22 |
| 400 | 25.22 |
| 410 | 25.22 |
| 420 | 25.22 |
| 430 | 25.22 |
| 440 | 25.22 |
| 450 | 25.22 |
| 460 | 25.22 |
| 470 | 25.22 |
| 480 | 25.22 |
| 490 | 25.22 |
| 500 | 25.22 |
| 510 | 25.22 |
| 520 | 25.22 |
| 530 | 25.22 |
| 540 | 25.22 |
| 550 | 25.22 |
| 560 | 25.22 |
| 570 | 25.22 |
| 580 | 25.22 |
| 590 | 25.22 |
| 600 | 25.22 |
| 610 | 25.22 |
| 620 | 25.22 |
| 630 | 25.22 |
| 640 | 25.22 |
| 650 | 25.22 |
| 660 | 25.22 |
| 670 | 25.22 |
| 680 | 25.22 |
| 690 | 25.22 |
| 700 | 25.22 |
| 710 | 25.22 |
| 720 | 25.22 |
| 730 | 25.22 |
| 740 | 25.22 |
| 750 | 25.22 |

| | |
|---|---|
| 760 | 25.22 |
| 770 | 25.22 |
| 780 | 25.22 |
| 790 | 25.22 |
| 800 | 25.22 |
| 810 | 25.22 |
| 820 | 25.22 |
| 830 | 25.22 |
| 840 | 25.22 |
| 850 | 25.22 |
| 860 | 25.22 |
| 870 | 25.22 |
| 880 | 25.22 |
| 890 | 25.22 |
| 900 | 25.22 |
| 910 | 25.22 |
| 920 | 25.22 |
| 930 | 25.22 |
| 940 | 25.22 |
| 950 | 25.22 |
| 960 | 25.22 |
| 970 | 25.22 |
| 980 | 25.22 |
| 990 | 25.22 |
| 1000 | 25.22 |
| 1010 | 25.22 |
| 1020 | 25.22 |
| 1030 | 25.22 |
| 1040 | 25.22 |
| 1050 | 25.22 |
| 1060 | 25.22 |
| 1070 | 25.22 |
| 1080 | 25.22 |
| 1090 | 25.22 |
| 1100 | 25.22 |
| 1110 | 25.22 |
| 1120 | 25.22 |
| 1130 | 25.22 |
| 1140 | 25.22 |
| 1150 | 25.22 |
| 1160 | 25.22 |
| 1170 | 25.22 |
| 1180 | 25.22 |
| 1190 | 25.22 |
| 1200 | 25.22 |
| 1210 | 25.22 |
| 1220 | 25.22 |
| 1230 | 25.22 |

| | |
|---|---|
| 1240 | 25.22 |
| 1250 | 25.22 |
| 1260 | 25.22 |
| 1270 | 25.22 |
| 1280 | 25.22 |
| 1290 | 25.22 |
| 1300 | 25.22 |
| 1310 | 25.22 |
| 1320 | 25.22 |
| 1330 | 25.22 |
| 1340 | 25.22 |
| 1350 | 25.22 |

# APPENDIX D

Model Calibration Run Output

```
U.S.G.S. METHOD-OF-CHARACTERISTICS MODEL FOR SOLUTE TRANSPORT IN GROUND WATER
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).


                  GRID DESCRIPTORS

       NY     (NUMBER OF ROWS)      =    20
       XDEL   (X-DISTANCE IN FEET) =   200.0
       YDEL   (Y-DISTANCE IN FEET) =   200.0
                  TIME  PARAMETERS


       NPMP    (NO. OF PUMPING PERIODS)        =      1
       PINT    (PUMPING PERIOD IN YEARS)       =     30.000
       TIMX    (TIME INCREMENT MULTIPLIER)     =      0.00
       TINIT   (INITIAL TIME STEP IN SEC.)     =      0.
         HYDROLOGIC AND CHEMICAL PARAMETERS


       POROS    (EFFECTIVE POROSITY)          =      0.200
       BETA     (LONGITUDINAL DISPERSIVITY) =     100.0
       DLTRAT   (RATIO OF TRANSVERSE TO
                LONGITUDINAL DISPERSIVITY)    =      0.30
       ANFCTR   (RATIO OF T-YY TO T-XX)       =      1.000000
                 EXECUTION PARAMETERS


       TOL     (CONVERGENCE CRITERIA - ADIP) =  0.10E-01
       ITMAX   (MAX.NO.OF ITERATIONS - ADIP) =  100
       CELDIS  (MAX.CELL DISTANCE PER MOVE
                   OF PARTICLES - M.O.C.)    =    0.500
       NPMAX   (MAX. NO. OF PARTICLES)       = 3200
       NPTPND  (NO. PARTICLES PER NODE)      =     9



               COMPLETE PRINTOUT)        =    30
       NPNTMV  (MOVE INTERVAL FOR CHEM.
               CONCENTRATION PRINTOUT)  =     0
       NPNTVL  (TIME STEP INTERVAL FOR
               VELOCITY PRINTOUT; 0=NEVER;
               -1=FIRST TIME STEP;
               -2=LAST TIME STEP)        =     0
       NPNTD   (PRINT OPTION-DISP.COEF.
               0=NO; 1=FIRST TIME STEP;
```

```
              2=ALL TIME STEPS)          =     0
     NUMOBS  (NO. OF OBSERVATION WELLS
              FOR HYDROGRAPH PRINTOUT)   =     5
     NREC    (NO. OF PUMPING WELLS)      =     0
     NCODES  (FOR NODE IDENT.)           =     5
     NPNCHV  (TIME STEP INTERVAL FOR
              VELOCITY PRINTOUT ON
              FILE UNIT 7; 0=NEVER;
              -1=FIRST TIME STEP;
              -2=LAST TIME STEP)         =     0
     NPDELC  (PRINT OPT.-CONC. CHANGE)   =  ****
     IREACT  (REACTION SPECIFIER)        =     0
```

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+( |
| 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+( |
| 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+08 | 0.31558E+( |

| | | |
|---|---|---|
| 2 | 8 | 8 |
| 3 | 9 | 7 |
| 4 | 8 | 13 |
| 5 | 7 | 8 |

X-Y SPACING:
200.00
200.00

TRANSMISSIVITY MAP (FT*FT/SEC)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 |
| 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 9.48E-03 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

AQUIFER THICKNESS (FT)

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |
| 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 0.0 |

```
   0.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0  0.0
   0.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0  0.0
   0.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0  0.0
   0.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0  0.0
   0.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0  0.0
   0.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0 65.0  0.0
   0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
 DIFFUSE RECHARGE AND DISCHARGE (FT/SEC)

  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
  0.00E+00 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10
 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10 -2.64E-10  0.00E+00
```

