AP - 010

STAGE 1 & 2 REPORTS

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Comprehensive Report Addendum
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
Phillips Pipe Line Company
3B11 Adams Building
Bartlesville, Oklahoma 74004

Prepared By:

Higgins and Associates, L.L.C.
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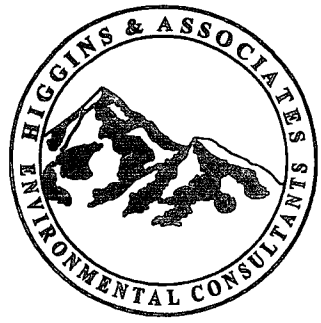

Higgins and Associates, LLC

December 28, 1999

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

RE: Comprehensive Report Addendum 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 Addendum for Groundwater Abatement Plan AP-10 at the Line NM-1-1 Site located in Hobbs, New Mexico. The above referenced report is based on the completion of the scope of work outlined in the Stage 1 Abatement Plan dated March 22, 1999, and the Comprehensive Report dated September 15, 1999. The abatement plan and comprehensive report 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.

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
Phone 303-708-9846 • Fax 303-708-9848

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1.0 Project Background and Initial Abatement Activities

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. The nearest well is located approximately 400 feet east/southeast of the pipeline release.

On October 27, 1999, Phillips Pipe Line (Phillips) personnel discovered a release of unrefined petroleum products (crude oil) associated with a local well field gathering pipeline 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.

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 geophysical investigative methods; Surface Induction Profiling (SIP) and Vertical Induction Profiling (VIP).

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. Details of the geophysical survey are discussed in the Comprehensive report dated September 15, 1999.

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 when 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 October 20, 1999, a total of approximately 2,400 gallons (57.1 barrels) of crude oil have been recovered.

2.0 Stage 1 Abatement Plan Assessment Activities

2.1 Drilling Activities

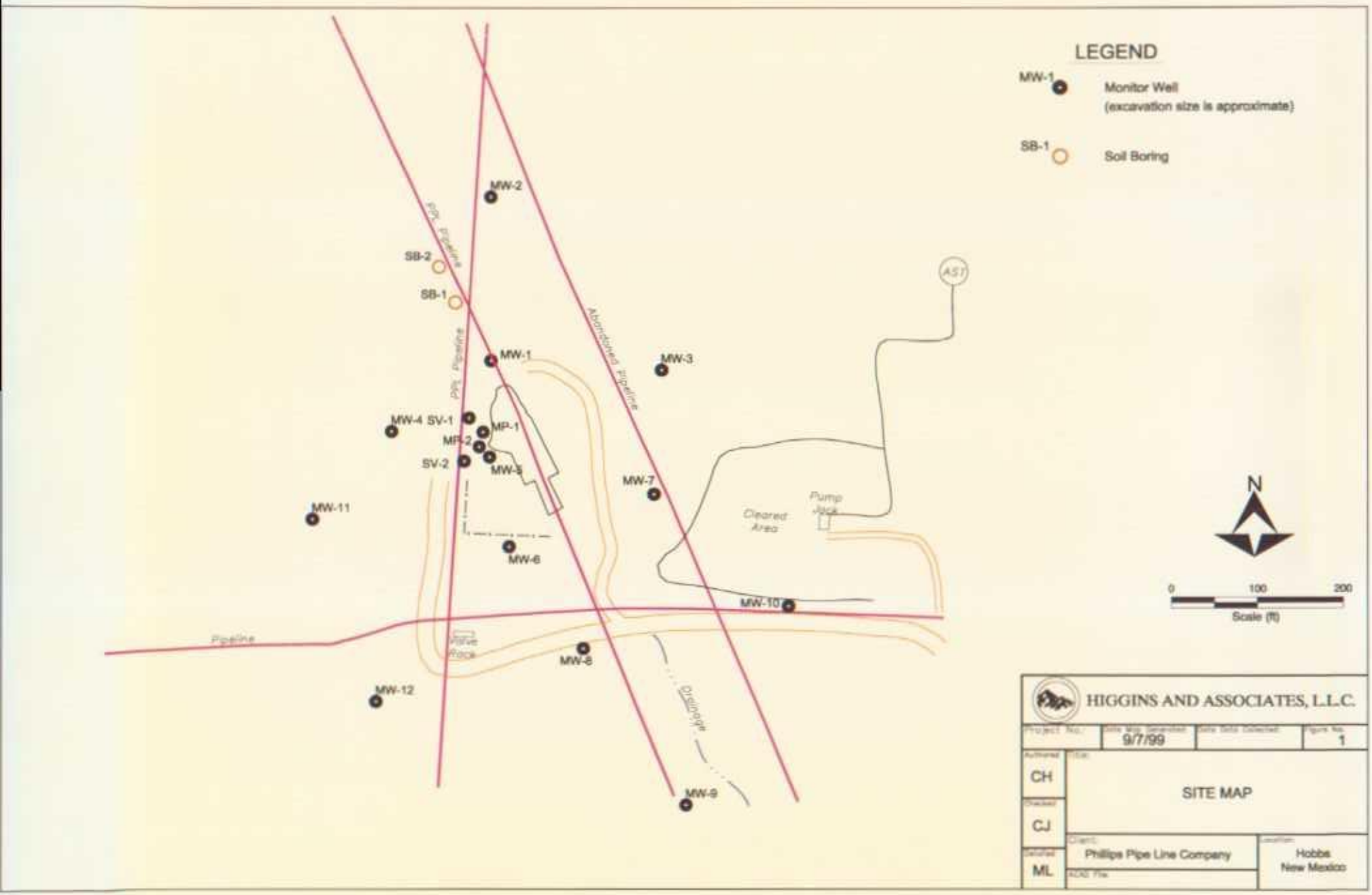
On July 13, 1999 through July 16, 1999, Higgins and Associates supervised the drilling and installation of monitoring wells MW-2 through MW-10 and two shallow soil borings (SB-1 and SB-2) (Figure 1). The results of the SIP and VIP geophysical surveys were taken into account for the locations of wells 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.

On October 18, 1999 through October 19, 1999, Higgins and Associates supervised the drilling and installation of monitoring wells MW-11, MW-12, monitoring points MP-1, MP-2, and vapor extraction wells SV-1 and SV-2. Monitoring wells MW-11 and MW-12 were installed to further delineate the dissolved hydrocarbon plume. Monitoring points MP-1 and MP-2, and vapor extraction wells SV-1 and SV-2 were installed within the hydrocarbon plume for the purpose of performing soil vapor extraction and biovent pilot tests. The pilot tests were performed on October 20, 1999 through October 24, 1999. The results of the pilot tests will be presented in detail in the forthcoming Stage 2 Abatement Plan.

Soil samples were logged by a geologist and 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 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.

Monitoring wells MW-2 through MW-4, and MW-6 through MW-12 were constructed to depths of 34 to 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 annulus of each well was backfilled with 10/20 silica sand to approximately 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.


LEGEND
MW-1
Monitor Well
(excavation size is approximate)
SB-1
Soil Boring
MW-2
SB-2
SB-1
MW-1
MW-3
MW-4
SV-1
MP-1
MP-2
SV-2
MW-5
MW-7
MW-11
MW-6
MW-10
MW-8
MW-12
MW-9
PPL Pipeline
Abandoned Pipeline
Pipeline
Drainage
AST
Cleared Area
Pump Jack
Valve Pit
N
0
100
200
Scale (ft)
HIGGINS AND ASSOCIATES, L.L.C.
9/7/99
1
CH
CJ
ML
SITE MAP
Phillips Pipe Line Company
Hobbs
New Mexico

Monitoring well MW-5 was constructed as above except that 4-inch diameter well materials were utilized. The larger diameter well materials were used are to facilitate the installation of a product recovery system if warranted.

Monitoring points MP-1 and MP-2 were constructed utilizing 2-inch diameter schedule 40 PVC screen and casing. Well MP-1 was installed to a depth of 20 feet with a screened interval of 10 to 20 feet below ground surface. Well MP-2 was installed at a depth of 35 feet with a screened interval of 10 to 35 feet. Vapor extraction well SV-1 was constructed as per MP-1 and SV-2 was constructed as per MP-2 except that 4-inch diameter materials were utilized.

2.2 Groundwater Monitoring and Sampling

On July 16, 1999, groundwater samples were collected from the monitoring wells MW-2, MW-3, MW-4, MW-9, and MW-10. 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. On October 20, 1999 groundwater samples were collected from monitoring wells MW-2, MW-3, and MW-9 through MW-12. The October 1999 groundwater samples were analyzed for BTEX, TPH, and chloride as per the approved work plan dated March 22, 1999. 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.

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. The quality assurance plan was presented for all sampling activities in the Stage I Abatement Plan 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.

2.4 Additional Excavation/Free Product Recovery Activities

On November 16, 1999 through November 18, 1999, Higgins and Associates supervised excavation activities adjacent to the crude oil release point. The excavation activities during this period consisted of using a track hoe to "pothole" down to the oil/water interface to facilitate more aggressive product recovery. A vacuum truck is utilized periodically to pump the product from the excavation. As of December 10, 1999, approximately 5,000 gallons (119 barrels) of crude oil have been recovered utilizing this recovery method.

3.0 Geology and Hydrogeology

3.1 Regional Setting

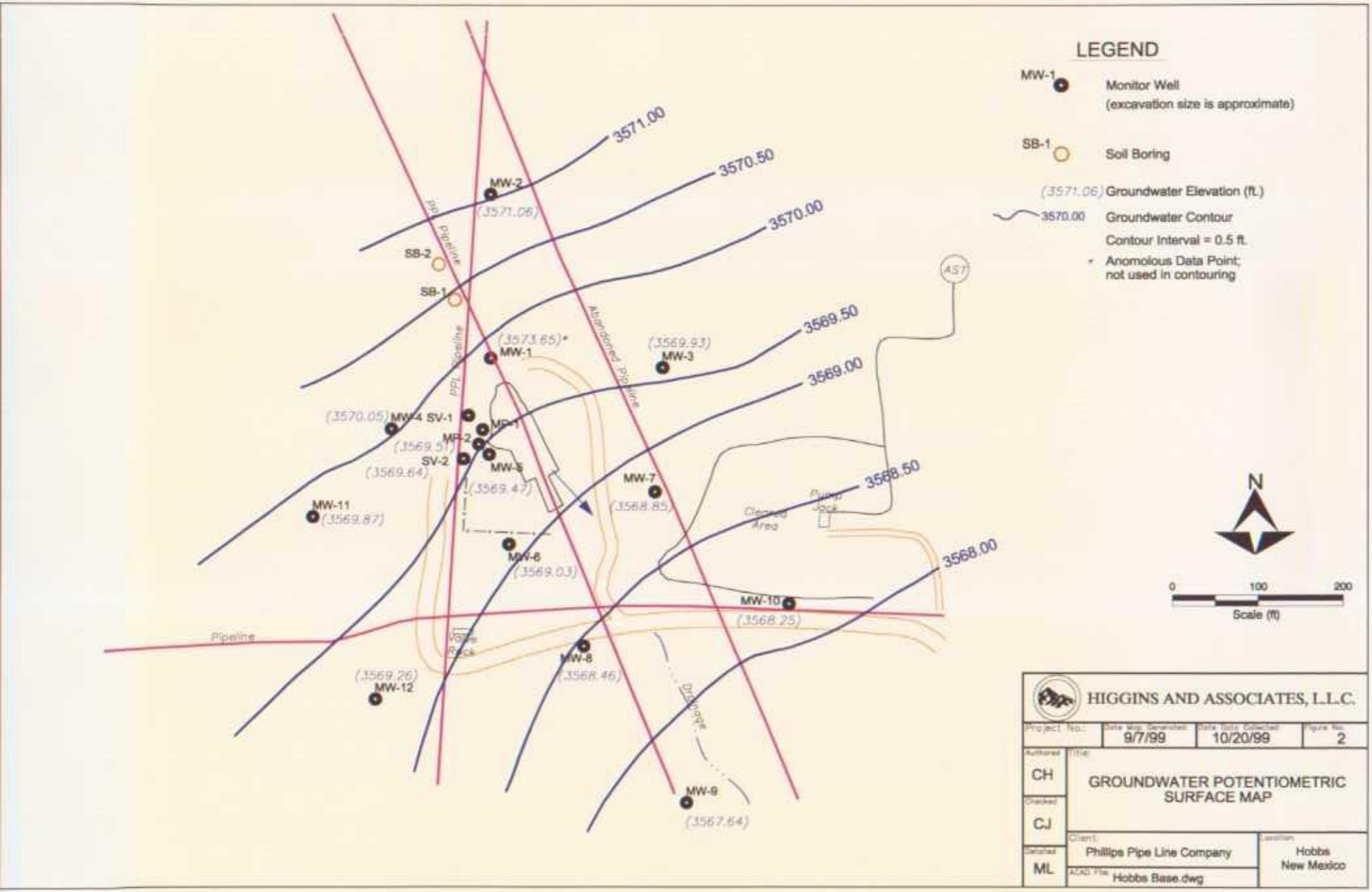
The regional geology surrounding the site is alluvium (unconsolidated) overlaying the Ogalalla Formation. The Ogalalla is also known as the High Plains aquifer which extends north to south from South Dakota to New Mexico and Texas. The Ogalalla was formed during the formation of the Rocky Mountains (Larimide 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 A 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. In July 1999, crude oil was detected in wells MW-1, MW-5, MW-6, MW-7, and MW-8. In October 1999, crude oil was detected in wells MW-1, MW-4, MW-5, MW-6, MW-7, MW-8, MP-1,and SV-2. The groundwater elevation and LPH thickness data for October 20, 1999 is in Appendix B. Figure 2 depicts the groundwater potentiometric surface map for the October 20, 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.


LEGEND
MW-1
Monitor Well
(excavation size is approximate)
SB-1
Soil Boring
(3571.06) Groundwater Elevation (ft.)
3570.00 Groundwater Contour
Contour Interval = 0.5 ft.
* Anomolous Data Point; not used in contouring
3571.00
3570.50
3570.00
3569.50
3569.00
3568.50
3568.00
MW-2
(3571.06)
SB-2
SB-1
(3573.65)*
MW-1
(3569.93)
MW-3
(3570.05)
MW-4
SV-1
MP-1
MP-2
(3569.57)
SV-2
MW-5
(3569.64)
(3569.47)
MW-7
(3568.85)
MW-11
(3569.87)
MW-6
(3569.03)
MW-10
(3568.25)
MW-8
(3568.46)
(3569.26)
MW-12
MW-9
(3567.64)
AST
Abandoned Pipeline
Pipeline
Disposal
Cleared Area
Pump Jack
N
0
100
200
Scale (ft)
HIGGINS AND ASSOCIATES, L.L.C.
Project No.:
Date Map Generated: 9/7/99
Date Data Collected: 10/20/99
Figure No.: 2
Authored: CH
Checked: CJ
Detailed: ML
Title: GROUNDWATER POTENTIOMETRIC SURFACE MAP
Client: Phillips Pipe Line Company
Location: Hobbs New Mexico
ACAD File: Hobbs Base.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. 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
MW-11	10/19/99	14 - 16	2	<0.025	<0.025	<0.025	<0.025	<10
MW-11	10/19/99	30 - 32	3	<0.025	<0.025	<0.025	<0.025	<10
MW-12	10/19/99	14 - 16	1.1	<0.025	<0.025	<0.025	<0.025	<10
MW-12	10/19/99	30 - 32	2.4	<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, and to the south and west by MW-11 and MW-12. The soil analytical reports are included in Appendix C.

4.2 Dissolved Phase Hydrocarbons

The lateral extent of the dissolved phase hydrocarbons has been defined to the north (MW-2), to the east (MW-3), to the south/southeast (MW-9 and MW-10), and to the south/southwest (MW-11 and MW-12). The following table summarizes the groundwater analytical data for BTEX and TPH during the assessment activities.

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-2	10/20/99	4.2	2.5	1.3	1.3	<2,000
MW-3	07/16/99	<0.5	<0.5	<0.5	<0.5	<2,000
MW-3	10/20/99	2.6	1.0	<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-9	10/20/99	2.8	<0.5	<0.5	<0.5	<2,000
MW-10	07/16/99	1.8	<0.5	<0.5	<0.5	<2,000
MW-10	10/20/99	3.8	2.3	<0.5	<0.5	<2,000
MW-11	10/20/99	<0.5	<0.5	1.2	1.3	<2,000
MW-12	10/20/99	1.1	<0.5	<0.5	<0.5	<2,000

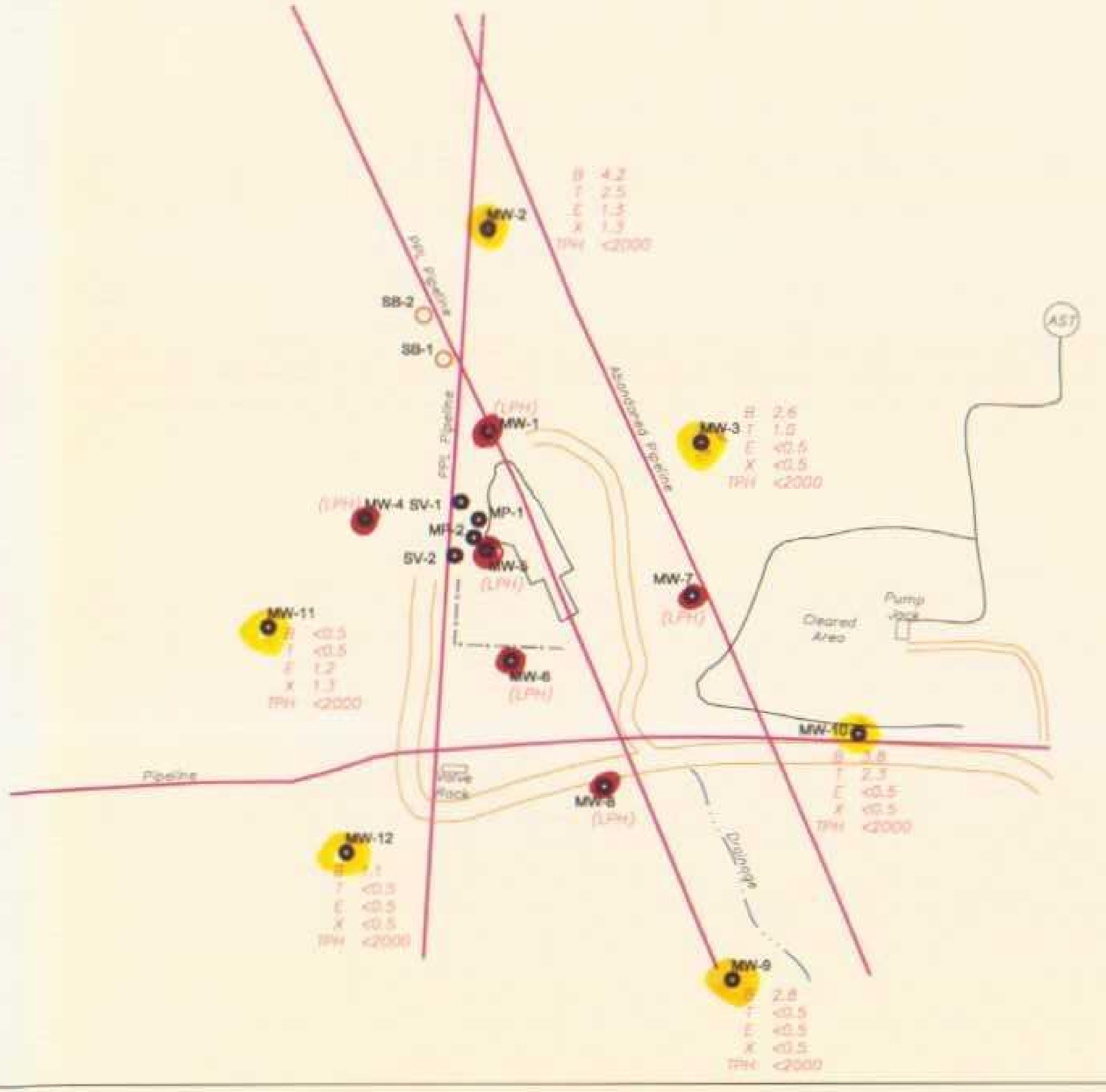
In October 1999, monitoring wells MW-1 and MW-4 through MW-8 were not sampled due to the presence of LPH. Figure 3 is the Hydrocarbon Concentration Map which shows the analytical data for BTEX and TPH. The wells sampled in October 1999 are below the action levels for BTEX. The groundwater analytical reports are included in Appendix C.

4.3 Dissolved Phase Polyaromatic Hydrocarbons

In July 1999, 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 report is included in Appendix C.

4.4 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. On October 20, 1999, LPH was detected in wells MW-1, MW-4, MW-5, MW-6, MW-7, and MW-8. The LPH thickness ranged from 0.85 feet in MW-4 to 14.88 feet in MW-1. Figure 4 is an isopleth map depicting the apparent LPH plume for October 1999.



