AP - 010

STAGE 1 & 2 REPORTS

DATE:

Sept 15, 1999

Comprehensive Report
for
Groundwater Abatement Plan AP-10

Line NM-1-1 Site
Phillips Pipe Line Company

Prepared For:

Mr. Anthony "Tony" C. Walker
Staff Environmental Scientist
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3B11 Adams Building
Bartlesville, Oklahoma 74004

Prepared By:

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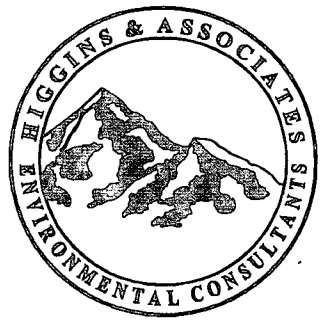

Higgins and Associates, LLC

September 15, 1999

Mr. Anthony "Tony" C. Walker
Staff Environmental Scientist
Phillips Pipe Line Company
3B11 Adams Building
Bartlesville, Oklahoma 74004

RE: Comprehensive Report for Groundwater Abatement Plan AP-10
Line NM-1-1 Site
Phillips Pipe Line Company
Hobbs, New Mexico

Dear Mr. Walker:

Higgins and Associates, L.L.C. (Higgins and Associates) has prepared the following Comprehensive Report for Groundwater Abatement Plan AP-10 at the Line NM-1-1 Site located in Hobbs, New Mexico. The above referenced report documents the completion of the scope of work outlined in the Stage I Abatement Plan dated March 22, 1999 as per the New Mexico Oil Conservation Division (OCD) Rule 19.E.3 for conducting assessment activities. The abatement plan presented a summary of the project background, a description of assessment activities conducted to date, a general description of the geology/hydrogeology, a discussion of the distribution of the hydrocarbon impacts, the scope of work for Stage I assessment activities, and a schedule for implementation of the activities. The Stage I Abatement Plan is included as an appendix to the following comprehensive report.

Higgins and Associates is pleased to provide environmental consulting services for Phillips Pipe Line Company. If you have any questions or comments regarding the following report please call me at (303) 708-9846.

Sincerely,
Higgins and Associates, L.L.C.

Chris Higgins
NMUSTB Certified Scientist #234
President

9940 East Costilla Avenue, Suite B ◦ Englewood, Colorado 80112
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1.0 Project Background

The subject site is located in Unit N, Section 9, Township 19 South, Range 38 East, N.M.P.M., Lea County, New Mexico. The property on which the release occurred is largely undeveloped arid land. The primary land use is grazing land for cattle. There are no surface bodies of water within 0.5 miles of the site. Several pipelines and crude oil production wells are located in the area. Two crude oil production wells are located near the pipeline release, of one which is located approximately 400 feet east/southeast of the pipeline release.

On October 27, 1999, Phillips personnel discovered a release of unrefined petroleum products (crude oil) associated with a local well field gathering pipe line located near the town of Hobbs, New Mexico. Two gathering lines parallel each other at the release site. One line is a six inch diameter line and the second line is an eight inch diameter line. The lines are separated by approximately one foot and are installed three to four feet beneath ground surface. The line leak was noted by the detection of oil impacts on the ground surface in the area of the release. The amount of crude oil released is unknown.

Phillips excavated approximately 1,500 cubic yards of petroleum impacted soil from around and below the release location. The limits of the excavation were approximately 30 feet wide by 120 feet long and averaged approximately 12 feet deep with the deepest extent around 18 feet. Petroleum impacts remained in the base and side walls of the excavation and therefore excavation activities were halted until the lateral extent of the hydrocarbon impacts could be defined.

Phillips personnel supervised the installation of a 4-inch diameter, 46 foot deep, monitoring well (MW-1) to determine the vertical extent of soil impacts and to determine if the groundwater had been impacted. The well was located approximately 10 feet north of the excavation. Visual contamination was observed during drilling activities from a depth of two feet to total depth. Groundwater was reportedly encountered at about 40 feet below ground surface. Approximately 13 feet of crude oil was detected on the water table.

Phillips initiated a product recovery program from monitoring well MW-1 on December 12, 1998. The program consisted of periodic bailing of the product from MW-1 utilizing a bailer. As of February 19, 1999, approximately 1,243 gallons of crude oil had been recovered from the water table by hand bailing.

A geophysical survey was conducted at the site by Ground Truth Technology, Inc. (GTT) from February 1, 1999 to February 8, 1999. The objective of the survey was to obtain preliminary information on the lateral and vertical distribution of petroleum hydrocarbons prior to the installation of the additional monitoring wells. The geophysical investigation consisted of conducting two methods as outlined below:

- Surface Induction Profiling (SIP). The SIP process provided general information concerning the lateral extent of hydrocarbon impacts by identifying areas of high resistivity in the subsurface. The SIP survey consisted of an induction coil and a receiver which were placed on the ground surface. A grid was developed and surveyed on a 100 x 100 foot spacing and the SIP

soundings were collected over a 25 x 25 foot spacing within the surveyed grid.

- Vertical Induction Profiling (VIP). The VIP survey provided specific information concerning the vertical extent of hydrocarbon impacts. The VIP survey was conducted by placing the induction coil at various surface stations and raising the receiver from the bottom of MW-1 with a wire line. Data was collected at 1/10th foot intervals along the well bore. The locations of the VIP lines were selected based on the results of the SIP survey.

The SIP survey consisted of 316 soundings covering an area of approximately 4.4 acres. The VIP survey consisted of 41 soundings taken along linear transects around the point of release. Five VIP lines were run based on the outcome of the SIP survey. One line was located approximately 100 feet west of MW-1 along a north/south direction. Two lines were located east approximately 75 and 100 feet respectively from the pipeline in a north/south direction. The fifth line was located in an east/west direction perpendicular to a high resistivity anomaly detected during the SIP survey. The lateral range of the VIP survey from monitoring well MW-1 was about 200 feet. Several high resistivity anomalies were identified by the SIP and VIP surveys. The anomalies will be discussed later in this report.

During the week of March 22, 1999, an Abanaki Corporation PetroXtractor product recovery system was installed in monitoring well MW-1. The PetroXtractor makes use of the differences in specific gravity and surface tension between oil and water. These physical differences allow the PetroXtractor's continuous belt, which extends from the top of the well to the oil/water interface, to attract floating oil in the well. The oil adheres to the belt and then travels through tandem "wiper blades" located at the well head scraping the oil off both sides of the belt and into a discharge hose. The discharge hose is connected to a 140 barrel storage tank located adjacent to the well. Due to the remote location of the release site, the PetroXtractor was designed to operate from a 12-volt battery system which is charged by a solar power unit. The PetroXtractor system was deployed for about a week before the solar power unit was stolen. A new solar power unit was ordered and the PetroXtractor system was put back online in June 1999. Approximately 1,006 gallons of crude oil have been recovered utilizing the PetroXtractor system. As of September 10, 1999, a total of approximately 2,249 gallons (53.5 barrels) of crude oil have been recovered.

2.0 Stage I Abatement Implementation

2.1 Drilling Activities

On July 13, 1999 through July 16, 1999, Higgins and Associates supervised the drilling and installation of monitoring wells MW-2 through MW-10 and two shallow soil borings (SB-1 and SB-2) (Figure 1). The results of the SIP and VIP geophysical surveys were taken into account for the locations of wells MW-2 through MW-10. The drilling activities were accomplished utilizing a truck mounted air rotary drill rig. Grab soil samples were collected at two foot intervals. An attempt was made to continuous core well MW-6. Due to poor core recovery and difficult drilling the continuous coring was stopped.

Soil samples were screened for volatile organic compound (VOC) headspace with a photoionization detector (PID). Samples were split into representative portions. One sample was placed in an appropriate laboratory container and placed on ice for possible analysis. The remaining portion of the sample was screened with the PID as outlined in the OCD guidance document. Two soil samples from each boring, including one sample from the water table interface, were submitted for laboratory analysis of benzene, toluene, ethlybenzene, and total xylenes (BTEX) by EPA Method 8021, and total petroleum hydrocarbons (TPH) by EPA Method 8015 Modified. The soil samples were and shipped on ice to Pinnacle Laboratories in Albuquerque, New Mexico under chain-of-custody.

In addition to the above sampling, soil samples were collected from from borings MW-2, MW-5, and MW-8 for phospholipid fatty acids (PLFA) and petroleum degraders Most Probable Number (MPN) analysis. The PLFA analysis provides information of the general types, populations, and stress level of the microbial community at the site. The MPN analysis provides information on the populations of specific hydrocarbon degrading organisms. The results of all the soil analytical data will be presented later in this report.

Monitoring wells MW-2 through MW-4 and MW-6 through MW-10 were constructed to a depth of 40 feet utilizing 2-inch diameter schedule 40 PVC screen and casing. The wells were screened from 20 to 40 feet utilizing 0.020 inch slotted screen. The well annulus was backfilled with 10/20 silica sand to two feet above the screen. Bentonite and cement was placed above the sand pack in the well annulus. A locking steel protective riser was installed on each monitoring well to a height of three feet. Each well was fitted with a J-plug water tight cap and secured with a brass lock.

Monitoring well MW-5 was constructed as above except that 4-inch diameter well materials were utilized. The larger diameter well materials are to facilitate the installation of a product recovery system. Following the installation of wells MW-2 through MW-10, each well absent of liquid phase hydrocarbons (LPH) was developed by bailing and surging with a bailer. Purged groundwater was collected in 55-gallon drums.

LEGEND

MW-1 ● Monitor Well (excavation size is approximate)

SB-1 ○ Soil Boring

N

0 100 200

Scale (ft)

HIGGINS AND ASSOCIATES, L.L.C.

Project No.:	Date Map Generated: 9/7/99	Date Data Collected:	Figure No. 1

Authored	Title:
CH	SITE PLAN
Checked: CJ	
Detailed: EC	Client: Phillips Pipe Line Company
	ACAD File: Hobbs Site Map.dwg
	Location: Hobbs New Mexico

2.2 Groundwater Monitoring and Sampling

On July 16, 1999, groundwater samples were collected from the monitoring wells absent of LPH. The wells sampled were MW-2, MW-3, MW-4, MW-9, and MW-10. A minimum of three well volumes of groundwater were purged from each well with a bailer. Measurements of temperature, pH, and conductivity were collected during purging to insure that the water sampled was representative of the aquifer. Groundwater samples were collected and analyzed for BTEX by EPA Method 8021, TPH by EPA Method 8015 Modified, polyaromatic hydrocarbons (PAHs) by EPA Method 8270, heavy metals (including uranium) by EPA Method 6010/6020, alkalinity, chloride, fluoride, sulfate, and total dissolved solids by EPA series 300, bromide by method 4500B, and mercury by EPA Method 7470. The groundwater samples were placed on ice and shipped under chain-of-custody to Pinnacle Laboratories. The results of the groundwater analytical data will be discussed later in this report.

Industry accepted standard operating practices were followed for all field activities to insure the quality of the data obtained. A quality assurance plan was presented to Phillips Pipe Line Company and the OCD in the Stage I Abatement Plan (Appendix A) dated March 22, 1999.

2.3 Rising Head Permeability Tests

On July 15, 1999, rising head permeability tests (slug out tests) were conducted in wells MW-2 and MW-9. The tests were conducted by instantaneous removal of a volume of water from the wells and measuring the rate of groundwater recharge into the well. The rate of groundwater recharge was measured using a data logger connected to a transducer probe deployed in the wells. The data was evaluated using the Graphical Well Analysis Package (GWAP). The data from the slug out tests will be discussed in the Hydrogeology section of this report.

3.0 Geology and Hydrogeology

3.1 Regional Setting

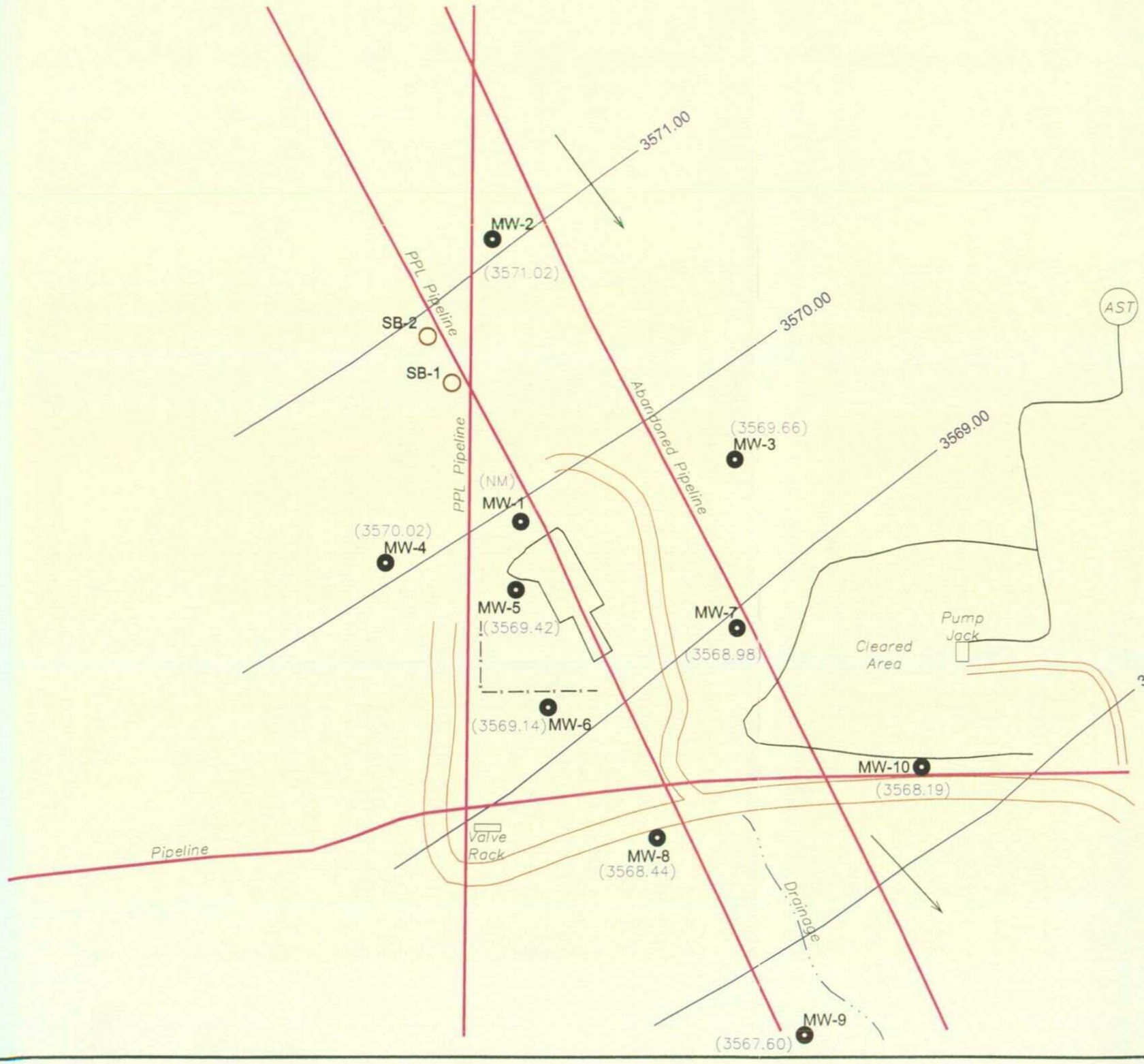
The regional geology surrounding the site is alluvium (unconsolidated) overlaying the Ogalalla Formation. The Ogalalla is also known as the High Plains aquifer which extends north to south from South Dakota to New Mexico and Texas. The Ogalalla was formed during the formation of the Rocky Mountains (Larimide orogeny - late Cretaceous to end of Paleocene). The Ogalalla Formation primarily consists of outwash alluvium deposited by the streams draining the newly formed Rocky Mountains. Caliche deposits are encountered in those areas considered under semiarid to arid conditions. The caliche was (and continues to be) formed as a result of the vertical movement of water through the unconsolidated alluvium from rainfall recharge (downward) and evaporation (upward). The calcium carbonate and/or calcium sulfate forms out of solution and creates a cementation effect. The origin of the calcarious material is either eolian (wind blown dust) or eroded limestone within the alluvium of the Ogalalla.

The hydrogeology of the Ogalalla aquifer can vary tremendously on a relatively small scale due to the wide grain-size distribution of the alluvial sediments. The regional water table slopes from west to east. The saturated thickness of the Ogalalla ranges from 0 feet to the west to upwards of 1,000 feet to the east. In the area of Hobbs, New Mexico, the saturated thickness may be 10 to 150 feet. Depth to groundwater is shallower to the west and gradually gets deeper to the east. Aquifer recharge is primarily rainfall; aquifer discharge is a combination of streams or springs and evapotranspiration.

3.2 Local Setting

Based on information obtained from the soil borings and the drilling of monitoring wells, the site specific geology consists primarily of caliche mixed with sands and some gravel. The caliche was encountered from ground surface to approximately 20 feet below ground surface. The sands and gravels were encountered below the caliche to total depth. The drilling logs for each well are in Appendix B for reference. The monitoring wells were surveyed for locations and elevations by a New Mexico licensed surveyor. The survey provides data which is used to create the groundwater potentiometric surface map.

Groundwater was encountered in the monitoring wells at approximately 27 feet below ground surface. Crude oil was detected in monitoring wells MW-1, MW-5, MW-6, MW-7, and MW-8. The groundwater elevation and LPH thickness data for July 16, 1999 is in Appendix C. Figure 2 depicts the groundwater potentiometric surface map for the July 16, 1999 data. The current groundwater flow direction and gradient is to the southeast. The groundwater gradient is approximately 0.004 ft/ft. Based on the rising head permeability test data from wells MW-2 and MW-9, the site specific hydraulic conductivity ranges from 5.9×10^{-3} cm/sec to 3.5×10^{-4} cm/sec. Based on an estimated porosity of 30%, average hydraulic conductivity of 3.1×10^{-3} cm/sec, and a gradient of 0.004 ft/ft, the average linear groundwater velocity is approximately 42 feet per year. This data is consistent with the lithology encountered during the drilling activities. The test data is included in Appendix D.



LEGEND

- MW-1 — Monitor Well (excavation size is approximate)
- SB-1 — Soil Boring
- (3571.02) — Groundwater Elevation in Feet
- 3570.0 — Groundwater Contour, Contour Interval = 1 ft.
- (NM) — Not Measured

N

0 100 200

Scale (ft)

HIGGINS AND ASSOCIATES, L.L.C.

Project No.:	Date Map Generated:	Date Data Collected:	Figure No.
	9/7/99	7/16/99	2

Authored	Title:
CH	GROUNDWATER POTENTIOMETRIC SURFACE MAP
Checked: CJ	
Detailed: EC	

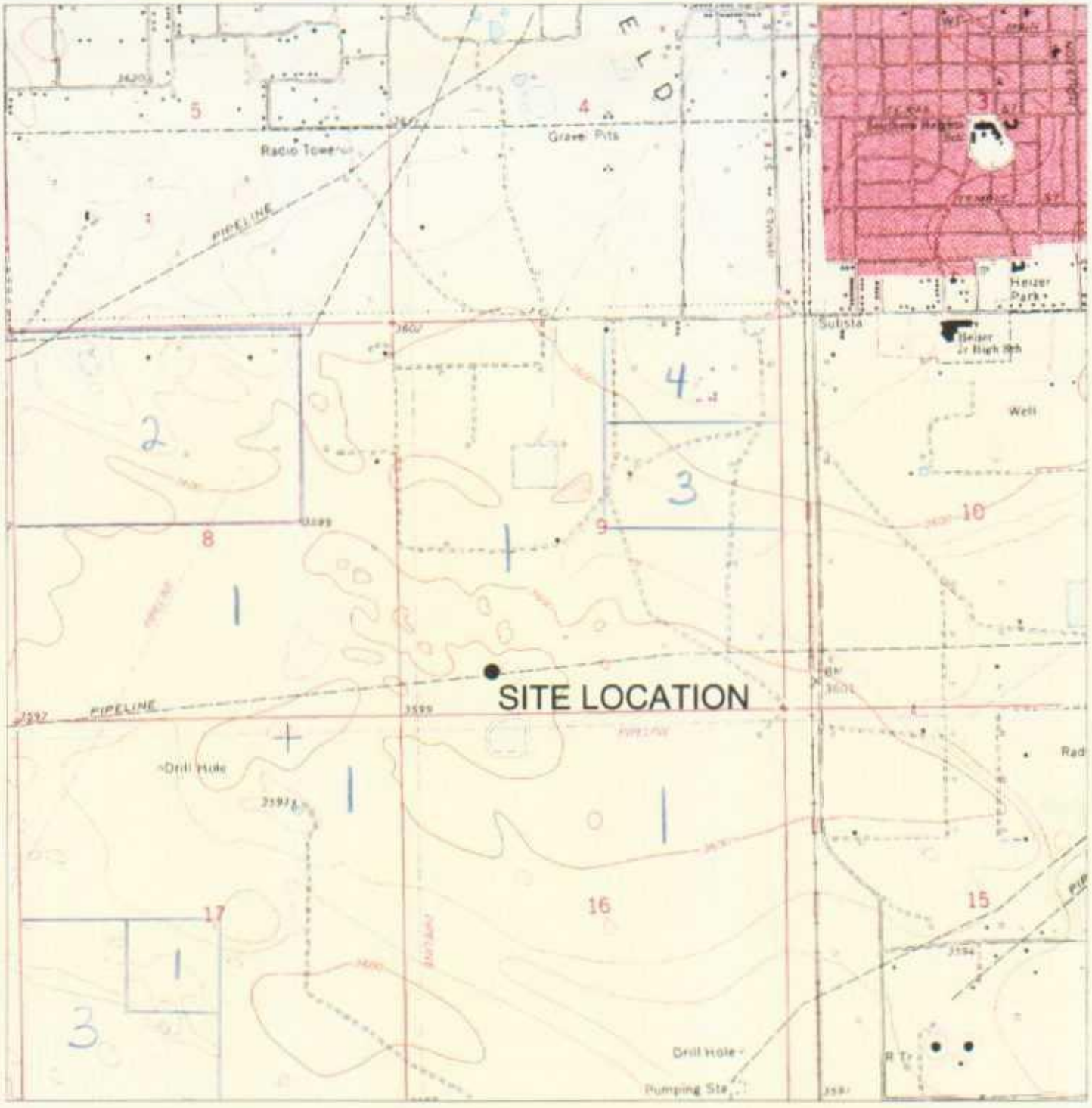
Client: Phillips Pipe Line Company

Location: Hobbs New Mexico

ACAD File: Hobbs Potentiometric.dwg

3.3 Land Ownership and Well Records Search

A record search for area landownership and water wells within 1 mile of the site was performed. Figure 3 shows the results of the record search and water well locations. The wells listed are U.S.G.S. registered. The New Mexico registered wells will be shown in the forthcoming Stage II Abatement Plan. There are seven U.S.G.S. registered wells within a one mile radius of the project site. These wells were installed in the 1940's and designated to be used for irrigation. The ENTRAC Corporation record search is in Appendix E.



Will N. Terry
Trust et. al
P.O. Box 686
Hobbs, NM 88241

Dee A. Cochran
P.O. Box 145
Hobbs, NM 88241

State Land Commissioner
New Mexico State Land Office
310 Old Santa Fe Trail
Santa Fe, NM 87501

Amoco Production
200 North Loraine, Ste 1205
Midland, TX 79701

Texaco, Inc.
500 Marquette Ave., NW
Suite 1100
Albuquerque, NM 87102

Area wells shown in Appendix E

N

0 2000 4000

Scale (ft)

HIGGINS AND ASSOCIATES, L.L.C.

Project No.:	Date Map Generated:	Date Data Collected:	Figure No.
	9/13/99		3

Authored	Title:
CH	LAND OWNERSHIP AND AREA WELL MAP
Checked: CJ	
Detailed: ML	

Client:	Location:
Phillips Pipe Line Company	Hobbs New Mexico
ACAD File: Hobbs Topo.dwg	

4.0 Hydrocarbon Distribution

The known phases of petroleum impacts associated with this site are adsorbed phase hydrocarbons, dissolved phase, and liquid phase hydrocarbons. The lateral extent of petroleum impacts to the soil and groundwater have been defined to the north, south, and east. The lateral extent of petroleum impacts have not been fully defined to the west. The following is a summary of each of these phases as defined by the assessment activities.

4.1 Adsorbed Phase Hydrocarbons

Petroleum impacts were apparent throughout the limits of the excavation from near surface to the total depth. Fingers of petroleum were apparent in the side walls of the excavation indicating that shallow migration of crude oil occurred along zones of increased permeability. Results of the Stage I assessment activities have detected petroleum hydrocarbon impacts exceeding the New Mexico action level of 100 mg/kg TPH for soil in borings for MW-4, MW-5, MW-6, MW-7, and MW-8. The levels exceeding 100 mg/kg TPH for the above referenced borings are limited to the water table interface. The following table summarizes the soil analytical data during the assessment activities.

Table 1
Soil Analytical Results for NM-1-1 Site
Hobbs, New Mexico

All results reported in mg/kg.

Well ID	Date	Depth (ft)	PID reading (ppmv)	Benzene	Toluene	Ethyl benzene	Total Xylenes	TPH
NM Action Levels			**100**	**10**				**100**
MW-2	07/13/99	10 - 12	26	<0.025	<0.025	<0.025	<0.025	<10
MW-2	07/13/99	30 - 32	16	<0.025	<0.025	<0.025	<0.025	39.6
MW-3	07/15/99	20 - 22	48	<0.025	<0.025	<0.025	<0.025	<10
MW-3	07/15/99	30 - 32	**140**	<0.025	<0.025	<0.025	<0.025	<10
MW-4	07/14/99	20 - 22	0	<0.025	<0.025	<0.025	0.032	<10
MW-4	07/14/99	30 - 32	**134**	0.029	0.16	0.25	0.27	**286**
MW-5	07/15/99	20 - 22	**314**	<0.025	<0.025	<0.025	<0.025	<10
MW-5	07/15/99	30 - 32	**>2,000**	**12**	94	95	150	**50,600**
MW-6	07/14/99	24 - 26	16	<0.025	<0.025	<0.025	<0.025	<10
MW-6	07/14/99	30 - 32	**331**	0.074	0.62	0.98	1.3	**1,762**
MW-7	07/13/99	14 - 16	16	<0.025	<0.025	<0.025	<0.025	<10

MW-7	07/13/99	30 - 32	**672**	0.14	1.8	3.2	4.7	**756**
MW-8	07/13/99	20 - 22	1	<0.025	<0.025	<0.025	<0.025	<10
MW-8	07/13/99	30 - 32	**235**	0.15	0.99	1.2	1.6	**912**
MW-9	07/14/99	20 - 22	3	<0.025	<0.025	<0.025	<0.025	<10
MW-9	07/14/99	30 - 32	15	<0.025	<0.025	<0.025	<0.025	<10
MW-10	07/15/99	20 - 22	10	<0.025	<0.025	<0.025	<0.025	<10
MW-10	07/15/99	30 - 32	40	<0.025	<0.025	<0.025	<0.025	<10
SB-1	07/15/99	10	0	-	-	-	-	-
SB-2	07/15/99	10	0	-	-	-	-	-

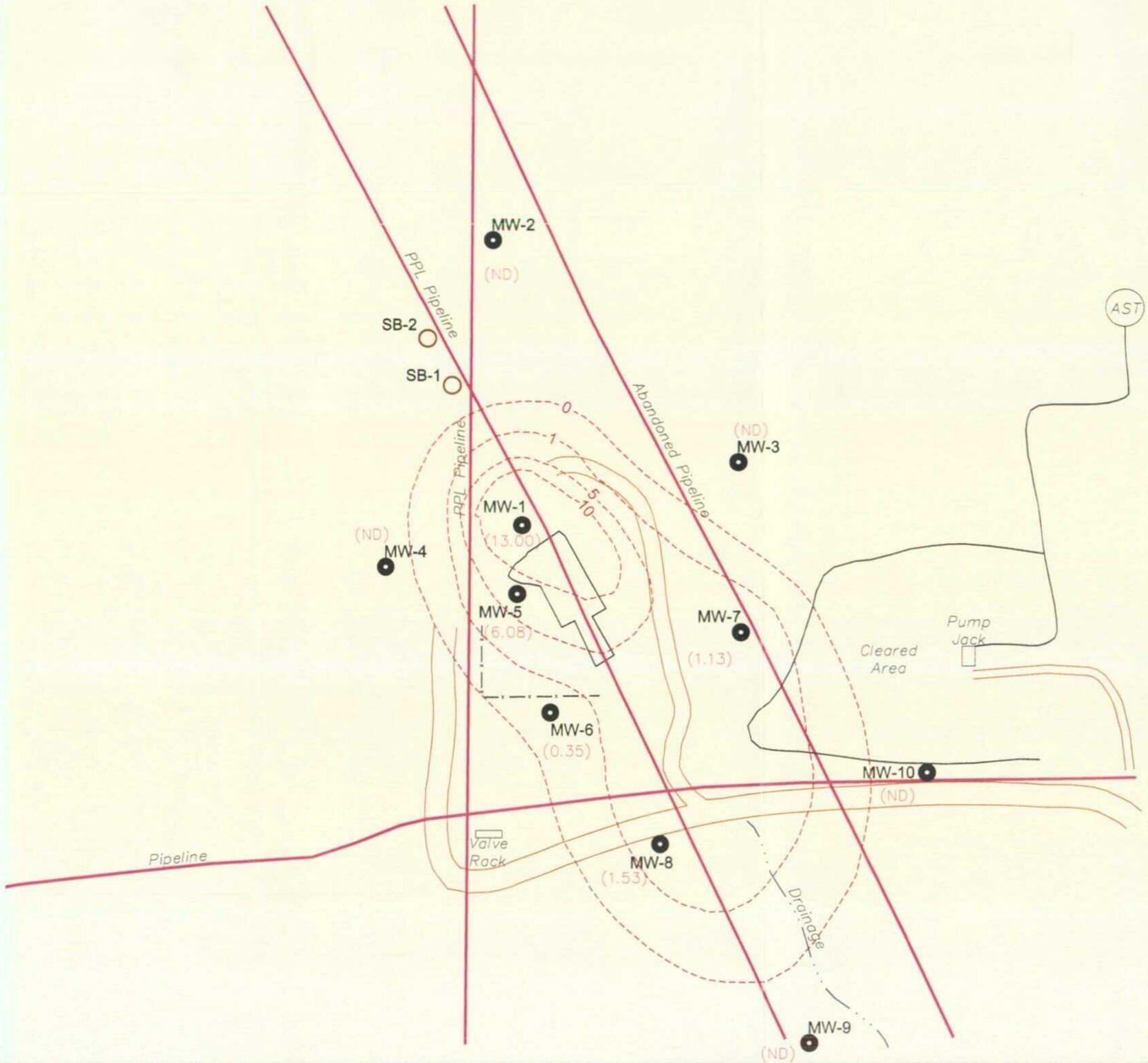
Concentrations of adsorbed phase hydrocarbons appear to be isolated to the water table interface outside of the excavated area. The migration of crude oil appears to have limited lateral migration prior to reaching the water table. The analytical data shows soil impacts are defined to the north by MW-2, to the south and east by borings MW-3, MW-9, and MW-10. Lateral soil impacts are not yet defined west and south west of borings MW-4 and MW-6. Away from the release area, the zone of hydrocarbon impact is isolated to the water table interface. The soil analytical data is included in Appendix F.

4.2 Liquid Phase Hydrocarbons

On July 16, 1999, liquid phase hydrocarbons (LPH) were detected in wells MW-1, MW-5, MW-6, MW-7, and MW-8. The LPH thickness ranged from 0.35 feet in MW-6 to 6.08 feet in MW-5. LPH is present in MW-1 but the thickness was not measured because the PetroXtractor product recovery system is deployed in the well. An isopleth map depicting the apparent LPH plume is Figure 4.

4.3 Dissolved Phase Hydrocarbons

The lateral extent of the dissolved phase hydrocarbons has been defined to the north (MW-2), to the east (MW-3), and to the south/southeast (MW-9 and MW-10). The only portion of the site which dissolved phase hydrocarbons have not yet been defined is to the west/southwest (MW-4). The following table summarizes the groundwater analytical data for BTEX and TPH during the assessment activities.



LEGEND

- MW-1 — Monitor Well (excavation size is approximate)
- SB-1 — Soil Boring
- (6.08) — LPH Thickness in Feet
- 5 — LPH Thickness Contour
- (ND) — LPH Not Detected

N

0 100 200

Scale (ft)

HIGGINS AND ASSOCIATES, L.L.C.

Project No.:	Date Map Generated: 9/7/99	Date Data Collected: 7/16/99	Figure No. 4

Authored: CH
Checked: CJ
Detailed: EC

Title: APPARENT LIQUID PHASE HYDROCARBON (LPH) THICKNESS MAP

Client: Phillips Pipe Line Company

Location: Hobbs New Mexico

ACAD File: Hobbs LPH.dwg

Table 2
Groundwater Analytical Results for NM-1-1 Site
Hobbs, New Mexico

All results reported in ug/L.

Well ID	Date	Benzene	Toluene	Ethyl benzene	Total Xylenes	TPH
NM Action Levels		**10**	**750**	**750**	**620**	
MW-2	07/16/99	3.6	2.7	1.3	0.5	<2,000
MW-3	07/16/99	<0.5	<0.5	<0.5	<0.5	<2,000
MW-4	07/16/99	**720**	**1,100**	260	280	3,000
MW-9	07/16/99	<0.5	<0.5	<0.5	<0.5	<2,000
MW-10	07/16/99	1.8	<0.5	<0.5	<0.5	<2,000

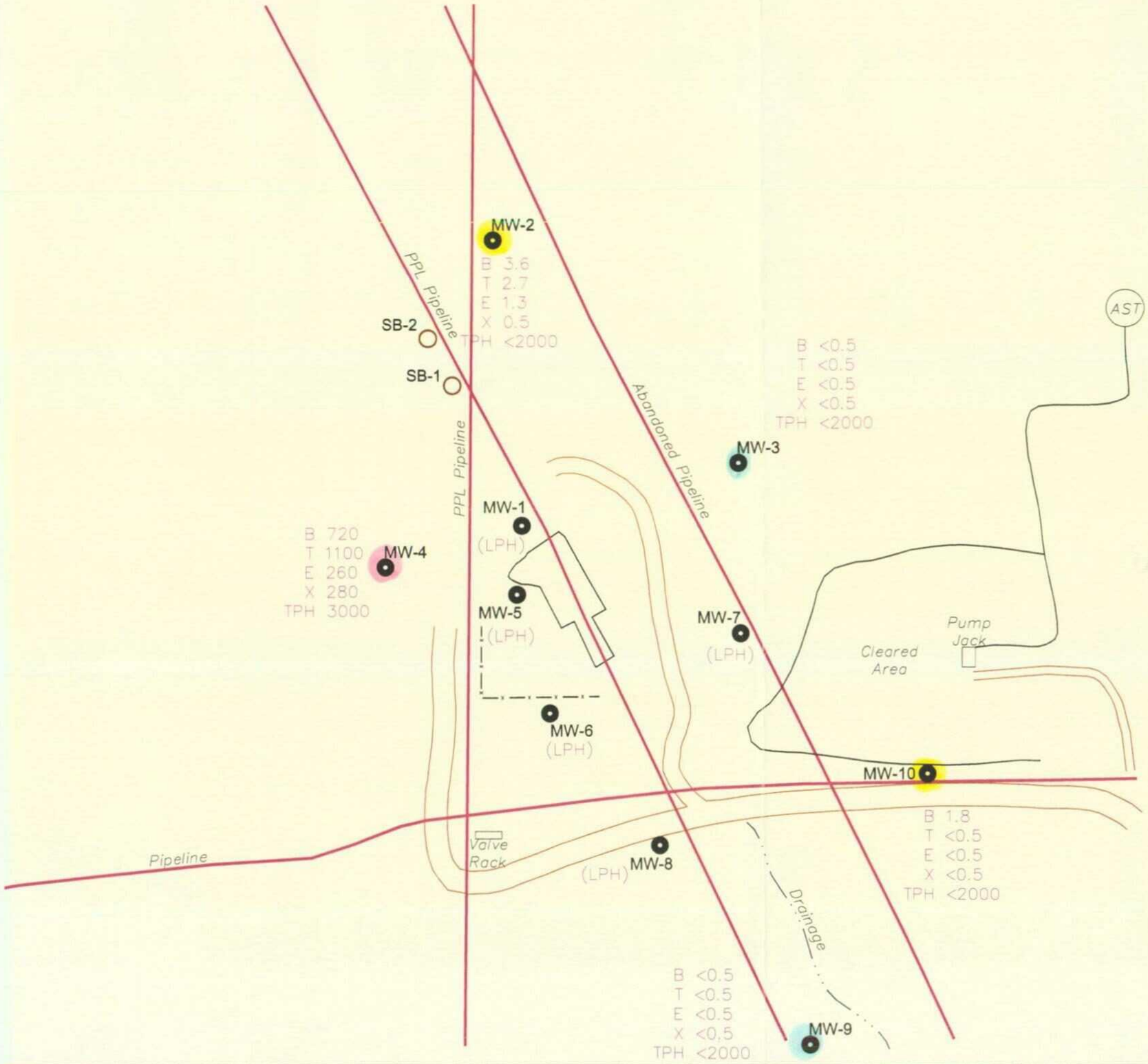
Monitoring wells MW-1 and MW-5 through MW-8 were not sampled due to the presence of LPH. Of the wells absent of LPH, only MW-4 shows dissolved phase hydrocarbons above the New Mexico action levels for benzene and toluene. Figure 5 is the Hydrocarbon Concentration Map which shows the analytical data for BTEX and TPH. The wells sampled are below the action levels for ethylbenzene and total xylenes. The groundwater analytical data is included in Appendix F.

4.4 Dissolved Phase Polyaromatic Hydrocarbons

The groundwater samples were analyzed for polyaromatic hydrocarbons (PAHs). PAHs were not detected in wells MW-2, MW-3, MW-9, and MW-10. Well MW-4 had detectable concentrations of 1-methylnaphthalene (10.8 ug/L), 2-methlnaphthalene (10.3 ug/L), naphthalene (7.76 ug/L), fluorene (0.76 ug/L), and phenanthrene (1.08 ug/L). These concentrations are below the New Mexico action levels. The analytical data is included in Appendix F.

4.5 PLFA and MPN Soil Analytical Data

Soil samples were collected from MW-2, MW-5, and MW-8 for the analysis of phospholipid fatty acids (PLFA) and MPN. The data obtained from these analyses will assist in evaluating remedial options. Further discussion of the PLFA and MPN analytical data for the site will be presented in the Stage II Abatement Plan.



LEGEND

MW-1 ● Monitor Well (excavation size is approximate)

SB-1 ○ Soil Boring

B Benzene
T Toluene
E Ethylbenzene
X Total Xylenes
TPH Total Petroleum Hydrocarbons
(LPH) Liquid Phase Hydrocarbons

all results are reported in µg/L

N

0 100 200
Scale (ft)

HIGGINS AND ASSOCIATES, L.L.C.

Project No.:	Date Map Generated: 9/7/99	Date Data Collected: 7/16/99	Figure No. 5
Authored: CH	Title: HYDROCARBON CONCENTRATION MAP		
Checked: CJ			
Detailed: EC	Client: Phillips Pipe Line Company		Location: Hobbs New Mexico
	ACAD File: Hobbs Hydrocarbon.dwg		

4.6 Other Groundwater Analytical Data

The results of the groundwater analytical data other than the BTEX, TPH, and PAH data is summarized on the Inorganic Data Table in Appendix F. The analytical data presented on the table includes the major anion and cations, total dissolved solids (TDS), and the New Mexico Water Quality Control Commission (NMWQCC) metals. Included on the table are the field measurements of pH and conductivity. Total dissolved solids ranged from 510 mg/L to 1,000 mg/L. Chloride ranged from 28 mg/L to 190 mg/L. The NMWQCC standard for groundwater <10,000 mg/L TDS for chloride is 0.1 mg/L. However, background concentrations of chloride are elevated in arid regions associated with an unconfined aquifer in contact with caliche. No other analyte was detected above the NMWQCC standards for groundwater with TDS <10,000 mg/L.

5.0 Disposition of Wastes Generated

As reported in the project background section of this report, approximately 1,500 cubic yards of soil were excavated from the release area. With permission of the New Mexico Oil Commission Department (NMOCD) and the Texas Railroad Commission (TRC), the excavated soil was hauled off site and transported to Gaines County, Texas where it was used as a roadbase material. All drill cuttings during well installation were spread out next to each well.

All well development and purge water from well sampling was containerized in 55-gallon drums. There is a drum placed next to each well sampled.

The crude oil removed from MW-1 is stored in a 12-foot diameter, 140 barrel above ground storage tank. The tank is located adjacent to well MW-1 and is centered within an earthen berm designed to hold twice the capacity of the storage tank. Once the tank fills to capacity, the product will be pumped and hauled off to the Phillips Pipe Line - Gaines Pump Station.

6.0 Conclusions and Recommendations

- The migration of crude oil appears to have limited lateral migration prior to reaching the water table. Concentrations of adsorbed phase hydrocarbons appear to be isolated to the water table interface outside of the excavated area. The analytical data shows soil impacts are defined to the north by MW-2, to the south and east by borings MW-3, MW-9, and MW-10. Lateral soil impacts are not yet defined west and south west of borings MW-4 and MW-6.

- On July 16, 1999, liquid phase hydrocarbons (LPH) were detected in wells MW-1, MW-5, MW-6, MW-7, and MW-8. The LPH thickness ranged from 0.35 feet in MW-6 to 6.08 feet in MW-5. The LPH plume appears to have been defined.

- The lateral extent of the dissolved phase hydrocarbons has been defined to the north (MW-2), to the east (MW-3), and to the south/southeast (MW-9 and MW-10). The only portion of the site which dissolved phase hydrocarbons have not yet been defined is to the west/southwest (MW-4).Monitoring wells MW-1 and MW-5 through MW-8 were not sampled due to the presence of LPH. Of the wells absent of LPH, only MW-4 shows dissolved phase hydrocarbons above the New Mexico action levels for benzene and toluene.

- As of September 10, 1999, a total of approximately 2,249 gallons (53.5 barrels) of crude oil have been recovered either by hand bailing or the product removal system.

It is recommended that LPH product recovery continue using the PetroXtractor. A Stage II Abatement Plan will be submitted with a proposed scope of work to address the next phase. Discussions in the Stage II Abatement Plan will include:

- An updated map showing all land ownership and water wells within 1 mile of the site.

- Drilling activities and well installations to define the lateral extent of petroleum impacts to the west of borings MW-4 and MW-6.

- Well installation(s) for remedial pilot tests to assist in performing a technological and economic feasibility evaluation for a corrective action plan.

- Description of remedial pilot and/or pump tests which will be proposed.

- A long term groundwater monitoring and sampling plan.

Appendix A

Stage I Abatement Plan

Higgins and Associates, L.L.C.
9940 East Costilla Avenue, Suite B
Englewood, Colorado 80112

303/708-9846
Fax 303/708-9848

FILE COPY

March 22,1999

Mr. Tony Walker
Phillips Pipe Line Company
3B11 Adams Building
Bartlesville, Oklahoma 74004

RE: Stage I Abatement Plan for the Hobbs, New Mexico Gathering Line Release, Line NM-1-1SITE

Dear Mr. Walker:

Higgins and Associates, L.L.C. (Higgins and Associates) has prepared the following Stage I Abatement Plan as per the New Mexico Oil Conservation Division (OCD) Rule 19.E.3 for conducting assessment activities at the referenced site. The abatement plan presents a summary of the project background, a description of assessment activities conducted to date, a general description of the geology/hydrogeology, a discussion of the distribution of the hydrocarbon impacts, the scope of work for Stage I assessment activities, and a schedule for implementation of the activities.

Project Background

The subject site is located in Unit N, Section 9, Township 19 South, Range 38 East, NMPM, Lea County, New Mexico. The property on which the release occurred is largely undeveloped arid land. The primary land use is grazing land for cattle. There are no surface bodies of water within 0.5 miles of the site. Several pipelines are located in the area as illustrated on Figure 1 (attached). Two crude oil production wells are located near the pipeline release. One well is in production and is located approximately 400 feet east/southeast of the pipeline release.

Phillips discovered a release of unrefined petroleum products (crude oil) associated with a local well field gathering pipe line located near the town of Hobbs, New Mexico. Two gathering lines parallel each other at the release site. One line is a six inch diameter line and the second line is an eight inch diameter line. The lines are separated by approximately one foot and are installed three to four feet beneath ground surface. The line leak was noted by the detection of oil impacts on the ground surface in the area of the release. The quantity of crude oil released is not known.

Phillips excavated approximately 1,500 cubic yards of petroleum impacted soil from around and below the release location. The limits of the excavation were approximately 30 feet wide by 120 feet long and averaged approximately 12 feet deep with the deepest extent around 18 feet. Petroleum impacts remained in the floor and side walls of the excavation and therefore the excavation activities were halted

until the lateral extent of impacts could be defined.

Phillips personnel supervised the installation of a 4-inch diameter, 46 foot deep, monitoring well (MW-1) to determine the vertical extent of soil impacts and to determine if the groundwater had been impacted. The well was located approximately 10 feet north of the excavation. Visual contamination was observed during drilling activities from a depth of two feet to the total depth. Groundwater was encountered at approximately 40 feet. Approximately 13 feet of crude oil was detected on the water table. The geology and hydrogeology will be discussed below.

Phillips initiated a product recovery program from monitoring well MW-1 on December 12, 1998. The program consists of periodic bailing of the product from the MW-1 utilizing a bailer. As of February 19, 1999 approximately 1,243 gallons of crude oil have been recovered from the water table.