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

PERMEABILTY MAP (FT/SEC)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 |
| 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 1.46E-04 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

NO. OF FINITE-DIFFERENCE CELLS IN AQUIFER = 324

PARTICLES; IF EXCEEDED, PARTICLES ARE REGENERATED) = 6

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

NO. OF NODE IDENT. CODES SPECIFIED = 5

THE FOLLOWING ASSIGNMENTS HAVE BEEN MADE:

| CODE NO. | LEAKANCE | SOURCE CONC. | RECHARGE |
|---|---|---|---|
| 1 | 0.100E+01 | 0.70 | |
| 2 | 0.100E+01 | 75.00 | -0.400E-06 |
| 3 | 0.100E+01 | 150.00 | -0.650E-06 |
| 4 | 0.100E+01 | 40.00 | -0.350E-06 |
| 5 | 0.100E+01 | 120.00 | -0.450E-06 |

VERTICAL PERMEABILITY/THICKNESS (FT/(FT*SEC))

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 |
| 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 0.00E+00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 |
| 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

WATER TABLE

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 94. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 96. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 96. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0. | 0. | 0. | 0. | 0. | 96. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 98. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 100. | 0. |
| 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |

HEAD DISTRIBUTION - ROW
NUMBER OF TIME STEPS = 0
TIME(SECONDS) = 0.00000
TIME(DAYS) = 0.00000E+00
TIME(YEARS) = 0.00000E+00

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 94.0000000 | 94.0000000 | 94.0000000 | 94.0000000 | 94.0000000 | 94.0000000 | 94.0000000 | 94.0000000 |
| 94.0000000 | 94.0000000 | 94.0000000 | 94.0000000 | 94.0000000 | 94.0000000 | 94.0000000 | 94.0000000 | 94.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 96.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 96.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 96.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 98.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 100.0000000 | 100.0000000 | 100.0000000 | 100.0000000 | 100.0000000 | 100.0000000 | 100.0000000 | 100.0000000 |
| 100.0000000 | 100.0000000 | 100.0000000 | 100.0000000 | 100.0000000 | 100.0000000 | 100.0000000 | 100.0000000 | 100.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |

ITERATION PARAMETERS

0.616850E-02
0.144040E-01
0.336346E-01
0.785398E-01
0.183397
0.428249
1.00000

CONCENTRATION

TIME(SECONDS) = 0.00000
CHEM.TIME(SECONDS) = 0.00000E+00
CHEM.TIME(DAYS) = 0.00000E+00
TIME(YEARS) = 0.00000E+00
CHEM.TIME(YEARS) = 0.00000E+00
NO. MOVES COMPLETED = 0

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |

```
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

 NUMBER OF ITERATIONS =   14
        STABILITY CRITERIA --- M.O.C.

TMV (MAX. INJ.) =  0.20000E+08
TIMV (CELDIS)   =  0.51042E+08
TIMV =  2.00E+07     NTIMV =     1     NMOV =      2

 TIMEVELO =  0.15779E+08
 TIMEDISP =  0.72612E+08
TIMV =  1.58E+07     NTIMD =     0     NMOV =      2
        THE LIMITING STABILITY CRITERION IS MAXIMUM INJECTION RATE
            MAX. INJECTION OCCURS AT CELL IX =    9  IY =  14
        NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2

 TIM(N)   =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.15779E+08
 NP       =         2970        IMOV     =            2
 TIM(N)   =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.31558E+08
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

```
                                              1      95.9        0.7        0.500
                                              2      95.9        0.6        1.000
           OBS.WELL NO.   X     Y             N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                              1      95.8        0.7        0.500
                                              2      95.8        0.9        1.000
           OBS.WELL NO.   X     Y             N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                              1      95.5        0.7        0.500
                                              2      95.5        6.9        1.000
           OBS.WELL NO.   X     Y             N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                              1      97.5        0.7        0.500
                                              2      97.5        1.3        1.000
           OBS.WELL NO.   X     Y             N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                              1      95.7        0.7        0.500
                                              2      95.7        2.1        1.000


  NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
       NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2


  TIM(N)   =  0.31558E+08       TIMV    =  0.15779E+08      SUMTCH =  0.47336E+08
  NP       =         2970       IMOV    =            2
  TIM(N)   =  0.31558E+08       TIMV    =  0.15779E+08      SUMTCH =  0.63115E+08
 EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 0.8 | 1.500 |
| | | | 2 | 95.9 | 0.9 | 2.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.8 | 1.5 | 1.500 |
| | | | 2 | 95.8 | 6.3 | 2.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.5 | 7.4 | 1.500 |
| | | | 2 | 95.5 | 7.9 | 2.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 97.5 | 2.4 | 1.500 |
| | | | 2 | 97.5 | 3.8 | 2.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

```
                 5          7    8

                                                  1        95.7          19.2          1.500
                                                  2        95.7          19.0          2.000


 NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
        NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2


 TIM(N)   =  0.31558E+08        TIMV     =  0.15779E+08         SUMTCH =  0.78894E+08
 NP       =         3077        IMOV     =            2
 TIM(N)   =  0.31558E+08        TIMV     =  0.15779E+08         SUMTCH =  0.94673E+08
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).



                                                  1        95.9           1.1          2.500
                                                  2        95.9           1.7          3.000
                 OBS.WELL NO.     X    Y          N     HEAD (FT)    CONC.(MG/L)   TIME (YEARS)


                                                  1        95.8           4.4          2.500
```

```
                                            2        95.8         6.5        3.000
         OBS.WELL NO.    X     Y            N     HEAD (FT)   CONC.(MG/L)  TIME (YEARS)



                                            1        95.5        13.0        2.500
                                            2        95.5        13.2        3.000
         OBS.WELL NO.    X     Y            N     HEAD (FT)   CONC.(MG/L)  TIME (YEARS)



                                            1        97.5         6.2        2.500
                                            2        97.5         7.7        3.000
         OBS.WELL NO.    X     Y            N     HEAD (FT)   CONC.(MG/L)  TIME (YEARS)



                                            1        95.7        19.2        2.500
                                            2        95.7        19.5        3.000


 NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
      NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2


 TIM(N)    =  0.31558E+08        TIMV    =  0.15779E+08       SUMTCH =  0.11045E+09
 NP        =         3077        IMOV    =            2
 TIM(N)    =  0.31558E+08        TIMV    =  0.15779E+08       SUMTCH =  0.12623E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 2.7 | 3.500 |
| | | | 2 | 95.9 | 3.0 | 4.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.8 | 6.7 | 3.500 |
| | | | 2 | 95.8 | 7.2 | 4.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.5 | 18.3 | 3.500 |
| | | | 2 | 95.5 | 25.2 | 4.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 97.5 | 10.0 | 3.500 |
| | | | 2 | 97.5 | 22.7 | 4.000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.7 | 26.8 | 3.500 |
| | | | 2 | 95.7 | 23.8 | 4.000 |

```
NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
        NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2

TIM(N)    =  0.31558E+08        TIMV     =  0.15779E+08       SUMTCH =  0.14201E+09
NP        =         3131        IMOV     =            2
TIM(N)    =  0.31558E+08        TIMV     =  0.15779E+08       SUMTCH =  0.15779E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).