LEGEND

MW-1 Monitor Well (excavation size is approximate)

SB-1 Soil Boring

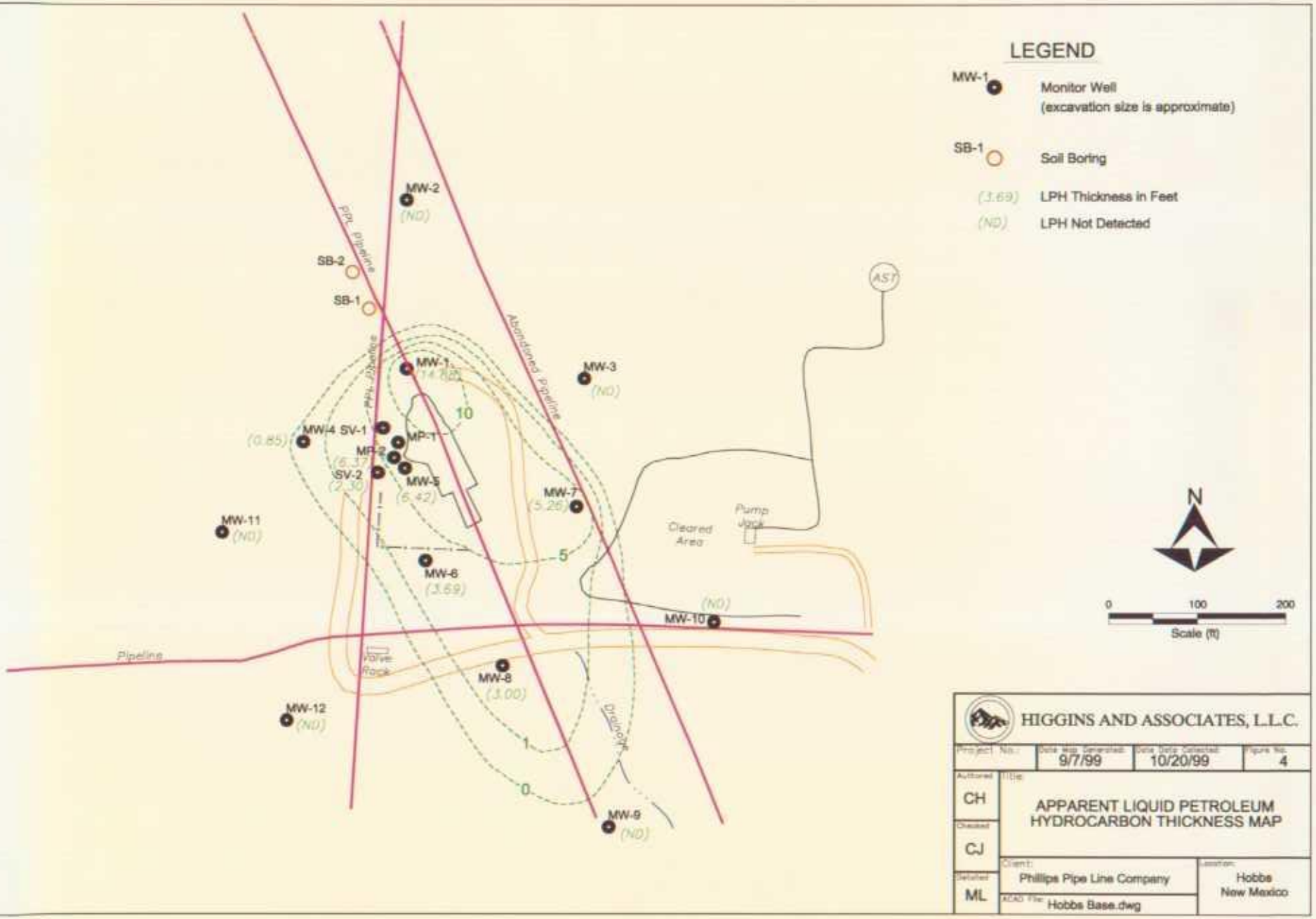
B – Benzene
T – Toluene
E – Ethylbenzene
X – Xylenes
TPH – Total Petroleum Hydrocarbons
(LPH) – Liquid Petroleum Hydrocarbons Present, Well Not Sampled

All results 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: 10/20/99	Figure No. 3
Authored: CH	Title: HYDROCARBON CONCENTRATION MAP		
Checked: CJ			
Detailed: ML	Client: Phillips Pipe Line Company	Location: Hobbs New Mexico	
	ACAD File: Hobbs Base.dwg		


LEGEND
MW-1
Monitor Well
(excavation size is approximate)
SB-1
Soil Boring
(3.69)
LPH Thickness in Feet
(ND)
LPH Not Detected
MW-2
(ND)
SB-2
SB-1
MW-1
(14.58)
MW-3
(ND)
MW-4
SV-1
MP-1
MP-2
SV-2
MW-5
(6.42)
(0.85)
(6.37)
(2.30)
MW-7
(5.26)
MW-11
(ND)
MW-6
(3.69)
MW-10
(ND)
MW-8
(3.00)
MW-12
(ND)
MW-9
(ND)
10
5
1
0
PPL Pipeline
Abandoned Pipeline
AST
Cleared Area
Pump Jack
Pipeline
Valve
Rock
Drainage
N
0
100
200
Scale (ft)
HIGGINS AND ASSOCIATES, L.L.C.
Project No.:
Date Map Generated:
9/7/99
Date Data Collected:
10/20/99
Figure No.
4
Authored
CH
Checked
CJ
Detailed
ML
Title:
APPARENT LIQUID PETROLEUM HYDROCARBON THICKNESS MAP
Client:
Phillips Pipe Line Company
Location:
Hobbs
New Mexico
ACAD File:
Hobbs Base.dwg

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 2 Abatement Plan.

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 C. 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. In July 1999, total dissolved solids ranged from 510 mg/L to 1,000 mg/L. Chloride ranged from 28 mg/L to 190 mg/L. In October 1999, the chloride concentrations ranged from 110 mg/L to 180 mg/L. The NMWQCC chloride standard for groundwater with less than 10,000 mg/L TDS 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 a TDS of less than 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 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.

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.

The crude oil removed from the excavation pothole is transported by vacuum trucks and hauled off to the Phillips Pipe Line - Gaines Pump Station.

6.0 Land Ownership and Well Records Search

A record search for area landownership and water wells within 1 mile of the site was performed. The wells listed from the ENTRAC record search are U.S.G.S. registered. The New Mexico registered wells are shown in the Baker Water Well record search. 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.

There are 18 New Mexico registered wells within a one mile radius of the project site. The installation dates are unknown. Some of the wells are designated domestic/stock or unused. Most of the wells are located upgradient of the project site and all the wells listed are outside the immediate area of the dissolved hydrocarbon plume. The ENTRAC Corporation and Baker record search with associated maps are in Appendix D.

7.0 Conclusions and Recommendations

- The migration of crude oil appears to have limited shallow, 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 boring MW-2, to the south and east by borings MW-3, MW-9, and MW-10, and to the south and west by borings MW-11 and MW-12.

- On October 20, 1999, liquid phase hydrocarbons (LPH) were detected in wells MW-1, MW-4, MW-5, MW-6, MW-7, and MW-8. The LPH thickness ranged from 0.85 feet in MW-4 to 14.88 feet in MW-1. The LPH plume appears to have been defined.

- In November 1999, aggressive crude oil product recovery continued. A "pothole" within the existing excavation was advanced to a depth of 35 feet to enhance crude oil recovery. A vacuum truck is removing crude oil periodically. As of December 10, 1999, approximately 5,000 gallons of crude oil have been recovered using the vacuum truck.

- The lateral extent of the dissolved phase hydrocarbons has been defined to the north (MW-2), to the east (MW-3), to the south/southeast (MW-9 and MW-10), and to the south/southwest (MW-11 and MW-12). In October 1999, monitoring wells MW-1 and MW-4 through MW-8 were not sampled due to the presence of LPH. All the wells sampled are reported below the NMED cleanup standards for BTEX.

- As of December 10, 1999, a total of approximately 7,400 gallons (176.1 barrels) of crude oil have been recovered by hand bailing, the product removal system, and the use of the vacuum truck.

LPH product recovery will continue at MW-1 using the PetroXtractor. The use of vacuum trucks to pump crude oil from the pothole in the excavation will also continue. A Stage 2 Abatement Plan will be submitted with a proposed scope of work to address the next phase. Discussions in the Stage 2 Abatement Plan will include:

- Description of the soil vapor extraction and biovent pilot tests which were completed.

- A technological and economic feasibility study for various remedial options for the project site.

- A proposed remedial action plan to address the adsorbed, dissolved, and liquid phase hydrocarbons.

- A long term groundwater monitoring and sampling plan.

Appendix A

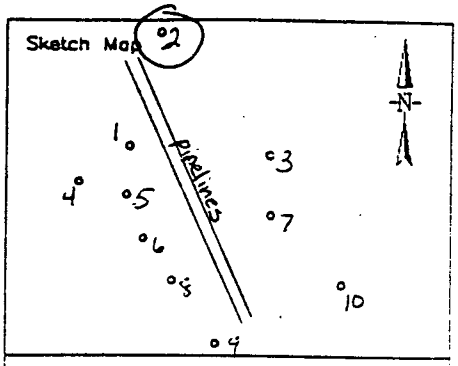
Drilling Logs

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)
0–4								
4–6		Bentonite/grout mix			X	6	CAL	Caliche, sandy, tan to white, poorly sorted, medium to coarse grained, subangular to subrounded, dense, dry to damp.
10–12			MW-2-10.0'		X	26		Sandy Caliche, as above.
14–16					X	13		silty, pebbly SAND, some caliche, tan to white, fine to medium grained, subangular to subrounded, very dense, dry to damp.
16–18		Bentonite						
20–22		Silica Sand Pack			X	5	SW	Silty, gravelly SAND, some caliche, tan to white, as above.
24–26					X	3		
30–32			MW-2-30.0'		X	16		silty, gravelly SAND, tan to light red and brown, moderately sorted, fine to coarse grained, subrounded, very dense, moist to wet.
34–36					X	10		
40								

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50

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'

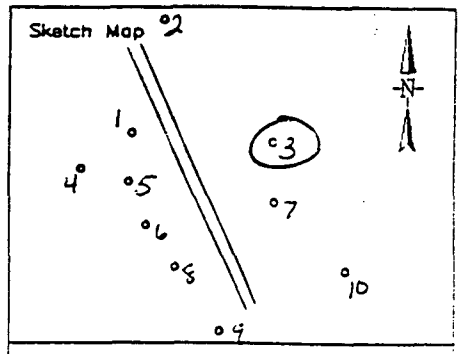
Screen: Dia. 2" Length 20' Slot Size 0.020"

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)
0–40	Bentonite/grout mix; Bentonite; Silica Sand Pack		MW-3 0'-2'		0		Cal	Caliche, some gravelly sand, tan to white, poorly sorted, medium to coarse grained, subangular to subrounded, very dense, dry.
					12		Cal	Caliche, as above.
			MW-3 20'-22'		30		Cal	
					45		SW	Silty, gravelly SAND, tan, some caliche, moderately sorted, fine to medium grained, subrounded, very dense, dry to damp.
					112		SW	Limestone @ 24'-35.5'.
			MW-3 38'-40'		140		SW	
					127		SW	Gravelly SAND, light brown, fine to medium grained, subrounded to rounded, very dense, wet.

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'

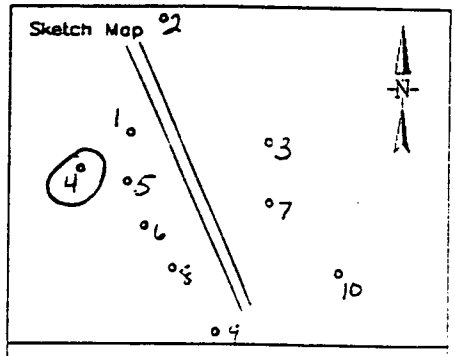
Screen: Dia. 2" Length 20' Slot Size 0.020"

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)
0–40		Bentonite grout mix	MW-4 30-33'			0	Calc	Caliche, with gravelly sand, tan to white, poorly sorted, coarse grained, subangular to subrounded, very dense, dry.
10–12						0	Calc	Caliche, as above.
14–16						0	Calc	
16–18		Bentonite						
18–40		Silica Sand Pack	MW-4 33-33'			0	SW	Silty, gravelly SAND, w/caliche, tan to white, moderately sorted, fine to medium grained, subrounded, very dense, dry.
30–32						0	SW	Silty, gravelly SAND, as above.
32–34						134	SW	Silty, gravelly SAND, as above, light brown, wet.
34–40						34	SW	

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'

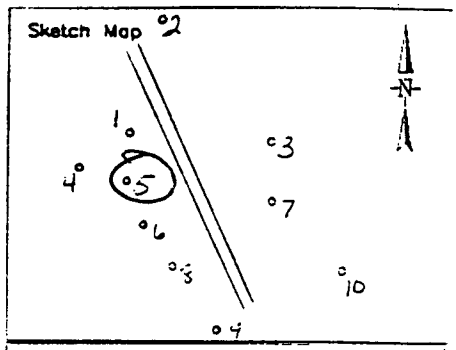
Screen: Dia. 4" Length 20' Slot Size 0.020"

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

Sketch Map



Notes

Depth (ft)	Well Construction	Notes	Sample No.	Blow Count	Recovery	PID (ppm)	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0–14		bentonite/ grout mix			0			Caliche, with sand, tan to white, poorly sorted, coarse grained, subrounded, very dense, dry.
12–14		bentonite			13		Cal	Caliche, as above.
14–16					72			
30–32					3/4			Caliche, as above.
24–36		Silica Sand Pack	MW-5: 20'-37'		6/12			Silty, gravelly SAND, light to dark brown, moderately to poorly sorted, medium to coarse grained, subrounded, very dense, damp to wet.
30–36					>3200		SW	

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'

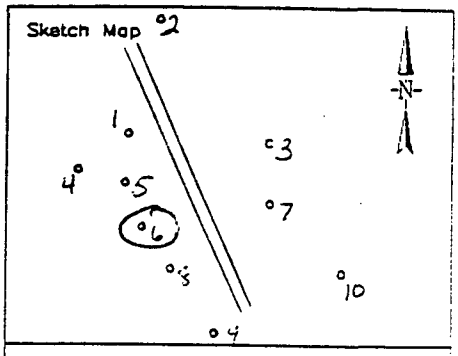
Screen: Dia. 2" Length 20' Slot Size 0.020"

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				0		Caliche, with sand, tan to white, poorly sorted, fine to coarse grained, subangular to subrounded, very dense, dry.
						-		
						-	Cal	Caliche, as above. Attempted to continuously core – no recovery.
16–18		Bentonite						
18–40		Silica Sand Pack	MW-1-30-33' MW-1-24-26'			0		Caliche, as above.
						16		
						231	SW	Silty, gravelly SAND, Light brown, poorly to moderately sorted, medium to coarse grained, subrounded, very dense, wet.
						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"

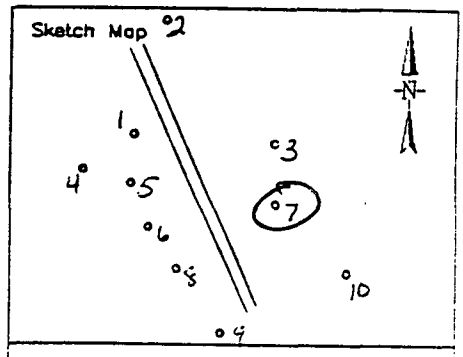
Surface Elevation 3599.51 Water depth (init.) — 24-hrs. 31'

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'-6'		2	0		Caliche, with sand, tan to white, poorly sorted, medium to coarse grained, subangular to subrounded, very dense, dry.
					10	0	Cal	Caliche, with silty sand, as above.
		Bentonite			16	0		
		Silica Sand Pack	MW-7-30'-32'		6	0		Caliche, with gravelly, silty sand, as above.
					14	0		Limestone @ 23'-25.5'.
					62	0	SW	Silty, gravelly SAND, light brown, moderately to poorly sorted, medium to coarse grained, subrounded very dense, moist to wet.
					391	0		

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"

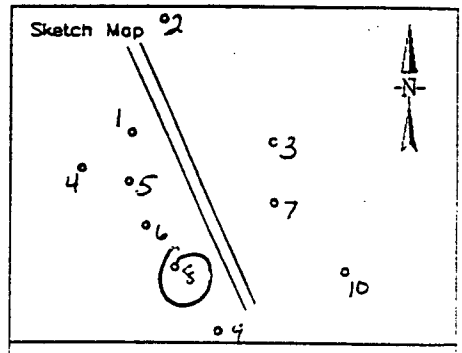
Surface Elevation 3596.53 Water depth (init.) — 24-hrs. 28'

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



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			Caliche, with gravelly sand, tan to white, poorly sorted, medium to coarse grained, very dense, subangular to subrounded, dry.
					2		Cal	
		Bentonite			0			Caliche, as above, some limestone "pieces".
					1			Caliche, as above, damp.
		Silica Sand Pack			5			
			MW-8 30-35'		235		SW	Silty, gravelly SAND, tan to light brown, medium to coarse grained, subrounded, very dense, damp to wet.
					145			

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'

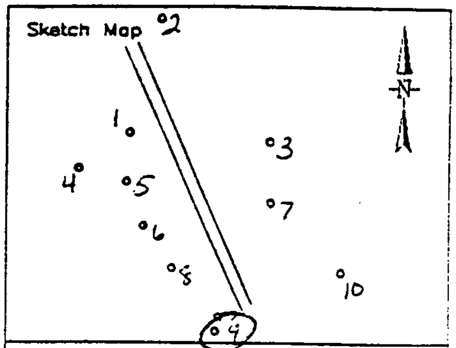
Screen: Dia. 2" | Length: 20' | Slot Size: 0.020"

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

Sketch Map



Notes

Depth (ft)	Well Construction / Notes	Sample No.	Recovery	PID (ppm)	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0–16	Bentonite/grout mix					
4–6			X	1		SILT, brown, medium stiff, nonplastic, dry.
12–14			X	2	Cal	Caliche, with silty, gravelly SAND, tan to white, moderately to poorly sorted, fine to medium grained, subrounded, very dense, dry to damp.
14–16			X	4.3		
16–18	Bentonite					
18–40	Silica Sand Pack					
20–22		MW-9-20'-22'	X	3		Caliche, as above.
23–24.5						Limestone @ 23'-24.5'.
24–26			X	18		
30–32		MW-9-30'-32'				Silty, gravelly SAND, Light brown, moderately sorted, fine to medium grained, subrounded, very dense, damp to wet.
32–34			X	15	SW	
36–38			X	13		
40						

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

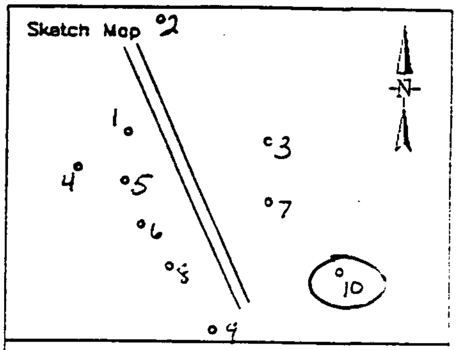
Screen: Dia. 2" — Length: 20' — Slot Size: 0.020"

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						
4–6					X	12		Caliche, with sand, tan to white, poorly sorted, medium grained, subrounded, very dense, dry.
10–12					X	13	Cal	
14–16					X	30		Caliche, as above.
16–18		Bentonite	MW-10:20-22'					
18–40		Silica Sand Pack						
20–22					X	10		Caliche, as above.
24–26					X	22		Limestone @ 23.5' to 26'
30–32			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.
34–36					X	13		
40								

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 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:			

	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)
6	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)
26	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
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)
13	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
8	w/caliche	%	very poorly					moist
NOTES:	Limestone @ 20.5' - 23.5'							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 (Peach)	(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)
3		%	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-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:	

(Circled entries shown in bold.)

	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-2		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:	5:30		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: 4-6'							
Gravel	(Gravelly)	Color: Tan-white	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
(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
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
(Weathered?)	%	(poorly)	cobbles/boulders			hard (>30)	(dry)
USCS:	%	very poorly					damp
Caliche	%						moist
							wet
							saturated

Sample ID: 1
Blow Counts: —
PID/FID: 0
NOTES:

Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval: 10-12'							
Gravel	(Gravelly)	Color: Tan-White	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
(Sand)	Sandy	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
(Silty)	Silty	very well	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
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
(Weathered?)	%	(poorly)	cobbles/boulders			hard (>30)	(dry)
USCS:	%	very poorly					damp
Caliche	%						moist
							wet
							saturated

Sample ID: 2
Blow Counts: —
PID/FID: 12
NOTES:

Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval: 14-16'							
Gravel	(Gravelly)	Color: Tan-white	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
(Sand)	Sandy	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
(Silty)	Silty	very well	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
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
(Weathered?)	%	(poorly)	cobbles/boulders			hard (>30)	(dry)
USCS:	%	very poorly					damp
Caliche	%						moist
							wet
							saturated

Sample ID: 3
Blow Counts: —
PID/FID: 30
NOTES:

Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval: 20-22'							
Gravel	(Gravelly)	Color: Tan	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
(Sand)	Sandy	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
(Silty)	Silty	very well	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
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
(Weathered?)	%	(poorly)	cobbles/boulders			hard (>30)	(dry)
USCS:	%	very poorly					(damp)
w/Caliche	%						moist
							wet
							saturated

Sample ID: 4
Blow Counts: —
PID/FID: 48
NOTES:

Primary Lithology	Subordinate Lithology		Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
Depth/Interval: 24-26'							
Gravel	(Gravelly)	Color: Light Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
(Sand)	Sandy	Sorting (sand/gravel)	fine	rounded	loose (4-10)	soft (2-4)	plastic
(Silty)	Silty	very well	(medium)	(subrounded)	medium dense (10-30)	medium stiff (4-8)	slightly plastic
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
(Weathered?)	%	poorly	cobbles/boulders			hard (>30)	dry
USCS:	%	very poorly					(damp)
Limestone	%						(moist)
							wet
							saturated

Sample ID: 5
Blow Counts: —
PID/FID: 112
NOTES: 24-25.5'

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:
te Drilled:	Borehole Diameter:		Bentonite Interval:
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 (circled)	Color					
30-32	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 (circled)	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	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately	very coarse	angular	very dense (>50) (circled)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
140		%	very poorly					damp
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	Light Brown	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silt	Silty	Sorting (sand/gravel)	fine (circled)	rounded (circled)	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	subangular	dense (30-50)	stiff (8-15)	nonplastic
—	(Weathered?)	%	moderately	very coarse	angular	very dense (>50) (circled)	very stiff (15-30)	Moisture
PID/FID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
122		%	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
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	Borehole completed as well?	(YES) NO	Well Casing Interval:	0'-30'
Project Number:		Well Name:	MW-4	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:	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-[illegible]		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	Angularity	Induration	Induration	Plasticity
Depth/Interval	Gravel	Gravelly	Color	(sand/gravel)	(sand/gravel)	(sand/gravel)	(silt/clay)	(silt/clay)
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
134		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size	Angularity	Induration	Induration	Plasticity
Depth/Interval	Gravel	Gravelly	Color	(sand/gravel)	(sand/gravel)	(sand/gravel)	(silt/clay)	(silt/clay)
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
34		%	very poorly					damp
NOTES:								moist
								wet
								saturated

	Primary Lithology	Subordinate Lithology		Grain Size	Angularity	Induration	Induration	Plasticity
Depth/Interval	Gravel	Gravelly	Color	(sand/gravel)	(sand/gravel)	(sand/gravel)	(silt/clay)	(silt/clay)
	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	Angularity	Induration	Induration	Plasticity
Depth/Interval	Gravel	Gravelly	Color	(sand/gravel)	(sand/gravel)	(sand/gravel)	(silt/clay)	(silt/clay)
	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	Angularity	Induration	Induration	Plasticity
[illegible]th/Interval	Gravel	Gravelly	Color	(sand/gravel)	(sand/gravel)	(sand/gravel)	(silt/clay)	(silt/clay)
	Sand	Sandy		very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
[illegible]mple 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
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
[illegible]ID	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
S:								moist
								wet
								saturated

Lithologic/Drilling Log

Project Information		Well Information				Well Casing Interval:	0 - 17
Project:	Hobbs	Borehole completed as well?	(YES)	NO		Well Screen Interval:	17 - 37
Project Number:		Well Name:	MW-5			Sand Pack Interval:	15 - 37
Location:	Hobbs, NM	Total Depth:	~~45~~ ~~35~~ 37'			Bentonite Interval:	2 - 15
Date Drilled:	7/15/99	Borehole Diameter:	8"			Cement/Grout Interval:	0 - 2
Client:	PPL	Well Elevation:					
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:	12:15		(4 inch)	0.020"			
			Other:				