A geophysical survey was conducted at the site by Ground Truth Technology, Inc. (GTT) during the period of February 1, 1999 through February 6, 1999. The objective of the survey was to obtain preliminary information on the lateral and vertical distribution of petroleum hydrocarbons prior to installation of additional monitoring wells. The investigation consisted of conducting two geophysical methods as outlined below:

- Surface Induction Profiling ("SIP"). The SIP process provides general information concerning the lateral extent of the petroleum impacts by identifying areas of high resistivity in the subsurface. The SIP survey consisted of an induction coil and a receiver both of which were placed on the surface. A grid was developed and surveyed on a 100 X 100 foot spacing and the SIP soundings were collected over a 25 foot by 25 foot grid spacing within the surveyed grid.

- Vertical Induction Profiling ("VIP"). The VIP survey provides specific information concerning the vertical extent of the petroleum impacts. The VIP survey was conducted by placing the induction coil at various surface stations and raising the receiver from the bottom of MW-1 with a wire line. Readings were collected at 1/10th foot intervals along the well bore. The locations of the VIP lines were selected based on the results of the SIP survey.

The SIP survey consisted of 316 soundings covering an area of approximately 4.4 acres. The VIP survey consisted of 41 soundings taken along linear transects around the point of release. Five VIP lines were run based on the results of the SIP survey. One line was located approximately 100 feet west of MW-1 along a north/south direction. Two lines were located east approximately 75 and 100 feet respectively from the pipeline, and ran in a north/south direction. The fifth line was located in a east/west direction perpendicular to a high resistivity anomaly detected by the SIP survey. The lateral range of the VIP survey from monitoring well MW-1 was approximately 200 feet. Several high resistivity anomalies were identified both by the SIP and VIP surveys. These anomalies will be discussed in the hydrocarbon

distribution section.

An Abernaki Corporation PetroXtractor product recovery system is scheduled to be installed in monitoring well MW-1 during the week of March 22, 1999. The Abernaki PetroXtractor has been specifically designed to recover oil from 2, 4, or 6 inch diameter wells up to depths of 100 feet. The PetroXtractor makes use of the differences in specific gravity and surface tension between oil and water. These physical characteristics allow the unit's continuous belt, which extends from the top of the well into the oil/water interface, to attract floating oil in the well. The oil adheres to the belt and then travels through tandem wiper blades located at the well head scraping the oil off both sides of the belt and into a discharge hose. Due to the remote location of the subject site, the PetroXtractor has been designed to operate from a 12 volt battery system which is charged by a solar power unit. Product collected by the PetroXtractor will be stored in a 120 barrel storage tank located adjacent to the well. The tank will be contained within an earthen berm designed to hold the capacity of the tank plus an allowance for precipitation.

Geology and Hydrogeology

The regional geology surrounding the site is alluvium (unconsolidated) overlaying the Ogalalla Formation. The Ogalalla is also known as the High Plains aquifer which extends north to south from South Dakota to New Mexico and Texas. The Ogalalla was formed during the formation of the Rocky Mountains (Larimide orogeny - late Cretaceous to end of Paleocene). The Ogalalla Formation primarily consists of outwash alluvium deposited by the streams draining the newly formed Rocky Mountains. Caliche deposits are encountered in those areas considered under semiarid to arid conditions. The caliche was (and continues to be) formed as a result of the vertical movement of water through the unconsolidated alluvium from rainfall recharge (downward) and evaporation (upward). The calcium carbonate and/or calcium sulfate forms out of solution and creates a cementation effect. The origin of the calcarious material is either eolian (wind blown dust) or eroded limestone within the alluvium of the Ogalalla.

The hydrogeology of the Ogalalla aquifer can vary tremendously on a relatively small scale due to the wide grain-size distribution of the alluvial sediments. The regional water table slopes from west to east. The saturated thickness of the Ogalalla ranges from 0 feet to the west to upwards of 1,000 feet to the east. In the area of Hobbs, New Mexico, the saturated thickness may be 10 to 150 feet. Depth to groundwater is shallower to the west and gradually gets deeper to the east. Aquifer recharge is primarily rainfall; aquifer discharge is a combination of streams or springs and evapotranspiration.

Based on information obtained from the drilling of monitoring well MW-1, the site specific geology consists primarily of caliche mixed with sands and some gravel. The upper 23 feet of the hole was drilled with hollow stem augers. A layer of limestone was encountered at a depth of 23 to 25 feet below ground surface (bgs) which required changing the drilling method to air rotary. The limestone was described as

very hard and dry while the caliche above the limestone was described as moist with a sheen on the outside of the split spoon. The lateral extent of the limestone is not known and may be discontinuous. Below the limestone layer the lithology is logged as caliche becoming "mostly sand with depth". This description indicates that the level of cementation of the caliche is decreasing with depth.

Groundwater was encountered in monitoring well MW-1 at approximately 40 feet. Thirteen feet of crude oil was detected on the water table. The depth to water following a bail down test was 36.97 feet with the top of the free phase hydrocarbons at 27.16 feet. Due to the presence of the crude oil, the actual depth to water is unknown but is anticipated to be between 30 and 35 feet. The actual site groundwater flow direction, gradient, and other specific hydrogeologic conditions (conductivity, permeability, velocity, and saturated thickness) are unknown at this time. However, based on topography the groundwater gradient is anticipated to be to the south/southeast.

Hydrocarbon Distribution

The known phases of petroleum impacts associated with this site are adsorbed phase hydrocarbons and liquid phase hydrocarbons. The presence/absence of dissolved phase hydrocarbons has not been determined. The lateral extent of petroleum impacts to the soil and groundwater are not known. Petroleum impacts were apparent throughout the limits of the excavation from near surface to the total depth. Fingers of petroleum were apparent in the side walls of the excavation indicating that shallow migration of crude oil occurred along zones of increased permeability. Also, shallow excavations advanced along the pipeline to the north and south of the release point indicate that crude oil migrated along the pipeline. Petroleum impacts to the soil were also noted during the drilling of MW-1 from a depth of two feet to the total depth of 50 feet.

As stated above, the lateral extent of petroleum impacts have not been defined. However, the results of the geophysical surveys appear to have provided preliminary data concerning the distribution of petroleum impacts at the site. The SIP survey detected several areas of high resistivity within the 4.4 acre study area. Whether or not all of these areas are associated with petroleum impacts can not be determined with the available information. However, one area identified by the SIP survey which is likely associated with the Phillips pipeline release originates just north of the release location and extends in a south/southwest direction for approximately 250 feet. The anomaly is approximately 100 feet to 150 feet wide. Other anomalies were noted in the study area which may be associated with crude oil production operations separate from the Phillips release. Further evaluation of the SIP results can be made after obtaining information of the subsurface geology and hydrocarbon distribution through the installation of monitoring wells and soil borings.

As discussed above, one VIP survey line was run across the resistivity anomaly which is most likely associated with the Phillips release. The results of this VIP line showed two zones of high resistivity, one

shallow and one deep. The shallow zone occurred at approximately 5 feet in depth and extended to a depth of 25 feet. This depth interval could represent the limestone layer that was described in the well log for MW-1. The second zone of high resistivity was noted between 35 and 40 feet. This zone could represent LPH on the water table.

The results of the SIP survey combined with the VIP survey indicate that the LPH plume may extend for approximately 250 feet south of the release point. The greatest accumulation of LPH may be located south of MW-1.

Project Approach

The assessment activities outlined in this abatement plan have been developed to obtain additional information concerning the lateral and vertical extent of petroleum hydrocarbons in the subsurface. This information will be used to prepare a Stage II Abatement Plan for evaluating and selection of the appropriate remedial method. The general project approach is as follows:

- Installation of a series of monitoring wells to define the lateral and vertical extent of petroleum impacts.
- Drilling of soil borings along the pipeline to determine the extent of migration along the line.
- Collection of soil samples for laboratory analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) and total recoverable petroleum hydrocarbons (TRPH).
- Collection of soil samples for phospholipid (PLFA) and most probable number (MPN) analysis to determine the types and populations of microbial organisms in the subsurface.
- Collection of groundwater samples from all wells absent of LPH to determine the lateral extent, if any, of dissolved phase hydrocarbons associated with the pipeline release.
- Conducting a series of rising head permeability tests to determine general aquifer characteristics.
- Prepare either a final site investigation report or a work plan for additional assessment activities.
- Prepare a Stage II Abatement Plan to evaluate remedial technologies for addressing the petroleum impacts, and to further define the lateral extent of petroleum hydrocarbons, if needed.

The detailed scope of work to accomplish the above is presented below.

Site Investigation Work Plan

Well Record Search

Available well records will be reviewed to determine the location of domestic or production wells within a one mile radius of the subject site. The location of these wells will be plotted on a topographic map.

Drilling Activities

In order to obtain information of the lateral and vertical extent of petroleum impacts, a series of soil borings and monitoring wells are proposed for the area surrounding the release point. Based on the results of the geophysical survey, combined with the presence of LPH in MW-1, seven monitoring wells and up to six shallow soil borings are proposed as illustrated on Figure 2. The objective of the drilling activities are to define the groundwater gradient beneath the release site and to define the vertical and lateral extent of petroleum impacts to soil and groundwater. Additional drilling activities may be required for complete definition of the petroleum impacts. The locations of the monitoring wells are discussed in the following.

- Monitoring well PMW-2 will be located approximately 100 feet north of MW-1. The objective of this well is to provide an upgradient well for definition of the northern extent of petroleum impacts.

- Monitoring well PMW-3 will be located approximately 140 feet east/southeast of monitoring well MW-1. The objective of this well is to define the lateral extent of impacts to the east.

- Monitoring well PMW-4 will be located approximately 130 feet southwest of monitoring well MW-1. The objective of this well is to define the west/southwest extent of petroleum hydrocarbons and to provide gradient control.

- Monitoring well PMW-5 will be located approximately 100 feet south/southeast of monitoring well MW-1. The purpose of this well is to confirm the results of the VIP survey which indicated both shallow and deep petroleum impacts in this area and to evaluate the thickness of LPH which is anticipated. This well may be used for recovery of LPH, if necessary.

- Monitoring well PMW-6 will be located approximately 100 feet south/southwest of PMW-5. The objective of this well is to define the southerly extent of LPH and to evaluate the presence/absence of dissolved phase petroleum hydrocarbons to the south.

- Monitoring well PMW-7 will be located approximately 150 feet south/southeast of PMW-3. The objective of this well is to define the southeast extent of petroleum impacts and to provide gradient control.

- Monitoring well PMW-8 will be located approximately 300 feet south/southeast of monitoring well MW-1. The objective of this well is to define and monitor the downgradient extent of petroleum impacts.

In addition to the monitoring wells discussed above, shallow soil borings are proposed to be advanced along Phillip's pipeline to determine the lateral extent of petroleum impacts along the line. The borings will be installed at 100 foot intervals in a northwest and southeast direction along the pipeline. The borings will be advanced to a depth of 10 feet or until petroleum impacts are not detected, whichever is deeper. The northern borings will start 100 feet north of MW-1. The southerly borings will commence at the southern limits of the excavation. Up to six soil borings are proposed for this abatement plan.

The drilling activities will be accomplished utilizing a truck mounted sonic or air rotary drill rig. The sonic drilling method cuts a continuous core allowing detailed description of the subsurface geology and hydrocarbon distribution. If air rotary is used, continuous cores will be collected from wells PMW-3, PMW-4, PMW-5, and PMW-6. Grab soil samples will be collected at five foot intervals from wells PMW-2, PMW-7, and PMW-8. The shallow soil borings will be continuously cored from approximately 5 to 10 feet.

Monitoring wells PMW-2 through PMW-4 and PMW-6 through PMW-8 will be constructed to a depth of 45 to 50 feet utilizing 2 inch diameter schedule 40 PVC screen and casing. The wells are anticipated to be screened from 20 feet to the total depth utilizing 0.020 inch slot screen. If adsorbed phase petroleum impacts are noted shallower than 20 feet, the well screen may be extended to a minimum depth of 10 feet to facilitate possible remedial measures in the future. The well annulus will be backfilled will 10/20 sand to depth of one foot above the screen. A two foot thick bentonite seal will be placed above the sand pack and the remaining well annulus will be backfilled with clean soil or cement grout to a depth of three feet. The remaining well annulus will be filled with cement grout. A locking steel protective riser will be installed over each monitoring well to a height of three feet. A J-plug well cap will be placed on the monitoring well and the well will be secured with a brass lock.

Monitoring well PMW-5 will be constructed as above except that 4 or 6 inch diameter well materials will be utilized. The larger diameter well materials are to facilitate installation of a product recovery system, if warranted. The size of the well will be determined based on the recovery rates of LPH from MW-1 with the PetroXtractor.

Well Development

Following completion each well absent of LPH will be developed by bailing and surging with a bailer and/or a submersible pump. Development water will be collected in 55 gallon drums.

Well Surveying

Following completion of the drilling activities the wells will be surveyed to a common benchmark in order to facilitate collection of groundwater elevation and gradient data.

Aquifer Testing

Rising head permeability tests will be conducted in wells PMW-2, PMW-3, PMW-6, and PMW-8. The tests will be conducted by instantaneous removal of a volume of water from the wells and measuring the rate of groundwater recharge into the well. The aquifer tests will provide general information on the hydraulic conductivity, transmissivity, and storativity of the aquifer. An aquifer pump test may be conducted as part of the Stage II Abatement Plan to provide the above information with a higher degree of accuracy, if necessary.

Sampling and Monitoring Plan

During the drilling activities, a geologist will collect and describe soil samples as described above. Representative soil samples will be collected at five foot intervals or from zones of obvious petroleum impact. The samples will be split into representative portions. One sample will be placed in the appropriate laboratory container and placed on ice for possible analysis. The remaining portion of the sample will be screened with a photoionization detector as outlined in the OCD guidance document. A minimum of one soil sample will be submitted from each boring for laboratory analysis of BTEX by EPA Method 8020 or 8021 and TRPH by EPA Method 418.1. If only one soil sample is submitted, the sample from just above the water table interface will be selected. If two samples are submitted, one sample will be submitted from the zone above the water table with the highest levels of observable hydrocarbon impact and the second sample will be submitted from the water table interface.

In addition to the above sampling, soil samples will be collected from PMW-2, PMW-5, and PMW-8 for PLFA and MPN analysis. The PLFA analysis will provide information on the general types, populations, and stress level of the microbial community upgradient, within, and downgradient of the areas of impact. The MPN analysis will provide information on the populations of specific hydrocarbon degrading organisms.

Following completion of drilling and well development activities, groundwater samples will be collected from all monitoring wells absent of LPH. A minimum of three well volumes of groundwater will be purged from each well with a bailer or a submersible pump. Measurements of temperature, pH, and conductivity will be collected during purging to insure that the water sampled is representative of the surround aquifer. A groundwater sample will be collected from each well for analysis of BTEX by EPA Method 8020 or 8021, major cations and anions, heavy metals by EPA Method 6010, PAH's by EPA Method 8100, and total

dissolved solids. The groundwater samples will be submitted to a New Mexico certified laboratory for analysis.

Quality Assurance Plan

Industry accepted standard operating practices will be followed for all field activities to insure the quality of the data obtained. These procedures are summarized as follows:

- Soil sampling equipment will be decontaminated between core intervals. The decontamination procedures will be based on the type of drilling method employed (ie. sonic or air rotary). Down hole drilling equipment will be decontaminated utilizing a high pressure washer between borehole locations. The wash water will be captured in a decontamination area and transferred to storage containers.

- Well development and purging activities for the monitoring wells will be conducted from the cleanest well (based on field observations) to the most contaminated well to minimize potential cross contamination between wells.

- All reusable groundwater sampling equipment will be decontaminated utilizing an alconox wash and distilled water rinse prior to sampling activities and between each well.

- Groundwater samples will be collected utilizing new disposable bailers. One duplicate sample will be collected during the sampling activities. In addition to the duplicate sample, one trip blank sample will be analyzed for the cooler containing the samples for BTEX analysis.

- The soil and groundwater samples will be collected in the appropriate sample containers, labeled, sealed with custody seals, and placed on ice. The samples will be logged on a chain of custody form and submitted to the laboratory for analysis.

- New disposable gloves will be utilized for all sampling activities and will be discarded between samples.

Public Notification Plan

The public notification process will be followed as outlined in Rule 19.G. Public Notification and Participation.

Reporting

Following completion of the above assessment activities an assessment report will be prepared which details the results of the assessment activities. This report will either be considered a final assessment report if delineation of the plume is complete or will contain a scope of work for additional assessment activities. Following definition of the petroleum impacts a Stage II Abatement Plan will be prepared to evaluate and select the appropriate remedial approach for addressing the petroleum hydrocarbons detected in the subsurface.

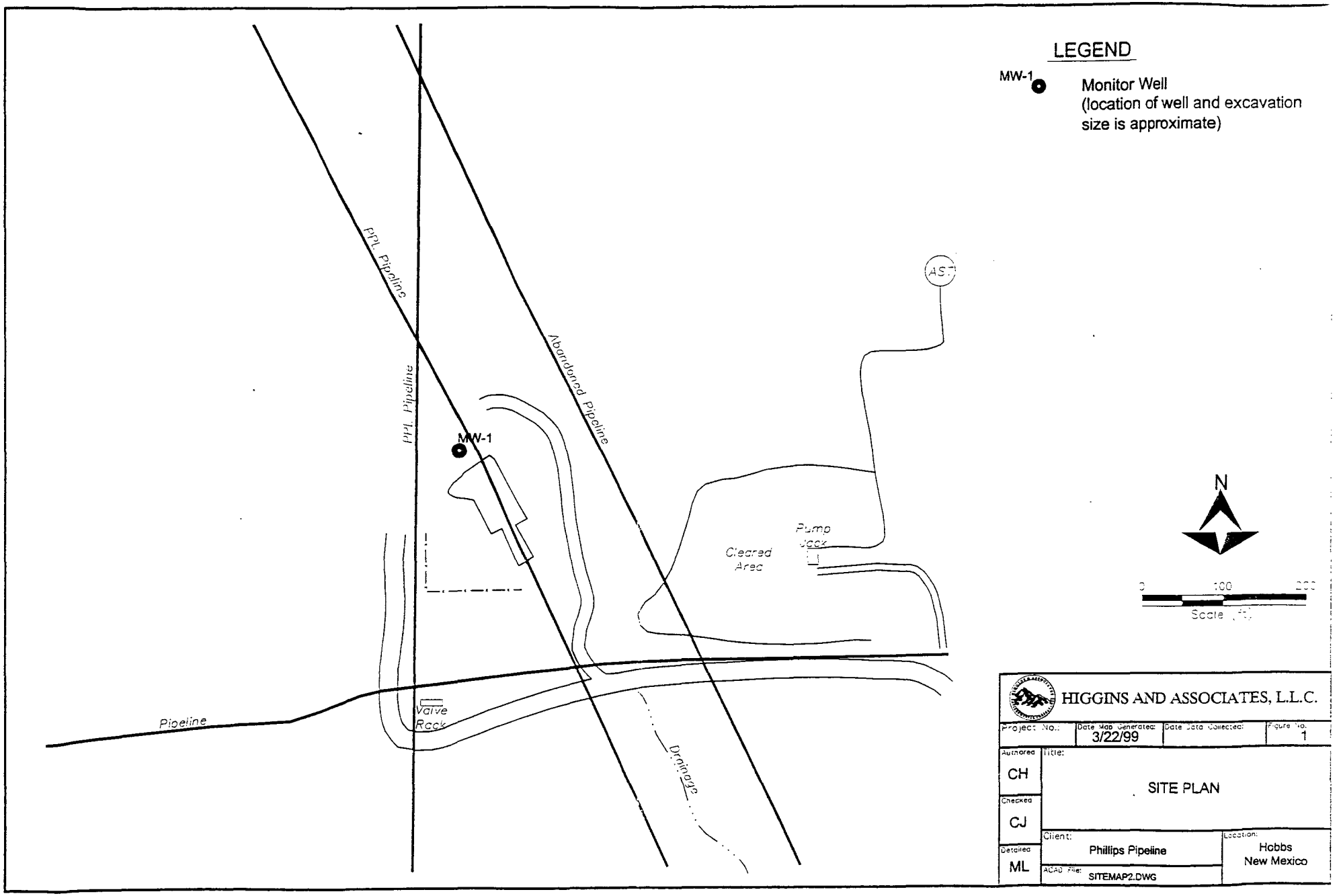
Schedule

Due to the uncertainty of the time period for acceptance of the plan and the public notification process for final plan approval, the actual schedule for implementation of the above activities can not be determined at this time. However, Higgins and Associates will proceed forward with implementation of the plan upon receipt of final approval from OCD. If available, the drilling contractor will be scheduled to perform the drilling within two weeks following plan acceptance. Completion of the scope of work and preparation of a detailed assessment report is anticipated to take 60 to 90 days from the date of plan approval.

Higgins and Associates appreciates the opportunity to provide Phillips Pipe Line Company with environmental consulting services. Should you have any questions concerning this work plan please contact me at 303/708-9846.

Sincerely,
Higgins and Associates, L.L.C.

Chris Higgins
NMUSTB Certified Scientist #234
President


LEGEND
MW-1
Monitor Well
(location of well and excavation size is approximate)
AST
MW-1
PPL Pipeline
PPL Pipeline
Abandonned Pipeline
Cleared Area
Pump Jack
Valve Rack
Pipeline
Drainage
N
0
100
200
Scale (Ft)
HIGGINS AND ASSOCIATES, L.L.C.
Project No.:
Date Map Generated: 3/22/99
Date Data Collected:
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Authored CH
Checked CJ
Detailed ML
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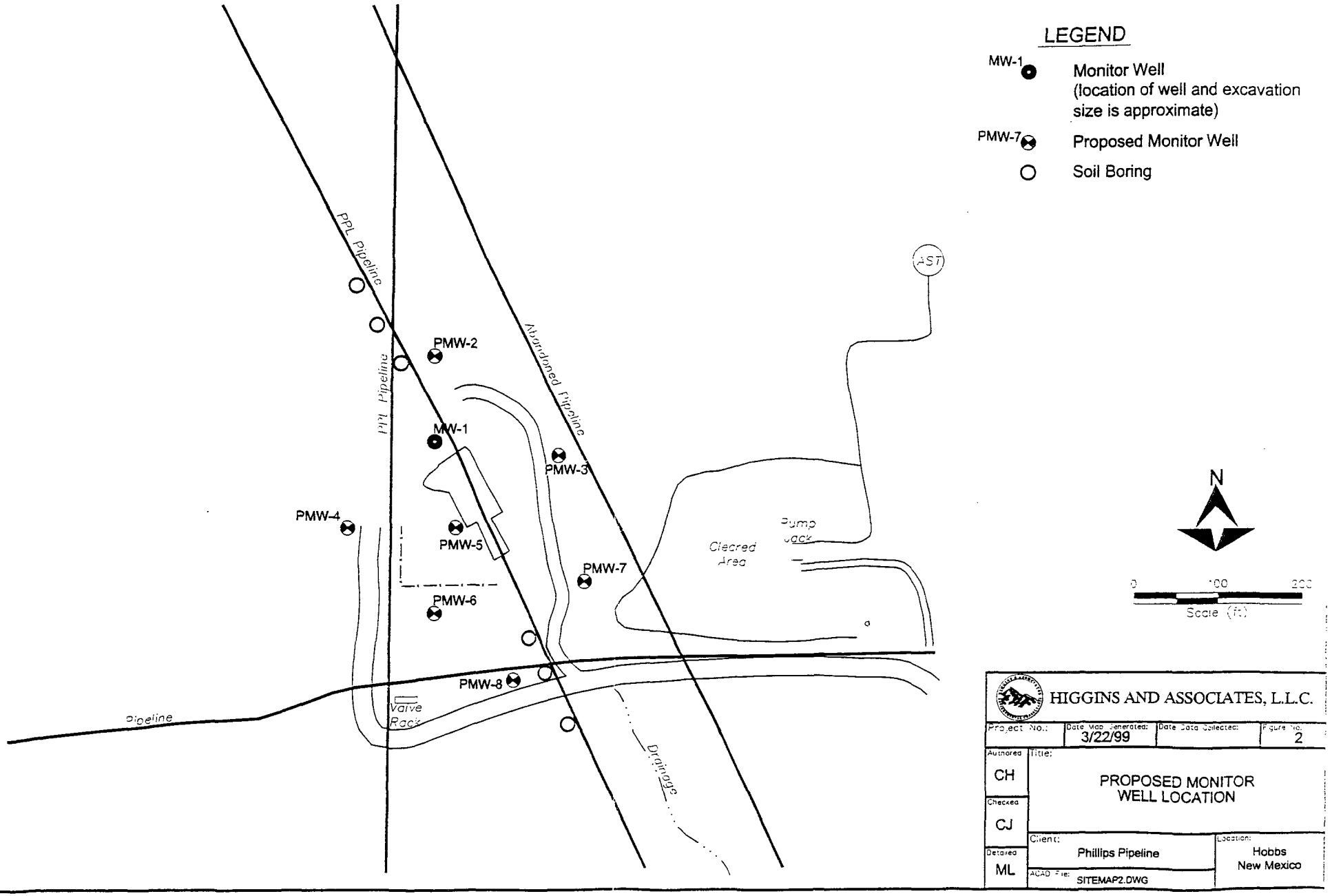
Client: Phillips Pipeline
Location: Hobbs New Mexico
ACAD File: SITEMAP2.DWG


LEGEND
MW-1
Monitor Well
(location of well and excavation size is approximate)
PMW-7
Proposed Monitor Well
Soil Boring
PPL Pipeline
Abandoned Pipeline
PMW-2
MW-1
PMW-3
PMW-4
PMW-5
PMW-6
PMW-7
PMW-8
AST
Cleared Area
Pump Jack
Valve Rack
Pipeline
Drainage
N
0
100
200
Scale (ft)
HIGGINS AND ASSOCIATES, L.L.C.
Project No.:
Date Map Generated: 3/22/99
Date Data Collected:
Figure No. 2
Authored CH
Checked CJ
Detailed ML
Title: PROPOSED MONITOR WELL LOCATION
Client: Phillips Pipeline
Location: Hobbs New Mexico
ACAD File: SITEMAP2.DWG

Appendix B

Drilling Logs

DRILLING LOG

Well No. MW-2

Project NM-1-1 Hobbs, NM Client Phillips Pipe Line Company

Location Hobbs, NM Project Number —

Date Drilled 7/13/99 Total Depth 40' Diameter 8"

Surface Elevation 3598.89' Water depth (init.) — 24-hrs. 27'

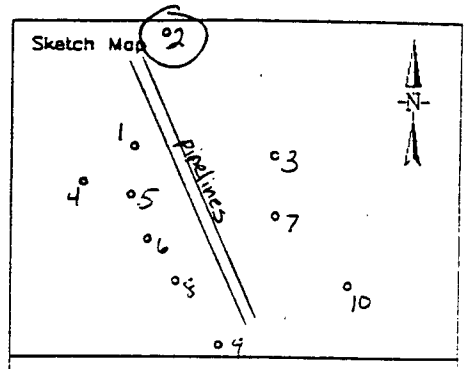
Screen: Dia. 2" Length 20' Slot Size 0.020"

Casing: Dia. 2" Length 23' Type Sch. 40 PVC

Drilling Company McDonald Drilling Method Air Rotary

Driller T. McDonald Log by C. Jensen Sampling Method Grab

Sketch Map



Notes

Depth (ft)	Well Construction	Notes	Sample No.	Blow Count	Recovery	PID (ppm)	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0–40		Bentonite grout mix	MW-2-0-2'		6		CAL	Caliche, sandy, tan to white, poorly sorted, medium to coarse grained, subangular to subrounded, dense, dry to damp.
					26		CAL	Sandy Caliche, as above.
		Bentonite			13			Silty, pebbly SAND, some caliche, tan to white, fine to medium grained, subangular to subrounded, very dense, dry to damp.
		Silica Sand Pack	MW-2-30-32'		8		SW	Silty, gravelly SAND, some caliche, tan to white, as above.
					23			
					16			Silty, gravelly SAND, tan to light red and brown, moderately sorted, fine to coarse grained, subrounded, very dense, moist to wet.
					10			

Page 1 of 1

DRILLING LOG

Well No. MW-3

Project: NM-1-1 Hobbs, NM Client: Phillips Pipe Line Company

Location: Hobbs, NM Project Number: —

Date Drilled: 7/15/99 Total Depth: 40' Diameter: 8"

Surface Elevation: 3600.15' Water depth (init.): — 24-hrs.: 30'

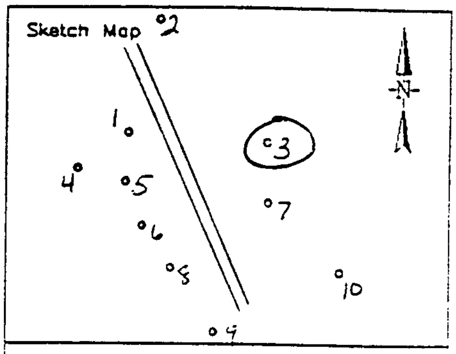
Screen: Dia. 2" Length: 20' Slot Size: 0.020"

Casing: Dia. 2" Length: 23' Type: Sch. 40 PVC

Drilling Company: McDonald Drilling Method: Air Rotary

Driller: T. McDonald Log by: C. Jensen Sampling Method: Grab

Sketch Map



Notes

Depth (ft)	Well Construction	Notes	Sample No.	Blow Count	Recovery	PID (ppm)	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0–16		Bentonite/grout mix						
4–8					X	0	Cal	Caliche, some gravelly sand, tan to white, poorly sorted, medium to coarse grained, subangular to subrounded, very dense, dry.
10–12					X	12		
14					X	30		Caliche, as above.
16–18		Bentonite						
18–40		Silica Sand Pack						
20–22			MW-3-20'-22'		X	45		Silty, gravelly SAND, tan, some caliche, moderately sorted, fine to medium grained, subrounded, very dense, dry to damp.
24					X	112		
24–35.5								Limestone @ 24'-35.5'.
28							SW	
30–32			MW-3-30'-32'		X	140		
34–36					X	122		Gravelly SAND, light brown, fine to medium grained, subrounded to rounded, very dense, wet.
40								

DRILLING LOG

Well No. MW-4

Project NM-1-1 Hobbs, NM Client Phillips Pipe Line Company

Location Hobbs, NM Project Number —

Date Drilled 7/14/99 Total Depth 40' Diameter 8"

Surface Elevation 3598.89 Water depth (init.) — 24-hrs. 28'

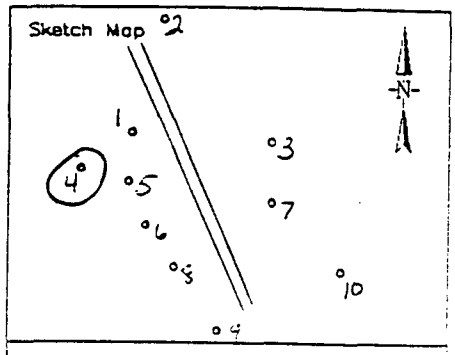
Screen: Dia. 2" Length 20' Slot Size 0.020"

Casing: Dia. 2" Length 23' Type Sch.40 PVC

Drilling Company McDonald Drilling Method Air Rotary

Driller T. McDonald Log by C. Jensen Sampling Method Grab

Sketch Map



Notes

Depth (ft)	Well Construction	Notes	Sample No.	Blow Count	Recovery	PID (ppm)	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0–4						0	Caliche	Caliche, with gravelly sand, tan to white, poorly sorted, coarse grained, subangular to subrounded, very dense, dry.
4–8		Bentonite/ grout mix				0	Caliche	Caliche, as above.
8–16						0	Caliche	
16–20		Bentonite				0	SW	Silty, gravelly SAND, w/caliche, tan to white, moderately sorted, fine to medium grained, subrounded, very dense, dry.
20–30		Silica Sand Pack	MW-4-30'-33'			0	SW	Silty, gravelly SAND, as above.
30–34			MW-4-33'-34'			134	SW	Silty, gravelly SAND, as above, light brown, wet.
34–40						34	SW	
40–50								

Page 1 of 1

DRILLING LOG

Well No. MW-5

Project NM-1-1, Hobbs, NM Client Phillips Pipe Line Company

Location Hobbs, NM Project Number —

Date Drilled 7/15/99 Total Depth 37' Diameter 8"

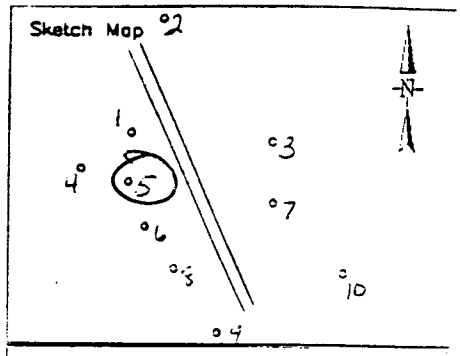
Surface Elevation 3598.91 Water depth (init.) — 24-hrs. 33'

Screen: Dia. 4" Length 20' Slot Size 0.020"

Casing: Dia. 4" Length 20' Type Sch 40 PVC

Drilling Company McDonald Drilling Method Air Rotary

Driller T. McDonald Log by C. Jensen Sampling Method Grab



Notes

Depth (ft)	Well Construction	Notes	Sample No.	Blow Count	Recovery	PID (ppm)	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0								
2		bentonite/ grout mix						
4					X	0		Caliche, with sand, tan to white, poorly sorted, coarse grained, subrounded, very dense, dry.
6								
8								
10								
12					X	13		
14		bentonite					Cal	Caliche, as above.
16					X	22		
18								
20								
22					X	314		Caliche, as above.
24								
26		Silica Sand Pack	MW-5: 20'-37'		X	612		Silty, gravelly SAND, light to dark brown, moderately to poorly sorted, medium to coarse grained, subrounded, very dense, damp to wet.
28								
30						>2000	SW	
32								
34					X	>2000		
36								
38								
40								
42								
44								
46								
48								
50								

DRILLING LOG

Well No. MW-6

Project NM-1-1 Hobbs, NM Client Phillips Pipe Line Company

Location Hobbs, NM Project Number —

Date Drilled 7/14/99 Total Depth 40' Diameter 8"

Surface Elevation 3696.68 Water depth (init.) — 24-hrs. 27'

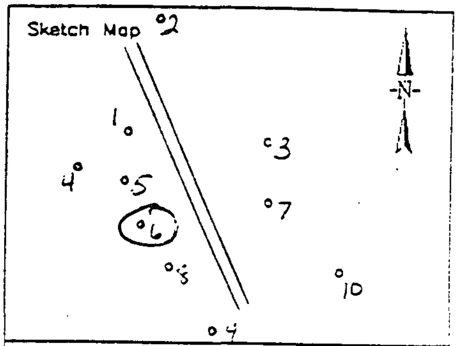
Screen: Dia. 2" Length 20' Slot Size 0.020"

Casing: Dia. 2" Length 23' Type Sch. 40 PVC

Drilling Company McDonald Drilling Method Air Rotary

Driller T. McDonald Log by C. Jensen Sampling Method Grab

Sketch Map



Notes

Depth (ft)	Well Construction	Notes	Sample No.	Blow Count	Recovery	PID (ppm)	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0–16		Bentonite/grout mix			X	0		Caliche, with sand, tan to white, poorly sorted, fine to coarse grained, subangular to subrounded, very dense, dry.
					X	-		Caliche, as above. Attempted to continuosly core - no Recovery.
					X	-	Cal	
16–18		Bentonite						
18–40		Silica Sand Pack	MW-6 24-26'		X	0		Caliche, as above.
					X	16		
			MW-6 30-32'		X	331	SW	Silty, gravelly SAND, light brown, poorly to moderately sorted, medium to coarse grained, subrounded, very dense, wet.
					X	224		

DRILLING LOG

Well No. MW-7

Project NM-1-1 Hobbs, NM Client Phillips Pipe Line Company

Location Hobbs, NM Project Number —

Date Drilled 7/13/99 Total Depth 40' Diameter 8"

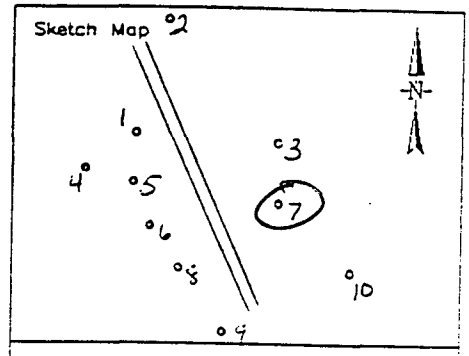
Surface Elevation 3599.51 Water depth (init.) — 24-hrs. 31'

Screen: Dia. 2" Length 20' Slot Size 0.020"

Casing: Dia. 2" Length 23' Type Sch.40 PVC

Drilling Company McDonald Drilling Method Air Rotary

Driller T. McDonald Log by C. Jensen Sampling Method Grab



Notes

Depth (ft)	Well Construction	Notes	Sample No. / Blow Count	Recovery	PID (ppm)	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0–40		Bentonite grout mix	MW-7-4'-4'	2			Caliche, with sand, tan to white, poorly sorted, medium to coarse grained, subangular to subrounded, very dense, dry.
				10	Cal		Caliche, with silty sand, as above.
		Bentonite		16			
		Silica Sand Pack	MW-7-20'-21'	6			Caliche, with gravelly, silty sand, as above.
				14			Limestone @ 23'-25.5'.
				60	SW		Silty, gravelly SAND, light brown, moderately to poorly sorted, medium to coarse grained, subrounded very dense, moist to wet.
				39			

DRILLING LOG

Well No. MW-8

Project NM-1-1 Hobbs, NM Client Phillips Pipe Line Company

Location Hobbs, NM Project Number —

Date Drilled 7/13/99 Total Depth 40' Diameter 8"

Surface Elevation 3596.53 Water depth (init.) — 24-hrs. 28'

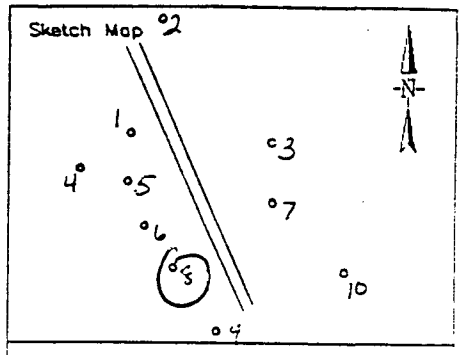
Screen: Dia. 2" Length 20' Slot Size 0.020"

Casing: Dia. 2" Length 23' Type Sch. 40 PVC

Drilling Company McDonald Drilling Method Air Rotary

Driller T. McDonald Log by C. Jensen Sampling Method Grab

Sketch Map



Notes

Depth (ft)	Well Construction	Notes	Sample No.	Blow Count	Recovery	PID (ppm)	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0–40		Bentonite/ grout mix	MW-8 30-32'		1	0		Caliche, with gravelly sand, tan to white, poorly sorted, medium to coarse grained, very dense, subangular to subrounded, dry.
					2	0	Cal	
		Bentonite			0	0		Caliche, as above, some limestone "pieces".
		Silica Sand Pack			1	2		Caliche, as above, damp.
			MW-8 30-33'		5			
					2.35	5W	SW	Silty, gravelly SAND, tan to light brown, medium to coarse grained, subrounded, very dense, damp to wet.
					1.45			

Page 1 of 1

DRILLING LOG

Well No. MW-9

Project NM-1-1 Hobbs, NM Client Phillips Pipe Line Company

Location Hobbs, NM Project Number —

Date Drilled 7/14/99 Total Depth 40' Diameter 8"

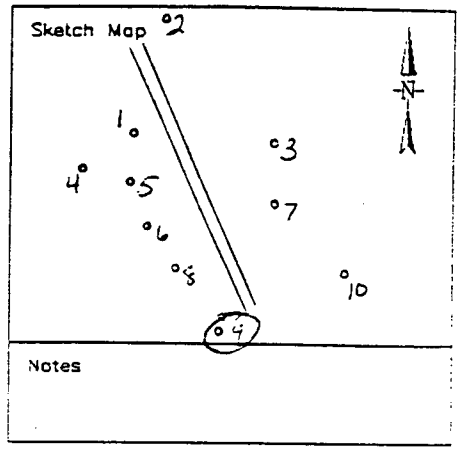
Surface Elevation 3595.31 Water depth (init.) — 24-hrs. 30'

Screen: Dia. 2" Length 20' Slot Size 0.020"

Casing: Dia. 2" Length 23' Type Sch.40 PVC

Drilling Company McDonald Drilling Method Air Rotary

Driller T. McDonald Log by C. Jensen Sampling Method Grab



Depth (ft)	Well Construction	Notes	Sample No.	Blow Count	Recovery	PID (ppm)	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0–18		Bentonite grout mix			1			SILT, brown, medium stiff, nonplastic, dry.
10–18		Bentonite			2	Calc.		Caliche, with silty, gravelly SAND, tan to white, moderately to poorly sorted, fine to medium grained, subrounded, very dense, dry to damp.
16–18		Bentonite			4.3			
20–40		Silica Sand Pack	MW-9-20'-22'		3			Caliche, as above.
22–24								Limestone @ 23'-24.5'.
24–40					18			
30–40			MW-9-30-32'		15	SW		Silty, gravelly SAND, Light brown, moderately sorted, fine to medium grained, subrounded, very dense, damp to wet.
36–40					13			

DRILLING LOG

Well No. MW-10

Project: NM-1-1 Hobbs, NM Client: Phillips Pipe Line Company

Location: Hobbs, NM Project Number: —

Date Drilled: 7/15/99 Total Depth: 40' Diameter: 8"

Surface Elevation: 3600.27 Water depth (init.): — 24-hrs.: 31

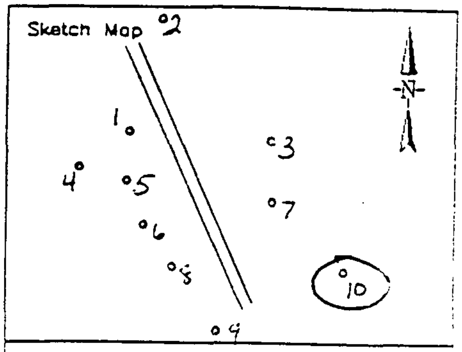
Screen: Dia. 2" Length: 20' Slot Size: 0.020"

Casing: Dia. 2" Length: 23' Type: Sch. 40 PVC

Drilling Company: McDonald Drilling Method: Air Rotary

Driller: T. McDonald Log by: C. Jensen Sampling Method: Grab

Sketch Map



Notes

Depth (ft)	Well Construction	Notes	Sample No.	Blow Count	Recovery	PID (ppm)	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0–16		Bentonite/ grout mix						
6					X	12		Caliche with sand, tan to white, poorly sorted, medium grained, subrounded, very dense, dry.
11					X	13	Cal	
15					X	30		Caliche, as above.
16–18		Bentonite						
18–40		Silica Sand Pack	mw-10:20-22					
21					X	10		Caliche, as above.
24					X	22		Limestone @ 23.5' to 26'
32			mw-10-30-32		X	40	SW	Silty, gravelly SAND, light brown, fine to coarse grained, subrounded to rounded, poorly sorted, very dense, damp to wet.
36					X	13		
40–50								

Lithologic/Drilling Log

Project Information		Well Information				
Project:	Hobbs	Borehole completed as well?	(YES)	NO	Well Casing Interval:	0'-20'
Project Number:		Well Name:	MW-2		Well Screen Interval:	20'-40'
Location:	Hobbs, NM	Total Depth:	40'		Sand Pack Interval:	18'-40'
Date Drilled:	7/13/99	Borehole Diameter:	8"		Bentonite Interval:	2'-18'
Client:	PPL	Well Elevation:			Cement/Grout Interval:	0'-2'
Rig/Core Type:	Air Rotary	Water Level Initial:	28'			
Drilling Company:	McDonald	Water Level Static:			Comments/Notes:	
Driller:	Tim McDonald	Well Type:	(PVC Sch 40)			
Drilling Method:	Air Rotary		PVC Sch 80			
Field Notes By:	C. Jensen		Low Carbon Steel			
Time Start:	0745	Well Diameter:	(2 inch)	0.020"		
Time Stop:	0830		4 inch			
			Other:			

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
4-6	(Gravel) ~~Sand~~	Gravelly ~~Sandy~~	TAN-white	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
1	Clay	Clayey	very well	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	(coarse)	(subangular)	~~dense (30-50)~~	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	(poorly)	cobbles/boulders			hard (>30)	(dry)
6	Caliche	%	very poorly					(damp)
NOTES:								moist
								wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
10-12	(Gravel) ~~Sand~~	Sandy	Tan-white	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	(silt)	rounded	loose (4-10)	soft (2-4)	plastic
2	Clay	Clayey	very well	medium	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	~~subangular~~	~~dense (30-50)~~	stiff (8-15)	nonplastic
—	(Weathered?)	%	(moderately)	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	(dry)
26	w/caliche	%	very poorly					(damp)
NOTES:								moist
								wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
14-16	~~Sand~~	Sandy	Tan - white	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(silt)	rounded	loose (4-10)	soft (2-4)	plastic
3	Clay	Clayey	very well	~~medium~~	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	(Pebbly)	well	coarse	~~subangular~~	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	(dry)
13	w/caliche	%	very poorly					(damp)
NOTES:								moist
								wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
20-22	(Gravel) ~~Sand~~	Sandy	Tan- white	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
4	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			(hard (>30))	(dry)
8	w/caliche	%	very poorly					damp
NOTES:	Limestone @ 20.5' - 23.5'							moist
								wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
24-26	(Gravel) ~~Sand~~	Sandy	TAN (Peach)	(very fine)	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(silt)	rounded	loose (4-10)	soft (2-4)	plastic
5	Clay	Clayey	very well	medium	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	(dense (30-50))	stiff (8-15)	nonplastic
—	(Weathered?)	%	~~moderately~~	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	(dry)
3		%	very poorly					(damp)
NOTES:								moist
								wet
								saturated