                                        1      95.9        3.9        4.500
                                        2      95.9        4.8        5.000
          OBS.WELL NO.   X    Y         N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                        1      95.8        7.3        4.500
                                        2      95.8        8.3        5.000
          OBS.WELL NO.   X    Y         N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                        1      95.5       26.8        4.500
                                        2      95.5       27.7        5.000
```

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 97.5 | 28.3 | 4.500 |
| | | | 2 | 97.5 | 29.7 | 5.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.7 | 25.9 | 4.500 |
| | | | 2 | 95.7 | 36.5 | 5.000 |

```
NUMBER OF ITERATIONS = 0  (HEADS UNCHANGED)
      NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2

TIM(N)   =  0.31558E+08       TIMV     =  0.15779E+08        SUMTCH =  0.17357E+09
   ***   NOTE   ***         NPTM.EQ.NPMAX --- IMOV=   2    PT. NO.=3069     CALL GENPT

TIM(N)   =  0.31558E+08       TIMV     =  0.15779E+08        SUMTCH =  0.18935E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

```
                                        1       95.9        5.2        5.500
                                        2       95.9        5.3        6.000
OBS.WELL NO.     X     Y                N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                        1       95.8        5.8        5.500
                                        2       95.8        6.8        6.000
OBS.WELL NO.     X     Y                N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                        1       95.5       26.1        5.500
                                        2       95.5       25.0        6.000
OBS.WELL NO.     X     Y                N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                        1       97.5       27.3        5.500
                                        2       97.5       26.5        6.000
OBS.WELL NO.     X     Y                N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                        1       95.7       42.1        5.500
                                        2       95.7       40.4        6.000

NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
      NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2

TIM(N)   =  0.31558E+08        TIMV    =   0.15779E+08      SUMTCH =  0.20512E+09
NP       =         2970        IMOV    =             2
```

TIM(N) = 0.31558E+08 TIMV = 0.15779E+08 SUMTCH = 0.22090E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 5.2 | 6.500 |
| | | | 2 | 95.9 | 7.5 | 7.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.8 | 7.7 | 6.500 |
| | | | 2 | 95.8 | 8.5 | 7.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.5 | 27.2 | 6.500 |
| | | | 2 | 95.5 | 26.2 | 7.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | |
|---|---|---|---|
| 1 | 97.5 | 24.5 | 6.500 |

```
                                                2         97.5        24.5        7.000
           OBS.WELL NO.     X     Y             N      HEAD (FT)   CONC.(MG/L)  TIME (YEARS)



                                                1         95.7        39.8        6.500
                                                2         95.7        47.3        7.000


 NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
       NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2


 TIM(N)    =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.23668E+09
 NP        =         2970        IMOV     =            2
 TIM(N)    =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.25246E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).



                                                1         95.9         7.5        7.500
                                                2         95.9         7.5        8.000
           OBS.WELL NO.     X     Y             N      HEAD (FT)   CONC.(MG/L)  TIME (YEARS)
```

```
                                          1        95.8        13.4        7.500
                                          2        95.8        11.8        8.000
     OBS.WELL NO.    X     Y              N     HEAD (FT)   CONC.(MG/L)   TIME (YEARS)

                                          1        95.5        25.1        7.500
                                          2        95.5        26.3        8.000
     OBS.WELL NO.    X     Y              N     HEAD (FT)   CONC.(MG/L)   TIME (YEARS)

                                          1        97.5        24.8        7.500
                                          2        97.5        22.3        8.000
     OBS.WELL NO.    X     Y              N     HEAD (FT)   CONC.(MG/L)   TIME (YEARS)

                                          1        95.7        45.5        7.500
                                          2        95.7        44.1        8.000

 NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
        NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP   =    2

 TIM(N)   =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.26824E+09
 NP       =         3077        IMOV     =            2
 TIM(N)   =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.28402E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 7.7 | 8.500 |
| | | | 2 | 95.9 | 8.5 | 9.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.8 | 13.8 | 8.500 |
| | | | 2 | 95.8 | 14.0 | 9.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.5 | 25.6 | 8.500 |
| | | | 2 | 95.5 | 27.5 | 9.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 97.5 | 23.2 | 8.500 |
| | | | 2 | 97.5 | 21.4 | 9.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | |
|---|---|---|---|
| 1 | 95.7 | 40.7 | 8.500 |
| 2 | 95.7 | 41.7 | 9.000 |

```
NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
       NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2

 TIM(N)   =  0.31558E+08      TIMV    =  0.15779E+08      SUMTCH =  0.29980E+09
 NP       =         3077      IMOV    =            2
 TIM(N)   =  0.31558E+08      TIMV    =  0.15779E+08      SUMTCH =  0.31558E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 8.3 | 9.500 |
| | | | 2 | 95.9 | 8.9 | 10.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.8 | 14.6 | 9.500 |
| | | | 2 | 95.8 | 14.5 | 10.000 |

```
                                          0       0.0        0.7       0.000
                                          1      95.5       29.6       9.500
                                          2      95.5       30.5      10.000
      OBS.WELL NO.     X     Y            N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)


                                          1      97.5       32.5       9.500
                                          2      97.5       38.4      10.000
      OBS.WELL NO.     X     Y            N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)


                                          1      95.7       37.8       9.500
                                          2      95.7       38.0      10.000


 NUMBER OF ITERATIONS = 0  (HEADS UNCHANGED)
        NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2

  TIM(N)   =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.33135E+09
  NP       =         3131        IMOV     =            2
  TIM(N)   =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.34713E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

```
                       1          5     9


                                                          1        95.9          9.8         10.500
                                                          2        95.9         10.6         11.000
                 OBS.WELL NO.     X     Y                 N     HEAD (FT)    CONC.(MG/L)   TIME (YEARS)