Depth/Interval	Primary Lithology Gravel	Subordinate Lithology Gravelly	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
4-6	(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
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)
0	Caliche	%	very poorly					damp
NOTES:								moist
								wet
								saturated

Depth/Interval	Primary Lithology Gravel	Subordinate Lithology Gravelly	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)
13	Caliche	%	very poorly					damp
NOTES:								moist
								wet
								saturated

Depth/Interval	Primary Lithology Gravel	Subordinate Lithology Gravelly	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)
12	Caliche	%	very poorly					damp
NOTES:								moist
								wet
								saturated

Depth/Interval	Primary Lithology Gravel	Subordinate Lithology Gravelly	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
30-32	(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)
314	Caliche	%	very poorly					damp
NOTES:								moist
								wet
								saturated

Depth/Interval	Primary Lithology Gravel	Subordinate Lithology (Gravelly)	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
34-36	(Sand)	Sandy	Light-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
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
12		%	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-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	Lt. 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
>2000		%	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	Lt. 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
>2000		%	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:	⁻² - 20'
Project Number:		Well Name:	MW-6	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:	PPC	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:	9:30	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
11.5-13	(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:	%	poorly					damp
16 —	Caliche	%	very poorly					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
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
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:
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:	

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
331	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
224	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
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

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:	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:	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
OTES:	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) PVC Sch 80 Low Carbon Steel		
Drilling Method:	Air Rotary	Well Diameter:	(2 inch) 0.020" 4 inch Other:		
Field Notes By:	C. Jensen				
Time Start:	11:25				
Time Stop:	12:00				

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	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)
2	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)
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)	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)
0	USCS:	%	very poorly					damp
NOTES:	Caliche	%						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)	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)
5	USCS:	%	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-8 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	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
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	anguiar	very dense (>50)	very stiff (15-30)	Moisture
—	(Weathered?)	%	moderately	cobbles/boulders			hard (>30)	dry
PID/FID	USCS:	%	poorly					damp
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	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)
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

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) 0.02"		
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	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
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
1		%	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)
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
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)
4.3	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)
3	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)
18		%	very poorly					moist
NOTES:								wet
	Limestone 22-24.5'							saturated

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:
[redacted]e Drilled:	Borehole Diameter:			Bentonite Interval:
[redacted]ient:	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
15		%	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	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]		%	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]low 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-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
18	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
40	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:
[illegible]ion:	Total Depth:		Sand Pack Interval:
[illegible] 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:	

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
[illegible]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
[illegible]OTES:		%						moist
								wet
								saturated

DRILLING LOG

Well No. SVE-2

Project Hobbs Client Phillips Pipe Line

Location Hobbs, NM Project Number

Date Drilled 10/19/99 Total Depth 35' Diameter 8"

Surface Elevation 3598.35 Water depth (init.) — 24-hrs. —

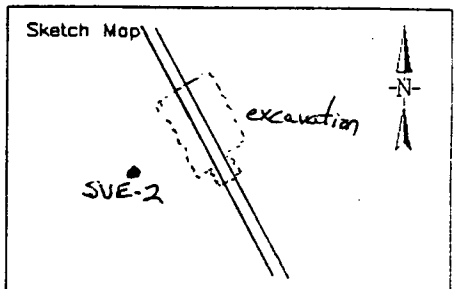
Screen: Dia. 4" Length 25' Slot Size 0.070"

Casing: Dia. 4" Length 13' Type PVC Sch 40

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								
2		Concrete						
4		bentonite						
6					X	1.7		
8								
10					X	5		Silty, sandy Caliche, tan to white, very dense, dry.
12								
14		10-30 Silica Sand						
16					X	4.2		
18								
20					X	13		Caliche, as above.
22								
24								
26					X	78		
28								
30					X	>2000	SW	Silty, gravelly SAND, light brown, moderately sorted, medium to coarse grained, subrounded to rounded, very dense, moist to wet.
32								
34					X	53		
36								
38								
40								
42								
44								
46								
48								
50								

Lithologic/Drilling Log

Project Information		Well Information			
Project:	PPL/Hobbs	Borehole completed as well?	(YES) NO	Well Casing Interval:	-3'-10'
Project Number:		Well Name:	SVE-2	Well Screen Interval:	10'-35'
Location:	Hobbs, NM	Total Depth:	35'	Sand Pack Interval:	8'-35'
Date Drilled:	10/19/99	Borehole Diameter:	8"	Bentonite Interval:	3'-8'
Client:	PPL	Well Elevation:	—	Cement/Grout Interval:	0'-3'
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:	8:25	Well Diameter:	2 inch		
Time Stop:	9:05		(4 inch) 0.020"		
			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	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)
1.7	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)
8-10'	Gravel	Gravelly	Tan	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	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)
.5	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)
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)	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)
4.2	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)
18-20'	Gravel	Gravelly	Tan	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)
13	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'	(Sand)	Sandy	Tan-Lt 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
78	w/Caliche	%	very poorly					(damp)
NOTES:								moist
								wet
								saturated

Lithologic/Drilling Log

Project Information		Well Information		
Project: PPL/Hobbs		Borehole completed as well? YES NO		Well Casing Interval:
Project Number:		Well Name: SVE-2 continued		Well Screen Interval:
Location:		Total Depth:		Sand Pack Interval:
Date Drilled:		Borehole Diameter:		Bentonite Interval:
ent:		Well Elevation:		Cement/Grout Interval:
ig/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	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
>2000	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)
34-35'	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
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
513	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
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

DRILLING LOG

Well No. SVE-1

Project Hobbs Client Phillips Pipe Line

Location Hobbs, NM Project Number

Date Drilled 10/18/99 Total Depth 20' Diameter 8"

Surface Elevation 3599.31 Water depth (init.) — 24-hrs. —

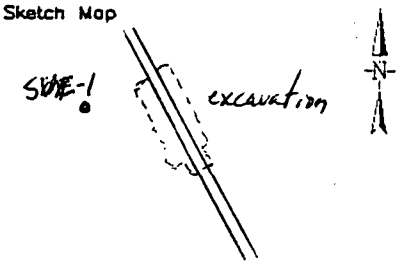
Screen: Dia. 4" Length 10' Slot Size 0.020"

Casing: Dia. 4" Length 13' Type PVC Sch 40

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								
2		Concrete						
4		bentonite						
6					X	1.7		Silty, sand Caliche, tan to white, very dense, dry.
8								
10					X	1.5		
12		10-20 silica sand						
14								
16					X	2.1		Caliche, as above.
18								
20					X	2.9		
22								
24								
26								
28								
30								
32								
34								
36								
38								
40								
42								
44								
46								
48								
50								

Lithologic/Drilling Log

Project Information		Well Information		
Project: PPL/Hobbs	Borehole completed as well? (YES) NO		Well Casing Interval:	-3' - 10'
Project Number:	Well Name: SVE-1		Well Screen Interval:	10' - 20'
Location: Hobbs, NM	Total Depth: 20'		Sand Pack Interval:	8' - 20'
Date Drilled: 10/18/99	Borehole Diameter: 8"		Bentonite Interval:	3' - 8'
Client: PPL	Well Elevation: —		Cement/Grout Interval:	0' - 3'
Rig/Core Type: Air Rotary	Water Level Initial:			
Drilling Company: McDonald	Water Level Static:		Comments/Notes:	
Driller: T. McDonald	Well Type: (PVC Sch 40) PVC Sch 80 Low Carbon Steel			
Drilling Method: Air Rotary				
Field Notes By: C. Jensen				
Time Start: 12:25	Well Diameter: 2 inch (4 inch) 0.020" Other:			
Time Stop: 12:45				

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'	(Sand)	Sandy	Tan-white	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
Sample ID	Silty	(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)
1.7	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)
6-10'	(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)
1.5	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	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)
2.1	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)
15-20'	Sand	~~Sandy~~	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
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)
2.9	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)
	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

DRILLING LOG

Well No. MP-2

Project Hobbs Client Phillips Pipe Line

Location Hobbs, NM Project Number

Date Drilled 10/18/99 Total Depth 35' Diameter 6.25"

Surface Elevation 3599.08 Water depth (init.) — 24-hrs. —

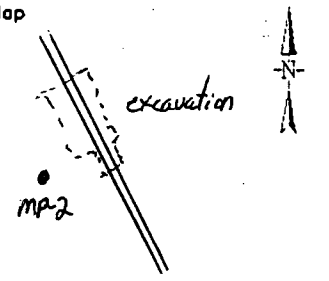
Screen: Dia. 2" Length 25' Slot Size 0.020"

Casing: Dia. 2" Length 13' Type PVC sch 40

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)
0–2		concrete						
2–8		bentonite				1.7		Silty, sandy Caliche, tan to white, very dense, dry.
8–10						3.2		
10–14								
14–16		10-20 Silica Sand				2.1		
16–18								Caliche, as above, dry.
18–20						4		
20–24								
24–26						90		
26–30						>2000		Silty, gravelly SAND, brown to dark brown, moderately sorted, medium to coarse grained, subrounded, very dense, damp to wet.
30–34						495		
34–50								

Lithologic/Drilling Log

Project Information		Well Information		
Project: PPL/Hobbs	Borehole completed as well? (YES) NO		Well Casing Interval:	-3' - 10'
Project Number:	Well Name: MP-2		Well Screen Interval:	10' - 35'
Location: Hobbs, NM	Total Depth: 35'		Sand Pack Interval:	0' - 35'
Date Drilled: 10/18/99	Borehole Diameter: 6.25'		Bentonite Interval:	3' - 8'
Client: PPL	Well Elevation: —		Cement/Grout Interval:	0' - 3'
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: 1:50	Well Diameter: (2 inch) 0.020"			
Time Stop: 2:40	4 inch			
	Other:			

Depth/Interval: 4-6	Primary Lithology: Sand	Subordinate Lithology: Sandy	Color: White-Tan	Grain Size (sand/gravel): very fine	Angularity (sand/gravel): well rounded	Induration (sand/gravel): very loose (<4 blows/ft)	Induration (silt/clay): very soft (<2)	Plasticity (silt/clay): very plastic
Sample ID: 1	Silt	Silty	Sorting (sand/gravel):	fine	rounded	loose (4-10)	soft (2-4)	plastic
Blow Counts: —	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
PID/FID: 1.7	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
NOTES:	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture:
	USCS: Caliche	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
								moist
								wet
								saturated

Depth/Interval: 8-10'	Primary Lithology: Sand	Subordinate Lithology: Sandy	Color: Tan	Grain Size (sand/gravel): very fine	Angularity (sand/gravel): well rounded	Induration (sand/gravel): very loose (<4 blows/ft)	Induration (silt/clay): very soft (<2)	Plasticity (silt/clay): very plastic
Sample ID: 2	Silt	Silty	Sorting (sand/gravel):	fine	rounded	loose (4-10)	soft (2-4)	plastic
Blow Counts: —	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
PID/FID: 3.2	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
NOTES:	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture:
	USCS: Caliche	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
								moist
								wet
								saturated

Depth/Interval: 14-16'	Primary Lithology: Sand	Subordinate Lithology: Sandy	Color: Tan	Grain Size (sand/gravel): very fine	Angularity (sand/gravel): well rounded	Induration (sand/gravel): very loose (<4 blows/ft)	Induration (silt/clay): very soft (<2)	Plasticity (silt/clay): very plastic
Sample ID: 3	Silt	Silty	Sorting (sand/gravel):	fine	rounded	loose (4-10)	soft (2-4)	plastic
Blow Counts: —	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
PID/FID: 2.1	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
NOTES:	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture:
	USCS: Caliche	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
								moist
								wet
								saturated

Depth/Interval: 18-20'	Primary Lithology: Sand	Subordinate Lithology: Sandy	Color: Tan	Grain Size (sand/gravel): very fine	Angularity (sand/gravel): well rounded	Induration (sand/gravel): very loose (<4 blows/ft)	Induration (silt/clay): very soft (<2)	Plasticity (silt/clay): very plastic
Sample ID: 4	Silt	Silty	Sorting (sand/gravel):	fine	rounded	loose (4-10)	soft (2-4)	plastic
Blow Counts: —	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
PID/FID: 4.5	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
NOTES:	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture:
	USCS: Caliche	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
								moist
								wet
								saturated

Depth/Interval: 24-26'	Primary Lithology: Sand	Subordinate Lithology: Sandy	Color: Tan - Brown	Grain Size (sand/gravel): very fine	Angularity (sand/gravel): well rounded	Induration (sand/gravel): very loose (<4 blows/ft)	Induration (silt/clay): very soft (<2)	Plasticity (silt/clay): very plastic
Sample ID: 5	Silt	Silty	Sorting (sand/gravel):	fine	rounded	loose (4-10)	soft (2-4)	plastic
Blow Counts: —	Clay	Clayey	very well	medium	subrounded	medium dense (10-30)	medium stiff (4-8)	slightly plastic
PID/FID: 90	Bedrock	Pebbly	well	coarse	subangular	dense (30-50)	stiff (8-15)	nonplastic
NOTES: Some Caliche	(Weathered?)	%	moderately	very coarse	angular	very dense (>50)	very stiff (15-30)	Moisture:
	USCS:	%	poorly	cobbles/boulders			hard (>30)	dry
		%	very poorly					damp
								moist
								wet
								saturated

Lithologic/Drilling Log

Project Information	Well Information		
Project: PPL/Hobbs	Borehole completed as well? YES NO		Well Casing Interval:
Project Number:	Well Name: MP-2 continued		Well Screen Interval:
Location:	Total Depth:		Sand Pack Interval:
Date Drilled:	Borehole Diameter:		Bentonite Interval:
[illegible]ient:	Well Elevation:		Cement/Grout Interval:
[illegible]g/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)
28-30'	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
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
>20000	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)
34-35	Gravel	Gravelly	DK. 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
495	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
	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

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
	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

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
	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
[illegible]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

DRILLING LOG

Well No. MP-1

Project Hobbs Client Phillips Pipe Line

Location Hobbs, NM Project Number

Date Drilled 10/18/99 Total Depth 20' Diameter 6.25"

Surface Elevation 3599.17 Water depth (init.) – 24-hrs. –

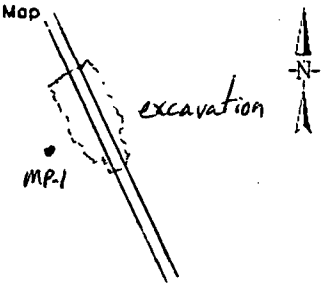
Screen: Dia. 2" Length 10' Slot Size 0.020"

Casing: Dia. 2" Length 13' Type PVC Sch 40

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								
2		concrete						
4		bentonite			X	0		Silty, sandy Caliche, tan to white, very dense, dry.
6								
8					X	0		
10								
12		10-20 Silica Sand						
14					X	0		Caliche, as above.
16								
18					X	0		
20								
22								
24								
26								
28								
30								
32								
34								
36								
38								
40								
42								
44								
46								
48								
50								

Lithologic/Drilling Log

Project Information		Well Information			
Project:	PPL/Hobbs	Borehole completed as well?	(YES) NO	Well Casing Interval:	-3 - 10'
Project Number:		Well Name:	MP-1	Well Screen Interval:	10' - 20'
Location:	Hobbs, NM	Total Depth:	20'	Sand Pack Interval:	8' - 20'
Date Drilled:	10/18/99	Borehole Diameter:	6.25"	Bentonite Interval:	3' - 8'
Client:	PPL	Well Elevation:	—	Cement/Grout Interval:	0' - 3'
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:	1:15	Well Diameter:	(2 inch) 0.020"		
Time Stop:	1:35		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)	White-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
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
	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
8-10'	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
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
	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	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)
	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
18-20'	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)
	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
	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

DRILLING LOG

Well No. MW-11

Project Hobbs Client Phillips Pipe Line

Location Hobbs, NM Project Number

Date Drilled 10/19/99 Total Depth 36' Diameter 6.25"

Surface Elevation 3597.86 Water depth (init.) — 24-hrs. —

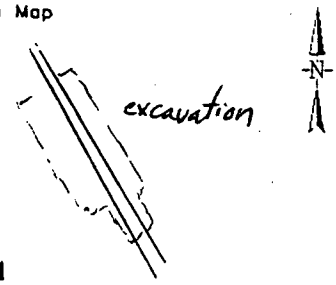
Screen: Dia. 2" Length 20' Slot Size 0.020"

Casing: Dia. 2" Length 19' Type PVC sch 40

Drilling Company Mc Donald 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)
0–2		concrete						
2–14		bentonite				0		Caliche, some silt and sand, white to tan, very dense, dry.
14–16			MW-11-14-16'			2.0		Caliche, as above, tan, dry.
16–20						0		
20–24		10-20 Silica Sand						
24–36			MW-11-30-32'			1 / 3.0 / 1.5	SW	Silty, gravelly SAND, light brown to brown, poorly sorted, fine to coarse grained, subrounded, very dense, damp to wet.
36–50								

Lithologic/Drilling Log

Project Information		Well Information			
Project:	PPL/Hobbs	Borehole completed as well?	(YES) NO	Well Casing Interval:	3 - 16'
Project Number:		Well Name:	MW-11	Well Screen Interval:	16'-36'
Location:	Hobbs, NM	Total Depth:	36'	Sand Pack Interval:	14'-36'
Date Drilled:	10/19/99	Borehole Diameter:	6.25"	Bentonite Interval:	3'-14'
Client:	PPL	Well Elevation:	—	Cement/Grout Interval:	0'-3'
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:	10:10	Well Diameter:	(2 inch) 0.020"		
Time Stop:	10:45		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	White-Tan	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)
0	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)
8'-10'	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)	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)
0	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)
14-16'	Gravel	Gravelly	Tan	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)	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)
2.0	USCS:	%	very poorly					damp
NOTES:	Caliche	%						moist
								wet
								saturated

10:20 hrs MW-11-15'

Depth/Interval	Primary Lithology	Subordinate Lithology	Color	Grain Size (sand/gravel)	Angularity (sand/gravel)	Induration (sand/gravel)	Induration (silt/clay)	Plasticity (silt/clay)
18-20'	Gravel	Gravelly	Tan	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)
0	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'	(Sand)	Sandy	Tan-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	w/Caliche	%	very poorly					(damp)
NOTES:								moist
								wet
								saturated

Lithologic/Drilling Log

Project Information	Well Information		
Project: PPL/Hobbs	Borehole completed as well? YES NO		Well Casing Interval:
Project Number:	Well Name: MW-11 continued		Well Screen Interval:
Location:	Total Depth:		Sand Pack Interval:
Date Drilled:	Borehole Diameter:		Bentonite Interval:
[illegible]ent:	Well Elevation:		Cement/Grout Interval:
[illegible]g/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	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
3.0		%	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	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
1.5		%	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
[illegible]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

DRILLING LOG

Well No. MW-12

Project Hobbs Client Phillips Pipe Line

Location Hobbs, NM Project Number

Date Drilled 10/19/99 Total Depth 38' Diameter 6.25"

Surface Elevation 3596.38 Water depth (init.) — 24-hrs. —

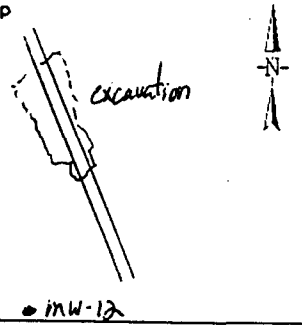
Screen: Dia. 2" Length 20' Slot Size 0.020"

Casing: Dia. 2" Length 20' Type PVC Sch 40

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)
0–2		concrete						
2–14	bentonite		MW-12-14'-16'		0.9	0		Silty, sandy Caliche, tan to white, very dense, dry.
14–16					1.1			Caliche, as above.
16–24	10-20 Silica Sand				2.2			
24–38			MW-12-30'-32'		0.7	2.4	SW	Silty, gravelly SAND, light brown to brown, moderately sorted, fine to coarse grained, subrounded, dense, damp to wet.
38–50					0.6			

Lithologic/Drilling Log

Project Information		Well Information			
Project: PPL/Hobbs	Borehole completed as well? (YES)	NO	Well Casing Interval:	-3'-17'
Project Number:	Well Name: MW-12		Well Screen Interval:	17'-37'
Location: Hobbs NM	Total Depth: 38'		Sand Pack Interval:	15'-38'
Date Drilled: 10/19/99	Borehole Diameter: 6.25"		Bentonite Interval:	3'-15'
Client: PPL	Well Elevation: —		Cement/Grout Interval:	0'-3'
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: 12:10	Well Diameter: (2 inch) 0.020"			
Time Stop: 17:45	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
0.9	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
8'-10'	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	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
1.1	Caliche	%	very poorly					moist
NOTES:								wet
								saturated

mw-12-14-16 13:35

	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
2.2	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	Light Color	very fine	well rounded	very loose (<4 blows/ft)	very soft (<2)	very plastic
24-26'	(Sand)	Sandy	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)
0.7		%	very poorly					moist
NOTES:								wet
								saturated

Lithologic/Drilling Log

Project Information		Well Information			
Project:	PPL/Hobbs	Borehole completed as well?	YES NO	Well Casing Interval:	
Project Number:		Well Name:	MW-12	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	Lgt 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
2.4		%	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	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
0.6		%	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

Appendix B

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: October 20, 1999

WELL ID	ETC	DTW	DTP	PT	PT X.8	ADJ DTW	WTE	COMMENTS
MW-1	3603.30	41.55	26.67	14.88	11.90	29.65	3573.65	
MW-2	3601.57	30.51		0.00	0.00	30.51	3571.06	
MW-3	3602.77	32.84		0.00	0.00	32.84	3569.93	
MW-4	3601.70	32.33	31.48	0.85	0.68	31.65	3570.05	
MW-5	3601.54	37.21	30.79	6.42	5.14	32.07	3569.47	
MW-6	3599.83	33.75	30.06	3.69	2.95	30.80	3569.03	
MW-7	3602.11	37.47	32.21	5.26	4.21	33.26	3568.85	
MW-8	3598.87	32.81	29.81	3.00	2.40	30.41	3568.46	
MW-9	3601.05	33.41		0.00	0.00	33.41	3567.64	
MW-10	3602.96	34.71		0.00	0.00	34.71	3568.25	
MW-11	3600.67	30.80		0.00	0.00	30.80	3569.87	
MW-12	3599.35	30.09		0.00	0.00	30.09	3569.26	
SVE-1	3602.16			0.00	0.00	0.00		Dry
SVE-2	3601.17	33.37	31.07	2.30	1.84	31.53	3569.64	
MP-1	3601.87			0.00	0.00	0.00		Dry
MP-2	3601.87	37.46	31.09	6.37	5.10	32.36	3569.51	

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 C

Soil and Groundwater Analytical Data

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
	MW-6-24'-26'	NON-AQ	7/14/99
	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

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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

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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
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

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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
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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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
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

PINNACLE LABORATORIES

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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
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

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
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

PINNACLE LABORATORIES

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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

PINNACLE LABORATORIES

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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

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

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

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
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

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

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

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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

PINNACLE LABORATORIES

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Albuquerque, New Mexico 87107
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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
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

PINNACLE LABORATORIES

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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
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

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
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:

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
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

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
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:		
O-TERPHENYL (%)		105
SURROGATE LIMITS (80 - 151)		

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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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

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

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

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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
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
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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	: 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:
O-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

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 99-06					X															X				
-20		1230		0720 99-07					X															X				
-21		1300		0720 99-08					X															X				
-22		1315		0720 99-09					X															X				
-23	↓	1345	↓	~~0720 99-10~~ VM					X		no sample rec'd								VM					X				

PROJECT INFORMATION

PROJECT #: 907053
PROJ. NAME: HIGGINS
QC LEVEL: (STD) IV
QC REQUIRED: MS MSD BLANK
TAT: (STANDARD) RUSH!!