Lithologic/Drilling Log

Project Information	Well Information		
Project:	Borehole completed as well? YES NO		Well Casing Interval:
Project Number:	Well Name:	MW-7 continued	Well Screen Interval:
Location:	Total Depth:		Sand Pack Interval:
Date Drilled:	Borehole Diameter:		Bentonite Interval:
Client:	Well Elevation:		Cement/Grout Interval:
Rig/Core Type:	Water Level Initial:		
Drilling Company:	Water Level Static:		Comments/Notes:
Driller:	Well Type:	PVC Sch 40	
Drilling Method:		PVC Sch 80	
Field Notes By:		Low Carbon Steel	
Time Start:	Well Diameter:	2 inch	
Time Stop:		4 inch	
		Other:	

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	**Gravelly**	Color					
30-33'	**Sand**	Sandy	Light brown-tan	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
6	Clay	Clayey	very well	**medium**	**subrounded**	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	**coarse**	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	**moderately**	very coarse	angular	**very dense (>50)**	very stiff (15-30)	Moisture
PID/FID	USCS:	%	**poorly**	cobbles/boulders			hard (>30)	dry
16		%	very poorly					**damp**
NOTES:								**moist**
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	**Gravelly**	Color					
34-36	**Sand**	Sandy	Light red brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	**Silty**	Sorting (sand/gravel)	**fine**	rounded	loose (4-10)	soft (2-4)	plastic
7	Clay	Clayey	very well	**medium**	**subrounded**	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	**coarse**	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately	very coarse	angular	**very dense (>50)**	very stiff (15-30)	Moisture
PID/FID	USCS:	%	**poorly**	cobbles/boulders			hard (>30)	dry
10		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

Lithologic/Drilling Log

Project Information		Well Information					
Project:	Hobbs	Borehole completed as well?	(YES)	NO	Well Casing Interval:	0 - 20'	
Project Number:		Well Name:	MW-3		Well Screen Interval:	20 - 40'	
Location:	Hobbs, NM	Total Depth:	40'		Sand Pack Interval:	18 - 40'	
Date Drilled:	7/15/99	Borehole Diameter:	8"		Bentonite Interval:	2' - 18'	
Client:	PPL	Well Elevation:			Cement/Grout Interval:	0 - 2'	
Rig/Core Type:	Air Rotary	Water Level Initial:					
Drilling Company:	McDonald	Water Level Static:			Comments/Notes:		
Driller:	T. McDonald	Well Type:	~~PVC Sch 40~~				
Drilling Method:	Air Rotary		PVC Sch 80				
Field Notes By:	C. Jensen		Low Carbon Steel				
Time Start:	7:50	Well Diameter:	~~2 inch~~	0.020"			
Time Stop:	8:30		4 inch				
			Other:				

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
4-6	~~Sand~~	Sandy	Tan-White	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
~~1~~	Clay	Clayey	very well	~~coarse~~	~~subangular~~	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	~~dry~~
PID/FID	USCS:	%	~~poorly~~					damp
0	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
10-12'	~~Sand~~	Sandy	Tan-White	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
2	Clay	Clayey	very well	~~coarse~~	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	~~dry~~
PID/FID	USCS:	%	~~poorly~~					damp
12	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
14-16	~~Sand~~	Sandy	Tan-White	~~fine~~	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
3	Clay	Clayey	very well	~~coarse~~	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	~~moderately~~	cobbles/boulders			hard (>30)	~~dry~~
PID/FID	USCS:	%	~~poorly~~					damp
30	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
20-22	~~Sand~~	Sandy	Tan	~~fine~~	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
4	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	~~moderately~~	cobbles/boulders			hard (>30)	~~dry~~
PID/FID	USCS:	%	~~poorly~~					~~damp~~
48	W/caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
24-26	~~Sand~~	Sandy	Light Brown	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
5	Clay	Clayey	very well	~~coarse~~	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	~~moderately~~	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					~~damp~~
112	Lime/Stn	%	very poorly					~~moist~~
NOTES:	24-25.5'							wet
								saturated

Lithologic/Drilling Log

Project Information	Well Information		
Project:	Borehole completed as well? YES NO		Well Casing Interval:
Project Number:	Well Name: MW-3 continued		Well Screen Interval:
Location:	Total Depth:		Sand Pack Interval:
[redacted]e Drilled:	Borehole Diameter:		Bentonite Interval:
[redacted]nt:	Well Elevation:		Cement/Grout Interval:
Rig/Core Type:	Water Level Initial:		
Drilling Company:	Water Level Static:		Comments/Notes:
Driller:	Well Type:	PVC Sch 40	
Drilling Method:		PVC Sch 80	
Field Notes By:		Low Carbon Steel	
Time Start:	Well Diameter:	2 inch	
Time Stop:		4 inch	
		Other:	

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
30 - 33'	~~Sand~~	Sandy	Light Brown	~~fine~~	~~rounded~~	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
6	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
140		%	very poorly					~~moist~~
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
34 - 36'	~~Sand~~	Sandy	Light Brown	~~fine~~	~~rounded~~	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
7	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
122		%	very poorly					moist
NOTES:								~~wet~~
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
	Sand	Sandy		fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
		%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
	Sand	Sandy		fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
		%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
	Sand	Sandy		fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
[redacted]w Counts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
		%	very poorly					moist
NOTES:								wet
								saturated

Lithologic/Drilling Log

Project Information		Well Information			
Project:	Nobbs	Borehole completed as well?	(YES) NO	Well Casing Interval:	0 - 20'
Project Number:		Well Name:	MW-4	Well Screen Interval:	20' - 40'
Location:	Hobbs, NM	Total Depth:	40'	Sand Pack Interval:	18' - 40'
Date Drilled:	7/14/99	Borehole Diameter:	8"	Bentonite Interval:	2' - 18'
Client:	PDL	Well Elevation:		Cement/Grout Interval:	0' - 2'
Rig/Core Type:	Air Rotary	Water Level Initial:			
Drilling Company:	McDonald	Water Level Static:		Comments/Notes:	
Driller:	T. McDonald	Well Type:	(PVC Sch 40)		
Drilling Method:	Air Rotary		PVC Sch 80		
Field Notes By:	C. Jensen		Low Carbon Steel		
Time Start:	12:05	Well Diameter:	(2 inch) 0.020"		
Time Stop:	12:40		4 inch		
			Other:		

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	(Gravelly)	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
4-6'	(Sand)	Sandy	Tan-White	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
1	Clay	Clayey	very well	(coarse)	(subangular)	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	(poorly)					damp
0	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	(Gravelly)	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
10-12	(Sand)	Sandy	Tan-White	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
2	Clay	Clayey	very well	(coarse)	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	(poorly)					damp
0	caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	(Gravelly)	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
14-16	(Sand)	Sandy	Tan-White	(fine)	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
3	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	(moderately)	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	poorly					damp
0	w/caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	(Gravelly)	Color	(very fine)	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
20-22	(Sand)	Sandy	Tan-White	(fine)	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
4	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	(moderately)	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	poorly					damp
0	w/caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	(Gravelly)	Color	(very fine)	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
24-26	(Sand)	Sandy	Tan-Light Br.	(fine)	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	medium	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
5	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	poorly					(damp)
0		%	very poorly					moist
NOTES:								wet
								saturated

Lithologic/Drilling Log

Project Information	Well Information			
Project:	Borehole completed as well?	YES	NO	Well Casing Interval:
Project Number:	Well Name:	MW-4 continued		Well Screen Interval:
Location:	Total Depth:			Sand Pack Interval:
Date Drilled:	Borehole Diameter:			Bentonite Interval:
[redacted]nt:	Well Elevation:			Cement/Grout Interval:
Rig/Core Type:	Water Level Initial:			
Drilling Company:	Water Level Static:			Comments/Notes:
Driller:	Well Type:	PVC Sch 40		
Drilling Method:		PVC Sch 80		
Field Notes By:		Low Carbon Steel		
Time Start:	Well Diameter:	2 inch		
Time Stop:		4 inch		
		Other:		

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
30-32	~~Sand~~	Sandy	Light Brown	~~fine~~	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
6	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	anguiar	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	~~moderately~~	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					~~damp~~
134		%	very poorly					~~moist~~
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
34-36	~~Sand~~	Sandy	Light Brown	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
7	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	anguiar	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	~~moderately~~	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
34		%	very poorly					~~moist~~
NOTES:								~~wet~~
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
	Sand	Sandy		fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	anguiar	very dense (>50)	very stiff (15-30)	Moisture
	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
		%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
	Sand	Sandy		fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
		%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
ıth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
	Sand	Sandy		fine	rounded	loose (4-10)	soft (2-4)	plastic
mple ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Counts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID	USCS:	%	poorly					damp
		%	very poorly					moist
S:								wet
								saturated

Lithologic/Drilling Log

Project Information		Well Information			
Project:	Hobbs	Borehole completed as well?	(YES) NO	Well Casing Interval:	0 - 17
Project Number:		Well Name:	MW-5	Well Screen Interval:	17 - 37
Location:	Hobbs, NM	Total Depth:	~~35~~ ~~37~~ 37'	Sand Pack Interval:	15 - 37
Date Drilled:	7/15/99	Borehole Diameter:	8"	Bentonite Interval:	2 - 15
Client:	PPL	Well Elevation:		Cement/Grout Interval:	0 - 2
Rig/Core Type:	Air Rotary	Water Level Initial:			
Drilling Company:	McDonald	Water Level Static:		Comments/Notes:	
Driller:	T. McDonald	Well Type:	(PVC Sch 40)		
Drilling Method:	Air Rotary		PVC Sch 80		
Field Notes By:	C. Jensen		Low Carbon Steel		
Time Start:	11:40	Well Diameter:	2 inch		
Time Stop:	13:15		(4 inch) 0.020"		
			Other:		

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
4-6	(Sand)	Sandy	Tan-white	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
1	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	poorly					damp
0	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
10-12	(Sand)	Sandy	Tan-white	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
2	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	poorly					damp
13		%	very poorly					moist
NOTES:	Caliche							wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
14-16	(Sand)	Sandy	Tan-white	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
3	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	poorly					damp
12		%	very poorly					moist
NOTES:	Caliche							wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
20-22	(Sand)	Sandy	Tan-white	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
4	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	poorly					damp
314	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	(Gravelly)	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
24-26	(Sand)	Sandy	Light-Dk Brown	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
5	Clay	Clayey	very well	(coarse)	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	(moderately)	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	(poorly)					(damp)
12		%	very poorly					(moist)
NOTES:								wet
								saturated

Lithologic/Drilling Log

Project Information		**Well Information**		
Project:		Borehole completed as well? YES NO		Well Casing Interval:
Project Number:		Well Name:	MW-5 continued	Well Screen Interval:
Location:		Total Depth:		Sand Pack Interval:
Date Drilled:		Borehole Diameter:		Bentonite Interval:
Client:		Well Elevation:		Cement/Grout Interval:
Rig/Core Type:		Water Level Initial:		
Drilling Company:		Water Level Static:		Comments/Notes:
Driller:		Well Type:	PVC Sch 40	
Drilling Method:			PVC Sch 80	
Field Notes By:			Low Carbon Steel	
Time Start:		Well Diameter:	2 inch	
Time Stop:			4 inch	
			Other:	

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
30-32	Sand	Sandy	Dk. Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
6	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
>3000		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
34-36	Sand	Sandy	Dk. Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
7	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
>3000		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

Lithologic/Drilling Log

Project Information		Well Information			
Project:	Hobbs	Borehole completed as well?	(YES)	NO	Well Casing Interval: 0 - 30'
Project Number:		Well Name:	MW-6		Well Screen Interval: 30 - 40'
Location:	Hobbs NM	Total Depth:	40'		Sand Pack Interval: 18 - 40'
Date Drilled:	7/14/99	Borehole Diameter:	8"		Bentonite Interval: 2 - 18'
Client:	PPL	Well Elevation:			Cement/Grout Interval: 0 - 2'
Rig/Core Type:	Air Rotary	Water Level Initial:			
Drilling Company:	McDonald	Water Level Static:			Comments/Notes:
Driller:	T. McDonald	Well Type:	(PVC Sch 40)		Cored from 8' - 18'
Drilling Method:	Air Rotary - Core		PVC Sch 80		2.5' of recovery only.
Field Notes By:	C. Jensen		Low Carbon Steel		Resumed air rotary.
Time Start:	9:20	Well Diameter:	(2 inch) 0.020"		
Time Stop:	10:35		4 inch		
			Other:		

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
4-6	(Sand)	Sandy	Tan-white	(fine)	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
1	Clay	Clayey	very well	(coarse)	(subangular)	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	(moderately)	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	(poorly)					damp
0	caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
15-15	(Sand)	Sandy	Tan-White	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
2	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
CORE	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	pooriy					damp
0 —	Caliche	%	very pooriy					moist
NOTES:								wet
								saturated

(12")	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
13-18	(Sand)	Sandy	Tan-white	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
3	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
core	(Weathered?)	%	(moderately)	cobbles/boulders			(hard (>30))	(dry)
PID/FID	USCS:	%	(poorly)					damp
0 —	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
20-22	(Sand)	Sandy	Tan-white	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
4	Clay	Clayey	very well	(coarse)	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	(poorly)					damp
0	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
24-26	(Sand)	Sandy	Tan-White	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
5	Clay	Clayey	very well	(coarse)	(subangular)	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	(poorly)					(damp)
16	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

Lithologic/Drilling Log

Project Information	Well Information		
Project:	Borehole completed as well? YES NO		Well Casing Interval:
Project Number:	Well Name: MW-6 continued		Well Screen Interval:
Location:	Total Depth:		Sand Pack Interval:
[redacted]e Drilled:	Borehole Diameter:		Bentonite Interval:
[redacted]ent:	Well Elevation:		Cement/Grout Interval:
Rig/Core Type:	Water Level Initial:		
Drilling Company:	Water Level Static:		Comments/Notes:
Driller:	Well Type:	PVC Sch 40	
Drilling Method:		PVC Sch 80	
Field Notes By:		Low Carbon Steel	
Time Start:	Well Diameter:	2 inch	
Time Stop:		4 inch	
		Other:	

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color					
30-32'	~~Sand~~	Sandy	Light Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
6	Clay	Clayey	very well	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	~~coarse~~	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	~~moderately~~	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
PID/FID	USCS:	%	~~poorly~~	cobbles/boulders			hard (>30)	dry
331		%	very poorly					~~damp~~
NOTES:								~~moist~~
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color					
34-36	~~Sand~~	Sandy	Light Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
7	Clay	Clayey	very well	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	~~coarse~~	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	~~moderately~~	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
PID/FID	USCS:	%	~~poorly~~	cobbles/boulders			hard (>30)	dry
[redacted]224		%	very poorly					damp
NOTES:								~~moist~~
								~~wet~~
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
[redacted]ow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

Lithologic/Drilling Log

Project Information		Well Information				
Project:	Hobbs, NM	Borehole completed as well?	(YES)	NO	Well Casing Interval:	0'-20'
Project Number:		Well Name:	MW-7		Well Screen Interval:	20'-40'
Location:	Hobbs, NM	Total Depth:	40'		Sand Pack Interval:	18'-40'
Date Drilled:	7/13/99	Borehole Diameter:	8"		Bentonite Interval:	2'-18'
Client:	PPL	Well Elevation:			Cement/Grout Interval:	0'-2'
Rig/Core Type:	Air Rotary	Water Level Initial:				
Drilling Company:	M. Donald	Water Level Static:			Comments/Notes:	
Driller:	T. McDonald	Well Type:	(PVC Sch 40)			
Drilling Method:	Air Rotary		PVC Sch 80			
Field Notes By:	C. Jensen		Low Carbon Steel			
Time Start:	0925	Well Diameter:	~~2 inch~~	0.020"		
Time Stop:	1005		4 inch			
			Other:			

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
4-6'	~~Sand~~	Sandy	Tan-White	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
1	Clay	Clayey	very well	~~coarse~~	~~subangular~~	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	~~moderately~~	cobbles/boulders			hard (>30)	~~dry~~
PID/FID	USCS:	%	~~poorly~~					damp
2	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
10-12'	~~Sand~~	Sandy	Tan-White	~~fine~~	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	medium	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
2	Clay	Clayey	very well	coarse	~~subangular~~	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	~~moderately~~	cobbles/boulders			hard (>30)	~~dry~~
PID/FID	USCS:	%	~~poorly~~					damp
10	caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
14-16'	~~Sand~~	Sandy	Tan-White	~~fine~~	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
3	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	~~dry~~
PID/FID	USCS:	%	~~poorly~~					damp
16	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	~~Gravelly~~	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
20'-22'	~~Sand~~	Sandy	Tan-White	~~fine~~	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	~~Silty~~	Sorting (sand/gravel)	~~medium~~	~~subrounded~~	medium dense (10-30)	medium stiff (4-8)	slightly plastic
4	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	~~very dense (>50)~~	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	~~dry~~
PID/FID	USCS:	%	~~poorly~~					damp
16	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
24-26'	Sand	Sandy	Tan	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
5	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
ow Counts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			(hard (>30))	~~dry~~
'ID/FID	USCS:	%	poorly					damp
14	Limestone	%	very poorly					moist
)TES:	22'-25.5'							wet
								saturated

Lithologic/Drilling Log

Project Information	Well Information		
Project:	Borehole completed as well? YES NO		Well Casing Interval:
Project Number:	Well Name: MW-7 continued		Well Screen Interval:
Location:	Total Depth: 40'		Sand Pack Interval:
Date Drilled:	Borehole Diameter: 8"		Bentonite Interval:
Client:	Well Elevation:		Cement/Grout Interval:
Rig/Core Type:	Water Level Initial:		
Drilling Company:	Water Level Static:		Comments/Notes:
Driller:	Well Type:	PVC Sch 40	
Drilling Method:		PVC Sch 80	
Field Notes By:		Low Carbon Steel	
Time Start:	Well Diameter:	2 inch	
Time Stop:		4 inch	
		Other:	

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
30-33'	Sand	Sandy	Light Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
6	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
672		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
34-36	Sand	Sandy	Light Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
7	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
391		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

Lithologic/Drilling Log

Project Information		Well Information				
Project:	Hobbs	Borehole completed as well?	(YES)	NO	Well Casing Interval:	0 - 20'
Project Number:		Well Name:	MW-8		Well Screen Interval:	20 - 40'
Location:	Hobbs, NM	Total Depth:	40'		Sand Pack Interval:	18' - 40'
Date Drilled:	7/13/99	Borehole Diameter:	8"		Bentonite Interval:	2' - 18'
Client:	PPL	Well Elevation:			Cement/Grout Interval:	0' - 2'
Rig/Core Type:	Air Rotary	Water Level Initial:	28'			
Drilling Company:	McDonald	Water Level Static:			Comments/Notes:	
Driller:	T. McDonald	Well Type:	(PVC Sch 40)			
Drilling Method:	Air Rotary		PVC Sch 80			
Field Notes By:	C. Jensen		Low Carbon Steel			
Time Start:	11:25	Well Diameter:	(2 inch) 0.020"			
Time Stop:	12:00		4 inch			
			Other:			

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
4-6	Gravel	Gravelly	Tan - White	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Sand	Sandy	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
1	Silt	Silty	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Clay	Clayey	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	Bedrock	Pebbly	moderately	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	(Weathered?)	%	poorly	cobbles/boulders			(hard (>30))	(dry)
1	USCS:	%	very poorly					damp
NOTES:	Caliche	%						moist
								wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
10-12'	(Gravel)	(Gravelly)	Tan - White	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	(Sand)	Sandy	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
2	Silt	Silty	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic	
Blow Counts	Clay	Clayey	very well	(coarse)	(subangular)	dense (30-50)	stiff (8-15)	nonplastic
—	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
2	USCS:	%	(poorly)					damp
NOTES:	caliche	%	very poorly					moist
								wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
14-16'	(Gravel)	(Gravelly)	Tan-white	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	(Sand)	Sandy	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
3	(Silt)	(Silty)	(medium)	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic	
Blow Counts	Clay	Clayey	very well	(coarse)	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
0	USCS:	%	poorly					damp
NOTES:	Caliche	%	very poorly					moist
	some limestone pieces"							wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
20-22'	(Gravel)	(Gravelly)	Tan - White	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	(Sand)	Sandy	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
4	Silt	(Silty)	very well	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Clay	Clayey	well	(coarse)	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	Bedrock	Pebbly	moderately	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	(Weathered?)	%	poorly	cobbles/boulders			hard (>30)	(dry)
1	USCS:	%	very poorly					(damp)
NOTES:	Caliche	%						moist
								wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
24-26'	(Gravel)	(Gravelly)	Light Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	(Sand)	Sandy	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
5	Silt	(Silty)	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic	
Blow Counts	Clay	Clayey	very well	(coarse)	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	Bedrock	Pebbly	well	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
5	USCS:	%	poorly					(damp)
NOTES:		%	very poorly					moist
								wet
								saturated

Lithologic/Drilling Log

Project Information	Well Information			
Project:	Borehole completed as well?	YES	NO	Well Casing Interval:
Project Number:	Well Name:	MW-8 continued		Well Screen Interval:
Location:	Total Depth:			Sand Pack Interval:
[redacted]e Drilled:	Borehole Diameter:			Bentonite Interval:
[redacted]ent:	Well Elevation:			Cement/Grout Interval:
Rig/Core Type:	Water Level Initial:			
Drilling Company:	Water Level Static:			Comments/Notes:
Driller:	Well Type:	PVC Sch 40		
Drilling Method:		PVC Sch 80		
Field Notes By:		Low Carbon Steel		
Time Start:	Well Diameter:	2 inch		
Time Stop:		4 inch		
		Other:		

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
30-32'	Sand	Sandy	Light Brown	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
6	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
235		%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
34-36	Sand	Sandy	Light Brown	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
7	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
[redacted]145		%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
	Sand	Sandy		fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
		%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
	Sand	Sandy		fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
		%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
	Sand	Sandy		fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
[redacted]ow Counts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
		%	very poorly					moist
NOTES:								wet
								saturated

Lithologic/Drilling Log

Project Information		Well Information			
Project:	Hobbs	Borehole completed as well?	(YES) NO	Well Casing Interval:	0-20
Project Number:		Well Name:	MW-9	Well Screen Interval:	20-40
Location:	Hobbs NM	Total Depth:	40'	Sand Pack Interval:	18-40
Date Drilled:	7/14/99	Borehole Diameter:	8"	Bentonite Interval:	2-18
Client:	PPL	Well Elevation:		Cement/Grout Interval:	0-2'
Rig/Core Type:	Air Rotary	Water Level Initial:			
Drilling Company:	McDonald	Water Level Static:		Comments/Notes:	
Driller:	T. McDonald	Well Type:	(PVC Sch 40)		
Drilling Method:	Air Rotary		PVC Sch 80		
Field Notes By:	C. Jensen		Low Carbon Steel		
Time Start:	7:55	Well Diameter:	(2 inch) 0.020"		
Time Stop:	8:30		4 inch		
			Other:		

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
4-6	Gravel	Gravelly	Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	(Sand)	Sandy	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
1	Silt	Silty	very well	medium	subrounded	medium dense (10-30)	(medium stiff (4-8))	slightly plastic
Blow Counts	Clay	Clayey	well	coarse	subangular	dense (30-50)	stiff (8-15)	(nonplastic)
—	Bedrock	Pebbly	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	(Weathered?)	%:	poorly	cobbles/boulders			hard (>30)	(dry)
1	USCS:	%:	very poorly					damp
NOTES:		%:						moist
								wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
10-12	(Sand)	Sandy	Tan-white	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(fine)	rounded	loose (4-10)	soft (2-4)	plastic
2	Clay	Clayey	very well	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	(subangular)	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%:	(moderately)	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	USCS:	%:	(poorly)	cobbles/boulders			hard (>30)	(dry)
2	caliche	%:	very poorly					(damp)
NOTES:								moist
								wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
14-16	(Sand)	Sandy	Tan-white	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(fine)	rounded	loose (4-10)	soft (2-4)	plastic
3	Clay	Clayey	very well	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%:	(moderately)	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	USCS:	%:	poorly	cobbles/boulders			hard (>30)	(dry)
4.3	caliche	%:	very poorly					(damp)
NOTES:								moist
								wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
20-22'	(Sand)	Sandy	Tan-White	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(fine)	rounded	loose (4-10)	soft (2-4)	plastic
4	Clay	Clayey	very well	medium	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	(coarse)	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%:	(moderately)	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	USCS:	%:	(poorly)	cobbles/boulders			hard (>30)	(dry)
3	caliche	%:	very poorly					(damp)
NOTES:								moist
								wet
								saturated

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
24-26	(Sand)	Sandy	Light Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	(Silty)	Sorting (sand/gravel)	(fine)	rounded	loose (4-10)	soft (2-4)	plastic
5	Clay	Clayey	very well	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%:	moderately	very coarse	angular	(very dense (>50))	very stiff (15-30)	Moisture
PID/FID	USCS:	%:	poorly	cobbles/boulders			hard (>30)	(dry)
1.8		%:	very poorly					(damp)
NOTES:								moist
								wet
								saturated

Limestone 25-24.5'

Lithologic/Drilling Log

Project Information		Well Information			
Project:		Borehole completed as well?	YES NO	Well Casing Interval:	
Project Number:		Well Name:	MW-9 continued	Well Screen Interval:	
Location:		Total Depth:		Sand Pack Interval:	
Date Drilled:		Borehole Diameter:		Bentonite Interval:	
Client:		Well Elevation:		Cement/Grout Interval:	
Rig/Core Type:		Water Level Initial:			
Drilling Company:		Water Level Static:		Comments/Notes:	
Driller:		Well Type:	PVC Sch 40		
Drilling Method:			PVC Sch 80		
Field Notes By:			Low Carbon Steel		
Time Start:		Well Diameter:	2 inch		
Time Stop:			4 inch		
			Other:		

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly (circled)	Color					
30-33	Sand (circled)	Sandy	Light Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty (circled)	Sorting (sand/gravel)	fine (circled)	rounded	loose (4-10)	soft (2-4)	plastic
6	Clay	Clayey	very well	medium (circled)	subrounded (circled)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse (circled)	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately (circled)	very coarse	angular	very dense (>50) (circled)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly (circled)	cobbles/boulders			hard (>30)	dry
15		%	very poorly					damp (circled)
NOTES:								moist (circled)
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly (circled)	Color					
34-36	Sand (circled)	Sandy	Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty (circled)	Sorting (sand/gravel)	fine (circled)	rounded	loose (4-10)	soft (2-4)	plastic
7	Clay	Clayey	very well	medium (circled)	subrounded (circled)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse (circled)	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately (circled)	very coarse	angular	very dense (>50) (circled)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly (circled)	cobbles/boulders			hard (>30)	dry
13		%	very poorly					damp
NOTES:								moist
								wet (circled)
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color					
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
NOTES:								moist
								wet
								saturated

Lithologic/Drilling Log

Project Information		Well Information				
Project:	Hobbs	Borehole completed as well?	(YES)	NO	Well Casing Interval:	0 - 20'
Project Number:		Well Name:	MW-10		Well Screen Interval:	20 - 40'
Location:	Hobbs, NM	Total Depth:	40'		Sand Pack Interval:	18 - 40'
Drilled:	7/15/99	Borehole Diameter:	8"		Bentonite Interval:	2 - 18
Client:	PPL	Well Elevation:			Cement/Grout Interval:	0 - 2'
Rig/Core Type:	Air Rotary	Water Level Initial:				
Drilling Company:	McDonald	Water Level Static:			Comments/Notes:	
Driller:	T. McDonald	Well Type:	(PVC Sch 40)			
Drilling Method:	Air Rotary		PVC Sch 80			
Field Notes By:	C. Jensen		Low Carbon Steel			
Time Start:	9:10	Well Diameter:	(2 inch) 0.020"			
Time Stop:	9:55		4 inch			
			Other:			

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
4-6	(Sand)	Sandy	Tan-white	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
1	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense) (>50)	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	poorly					damp
12	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
10-12	(Sand)	Sandy	Tan-white	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
2	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense) (>50)	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
[redacted]/FID	USCS:	%	poorly					damp
8	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
14-16	(Sand)	Sandy	Tan-white	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
3	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense) (>50)	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	poorly					damp
30	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
20-22	(Sand)	Sandy	Tan-white	fine	rounded	loose (4-10)	soft (2-4)	plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
4	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
Blow Counts	Bedrock	Pebbly	well	very coarse	angular	(very dense) (>50)	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	(dry)
PID/FID	USCS:	%	poorly					damp
10	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval	Gravel	Gravelly	Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
24-26	Sand	Sandy	TAN-White	fine	rounded	loose (4-10)	soft (2-4)	plastic
[redacted]ple ID	Silt	Silty	Sorting (sand/gravel)	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
5	Clay	Clayey	very well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
[redacted]ounts	Bedrock	Pebbly	well	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
	USCS:	%	poorly					damp
limestone		%	very poorly					moist
								wet
								saturated

Lithologic/Drilling Log

Project Information	Well Information	
Project:	Borehole completed as well? YES NO	Well Casing Interval:
Project Number:	Well Name: MW-10 continued	Well Screen Interval:
Location:	Total Depth:	Sand Pack Interval:
rilled:	Borehole Diameter:	Bentonite Interval:
Client:	Well Elevation:	Cement/Grout Interval:
Rig/Core Type:	Water Level Initial:	
Drilling Company:	Water Level Static:	Comments/Notes:
Driller:	Well Type: PVC Sch 40	
Drilling Method:	PVC Sch 80	
Field Notes By:	Low Carbon Steel	
Time Start:	Well Diameter: 2 inch	
Time Stop:	4 inch	
	Other:	

Depth/Interval	Primary Lithology	Subordinate Lithology		Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
30-32	Gravel	Gravelly		Light Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Sand	Sandy		Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
6	Silt	Silty		very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Clay	Clayey		well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	Bedrock	Pebbly		moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	(Weathered?)		%	poorly	cobbles/boulders			hard (>30)	dry
40	USCS:		%	very poorly					damp
NOTES:			%						moist
									wet
									saturated

Depth/Interval	Primary Lithology	Subordinate Lithology		Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
34-36	Gravel	Gravelly		Light Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Sand	Sandy		Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
7	Silt	Silty		very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Clay	Clayey		well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	Bedrock	Pebbly		moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	(Weathered?)		%	poorly	cobbles/boulders			hard (>30)	dry
13	USCS:		%	very poorly					damp
NOTES:			%						moist
									wet
									saturated

Depth/Interval	Primary Lithology	Subordinate Lithology		Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
	Gravel	Gravelly			very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Sand	Sandy		Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Silt	Silty		very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Clay	Clayey		well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	Bedrock	Pebbly		moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	(Weathered?)		%	poorly	cobbles/boulders			hard (>30)	dry
	USCS:		%	very poorly					damp
NOTES:			%						moist
									wet
									saturated

Depth/Interval	Primary Lithology	Subordinate Lithology		Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
	Gravel	Gravelly			very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Sand	Sandy		Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Silt	Silty		very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Clay	Clayey		well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	Bedrock	Pebbly		moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	(Weathered?)		%	poorly	cobbles/boulders			hard (>30)	dry
	USCS:		%	very poorly					damp
NOTES:			%						moist
									wet
									saturated

Depth/Interval	Primary Lithology	Subordinate Lithology		Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
	Gravel	Gravelly			very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
ple ID	Sand	Sandy		Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
	Silt	Silty		very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
Blow Counts	Clay	Clayey		well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
	Bedrock	Pebbly		moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture
PID/FID	(Weathered?)		%	poorly	cobbles/boulders			hard (>30)	dry
	USCS:		%	very poorly					damp
OTES:			%						moist
									wet
									saturated

Appendix C

Groundwater Elevation and LPH Thickness Data

GROUNDWATER ELEVATION DATA

CLIENT: Phillips Pipe Line
FACILITY: Hobbs, NM
LOCATION: Section 9, Township 19 S, Range 38 E
Hobbs, New Mexico
DATE: July 16, 1999

WELL ID	ETC	DTW	DTP	PT	PT X.8	ADJ DTW	WTE	COMMENTS
MW-1	3603.30			0.00	0.00	0.00		
MW-2	3601.57	30.55		0.00	0.00	30.55	3571.02	
MW-3	3602.77	33.11		0.00	0.00	33.11	3569.66	
MW-4	3601.70	31.68		0.00	0.00	31.68	3570.02	
MW-5	3601.54	36.98	30.90	6.08	4.86	32.12	3569.42	
MW-6	3599.83	30.97	30.62	0.35	0.28	30.69	3569.14	
MW-7	3602.11	34.03	32.90	1.13	0.90	33.13	3568.98	
MW-8	3598.87	31.65	30.12	1.53	1.22	30.43	3568.44	
MW-9	3601.05	33.45		0.00	0.00	33.45	3567.60	
MW-10	3602.96	34.77		0.00	0.00	34.77	3568.19	

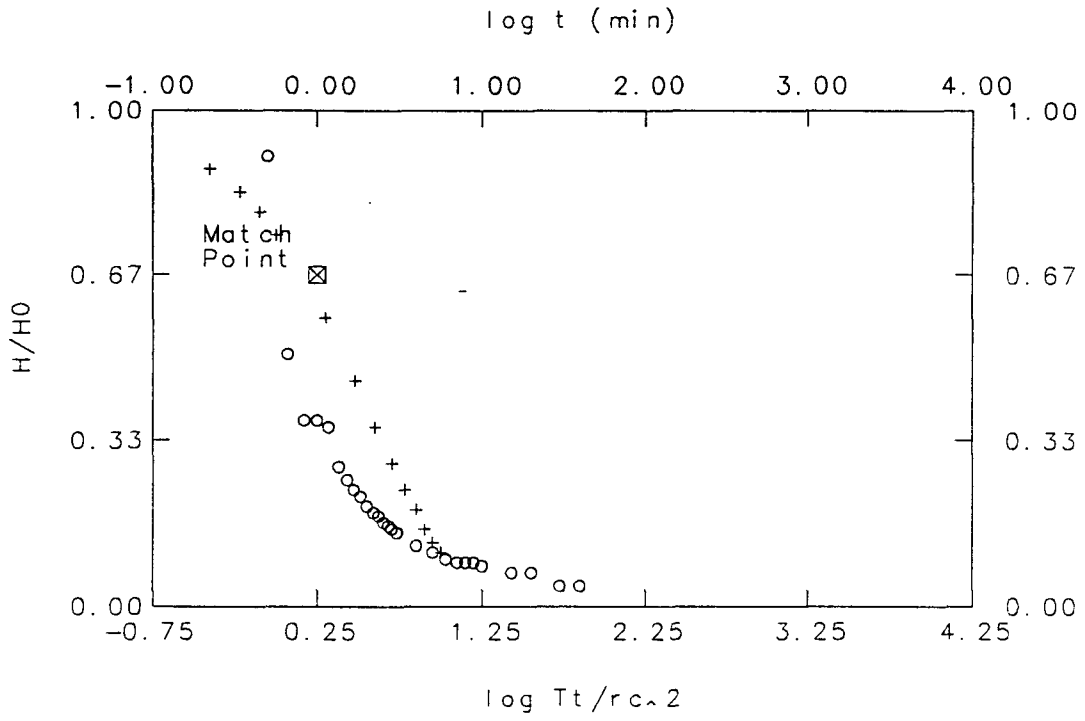
ETC = Elevation Top of Casing
DTW = Depth to water
DTP = Depth to Petroleum Hydrocarbons
PT = Measured Petroleum Thickness

ADJ. DTW = Adjusted Depth to Water
WTE = Water Table Elevation
PTE = Elevation Top of Petroleum
N.A. = Not Applicable
All measurements in linear feet

Appendix D

Rising Head Permeability Test Data

PPL/Hobbs Slug Test MW-2

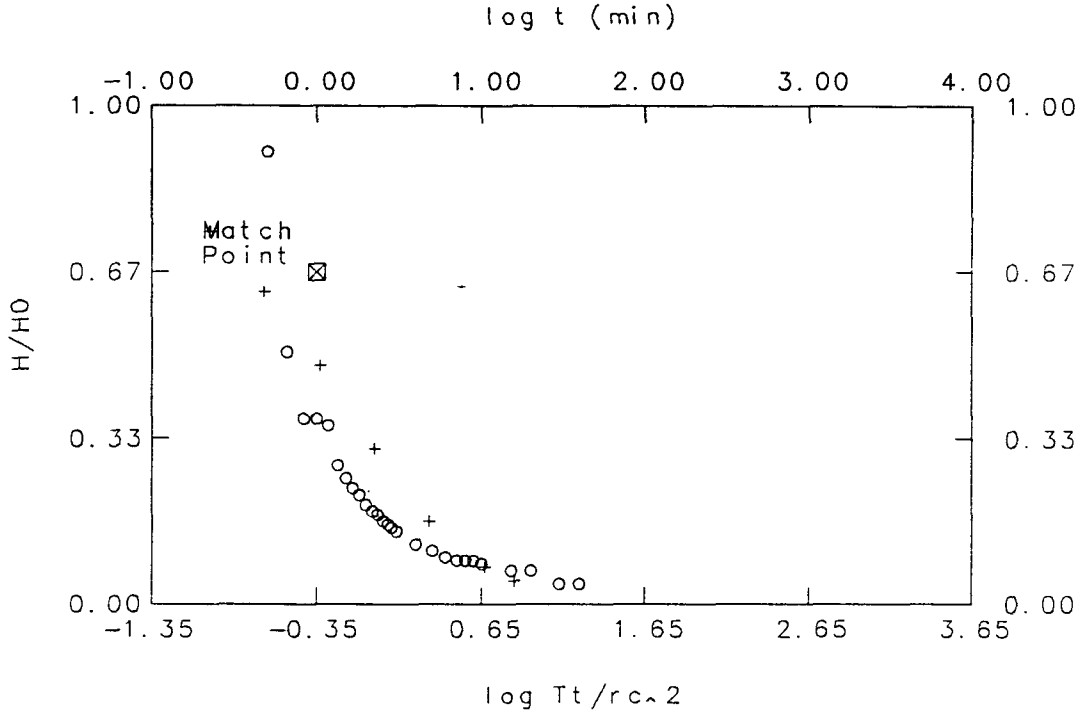


o - Data
\+ - Type Curve
Slug Test: alpha = -6.0

MATCH POINT		SOLUTION		
t	= 1.000E+0000	Transmissivity	= 5.341E+0002	gpd/ft
		Hydraulic. Cond.	= 2.967E+0001	gpd/sq ft
Tt/rc^2	= 1.778E+0000	Storativity	= 1.000E-0006	

WELL INFORMATION	
WELL IDENTIFICATION	: MW-2
DATE OF AQUIFER TEST	: 07/15/99
AQUIFER THICKNESS (b)	: 1.800E+0001 ft
VOLUME OF SLUG (V)	: 3.530E-0002 cu ft
EFFECTIVE RADIUS	: 1.670E-0001 cu ft
WELL RADIUS AT MEASURED WATER LEVELS (rc)	: 1.670E-0001 ft

PPL/Hobbs Slug Test MW-2

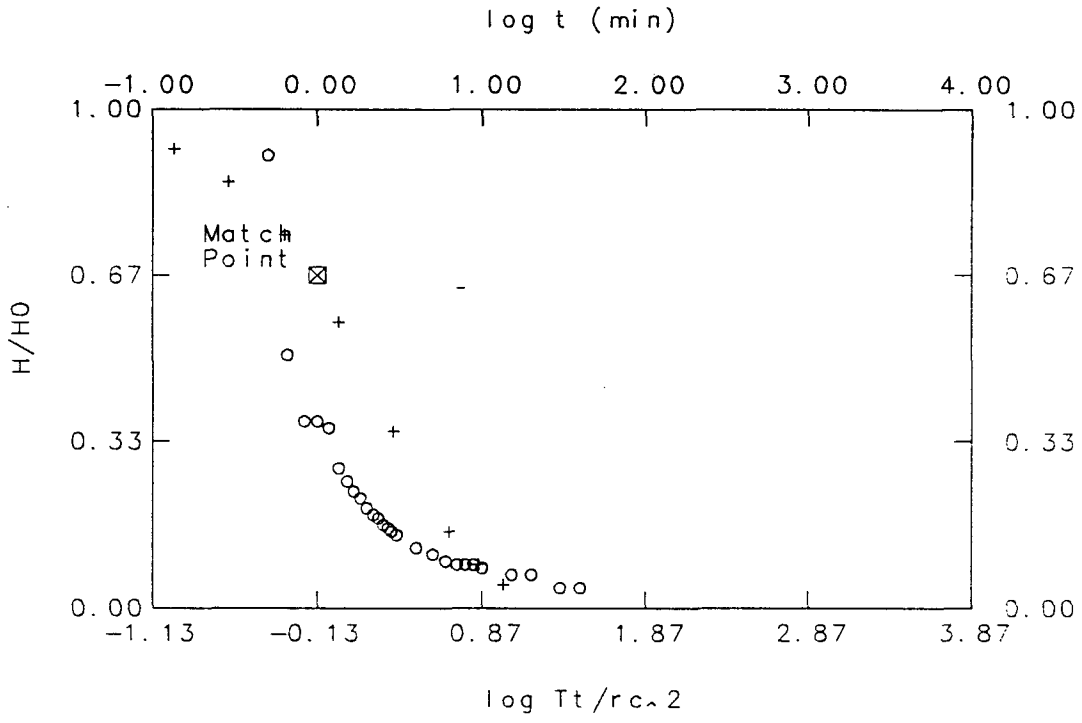


o – Data
+ – Type Curve
Slug Test: alpha = -1.0

MATCH POINT		SOLUTION		
t	= 1.000E+0000	Transmissivity	= 1.342E+0002	gpd/ft
		Hydraulic. Cond.	= 7.454E+0000	gpd/sq ft
Tt/rc^2	= 4.467E-0001	Storativity	= 1.000E-0001	

WELL INFORMATION	
WELL IDENTIFICATION	: MW-2
DATE OF AQUIFER TEST	: 07/15/99
AQUIFER THICKNESS (b)	: 1.800E+0001 ft
VOLUME OF SLUG (V)	: 3.530E-0002 cu ft
EFFECTIVE RADIUS	: 1.670E-0001 cu ft
WELL RADIUS AT MEASURED WATER LEVELS (rc)	: 1.670E-0001 ft

PPL/Hobbs Slug Test MW-2

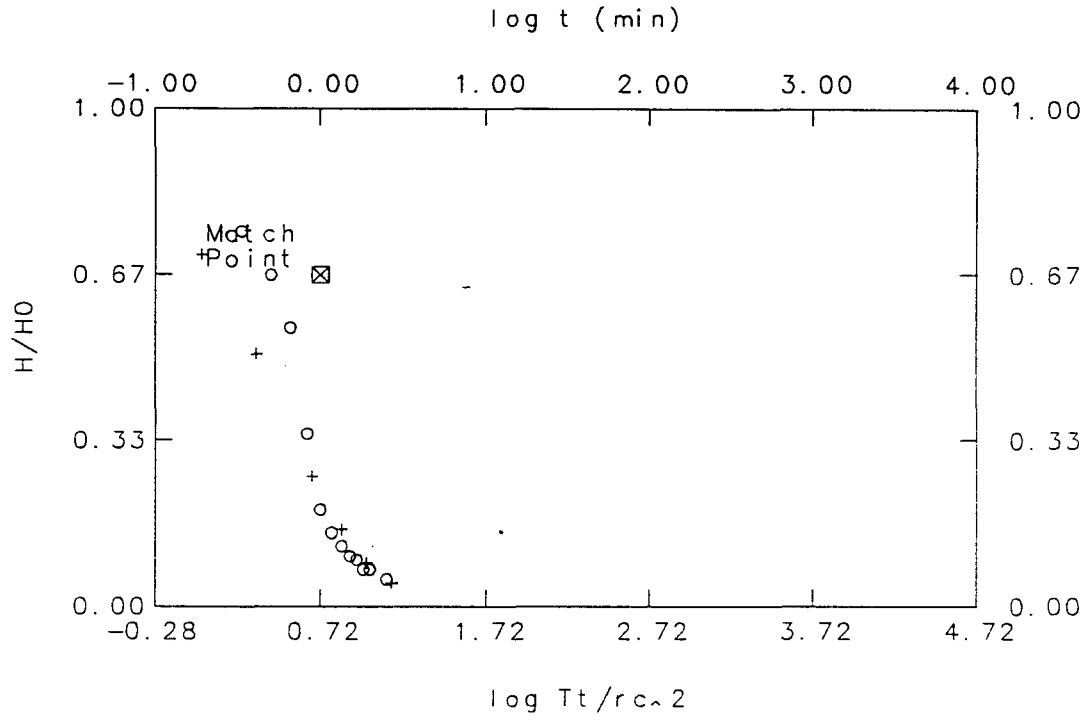


o - Data
+ - Type Curve
Slug Test: alpha = -3.0

MATCH POINT		SOLUTION		
t	= 1.000E+0000	Transmissivity	= 2.227E+0002	gpd/ft
		Hydraulic. Cond.	= 1.237E+0001	gpa/sq ft
Tt/rc^2	= 7.413E-0001	Storativity	= 1.000E-0003	

WELL INFORMATION	
WELL IDENTIFICATION	: MW-2
DATE OF AQUIFER TEST	: 07/15/99
AQUIFER THICKNESS (b)	: 1.800E+0001 ft
VOLUME OF SLUG (V)	: 3.530E-0002 cu ft
EFFECTIVE RADIUS	: 1.670E-0001 cu ft
WELL RADIUS AT MEASURED WATER LEVELS (rc)	: 1.670E-0001 ft