                                                          1        95.8         15.4         10.500
                                                          2        95.8         12.8         11.000
                 OBS.WELL NO.     X     Y                 N     HEAD (FT)    CONC.(MG/L)   TIME (YEARS)


                                                          1        95.5         30.8         10.500
                                                          2        95.5         29.8         11.000
                 OBS.WELL NO.     X     Y                 N     HEAD (FT)    CONC.(MG/L)   TIME (YEARS)


                                                          1        97.5         38.6         10.500
                                                          2        97.5         35.9         11.000
                 OBS.WELL NO.     X     Y                 N     HEAD (FT)    CONC.(MG/L)   TIME (YEARS)


                                                          1        95.7         46.6         10.500
                                                          2        95.7         47.3         11.000


    NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
          NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2
```

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NP | = | 2916 | IMOV | = | 1 | | | |
| TIM(N) | = | 0.31558E+08 | TIMV | = | 0.15779E+08 | SUMTCH | = | 0.36291E+09 |
| NP | = | 2970 | IMOV | = | 2 | | | |
| TIM(N) | = | 0.31558E+08 | TIMV | = | 0.15779E+08 | SUMTCH | = | 0.37869E+09 |

EPNG/JAL #4 - CALIBRATION (NEW RUN 1).

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 10.5 | 11.500 |
| | | | 2 | 95.9 | 10.7 | 12.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.8 | 13.7 | 11.500 |
| | | | 2 | 95.8 | 14.5 | 12.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.5 | 29.1 | 11.500 |
| | | | 2 | 95.5 | 30.5 | 12.000 |

```
                                        1        97.5        35.2       11.500
                                        2        97.5        30.4       12.000
                OBS.WELL NO.   X   Y    N     HEAD (FT)   CONC.(MG/L)  TIME (YEARS)


                                        1        95.7        46.2       11.500
                                        2        95.7        46.2       12.000


 NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
        NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2


 TIM(N)    =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.39447E+09
 NP        =         2970        IMOV     =            2
 TIM(N)    =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.41025E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).


                                        1        95.9        11.9       12.500
                                        2        95.9        11.9       13.000
                OBS.WELL NO.   X   Y    N     HEAD (FT)   CONC.(MG/L)  TIME (YEARS)
```

```
                                             1        95.8        15.2       12.500
                                             2        95.8        19.1       13.000
       OBS.WELL NO.    X     Y               N     HEAD (FT)   CONC.(MG/L)  TIME (YEARS)

                                             1        95.5        29.7       12.500
                                             2        95.5        28.8       13.000
       OBS.WELL NO.    X     Y               N     HEAD (FT)   CONC.(MG/L)  TIME (YEARS)

                                             1        97.5        30.7       12.500
                                             2        97.5        31.1       13.000
       OBS.WELL NO.    X     Y               N     HEAD (FT)   CONC.(MG/L)  TIME (YEARS)

                                             1        95.7      - 52.4       12.500
                                             2        95.7        51.0       13.000

 NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
        NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2

 TIM(N)   =  0.31558E+08      TIMV    =  0.15779E+08      SUMTCH =  0.42603E+09
 NP       =         3077      IMOV    =            2
 TIM(N)   =  0.31558E+08      TIMV    =  0.15779E+08      SUMTCH =  0.44181E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

PUMPING PERIOD NO. 1

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 12.0 | 13.500 |
| | | | 2 | 95.9 | 12.5 | 14.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.8 | 18.1 | 13.500 |
| | | | 2 | 95.8 | 19.8 | 14.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.5 | 29.5 | 13.500 |
| | | | 2 | 95.5 | 29.0 | 14.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 97.5 | 27.3 | 13.500 |
| | | | 2 | 97.5 | 28.2 | 14.000 |

```
                                                    0      0.0       0.7      0.000
                                                    1     95.7      49.9     13.500
                                                    2     95.7      46.7     14.000


NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
       NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2


TIM(N)   =  0.31558E+08        TIMV    =  0.15779E+08        SUMTCH =  0.45759E+09
NP       =         3077        IMOV    =            2
TIM(N)   =  0.31558E+08        TIMV    =  0.15779E+08        SUMTCH =  0.47336E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).



                                                    1     95.9      14.4      14.500
                                                    2     95.9      13.7      15.000
               OBS.WELL NO.    X    Y               N   HEAD (FT)  CONC.(MG/L)  TIME (YEARS)


                                                    1     95.8      20.2      14.500
                                                    2     95.8      20.8      15.000
               OBS.WELL NO.    X    Y               N   HEAD (FT)  CONC.(MG/L)  TIME (YEARS)
```

```
                 3          9    7

                                                 1       95.5       30.3      14.500
                                                 2       95.5       31.8      15.000
            OBS.WELL NO.    X    Y               N     HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                                 1       97.5       26.0      14.500
                                                 2       97.5       36.1      15.000
            OBS.WELL NO.    X    Y               N     HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                                 1       95.7       47.1      14.500
                                                 2       95.7       43.5      15.000

  NUMBER OF ITERATIONS = 0  (HEADS UNCHANGED)
        NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2

  TIM(N)   =  0.31558E+08       TIMV     =  0.15779E+08       SUMTCH =  0.48914E+09
  NP       =         3131       IMOV     =            2
  TIM(N)   =  0.31558E+08       TIMV     =  0.15779E+08       SUMTCH =  0.50492E+09
 EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

```
                                    1     95.9        14.5        15.500
                                    2     95.9        15.1        16.000
OBS.WELL NO.    X     Y             N   HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                    1     95.8        21.0        15.500
                                    2     95.8        21.8        16.000
OBS.WELL NO.    X     Y             N   HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                    1     95.5        32.5        15.500
                                    2     95.5        32.6        16.000
OBS.WELL NO.    X     Y             N   HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                    1     97.5        42.2        15.500
                                    2     97.5        41.5        16.000
OBS.WELL NO.    X     Y             N   HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                    1     95.7        43.3        15.500
                                    2     95.7        51.0        16.000

NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
     NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2
```

```
TIM(N)    =  0.31558E+08        TIMV       =  0.15779E+08           SUMTCH =  0.52070E+09
    ***    NOTE    ***       NPTM.EQ.NPMAX --- IMOV=    2      PT. NO.=3069     CALL GENPT

TIM(N)    =  0.31558E+08        TIMV       =  0.15779E+08           SUMTCH =  0.53648E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

```
                                          1       95.9          16.3          16.500
                                          2       95.9          16.0          17.000
OBS.WELL NO.      X      Y                N     HEAD (FT)    CONC.(MG/L)   TIME (YEARS)


                                          1       95.8          20.1          16.500
                                          2       95.8          21.0          17.000
OBS.WELL NO.      X      Y                N     HEAD (FT)    CONC.(MG/L)   TIME (YEARS)


                                          1       95.5          31.7          16.500
                                          2       95.5          31.1          17.000
OBS.WELL NO.      X      Y                N     HEAD (FT)    CONC.(MG/L)   TIME (YEARS)
```