SAMPLE RECEIPT

Total Number of Containers	4
Chain of Custody Seals	N
Received Intact?	Y
Received Good Cond./Cold	Y
LAB NUMBER:	

SAMPLES SENT TO:

PENSACOLA - STL-FL
PORTLAND - ESL-OR
STL - CT
STL- NEW JERSEY
N. CREEK
BARRINGER
SEQUOIA
ATEL X

DUE DATE: 8/2
RUSH SURCHARGE: -
CLIENT DISCOUNT:
SPECIAL CERTIFICATION REQUIRED: (NO)

COMMENTS

RELINQUISHED BY: 1.
Signature: Francine Tonno Time: 1700
Printed Name: Francine Tonno Date: 7/19/99
Pinnacle Laboratories, Inc.

RECEIVED BY: 1.
Signature: Time: 1119
Printed Name: V Hunter Date: 7/20
Company ATEL

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

RECEIVED BY: 2
Signature: Time
Printed Name: Date:
Company

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

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: 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	072099-06					X															X				
-20		1230		072099-07					X															X				
-21		1300		072099-08					X															X				
-22		1315		072099-09					X															X				
-23		1345		~~072099-10~~					X			no sample rec'd	VBA											X				
				072299-24								rec'd 7/22 from ESL	VBA															

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:	NO				

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
Signature: — Time: 1700	Signature: Time:
Printed Name: Francine Tonno Date: 7/19/99	Printed Name: Date:
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:

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
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:

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
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
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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	**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

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B - Analyte detected in the associated Method Blank

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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

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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	**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

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
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-Methylnaphthalene	ND	0.1									
2-Methylnaphthalene	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

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

Environmental Services Laboratory

Date: *04-Aug-99*

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.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(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, Cu, Na, B	TOX	TOC	Gen Chemistry: Cl, Br, SO4	Fl, Alk, TDS	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	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 McNeill 1015	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: 303-708-9846
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.	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'-12'	7/13/99	8:20	Soil	01			X			X																						1
mw-2-30'-32'	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-8-30'-32'	7/13/99	11:45	Soil	05			X			X																						1
mw-8-30'-32'	7/13/99	12:00	Soil	06			X			X																						1
mw-9-20'-22'	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: PPL/Hobbs
P.O. NO.:
SHIPPED VIA: Greyhound

SAMPLE RECEIPT

NO. CONTAINERS	10
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 (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.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Chris Higgins

COMPANY: Higgins and Associates
ADDRESS: 9940 East Castilla Ave St. 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.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	BTEX - 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-4-20'-22'	7/14/99	12:20	Soil	11			X			X																				1
mw-4-30'-32'	7/14/99	12:30	Soil	12			X			X																				1
mw-3-30'-32'	7/15/99	8:10	Soil	13			X			X																				1
mw-3-20'-32'	7/15/99	8:20	Soil	14			X			X																				1
mw-10-20'-22'	7/15/99	9:30	Soil	15			X			X																				1
mw-10-30'-32'	7/15/99	9:40	Soil	16			X			X																				1
mw-5-20'-22'	7/15/99	11:55	Soil	17			X			X																				1
mw-5-30'-32'	7/15/99	12:05	Soil	18			X			X																				1

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

SAMPLE RECEIPT	
NO. CONTAINERS	9
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.	RELINQUISHED BY: 2.
Signature: Charles Jensen Time: 2:30	Signature: Time:
Printed Name: Charles Jensen Date: 7/16/99	Printed Name: Date:
Company: Higgins	Company:
See reverse side (Bruce Magure)	
RECEIVED BY: 1	**RECEIVED BY: (LAB) 2.**
Signature: Time:	Signature: Francine Tonno Time: 1030
Printed Name: Date:	Printed Name: Francine Tonno Date: 7/19/99
Company:	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.

PLEASE FILL THIS FORM IN COMPLETELY.

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

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:	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
mw-2	7/16/99	12:00	water	19			X			X													X		X					X	X	7
mw-3		12:30		20																												7
mw-4		1:00		21																												7
mw-10		1:15		22																												7
mw-9		1:45		23																												7
Trip Blank	7/7	1550	"	24						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/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 [ ]

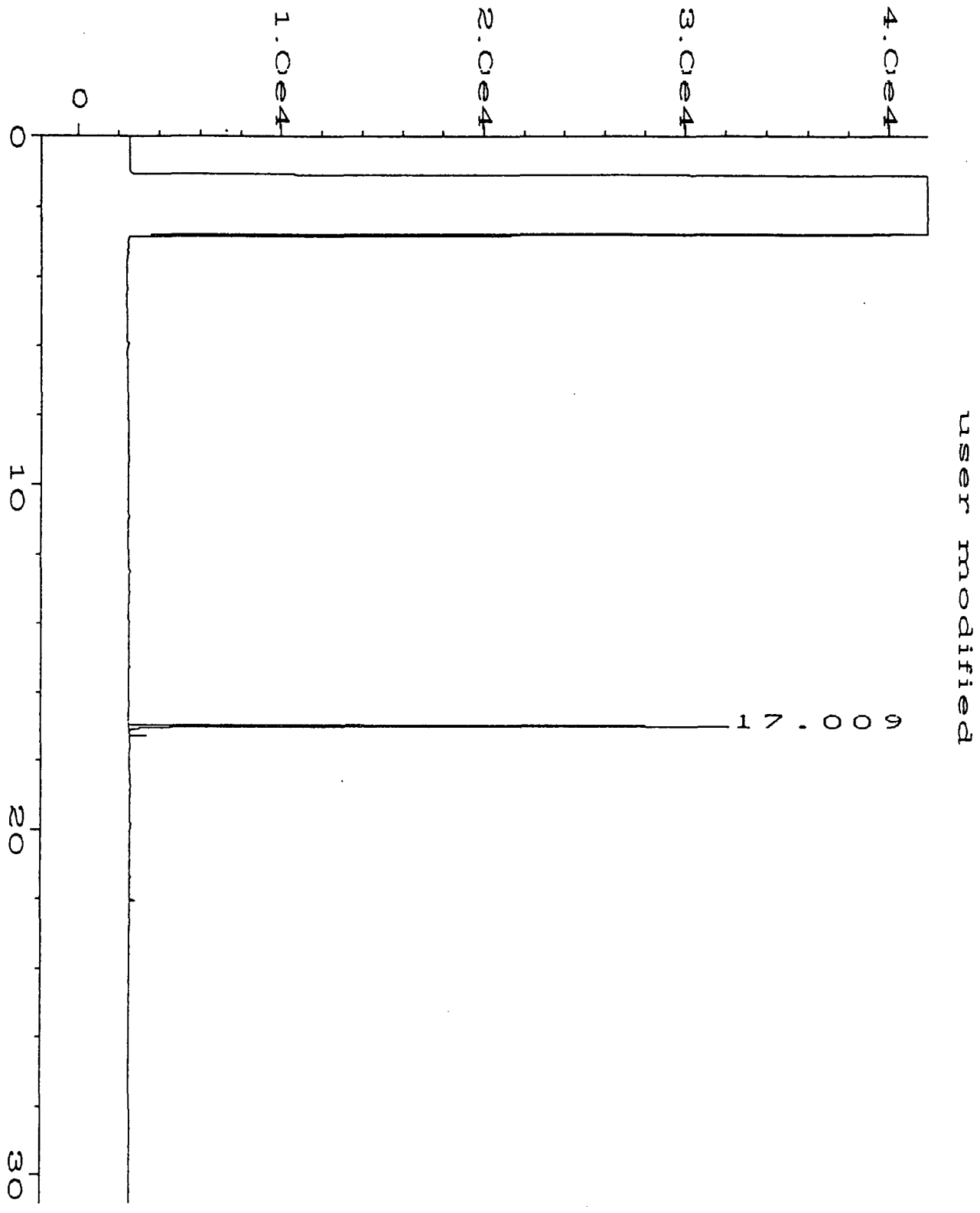
COMMENTS: FIXED FEE [ ]
See 6/16/99 Quote.

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



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Run Time Bar Code:		Sequence Line	: 1
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Report Created on	: 21 Jul 99 09:27 AM	Analysis Method	: HX071599.MTH
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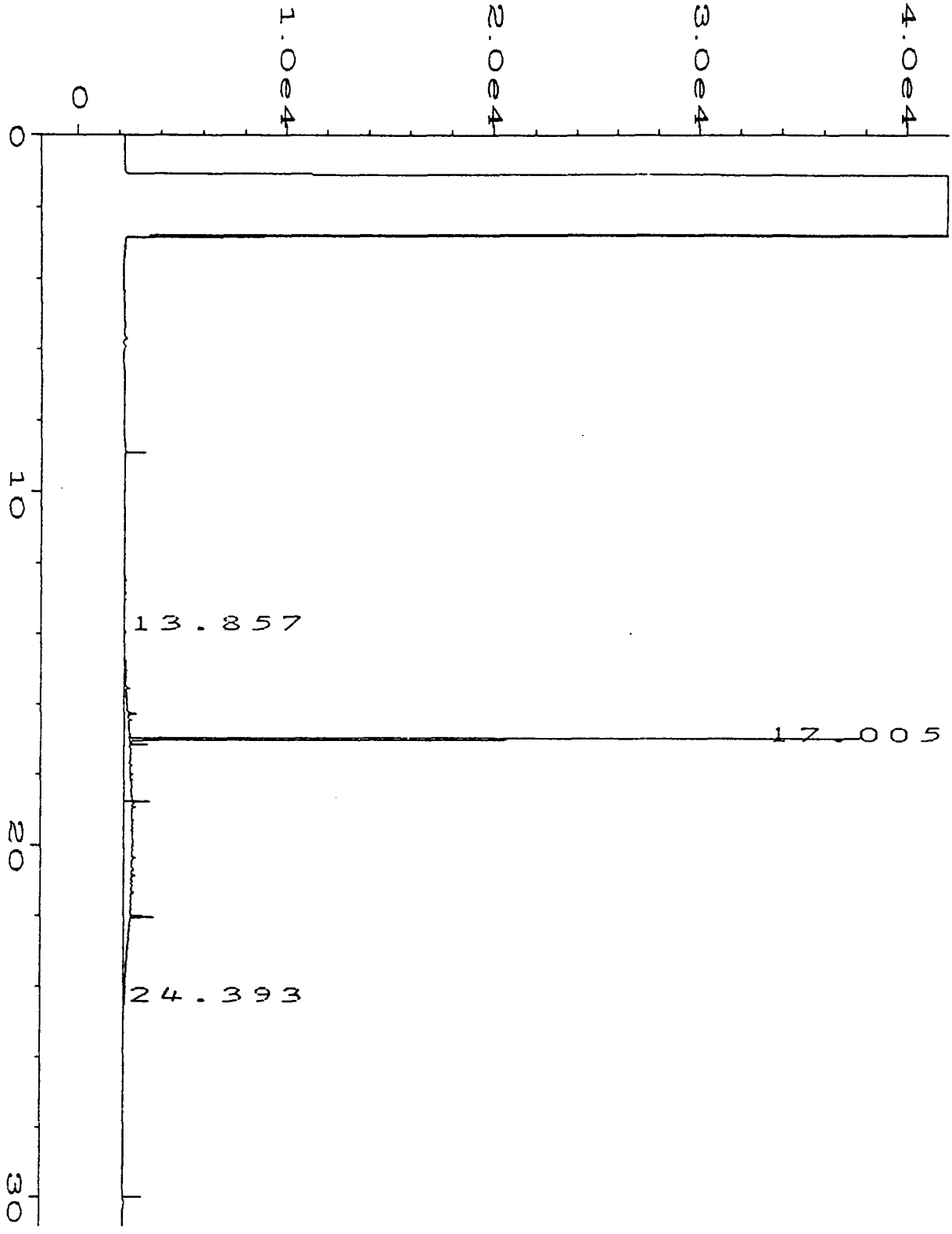

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Instrument	: FID1	Vial Number	: 32
Sample Name	: 907053-02rr	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
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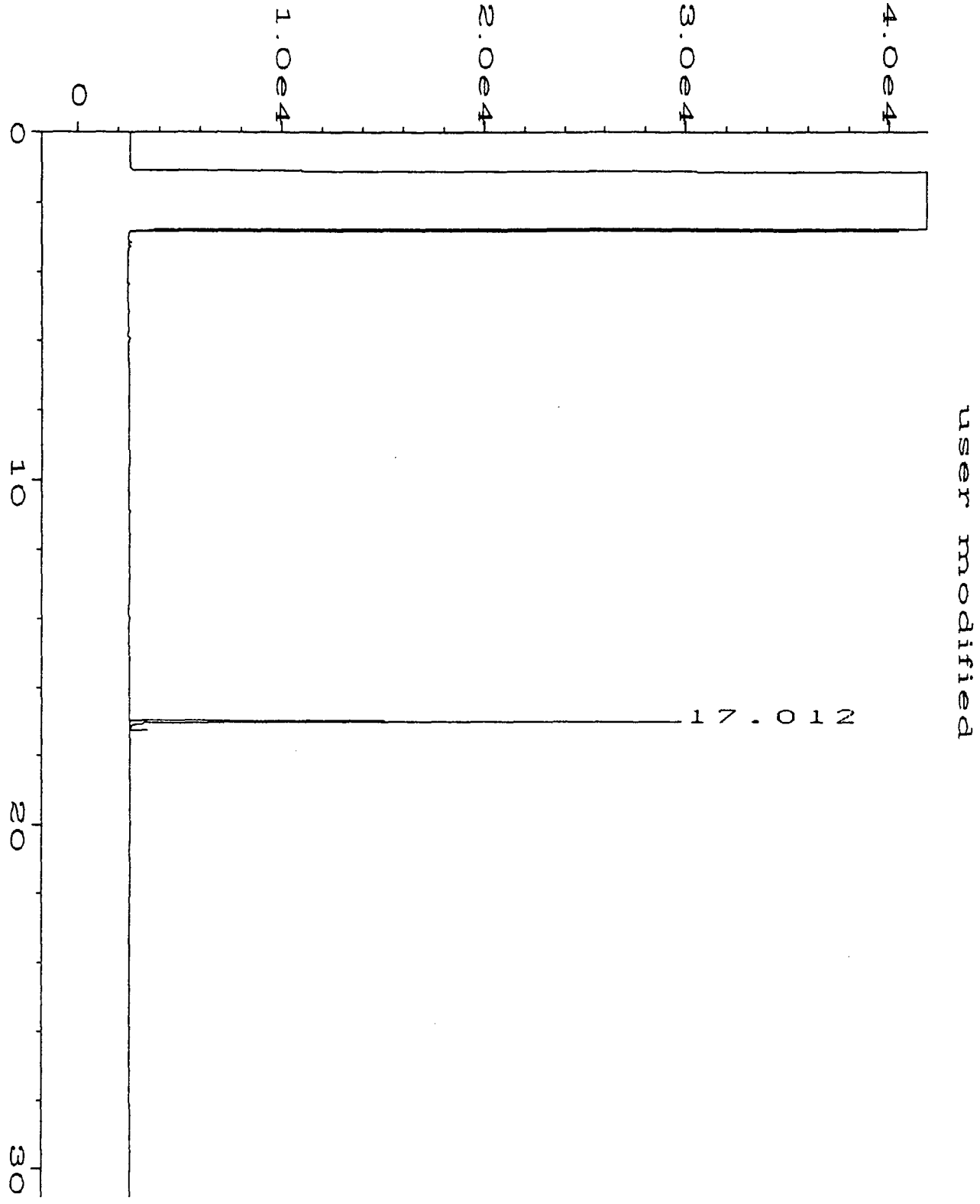
Report Created on	: 21 Jul 99 12:42 PM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



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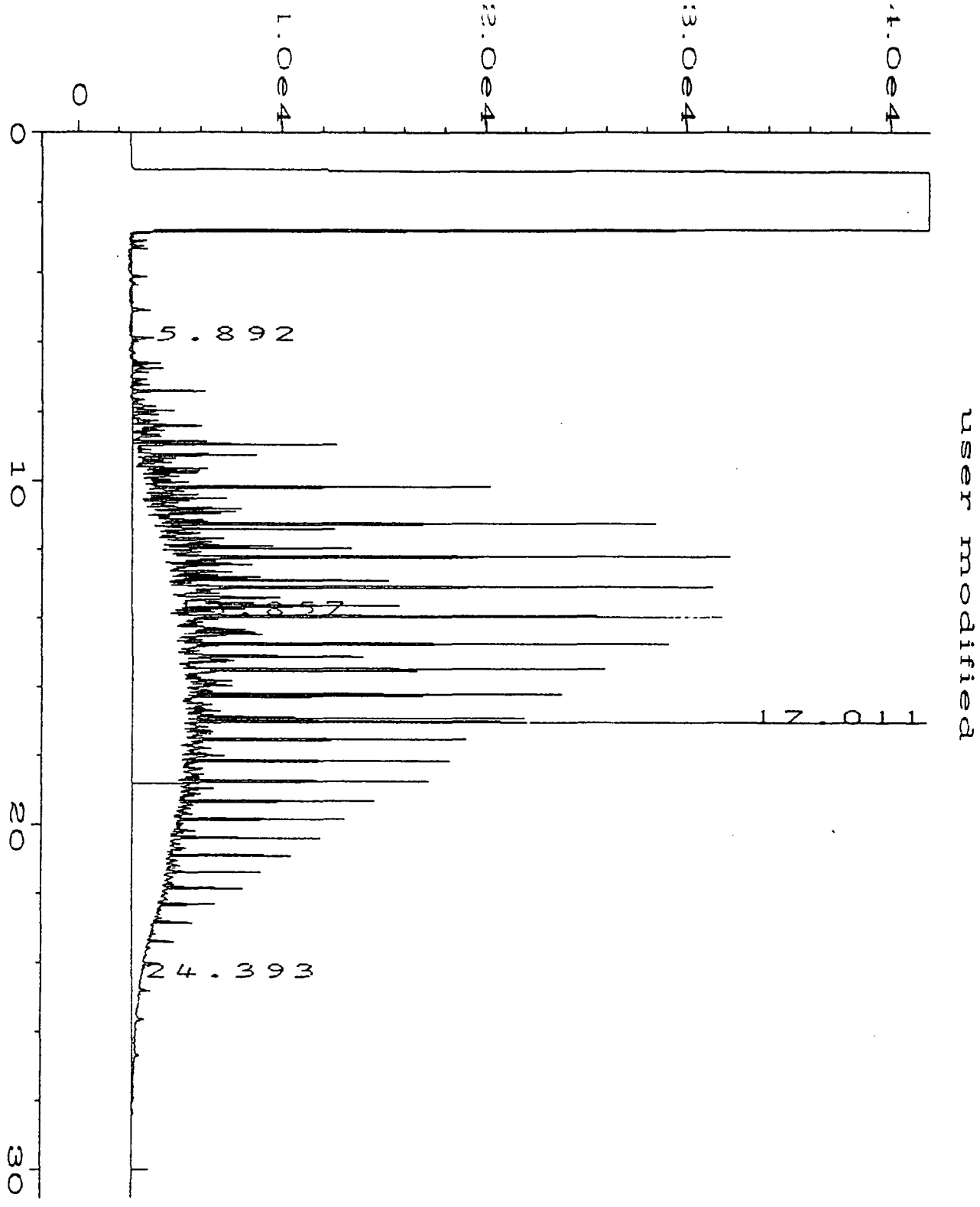
Instrument	: FID1	Vial Number	: 25
Sample Name	: 907053-03	Injection Number	: 1
Bar Code	Time Bar Code:	Sequence Line	: 1
Acquired on	: 21 Jul 99 05:32 AM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 11:24 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample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



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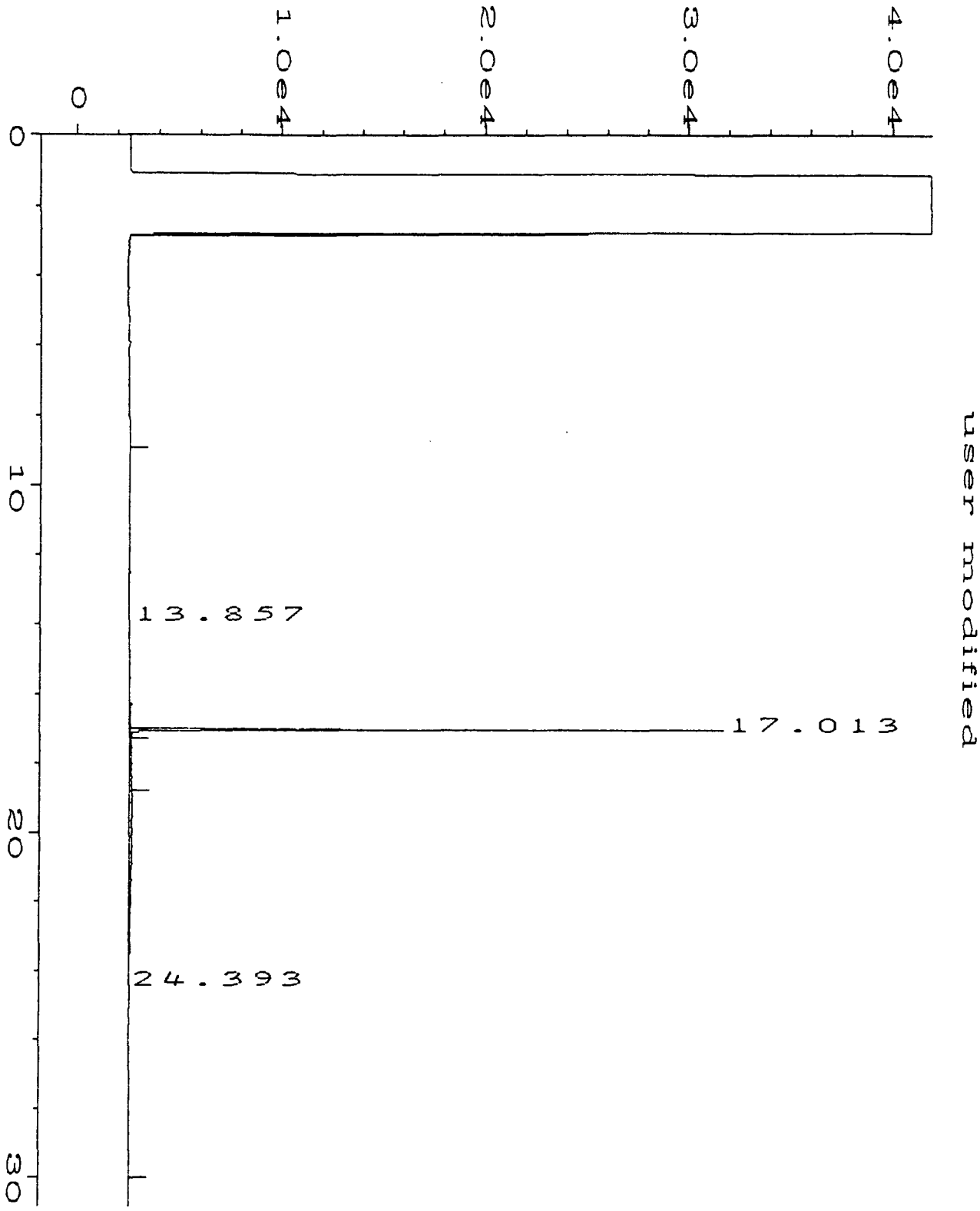
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 26
Sample Name	: 907053-04	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 06:20 AM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 11:25 AM	Analysis Method	: HX071599.MTH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