PPL/Hobbs Slug Test MW-9

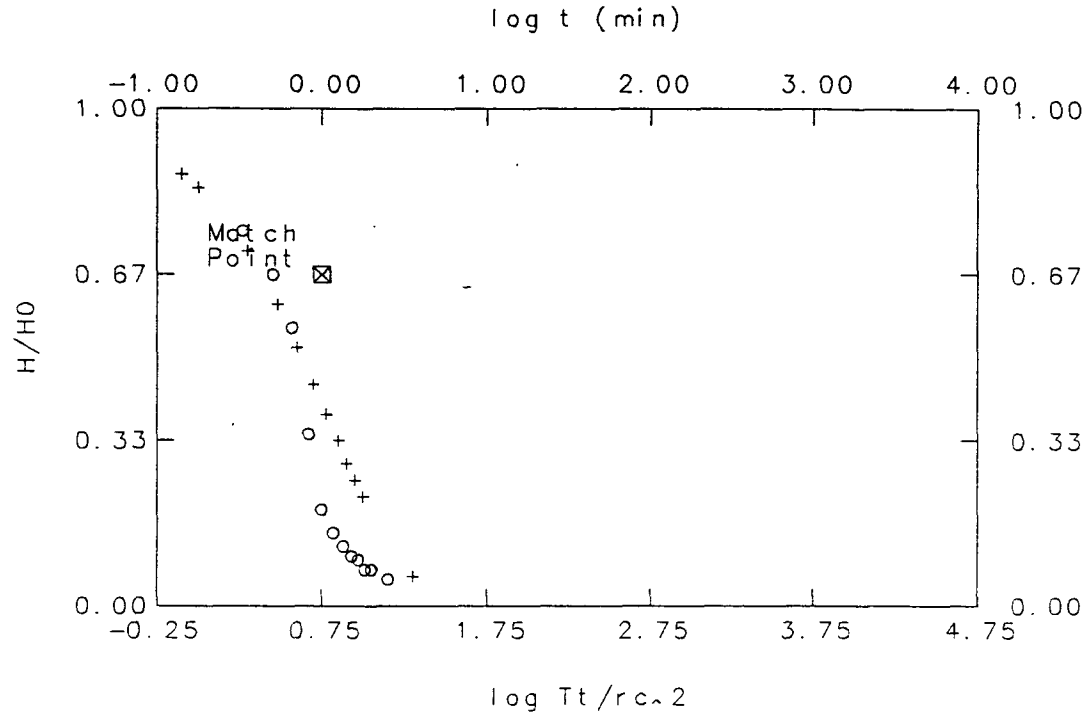


o - Data
+ - Type Curve
Slug Test: alpha = -5.0

MATCH POINT			SOLUTION		
t	=	1.000E+0000	Transmissivity	=	1.576E+0003 gpd/ft
			Hydraulic. Cond.	=	8.757E+0001 gpd/sq ft
Tt/rc^2	=	5.248E+0000	Storativity	=	1.000E-0005

WELL INFORMATION		
WELL IDENTIFICATION	:	MW-9
DATE OF AQUIFER TEST	:	07/15/99
AQUIFER THICKNESS (b)	:	1.800E+0001 ft
VOLUME OF SLUG (V)	:	3.530E-0002 cu ft
EFFECTIVE RADIUS	:	1.670E-0001 cu ft
WELL RADIUS AT MEASURED WATER LEVELS (rc)	:	1.670E-0001 ft

PPL/Hobbs Slug Test MW-9

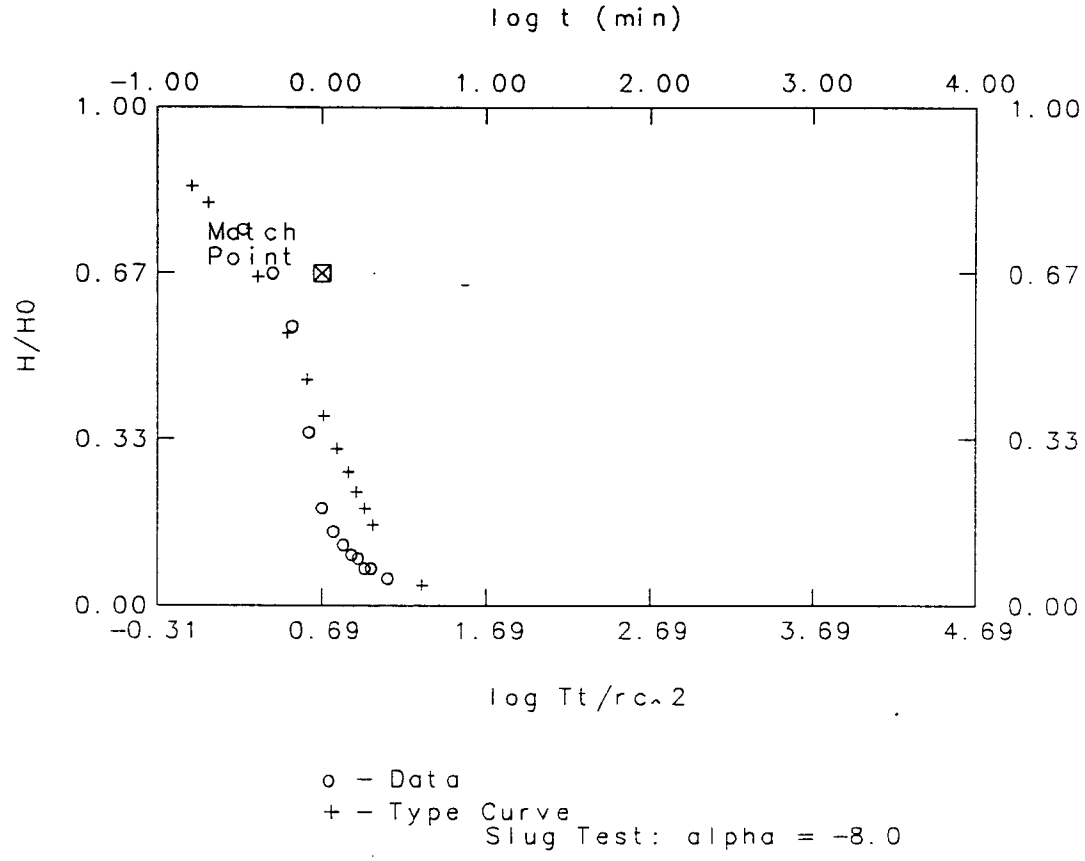


o - Data
\+ - Type Curve
Slug Test: alpha =-10.0

MATCH POINT		SOLUTION		
t	= 1.000E+0000	Transmissivity	= 1.689E+0003	gpd/ft
		Hydraulic. Cond.	= 9.384E+0001	gpd/sq ft
Tt/rc^2	= 5.623E+0000	Storativity	= 1.000E-0010	

WELL INFORMATION		
WELL IDENTIFICATION	:	MW-9
DATE OF AQUIFER TEST	:	07/15/99
AQUIFER THICKNESS (b)	:	1.800E+0001 ft
VOLUME OF SLUG (V)	:	3.530E-0002 cu ft
EFFECTIVE RADIUS	:	1.670E-0001 cu ft
WELL RADIUS AT MEASURED WATER LEVELS (rc)	:	1.670E-0001 ft

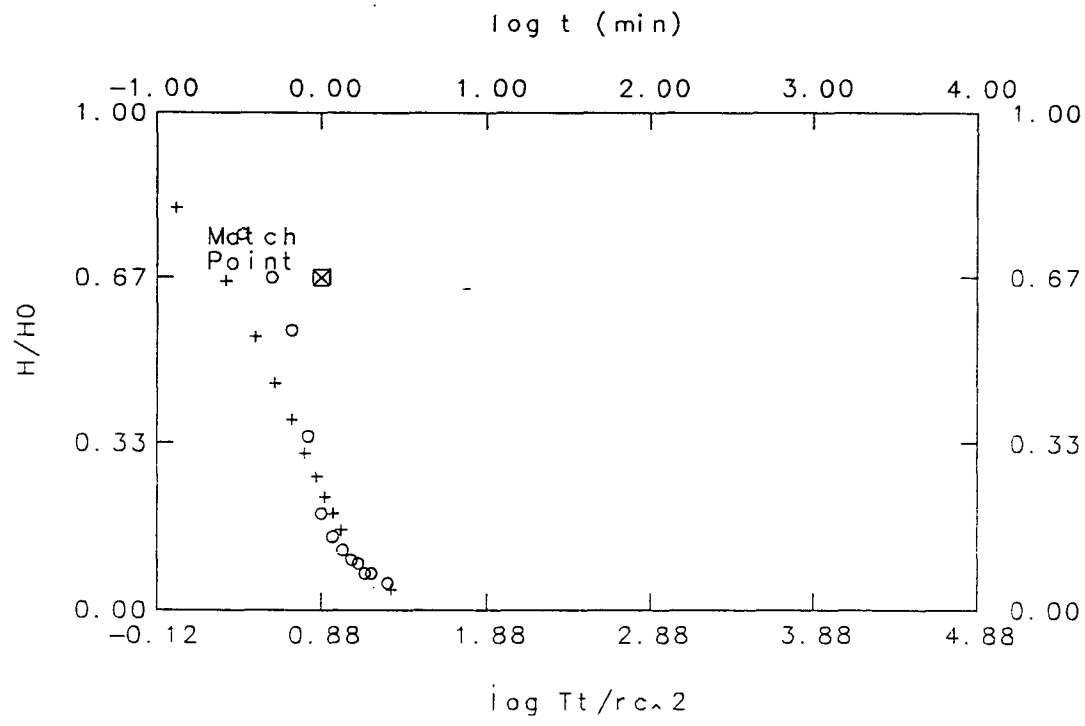
PPL/Hobbs Slug Test MW-9



MATCH POINT		SOLUTION		
t	= 1.000E+0000	Transmissivity	= 1.471E+0003	gpd/ft
		Hydraulic. Cond.	= 8.173E+0001	gpd/sq ft
Tt/rc^2	= 4.898E+0000	Storativity	= 1.000E-0008	

WELL INFORMATION		
WELL IDENTIFICATION	:	MW-9
DATE OF AQUIFER TEST	:	07/15/99
AQUIFER THICKNESS (b)	:	1.800E+0001 ft
VOLUME OF SLUG (V)	:	3.530E-0002 cu ft
EFFECTIVE RADIUS	:	1.670E-0001 cu ft
WELL RADIUS AT MEASURED WATER LEVELS (rc)	:	1.670E-0001 ft

PPL/Hobbs Slug Test MW-9



o - Data
\+ - Type Curve
Slug Test: alpha = -8.0

MATCH POINT		SOLUTION		
t	= 1.000E+0000	Transmissivity	= 2.278E+0003	gpd/ft
		Hydraulic. Cond.	= 1.266E+0002	gpd/sq ft
Tt/rc^2	= 7.586E+0000	Storativity	= 1.000E-0008	

WELL INFORMATION		
WELL IDENTIFICATION	:	MW-9
DATE OF AQUIFER TEST	:	07/15/99
AQUIFER THICKNESS (b)	:	1.800E+0001 ft
VOLUME OF SLUG (V)	:	3.530E-0002 cu ft
EFFECTIVE RADIUS	:	1.670E-0001 cu ft
WELL RADIUS AT MEASURED WATER LEVELS (rc)	:	1.670E-0001 ft

Appendix E

Well Record Search

USGS WELLS
(SEARCHED TO 1 MILE)

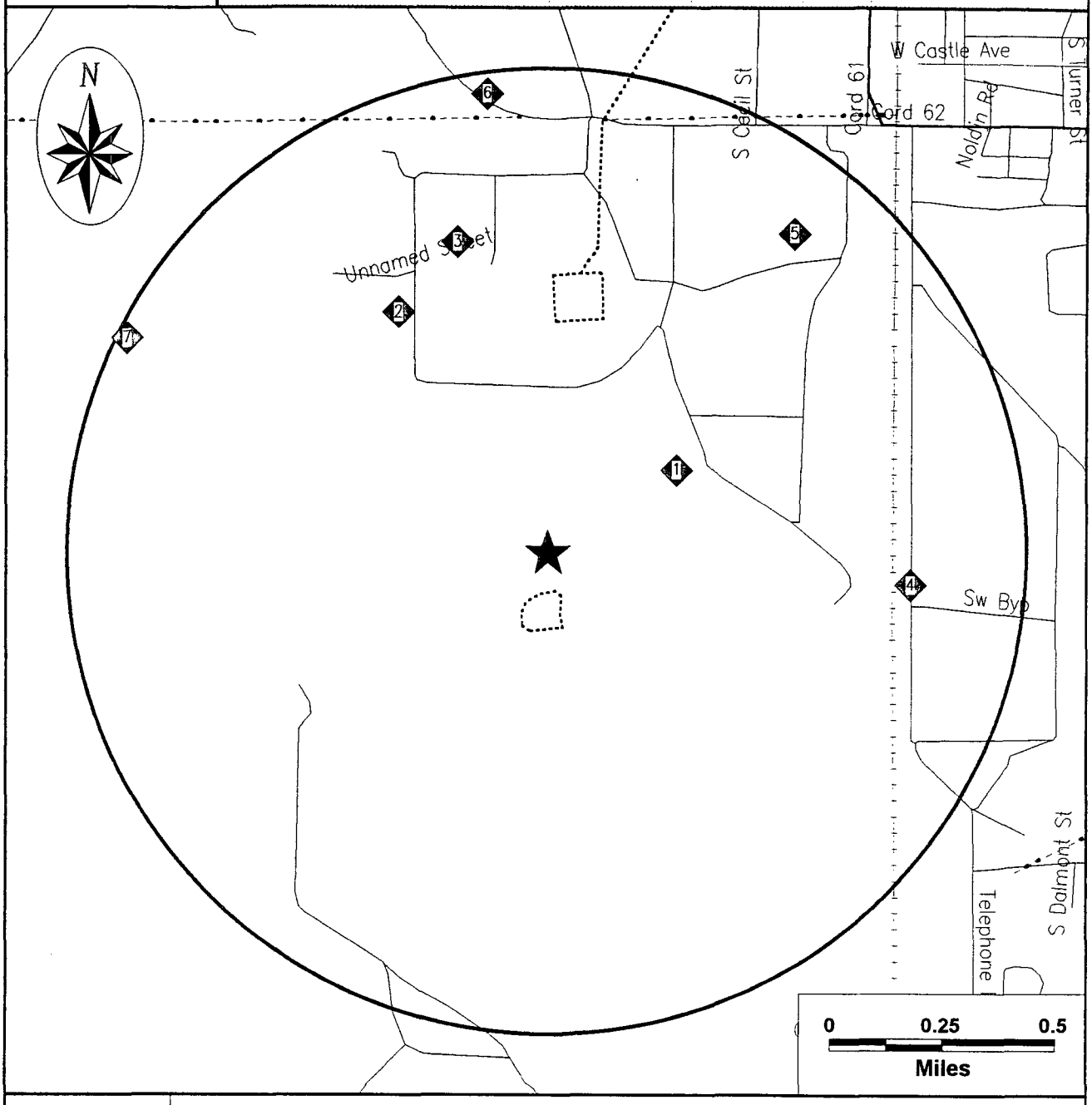
PROPERTY INFORMATION	CLIENT INFORMATION
Project Name/Ref #: Not Provided LINE NM-1-1 SITE PHILLIPS PIPELINE HOBBS, NM Latitude/Longitude: (32.668538, 103.156564)	CHRIS HIGGINS HIGGINS AND ASSOCIATES, LLC 9940 EAST COSTILLA AVENUE SUITE B ENGLEWOOD, CO 80112

Site Distribution Summary Agency / Database - Type of Records			within 1 mile
A) Databases searched to 1 mile:			
STATE	NON ASTM	Additional federal, state and regional lists	7

NOTES

USGS WELLS
(SEARCHED TO 1 MILE)

Map of Sites within 1 mile



Subject Site

Category: A

Single Sites

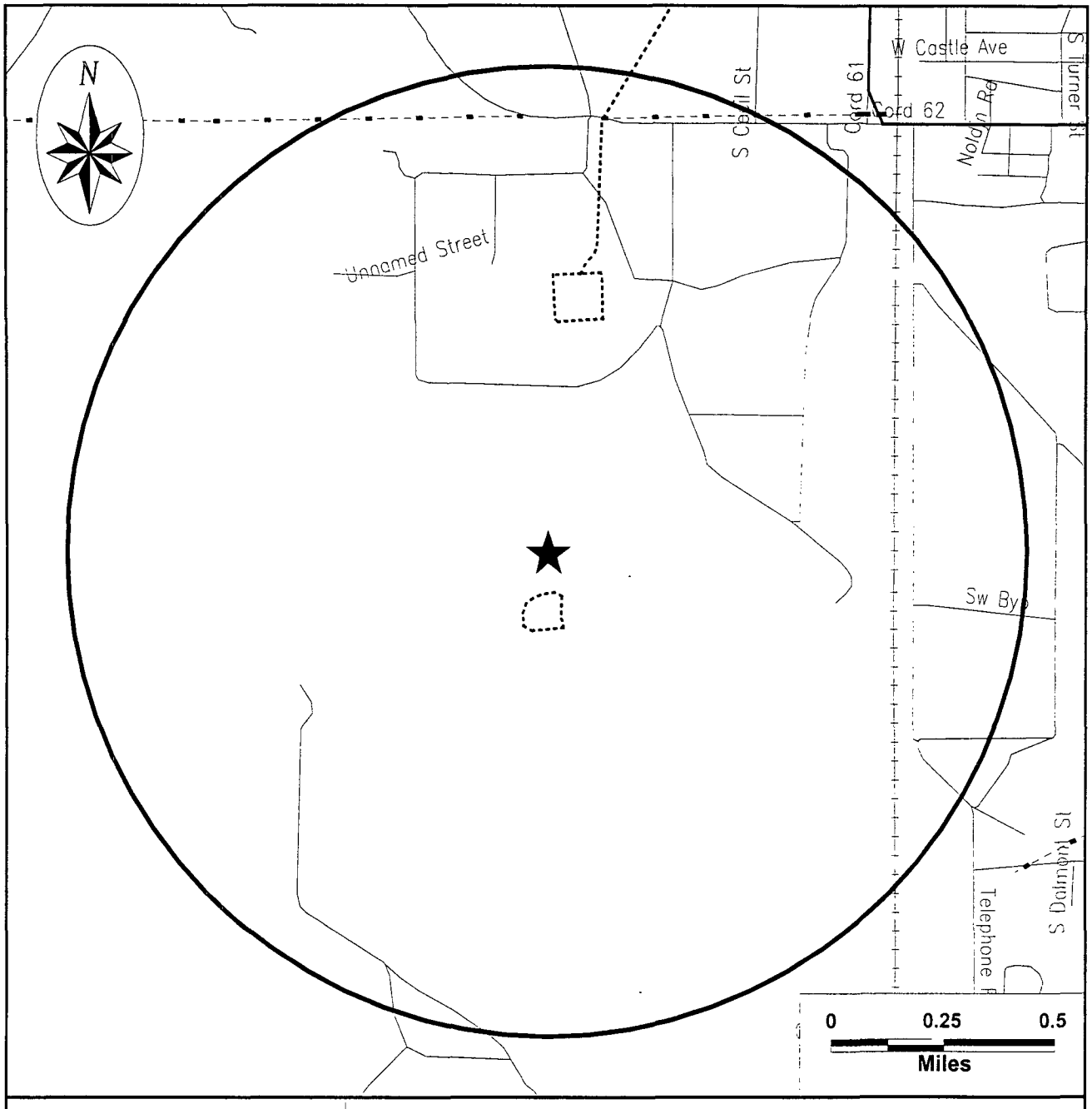
Multiple Sites

Highways and Major Roads
Roads
Railroads
Rivers or Water Bodies
Utilities

Categories correspond to database searches described in the Site Distribution Summary, beginning on Page #1.

USGS WELLS
(SEARCHED TO 1 MILE)

Street Map



Subject Site

Highways and Major Roads
Roads
Railroads
Rivers or Water Bodies
Utilities

USGS WELLS
(SEARCHED TO 1 MILE)

SITE INVENTORY

MAP ID	PROPERTY AND THE ADJACENT AREA (within 1 mile)	A NON ASTM	VISTA ID DISTANCE DIRECTION
1	USGS WATER WELL ID #324016103090601 , NM	X	9402208 0.28 MI NE
2	USGS WATER WELL ID #324034103094401 , NM	X	9402227 0.56 MI NW
3	USGS WATER WELL ID #324042103093601 , NM	X	9402237 0.65 MI N
4	USGS WATER WELL ID #324003103083401 , NM	X	9402186 0.74 MI E
5	USGS WATER WELL ID #324043103085001 , NM	X	9402240 0.82 MI NE
6	USGS WATER WELL ID #324059103093201 , NM	X	9402253 0.95 MI N
7	USGS WATER WELL ID #324031103102101 , NM	X	9402226 0.98 MI NW

UNMAPPED SITES	NON ASTM	VISTA ID
No Records Found		

USGS WELLS (SEARCHED TO 1 MILE)

DETAILS

PROPERTY AND THE ADJACENT AREA (within 1 mile)

VISTA Address*:	**USGS WATER WELL ID #324016103090601 NM**	VISTA ID#:	9402208	Map ID
		Distance/Direction:	0.28 MI / NE	1
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	*SAME AS ABOVE*
Well ID:	*324016103090601*
Latitude:	*32.671111111111*
Longitude:	*-103.1516666666*
Section Township Range:	*SWSWNE S09 T19S R38E*
Surface Elevation:	*3595.*
County FIPS:	*35025*

VISTA Address*:	**USGS WATER WELL ID #324034103094401 NM**	VISTA ID#:	9402227	Map ID
		Distance/Direction:	0.56 MI / NW	2
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	*SAME AS ABOVE*
Well ID:	*324034103094401*
Latitude:	*32.676111111111*
Longitude:	*-103.1622222222*
Section Township Range:	*NENENE S08 T19S R38E*
Surface Elevation:	*3601.*
County FIPS:	*35025*

VISTA Address*:	**USGS WATER WELL ID #324042103093601 NM**	VISTA ID#:	9402237	Map ID
		Distance/Direction:	0.65 MI / N	3
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	*SAME AS ABOVE*
Well ID:	*324042103093601*
Latitude:	*32.678333333333*
Longitude:	*-103.16*
Section Township Range:	*SWSWSW S04 T19S R38E*
Surface Elevation:	*3603.*
County FIPS:	*35025*

PROPERTY AND THE ADJACENT AREA (within 1 mile) CONT.

VISTA Address*:	USGS WATER WELL ID #324003103083401 NM	VISTA ID#:	9402186	Map ID 4
		Distance/Direction:	0.74 MI / E	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	*SAME AS ABOVE*
Well ID:	*324003103083401*
Use:	*IRRIGATION*
Latitude:	*32.6675*
Longitude:	*-103.1427777777*
Quadrangle Name:	*HATCH*
Section Township Range:	*SWNWSW S10 T19S R38E*
Surface Elevation:	*3593.*
Static Water Level:	*10.29*
County FIPS:	*35025*

VISTA Address*:	USGS WATER WELL ID #324043103085001 NM	VISTA ID#:	9402240	Map ID 5
		Distance/Direction:	0.82 MI / NE	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	*SAME AS ABOVE*
Well ID:	*324043103085001*
Latitude:	*32.678611111111*
Longitude:	*-103.1472222222*
Section Township Range:	*NWSESE S04 T19S R38E*
Surface Elevation:	*3608.*
County FIPS:	*35025*

VISTA Address*:	USGS WATER WELL ID #324059103093201 NM	VISTA ID#:	9402253	Map ID 6
		Distance/Direction:	0.95 MI / N	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

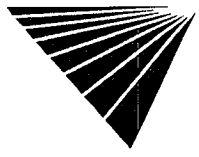
Agency Address:	*SAME AS ABOVE*
Well ID:	*324059103093201*
Use:	*STOCK*
Latitude:	*32.683055555555*
Longitude:	*-103.1588888888*
Quadrangle Name:	*TYRONE NM*
Section Township Range:	*NENWSW S04 T19S R38E*
Surface Elevation:	*3609.*
Static Water Level:	*393.59*
Date Well Drilled:	*08/01/1944*
County FIPS:	*35025*

VISTA Address*:	USGS WATER WELL ID #324031103102101 NM	VISTA ID#:	9402226	Map ID 7
		Distance/Direction:	0.98 MI / NW	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	*SAME AS ABOVE*
Well ID:	*324031103102101*

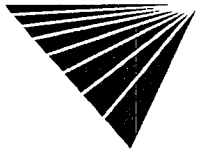
PROPERTY AND THE ADJACENT AREA (within 1 mile) CONT.

Use:	*IRRIGATION*
Depth:	*70.00*
Latitude:	*32.675277777777*
Longitude:	*-103.1725*
Section Township Range:	*NENENW S08 T19S R38E*
Surface Elevation:	*3604.*
Static Water Level:	*11.45*
County FIPS:	*35025*



UNMAPPED SITES

No Records Found



USGS WELLS
(SEARCHED TO 1 MILE)

DESCRIPTION OF DATABASES SEARCHED

A) DATABASES SEARCHED TO 1 MILE

Water Wells
SRC#: 5384

VISTA conducts a database search to identify all sites within 1 mile of your property.
The agency release date for USGS WATER WELLS was March, 1998.

The Ground Water Site Inventory (GWSI) database was provided by the United States Geological Survey (USGS). The database contains information for over 1,000,000 wells and other sources of groundwater which the USGS has studied, used, or otherwise had reason to document through the course of research. The agency may be contacted at 703-648-6819.

Finds
SRC#: 5980

VISTA conducts a database search to identify all sites within 1 mile of your property.
The agency release date for FINDS was February, 1999.

The Facility Index System (FINDS) is a compilation of any property or site which the EPA has investigated, reviewed or been made aware of in connection with its various regulatory programs. Each record indicates the EPA Program Office that may have files on the site or facility.

End of Report

Appendix F

Soil and Groundwater Analytical Data

PPL/Hobbs
Hobbs, New Mexico

Soil Analytical Data

Well	Date	Depth (ft)	PID Reading (ppm)	Benzene (mg/Kg)	Toluene (mg/Kg)	Ethylbenzene (mg/Kg)	Xylenes (mg/Kg)	TPH (mg/Kg)
MW-2	07/13/99	10.0 - 12.0	26	<0.025	<0.025	<0.025	<0.025	<10
MW-2	07/13/99	30.0 - 32.0	16	<0.025	<0.025	<0.025	<0.025	39.6
MW-3	07/15/99	20.0 - 22.0	48	<0.025	<0.025	<0.025	<0.025	<10
MW-3	07/15/99	30.0 - 32.0	140	<0.025	<0.025	<0.025	<0.025	<10
MW-4	07/14/99	20.0 - 22.0	0	<0.025	<0.025	<0.025	0.032	<10
MW-4	07/14/99	30.0 - 32.0	134	0.029	0.16	0.25	0.27	286
MW-5	07/15/99	20.0 - 22.0	314	<0.025	<0.025	<0.025	<0.025	<10
MW-5	07/15/99	30.0 - 32.0	>2,000	12	94	95	150	50,600
MW-6	07/14/99	24.0 - 26.0	16	<0.025	<0.025	<0.025	<0.025	<10
MW-6	07/14/99	30.0 - 32.0	331	0.074	0.62	0.98	1.3	1762
MW-7	07/13/99	14.0 - 16.0	16	<0.025	<0.025	<0.025	<0.025	<10
MW-7	07/13/99	30.0 - 32.0	672	0.14	1.8	3.2	4.7	756
MW-8	07/13/99	20.0 - 22.0	1	<0.025	<0.025	<0.025	<0.025	<10
MW-8	07/13/99	30.0 - 32.0	235	0.15	0.99	1.2	1.6	912
MW-9	07/14/99	20.0 - 22.0	3	<0.025	<0.025	<0.025	<0.025	<10
MW-9	07/14/99	30.0 - 32.0	15	<0.025	<0.025	<0.025	<0.025	<10
MW-10	07/15/99	20.0 - 22.0	10	<0.025	<0.025	<0.025	<0.025	<10
MW-10	07/15/99	30.0 - 32.0	40	<0.025	<0.025	<0.025	<0.025	<10

Groundwater Analytical Data
PPL/Hobbs
Hobbs, NM

Well	Date	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Xylenes (ug/L)	TPH (ug/L)
MW-2	07/16/99	3.6	2.7	1.3	0.5	<2,000
MW-3	07/16/99	<0.5	<0.5	<0.5	<0.5	<2,000
MW-4	07/16/99	720	1,100	260	280	3,000
MW-9	07/16/99	<0.5	<0.5	<0.5	<0.5	<2,000
MW-10	07/16/99	1.8	<0.5	<0.5	<0.5	<2,000

PPL/Hobbs
Hobbs, NM
Inorganic Data

(Results in mg/L unless otherwise noted)

Analyte	NM Standards for Groundwater with <10,000 mg/L TDS	MW-2	MW-3	MW-4	MW-9	MW-10
Date		07/16/99	07/16/99	07/16/99	07/16/99	07/16/99
Lithium (ug/L)		56	53	<50	<50	110
Silicon		65.5	65	59	75	59.3
Strontium		1,400	1,200	860	2,700	2,100
Uranium (ug/L)	**5,000 ug/L**	<20.0	<20.0	<20.0	<20.0	<20.0
Mercury	**0.002**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Arsenic	**0.1**	0.0082	0.0058	0.006	<0.005	0.0052
Barium	**1**	0.14	0.095	0.08	0.12	0.08
Boron	**0.75**	0.26	0.25	0.25	0.13	0.25
Cadmium	**0.01**	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium		140	98	95	150	96
Chromium	**0.05**	<0.005	<0.005	<0.005	<0.005	<0.005
Lead	**0.05**	<0.005	<0.005	<0.005	<0.005	<0.005
Magnesium		24	17	16	20	15
Potassium		3	3.1	3.3	3.9	2.9
Selenium	**0.05**	0.0069	0.0055	0.005	0.0057	<0.005
Silver	**0.05**	<0.005	<0.005	<0.005	<0.005	<0.005
Sodium		86	75	110	38	83
Alkalinity		350	340	580	2,800	430
Bromide		1	0.95	0.92	0.99	0.8
Chloride	**0.1**	28	170	190	140	100
Fluoride	**1.6**	1.1	1.4	1.4	0.66	1.3
Sulfate	**600**	150	76	120	85	59
Total Dissolved Solids	**1,000**	1,000	540	690	740	510
pH	**Between 6 and 9**	7.63	7.70	7.68	7.77	7.73
Conductivity		1,290	870	870	810	770

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

Pinnacle Lab ID number **907053**
August 05, 1999

HIGGINS & ASSOCIATES, L.L.C
9940 EAST COSTILLA AVE., STE.B
ENGLEWOOD, CO 80112

Project Name PPL/HOBBS
Project Number (none)

Attention: CHRIS HIGGINS

On 7/19/99 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous and non-aq** samples. The samples 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.

While the cooler was received above 6 degrees, the samples were at 13 degrees Celsius which is clearly below ambient. The samples are considered viable for analysis.

EPA methods 8021 and 8015 were performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

Lithium, Silicon, Strontium and Uranium were analyzed by ATEL, Marion, OH.

All other parameters were performed by ESL (OR) Inc., Portland, OR.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.

Kimberly D. McNeill
Project Manager

H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt

Enclosure

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

CLIENT	: HIGGINS & ASSOCIATES, L.L.C	PINNACLE ID	: 907053
PROJECT #	: (none)	DATE RECEIVED	: 7/19/99
PROJECT NAME	: PPL/HOBBS	REPORT DATE	: 8/5/99

PIN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	MW-2-10'-12'	NON-AQ	7/13/99
02	MW-2-30'-30'	NON-AQ	7/13/99
03	MW-7-14'-16'	NON-AQ	7/13/99
04	MW-7-30'-32'	NON-AQ	7/13/99
05	MW-8-20'-22'	NON-AQ	7/13/99
06	MW-8-20'-32'	NON-AQ	7/13/99
07	MW-9-20'-22'	NON-AQ	7/14/99
08	MW-9-30'-32'	NON-AQ	7/14/99
[illegible]	MW-6-24'-26'	NON-AQ	7/14/99
[illegible]	MW-6-30'-32'	NON-AQ	7/14/99
11	MW-4-20'-22'	NON-AQ	7/14/99
12	MW-4-30'-32'	NON-AQ	7/14/99
13	MW-3-20'-22'	NON-AQ	7/15/99
14	MW-3-30'-32'	NON-AQ	7/15/99
15	MW-10-20'-22'	NON-AQ	7/15/99
16	MW-10-30'-32'	NON-AQ	7/15/99
17	MW-5-20'-22'	NON-AQ	7/15/99
18	MW-5-30'-32'	NON-AQ	7/15/99
19	MW-2	AQUEOUS	7/16/99
20	MW-3	AQUEOUS	7/16/99
21	MW-4	AQUEOUS	7/16/99
22	MW-10	AQUEOUS	7/16/99
23	MW-9	AQUEOUS	7/16/99
24	TRIP BLANK	AQUEOUS	7/7/99

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	MW-2-10'-12'	NON-AQ	7/13/99	7/19/99	7/20/99	1
02	MW-2-30'-32'	NON-AQ	7/13/99	7/19/99	7/20/99	1
03	MW-7-14'-16'	NON-AQ	7/13/99	7/19/99	7/20/99	1

PARAMETER	DET. LIMIT	UNITS	MW-2-10'-12'	MW-2-30'-32'	MW-7-14'-16'
BENZENE	0.025	MG/KG	< 0.025	< 0.025	< 0.025
TOLUENE	0.025	MG/KG	< 0.025	< 0.025	< 0.025
ETHYLBENZENE	0.025	MG/KG	< 0.025	< 0.025	< 0.025
TOTAL XYLENES	0.025	MG/KG	< 0.025	< 0.025	< 0.025
SURROGATE:					
TRIFLUOROTOLUENE (%)			86	91	89
SURROGATE LIMITS	(69 - 117)				

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	MW-7-30'-32'	NON-AQ	7/13/99	7/19/99	7/21/99	1
05	MW-8-20'-22'	NON-AQ	7/13/99	7/19/99	7/20/99	1
06	MW-8-30'-32'	NON-AQ	7/13/99	7/19/99	7/21/99	1

PARAMETER	DET. LIMIT	UNITS	MW-7-30'-32'	MW-8-20'-22'	MW-8-30'-32'
BENZENE	0.025	**MG/KG**	**0.14**	< 0.025	**0.15**
TOLUENE	0.025	**MG/KG**	**1.8**	< 0.025	**0.99**
ETHYLBENZENE	0.025	**MG/KG**	**3.2**	< 0.025	**1.2**
TOTAL XYLENES	0.025	**MG/KG**	**4.7**	< 0.025	**1.6**
SURROGATE:					
TRIFLUOROTOLUENE (%)			108	92	79
SURROGATE LIMITS	(69 - 117)				

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
07	MW-9-20'-22'	NON-AQ	7/14/99	7/19/99	7/21/99	1
08	MW-9-30'-32'	NON-AQ	7/14/99	7/19/99	7/21/99	1
09	MW-6-24'-26'	NON-AQ	7/14/99	7/19/99	7/21/99	1

PARAMETER	DET. LIMIT	UNITS	MW-9-20'-22'	MW-9-30'-32'	MW-6-24'-26'
BENZENE	0.025	MG/KG	< 0.025	< 0.025	< 0.025
TOLUENE	0.025	MG/KG	< 0.025	< 0.025	< 0.025
ETHYLBENZENE	0.025	MG/KG	< 0.025	< 0.025	< 0.025
TOTAL XYLENES	0.025	MG/KG	< 0.025	< 0.025	< 0.025
SURROGATE:					
TRIFLUOROTOLUENE (%)			90	90	93
SURROGATE LIMITS	(69 - 117)				

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	MW-6-30'-32'	NON-AQ	7/14/99	7/19/99	7/21/99	1
11	MW-4-20'-22'	NON-AQ	7/14/99	7/19/99	7/21/99	1
12	MW-4-30'-32'	NON-AQ	7/14/99	7/19/99	7/21/99	1

PARAMETER	DET. LIMIT	UNITS	MW-6-30'-32'	MW-4-20'-22'	MW-4-30'-32'
BENZENE	0.025	**MG/KG**	**0.074**	< 0.025	**0.029**
TOLUENE	0.025	**MG/KG**	**0.62**	< 0.025	**0.16**
ETHYLBENZENE	0.025	**MG/KG**	**0.98**	< 0.025	**0.25**
TOTAL XYLENES	0.025	**MG/KG**	**1.3**	**0.032**	**0.27**
SURROGATE:					
TRIFLUOROTOLUENE (%)			76	88	90
SURROGATE LIMITS	(69 - 117)				

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
13	MW-3-20'-22'	NON-AQ	7/15/99	7/19/99	7/21/99	1
14	MW-3-30'-32'	NON-AQ	7/15/99	7/19/99	7/21/99	1
15	MW-10-20'-22'	NON-AQ	7/15/99	7/19/99	7/21/99	1

PARAMETER	DET. LIMIT	UNITS	MW-3-20'-22'	MW-3-30'-32'	MW-10-20'-22'
BENZENE	0.025	MG/KG	< 0.025	< 0.025	< 0.025
TOLUENE	0.025	MG/KG	< 0.025	< 0.025	< 0.025
ETHYLBENZENE	0.025	MG/KG	< 0.025	< 0.025	< 0.025
TOTAL XYLENES	0.025	MG/KG	< 0.025	< 0.025	< 0.025
SURROGATE:					
TRIFLUOROTOLUENE (%)			92	92	89
SURROGATE LIMITS	(69 - 117)				

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
16	MW-10-30'-32'	NON-AQ	7/15/99	7/19/99	7/21/99	1
17	MW-5-20'-22'	NON-AQ	7/15/99	7/19/99	7/21/99	1
18	MW-5-30'-32'	NON-AQ	7/15/99	7/19/99	7/21/99	10

PARAMETER	DET. LIMIT	UNITS	MW-10-30'-32'	MW-5-20'-22'	MW-5-30'-32'
BENZENE	0.025	**MG/KG**	< 0.025	< 0.025	**12**
TOLUENE	0.025	**MG/KG**	< 0.025	< 0.025	**94**
ETHYLBENZENE	0.025	**MG/KG**	< 0.025	< 0.025	**95**
TOTAL XYLENES	0.025	**MG/KG**	< 0.025	< 0.025	**150**
SURROGATE:					
TRIFLUOROTOLUENE (%)			83	86	73
SURROGATE LIMITS	(69 - 117)				

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8021 MODIFIED	PINNACLE I.D.	: 907053
BLANK I. D.	: 071999	DATE EXTRACTED	: 7/19/99
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE ANALYZED	: 7/20/99
PROJECT #	: (none)	SAMPLE MATRIX	: NON-AQ
PROJECT NAME	: PPL/HOBBS		

PARAMETER	UNITS	
BENZENE	MG/KG	<0.025
TOLUENE	MG/KG	<0.025
ETHYLBENZENE	MG/KG	<0.025
TOTAL XYLENES	MG/KG	<0.025
SURROGATE:		
TRIFLUOROTOLUENE (%)		104
SURROGATE LIMITS:	(69 - 117)	

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: EPA 8021 MODIFIED		
MSMSD #	: 907053-01	PINNACLE I.D.	: 907053
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXRACTED	: 7/19/99
PROJECT #	: (none)	DATE ANALYZED	: 7/21/99
PROJECT NAME	: PPL/HOBBS	SAMPLE MATRIX	: NON-AQ
		UNITS	: MG/KG

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.025	1.00	9.5	950	10.2	1020	7	(68 - 120)	20
TOLUENE	<0.025	1.00	11.3	1130	10.6	1060	6	(64 - 120)	20
ETHYLBENZENE	<0.025	1.00	11.4	1140	10.7	1070	6	(49 - 127)	20
TOTAL XYLENES	<0.025	3.00	28.7	957	29.1	970	1	(58 - 120)	20

CHEMIST NOTES:
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
19	MW-2	AQUEOUS	7/16/99	NA	7/21/99	1
20	MW-3	AQUEOUS	7/16/99	NA	7/21/99	1
21	MW-4	AQUEOUS	7/16/99	NA	7/22/99	10

PARAMETER	DET. LIMIT	UNITS	MW-2	MW-3	MW-4
BENZENE	0.5	**UG/L**	**3.6**	< 0.5	**720**
TOLUENE	0.5	**UG/L**	**2.7**	< 0.5	**1100**
ETHYLBENZENE	0.5	**UG/L**	**1.3**	< 0.5	**260**
TOTAL XYLENES	0.5	**UG/L**	**0.5**	< 0.5	**280**
SURROGATE:					
TRIFLUOROTOLUENE (%)			99	106	98
SURROGATE LIMITS	(69 - 117)				

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
22	MW-10	AQUEOUS	7/16/99	NA	7/22/99	1
23	MW-9	AQUEOUS	7/16/99	NA	7/22/99	1
24	TRIP BLANK	AQUEOUS	7/7/99	NA	7/22/99	1

PARAMETER	DET. LIMIT	UNITS	MW-10	MW-9	TRIP BLANK
BENZENE	0.5	**UG/L**	**1.8**	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TAL XYLENES	0.5	UG/L	< 0.5	< 0.5	< 0.5
SURROGATE:					
TRIFLUOROTOLUENE (%)			103	102	102
SURROGATE LIMITS	(69 - 117)				

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8021 MODIFIED	PINNACLE I.D.	: 907053
BLANK I. D.	: 072199	DATE EXTRACTED	: NA
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE ANALYZED	: 7/21/99
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: PPL/HOBBS		

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
ETHYLBENZENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5
SURROGATE:		
TRIFLUOROTOLUENE (%)		102
SURROGATE LIMITS:	(69 - 117)	

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8021 MODIFIED	PINNACLE I.D.	: 907053
BLANK I. D.	: 072299	DATE EXTRACTED	: NA
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE ANALYZED	: 7/22/99
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: PPL/HOBBS		

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
ETHYLBENZENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5
SURROGATE:		
TRIFLUOROTOLUENE (%)		106
SURROGATE LIMITS:	(69 - 117)	

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: EPA 8021 MODIFIED		
MSMSD #	: 907053-19	PINNACLE I.D.	: 907053
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXTRACTED	: NA
PROJECT #	: (none)	DATE ANALYZED	: 7/22/99
PROJECT NAME	: PPL/HOBBS	SAMPLE MATRIX	: AQUEOUS
		UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.5	10.0	10.4	104	9.6	96	8	(80 - 120)	20
TOLUENE	<0.5	10.0	11.0	110	11.3	113	3	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	10.9	109	10.4	104	5	(80 - 120)	20
TOTAL XYLENES	<0.5	30.0	29.6	99	31.7	106	7	(80 - 120)	20

CHEMIST NOTES:
N/A

$$\%\ \text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	MW-2-10'-12'	NON-AQ	7/13/99	7/20/99	7/21/99	1
02	MW-2-30'-30'	NON-AQ	7/13/99	7/20/99	7/21/99	1
03	MW-7-14'-16'	NON-AQ	7/13/99	7/20/99	7/21/99	1

PARAMETER	DET. LIMIT	UNITS	MW-2-10'-12'	MW-2-30'-30'	MW-7-14'-16'
FUEL HYDROCARBONS, C6-C10	10	MG/KG	< 10	< 10	< 10
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	< 5.0	**6.8**	< 5.0
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	< 5.0	**13**	< 5.0
CALCULATED SUM:				**19.8**	
SURROGATE:					
O-TERPHENYL (%)			103	106	101
SURROGATE LIMITS	(66 - 151)				

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	MW-7-30'-32'	NON-AQ	7/13/99	7/20/99	7/21/99	1
05	MW-8-20'-22'	NON-AQ	7/13/99	7/20/99	7/21/99	1
06	MW-8-30'-32'	NON-AQ	7/13/99	7/20/99	7/21/99	1

PARAMETER	DET. LIMIT	UNITS	MW-7-30'-32'	MW-8-20'-22'	MW-8-30'-32'
FUEL HYDROCARBONS, C6-C10	10	**MG/KG**	**17**	< 10	**36**
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	**270**	< 5.0	**300**
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	**91**	< 5.0	**120**
CALCULATED SUM:			**378**		**456**
SURROGATE:					
O-TERPHENYL (%)			116	95	101
SURROGATE LIMITS	(66 - 151)				

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
07	MW-9-20'-22'	NON-AQ	7/14/99	7/20/99	7/21/99	1
08	MW-9-30'-32'	NON-AQ	7/14/99	7/20/99	7/21/99	1
09	MW-6-24'-26'	NON-AQ	7/14/99	7/20/99	7/21/99	1

PARAMETER	DET. LIMIT	UNITS	MW-9-20'-22'	MW-9-30'-32'	MW-6-24'-26'
FUEL HYDROCARBONS, C6-C10	10	MG/KG	< 10	< 10	< 10
FUEL HYDROCARBONS, C10-C22	5.0	MG/KG	< 5.0	< 5.0	< 5.0
FUEL HYDROCARBONS, C22-C36	5.0	MG/KG	< 5.0	< 5.0	< 5.0
CALCULATED SUM:					
SURROGATE:					
O-TERPHENYL (%)			109	97	97
SURROGATE LIMITS	(66 - 151)				

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	MW-6-30'-32'	NON-AQ	7/14/99	7/20/99	7/21/99	1
11	MW-4-20'-22'	NON-AQ	7/14/99	7/20/99	7/21/99	1
12	MW-4-30'-32'	NON-AQ	7/14/99	7/20/99	7/21/99	1

PARAMETER	DET. LIMIT	UNITS	MW-6-30'-32'	MW-4-20'-22'	MW-4-30'-32'
FUEL HYDROCARBONS, C6-C10	10	**MG/KG**	**81**	< 10	< 10
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	**570**	< 5.0	**98**
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	**230**	< 5.0	**45**
CALCULATED SUM:			**881**		**143**
SURROGATE:					
O-TERPHENYL (%)			104	105	98
SURROGATE LIMITS	(66 - 151)				

CHEMIST NOTES:

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
13	MW-3-20'-22'	NON-AQ	7/15/99	7/20/99	7/21/99	1
14	MW-3-30'-32'	NON-AQ	7/15/99	7/20/99	7/21/99	1
15	MW-10-20'-22'	NON-AQ	7/15/99	7/20/99	7/21/99	1

PARAMETER	DET. LIMIT	UNITS	MW-3-20'-22'	MW-3-30'-32'	MW-10-20'-22'
FUEL HYDROCARBONS, C6-C10	10	MG/KG	< 10	< 10	< 10
FUEL HYDROCARBONS, C10-C22	5.0	MG/KG	< 5.0	< 5.0	< 5.0
FUEL HYDROCARBONS, C22-C36	5.0	MG/KG	< 5.0	< 5.0	< 5.0
CALCULATED SUM:					
SURROGATE:					
O-TERPHENYL (%)			105	96	101
SURROGATE LIMITS	(66 - 151)				

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
16	MW-10-30'-32'	NON-AQ	7/15/99	7/20/99	7/21/99	1
17	MW-5-20'-22'	NON-AQ	7/15/99	7/20/99	7/21/99	1
18	MW-5-30'-32'	NON-AQ	7/15/99	7/20/99	7/23/99	20

PARAMETER	DET. LIMIT	UNITS	MW-10-30'-32'	MW-5-20'-22'	MW-5-30'-32'
FUEL HYDROCARBONS, C6-C10	10	MG/KG	< 10	< 10	**7900**
FUEL HYDROCARBONS, C10-C22	5.0	MG/KG	< 5.0	< 5.0	**13000**
FUEL HYDROCARBONS, C22-C36	5.0	MG/KG	< 5.0	< 5.0	**4400**
CALCULATED SUM:					**25300**
SURROGATE:					
O-TERPHENYL (%)			116	96	D
SURROGATE LIMITS	(66 - 151)				

CHEMIST NOTES:
D=Surrogate diluted out

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GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8015 MODIFIED (DIRECT INJECT)		
BLANK I.D.	: 072099	PINNACLE I.D.	: 907053
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXTRACTED	: 7/20/99
PROJECT #	: (none)	DATE ANALYZED	: 7/20/99
PROJECT NAME	: PPL/HOBBS	SAMPLE MATRIX	: NON-AQ

PARAMETER	UNITS	
FUEL HYDROCARBONS	MG/KG	< 10
HYDROCARBON RANGE		< 5.0
HYDROCARBONS QUANTITATED USING		< 5.0
SURROGATE:		
TERPHENYL (%)		105
SURROGATE LIMITS (80 - 151)		

CHEMIST NOTES:
N/A

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Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: EPA 8015 MODIFIED (DIRECT INJECT)		
MSMSD #	: 072099	PINNACLE I.D.	: 907053
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXRACTED	: 7/20/99
PROJECT #	: (none)	DATE ANALYZED	: 7/20/99
PROJECT NAME	: PPL/HOBBS	SAMPLE MATRIX	: NON-AQ
		UNITS	:

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
FUEL HYDROCARBONS	<5.0	100	128	128	124	124	3	(56 - 148)	20

CHEMIST NOTES:
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
19	MW-2	AQUEOUS	7/16/99	7/20/99	7/20/99	1
20	MW-3	AQUEOUS	7/16/99	7/20/99	7/20/99	1
21	MW-4	AQUEOUS	7/16/99	7/20/99	7/20/99	1

PARAMETER	DET. LIMIT	UNITS	MW-2	MW-3	MW-4
FUEL HYDROCARBONS, C6-C10	2.0	**MG/L**	< 2.0	< 2.0	**3.0**
FUEL HYDROCARBONS, C10-C22	1.0	MG/L	< 1.0	< 1.0	< 1.0
FUEL HYDROCARBONS, C22-C36	1.0	MG/L	< 1.0	< 1.0	< 1.0
CALCULATED SUM:					**3.0**
SURROGATE:					
O-TERPHENYL (%)			90	95	94
SURROGATE LIMITS	(79 - 124)				

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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Albuquerque, New Mexico 87107
Phone (505) 344-3777
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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 907053
PROJECT # : (none)
PROJECT NAME : PPL/HOBBS

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
22	MW-10	AQUEOUS	7/16/99	7/20/99	7/20/99	1
23	MW-9	AQUEOUS	7/16/99	7/20/99	7/21/99	1

PARAMETER	DET. LIMIT	UNITS	MW-10	MW-9
FUEL HYDROCARBONS, C6-C10	2.0	MG/L	< 2.0	< 2.0
FUEL HYDROCARBONS, C10-C22	1.0	MG/L	< 1.0	< 1.0
FUEL HYDROCARBONS, C22-C36	1.0	MG/L	< 1.0	< 1.0
CALCULATED SUM:				
SURROGATE:				
O-TERPHENYL (%)			88	92
SURROGATE LIMITS	(79 - 124)			

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8015 MODIFIED (DIRECT INJECT)		
BLANK I.D.	: 072099	PINNACLE I.D.	: 907053
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXTRACTED	: 7/20/99
PROJECT #	: (none)	DATE ANALYZED	: 7/20/99
PROJECT NAME	: PPL/HOBBS	SAMPLE MATRIX	: AQUEOUS

PARAMETER	UNITS	
FUEL HYDROCARBONS, C6-C10	MG/L	< 2.0
FUEL HYDROCARBONS, C10-C22	MG/L	< 1.0
FUEL HYDROCARBONS, C22-C36	MG/L	< 1.0

SURROGATE:
TERPHENYL (%) 97
SURROGATE LIMITS (78 - 128)

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: EPA 8015 MODIFIED (DIRECT INJECT)		
MSMSD #	: 072099	PINNACLE I.D.	: 907053
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXTRACTED	: 7/20/99
PROJECT #	: (none)	DATE ANALYZED	: 7/20/99
PROJECT NAME	: PPL/HOBBS	SAMPLE MATRIX	: AQUEOUS
		UNITS	: MG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
FUEL HYDROCARBONS	<1.0	33.3	38.0	114	38.6	116	2	(64 - 127)	20

CHEMIST NOTES:
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

ATEL

Aqua Tech Environmental Laboratories, Inc.