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 97.5 | 38.9 | 16.500 |
| | | | 2 | 97.5 | 38.2 | 17.000 |
| | | | 1 | 95.7 | 51.4 | 16.500 |
| | | | 2 | 95.7 | 50.6 | 17.000 |

NUMBER OF ITERATIONS = 0 (HEADS UNCHANGED)
NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP = 2

```
TIM(N)   =  0.31558E+08      TIMV   =  0.15779E+08      SUMTCH =  0.55226E+09
NP       =        2970       IMOV   =            2
TIM(N)   =  0.31558E+08      TIMV   =  0.15779E+08      SUMTCH =  0.56804E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

```
                                            1      95.9      14.9      17.500
                                            2      95.9      16.4      18.000
        OBS.WELL NO.    X    Y              N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                            1      95.8      21.8      17.500
                                            2      95.8      23.8      18.000
        OBS.WELL NO.    X    Y              N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                            1      95.5      32.3      17.500
                                            2      95.5      31.7      18.000
        OBS.WELL NO.    X    Y              N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                            1      97.5      32.6      17.500
                                            2      97.5      32.9      18.000
        OBS.WELL NO.    X    Y              N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)

                                            1      95.7      50.7      17.500
                                            2      95.7      55.9      18.000

 NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
     NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2

 TIM(N)    =  0.31558E+08        TIMV    =  0.15779E+08     SUMTCH =  0.58382E+09
 NP        =         2970        IMOV    =            2
 TIM(N)    =  0.31558E+08        TIMV    =  0.15779E+08     SUMTCH =  0.59959E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 16.2 | 18.500 |
| | | | 2 | 95.9 | 16.0 | 19.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.8 | 26.6 | 18.500 |
| | | | 2 | 95.8 | 26.2 | 19.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.5 | 31.1 | 18.500 |
| | | | 2 | 95.5 | 32.0 | 19.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 97.5 | 33.4 | 18.500 |
| | | | 2 | 97.5 | 29.1 | 19.000 |

```
                    5          7    8

                                                  1      95.7       54.7      18.500
                                                  2      95.7       53.8      19.000


 NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
         NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2


 TIM(N)   =  0.31558E+08       TIMV     =  0.15779E+08       SUMTCH =  0.61537E+09
 NP       =         3077       IMOV     =            2
 TIM(N)   =  0.31558E+08       TIMV     =  0.15779E+08       SUMTCH =  0.63115E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).


                                                  1      95.9       15.5      19.500
                                                  2      95.9       16.1      20.000
              OBS.WELL NO.    X    Y              N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)


                                                  1      95.8       28.2      19.500
```

```
                                                      2        95.8        28.8        20.000
             OBS.WELL NO.      X     Y                N      HEAD (FT)   CONC.(MG/L)   TIME (YEARS)


                                                      1        95.5        31.6        19.500
                                                      2        95.5        32.7        20.000
             OBS.WELL NO.      X     Y                N      HEAD (FT)   CONC.(MG/L)   TIME (YEARS)


                                                      1        97.5        30.1        19.500
                                                      2        97.5        27.7        20.000
             OBS.WELL NO.      X     Y                N      HEAD (FT)   CONC.(MG/L)   TIME (YEARS)


                                                      1        95.7        51.0        19.500
                                                      2        95.7        51.6        20.000


  NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
          NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2


  TIM(N)    =  0.31558E+08       TIMV     =  0.15779E+08        SUMTCH =  0.64693E+09
  NP        =         3077       IMOV     =            2
  TIM(N)    =  0.31558E+08       TIMV     =  0.15779E+08        SUMTCH =  0.66271E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

```
                                 1      95.9        14.7       20.500
                                 2      95.9        14.7       21.000
OBS.WELL NO.     X     Y         N      HEAD (FT)   CONC.(MG/L)  TIME (YEARS)

                                 1      95.8        29.3       20.500
                                 2      95.8        29.8       21.000
OBS.WELL NO.     X     Y         N      HEAD (FT)   CONC.(MG/L)  TIME (YEARS)

                                 1      95.5        34.0       20.500
                                 2      95.5        34.5       21.000
OBS.WELL NO.     X     Y         N      HEAD (FT)   CONC.(MG/L)  TIME (YEARS)

                                 1      97.5        37.5       20.500
                                 2      97.5        43.6       21.000
OBS.WELL NO.     X     Y         N      HEAD (FT)   CONC.(MG/L)  TIME (YEARS)

                                 1      95.7        48.8       20.500
                                 2      95.7        48.5       21.000
```

```
 NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
        NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2


 TIM(N)    =  0.31558E+08       TIMV     =  0.15779E+08        SUMTCH =  0.67849E+09
 NP        =         3131       IMOV     =            2
 TIM(N)    =  0.31558E+08       TIMV     =  0.15779E+08        SUMTCH =  0.69427E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).




                                           1       95.9        15.4       21.500
                                           2       95.9        16.7       22.000
          OBS.WELL NO.    X    Y           N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)


                                           1       95.8        30.9       21.500
                                           2       95.8        30.8       22.000
          OBS.WELL NO.    X    Y           N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)


                                           1       95.5        35.0       21.500
                                           2       95.5        34.3       22.000
```

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 97.5 | 42.6 | 21.500 |
| | | | 2 | 97.5 | 40.1 | 22.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.7 | 55.2 | 21.500 |
| | | | 2 | 95.7 | 55.7 | 22.000 |

NUMBER OF ITERATIONS = 0 (HEADS UNCHANGED)
NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP = 2

```
TIM(N)   =  0.31558E+08      TIMV   =  0.15779E+08      SUMTCH =  0.71005E+09
NP       =         2970      IMOV   =            2
TIM(N)   =  0.31558E+08      TIMV   =  0.15779E+08      SUMTCH =  0.72582E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 16.5 | 22.500 |
| | | | 2 | 95.9 | 15.6 | 23.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
| | | | 1 | 95.8 | 31.4 | 22.500 |
| | | | 2 | 95.8 | 32.0 | 23.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
| | | | 1 | 95.5 | 33.8 | 22.500 |
| | | | 2 | 95.5 | 34.7 | 23.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
| | | | 1 | 97.5 | 39.4 | 22.500 |
| | | | 2 | 97.5 | 33.4 | 23.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
| | | | 1 | 95.7 | 55.0 | 22.500 |
| | | | 2 | 95.7 | 55.1 | 23.000 |