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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
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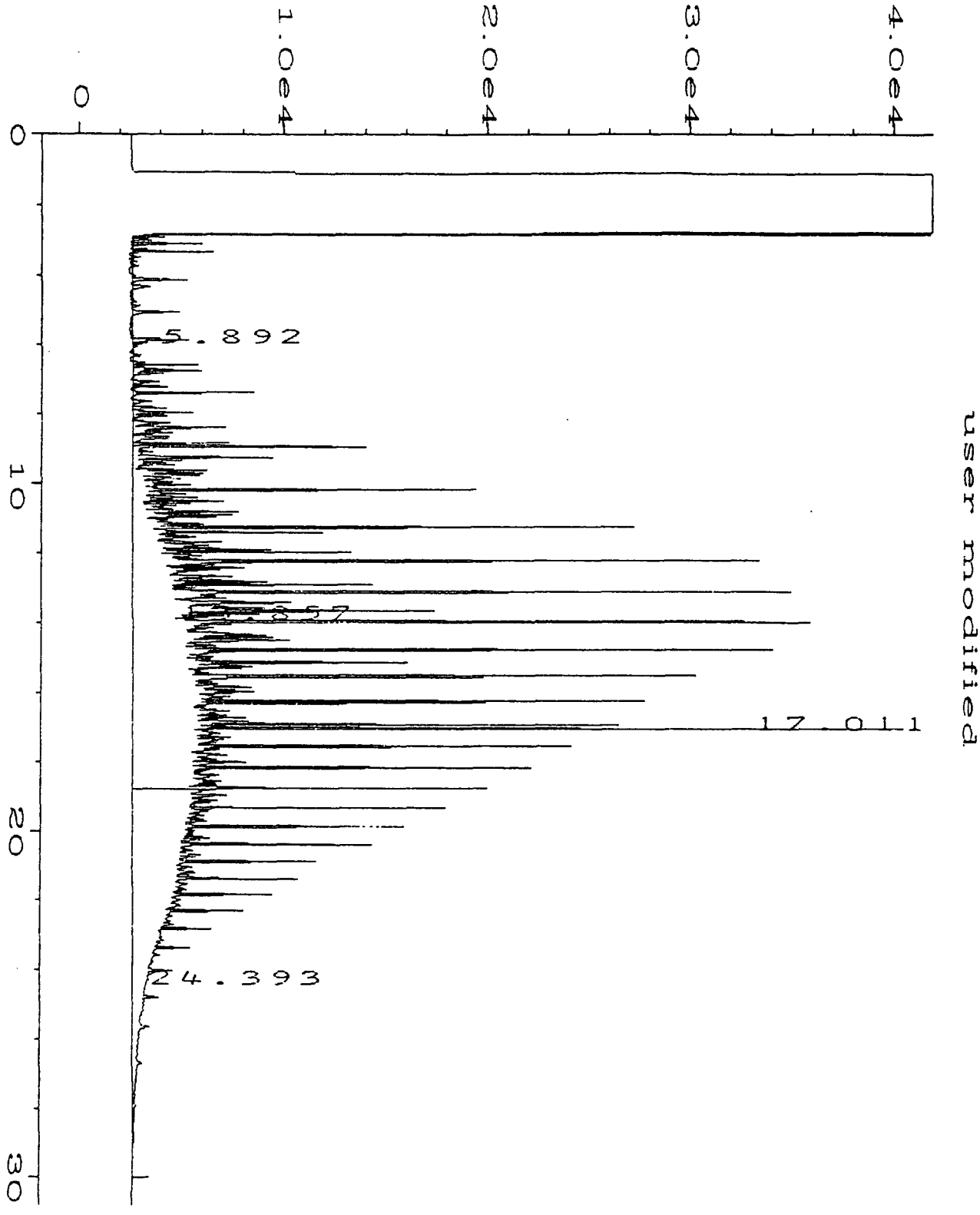
Multiplier	: 1	ISTD Amount	:



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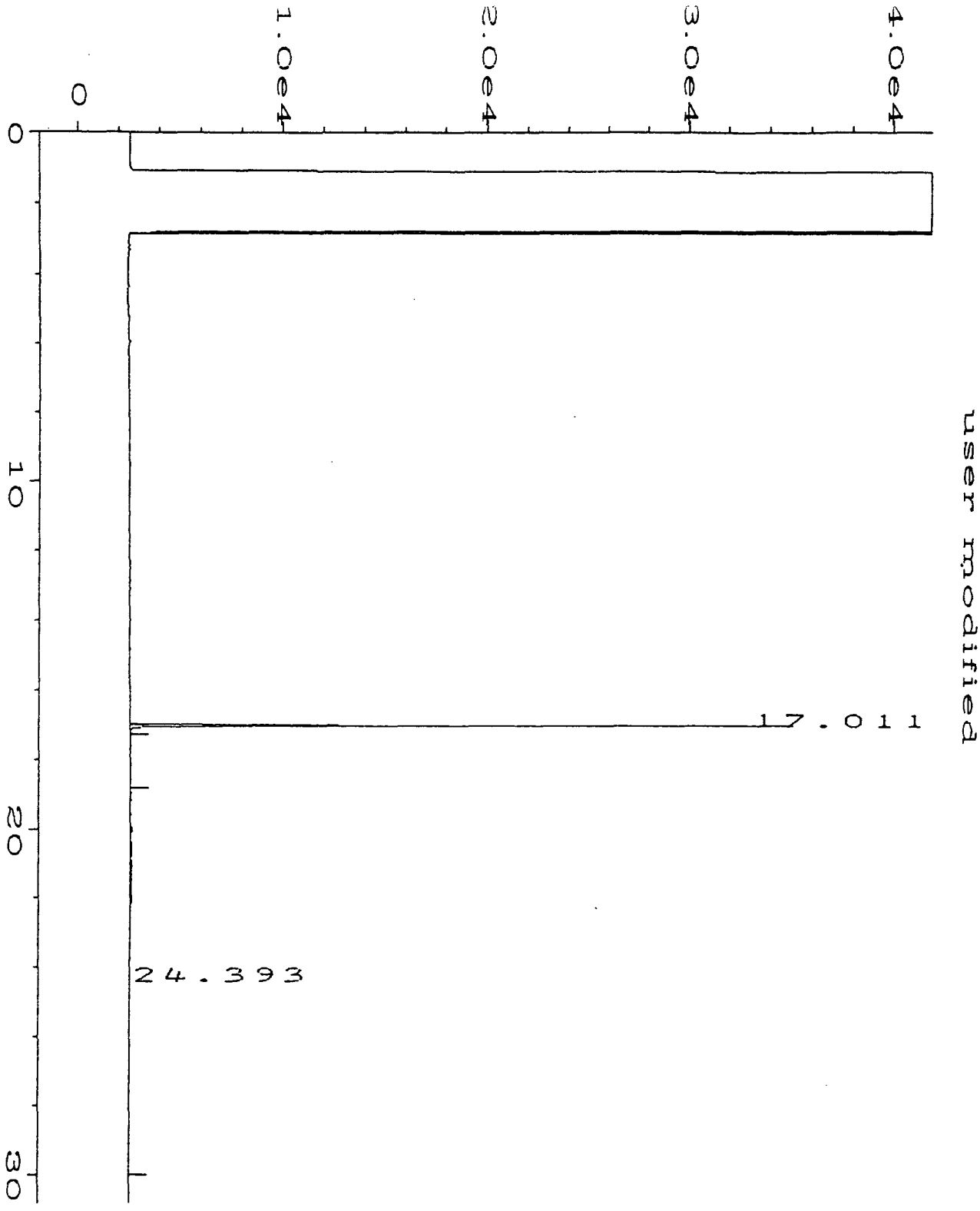
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 28
Sample Name	: 907053-06	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 07:56 AM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 11:27 AM	Analysis Method	: HX071599.MTH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



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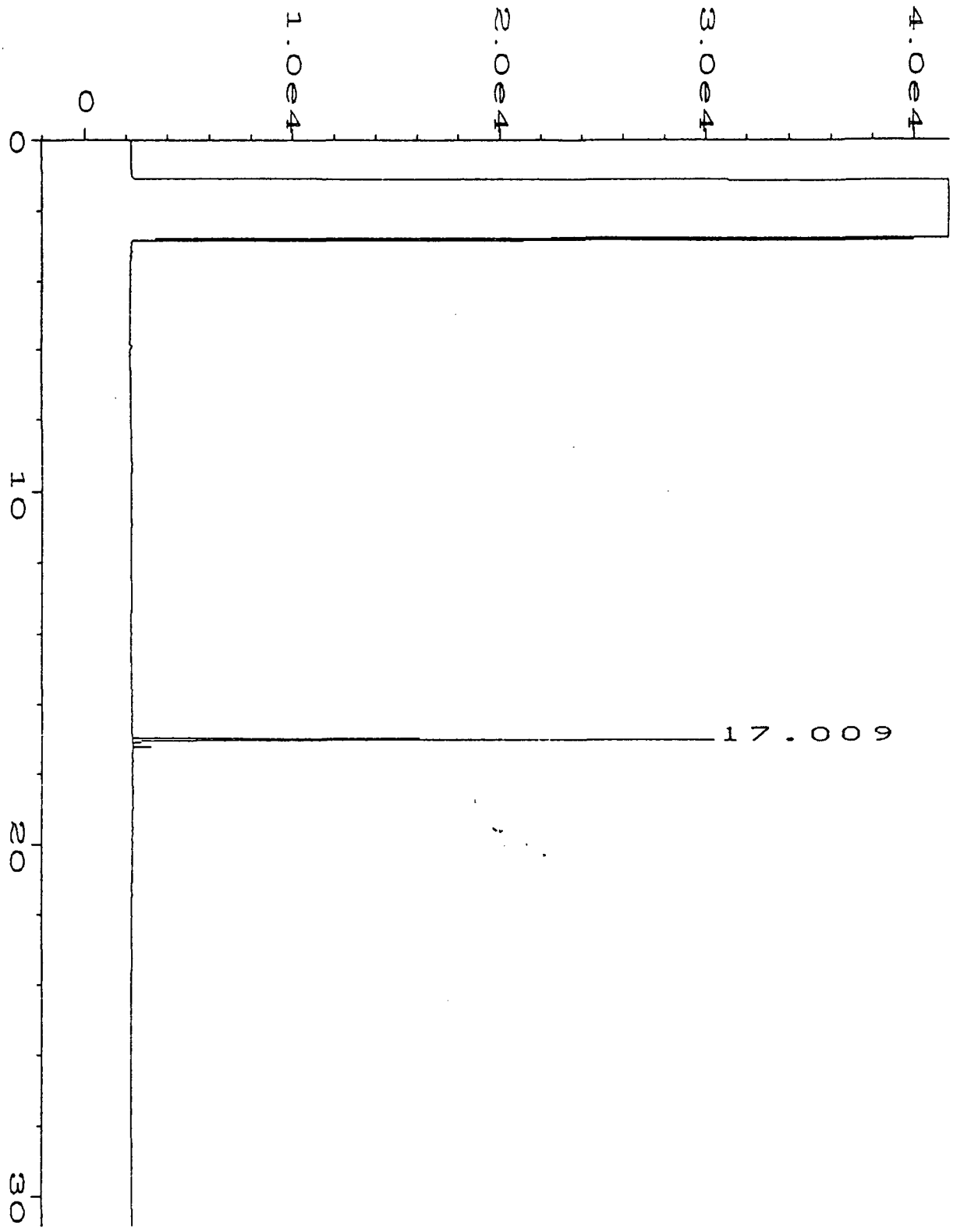
Sample Name	: 907053-07	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 08:43 AM	Instrument Method	: HX071599.MTH
Report Created on	: 21 Jul 99 11:28 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount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



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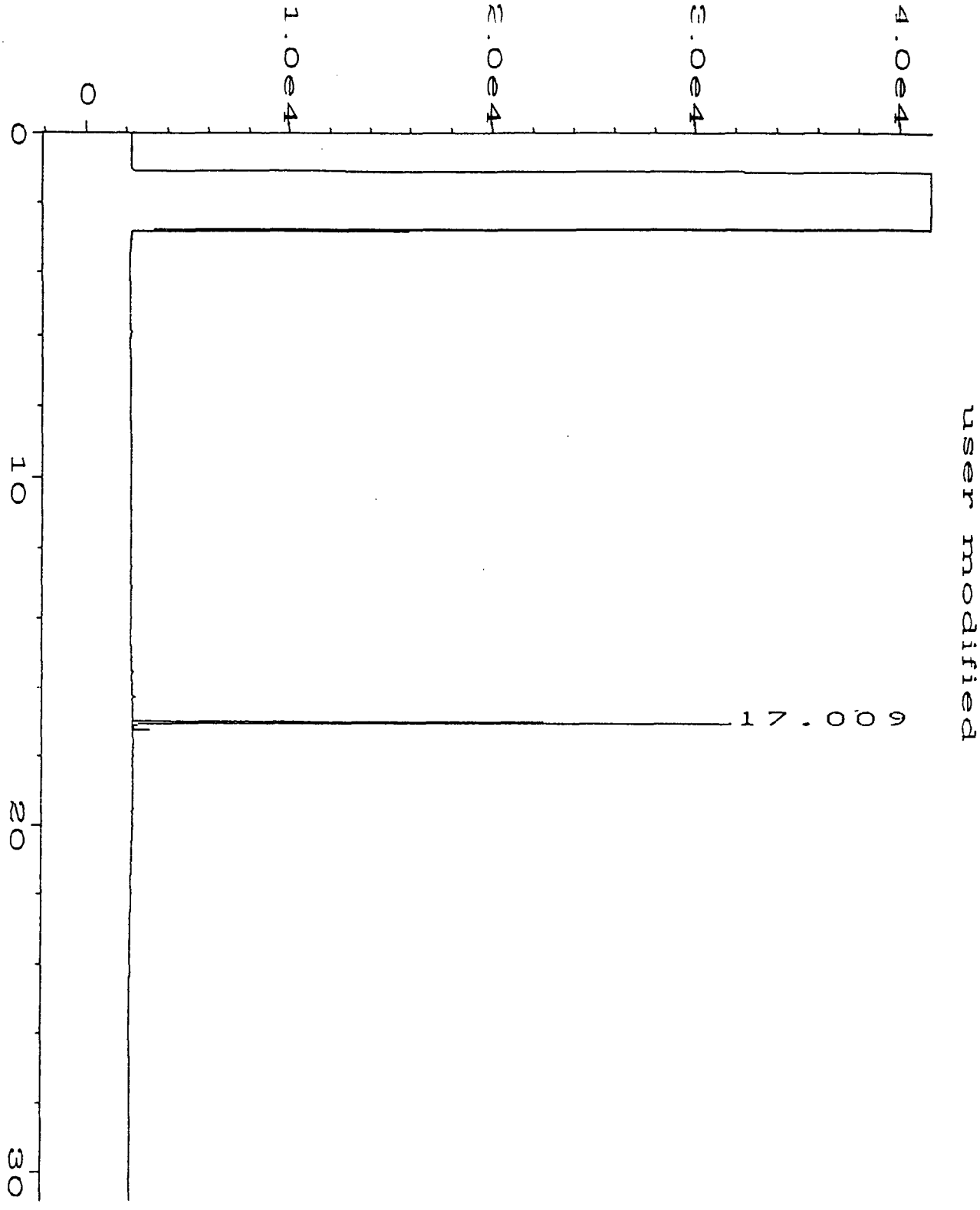
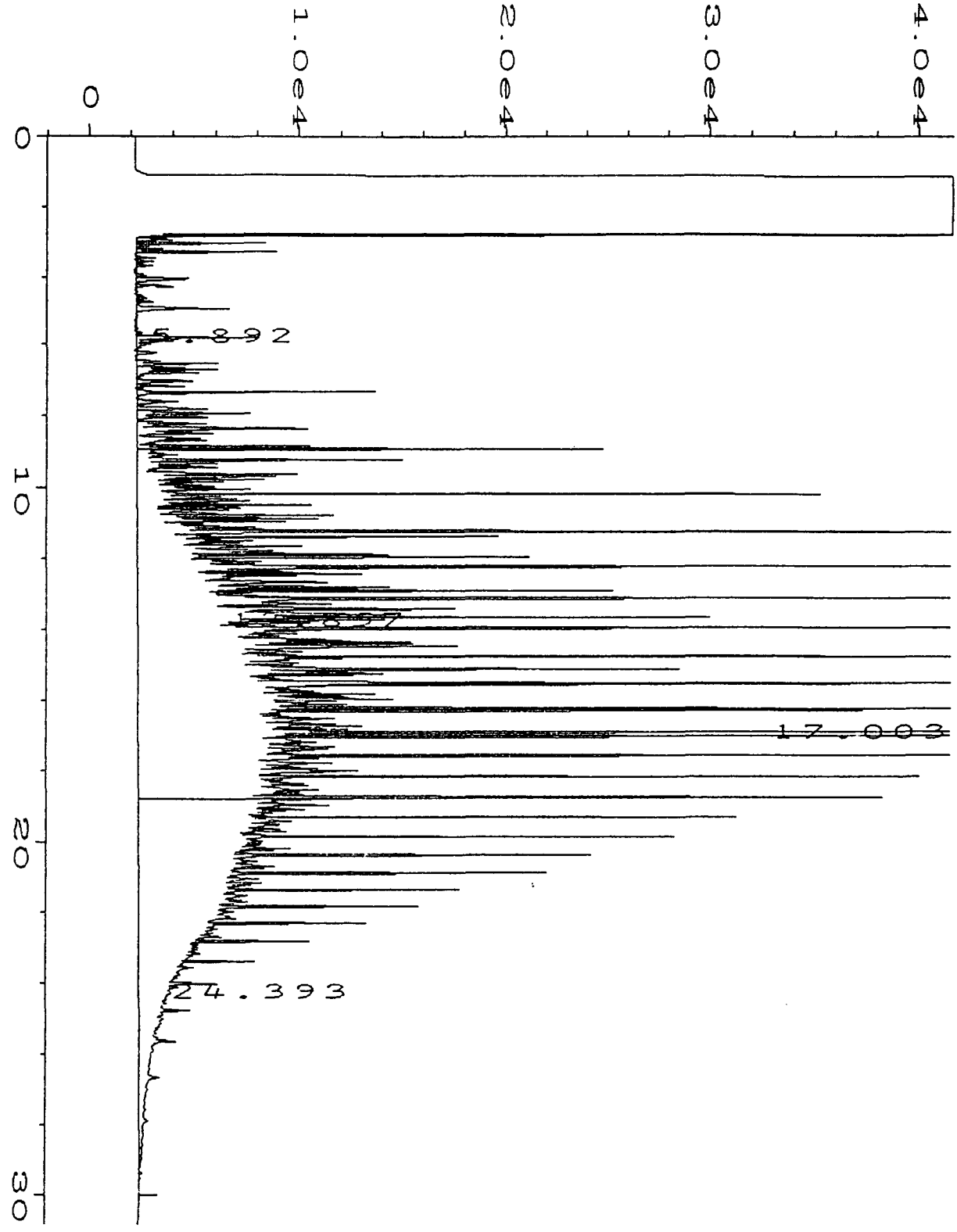
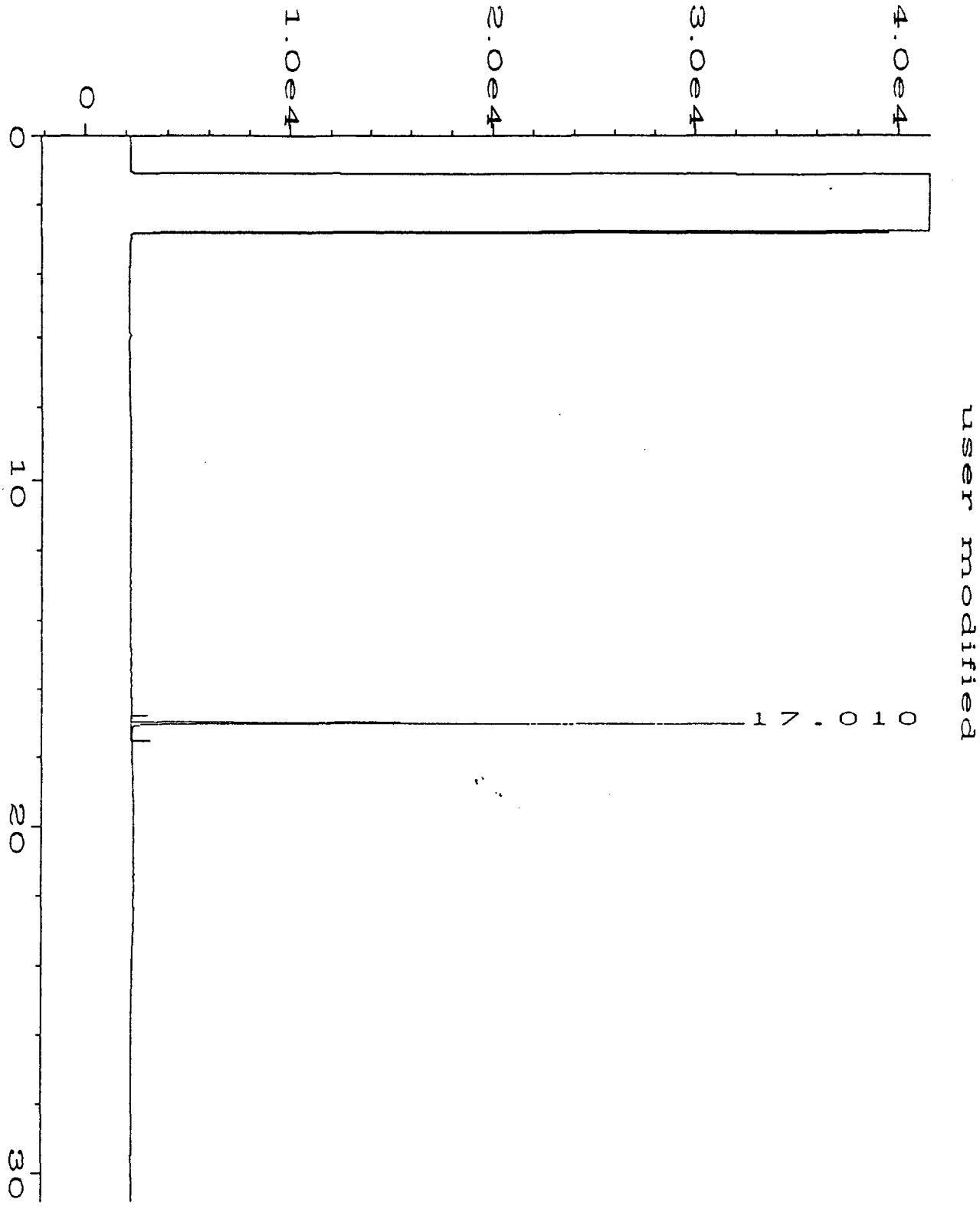
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 33
Sample Name	: 907053-08	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 12:41 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 10:39 AM	Analysis Method	: HX071599.MTH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