- CERTIFICATE OF ANALYSIS -

Client #: T0499
Pinnacle Laboratories Inc
2709 - D Panamerican Pwy NE
Albuquerque, NM 87107-

Report Date: *03-Aug-99*

Attn:

Phone: (505) 344-3777 **Ext:**
FAX: (505) 344-4413

Our Lab #: MAR99-18140 **Your Sample ID:** 907053-19
Date Logged-In: 7/23/99 **Sample Source:** NPDES/WWTP's
Matrix: WasteWater **Client Project #:** **PO#:** 907053/072006
Project #: 072099-06 **Date Submitted to Lab:** 7/21/99

- COLLECTION INFORMATION -

Date/Time/By: 7/16/99 12:00 PM

Test Group	EPA Method	Test	Result	Units	Analysis Date	Analyst	WS#
LI-MS	6020	Lithium, Li	56	UG/L	7/29/99	KRG	15966
SI-MS	200.8	Silicon, Si	65.5	MG/L	7/29/99	KRG	15966
SR-MS	200.8/6020	Strontium, Sr	1400	UG/L	7/29/99	KRG	15966
U-MS	6020	Uranium, U	< 20.0	UG/L	7/29/99	KRG	15966

End of Report

Report Approved By: Deborah K. Johnson

Deborah K. Johnson

1776 MARION-WALDO RD. • P.O. BOX 436 • MARION, OH 43301-0436
PHONE 740-389-5991 • 1-800-873-2835 • FAX 740-389-1481

ATEL

Aqua Tech Environmental Laboratories, Inc.

- CERTIFICATE OF ANALYSIS -

Client #: T0499
Pinnacle Laboratories Inc
2709 - D Panamerican Pwy NE
Albuquerque, NM 87107-

Report Date: *02-Aug-99*

Attn:

Phone: (505) 344-3777 **Ext:**
FAX: (505) 344-4413

Our Lab #: MAR99-18141 **Your Sample ID:** 907053-20
Date Logged-In: 7/23/99 **Sample Source:** NPDES/WWTP's
Matrix: WasteWater **Client Project #:** **PO#:** 907053/072006
Project #: 072099-07 **Date Submitted to Lab:** 7/21/99

- COLLECTION INFORMATION -

Date/Time/By: 7/16/99 12:30 PM

Test Group	EPA Method	Test	Result	Units	Analysis Date	Analyst	WS#
LI-MS	6020	Lithium, Li	53	UG/L	7/29/99	KRG	15966
SI-MS	200.8	Silicon, Si	65	MG/L	7/29/99	KRG	15966
SR-MS	200.8/6020	Strontium, Sr	1200	UG/L	7/29/99	KRG	15966
U-MS	6020	Uranium, U	< 20.0	UG/L	7/29/99	KRG	15966

End of Report

Report Approved By: Deborah K. Johnson

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Aqua Tech Environmental Laboratories, Inc.

- CERTIFICATE OF ANALYSIS -

Client #: T0499
Pinnacle Laboratories Inc
2709 - D Panamerican Pwy NE
Albuquerque, NM 87107-

Report Date: *02-Aug-99*

Attn:

Phone: (505) 344-3777 **Ext:**
FAX: (505) 344-4413

Our Lab #: MAR99-18142 **Your Sample ID:** 907053-21
Date Logged-In: 7/23/99 **Sample Source:** NPDES/WWTP's
Matrix: WasteWater **Client Project #:** **PO#:** 907053/072006
Project #: 072099-08 **Date Submitted to Lab:** 7/21/99

- COLLECTION INFORMATION -

Date/Time/By: 7/16/99 1:00 PM

Test Group	EPA Method	Test	Result	Units	Analysis Date	Analyst	WS#
LI-MS	6020	Lithium, Li	< 50	UG/L	7/29/99	KRG	15966
SI-MS	200.8	Silicon, Si	59	MG/L	7/29/99	KRG	15966
SR-MS	200.8/6020	Strontium, Sr	860	UG/L	7/29/99	KRG	15966
U-MS	6020	Uranium, U	< 20.0	UG/L	7/29/99	KRG	15966

End of Report

Report Approved By: Deborah K. Johnson

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Aqua Tech Environmental Laboratories, Inc.

- CERTIFICATE OF ANALYSIS -

Client #: T0499
Pinnacle Laboratories Inc
2709 - D Panamerican Pwy NE
Albuquerque, NM 87107-

Report Date: *03-Aug-99*

Attn:

Phone: (505) 344-3777 **Ext:**
FAX: (505) 344-4413

Our Lab #: MAR99-18143 **Your Sample ID:** 907053-22
Date Logged-In: 7/23/99 **Sample Source:** NPDES/WWTP's
Matrix: WasteWater **Client Project #:** **PO#:** 907053/072006
Project #: 072099-09 **Date Submitted to Lab:** 7/21/99

- COLLECTION INFORMATION -

Date/Time/By: 7/16/99 1:15 PM

Test Group	EPA Method	Test	Result	Units	Analysis Date	Analyst	WS#
LI-MS	6020	Lithium, Li	110	UG/L	7/29/99	KRG	15966
SI-MS	200.8	Silicon, Si	59.3	MG/L	7/29/99	KRG	15966
SR-MS	200.8/6020	Strontium, Sr	2100	UG/L	7/29/99	KRG	15966
U-MS	6020	Uranium, U	< 20.0	UG/L	7/29/99	KRG	15966

End of Report

Report Approved By: Deborah K. Johnson

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- QUALITY CONTROL REPORT -

Printed: 8/3/99

WS#	Lab#	Test ID	QC Code	Result	Units	True Added	-- QC Calculations -- QC1			-- QC Calculations -- QC2		Lower Limit	Upper Limit
15966	LCS	LI	C	19.206	UG/L	20	96	%R:				50	150
15966	LCS	SI	C	.177	MG/L	0.192	92	%R:				50	150
15966	LCS	SR	C	29.613	UG/L	30	99	%R:				50	150
15966	LCS	U	C	93.569	UG/L	100	94	%R:				50	150
15966	LCSA 7.22.3	LI	C	10328.854	UG/L	10000	103	%R:				50	150
15966	LCSA 7.22.3	SI	C	.129	MG/L	0.1	129	%R:				50	150
15966	LCSA 7.22.3	SR	C	10679.795	UG/L	10000	107	%R:				50	150
15966	LCSA 7.22.3	U	C	959.612	UG/L	1000	96	%R:				50	150
15966	LCSA 7.27.3	LI	C	10231.706	UG/L	10000	102	%R:				50	150
15966	LCSA 7.27.3	SI	C	9.617	MG/L	10	96	%R:				50	150
15966	LCSA 7.27.3	SR	C	10627.111	UG/L	10000	106	%R:				50	150
15966	LCSA 7.27.3	U	C	988.357	UG/L	1000	99	%R:				50	150
15966	LCSS 7.26.4B	U	C	329.180714	MG/KG	357.1	92	%R:				50	150
15906	MAR99-17709D	TS-%	D	82.736	%		0	%D					20
15966	MAR99-18140M	LI	M	538.823	UG/L	500	97	%R:		2	%RPD	75	125
15966	MAR99-18140M	SR	M	2179.486	UG/L	1000	79	%R:		4	%RPD	75	125
15966	MAR99-18140M	U	M	530.346	UG/L	500	104	%R:		1	%RPD	75	125
15966	MAR99-18140S	LI	S	549.744	UG/L	500	99	%R:				75	125
15966	MAR99-18140S	SR	S	2262.834	UG/L	1000	87	%R:				75	125
15966	MAR99-18140S	U	S	526.948	UG/L	500	104	%R:				75	125
15966	MAR99-18141D	LI	D	51.065	UG/L		3	%D	(<5 x MDL)				20
15966	MAR99-18141D	SI	D	62.67	MG/L		3	%D					20
15966	MAR99-18141D	SR	D	1166.979	UG/L		2	%D					20
15966	MAR99-18141D	U	D	9.244	UG/L		4	%D	(<5 x MDL)				20
15906	MAR99-18224D	TS-%	D	62.583	%		7	%D					20
15906	MAR99-18244D	TS-%	D	81.921	%		0	%D					20
15906	MAR99-18256D	TS-%	D	83.442	%		1	%D					20
15966	MAR99-18538M	U	M	28.2911052	MG/KG	32.7	86	%R:		4	%RPD	75	125
15966	MAR99-18538S	U	S	29.3900065	MG/KG	32.9	89	%R:				75	125
15966	MAR99-18539D	U	D	.240295857	MG/KG		32	%D *	(<5 x MDL)				20
15966	MAR99-18544D	U	D	1.843	UG/L		86	%D *	(<5 x MDL)				20
15906	PB 7.26.99	TS-%	C	99.984	%								
15966	PBS 7.26.4BB	U	C	.11	UG/L								
15966	PBW 7.22.3	LI	C	0	UG/L								
15966	PBW 7.22.3	SI	C	.042	MG/L								
15966	PBW 7.22.3	SR	C	.031	UG/L								
15966	PBW 7.22.3	U	C	.007	UG/L								

QC Code Legend

B	Blanks	K	Calibration Checks	S	Spikes
C	Control Samples	M	Matrix Spike Duplicates		
D	Duplicates	R	Surrogates		

- QUALITY CONTROL REPORT -

Printed: 8/3/99

WS#	Lab#	Test ID	QC Code	Result	Units	True Added	-- QC Calculations -- QC1	-- QC Calculations -- QC2	Lower Limit	Upper Limit
15966	PBW 7.27.3	LI	C	0	UG/L					
15966	PBW 7.27.3	SI	C	.034	MG/L					
15966	PBW 7.27.3	SR	C	2.186	UG/L					
15966	PBW 7.27.3	U	C	.041	UG/L					

QC Code Legend

B Blanks	K Calibration Checks	S Spikes
C Control Samples	M Matrix Spike Duplicates	
D Duplicates	R Surrogates	

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 7/19 Page: 1 of 1

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

TO499

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals-TAL	Si, Sr, Li	TOX	TOC	Gen Chemistry		Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM by ICP-MS	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
907053-19	7/16	1200	AQ	0720[illegible]-06					X															X				
-20		1230		0720[illegible]-07					X															X				
-21		1300		0720[illegible]-08					X															X				
-22		1315		0720[illegible]-09					X															X				
-23		1345		~~0720[illegible]-10~~					X		no sample rec'd		VM											X				

PROJECT INFORMATION	SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
PROJECT #: 907053	Total Number of Containers	4	PENSACOLA - STL-FL		Signature: Time: Francine Tonno 1700	Signature: Time:
PROJ. NAME: HIGGINS	Chain of Custody Seals	N	PORTLAND - ESL-OR		Printed Name: Date: Francine Tonno 7/19/99	Printed Name: Date:
QC LEVEL: (STD) IV	Received Intact?	Y	STL - CT		Pinnacle Laboratories, Inc.	Company
QC REQUIRED: (STANDARD) MS MSD BLANK	Received Good Cond./Cold	Y	STL- NEW JERSEY		RECEIVED BY: 1.	RECEIVED BY: 2
TAT: (STANDARD) RUSH!!	LAB NUMBER:		N. CREEK		Signature: Time: 1119	Signature: Time
DUE DATE: 8/2	COMMENTS		BARRINGER		Printed Name: Date: V Hunter 7/20	Printed Name: Date:
RUSH SURCHARGE: -			SEQUOIA		Company ATEL	Company
CLIENT DISCOUNT:			ATEL	X		
SPECIAL CERTIFICATION REQUIRED: (NO)						

ATEL

Aqua Tech Environmental Laboratories, Inc.

- CERTIFICATE OF ANALYSIS -

Client #: T0499
Pinnacle Laboratories Inc
2709 - D Panamerican Pwy NE
Albuquerque, NM 87107-

Report Date: *02-Aug-99*

Attn:

Phone: (505) 344-3777 **Ext:**
FAX: (505) 344-4413

Our Lab #: MAR99-18545 **Your Sample ID:** 907053-23
Date Logged-In: 7/26/99 **Sample Source:** NPDES/WWTP's
Matrix: Water **Client Project #:** **PO#:** 907053/072006
Project #: 072299-24 **Date Submitted to Lab:** 7/23/99

- COLLECTION INFORMATION -

Date/Time/By: 7/16/99 1:45 PM

Test Group	EPA Method	Test	Result	Units	Analysis Date	Analyst	WS#
LI-MS	6020	Lithium, Li	< 50	UG/L	7/29/99	KRG	15966
SI-MS	200.8	Silicon, Si	75.0	MG/L	7/29/99	KRG	15966
SR-MS	200.8/6020	Strontium, Sr	2700	UG/L	7/29/99	KRG	15966
U-MS	6020	Uranium, U	< 20.0	UG/L	7/29/99	KRG	15966

End of Report

Report Approved By: Deborah K. Johnson

1776 MARION-WALDO RD. • P.O. BOX 436 • MARION, OH 43301-0436
PHONE 740-389-5991 • 1-800-873-2835 • FAX 740-389-1481

- QUALITY CONTROL REPORT -

Printed: 8/3/99

WS#	Lab#	Test ID	QC Code	Result	Units	True Added	-- QC Calculations -- QC1			-- QC Calculations -- QC2		Lower Limit	Upper Limit
15966	LCS	LI	C	19.206	UG/L	20	96	%R:				50	150
15966	LCS	SI	C	.177	MG/L	0.192	92	%R:				50	150
15966	LCS	SR	C	29.613	UG/L	30	99	%R:				50	150
15966	LCS	U	C	93.569	UG/L	100	94	%R:				50	150
15966	LCSA 7.22.3	LI	C	10328.854	UG/L	10000	103	%R:				50	150
15966	LCSA 7.22.3	SI	C	.129	MG/L	0.1	129	%R:				50	150
15966	LCSA 7.22.3	SR	C	10679.795	UG/L	10000	107	%R:				50	150
15966	LCSA 7.22.3	U	C	959.612	UG/L	1000	96	%R:				50	150
15966	LCSA 7.27.3	LI	C	10231.706	UG/L	10000	102	%R:				50	150
15966	LCSA 7.27.3	SI	C	9.617	MG/L	10	96	%R:				50	150
15966	LCSA 7.27.3	SR	C	10627.111	UG/L	10000	106	%R:				50	150
15966	LCSA 7.27.3	U	C	988.357	UG/L	1000	99	%R:				50	150
15966	LCSS 7.26.4B	U	C	329.180714	MG/KG	357.1	92	%R:				50	150
15906	MAR99-17709D	TS-%	D	82.736	%		0	%D					20
15966	MAR99-18140M	LI	M	538.823	UG/L	500	97	%R:		2	%RPD	75	125
15966	MAR99-18140M	SR	M	2179.486	UG/L	1000	79	%R:		4	%RPD	75	125
15966	MAR99-18140M	U	M	530.346	UG/L	500	104	%R:		1	%RPD	75	125
15966	MAR99-18140S	LI	S	549.744	UG/L	500	99	%R:				75	125
15966	MAR99-18140S	SR	S	2262.834	UG/L	1000	87	%R:				75	125
15966	MAR99-18140S	U	S	526.948	UG/L	500	104	%R:				75	125
15966	MAR99-18141D	LI	D	51.065	UG/L		3	%D	(<5 x MDL)				20
15966	MAR99-18141D	SI	D	62.67	MG/L		3	%D					20
15966	MAR99-18141D	SR	D	1166.979	UG/L		2	%D					20
15966	MAR99-18141D	U	D	9.244	UG/L		4	%D	(<5 x MDL)				20
15906	MAR99-18224D	TS-%	D	62.583	%		7	%D					20
15906	MAR99-18244D	TS-%	D	81.921	%		0	%D					20
15906	MAR99-18256D	TS-%	D	83.442	%		1	%D					20
15966	MAR99-18538M	U	M	28.2911052	MG/KG	32.7	86	%R:		4	%RPD	75	125
15966	MAR99-18538S	U	S	29.3900065	MG/KG	32.9	89	%R:				75	125
15966	MAR99-18539D	U	D	.240295857	MG/KG		32	%D *	(<5 x MDL)				20
15966	MAR99-18544D	U	D	1.843	UG/L		86	%D *	(<5 x MDL)				20
15906	PB 7.26.99	TS-%	C	99.984	%								
15966	PBS 7.26.4BB	U	C	.11	UG/L								
15966	PBW 7.22.3	LI	C	0	UG/L								
15966	PBW 7.22.3	SI	C	.042	MG/L								
15966	PBW 7.22.3	SR	C	.031	UG/L								
15966	PBW 7.22.3	U	C	.007	UG/L								

QC Code Legend

B	Blanks	K	Calibration Checks	S	Spikes
C	Control Samples	M	Matrix Spike Duplicates		
D	Duplicates	R	Surrogates		

- QUALITY CONTROL REPORT -

Printed: 8/3/99

WS#	Lab#	Test ID	QC Code	Result	Units	True Added	-- QC Calculations -- QC1	-- QC Calculations -- QC2	Lower Limit	Upper Limit
15966	PBW 7.27.3	LI	C	0	UG/L					
15966	PBW 7.27.3	SI	C	.034	MG/L					
15966	PBW 7.27.3	SR	C	2.186	UG/L					
15966	PBW 7.27.3	U	C	.041	UG/L					

QC Code Legend					
B	Blanks	K	Calibration Checks	S	Spikes
C	Control Samples	M	Matrix Spike Duplicates		
D	Duplicates	R	Surrogates		

Pinnacle Laboratories, Inc. — Interlab Chain of Custody

Date: 1/19 Page: 1 of 1

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

TO499

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
907053-19	7/16	1200	AQ	07206-99-06
-20		1230		07206-99-07
-21		1300		07206-99-08
-22		1315		07206-99-09
-23	↓	1345	↓	~~07206-99-10~~ VBA
				07206-99-24

SAMPLE ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals-TAL	Si, Sr, Li	TOX	TOC	Gen Chemistry		Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM by ICP-MS	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
907053-19					X															X				
-20					X															X				
-21					X															X				
-22					X															X				
-23					X			no sample rec'd	VBA											X				
								rec'd 7/22 VBA from ESL																

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:	
PROJECT #:	907053/072006	Total Number of Containers	4	PENSACOLA - STL-FL	
PROJ. NAME:	HIGGINS	Chain of Custody Seals	N	PORTLAND - ESL-OR	
QC LEVEL:	(STD) IV	Received Intact?	Y	STL - CT	
QC REQUIRED:	(MS) MSD BLANK	Received Good Cond./Cold	Y	STL- NEW JERSEY	
TAT:	(STANDARD) RUSH!!	LAB NUMBER:		N. CREEK	
				BARRINGER	
DUE DATE:	8/2	COMMENTS		SEQUOIA	
RUSH SURCHARGE:	—			ATEL	X
CLIENT DISCOUNT:					
SPECIAL CERTIFICATION REQUIRED?	YES (NO)				

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
Signature: Francine Tonno Time: 1700	Signature: Time:
Printed Name: Francine Tonno Date: 7/19/99	Printed Name: Date:
Company: Pinnacle Laboratories, Inc.	Company
RECEIVED BY: 1.	**RECEIVED BY: 2**
Signature: Time: 1119	Signature: Time: 1144
Printed Name: V Hunter Date: 7/20	Printed Name: Date: 7/22
Company: ATEL	Company

Environmental Services Laboratory, Inc. E S L

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

August 04, 1999

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107
TEL: 505-344-3777
FAX (505) 344-4413

RE: 907053/HIGGINS/PPL/Hobbs Order No.: 9907110

Dear Kim McNeill,

Environmental Services Laboratory received 5 samples on 7/20/99 for the analyses presented in the following report.

The Samples were analyzed for the following tests:

Alkalinity (Alkalinity)
Bromide (Bromide)
CHLORIDE (Chloride)
Fluoride (fluoride)
ICP Metals (ICPMET)
MERCURY (Mercury)
PAH BY SIM, Aqueous (SW8270B)
Sulfate (Sulfate)
TOTAL DISSOLVED SOLIDS (E160.1)

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative. Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety, without the written approval from the Laboratory.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Kimberly Hill
Project Manager

Technical Review

ANALYTICAL SERVICES FOR THE ENVIRONMENT

Environmental Services Laboratory

Date: 04-Aug-99

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	907053-19
Lab Order:	9907110	**Tag Number:**	
Project:	907053/HIGGINS/PPL/Hobbs	**Collection Date:**	7/16/99
Lab ID:	9907110-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**EPA 310.0**				Analyst: sld
Alkalinity, Total (As CaCO3)	350	5		mg/L CaCO3	1	7/22/99
BROMIDE		**4500 B**				Analyst: sld
Bromide	1	0.2		mg/L	2	7/28/99
CHLORIDE		**EPA 325.3**				Analyst: sld
Chloride	28	5		mg/L	10	7/26/99
FLUORIDE		**EPA 340.2**				Analyst: sld
Fluoride	1.1	0.2		mg/L	1	7/27/99
SULFATE		**EPA 375.4**				Analyst: sld
Sulfate	150	25		mg/L	12.5	7/21/99
TOTAL DISSOLVED SOLIDS		**EPA 160.1**				Analyst: sld
Total Dissolved Solids (Residue, Filterable)	1000	40		mg/L	4	8/3/99
MERCURY		**SW 7470 / EPA 245.**				Analyst: btn
Mercury	ND	0.0002		mg/L	1	7/29/99
ICP METALS		**SW 6010 / EPA 200.**				Analyst: btn
Arsenic	0.0082	0.005		mg/L	1	7/28/99
Barium	0.14	0.005		mg/L	1	7/28/99
Boron	0.28	0.01		mg/L	1	7/28/99
Cadmium	ND	0.002		mg/L	1	7/28/99
Calcium	140	0.05		mg/L	1	7/28/99
Chromium	ND	0.005		mg/L	1	7/28/99
Lead	ND	0.005		mg/L	1	7/28/99
Magnesium	24	0.05		mg/L	1	7/28/99
Potassium	3	0.2		mg/L	1	7/28/99
Selenium	0.0069	0.005		mg/L	1	7/28/99
Silver	ND	0.005		mg/L	1	7/28/99
Sodium	86	2		mg/L	1	7/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	907053-19
Lab Order:	9907110	**Tag Number:**	
Project:	907053/HIGGINS/PPL/Hobbs	**Collection Date:**	7/16/99
Lab ID:	9907110-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PAH BY SIM, AQUEOUS		**SW 8270B**				Analyst: **ams**
1-Methylnaphthalene	ND	0.4		µg/L	1	7/27/99
2-Methylnaphthalene	ND	0.4		µg/L	1	7/27/99
Acenaphthene	ND	0.4		µg/L	1	7/27/99
Acenaphthylene	ND	0.4		µg/L	1	7/27/99
Anthracene	ND	0.4		µg/L	1	7/27/99
Benz(a)anthracene	ND	0.4		µg/L	1	7/27/99
Benzo(a)pyrene	ND	0.4		µg/L	1	7/27/99
Benzo(b)fluoranthene	ND	0.4		µg/L	1	7/27/99
Benzo(g,h,i)perylene	ND	0.4		µg/L	1	7/27/99
Benzo(k)fluoranthene	ND	0.4		µg/L	1	7/27/99
Chrysene	ND	0.4		µg/L	1	7/27/99
Dibenz(a,h)anthracene	ND	0.4		µg/L	1	7/27/99
Fluoranthene	ND	0.4		µg/L	1	7/27/99
Fluorene	ND	0.4		µg/L	1	7/27/99
Indeno(1,2,3-cd)pyrene	ND	0.4		µg/L	1	7/27/99
Naphthalene	ND	0.4		µg/L	1	7/27/99
Phenanthrene	ND	0.4		µg/L	1	7/27/99
Pyrene	ND	0.4		µg/L	1	7/27/99
Surr: 2-Fluorobiphenyl	46.0	43-116		%REC	1	7/27/99
Surr: 4-Terphenyl-d14	84.0	33-141		%REC	1	7/27/99
Surr: Nitrobenzene-d5	36.0	35-114		%REC	1	7/27/99

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	907053-20
Lab Order:	9907110	**Tag Number:**	
Project:	907053/HIGGINS/PPL/Hobbs	**Collection Date:**	7/16/99
Lab ID:	9907110-02A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**EPA 310.0**				Analyst: **sld**
Alkalinity, Total (As CaCO3)	340	5		mg/L CaCO3	1	7/22/99
BROMIDE		**4500 B**				Analyst: **sld**
Bromide	0.95	0.1		mg/L	1	7/28/99
CHLORIDE		**EPA 325.3**				Analyst: **sld**
Chloride	170	5		mg/L	10	7/26/99
FLUORIDE		**EPA 340.2**				Analyst: **sld**
Fluoride	1.4	0.2		mg/L	1	7/27/99
SULFATE		**EPA 375.4**				Analyst: **sld**
Sulfate	76	25		mg/L	5	7/21/99
TOTAL DISSOLVED SOLIDS		**EPA 160.1**				Analyst: **sld**
Total Dissolved Solids (Residue, Filterable)	540	40		mg/L	4	8/3/99
MERCURY		**SW 7470 / EPA 245.**				Analyst: **btn**
Mercury	ND	0.0002		mg/L	1	7/29/99
ICP METALS		**SW 6010 / EPA 200.**				Analyst: **btn**
Arsenic	0.0058	0.005		mg/L	1	7/28/99
Barium	0.095	0.005		mg/L	1	7/28/99
Boron	0.25	0.01		mg/L	1	7/28/99
Cadmium	ND	0.002		mg/L	1	7/28/99
Calcium	98	0.05		mg/L	1	7/28/99
Chromium	ND	0.005		mg/L	1	7/28/99
Lead	ND	0.005		mg/L	1	7/28/99
Magnesium	17	0.05		mg/L	1	7/28/99
Potassium	3.1	0.2		mg/L	1	7/28/99
Selenium	0.0055	0.005		mg/L	1	7/28/99
Silver	ND	0.005		mg/L	1	7/28/99
Sodium	75	2		mg/L	1	7/28/99

Qualifiers:

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J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	907053-20
Lab Order:	9907110	**Tag Number:**	
Project:	907053/HIGGINS/PPL/Hobbs	**Collection Date:**	7/16/99
Lab ID:	9907110-02A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PAH BY SIM, AQUEOUS		**SW 8270B**				Analyst: **ams**
1-Methylnaphthalene	ND	0.4		µg/L	1	7/27/99
2-Methylnaphthalene	ND	0.4		µg/L	1	7/27/99
Acenaphthene	ND	0.4		µg/L	1	7/27/99
Acenaphthylene	ND	0.4		µg/L	1	7/27/99
Anthracene	ND	0.4		µg/L	1	7/27/99
Benz(a)anthracene	ND	0.4		µg/L	1	7/27/99
Benzo(a)pyrene	ND	0.4		µg/L	1	7/27/99
Benzo(b)fluoranthene	ND	0.4		µg/L	1	7/27/99
Benzo(g,h,i)perylene	ND	0.4		µg/L	1	7/27/99
Benzo(k)fluoranthene	ND	0.4		µg/L	1	7/27/99
Chrysene	ND	0.4		µg/L	1	7/27/99
Dibenz(a,h)anthracene	ND	0.4		µg/L	1	7/27/99
Fluoranthene	ND	0.4		µg/L	1	7/27/99
Fluorene	ND	0.4		µg/L	1	7/27/99
Indeno(1,2,3-cd)pyrene	ND	0.4		µg/L	1	7/27/99
Naphthalene	ND	0.4		µg/L	1	7/27/99
Phenanthrene	ND	0.4		µg/L	1	7/27/99
Pyrene	ND	0.4		µg/L	1	7/27/99
Surr: 2-Fluorobiphenyl	52.0	43-116		%REC	1	7/27/99
Surr: 4-Terphenyl-d14	82.0	33-141		%REC	1	7/27/99
Surr: Nitrobenzene-d5	39.0	35-114		%REC	1	7/27/99

Qualifiers:

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J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	907053-21
Lab Order:	9907110	**Tag Number:**	
Project:	907053/HIGGINS/PPL/Hobbs	**Collection Date:**	7/16/99
Lab ID:	9907110-03A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**EPA 310.0**				Analyst: sld
Alkalinity, Total (As CaCO3)	580	5		mg/L CaCO3	1	7/22/99
BROMIDE		**4500 B**				Analyst: sld
Bromide	0.92	0.2		mg/L	2	7/28/99
CHLORIDE		**EPA 325.3**				Analyst: sld
Chloride	190	5		mg/L	10	7/26/99
FLUORIDE		**EPA 340.2**				Analyst: sld
Fluoride	1.4	0.2		mg/L	1	7/27/99
SULFATE		**EPA 375.4**				Analyst: sld
Sulfate	120	25		mg/L	5	7/21/99
TOTAL DISSOLVED SOLIDS		**EPA 160.1**				Analyst: sld
Total Dissolved Solids (Residue, Filterable)	690	40		mg/L	4	8/3/99
MERCURY		**SW 7470 / EPA 245.**				Analyst: btn
Mercury	ND	0.0002		mg/L	1	7/29/99
ICP METALS		**SW 6010 / EPA 200.**				Analyst: btn
Arsenic	0.006	0.005		mg/L	1	7/28/99
Barium	0.08	0.005		mg/L	1	7/28/99
Boron	0.25	0.01		mg/L	1	7/28/99
Cadmium	ND	0.002		mg/L	1	7/28/99
Calcium	95	0.05		mg/L	1	7/28/99
Chromium	ND	0.005		mg/L	1	7/28/99
Lead	ND	0.005		mg/L	1	7/28/99
Magnesium	16	0.05		mg/L	1	7/28/99
Potassium	3.3	0.2		mg/L	1	7/28/99
Selenium	0.005	0.005		mg/L	1	7/28/99
Silver	ND	0.005		mg/L	1	7/28/99
Sodium	110	2		mg/L	1	7/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	907053-21
Lab Order:	9907110	**Tag Number:**	
Project:	907053/HIGGINS/PPL/Hobbs	**Collection Date:**	7/16/99
Lab ID:	9907110-03A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PAH BY SIM, AQUEOUS		**SW 8270B**				Analyst: **ams**
1-Methylnaphthalene	10.8	0.4		µg/L	1	7/27/99
2-Methylnaphthalene	10.3	0.4		µg/L	1	7/27/99
Acenaphthene	ND	0.4		µg/L	1	7/27/99
Acenaphthylene	ND	0.4		µg/L	1	7/27/99
Anthracene	ND	0.4		µg/L	1	7/27/99
Benz(a)anthracene	ND	0.4		µg/L	1	7/27/99
Benzo(a)pyrene	ND	0.4		µg/L	1	7/27/99
Benzo(b)fluoranthene	ND	0.4		µg/L	1	7/27/99
Benzo(g,h,i)perylene	ND	0.4		µg/L	1	7/27/99
Benzo(k)fluoranthene	ND	0.4		µg/L	1	7/27/99
Chrysene	ND	0.4		µg/L	1	7/27/99
Dibenz(a,h)anthracene	ND	0.4		µg/L	1	7/27/99
Fluoranthene	ND	0.4		µg/L	1	7/27/99
Fluorene	0.76	0.4		µg/L	1	7/27/99
Indeno(1,2,3-cd)pyrene	ND	0.4		µg/L	1	7/27/99
Naphthalene	7.76	0.4		µg/L	1	7/27/99
Phenanthrene	1.08	0.4		µg/L	1	7/27/99
Pyrene	ND	0.4		µg/L	1	7/27/99
Surr: 2-Fluorobiphenyl	63.0	43-116		%REC	1	7/27/99
Surr: 4-Terphenyl-d14	92.0	33-141		%REC	1	7/27/99
Surr: Nitrobenzene-d5	48.0	35-114		%REC	1	7/27/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	907053-22
Lab Order:	9907110	**Tag Number:**	
Project:	907053/HIGGINS/PPL/Hobbs	**Collection Date:**	7/16/99
Lab ID:	9907110-04A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**EPA 310.0**				Analyst: **sld**
Alkalinity, Total (As CaCO3)	430	5		mg/L CaCO3	1	7/22/99
BROMIDE		**4500 B**				Analyst: **sld**
Bromide	0.8	0.1		mg/L	1	7/28/99
CHLORIDE		**EPA 325.3**				Analyst: **sld**
Chloride	100	50		mg/L	100	7/26/99
FLUORIDE		**EPA 340.2**				Analyst: **sld**
Fluoride	1.3	0.2		mg/L	1	7/27/99
SULFATE		**EPA 375.4**				Analyst: **sld**
Sulfate	59	25		mg/L	5	7/21/99
TOTAL DISSOLVED SOLIDS		**EPA 160.1**				Analyst: **sld**
Total Dissolved Solids (Residue, Filterable)	510	40		mg/L	4	8/3/99
MERCURY		**SW 7470 / EPA 245.**				Analyst: **btn**
Mercury	ND	0.0002		mg/L	1	7/29/99
ICP METALS		**SW 6010 / EPA 200.**				Analyst: **btn**
Arsenic	0.0052	0.005		mg/L	1	7/28/99
Barium	0.08	0.005		mg/L	1	7/28/99
Boron	0.25	0.01		mg/L	1	7/28/99
Cadmium	ND	0.002		mg/L	1	7/28/99
Calcium	96	0.05		mg/L	1	7/28/99
Chromium	ND	0.005		mg/L	1	7/28/99
Lead	ND	0.005		mg/L	1	7/28/99
Magnesium	15	0.05		mg/L	1	7/28/99
Potassium	2.9	0.2		mg/L	1	7/28/99
Selenium	ND	0.005		mg/L	1	7/28/99
Silver	ND	0.005		mg/L	1	7/28/99
Sodium	83	2		mg/L	1	7/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	907053-22
Lab Order:	9907110	**Tag Number:**	
Project:	907053/HIGGINS/PPL/Hobbs	**Collection Date:**	7/16/99
Lab ID:	9907110-04A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PAH BY SIM, AQUEOUS		**SW 8270B**				Analyst: **ams**
1-Methylnaphthalene	ND	0.4		µg/L	1	7/27/99
2-Methylnaphthalene	ND	0.4		µg/L	1	7/27/99
Acenaphthene	ND	0.4		µg/L	1	7/27/99
Acenaphthylene	ND	0.4		µg/L	1	7/27/99
Anthracene	ND	0.4		µg/L	1	7/27/99
Benz(a)anthracene	ND	0.4		µg/L	1	7/27/99
Benzo(a)pyrene	ND	0.4		µg/L	1	7/27/99
Benzo(b)fluoranthene	ND	0.4		µg/L	1	7/27/99
Benzo(g,h,i)perylene	ND	0.4		µg/L	1	7/27/99
Benzo(k)fluoranthene	ND	0.4		µg/L	1	7/27/99
Chrysene	ND	0.4		µg/L	1	7/27/99
Dibenz(a,h)anthracene	ND	0.4		µg/L	1	7/27/99
Fluoranthene	ND	0.4		µg/L	1	7/27/99
Fluorene	ND	0.4		µg/L	1	7/27/99
Indeno(1,2,3-cd)pyrene	ND	0.4		µg/L	1	7/27/99
Naphthalene	ND	0.4		µg/L	1	7/27/99
Phenanthrene	ND	0.4		µg/L	1	7/27/99
Pyrene	ND	0.4		µg/L	1	7/27/99
Surr: 2-Fluorobiphenyl	58.0	43-116		%REC	1	7/27/99
Surr: 4-Terphenyl-d14	95.0	33-141		%REC	1	7/27/99
Surr: Nitrobenzene-d5	36.0	35-114		%REC	1	7/27/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	907053-23
Lab Order:	9907110	**Tag Number:**	
Project:	907053/HIGGINS/PPL/Hobbs	**Collection Date:**	7/16/99
Lab ID:	9907110-05A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**EPA 310.0**				Analyst: **sld**
Alkalinity, Total (As CaCO3)	2800	5		mg/L CaCO3	1	7/22/99
BROMIDE		**4500 B**				Analyst: **sld**
Bromide	0.99	0.1		mg/L	1	7/28/99
CHLORIDE		**EPA 325.3**				Analyst: **sld**
Chloride	140	5		mg/L	10	7/26/99
FLUORIDE		**EPA 340.2**				Analyst: **sld**
Fluoride	0.66	0.2		mg/L	1	7/27/99
SULFATE		**EPA 375.4**				Analyst: **sld**
Sulfate	85	25		mg/L	5	7/21/99
TOTAL DISSOLVED SOLIDS		**EPA 160.1**				Analyst: **sld**
Total Dissolved Solids (Residue, Filterable)	740	100		mg/L	10	8/3/99
MERCURY		**SW 7470 / EPA 245.**				Analyst: **btn**
Mercury	ND	0.0002		mg/L	1	7/29/99
ICP METALS		**SW 6010 / EPA 200.**				Analyst: **btn**
Arsenic	ND	0.005		mg/L	1	7/28/99
Barium	0.12	0.005		mg/L	1	7/28/99
Boron	0.13	0.01		mg/L	1	7/28/99
Cadmium	ND	0.002		mg/L	1	7/28/99
Calcium	150	0.05		mg/L	1	7/28/99
Chromium	ND	0.005		mg/L	1	7/28/99
Lead	ND	0.005		mg/L	1	7/28/99
Magnesium	20	0.05		mg/L	1	7/28/99
Potassium	3.9	0.2		mg/L	1	7/28/99
Selenium	0.0057	0.005		mg/L	1	7/28/99
Silver	ND	0.005		mg/L	1	7/28/99
Sodium	38	2		mg/L	1	7/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	907053-23
Lab Order:	9907110	**Tag Number:**	
Project:	907053/HIGGINS/PPL/Hobbs	**Collection Date:**	7/16/99
Lab ID:	9907110-05A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PAH BY SIM, AQUEOUS		**SW 8270B**				Analyst: ams
1-Methylnaphthalene	ND	0.4		µg/L	1	7/27/99
2-Methylnaphthalene	ND	0.4		µg/L	1	7/27/99
Acenaphthene	ND	0.4		µg/L	1	7/27/99
Acenaphthylene	ND	0.4		µg/L	1	7/27/99
Anthracene	ND	0.4		µg/L	1	7/27/99
Benz(a)anthracene	ND	0.4		µg/L	1	7/27/99
Benzo(a)pyrene	ND	0.4		µg/L	1	7/27/99
Benzo(b)fluoranthene	ND	0.4		µg/L	1	7/27/99
Benzo(g,h,i)perylene	ND	0.4		µg/L	1	7/27/99
Benzo(k)fluoranthene	ND	0.4		µg/L	1	7/27/99
Chrysene	ND	0.4		µg/L	1	7/27/99
Dibenz(a,h)anthracene	ND	0.4		µg/L	1	7/27/99
Fluoranthene	ND	0.4		µg/L	1	7/27/99
Fluorene	ND	0.4		µg/L	1	7/27/99
Indeno(1,2,3-cd)pyrene	ND	0.4		µg/L	1	7/27/99
Naphthalene	ND	0.4		µg/L	1	7/27/99
Phenanthrene	ND	0.4		µg/L	1	7/27/99
Pyrene	ND	0.4		µg/L	1	7/27/99
Surr: 2-Fluorobiphenyl	57.0	43-116		%REC	1	7/27/99
Surr: 4-Terphenyl-d14	103.0	33-141		%REC	1	7/27/99
Surr: Nitrobenzene-d5	39.0	35-114		%REC	1	7/27/99

Qualifiers:

ND - Not Detected at the Reporting Limit

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B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 ALK A-7/2** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **7/22/99** Prep Date:
Client ID: **9907110** Run ID: **NO INST_990722A** SeqNo: **18315**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 BR A-7/28/** Test Code: **Bromide** Units: **mg/L** Analysis Date **7/28/99** Prep Date:
Client ID: **9907110** Run ID: **HIT MAN_990728A** SeqNo: **18864**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	ND	0.1									