NUMBER OF ITERATIONS = 0 (HEADS UNCHANGED)
NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP = 2

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TIM(N) | = | 0.31558E+08 | TIMV | = | 0.15779E+08 | SUMTCH | = | 0.74160E+09 |
| NP | = | 2970 | IMOV | = | 2 | | | |

TIM(N) = 0.31558E+08 TIMV = 0.15779E+08 SUMTCH = 0.75738E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 17.0 | 23.500 |
| | | | 2 | 95.9 | 16.9 | 24.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.8 | 34.7 | 23.500 |
| | | | 2 | 95.8 | 35.9 | 24.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.5 | 34.3 | 23.500 |
| | | | 2 | 95.5 | 33.9 | 24.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |

| | | | |
|---|---|---|---|
| 1 | 97.5 | 33.8 | 23.500 |

```
OBS.WELL NO.    X    Y              2       97.5        34.3        24.000
                                    N    HEAD (FT)   CONC.(MG/L)  TIME (YEARS)


                                    1       95.7        59.5        23.500
                                    2       95.7        58.5        24.000

NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
      NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2

TIM(N)    =  0.31558E+08     TIMV    =  0.15779E+08      SUMTCH =  0.77316E+09
NP        =         3077     IMOV    =            2
TIM(N)    =  0.31558E+08     TIMV    =  0.15779E+08      SUMTCH =  0.78894E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).


                                    1       95.9        16.8        24.500
                                    2       95.9        16.3        25.000
OBS.WELL NO.    X    Y              N    HEAD (FT)   CONC.(MG/L)  TIME (YEARS)
```

```
                                             1      95.8       35.9       24.500
                                             2      95.8       38.0       25.000
          OBS.WELL NO.     X     Y           N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)


                                             1      95.5       35.0       24.500
                                             2      95.5       34.7       25.000
          OBS.WELL NO.     X     Y           N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)


                                             1      97.5       29.7       24.500
                                             2      97.5       30.8       25.000
          OBS.WELL NO.     X     Y           N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)


                                             1      95.7       57.8       24.500
                                             2      95.7       55.6       25.000


 NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
      NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2


 TIM(N)   =  0.31558E+08      TIMV   =  0.15779E+08      SUMTCH =  0.80472E+09
 NP       =         3077      IMOV   =            2
 TIM(N)   =  0.31558E+08      TIMV   =  0.15779E+08      SUMTCH =  0.82050E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 16.9 | 25.500 |
| | | | 2 | 95.9 | 15.4 | 26.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
| | | | 1 | 95.8 | 38.6 | 25.500 |
| | | | 2 | 95.8 | 38.8 | 26.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
| | | | 1 | 95.5 | 35.5 | 25.500 |
| | | | 2 | 95.5 | 36.6 | 26.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
| | | | 1 | 97.5 | 28.4 | 25.500 |
| | | | 2 | 97.5 | 38.0 | 26.000 |
| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
| | | | 1 | 95.7 | 56.5 | 25.500 |
| | | | 2 | 95.7 | 54.5 | 26.000 |

```
NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
       NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2


 TIM(N)    =  0.31558E+08         TIMV     =  0.15779E+08         SUMTCH =  0.83628E+09
 NP        =         3131         IMOV     =            2
 TIM(N)    =  0.31558E+08         TIMV     =  0.15779E+08         SUMTCH =  0.85206E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).



                                              1       95.9        15.4       26.500
                                              2       95.9        16.1       27.000
          OBS.WELL NO.    X     Y             N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)


                                              1       95.8        39.6       26.500
                                              2       95.8        40.5       27.000
          OBS.WELL NO.    X     Y             N    HEAD (FT)  CONC.(MG/L)  TIME (YEARS)
```

```
                                                   0        0.0          0.7         0.000
                                                   1       95.5         37.0        26.500
                                                   2       95.5         37.6        27.000
          OBS.WELL NO.    X    Y                   N    HEAD (FT)   CONC.(MG/L)  TIME (YEARS)


                                                   1       97.5         44.1        26.500
                                                   2       97.5         43.1        27.000
          OBS.WELL NO.    X    Y                   N    HEAD (FT)   CONC.(MG/L)  TIME (YEARS)


                                                   1       95.7         54.2        26.500
                                                   2       95.7         59.5        27.000


  NUMBER OF ITERATIONS = 0   (HEADS UNCHANGED)
        NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =    2


  TIM(N)   =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.86783E+09
     ***   NOTE   ***          NPTM.EQ.NPMAX --- IMOV=   2    PT. NO.=3069    CALL GENPT

  TIM(N)   =  0.31558E+08        TIMV     =  0.15779E+08        SUMTCH =  0.88361E+09
 EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 17.5 | 27.500 |
| | | | 2 | 95.9 | 17.4 | 28.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.8 | 42.0 | 27.500 |
| | | | 2 | 95.8 | 42.1 | 28.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.5 | 37.1 | 27.500 |
| | | | 2 | 95.5 | 36.7 | 28.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 97.5 | 40.6 | 27.500 |
| | | | 2 | 97.5 | 39.9 | 28.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.7 | 60.0 | 27.500 |
| | | | 2 | 95.7 | 59.4 | 28.000 |

NUMBER OF ITERATIONS = 0 (HEADS UNCHANGED)
NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP = 2

```
 NP       =       2970      IMOV   =            1
 TIM(N)   = 0.31558E+08     TIMV   =  0.15779E+08     SUMTCH =  0.89939E+09
 NP       =       2970      IMOV   =            2
 TIM(N)   = 0.31558E+08     TIMV   =  0.15779E+08     SUMTCH =  0.91517E+09
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

```
                                  1      95.9        16.4         28.500
                                  2      95.9        17.6         29.000
OBS.WELL NO.    X    Y            N   HEAD (FT)   CONC.(MG/L)   TIME (YEARS)

                                  1      95.8        42.3         28.500
                                  2      95.8        43.7         29.000
OBS.WELL NO.    X    Y            N   HEAD (FT)   CONC.(MG/L)   TIME (YEARS)

                                  1      95.5        37.5         28.500
                                  2      95.5        37.2         29.000
OBS.WELL NO.    X    Y            N   HEAD (FT)   CONC.(MG/L)   TIME (YEARS)
```

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 97.5 | 33.7 | 28.500 |
| | | | 2 | 97.5 | 34.2 | 29.000 |
| | | | 1 | 95.7 | 59.4 | 28.500 |
| | | | 2 | 95.7 | 62.6 | 29.000 |

NUMBER OF ITERATIONS = 0 (HEADS UNCHANGED)
HEAD DISTRIBUTION - ROW
NUMBER OF TIME STEPS = 30
TIME(SECONDS) = 0.94673E+09
TIME(DAYS) = 0.10958E+05
TIME(YEARS) = 0.30000E+02

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| 0.0000000 | 94.0000001 | 94.0000001 | 94.0000001 | 94.0000001 | 94.0000001 | 94.0000001 | 94.0000001 | 94.0000001 |
| 94.0000001 | 94.0000001 | 94.0000001 | 94.0000001 | 94.0000001 | 94.0000001 | 94.0000001 | 94.0000001 | 94.0000001 |
| 0.0000000 | 94.2666284 | 94.2657421 | 94.2658097 | 94.2676980 | 94.2702868 | 94.2732907 | 94.2759260 | 94.2766869 |
| 94.2738393 | 94.2710805 | 94.2687377 | 94.2669900 | 94.2658412 | 94.2650592 | 94.2649949 | 94.2659814 | 94.2673735 |
| 0.0000000 | 94.5385216 | 94.5399713 | 94.5417033 | 94.5454748 | 94.5510656 | 94.5579987 | 94.5644150 | 94.5667613 |
| 94.5596764 | 94.5534322 | 94.5482970 | 94.5446492 | 94.5423771 | 94.5409885 | 94.5410143 | 94.5414170 | 94.5409893 |
| 0.0000000 | 94.8102880 | 94.8110968 | 94.8127683 | 94.8185370 | 94.8282798 | 94.8415479 | 94.8549475 | 94.8613091 |
| 94.8460781 | 94.8346399 | 94.8257893 | 94.8198410 | 94.8163027 | 94.8142546 | 94.8143966 | 94.8158236 | 94.8164879 |
| 0.0000000 | 95.0837391 | 95.0833403 | 95.0844669 | 95.0919432 | 95.1070629 | 95.1309086 | 95.1582497 | 95.1755575 |
| 95.1415827 | 95.1222104 | 95.1085841 | 95.1000223 | 95.0952037 | 95.0925356 | 95.0926925 | 95.0949214 | 95.0968395 |
| 0.0000000 | 95.3663703 | 95.3657903 | 95.3652548 | 95.3717224 | 95.3915622 | 95.4323375 | 95.4867526 | 95.5383179 |
| 95.4546947 | 95.4245614 | 95.4058985 | 95.3950948 | 95.3894303 | 95.3865655 | 95.3870432 | 95.3891726 | 95.3902612 |
| 0.0000000 | 95.6586321 | 95.6544583 | 95.6469063 | 95.6448411 | 95.6618202 | 95.7275146 | 95.8223345 | 96.0000002 |
| 95.7695427 | 95.7310084 | 95.7097648 | 95.6982323 | 95.6925620 | 95.6899877 | 95.6911775 | 95.6944947 | 95.6964114 |
| 0.0000000 | 95.9626561 | 95.9537625 | 95.9345418 | 95.9089729 | 95.8912031 | 96.0000004 | 96.0753959 | 96.1407814 |
| 96.0690999 | 96.0405959 | 96.0229268 | 96.0130029 | 96.0083090 | 96.0063899 | 96.0081427 | 96.0118887 | 96.0141621 |
| 0.0000000 | 96.2876065 | 96.2752537 | 96.2442439 | 96.1785055 | 96.0000006 | 96.2373753 | 96.3436171 | 96.3944246 |
| 96.3814757 | 96.3640893 | 96.3515482 | 96.3442023 | 96.3409709 | 96.3399270 | 96.3422616 | 96.3463659 | 96.3487196 |
| 0.0000000 | 96.6365136 | 96.6257956 | 96.6028558 | 96.5704691 | 96.5373312 | 96.6131922 | 96.6787082 | 96.7156258 |
| 96.7171515 | 96.7054935 | 96.6962552 | 96.6909051 | 96.6889545 | 96.6887777 | 96.6917477 | 96.6963263 | 96.6990100 |
| 0.0000000 | 97.0092541 | 97.0020015 | 96.9889324 | 96.9783797 | 96.9794444 | 97.0159430 | 97.0592025 | 97.0878481 |
| 97.0810282 | 97.0693109 | 97.0606017 | 97.0559432 | 97.0547180 | 97.0552334 | 97.0587899 | 97.0638531 | 97.0668236 |
| 0.0000000 | 97.4031945 | 97.3992910 | 97.3931049 | 97.3931698 | 97.4039880 | 97.4321941 | 97.4728460 | 97.5094949 |

```
 97.4716783  97.4558401  97.4458873  97.4410972  97.4401293  97.4410130  97.4447346  97.4495893  97.4520599
  0.0000000  97.8102423  97.8082946  97.8062412  97.8109456  97.8246303  97.8520394  97.9028711  98.0000006
 97.8758899  97.8557625  97.8448985  97.8400906  97.8392363  97.8401737  97.8435251  97.8476922  97.8498679
  0.0000000  98.2305576  98.2284705  98.2274754  98.2328659  98.2446020  98.2642234  98.2935826  98.3219492
 98.2785569  98.2635276  98.2545796  98.2505978  98.2500486  98.2510426  98.2540654  98.2582089  98.2610778
  0.0000000  98.6654381  98.6647178  98.6643178  98.6683147  98.6763309  98.6881957  98.7031777  98.7129509
 98.6964719  98.6874071  98.6814272  98.6787935  98.6786881  98.6797823  98.6825389  98.6858423  98.6874392
  0.0000000  99.1051621  99.1053940  99.1055457  99.1079817  99.1126188  99.1188662  99.1260027  99.1297357
 99.1232679  99.1186062  99.1152878  99.1138965  99.1140400  99.1149115  99.1168774  99.1187394  99.1191849
  0.0000000  99.5484347  99.5466971  99.5458335  99.5470096  99.5491701  99.5518197  99.5546887  99.5560438
 99.5537830  99.5518943  99.5504597  99.5498722  99.5499798  99.5503734  99.5513253  99.5531776  99.5552556
  0.0000000  99.9999999  99.9999999  99.9999999  99.9999999  99.9999999  99.9999999  99.9999999  99.9999999
 99.9999999  99.9999999  99.9999999  99.9999999  99.9999999  99.9999999  99.9999999  99.9999999  99.9999999
  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
HEAD DISTRIBUTION - ROW
NUMBER OF TIME STEPS =    30
      TIME(SECONDS) =  0.94673E+09
      TIME(DAYS)    =  0.10958E+05
      TIME(YEARS)   =  0.30000E+02