Sample ID: **MBlank** Batch ID: **01 CL A-7/26/** Test Code: **Chloride** Units: **mg/L** Analysis Date **7/26/99** Prep Date:
Client ID: **9907110** Run ID: **NO INST_990726B** SeqNo: **18573**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Sample ID: **MBlank** Batch ID: **01 FL A-7/27/** Test Code: **fluoride** Units: **mg/L** Analysis Date **7/27/99** Prep Date:
Client ID: **9907110** Run ID: **NO INST_990727A** SeqNo: **18706**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.2									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **7/21/99** Prep Date:
Client ID: **9907110** Run ID: **HIT MAN_990721A** SeqNo: **18099**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 TDS-8/4/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **8/3/99** Prep Date:
Client ID: **9907110** Run ID: **NO INST_990803C** SeqNo: **19312**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: **MB-670** Batch ID: **670** Test Code: **ICPMET** Units: **mg/L** Analysis Date **7/28/99** Prep Date: **7/26/99**
Client ID: **9907110** Run ID: **ICP_990728A** SeqNo: **19002**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.005									
Barium	ND	0.005									
Boron, 200.7	ND	0.01									
Cadmium, 200.7	ND	0.002									
Calcium	ND	0.05									
Chromium, 200.7	ND	0.005									
Copper, 200.7	ND	0.005									
Lead, 200.7	ND	0.005									
Magnesium	ND	0.05									
Molybdenum	ND	0.005									
Nickel, 200.7	ND	0.005									
Potassium	ND	0.2									
Selenium	ND	0.005									
Silver, 200.7	ND	0.005									
Vanadium	ND	0.005									
Zinc, 200.7	ND	0.005									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-672** Batch ID: **672** Test Code: **SW8270B** Units: **µg/L** Analysis Date **7/27/99** Prep Date: **7/26/99**
Client ID: **9907110** Run ID: **HEISENBURG_990727A** SeqNo: **18749**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1-Methy naphthalene	ND	0.1									
2-Methy naphthalene	ND	0.1									
Acenaphthene	ND	0.1									
Acenaphthylene	ND	0.1									
Anthracene	ND	0.1									
Benz(a)anthracene	ND	0.1									
Benzo(a)pyrene	ND	0.1									
Benzo(b)fluoranthene	ND	0.1									
Benzo(g,h,i)perylene	ND	0.1									
Benzo(k)fluoranthene	ND	0.1									
Chrysene	ND	0.1									
Dibenz(a,h)anthracene	ND	0.1									
Fluoranthene	ND	0.1									
Fluorene	ND	0.1									
Indeno(1,2,3-cd)pyrene	ND	0.1									
Naphthalene	ND	0.1									
Phenanthrene	ND	0.1									
Pyrene	ND	0.1									

Sample ID: **MBLK-686** Batch ID: **686** Test Code: **Mercury** Units: **mg/L** Analysis Date **7/29/99** Prep Date: **7/28/99**
Client ID: **9907110** Run ID: **MERC_990729A** SeqNo: **18949**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT

Sample Duplicate

Sample ID: **9907110-05A DUP** Batch ID: **01 ALK A-7/2** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **7/22/99** Prep Date:
Client ID: **907053-23** **9907110** Run ID: **NO INST_990722A** SeqNo: **18324**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	3100	5	0	0	0.0%	0	0	2800	10.2%	20	

Sample ID: **9907110-02A DUP** Batch ID: **01 BR A-7/28/** Test Code: **Bromide** Units: **mg/L** Analysis Date **7/28/99** Prep Date:
Client ID: **907053-20** **9907110** Run ID: **HIT MAN_990728A** SeqNo: **18868**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	.95	0.1	0	0	0.0%	0	0	0.95	0.0%	20	

Sample ID: **9907110-05A DUP** Batch ID: **01 CL A-7/26/** Test Code: **Chloride** Units: **mg/L** Analysis Date **7/26/99** Prep Date:
Client ID: **907053-23** **9907110** Run ID: **NO INST_990726B** SeqNo: **18582**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	140	5	0	0	0.0%	0	0	142.5	1.8%	20	

Sample ID: **9907110-05A DUP** Batch ID: **01 FL A-7/27/** Test Code: **fluoride** Units: **mg/L** Analysis Date **7/27/99** Prep Date:
Client ID: **907053-23** **9907110** Run ID: **NO INST_990727A** SeqNo: **18713**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	.7	0.2	0	0	0.0%	0	0	0.66	5.9%	20	

Sample ID: **9907110-02A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **7/21/99** Prep Date:
Client ID: **907053-20** **9907110** Run ID: **HIT MAN_990721A** SeqNo: **18105**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	79.85	25	0	0	0.0%	80	120	76	4.9%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9907110-04A DUP** Batch ID: **01 TDS-8/4/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **8/3/99** Prep Date:
Client ID: **907053-22** **9907110** Run ID: **NO INST_990803C** SeqNo: **19318**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	592	40	0	0	0.0%	0	0	508	15.3%	20	

Sample ID: **9907117-01A DUP** Batch ID: **670** Test Code: **ICPMET** Units: **mg/L** Analysis Date **7/28/99** Prep Date: **7/26/99**
Client ID: **9907110** Run ID: **ICP_990728A** SeqNo: **18978**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.005077	0.005	0	0	0.0%	0	0	0	200.0%	20	T
Barium	.09254	0.005	0	0	0.0%	0	0	0.09193	0.7%	20	
Boron, 200.7	.215	0.01	0	0	0.0%	0	0	0.2133	0.8%	20	
Cadmium, 200.7	.00201	0.002	0	0	0.0%	0	0	0.002049	1.9%	20	
Calcium	93.45	0.05	0	0	0.0%	0	0	93.37	0.1%	20	
Chromium, 200.7	.01073	0.005	0	0	0.0%	0	0	0.01109	3.3%	20	
Copper, 200.7	.1537	0.005	0	0	0.0%	0	0	0.1514	1.5%	20	
Lead, 200.7	.04428	0.005	0	0	0.0%	0	0	0.04414	0.3%	20	
Magnesium	22.75	0.05	0	0	0.0%	0	0	22.64	0.5%	20	
Molybdenum	.005405	0.005	0	0	0.0%	0	0	0.006162	13.1%	20	
Nickel, 200.7	.006973	0.005	0	0	0.0%	0	0	0.006974	0.0%	20	
Potassium	10.64	0.2	0	0	0.0%	0	0	10.5	1.2%	20	
Selenium	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Silver, 200.7	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Sodium	119.2	2	0	0	0.0%	0	0	106.4	11.3%	20	
Vanadium	.006186	0.005	0	0	0.0%	0	0	0.006442	4.1%	20	
Zinc, 200.7	.3391	0.005	0	0	0.0%	0	0	0.3416	0.7%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9907108-01A DUP** Batch ID: **686** Test Code: **Mercury** Units: **mg/L** Analysis Date **7/29/99** Prep Date: **7/28/99**
Client ID: **9907110** Run ID: **MERC_990729A** SeqNo: **18952**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9907110-02A MS** Batch ID: **01 BR A-7/28/** Test Code: **Bromide** Units: **mg/L** Analysis Date **7/28/99** Prep Date:
Client ID: **907053-20** **9907110** Run ID: **HIT MAN_990728A** SeqNo: **18869**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	29.3	10	30	0.95	94.5%	75	125	0			

Sample ID: **9907110-02A MSD** Batch ID: **01 BR A-7/28/** Test Code: **Bromide** Units: **mg/L** Analysis Date **7/28/99** Prep Date:
Client ID: **907053-20** **9907110** Run ID: **HIT MAN_990728A** SeqNo: **18870**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	33.8	10	30	0.95	109.5%	75	125	29.3	14.3%	20	

Sample ID: **9907110-05A MS** Batch ID: **01 CL A-7/26/** Test Code: **Chloride** Units: **mg/L** Analysis Date **7/26/99** Prep Date:
Client ID: **907053-23** **9907110** Run ID: **NO INST_990726B** SeqNo: **18583**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	195	5	50	142.5	105.0%	75	125	0			

Sample ID: **9907110-05A MSD** Batch ID: **01 CL A-7/26/** Test Code: **Chloride** Units: **mg/L** Analysis Date **7/26/99** Prep Date:
Client ID: **907053-23** **9907110** Run ID: **NO INST_990726B** SeqNo: **18584**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	197.5	5	50	142.5	110.0%	75	125	195	1.3%	20	

Sample ID: **9907110-05A MS** Batch ID: **01 FL A-7/27/** Test Code: **fluoride** Units: **mg/L** Analysis Date **7/27/99** Prep Date:
Client ID: **907053-23** **9907110** Run ID: **NO INST_990727A** SeqNo: **18714**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	6	0.2	6	0.66	89.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9907110-05A MSD** Batch ID: **01 FL A-7/27/** Test Code: **fluoride** Units: **mg/L** Analysis Date **7/27/99** Prep Date:
Client ID: **907053-23** **9907110** Run ID: **NO INST_990727A** SeqNo: **18715**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	6.7	0.2	6	0.66	100.7%	75	125	6	11.0%	20	

Sample ID: **9907110-02A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **7/21/99** Prep Date:
Client ID: **907053-20** **9907110** Run ID: **HIT MAN_990721A** SeqNo: **18106**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	120.4	25	50	76	88.7%	75	125	0			

Sample ID: **9907110-02A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **7/21/99** Prep Date:
Client ID: **907053-20** **9907110** Run ID: **HIT MAN_990721A** SeqNo: **18107**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	115.8	25	50	76	79.6%	75	125	120.4	3.9%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9907117-01A MS** Batch ID: **670** Test Code: **ICPMET** Units: **mg/L** Analysis Date **7/28/99** Prep Date: **7/26/99**
Client ID: **9907110** Run ID: **ICP_990728A** SeqNo: **18979**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.5203	0.005	0.5	0	104.1%	80	120	0			
Barium	.5602	0.005	0.5	0.09193	93.7%	80	120	0			
Boron, 200.7	.6868	0.01	0.5	0.2133	94.7%	90	110	0			
Cadmium, 200.7	.5019	0.002	0.5	0.002049	100.0%	90	110	0			
Calcium	97.91	0.05	5	93.37	90.7%	80	120	0			
Chromium, 200.7	.5107	0.005	0.5	0.01109	99.9%	90	110	0			
Copper, 200.7	.6445	0.005	0.5	0.1514	98.6%	90	110	0			
Lead, 200.7	.5422	0.005	0.5	0.04414	99.6%	90	110	0			
Magnesium	27.4	0.05	5	22.64	95.3%	80	120	0			
Molybdenum	.5014	0.005	0.5	0.006162	99.0%	80	120	0			
Nickel, 200.7	.4939	0.005	0.5	0.006974	97.4%	90	110	0			
Potassium	15.95	0.2	5	10.5	109.0%	80	120	0			
Selenium	.4946	0.005	0.5	0	98.9%	80	120	0			
Silver, 200.7	.4585	0.005	0.5	0	91.7%	90	110	0			
Sodium	127.4	2	5	106.4	419.4%	80	120	0			N
Vanadium	.5	0.005	0.5	0.006442	98.7%	80	120	0			
Zinc, 200.7	.8301	0.005	0.5	0.3416	97.7%	90	110	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9907117-01A MSD** Batch ID: **670** Test Code: **ICPMET** Units: **mg/L** Analysis Date **7/28/99** Prep Date: **7/26/99**
Client ID: **9907110** Run ID: **ICP_990728A** SeqNo: **18980**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.5166	0.005	0.5	0	103.3%	80	120	0.5203	0.7%	20	
Barium	.5769	0.005	0.5	0.09193	97.0%	80	120	0.5602	2.9%	20	
Boron, 200.7	.6983	0.01	0.5	0.2133	97.0%	90	110	0.6868	1.7%	20	
Cadmium, 200.7	.4968	0.002	0.5	0.002049	98.9%	90	110	0.5019	1.0%	20	
Calcium	98.26	0.05	5	93.37	97.8%	80	120	97.91	0.4%	20	
Chromium, 200.7	.5223	0.005	0.5	0.01109	102.2%	90	110	0.5107	2.3%	20	
Copper, 200.7	.6607	0.005	0.5	0.1514	101.9%	90	110	0.6445	2.5%	20	
Lead, 200.7	.5385	0.005	0.5	0.04414	98.9%	90	110	0.5422	0.7%	20	
Magnesium	27.62	0.05	5	22.64	99.7%	80	120	27.4	0.8%	20	
Molybdenum	.5059	0.005	0.5	0.006162	100.0%	80	120	0.5014	0.9%	20	
Nickel, 200.7	.5048	0.005	0.5	0.006974	99.6%	90	110	0.4939	2.2%	20	
Potassium	16.09	0.2	5	10.5	111.8%	80	120	15.95	0.9%	20	
Selenium	.4933	0.005	0.5	0	98.7%	80	120	0.4946	0.3%	20	
Silver, 200.7	.4654	0.005	0.5	0	93.1%	90	110	0.4585	1.5%	20	
Sodium	132.7	2	5	106.4	525.2%	80	120	127.4	4.1%	20	N
Vanadium	.5095	0.005	0.5	0.006442	100.6%	80	120	0.5	1.9%	20	
Zinc, 200.7	.8394	0.005	0.5	0.3416	99.6%	90	110	0.8301	1.1%	20	

Sample ID: **9907108-01A MS** Batch ID: **686** Test Code: **Mercury** Units: **mg/L** Analysis Date **7/29/99** Prep Date: **7/28/99**
Client ID: **9907110** Run ID: **MERC_990729A** SeqNo: **18953**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00181	0.0002	0.002	0	90.5%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9907108-01A MSD** Batch ID: **686** Test Code: **Mercury** Units: **mg/L** Analysis Date **7/29/99** Prep Date: **7/28/99**
Client ID: **9907110** Run ID: **MERC_990729A** SeqNo: **18954**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.0021	0.0002	0.002	0	105.0%	75	125	0.00181	14.8%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 ALK A-7/2	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 7/22/99	Prep Date:
Client ID: 9907110	Run ID: NO INST_990722A			SeqNo: 18316	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	160	5	157	0	101.9%	85	115	0			

Sample ID: LCS	Batch ID: 01 BR A-7/28/	Test Code: Bromide	Units: mg/L	Analysis Date 7/28/99	Prep Date:
Client ID: 9907110	Run ID: HIT MAN_990728A			SeqNo: 18865	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	.524	0.1	0.5	0	104.8%	85	115	0			

Sample ID: LCS	Batch ID: 01 CL A-7/26/	Test Code: Chloride	Units: mg/L	Analysis Date 7/26/99	Prep Date:
Client ID: 9907110	Run ID: NO INST_990726B			SeqNo: 18574	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	10	0.5	10	0	100.0%	85	115	0			

Sample ID: LCS	Batch ID: 01 FL A-7/27/	Test Code: fluoride	Units: mg/L	Analysis Date 7/27/99	Prep Date:
Client ID: 9907110	Run ID: NO INST_990727A			SeqNo: 18707	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	5.5	0.2	6	0	91.7%	85	115	0			

Sample ID: LCS	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 7/21/99	Prep Date:
Client ID: 9907110	Run ID: HIT MAN_990721A			SeqNo: 18100	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	8.94	5	8	0	111.8%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: **LCS** Batch ID: **01 TDS-8/4/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **8/3/99** Prep Date:
Client ID: **9907110** Run ID: **NO INST_990803C** SeqNo: **19313**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	2720	10	2662	0	102.2%	85	115	0			

Sample ID: **LCS-670** Batch ID: **670** Test Code: **ICPMET** Units: **mg/L** Analysis Date **7/28/99** Prep Date: **7/26/99**
Client ID: **9907110** Run ID: **ICP_990728A** SeqNo: **19000**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.503	0.005	0.5	0	100.6%	80	120	0			
Barium	.4758	0.005	0.5	0	95.2%	80	120	0			
Boron, 200.7	.4672	0.01	0.5	0	93.4%	90	110	0			
Cadmium, 200.7	.5048	0.002	0.5	0	101.0%	90	110	0			
Calcium	5.13	0.05	5	0	102.6%	80	120	0			
Chromium, 200.7	.5006	0.005	0.5	0	100.1%	90	110	0			
Copper, 200.7	.4798	0.005	0.5	0	96.0%	90	110	0			
Lead, 200.7	.4986	0.005	0.5	0	99.7%	90	110	0			
Magnesium	4.836	0.05	5	0	96.7%	80	120	0			
Molybdenum	.488	0.005	0.5	0	97.6%	80	120	0			
Nickel, 200.7	.489	0.005	0.5	0	97.8%	90	110	0			
Potassium	4.922	0.2	5	0	98.4%	80	120	0			
Selenium	.483	0.005	0.5	0	96.6%	80	120	0			
Silver, 200.7	.4906	0.005	0.5	0	98.1%	90	110	0			
Vanadium	.4908	0.005	0.5	0	98.2%	80	120	0			
Zinc, 200.7	.499	0.005	0.5	0	99.8%	90	110	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: **LCS-672** Batch ID: **672** Test Code: **SW8270B** Units: **µg/L** Analysis Date **7/27/99** Prep Date: **7/26/99**
Client ID: **9907110** Run ID: **HEISENBURG_990727A** SeqNo: **18750**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1-Methylnaphthalene	.72	0.1	1	0	72.0%	21	133	0			
2-Methylnaphthalene	.59	0.1	1	0	59.0%	21	133	0			
Acenaphthene	.59	0.1	1	0	59.0%	47	145	0			
Acenaphthylene	.57	0.1	1	0	57.0%	33	145	0			
Anthracene	.49	0.1	1	0	49.0%	27	133	0			
Benz(a)anthracene	.58	0.1	1	0	58.0%	33	143	0			
Benzo(a)pyrene	.57	0.1	1	0	57.0%	17	163	0			
Benzo(b)fluoranthene	.57	0.1	1	0	57.0%	24	159	0			
Benzo(g,h,i)perylene	.7	0.1	1	0	70.0%	1	219	0			
Benzo(k)fluoranthene	.69	0.1	1	0	69.0%	11	162	0			
Chrysene	.73	0.1	1	0	73.0%	17	168	0			
Dibenz(a,h)anthracene	.64	0.1	1	0	64.0%	1	227	0			
Fluoranthene	.64	0.1	1	0	64.0%	26	137	0			
Fluorene	.6	0.1	1	0	60.0%	59	121	0			
Indeno(1,2,3-cd)pyrene	.68	0.1	1	0	68.0%	1	171	0			
Naphthalene	.56	0.1	1	0	56.0%	21	133	0			
Phenanthrene	.56	0.1	1	0	56.0%	54	120	0			
Pyrene	.88	0.1	1	0	88.0%	52	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Laboratory Control Spike Duplicate

Sample ID: **LCSD-672** Batch ID: **672** Test Code: **SW8270B** Units: **µg/L** Analysis Date **7/27/99** Prep Date: **7/26/99**
Client ID: **9907110** Run ID: **HEISENBURG_990727A** SeqNo: **18751**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1-Methylnaphthalene	.69	0.1	1	0	69.0%	21	133	0.72	4.3%	30	
2-Methylnaphthalene	.69	0.1	1	0	69.0%	21	133	0.59	15.6%	30	
Acenaphthene	.6	0.1	1	0	60.0%	47	145	0.59	1.7%	30	
Acenaphthylene	.58	0.1	1	0	58.0%	33	145	0.57	1.7%	30	
Anthracene	.54	0.1	1	0	54.0%	27	133	0.49	9.7%	30	
Benz(a)anthracene	.52	0.1	1	0	52.0%	33	143	0.58	10.9%	30	
Benzo(a)pyrene	.59	0.1	1	0	59.0%	17	163	0.57	3.4%	30	
Benzo(b)fluoranthene	.58	0.1	1	0	58.0%	24	159	0.57	1.7%	30	
Benzo(g,h,i)perylene	.65	0.1	1	0	65.0%	1	219	0.7	7.4%	30	
Benzo(k)fluoranthene	.75	0.1	1	0	75.0%	11	162	0.69	8.3%	30	
Chrysene	.73	0.1	1	0	73.0%	17	168	0.73	0.0%	30	
Dibenz(a,h)anthracene	.61	0.1	1	0	61.0%	1	227	0.64	4.8%	30	
Fluoranthene	.63	0.1	1	0	63.0%	26	137	0.64	1.6%	30	
Fluorene	.61	0.1	1	0	61.0%	59	121	0.6	1.7%	30	
Indeno(1,2,3-cd)pyrene	.6	0.1	1	0	60.0%	1	171	0.68	12.5%	30	
Naphthalene	.56	0.1	1	0	56.0%	21	133	0.56	0.0%	30	
Phenanthrene	.58	0.1	1	0	58.0%	54	120	0.56	3.5%	30	
Pyrene	1.08	0.1	1	0	108.0%	52	115	0.88	20.4%	30	

Sample ID: **LCS-686** Batch ID: **686** Test Code: **Mercury** Units: **mg/L** Analysis Date **7/29/99** Prep Date: **7/28/99**
Client ID: **9907110** Run ID: **MERC_990729A** SeqNo: **18950**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00091	0.0002	0.001	0	91.0%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **672** Test Code: **SW8270B** Units: **µg/L** Analysis Date **7/27/99** Prep Date:
Client ID: **9907110** Run ID: **HEISENBURG_990727A** SeqNo: **18748**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1-Methylnaphthalene	1.06	0.1	1	0	106.0%	80	120	0			
2-Methylnaphthalene	.91	0.1	1	0	91.0%	80	120	0			
Acenaphthene	.95	0.1	1	0	95.0%	80	120	0			
Acenaphthylene	.93	0.1	1	0	93.0%	80	120	0			
Anthracene	.84	0.1	1	0	84.0%	80	120	0			
Benz(a)anthracene	.87	0.1	1	0	87.0%	80	120	0			
Benzo(a)pyrene	.9	0.1	1	0	90.0%	80	120	0			
Benzo(b)fluoranthene	.81	0.1	1	0	81.0%	80	120	0			
Benzo(g,h,i)perylene	1.02	0.1	1	0	102.0%	80	120	0			
Benzo(k)fluoranthene	.96	0.1	1	0	96.0%	80	120	0			
Chrysene	.96	0.1	1	0	96.0%	80	120	0			
Dibenz(a,h)anthracene	.99	0.1	1	0	99.0%	80	120	0			
Fluoranthene	.94	0.1	1	0	94.0%	80	120	0			
Fluorene	.89	0.1	1	0	89.0%	80	120	0			
Indeno(1,2,3-cd)pyrene	.96	0.1	1	0	96.0%	80	120	0			
Naphthalene	.9	0.1	1	0	90.0%	80	120	0			
Phenanthrene	.88	0.1	1	0	88.0%	80	120	0			
Pyrene	1.05	0.1	1	0	105.0%	80	120	0			
2-Fluorobiphenyl	.86	0.1	1	0	86.0%	43	116	0			
4-Terphenyl-d14	1.01	0.1	1	0	101.0%	33	141	0			
Nitrobenzene-d5	.84	0.1	1	0	84.0%	35	114	0			

Sample ID: **ICV** Batch ID: **686** Test Code: **Mercury** Units: **mg/L** Analysis Date **7/29/99** Prep Date: **7/28/99**
Client ID: **9907110** Run ID: **MERC_990729A** SeqNo: **18970**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00218	0.0002	0.002	0	109.0%	90	110	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *04-Aug-99*

CLIENT: Pinnacle Laboratories
Work Order: 9907110
Project: 907053/HIGGINS/PPL/Hobbs

QC SUMMARY REPORT
Minerals ICV for ICP

Sample ID: **ICVHI** Batch ID: **670** Test Code: **ICPMET** Units: **mg/L** Analysis Date **7/28/99** Prep Date:
Client ID: **9907110** Run ID: **ICP_990728A** SeqNo: **18998**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	25.32	0.05	25	0	101.3%	90	110	0			
Magnesium	24.4	0.05	25	0	97.6%	90	110	0			
Sodium	5.113	0.2	5	0	102.3%	90	110	0			

Sample ID: **ICVLOW** Batch ID: **670** Test Code: **ICPMET** Units: **mg/L** Analysis Date **7/28/99** Prep Date:
Client ID: **9907110** Run ID: **ICP_990728A** SeqNo: **18999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.5099	0.005	0.5	0	102.0%	90	110	0			
Barium	.4964	0.005	0.5	0	99.3%	90	110	0			
Boron, 200.7	.4989	0.01	0.5	0	99.8%	95	105	0			
Cadmium, 200.7	.5041	0.002	0.5	0	100.8%	95	105	0			
Chromium, 200.7	.5064	0.005	0.5	0	101.3%	95	105	0			
Copper, 200.7	.5053	0.005	0.5	0	101.1%	95	105	0			
Lead, 200.7	.5073	0.005	0.5	0	101.5%	95	105	0			
Molybdenum	.5017	0.005	0.5	0	100.3%	90	110	0			
Nickel, 200.7	.4941	0.005	0.5	0	98.8%	95	105	0			
Potassium	5.055	0.2	5	0	101.1%	90	110	0			
Selenium	.5008	0.005	0.5	0	100.2%	90	110	0			
Silver, 200.7	.5036	0.005	0.5	0	100.7%	95	105	0			
Vanadium	.5045	0.005	0.5	0	100.9%	90	110	0			
Zinc, 200.7	.5002	0.005	0.5	0	100.0%	95	105	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Pinnacle Laboratories, Inc. — **Interlab Chain of Custody** — Date: 7/19 Page: 1 of 1 — 9907110

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
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(505) 344-3777 Fax (505) 344-4413

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals-TAL	K, Mg, Ca, Na, B	TOX	TOC	Gen Chemistry: Cl, Br, SO4	Fl, Alk, TDS	Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (6C8/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
907053-19	7/16	1200	AQ	01	X				X			X	X															
-20		1230		02	X				X			X	X															
-21		1300		03	X				X			X	X															
-22		1315		04	X				X			X	X															
-23	↓	1345	↓	05	X				X			X	X															

PROJECT INFORMATION	SAMPLE RECEIPT	SAMPLES SENT TO:	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
PROJECT #: 907053	Total Number of Containers	PENSACOLA - STL-FL	Signature: — Time: Francine Irvine 1700	Signature: Time:
PROJ. NAME: HIGGINS	Chain of Custody Seals	PORTLAND - ESL-OR X	Printed Name: Francine Irvine Date: 7/19/99	Printed Name: Date:
QC LEVEL: (STD) IV	Received Intact?	STL - CT	Pinnacle Laboratories, Inc.	Company
QC REQUIRED: MS MSD BLANK	Received Good Cond./Cold	STL- NEW JERSEY	RECEIVED BY: 1.	RECEIVED BY: 2
TAT: (STANDARD) RUSH!!	LAB NUMBER:	N. CREEK	Signature: Time: Kimberly Li 10:15	Signature: Time:
DUE DATE: 8/2	COMMENTS:	BARRINGER	Printed Name: Date: 7/20/99	Printed Name: Date:
RUSH SURCHARGE: —		SEQUOIA	Company	Company
CLIENT DISCOUNT:				
SPECIAL CERTIFICATION REQUIRED: YES (NO)				

PINNACLE LABORATORIES

Pinnacle Laboratories Inc.

CHAIN OF CUSTODY

DATE: 7/13/99 PAGE: 1 OF 3

PLI Accession #: 907053

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Chris Higgins

COMPANY: Higgins and Associates
ADDRESS: 9940 East Costilla Ave Ste B
Englewood, CO 80112
PHONE: 303-705-9846
FAX: 303-705-9848

BILL TO: Tony Walker
COMPANY: Phillips Pipe Line
ADDRESS: 3B11 Adams Building
Bartlesville, OK 74004

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	8015 - Total Extractable	(M8015) Gas/Purge & Trap	8021 (BTEX)/8015 (Gasoline) MTBE	8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE	8021 (TCL)	8021 (EDX)	8021 (HALO)	8021 (CUST)	504.1 EDB ☐ / DBCP ☐	8260 (TCL) Volatile Organics	8260 (Full) Volatile Organics	8260 (CUST) Volatile Organics	8260 (Landfill) Volatile Organics	Pesticides /PCB (608/8081/8082)	Herbicides (615/8151)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Polynuclear Aromatics (610/8310/8270-SIMS)	General Chemistry:		Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:		NUMBER OF CONTAINERS
mw-2-10'-13'	7/13/99	8:20	Soil	01			X			X																						1
mw-2-30'-33'	7/13/99	8:30	Soil	02			X			X																						1
mw-7-14-16'	7/13/99	9:45	Soil	03			X			X																						1
mw-7-30'-32'	7/13/99	10:00	Soil	04			X			X																						1
mw-8-20'-22'	7/13/99	11:45	Soil	05			X			X																						1
mw-8-30'-33'	7/13/99	12:00	Soil	06			X			X																						1
mw-9-20'-23'	7/14/99	8:15	Soil	07			X			X																						1
mw-9-30'-32'	7/14/99	8:25	Soil	08			X			X																						1
mw-6-24'-26'	7/14/99	9:55	Soil	09			X			X																						1
mw-6-30'-32'	7/14/99	10:15	Soil	10			X			X																						1

PROJECT INFORMATION

PROJ. NO.:
PROJ NAME: APL/Hobbs
P.O. NO.:
SHIPPED VIA: Greyhound

SAMPLE RECEIPT

NO. CONTAINERS	10
CUSTODY SEALS	Y / N / (NA)
RECEIVED INTACT	Y
BLUE ICE/ICE	13°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) [ ] 24hr [ ] 48hr [ ] 72hr [ ] 1 WEEK (NORMAL) [X]

CERTIFICATION REQUIRED: [ ] NM [ ] SDWA [ ] OTHER

METHANOL PRESERVATION [ ]

COMMENTS: FIXED FEE [ ]

RELINQUISHED BY: 1.

Signature: Charles Jensen Time: 2:30
Printed Name: Charles Jensen Date: 7/16/99
Company: Higgins
See reverse side (Joyce Magure)

RECEIVED BY: 1.

Signature: Time:
Printed Name: Date:
Company:

RELINQUISHED BY: 2.

Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: (LAB) 2.

Signature: Francine Tonno Time: 1030
Printed Name: Francine Tonno Date: 7/19/99
Pinnacle Laboratories Inc.

PINNACLE LABORATORIES

Pinnacle Laboratories Inc.

CHAIN OF CUSTODY

DATE: 7/14/99 PAGE: 2 OF 3

PLI Accession #: 907053

SHADED AREAS ARE FOR LAB USE ONLY.

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PROJECT MANAGER: Chris Higgins

COMPANY: Higgins and Associates

ADDRESS: 9940 East Costilla Ave Ste.B
Englewood, CO 80112

PHONE: 303-708-9846

FAX: 303-708-9848

BILL TO: Tony Walker

COMPANY: Phillips Pipe Line

ADDRESS: 3B11 Adams Building
Bartlesville, OK 74004

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	NUMBER OF CONTAINERS
mw-4-20'-22'	7/14/99	12:20	Soil	11	1
mw-4-30'-32'	7/14/99	13:20	Soil	12	1
mw-3-20'-22'	7/15/99	8:10	Soil	13	1
mw-3-30'-32'	7/15/99	8:20	Soil	14	1
mw-10-20'-22'	7/15/99	9:30	Soil	15	1
mw-10-30'-32'	7/15/99	9:40	Soil	16	1
mw-5-20'-22'	7/15/99	11:55	Soil	17	1
mw-5-30'-32'	7/15/99	12:05	Soil	18	1

Petroleum Hydrocarbons (418.1) TRPH
(MOD.8015) Diesel/Direct Inject
8015 - Total Extractable
(M8015) Gas/Purge & Trap
8021 (BTEX)/8015 (Gasoline) MTBE
8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE
8021 (TCL)
8021 (EDX)
8021 (HALO)
8021 (CUST)
504.1 EDB ☐ / DBCP ☐
8260 (TCL) Volatile Organics
8260 (Full) Volatile Organics
8260 (CUST) Volatile Organics
8260 (Landfill) Volatile Organics
Pesticides /PCB (608/8081/8082)
Herbicides (615/8151)
Base/Neutral/Acid Compounds GC/MS (625/8270)
Polynuclear Aromatics (610/8310/8270-SIMS)
General Chemistry:
Priority Pollutant Metals (13)
Target Analyte List Metals (23)
RCRA Metals (8)
RCRA Metals by TCLP (Method 1311)
Metals:

PROJECT INFORMATION

PROJ. NO.:

PROJ. NAME: PPL/Hobbs

P.O. NO

SHIPPED VIA: Greyhound

SAMPLE RECEIPT

NO. CONTAINERS	8
CUSTODY SEALS	Y / N / (NA)
RECEIVED INTACT	YES
BLUE ICE/ICE	13°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) [ ]24hr [ ]48hr [ ]72hr [ ]1 WEEK (NORMAL) X

CERTIFICATION REQUIRED: [ ]NM [ ]SDWA [ ]OTHER

METHANOL PRESERVATION [ ]

COMMENTS: FIXED FEE [ ]

RELINQUISHED BY: 1.

Signature: Charles Jensen Time: 2:30

Printed Name: Charles Jensen Date: 7/16/99

Company: Higgins

See reverse side (Force Magure)

RECEIVED BY: 1.

Signature: Time:

Printed Name: Date:

Company:

RELINQUISHED BY: 2.

Signature: Time:

Printed Name: Date:

Company:

RECEIVED BY: (LAB) 2.

Signature: Francine Tonno Time: 1030

Printed Name: Francine Tonno Date: 7/19/99

Pinnacle Laboratories Inc.

PINNACLE LABORATORIES

Pinnacle Laboratories Inc.

CHAIN OF CUSTODY

DATE: 7/16/99 PAGE: 3 OF 3

PLI Accession #: 907053

SHADED AREAS ARE FOR LAB USE ONLY.

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PROJECT MANAGER:

COMPANY: Higgins and Associates
ADDRESS: 9940 East Costilla Ave. Ste. B
Englewood, CO 80112
PHONE: 303-708-9846
FAX: 303-708-9848

BILL TO: Phillips Pipe Line % Tony Walker
COMPANY:
ADDRESS: 3B11 Adams Building
Bartlesville, OK 74004

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
mw-2	7/16/99	12:00	water	19
mw-3		12:30		20
mw-4		1:00		21
mw-10		1:15		22
mw-9		1:45		23
Trip Blank	7/7	1550	"	24

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	8015-Total Extractable	(M8015) Gas/Purge & Trap	8021 (BTEX)/8015 (Gasoline) MTBE	8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE	8021 (TCL)	8021 (EDX)	8021 (HALO)	8021 (CUST)	504.1 EDB ☐ / DBCP ☐	8260 (TCL) Volatile Organics	8260 (Full) Volatile Organics	8260 (CUST) Volatile Organics	8260 (Landfill) Volatile Organics	Pesticides /PCB (608/8081/8082)	Herbicides (615/8151)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Polynuclear Aromatics (610/8310 8270-SIMS)	General Chemistry:	Uranium per Client	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals/Cations	TDS/Anions	NUMBER OF CONTAINERS
		X			X													X		X					X	X	7
																											7
																											7
																											7
																											7
					X																						1

PROJECT INFORMATION

PROJ. NO.:
PROJ. NAME: PPL/Hobbs
P.O. NO.:
SHIPPED VIA: Greyhound

SAMPLE RECEIPT

NO. CONTAINERS	36
CUSTODY SEALS	Y/N/(NA)
RECEIVED INTACT	YES
BLUE ICE	13°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) [ ] 24hr [ ] 48hr [ ] 72hr [ ] 1 WEEK (NORMAL) X

CERTIFICATION REQUIRED: [ ] NM [ ] SDWA [ ] OTHER

METHANOL PRESERVATION [ ]

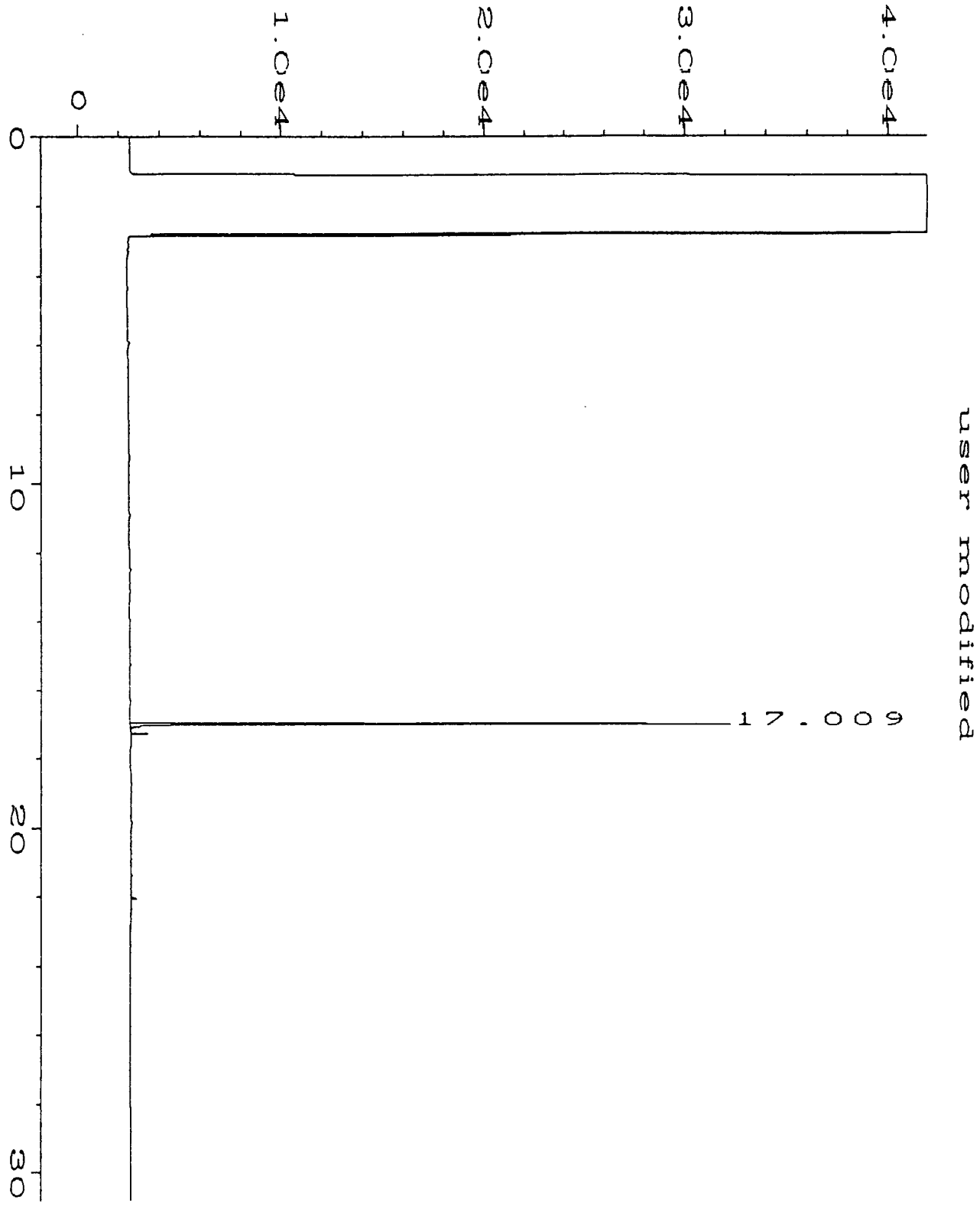
COMMENTS: FIXED FEE [ ]
See 6/16/99 Quote.

RELINQUISHED BY: 1.
Signature: Charles Jensen Time: 2:30
Printed Name: C. Jensen Date: 7/16/99
Company:
See reverse side (Force Magure)

RECEIVED BY: 1.
Signature: Time:
Printed Name: Date:
Company:

RELINQUISHED BY: 2.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: (LAB) 2.
Signature: Francine Tonno Time: 1030
Printed Name: Francine Tonno Date: 7/19/99
Pinnacle Laboratories Inc.



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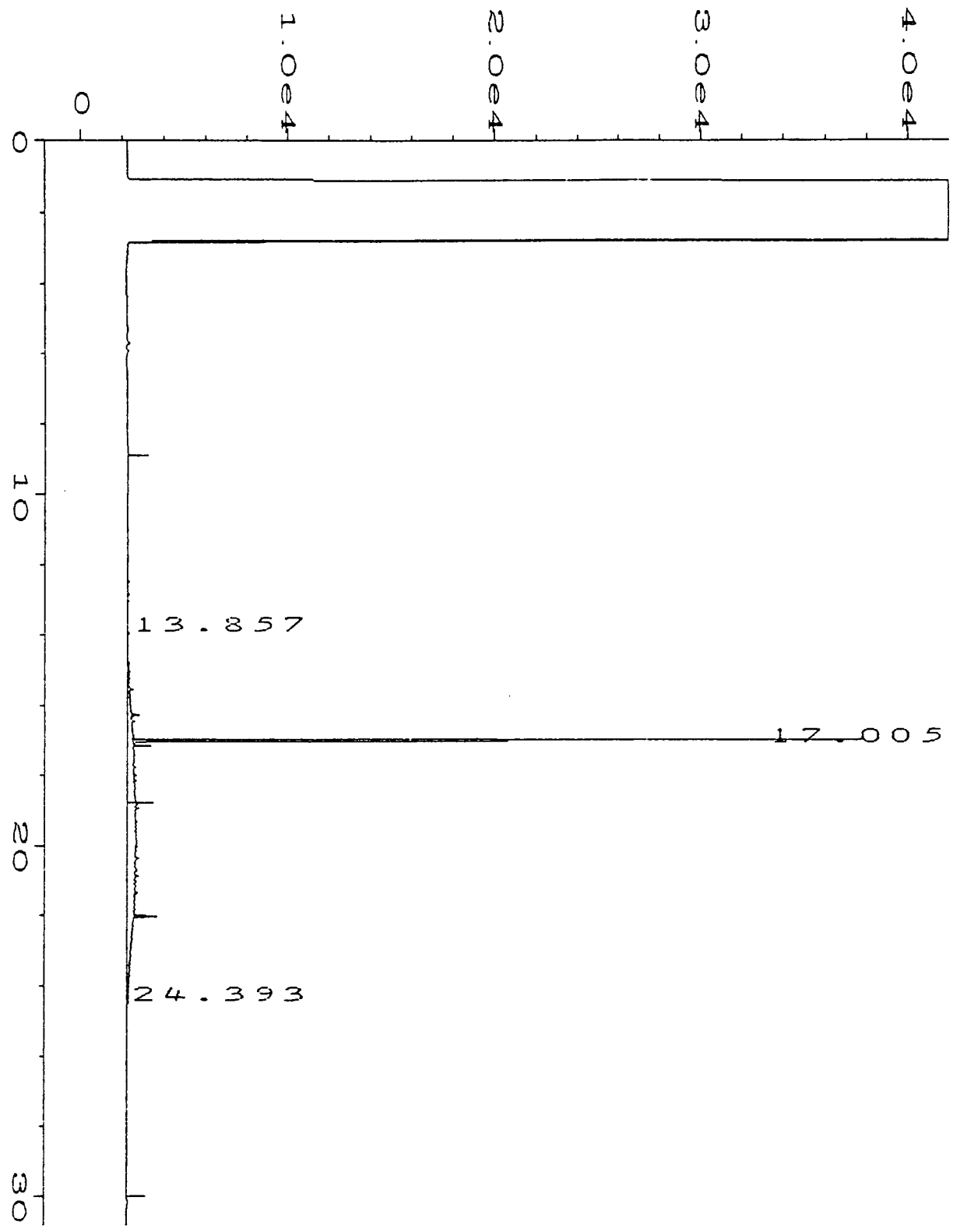
Instrument	: FID1	Vial Number	: 20
Sample Name	: 907053-01	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 01:32 AM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 09:27 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



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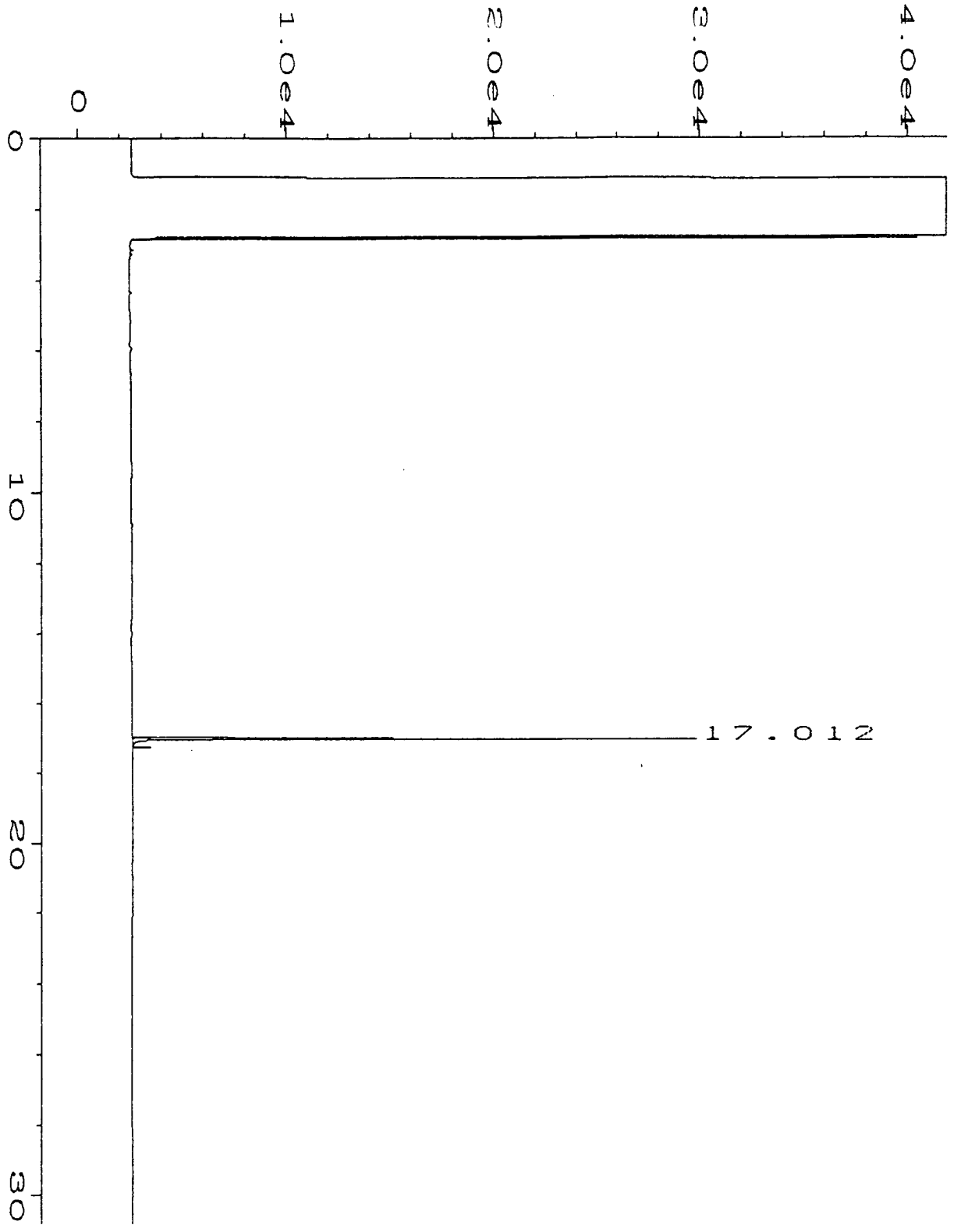
Instrument	: FID1	Vial Number	: 32
Sample Name	: 907053-02rr	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 12:07 PM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 12:42 PM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



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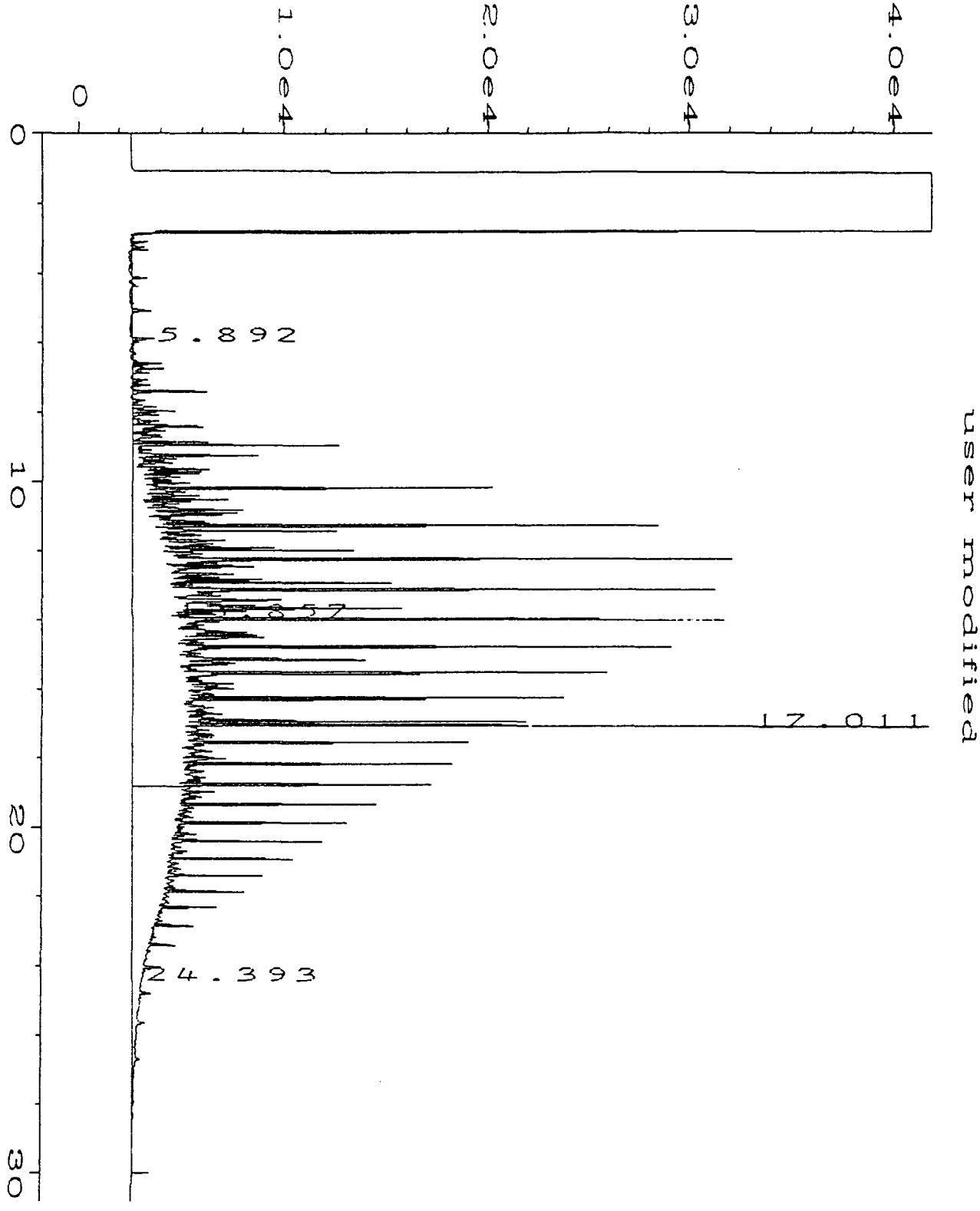
Instrument	: FID1	Vial Number	: 25
Sample Name	: 907053-03	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 05:32 AM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 11:24 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



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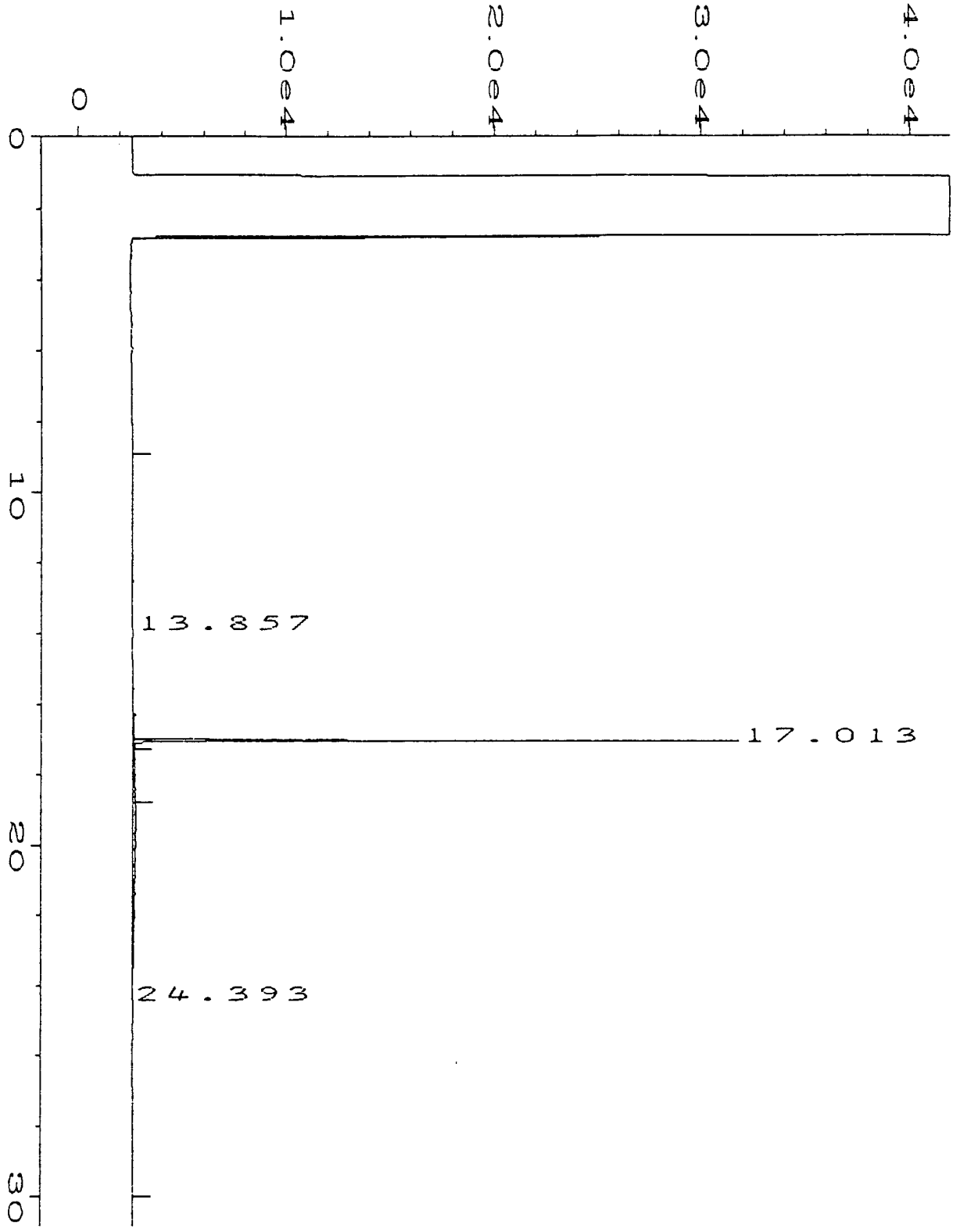
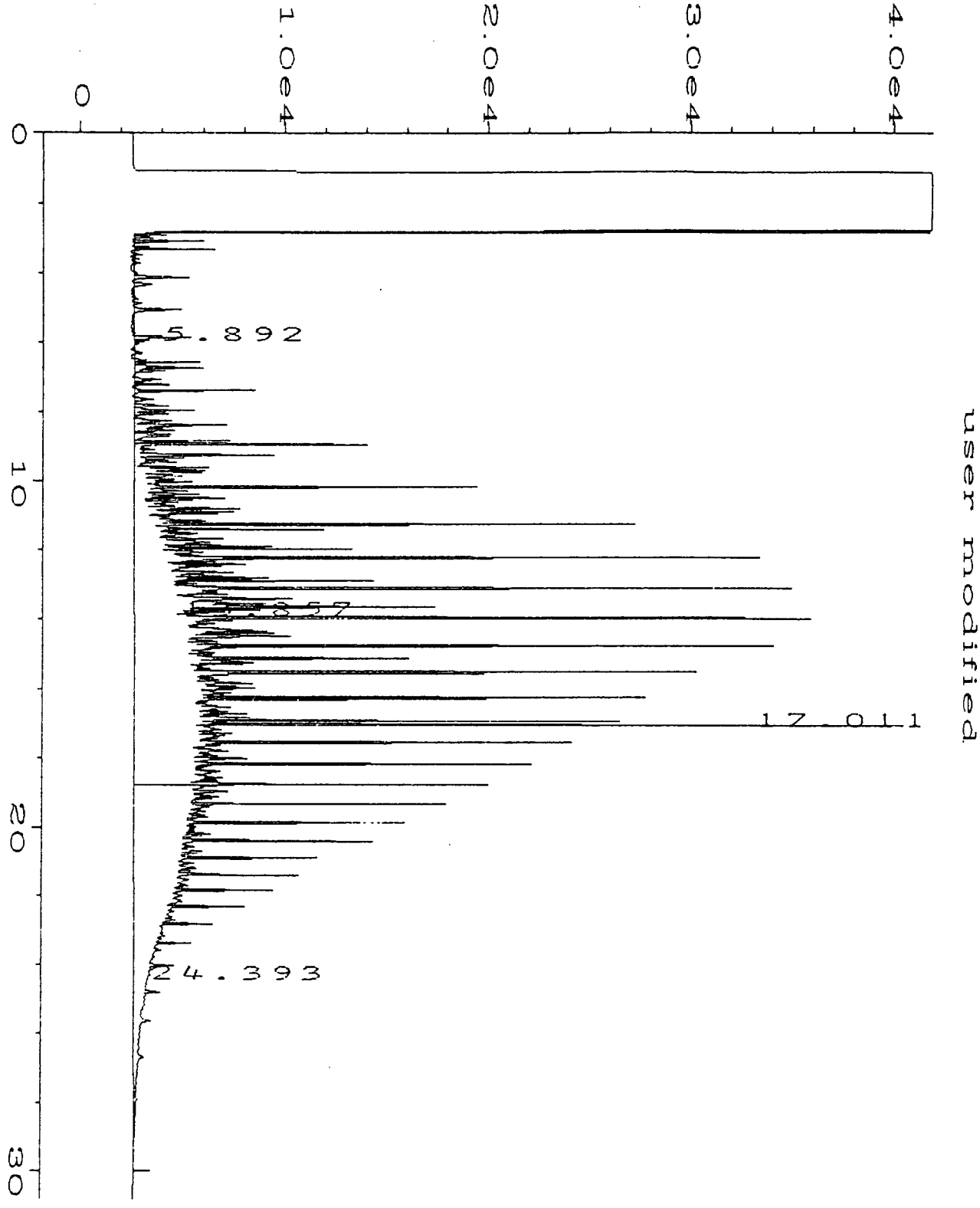
Instrument	: FID1	Vial Number	: 26
Sample Name	: 907053-04	Injection Number	: 1
Event Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 06:20 AM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 11:25 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



Data File Name	: C:\HPCHEM\2\DATA\20JUL99\027R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 27
Sample Name	: 907053-05	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 07:08 AM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 11:26 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



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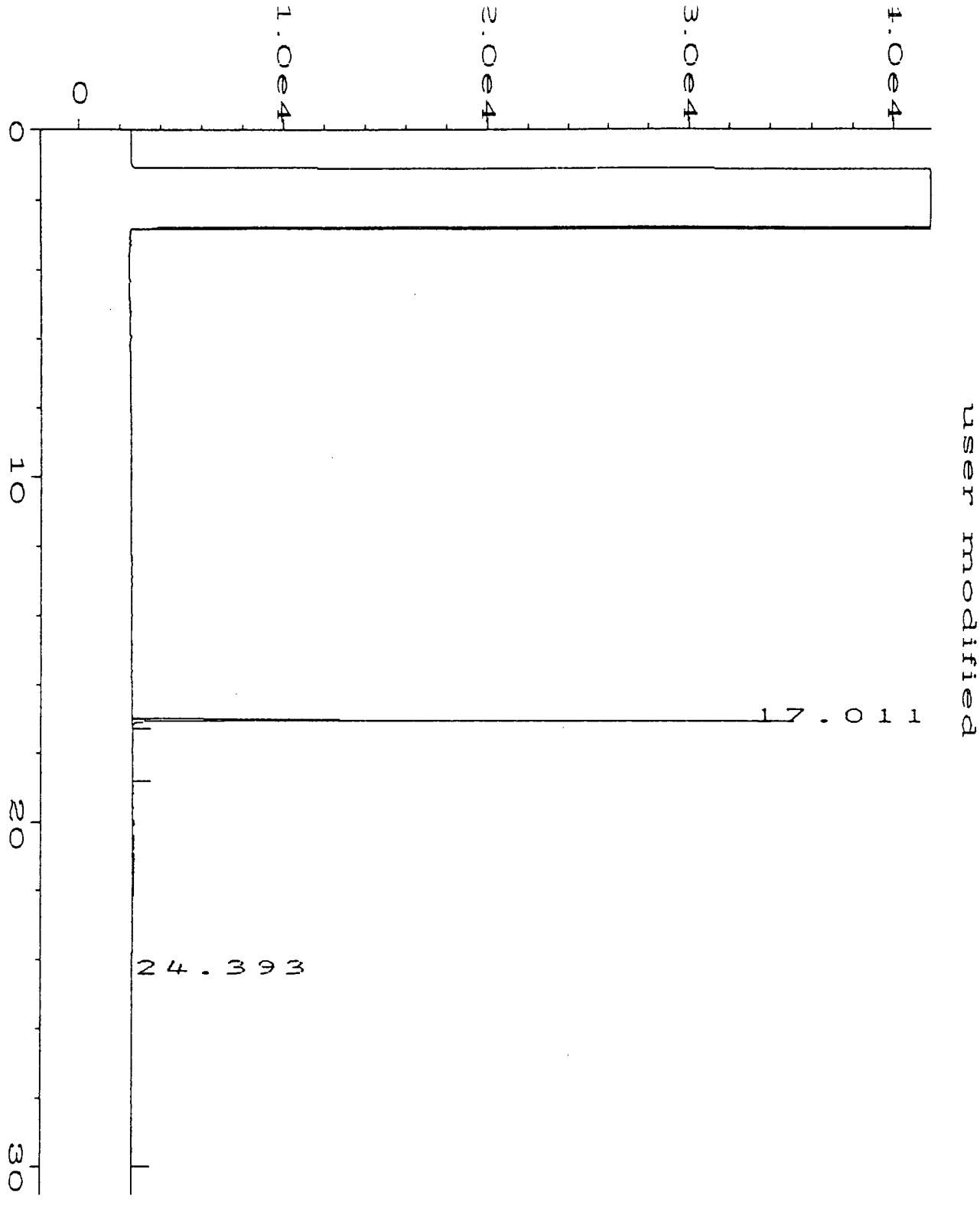
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 28
Sample Name	: 907053-06	Injection Number	: 1
Real Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 07:56 AM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 11:27 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



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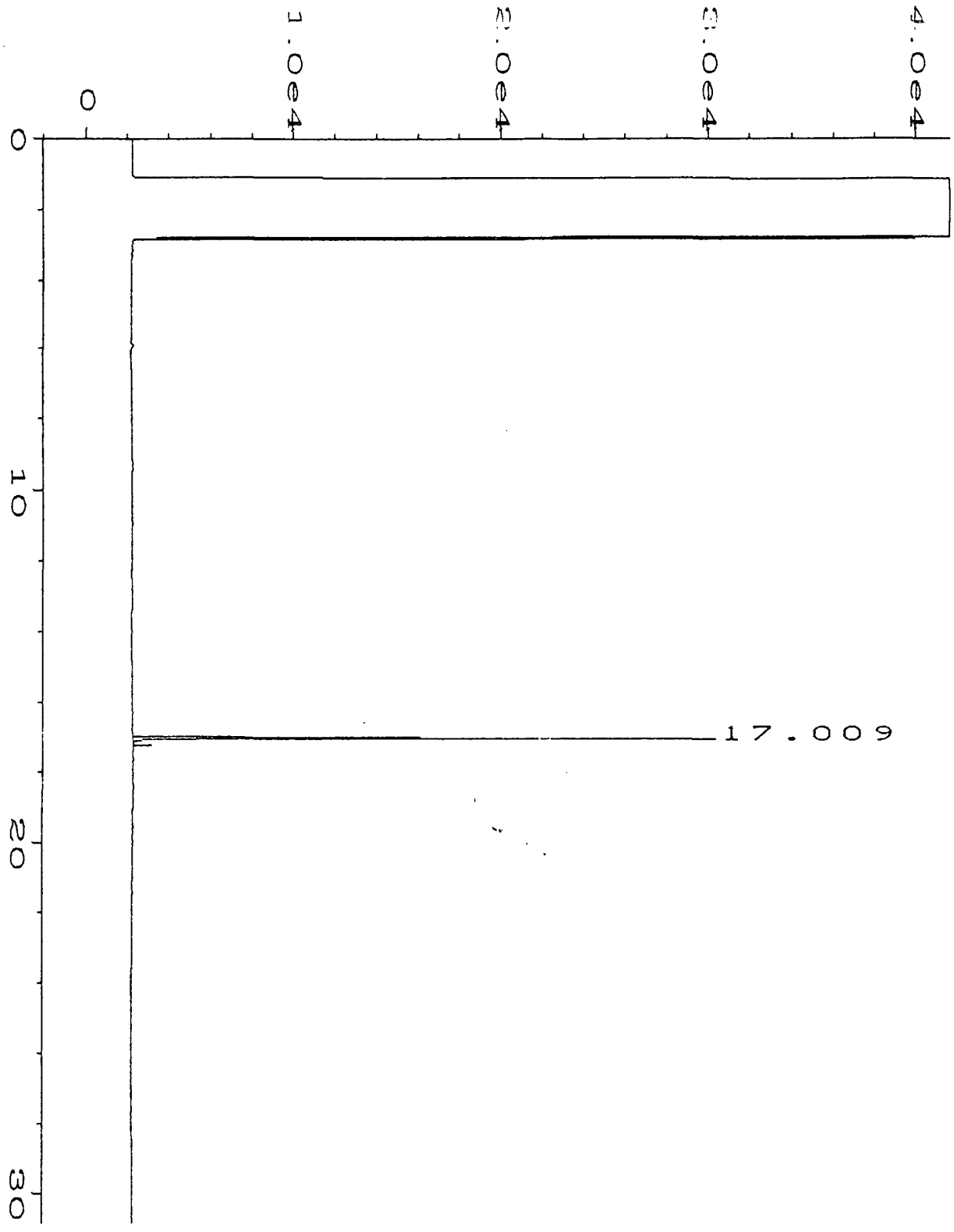
Instrument	: FID1	Vial Number	: 29
Sample Name	: 907053-07	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 08:43 AM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 11:28 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



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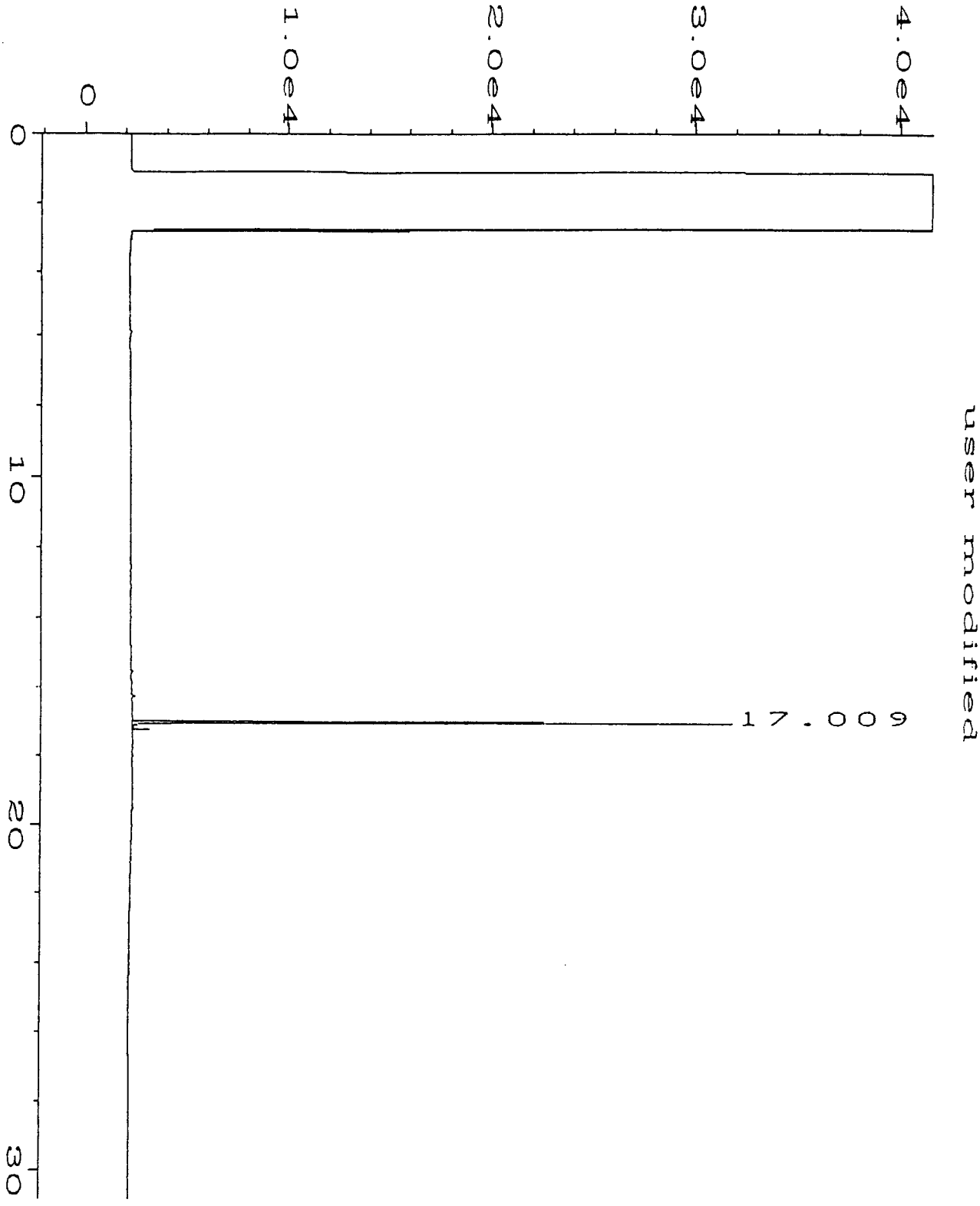
Instrument	: FID1	Vial Number	: 33
Sample Name	: 907053-08	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 12:41 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 10:39 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



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Instrument	: FID1	Vial Number	: 34
Sample Name	: 907053-09	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 01:32 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 10:39 AM	Analysis Method	: HX071599.MTH
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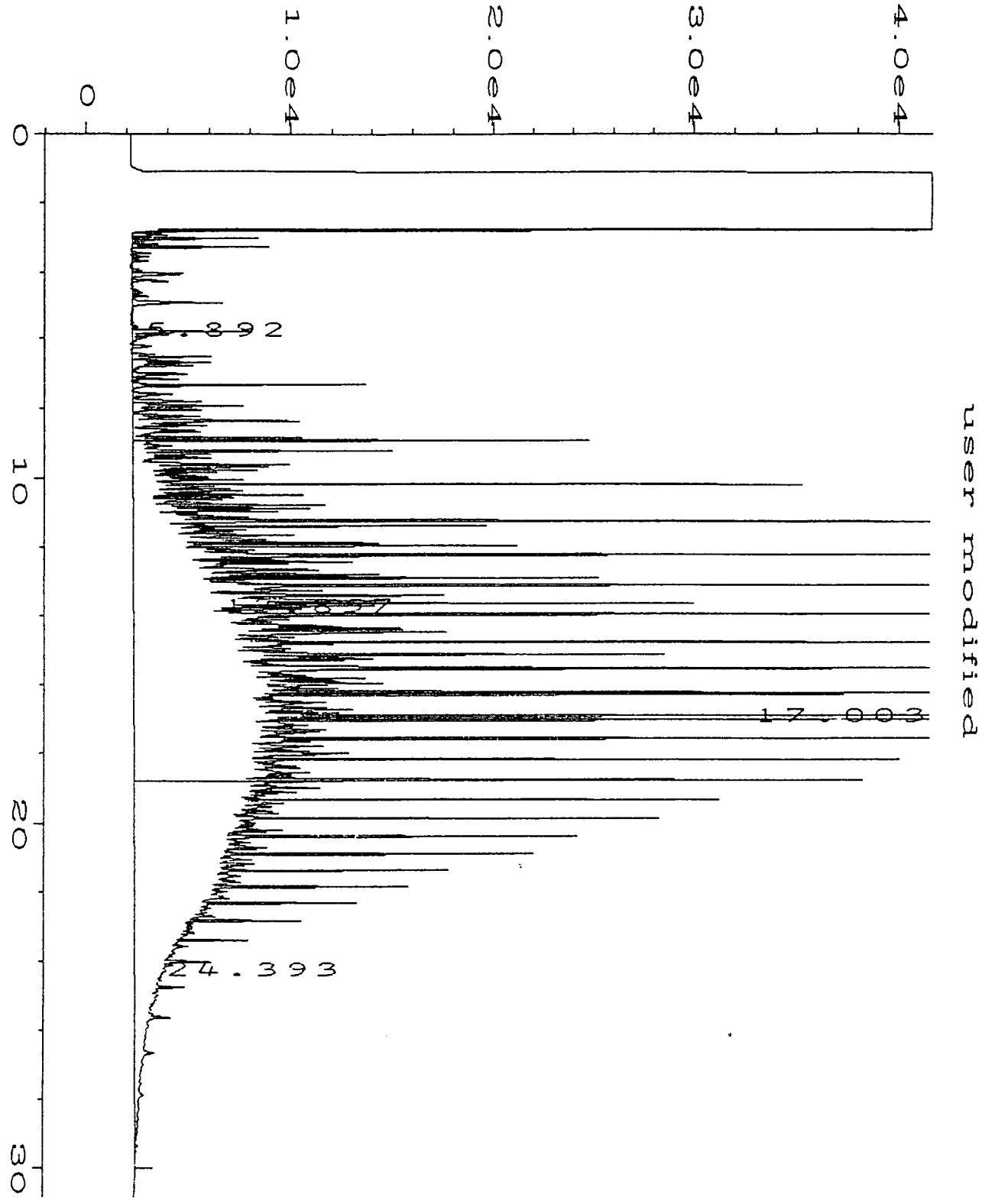
Multiplier	: 1	ISTD Amount	:



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Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 36
Sample Name	: 907053-10	Injection Number	: 1
Bar Code Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 03:32 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 10:40 AM	Analysis Method	: HX071599.MTH
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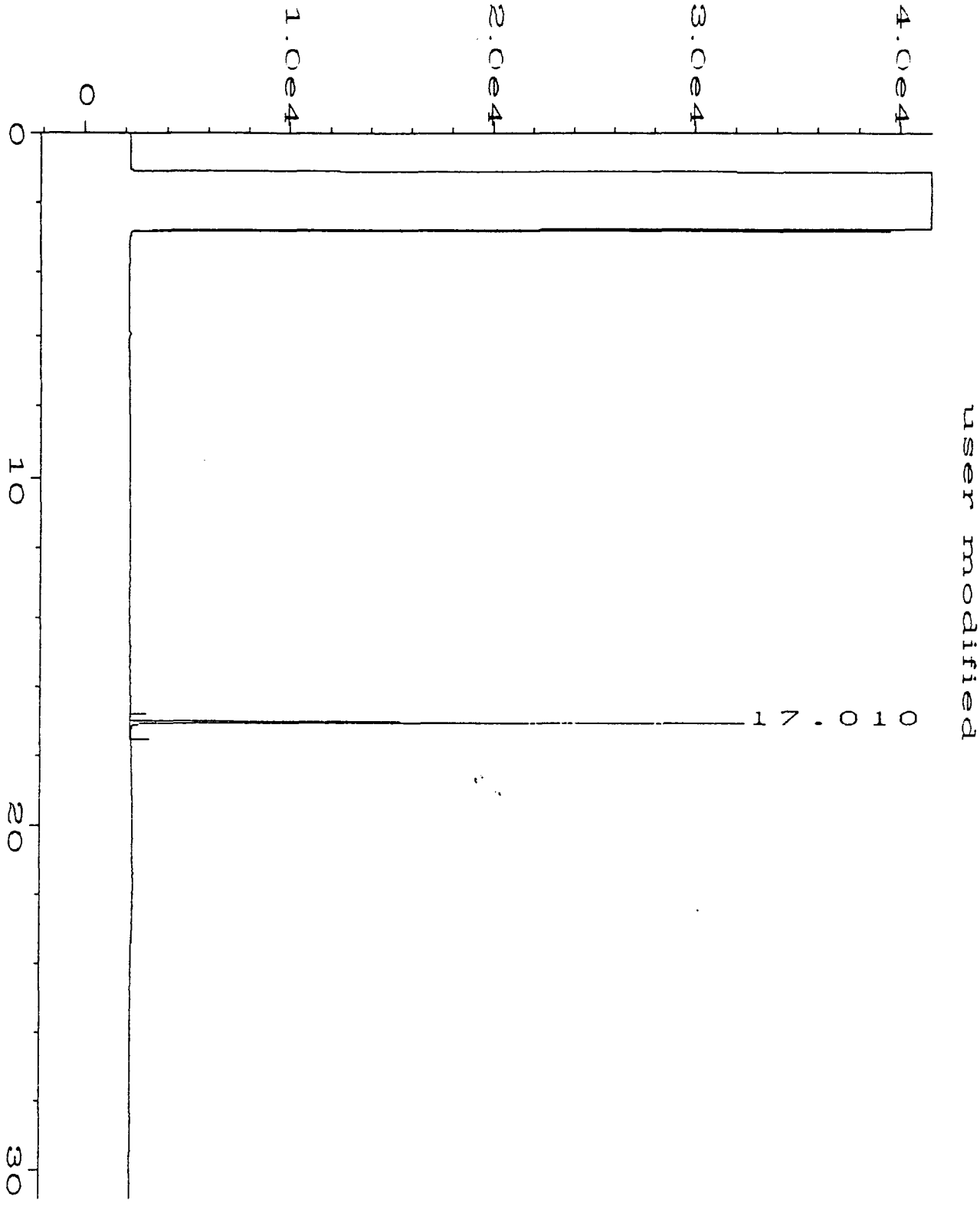
Multiplier	: 1	ISTD Amount	:



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Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 37
Sample Name	: 907053-11	Injection Number	: 1
Event Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 04:24 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 10:45 AM	Analysis Method	: HX071599.MTH
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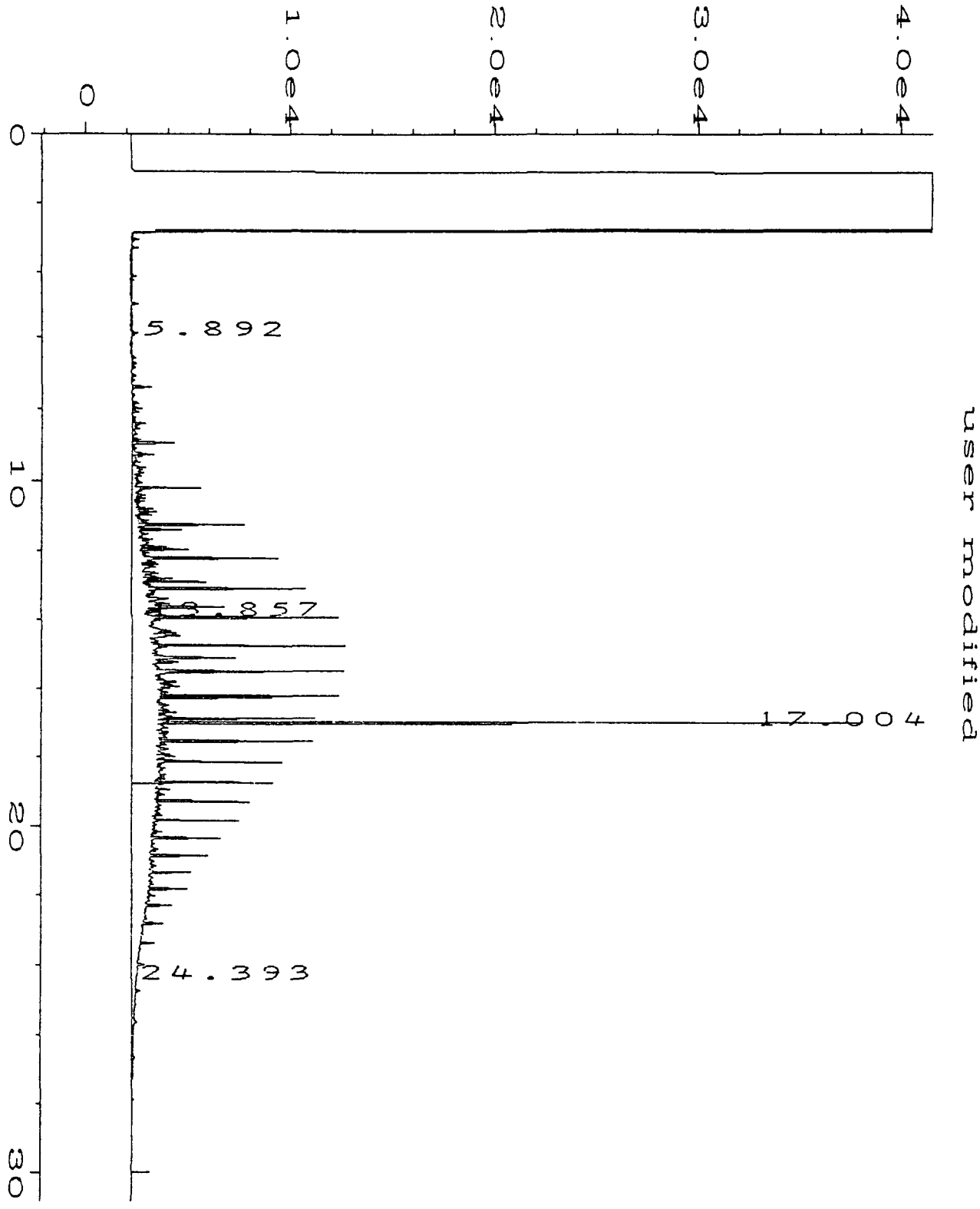
Multiplier	: 1	ISTD Amount	:



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Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 38
Sample Name	: 907053-12	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 05:15 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 10:52 AM	Analysis Method	: HX071599.MTH
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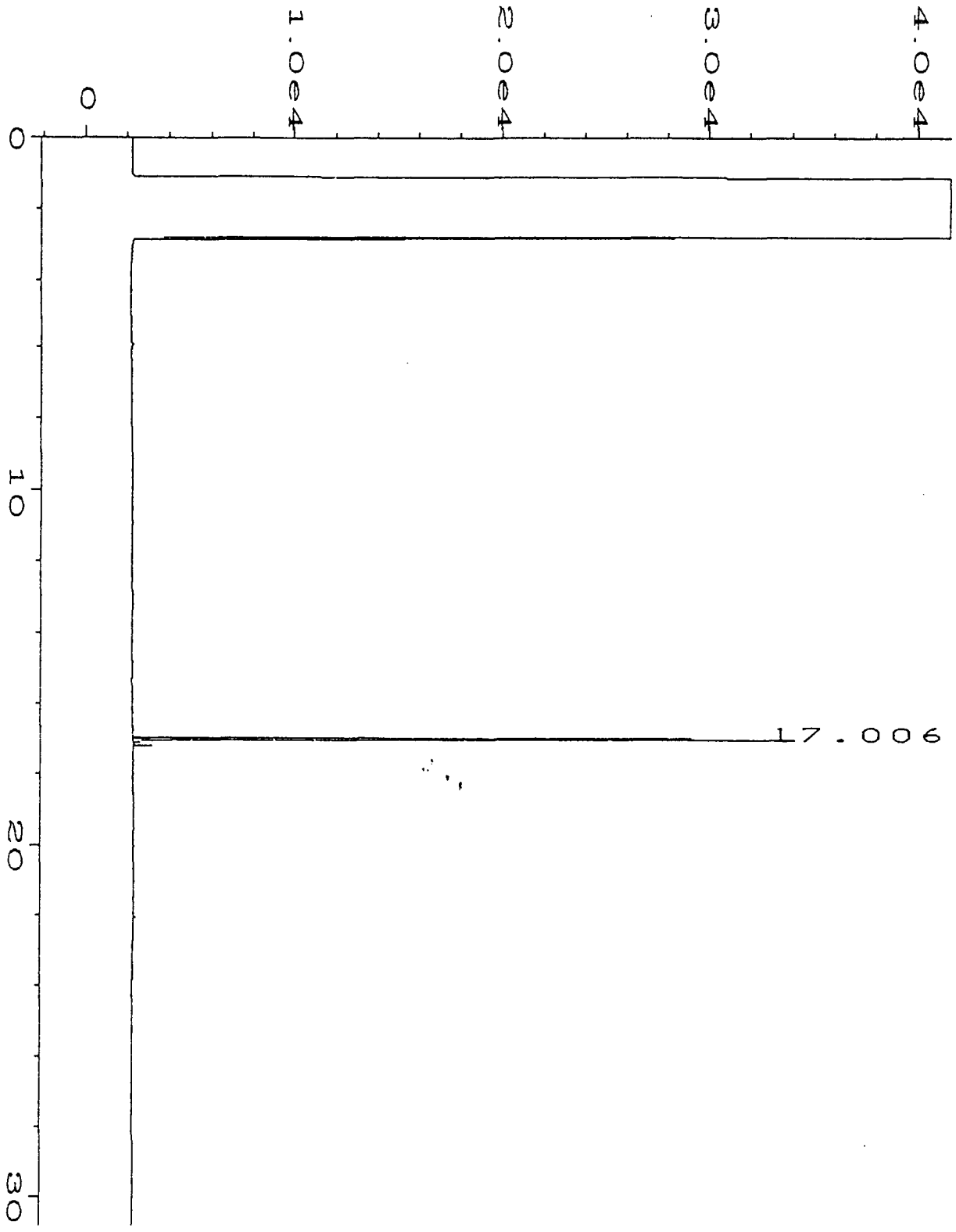
Multiplier	: 1	ISTD Amount	:



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Instrument : FID1
Sample Name : 907053-13
Run Time Bar Code:
Acquired on : 21 Jul 99 06:04 PM
Report Created on: 23 Jul 99 10:53 AM
Last Recalib on : 11 JAN 93 08:58 AM
Multiplier : 1

Page Number : 1
Vial Number : 39
Injection Number : 1
Sequence Line : 1
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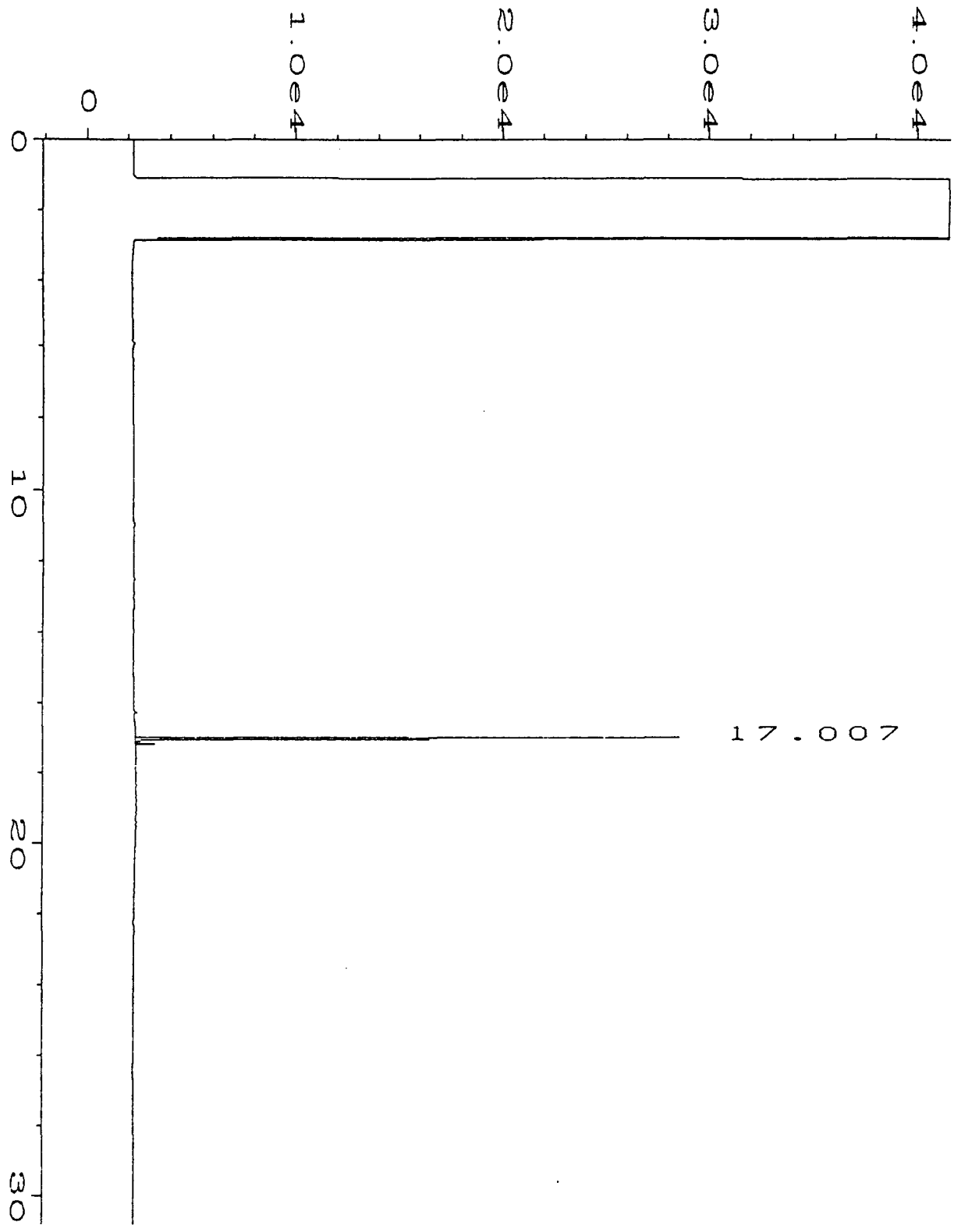
Analysis Method : HX071599.MTH
Sample Amount : 0
ISTD Amount :