  0  94  94  94  94  94  94  94  94  94  94  94  94  94  94  94  94  94  94   0
  0  94  94  94  94  94  94  94  94  94  94  94  94  94  94  94  94  94  94   0
  0  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95   0
  0  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95   0
  0  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95  95   0
  0  95  95  95  95  95  95  95  96  95  95  95  95  95  95  95  95  95  95   0
  0  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96   0
  0  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96   0
  0  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96  96   0
  0  97  97  97  97  97  97  97  97  97  97  97  97  97  97  97  97  97  97   0
  0  97  97  97  97  97  97  97  97  97  97  97  97  97  97  97  97  97  97   0
  0  97  97  97  97  97  97  97  98  97  97  97  97  97  97  97  97  97  97   0
  0  98  98  98  98  98  98  98  98  98  98  98  98  98  98  98  98  98  98   0
  0  98  98  98  98  98  98  98  98  98  98  98  98  98  98  98  98  98  98   0
  0  99  99  99  99  99  99  99  99  99  99  99  99  99  99  99  99  99  99   0
  0  99  99  99  99  99  99  99  99  99  99  99  99  99  99  99  99  99  99   0
  0 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100   0
  0 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
DRAWDOWN
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0   -94   -94   -94   -94   -94   -94   -94   -94   -94   -94   -94   -94   -94   -94   -94   -94   -94   -94     0
     0   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95     0
     0   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95   -95     0
```

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | 0 |
| 0 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -96 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | -95 | 0 |
| 0 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | 0 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | 0 |
| 0 | -96 | -96 | -96 | -96 | -96 | 0 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | 0 |
| 0 | -96 | -96 | -96 | -96 | 0 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | -96 | 0 |
| 0 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | 0 |
| 0 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | 0 |
| 0 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -98 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | -97 | 0 |
| 0 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | 0 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | 0 |
| 0 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 | 0 |
| 0 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | 0 |
| 0 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | -99 | 0 |
| 0 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -100 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

CUMULATIVE MASS BALANCE -- (IN FT**3)

```
PUMPAGE AND E-T WITHDRAWAL =  0.00000E+00
CUMULATIVE  NET  PUMPAGE   = -0.73257E+08
WATER RELEASE FROM STORAGE =  0.00000E+00
LEAKAGE INTO AQUIFER       =  0.72327E+08
LEAKAGE OUT OF AQUIFER     = -0.11153E+09
CUMULATIVE  NET  LEAKAGE   = -0.39203E+08
    MASS BALANCE RESIDUAL  =  0.34054E+08
    ERROR  (AS PERCENT)    =   26.489


LEAKAGE OUT OF AQUIFER     = -0.11781E+00
NET LEAKAGE     (QNET)     = -0.41409E-01
RECHARGE AND INJECTION     = -0.77379E-01
PUMPAGE AND E-T WITHDRAWAL =  0.00000E+00
NET WITHDRAWAL    (TPUM)   = -0.77379E-01
       NO. OF PARTICLE MOVES REQUIRED TO COMPLETE THIS TIME STEP  =     2


 TIM(N)   =  0.31558E+08        TIMV      =  0.15779E+08         SUMTCH =  0.93095E+09
 NP       =         2970        IMOV      =            2
 TIM(N)   =  0.31558E+08        TIMV      =  0.15779E+08         SUMTCH =  0.94673E+09
CONCENTRATION
```

```
      DELTA T          =  0.31558E+08
      TIME(SECONDS)    =  0.94673E+09
 CHEM.TIME(SECONDS)    =  0.94673E+09
 CHEM.TIME(DAYS)       =  0.10958E+05
      TIME(YEARS)      =  0.30000E+02
 CHEM.TIME(YEARS)      =  0.30000E+02
NO. MOVES COMPLETED    =      2
```

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 1 | 2 | 4 | 9 | 12 | 11 | 12 | 8 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 2 | 7 | 15 | 17 | 16 | 17 | 10 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 3 | 10 | 23 | 26 | 22 | 22 | 14 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 4 | 14 | 33 | 33 | 28 | 27 | 18 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 2 | 5 | 16 | 41 | 40 | 33 | 33 | 22 | 8 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 2 | 5 | 18 | 48 | 50 | 39 | 38 | 27 | 9 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 5 | 18 | 57 | 61 | 44 | 41 | 28 | 10 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 4 | 18 | 69 | 70 | 50 | 57 | 32 | 11 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 3 | 13 | 87 | 34 | 46 | 69 | 35 | 11 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 2 | 6 | 20 | 17 | 44 | 81 | 38 | 10 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 2 | 6 | 10 | 42 | 98 | 37 | 8 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 2 | 6 | 30 | 114 | 29 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 3 | 14 | 124 | 14 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 23 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

```
  MASS OUT BOUNDARIES     = -0.61416E+10
  MASS PUMPED IN          =  0.74035E+10
  MASS PUMPED OUT         =  0.00000E+00
  MASS LOST BY DECAY      =  0.00000E+00
  MASS ADSORBED ON SOLIDS=  0.00000E+00
  INITIAL MASS ADSORBED   =  0.00000E+00
  INFLOW MINUS OUTFLOW    =  0.13125E+10
  INITIAL MASS DISSOLVED =  0.11794E+09
  PRESENT MASS DISSOLVED =  0.14225E+10
  CHANGE MASS DISSOLVED   =  0.13046E+10
  CHANGE TOTL.MASS STORED=  0.13046E+10
 COMPARE RESIDUAL WITH NET FLUX AND MASS ACCUMULATION:
  MASS BALANCE RESIDUAL   =  0.79151E+07
  ERROR  (AS PERCENT)     =  0.10618E+00
EPNG/JAL #4 - CALIBRATION (NEW RUN 1).
```

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.9 | 17.6 | 29.500 |
| | | | 2 | 95.9 | 17.5 | 30.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.8 | 43.5 | 29.500 |
| | | | 2 | 95.8 | 44.1 | 30.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 95.5 | 37.0 | 29.500 |
| | | | 2 | 95.5 | 38.2 | 30.000 |

| OBS.WELL NO. | X | Y | N | HEAD (FT) | CONC.(MG/L) | TIME (YEARS) |
|---|---|---|---|---|---|---|
| | | | 1 | 97.5 | 34.7 | 29.500 |
| | | | 2 | 97.5 | 30.1 | 30.000 |

| | | | |
|---|---|---|---|
| 1 | 95.7 | 61.7 | 29.500 |
| 2 | 95.7 | 61.1 | 30.000 |