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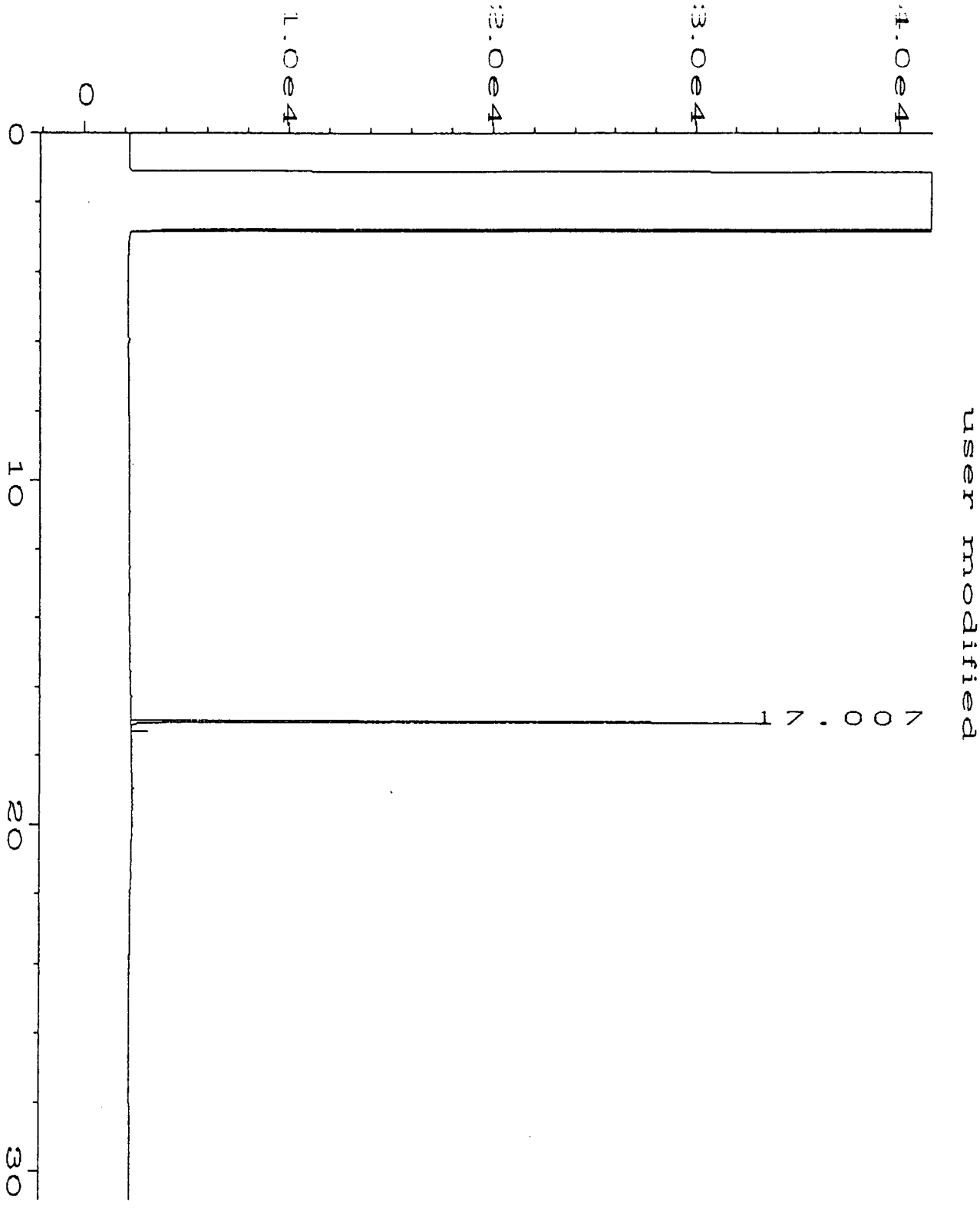
Instrument	: FID1	Vial Number	: 40
Sample Name	: 907053-14	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 06:52 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 10:53 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



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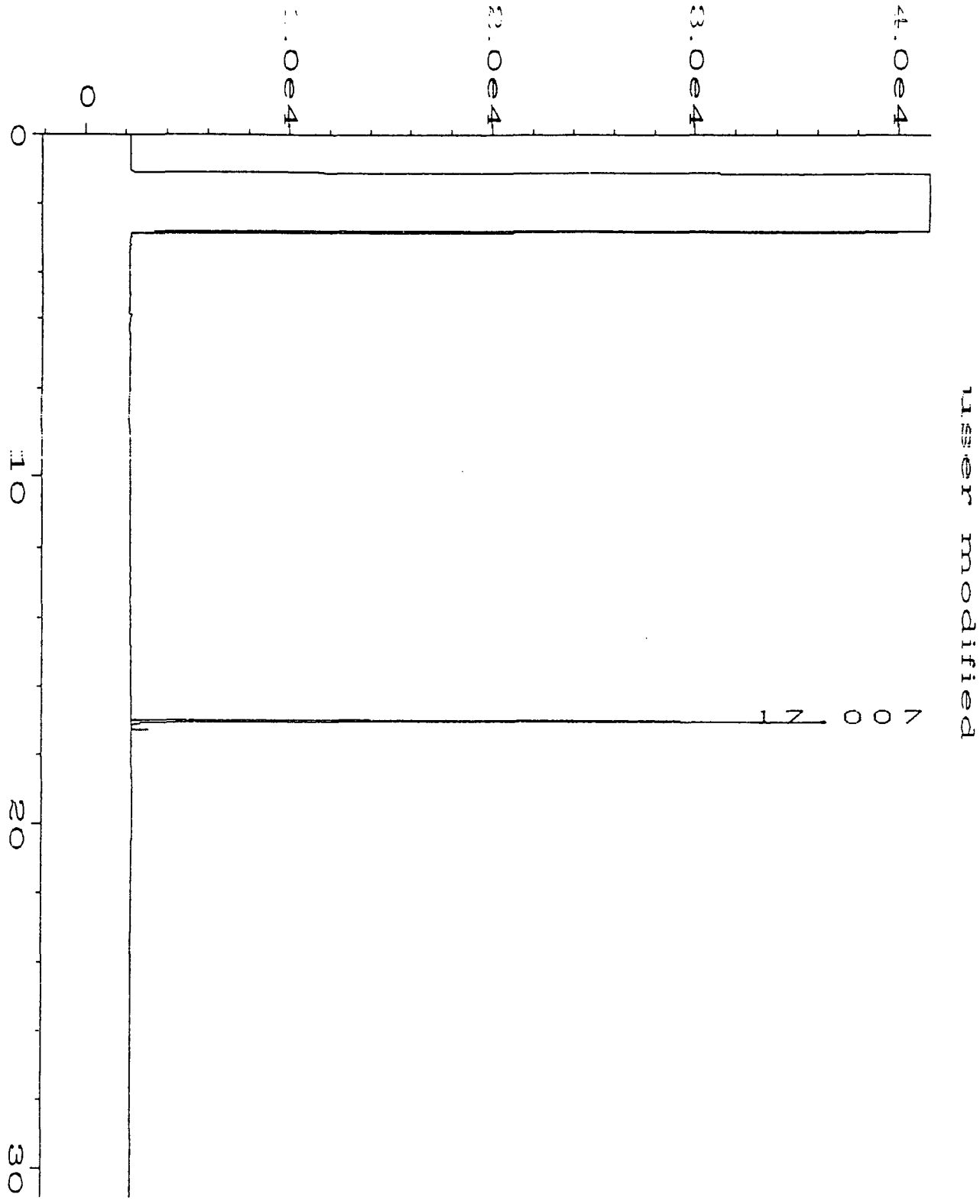
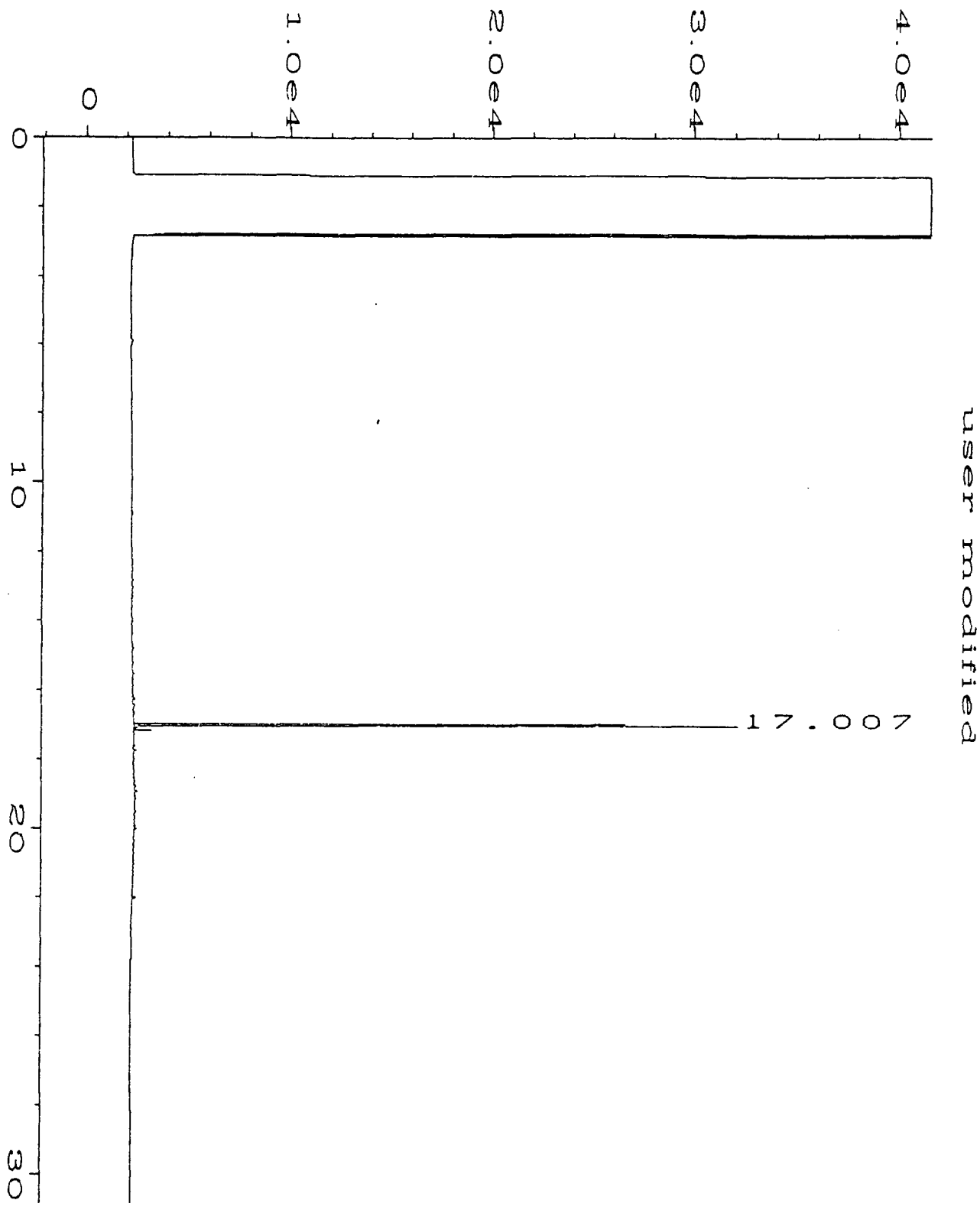
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 41
Sample Name	: 907053-15	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 07:40 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 11:32 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

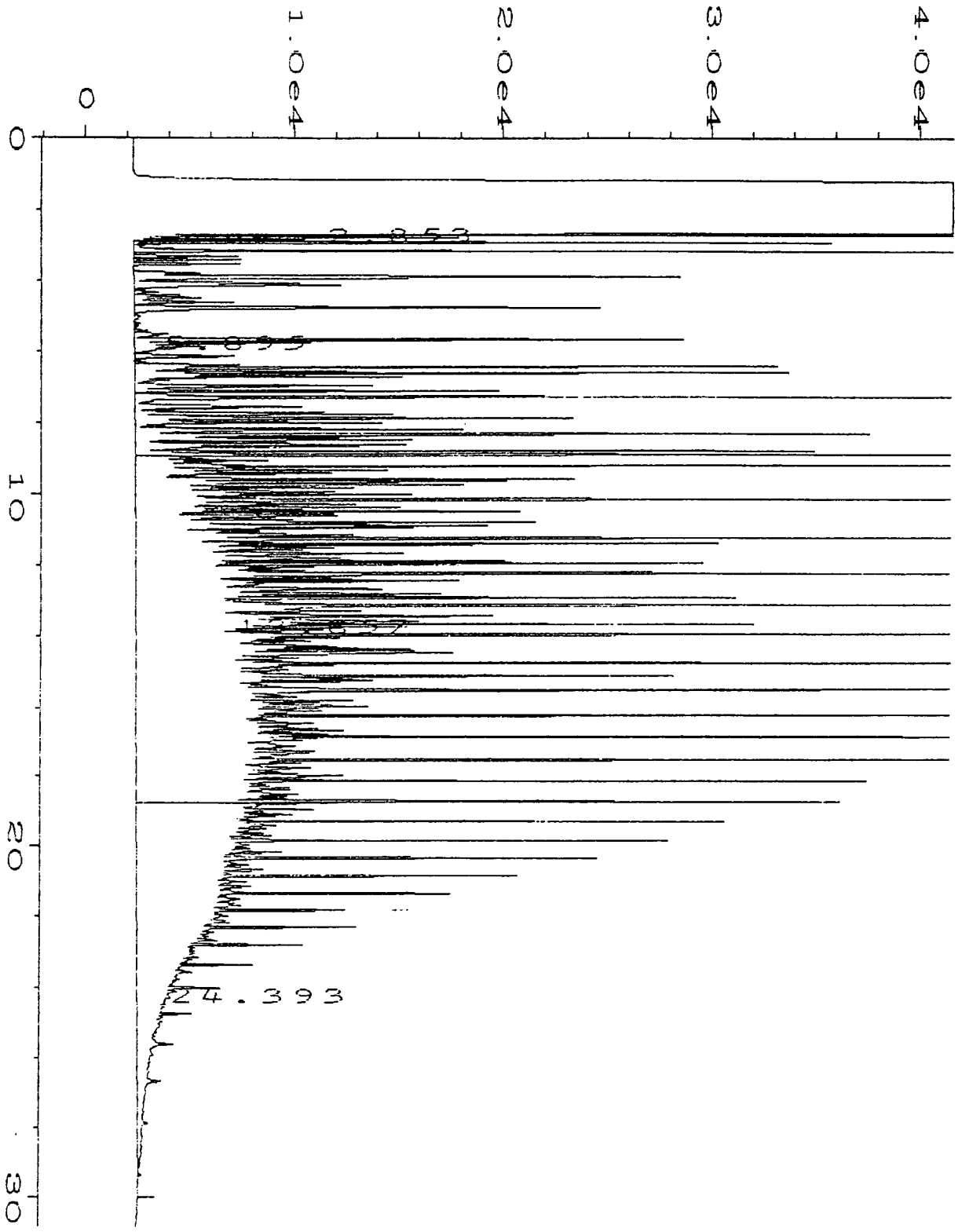


Data File Name : C:\HPCHEM\2\DATA\20JUL99\042R0101.D
Operator : Pinnacle - rg & cff
Instrument : FID1
Sample Name : 907053-16
Real Time Bar Code:
Acquired on : 21 Jul 99 08:28 PM
Report Created on: 23 Jul 99 11:33 AM
Last Recalib on : 11 JAN 93 08:58 AM
Multiplier : 1

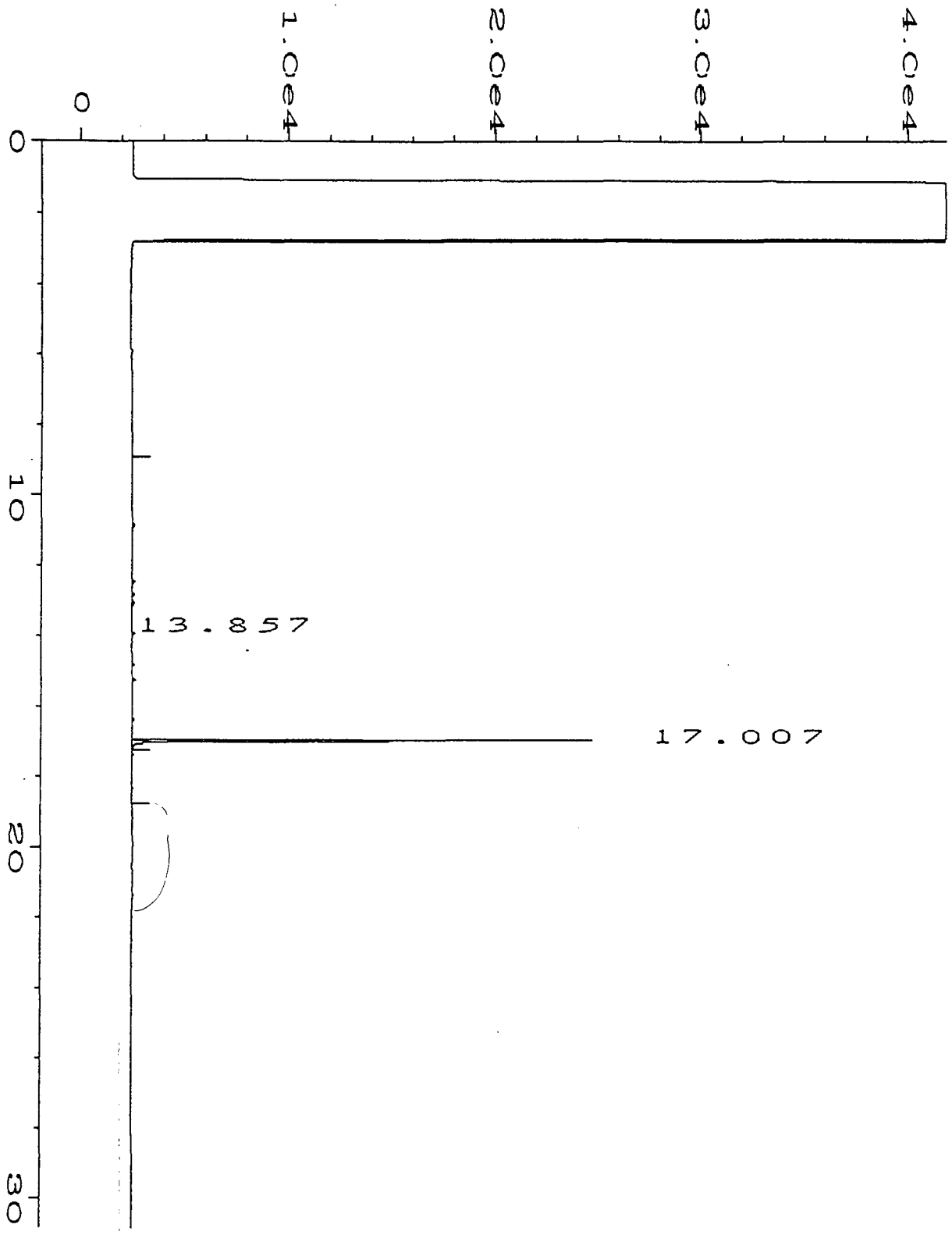
Page Number : 1
Vial Number : 42
Injection Number : 1
Sequence Line : 1
Instrument Method: HX071599.MTH
Analysis Method : HX071599.MTH
Sample Amount : 0
ISTD Amount :



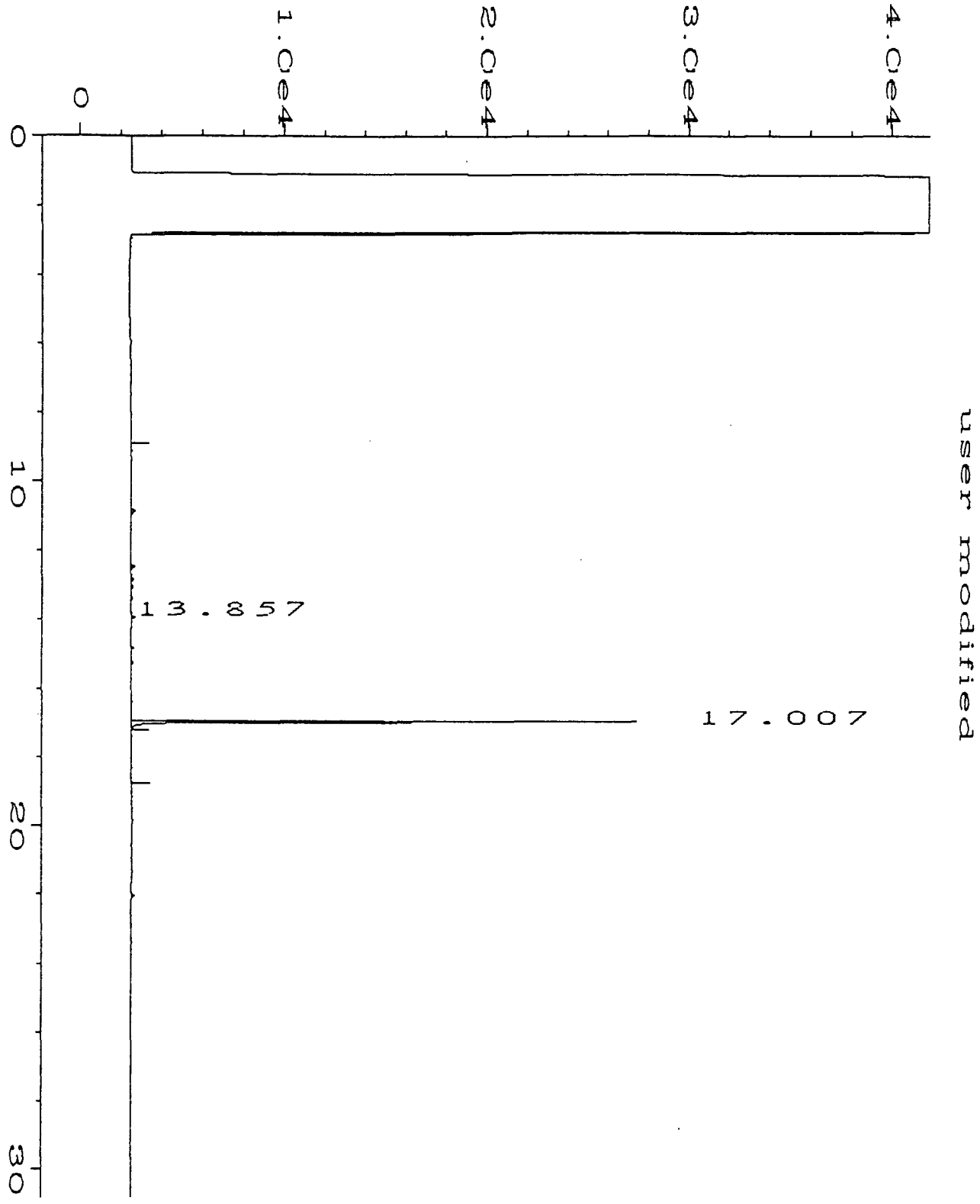
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\043R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 43
Sample Name	: 907053-17	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 09:15 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 11:33 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



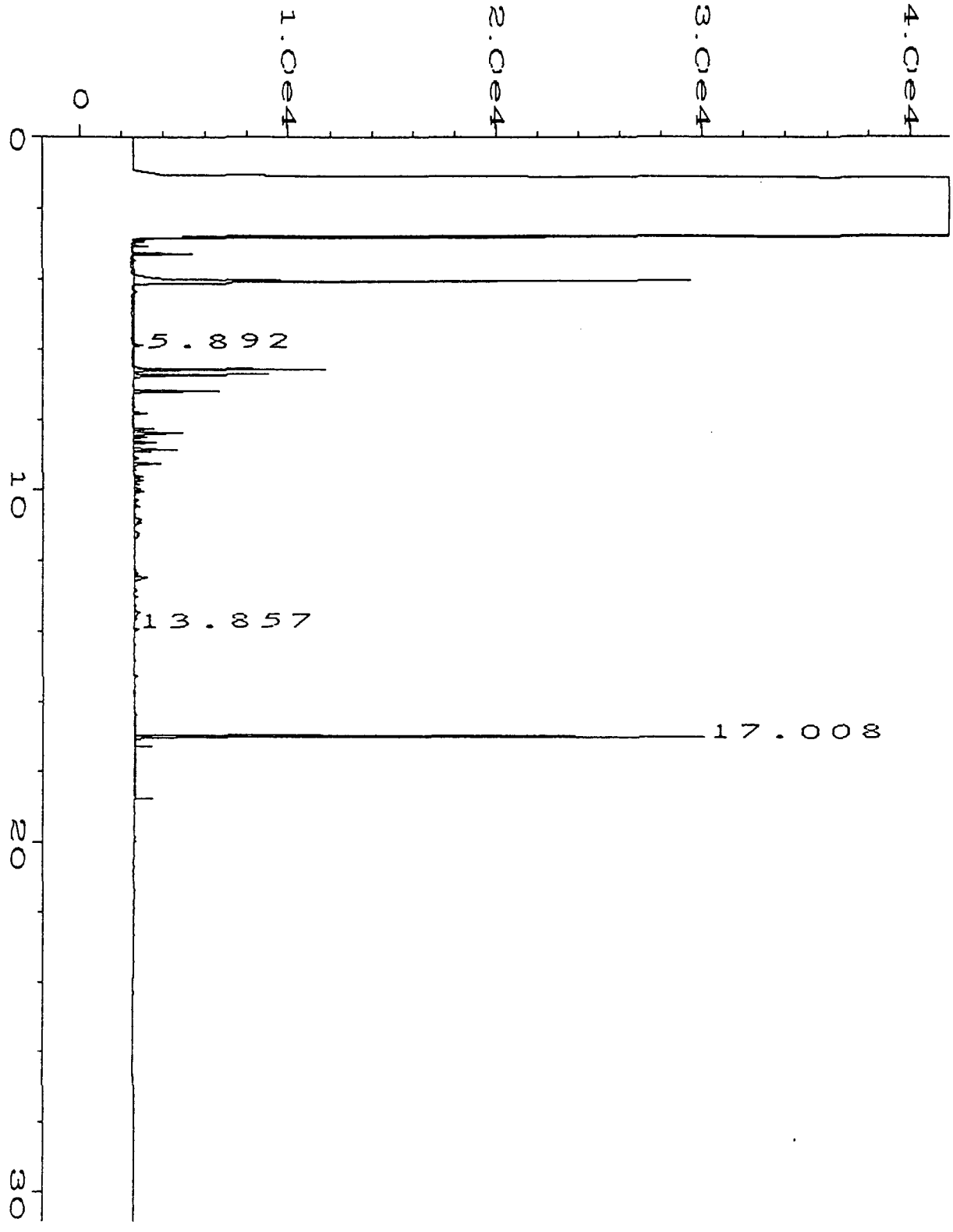
Data File Name	: C:\HPCHEM\2\DATA\23JUL99\004R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 4
Sample Name	: 907053-18*20	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 23 Jul 99 03:08 PM	Instrument Method	: HX071599.MTH
Report Created on	: 26 Jul 99 09:14 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



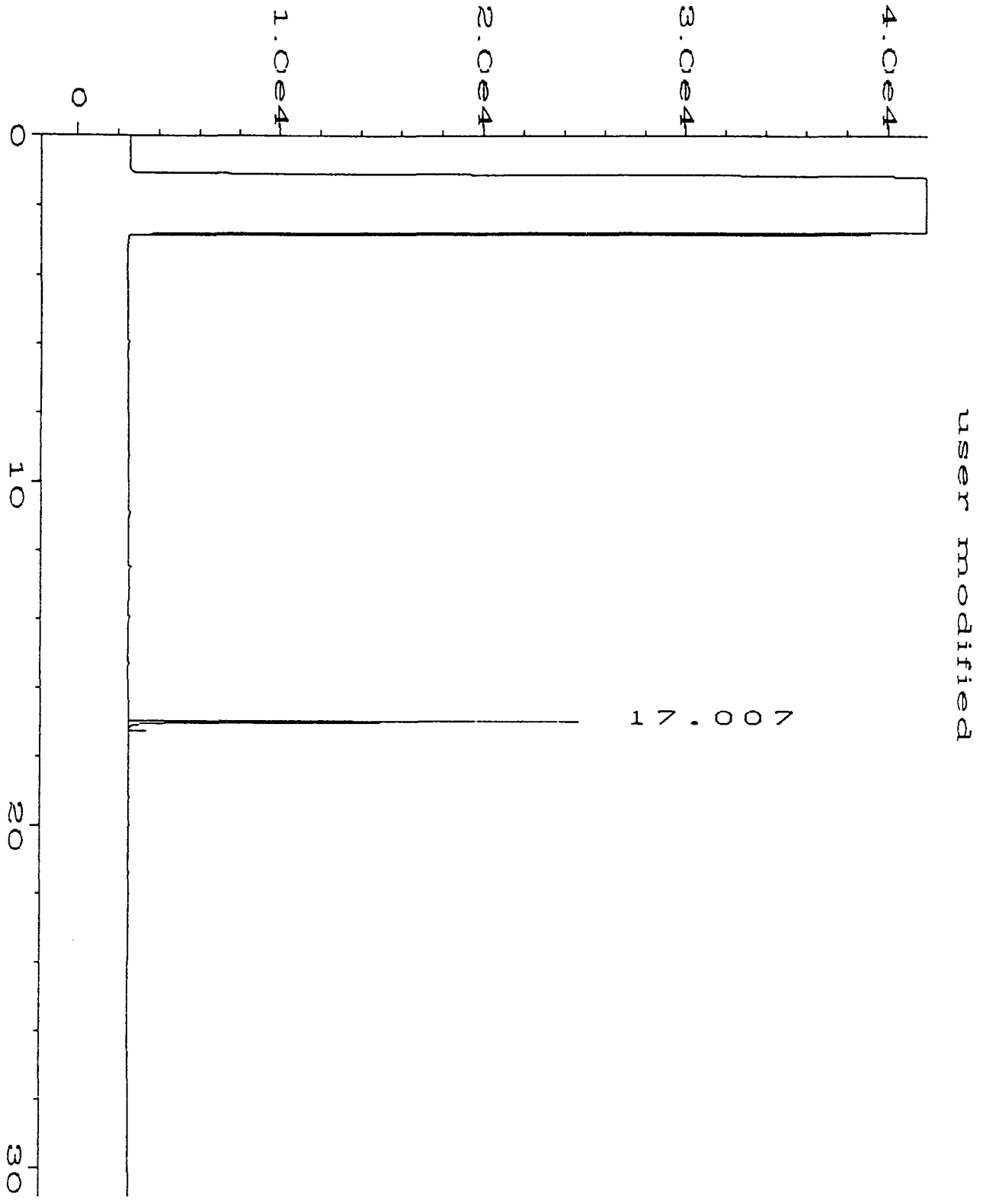
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\011R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 11
Sample Name	: 907053-19	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 20 Jul 99 06:08 PM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 09:16 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



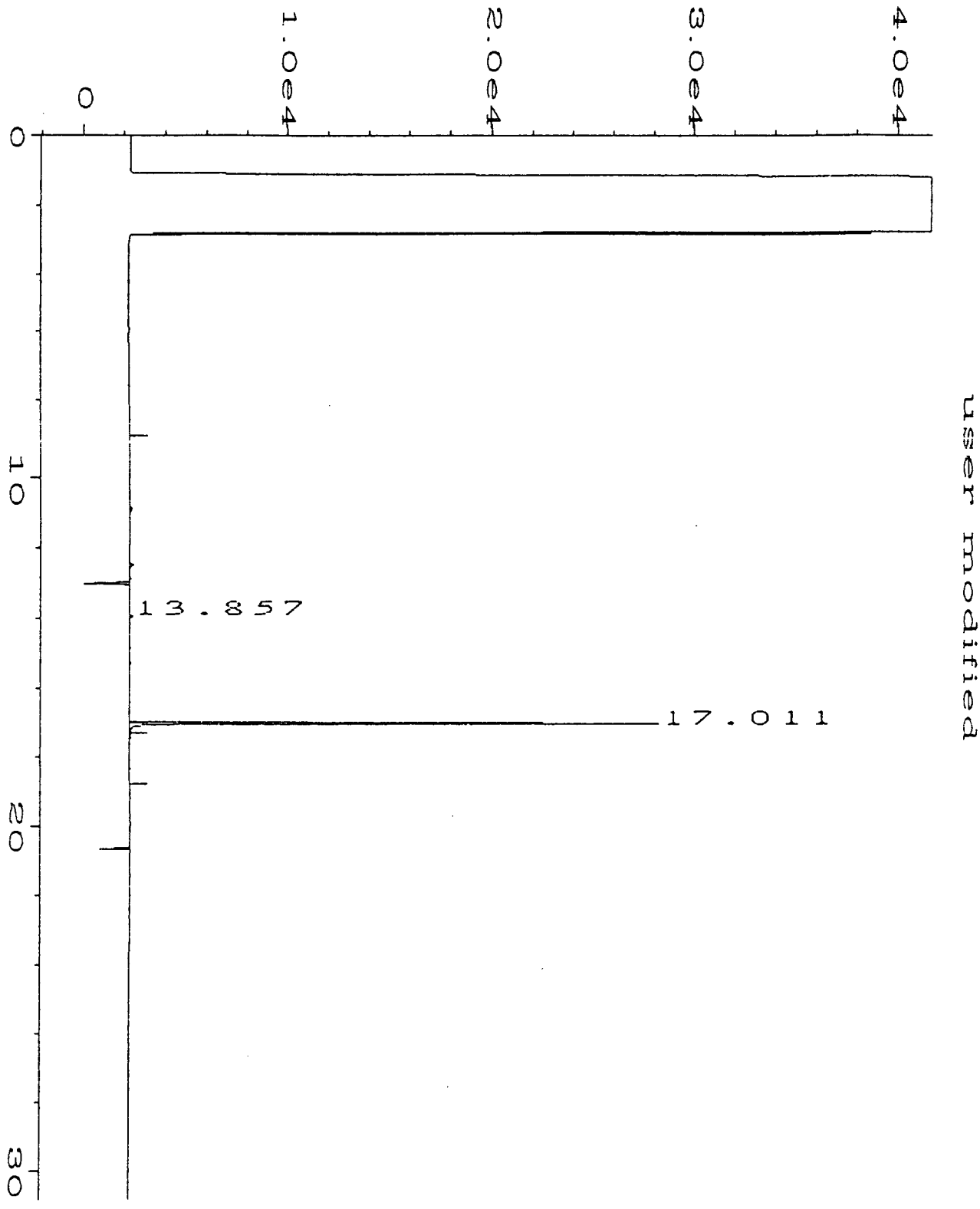
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\012R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 12
Sample Name	: 907053-20	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 20 Jul 99 06:59 PM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 09:16 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



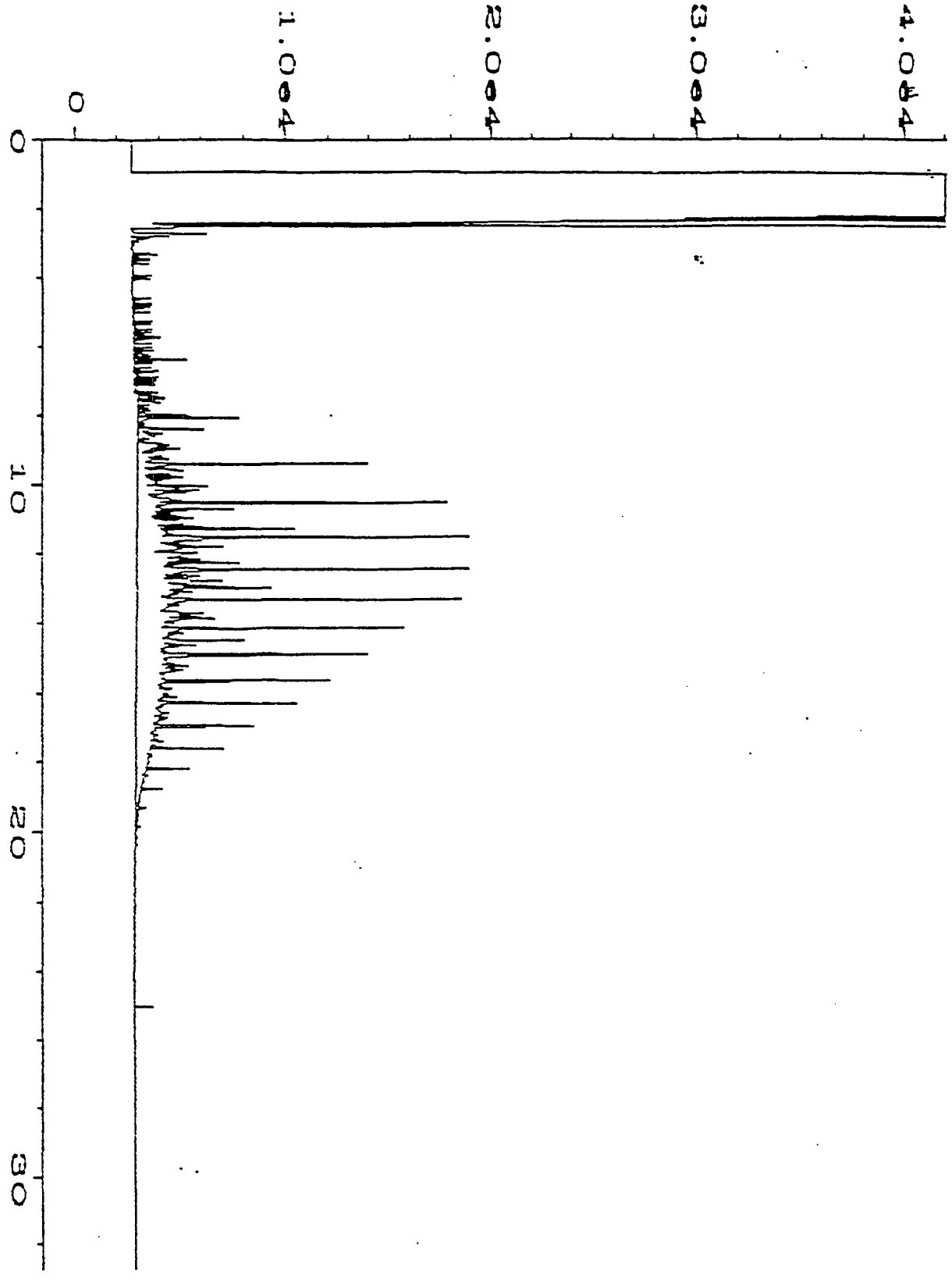
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\014R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 14
Sample Name	: 907053-21	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 20 Jul 99 08:39 PM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 09:18 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



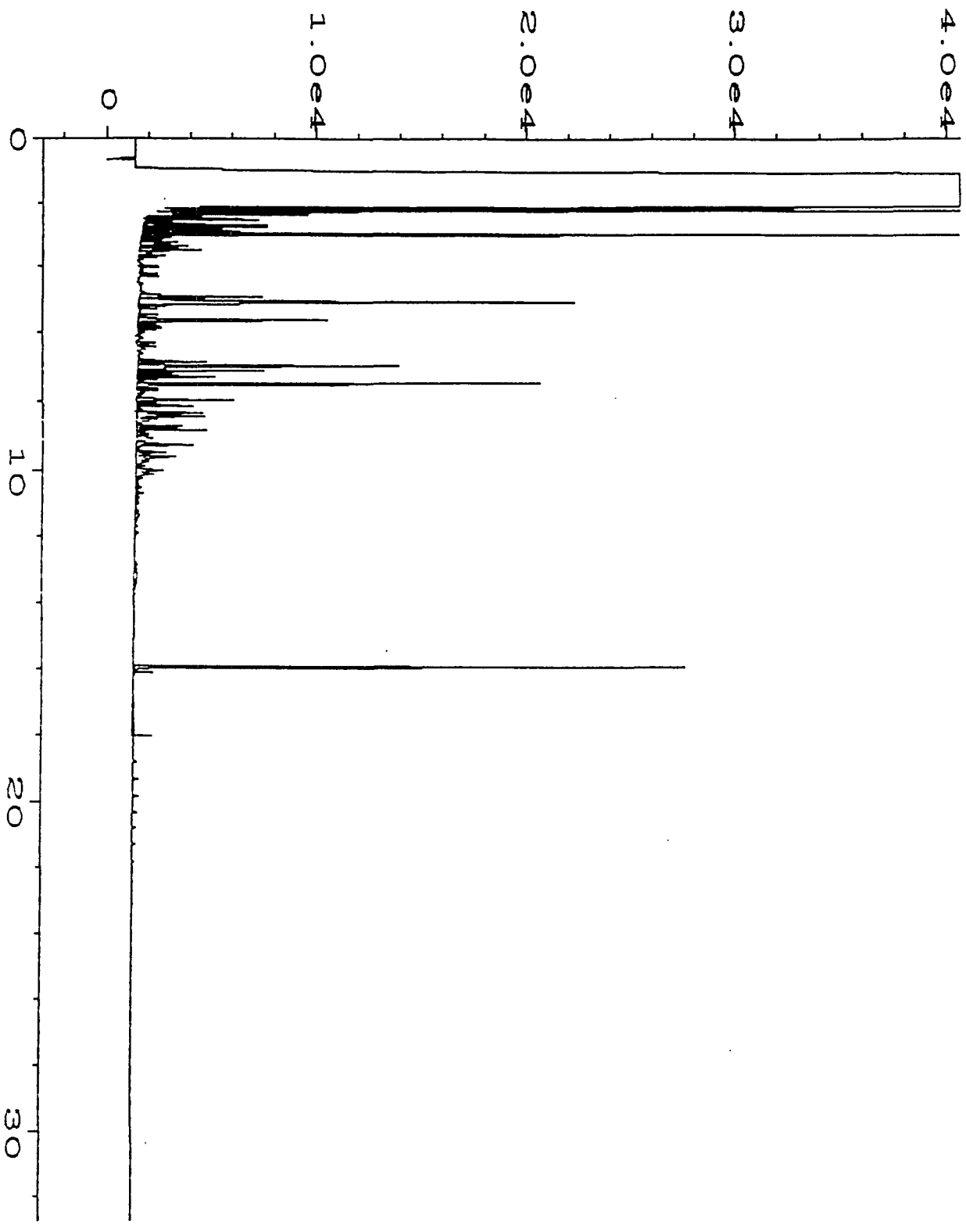
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\015R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 15
Sample Name	: 907053-22	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 20 Jul 99 09:29 PM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 09:19 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



Data File Name	: C:\HPCHEM\2\DATA\20JUL99\031R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 31
Sample Name	: 907053-23rr	Injection Number	: 1
Bar Code Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 11:19 AM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 12:50 PM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

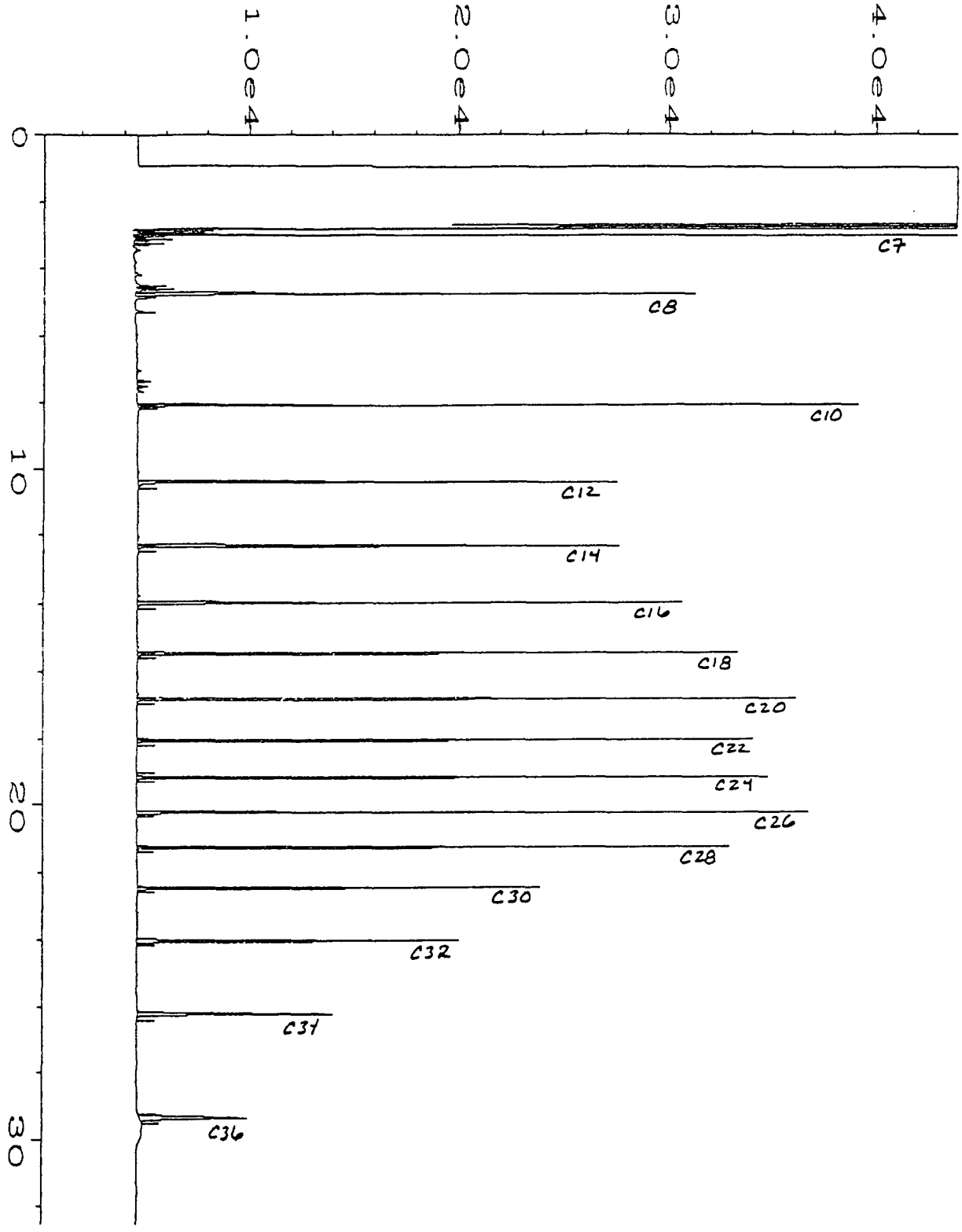


Data File Name	: C:\HPCHEM\1\DATA\16SEPT97\011F0101.D		
Operator	: AEN NM GC #1 FID DI	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	: 11
Sample Name	: DSL GC3-103-15	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Sep 97 08:50 PM	Instrument Method	: SDF0820.MTH
Report Created on	: 17 Sep 97 11:19 AM	Analysis Method	: SDF0820.MTH



ta File Name : C:\HPCHEM\2\DATA\12FEB99\002F0101.D
er or : Pinnacle - mb & cff
strament : FID1
mple Name : gas gc3-141-23
n Time Bar Code:
quired on : 12 Feb 99 10:38 AM
port Created on: 12 Feb 99 11:45 AM

Page Number : 1
Vial Number : 2
Injection Number : 1
Sequence Line : 1
Instrument Method: RT061698.MTH
Analysis Method : RT061698.MTH



user modified

Data File Name : B:\11APR96\004F0101.D
Operator : DJ
Instrument : GC#1 5890
Sample Name : RET TIME STAND
Ru Time Bar Code:
Acquired on : 11 Apr 96 10:17 AM
Report Created on: 03 Dec 98 02:11 PM

Page Number : 1
Vial Number : 4
Injection Number : 1
Sequence Line : 1
Instrument Method: SDF0311.MTH
Analysis Method : RT061698.MTH