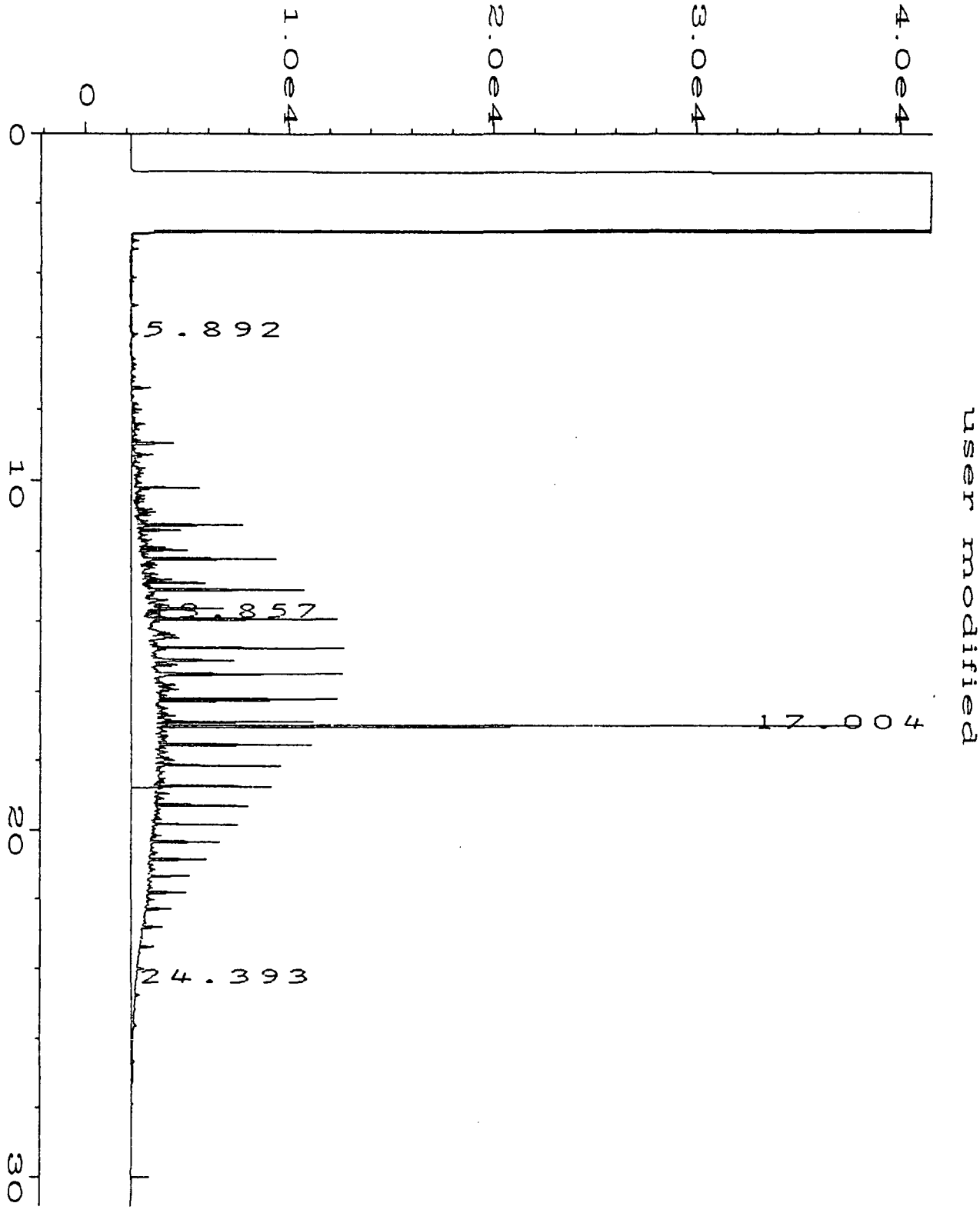
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\034R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 34
Sample Name	: 907053-09	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 01:32 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 10:39 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



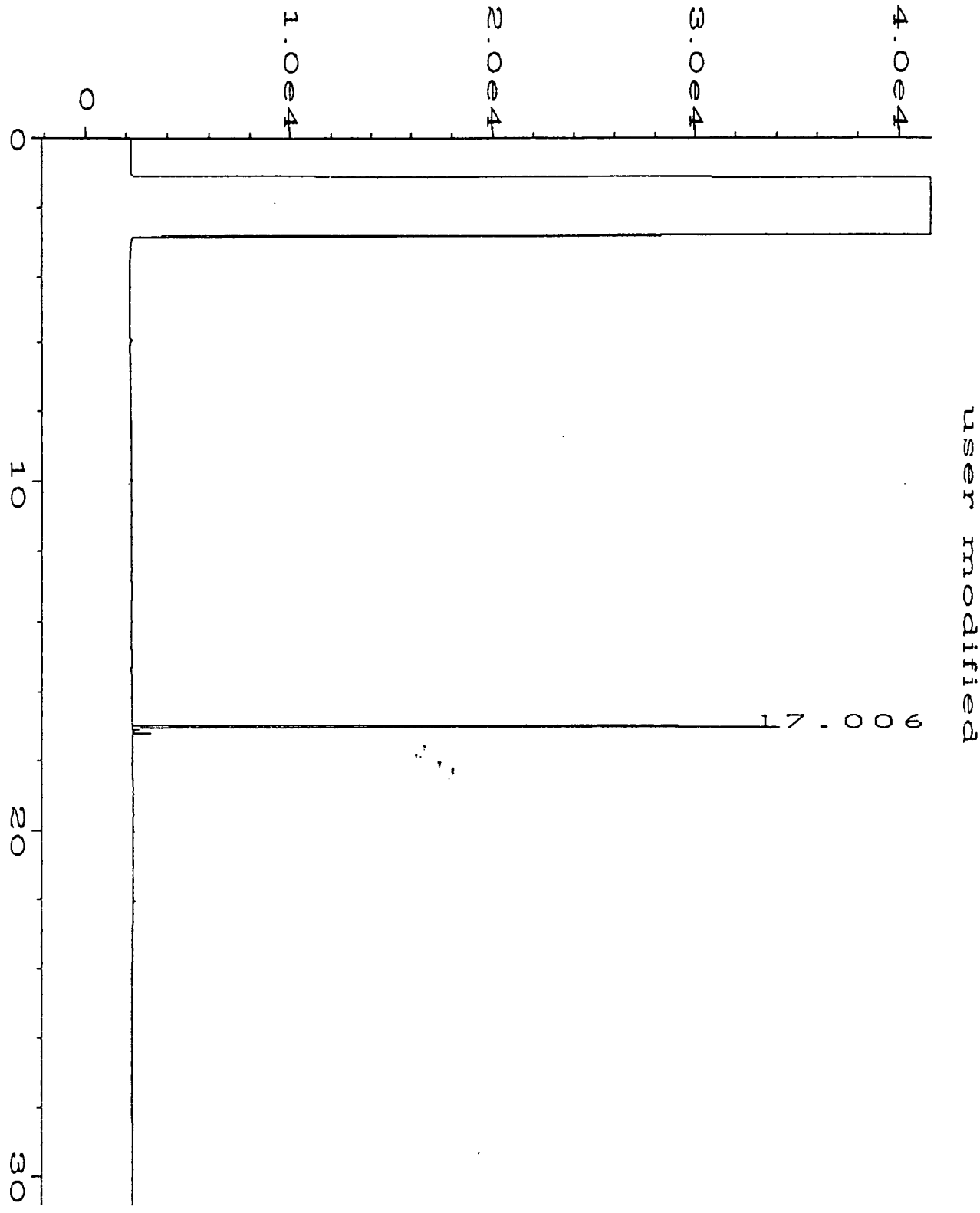
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\036R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 36
Sample Name	: 907053-10	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 03:32 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 10:40 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



Data File Name	: C:\HPCHEM\2\DATA\20JUL99\037R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 37
Sample Name	: 907053-11	Injection Number	: 1
Run 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
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

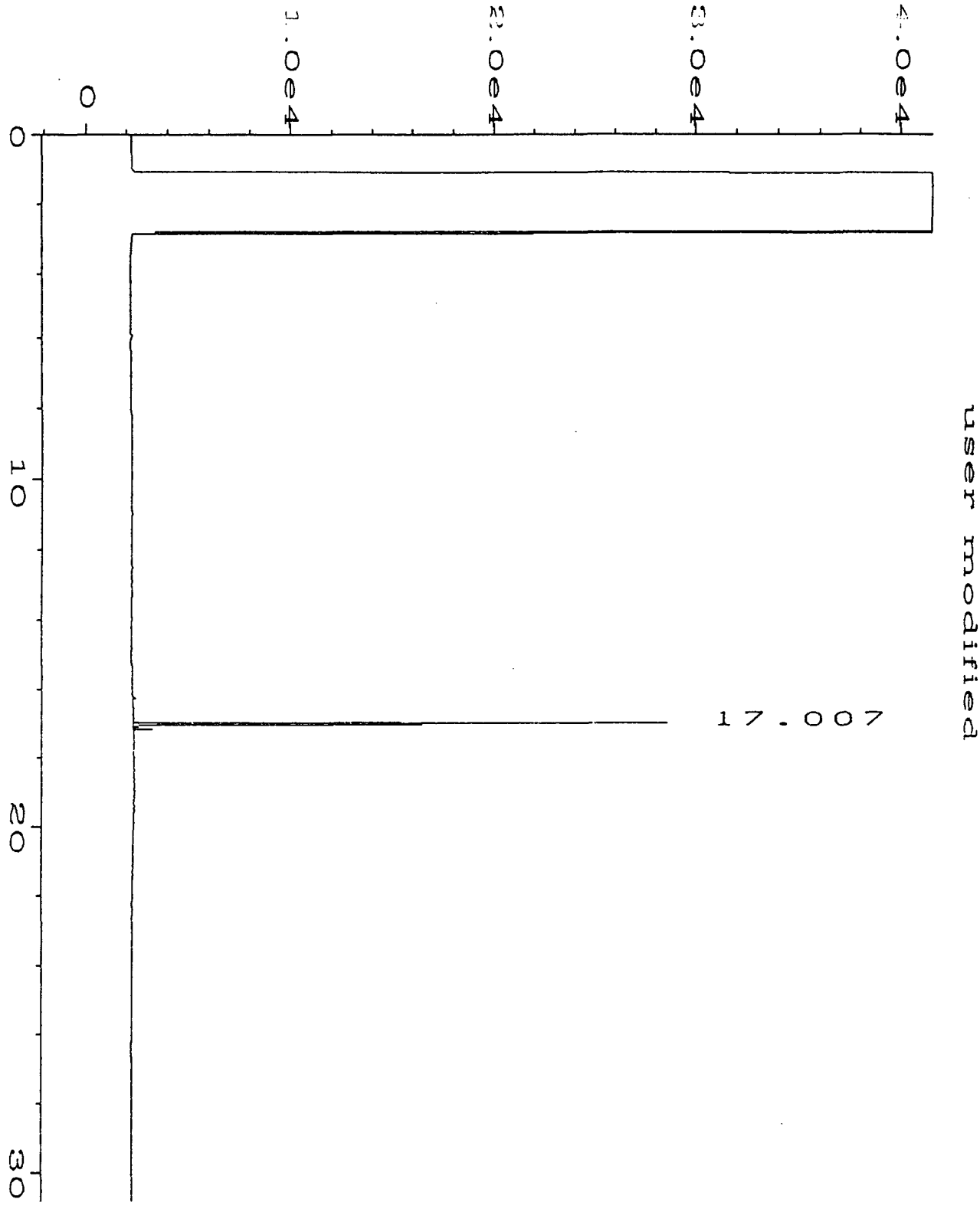


Data File Name	: C:\HPCHEM\2\DATA\20JUL99\038R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 38
Sample Name	: 907053-12	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 05:15 PM	Instrument Method	: HX071599.MTH
Report Created on	: 23 Jul 99 10:52 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

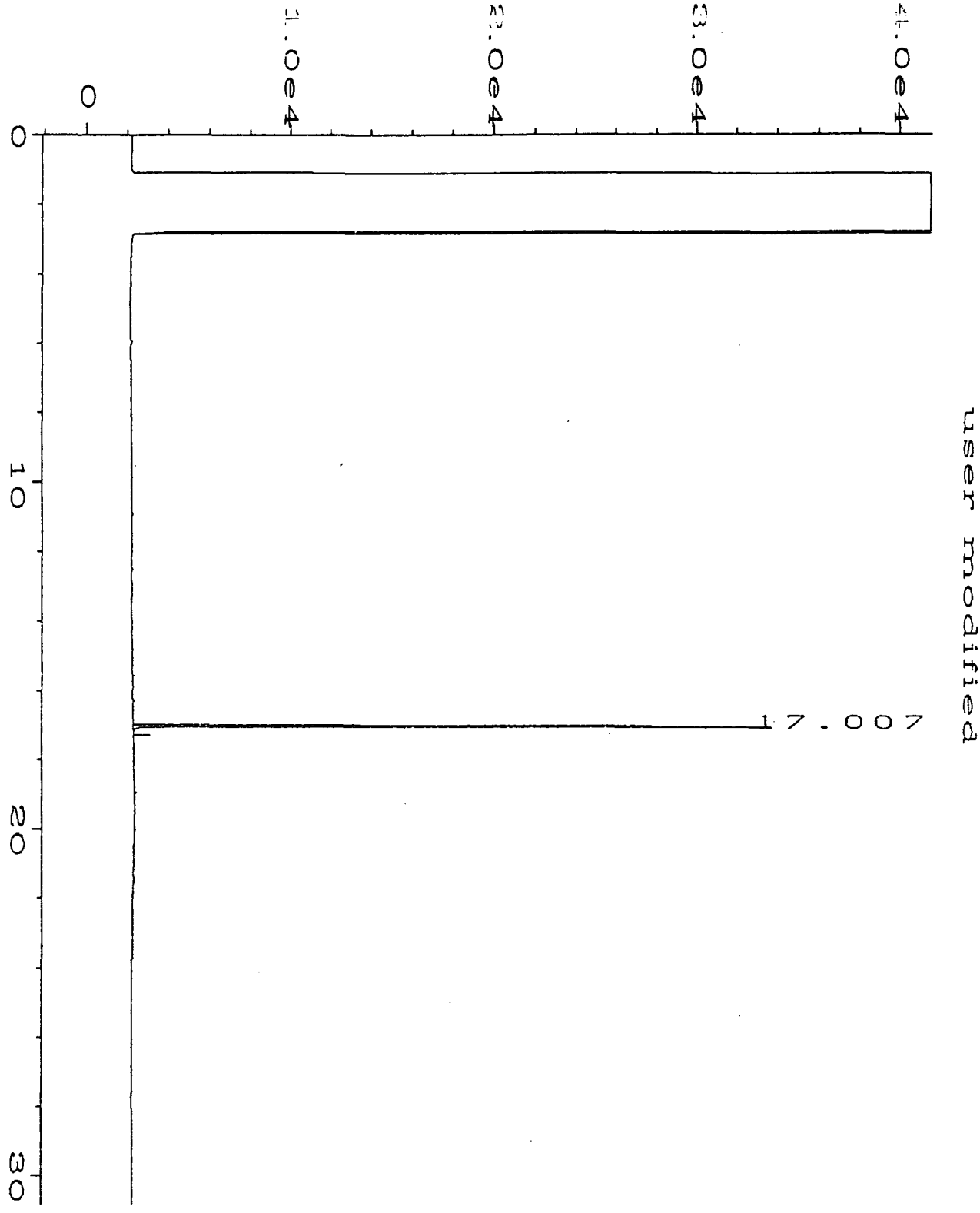


Data File Name : C:\HPCHEM\2\DATA\20JUL99\039R0101.D
Operator : Pinnacle - rg & cff
Instrument : FID1
Sample Name : 907053-13
Run Time Bar Code:
Acquired on : 21 Jul 99 06:04 PM
Report Created on: 23 Jul 99 10:53 AM
Last Recalib on : 11 JAN 93 08:58 AM
Multiplier : 1

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

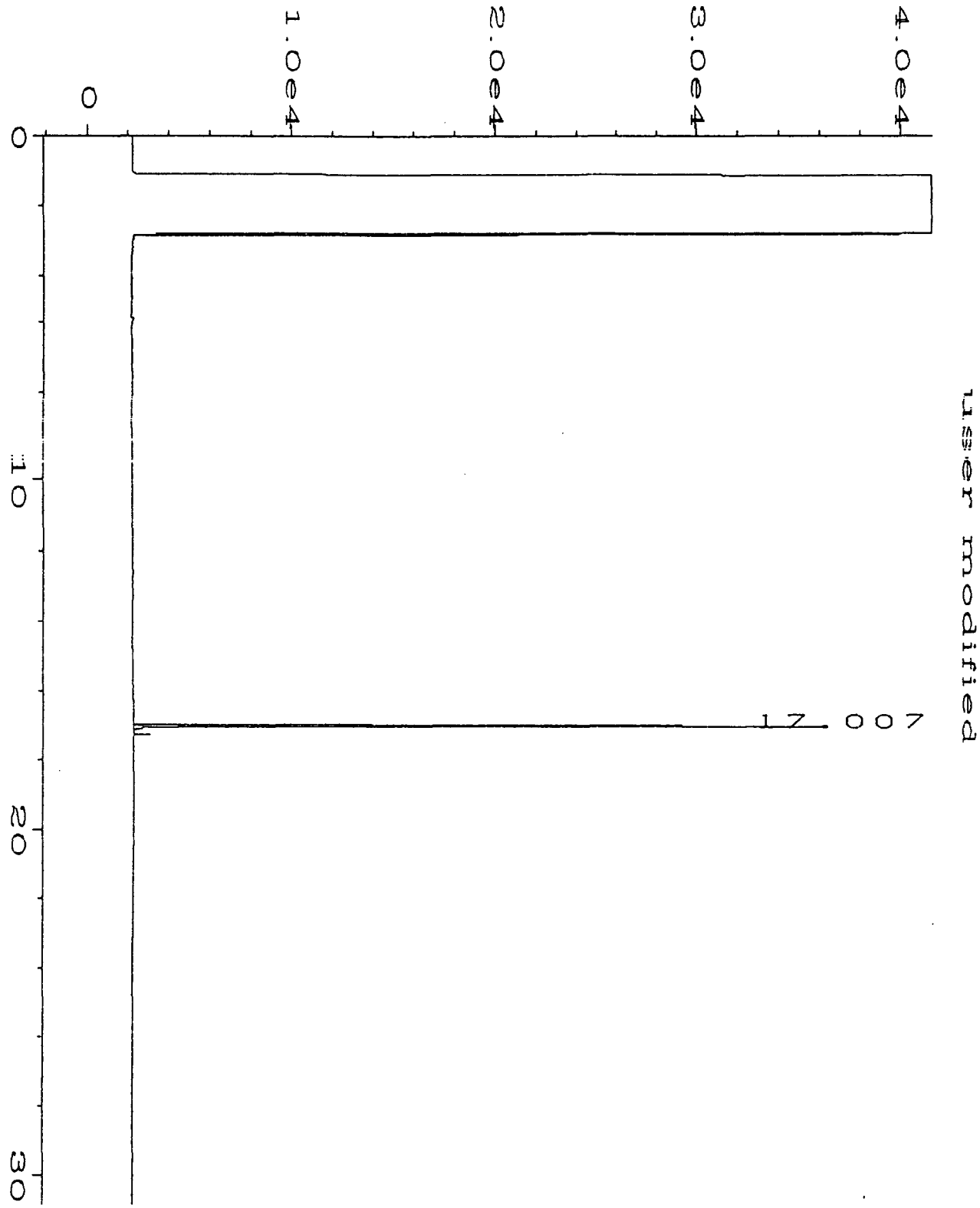


Data File Name	: C:\HPCHEM\2\DATA\20JUL99\040R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 40
Sample Name	: 907053-14	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 06:52 PM	Instrument Method	: HX071599.MTH
Report Created 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	:

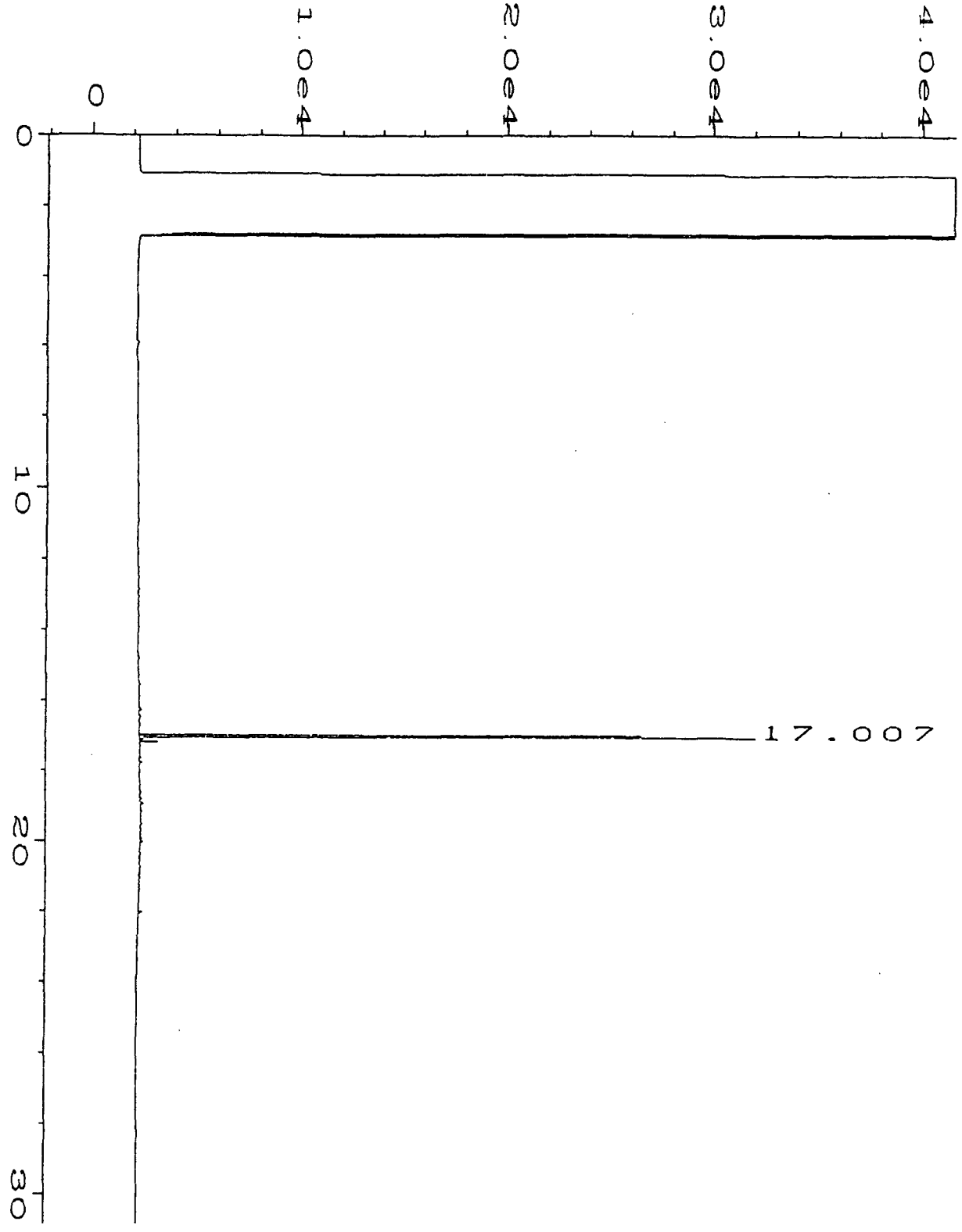


Data File Name : C:\HPCHEM\2\DATA\20JUL99\041R0101.D
Operator : Pinnacle - rg & cff
Instrument : FID1
Sample Name : 907053-15
Run Time Bar Code:
Acquired on : 21 Jul 99 07:40 PM
Report Created on: 23 Jul 99 11:32 AM
Last Recalib on : 11 JAN 93 08:58 AM
Multiplier : 1

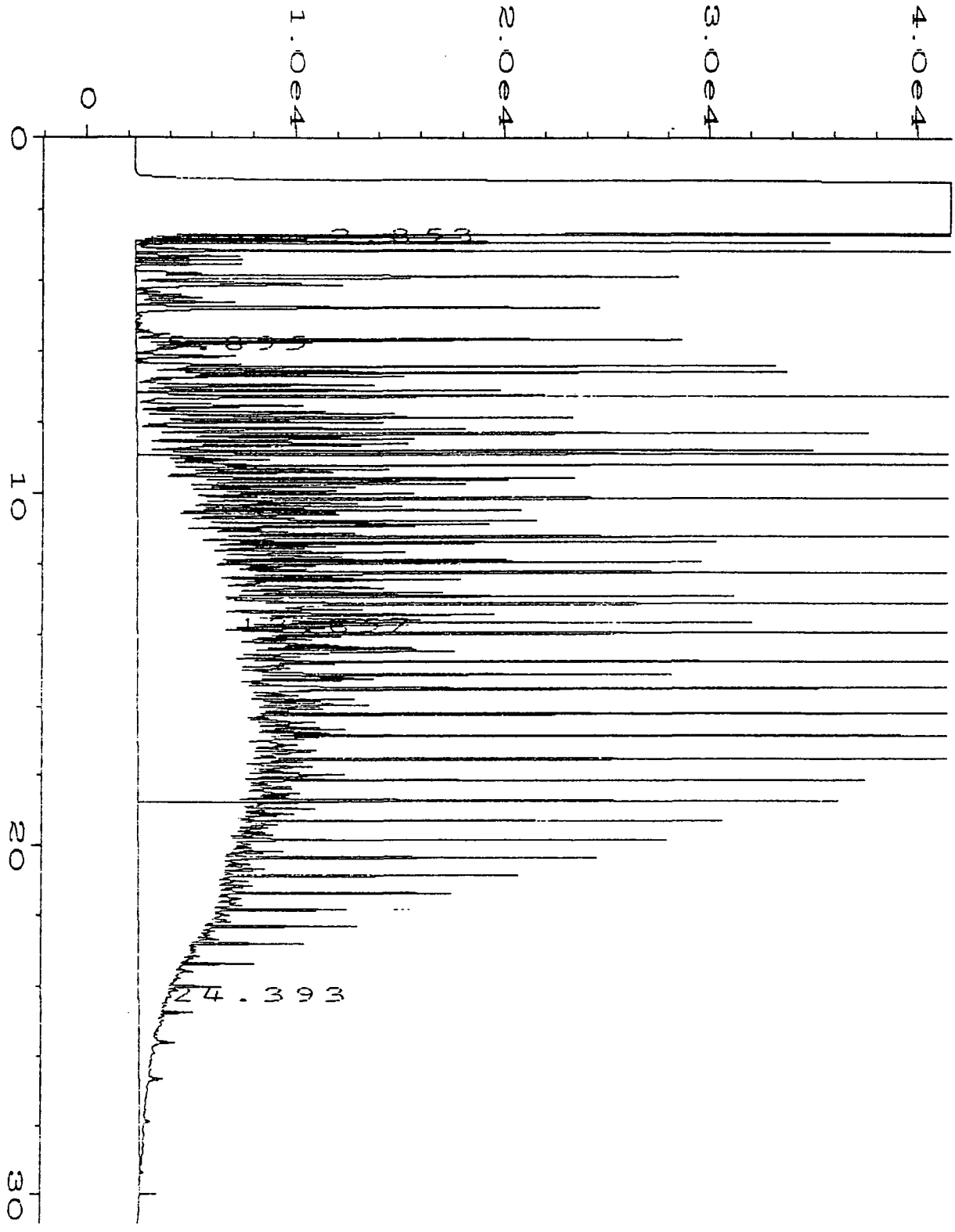
Page Number : 1
Vial Number : 41
Injection Number : 1
Sequence Line : 1
Instrument Method: HX071599.MTH
Analysis Method : HX071599.MTH
Sample Amount : 0
ISTD Amount :



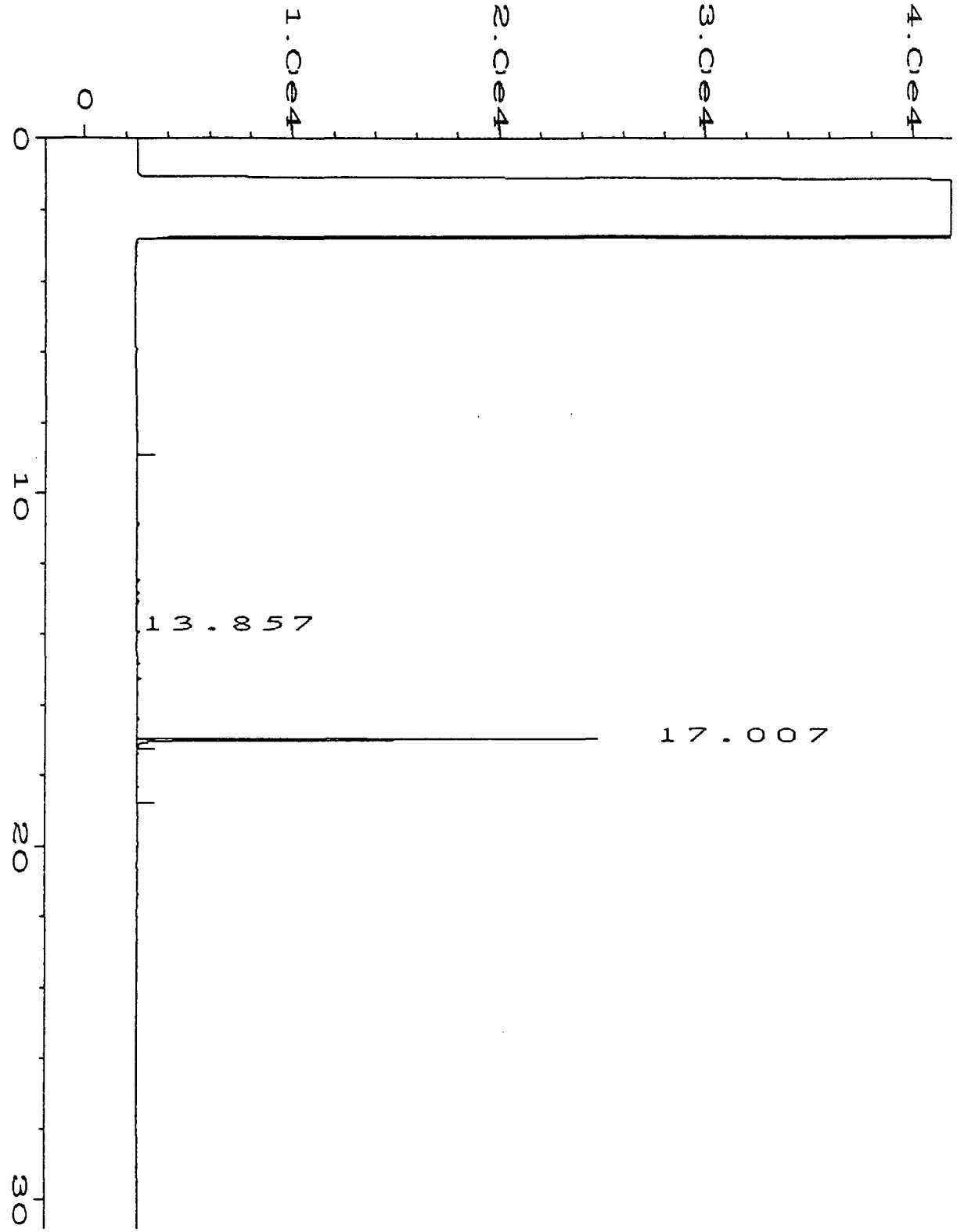
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\042R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 42
Sample Name	: 907053-16	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 08:28 PM	Instrument Method	: HX071599.MTH
Report Created 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	:



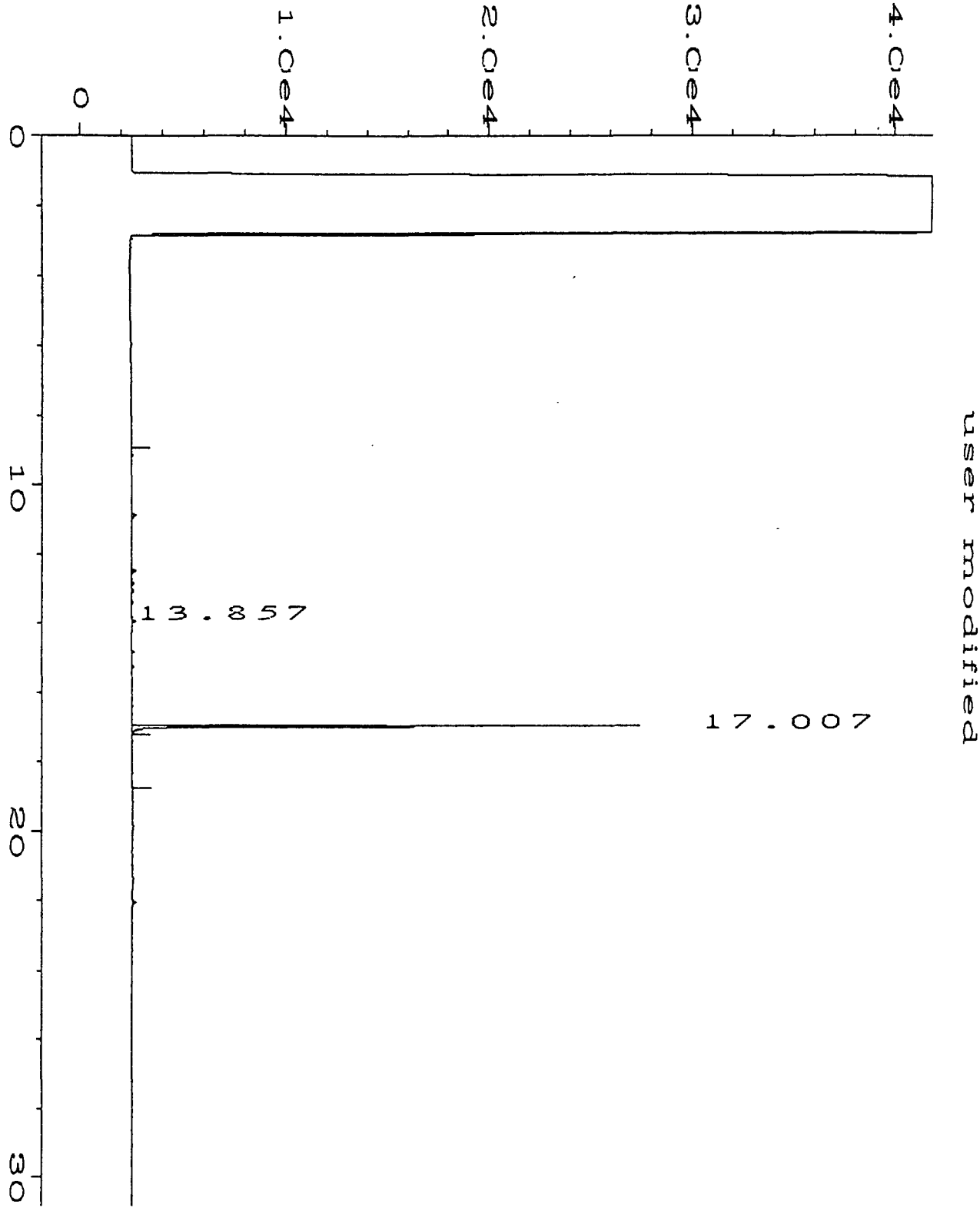
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\043R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 43
Sample Name	: 907053-17	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 09:15 PM	Instrument Method	: HX071599.MTH
Report Created 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	:



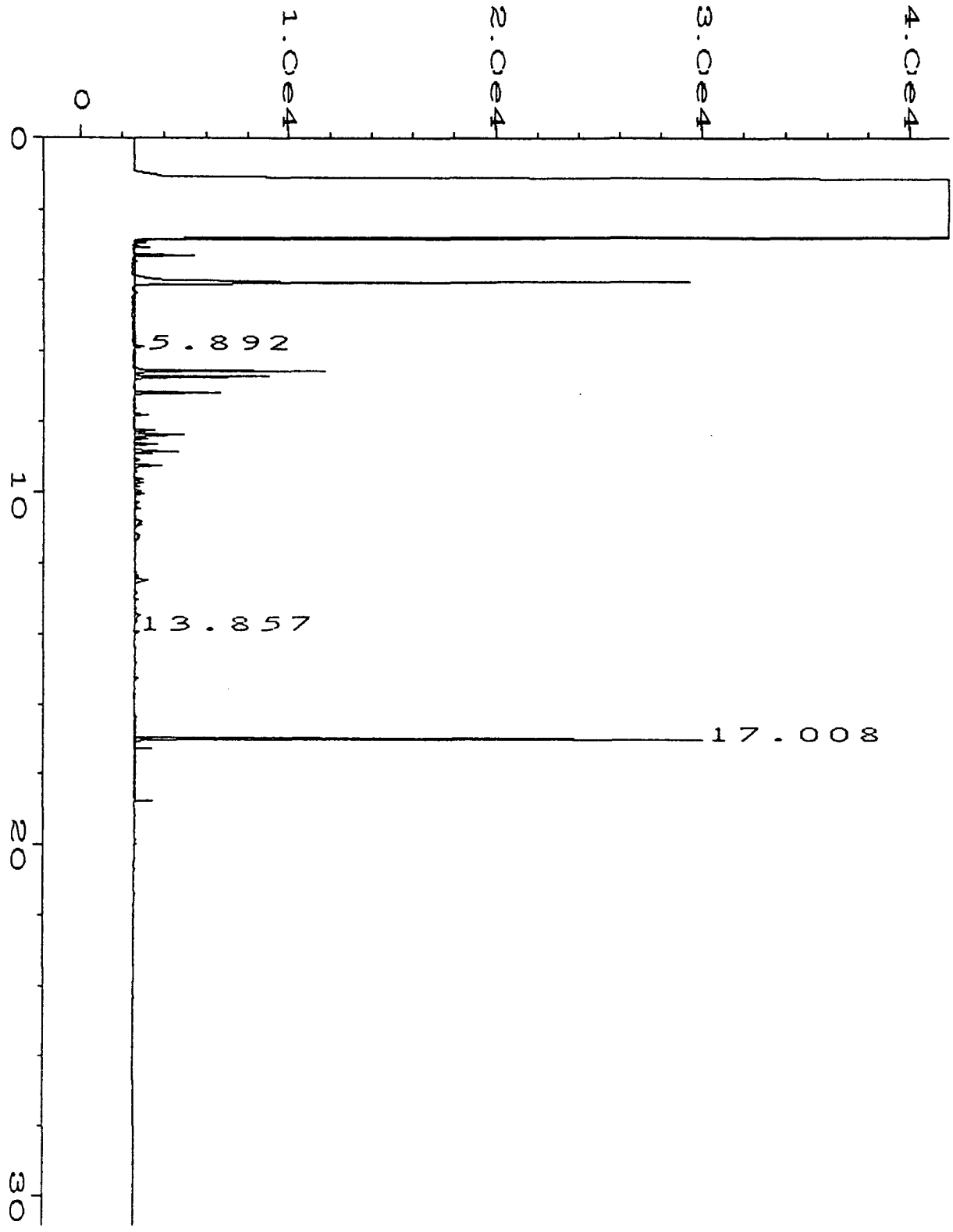
Data File Name	: C:\HPCHEM\2\DATA\23JUL99\004R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 4
Sample Name	: 907053-18*20	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 23 Jul 99 03:08 PM	Instrument Method	: HX071599.MTH
Report Created 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	:



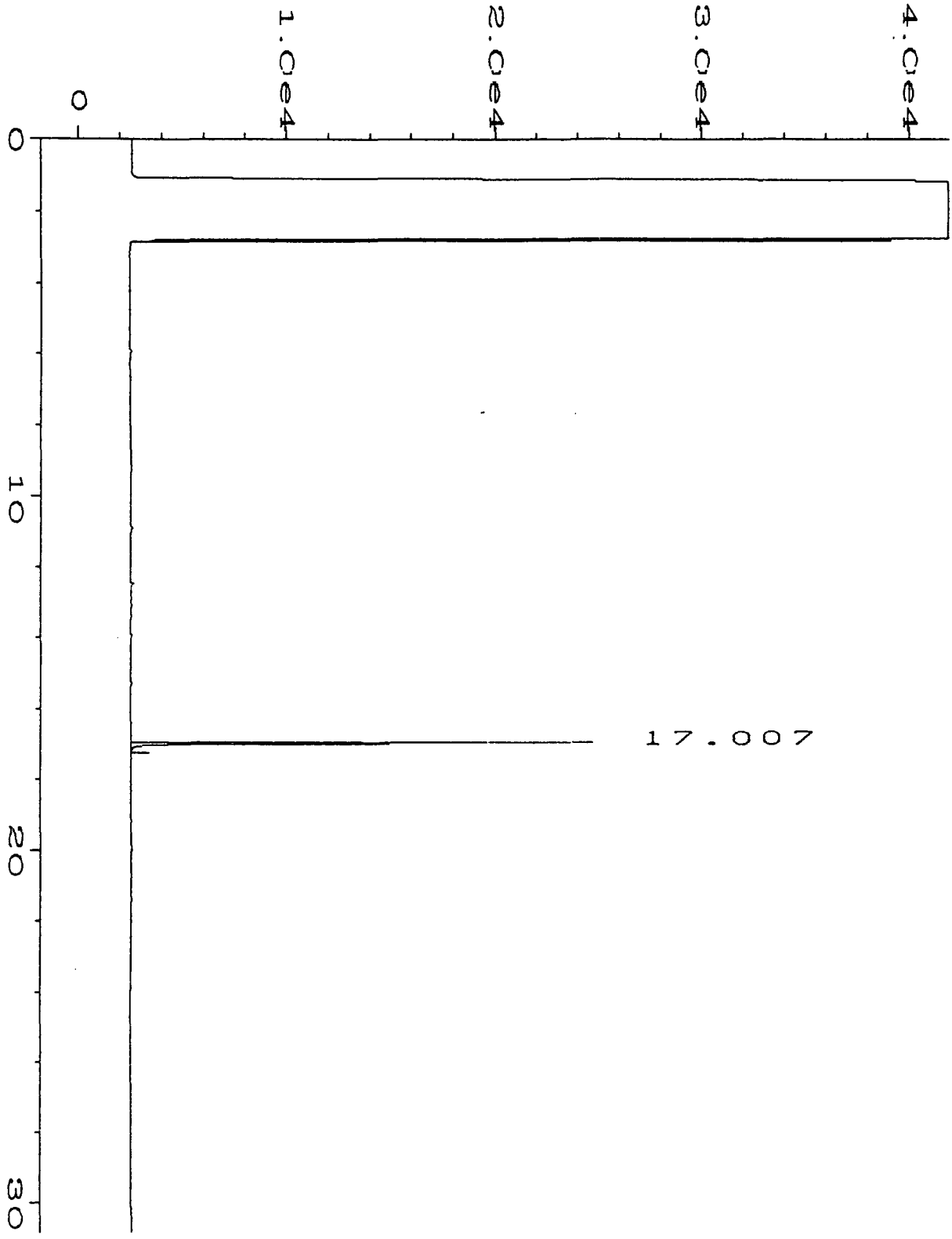
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\011R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 11
Sample Name	: 907053-19	Injection Number	: 1
Time Bar Code:		Sequence Line	: 1
Acquired on	: 20 Jul 99 06:08 PM	Instrument Method	: HX071599.MTH
Report Created on	: 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	:



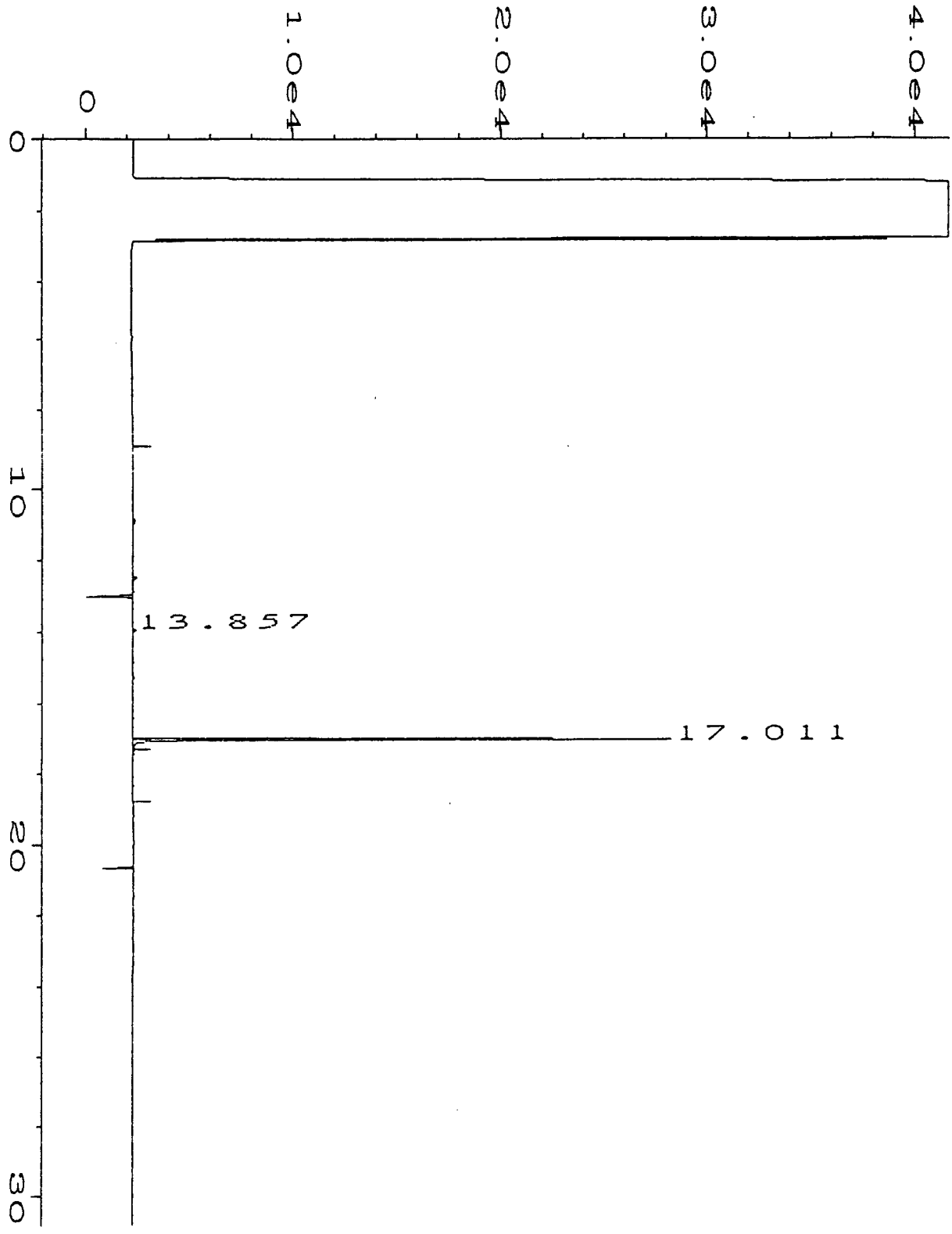
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\012R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 12
Sample Name	: 907053-20	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 20 Jul 99 06:59 PM	Instrument Method	: HX071599.MTH
Report Created 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	:



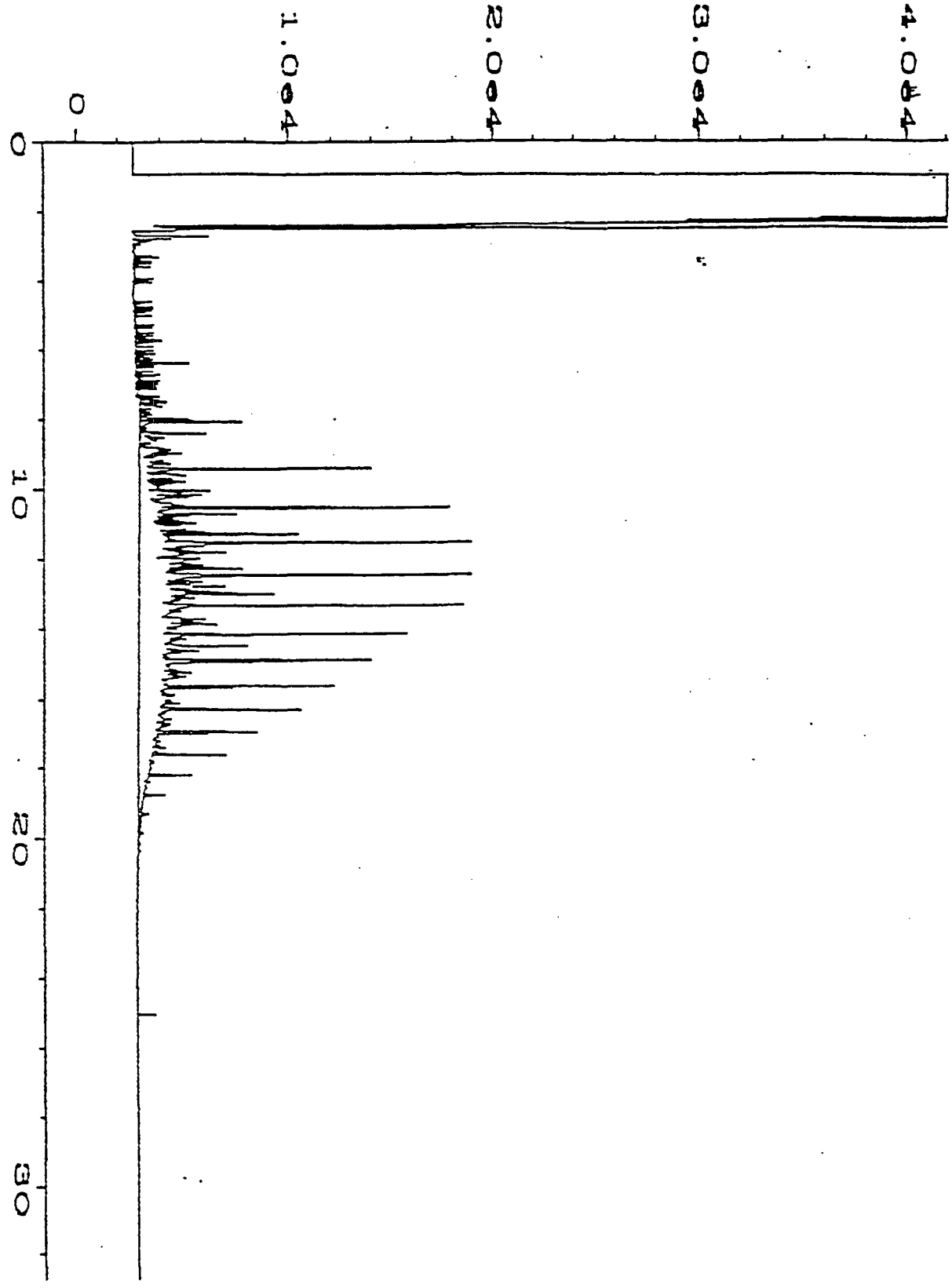
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\014R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 14
Sample Name	: 907053-21	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 20 Jul 99 08:39 PM	Instrument Method	: HX071599.MTH
Report Created 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	:



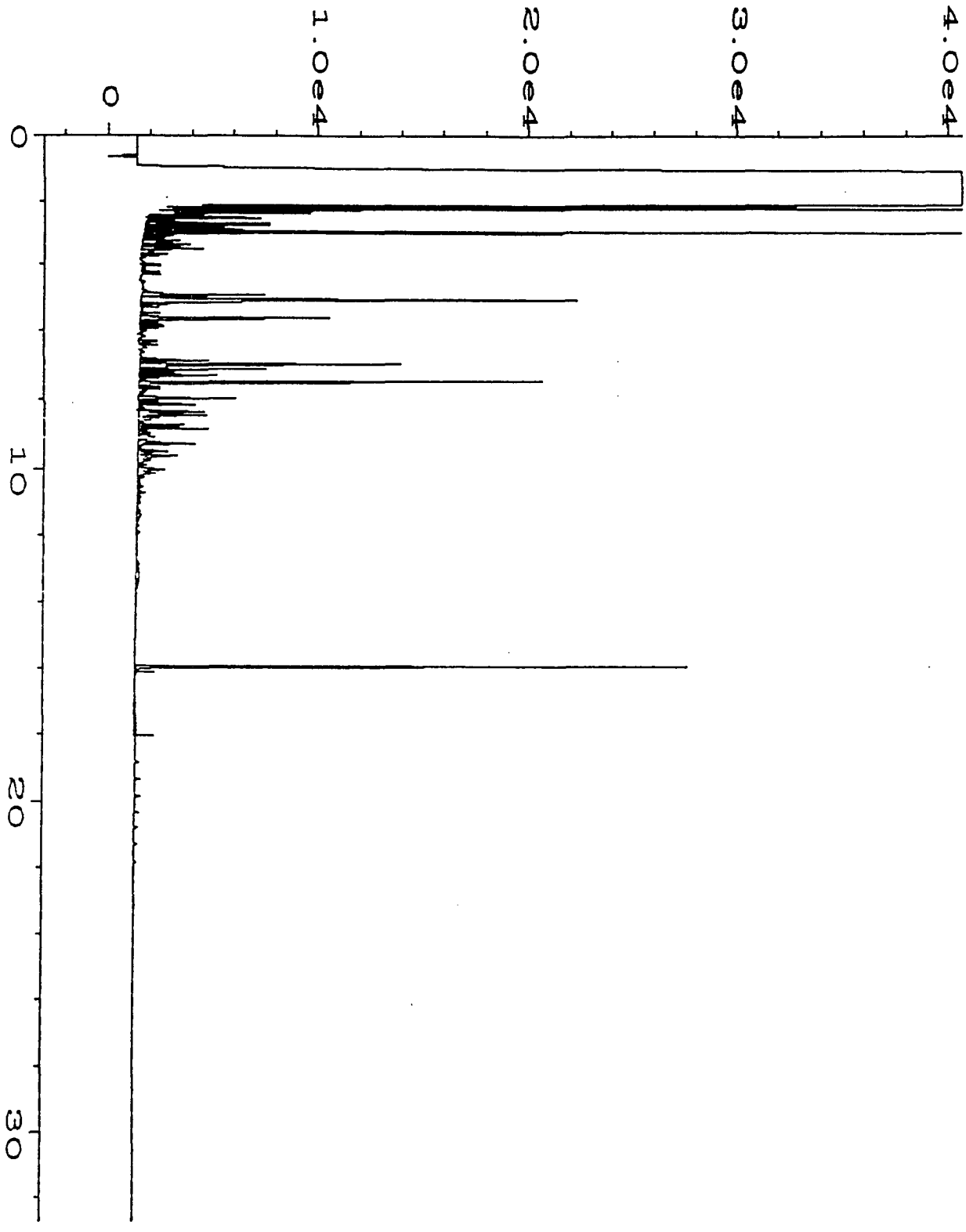
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\015R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 15
Sample Name	: 907053-22	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 20 Jul 99 09:29 PM	Instrument Method	: HX071599.MTH
Report Created 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	:



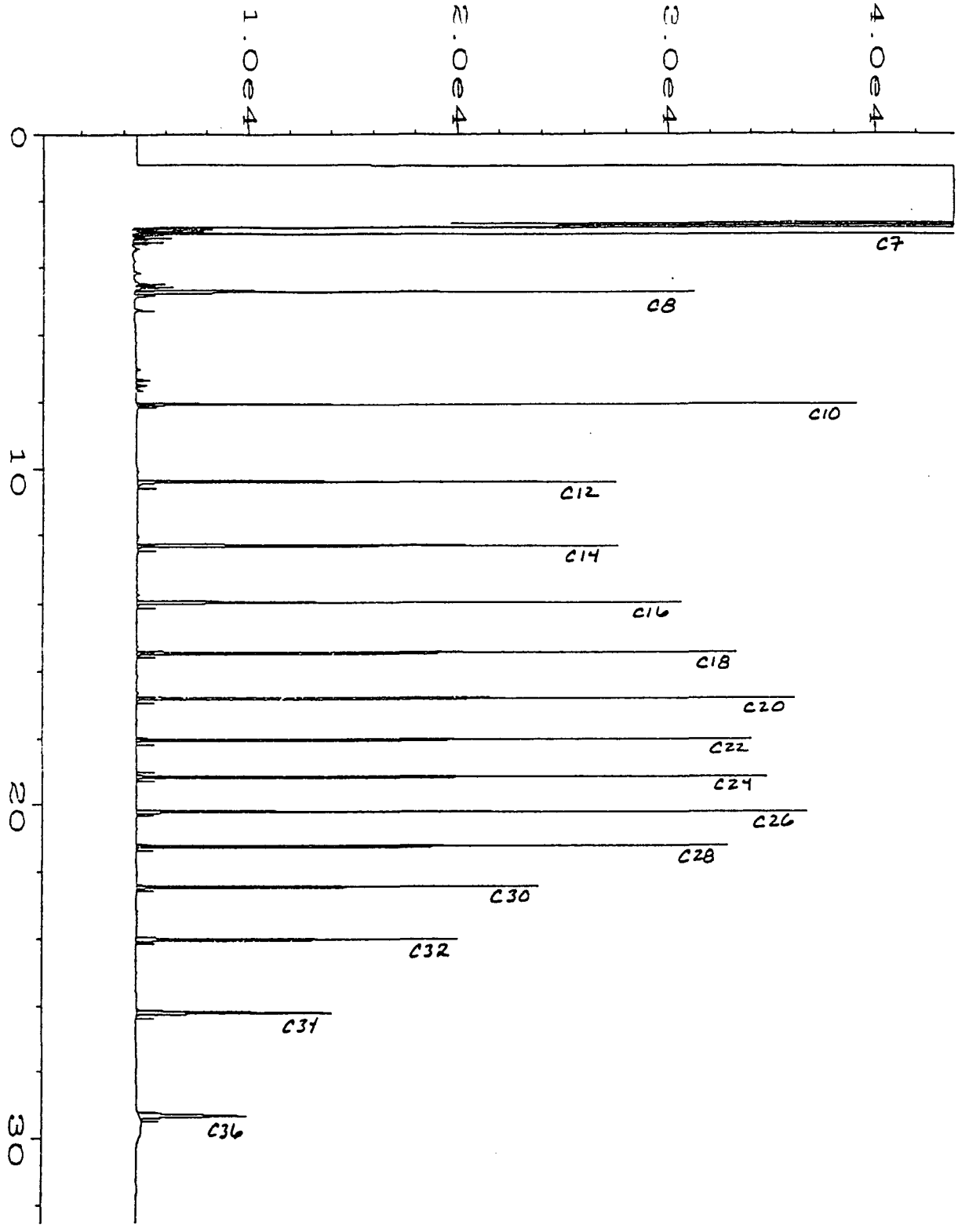
Data File Name	: C:\HPCHEM\2\DATA\20JUL99\031R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 31
Sample Name	: 907053-23rr	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 21 Jul 99 11:19 AM	Instrument Method	: HX071599.MTH
Report Created 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



ata File Name	: C:\HPCHEM\2\DATA\12FEB99\002F0101.D		
perator	: Pinnacle - mb & cff	Page Number	: 1
nstrument	: FID1	Vial Number	: 2
ample Name	: gas gc3-141-23	Injection Number	: 1
un Time Bar Code:		Sequence Line	: 1
cquired on	: 12 Feb 99 10:38 AM	Instrument Method	: RT061698.MTH
eport Created on	: 12 Feb 99 11:45 AM	Analysis Method	: RT061698.MTH



user modified

Data File Name : B:\11APR96\004F0101.D
Operator : DJ
Instrument : GC#1 5890
Sample Name : RET TIME STAND
Run 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

PINNACLE LABORATORIES

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

Pinnacle Lab ID number **910076**
November 05, 1999

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

Project Name HOBBS, NM
Project Number (none)

Attention: CHRIS HIGGINS

On 10/22/99 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592 pending), 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.

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: jt

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	: 910076
PROJECT #	: (none)	DATE RECEIVED	: 10/22/99
PROJECT NAME	: HOBBS, NM	REPORT DATE	:

PIN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	MW-2	AQUEOUS	10/20/99
02	MW-3	AQUEOUS	10/20/99
03	MW-10	AQUEOUS	10/20/99
04	MW-9	AQUEOUS	10/20/99
05	MW-12	AQUEOUS	10/20/99
06	MW-11	AQUEOUS	10/20/99
07	MW-11-14'-16'	NON-AQ	10/19/99
08	MW-11-30'-32'	NON-AQ	10/19/99
09	MW-12-14'-16'	NON-AQ	10/19/99
11	TRIP BLANK	AQUEOUS	10/14/99

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.: 910076
PROJECT # : (none)
PROJECT NAME : HOBBS, NM

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	MW-2	AQUEOUS	10/20/99	NA	10/27/99	1
02	MW-3	AQUEOUS	10/20/99	NA	10/27/99	1
03	MW-10	AQUEOUS	10/20/99	NA	10/27/99	1

PARAMETER	DET. LIMIT	UNITS	MW-2	MW-3	MW-10
BENZENE	0.5	**UG/L**	**4.2**	**2.6**	**3.8**
TOLUENE	0.5	**UG/L**	**2.5**	**1.0**	**2.3**
ETHYLBENZENE	0.5	**UG/L**	**1.3**	< 0.5	< 0.5
TOTAL XYLENES	0.5	**UG/L**	**1.3**	< 0.5	< 0.5
SURROGATE:					
BROMOFLUOROBENZENE (%)			92	100	95
SURROGATE LIMITS	(80 - 120)				

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : HIGGINS & ASSOCIATES, L.L.C
PROJECT # : (none)
PROJECT NAME : HOBBS, NM

PINNACLE I.D.: 910076

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	MW-9	AQUEOUS	10/20/99	NA	10/27/99	1
05	MW-12	AQUEOUS	10/20/99	NA	10/27/99	1
06	MW-11	AQUEOUS	10/20/99	NA	10/27/99	1

PARAMETER	DET. LIMIT	UNITS	MW-9	MW-12	MW-11
BENZENE	0.5	**UG/L**	**2.8**	**1.1**	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	**1.2**
TOTAL XYLENES	0.5	UG/L	< 0.5	< 0.5	**1.3**
SURROGATE:					
BROMOFLUOROBENZENE (%)			95	99	100
SURROGATE LIMITS	(80 - 120)				

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : HIGGINS & ASSOCIATES, L.L.C
PROJECT # : (none)
PROJECT NAME : HOBBS, NM

PINNACLE I.D.: 910076

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
11	TRIP BLANK	AQUEOUS	10/14/99	NA	10/27/99	1

PARAMETER	DET. LIMIT	UNITS	TRIP BLANK
BENZENE	0.5	UG/L	< 0.5
TOLUENE	0.5	UG/L	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5

SURROGATE:
BROMOFLUOROBENZENE (%) 90
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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

GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 910076
PROJECT # : (none)
PROJECT NAME : HOBBS, NM

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
07	MW-11-14'-16'	NON-AQ	10/19/99	10/27/99	10/27/99	1
08	MW-11-30'-32'	NON-AQ	10/19/99	10/27/99	10/27/99	1
09	MW-12-14'-16'	NON-AQ	10/19/99	10/27/99	10/27/99	1

PARAMETER	DET. LIMIT	UNITS	MW-11-14'-16'	MW-11-30'-32'	MW-12-14'-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:					
BROMOFLUOROBENZENE (%)			82	97	99
SURROGATE LIMITS	(65 - 120)				

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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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
PROJECT # : (none)
PROJECT NAME : HOBBS, NM

PINNACLE I.D.: 910076

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	MW-12-30'-32'	NON-AQ	10/19/99	10/27/99	10/27/99	1

PARAMETER	DET. LIMIT	UNITS	MW-12-30'-32'
BENZENE	0.025	MG/KG	< 0.025
TOLUENE	0.025	MG/KG	< 0.025
ETHYLBENZENE	0.025	MG/KG	< 0.025
TOTAL XYLENES	0.025	MG/KG	< 0.025

SURROGATE:
BROMOFLUOROBENZENE (%) 99
SURROGATE LIMITS (65 - 120)

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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Phone (505) 344-3777
Fax (505) 344-4413

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8021 MODIFIED	PINNACLE I.D.	: 910076
BLANK I. D.	: 102799	DATE EXTRACTED	: NA
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE ANALYZED	: 10/27/99
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: HOBBS, NM		

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
ETHYLBENZENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5
SURROGATE:		
BROMOFLUOROBENZENE (%)		98
SURROGATE LIMITS:	(80 - 120)	

CHEMIST NOTES:
N/A

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Fax (505) 344-4413

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8021 MODIFIED	PINNACLE I.D.	: 910076
BLANK I. D.	: 102799	DATE EXTRACTED	: 10/27/99
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE ANALYZED	: 10/27/99
PROJECT #	: (none)	SAMPLE MATRIX	: NON-AQ
PROJECT NAME	: HOBBS, NM		

PARAMETER	UNITS	
BENZENE	MG/KG	<0.025
TOLUENE	MG/KG	<0.025
ETHYLBENZENE	MG/KG	<0.025
TOTAL XYLENES	MG/KG	<0.025
SURROGATE:		
BROMOFLUOROBENZENE (%)		94
SURROGATE LIMITS:	(80 - 120)	

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8021 MODIFIED	PINNACLE I.D.	: 910076
BLANK I. D.	: 102799	DATE EXTRACTED	: NA
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE ANALYZED	: 10/27/99
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: HOBBS, NM		

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
ETHYLBENZENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5
SURROGATE:		
BROMOFLUOROBENZENE (%)		98
SURROGATE LIMITS:	(80 - 120)	

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8021 MODIFIED	PINNACLE I.D.	: 910076
BLANK I. D.	: 102799	DATE EXTRACTED	: 10/27/99
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE ANALYZED	: 10/27/99
PROJECT #	: (none)	SAMPLE MATRIX	: NON-AQ
PROJECT NAME	: HOBBS, NM		

PARAMETER	UNITS	
BENZENE	MG/KG	<0.025
TOLUENE	MG/KG	<0.025
ETHYLBENZENE	MG/KG	<0.025
TOTAL XYLENES	MG/KG	<0.025

SURROGATE:
BROMOFLUOROBENZENE (%) 94
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: EPA 8021 MODIFIED		
MSMSD #	: 102799	PINNACLE I.D.	: 910076
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXTRACTED	: NA
PROJECT #	: (none)	DATE ANALYZED	: 10/27/99
PROJECT NAME	: HOBBS, NM	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	20.0	18.5	93	18.2	91	2	(80 - 120)	20
TOLUENE	<0.5	20.0	19.2	96	19.0	95	1	(80 - 120)	20
ETHYLBENZENE	<0.5	20.0	19.7	99	19.5	98	1	(80 - 120)	20
TOTAL XYLENES	<0.5	60.0	60.4	101	59.3	99	2	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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

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GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: EPA 8021 MODIFIED		
MSMSD #	: 910076-08	PINNACLE I.D.	: 910076
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXTRACTED	: 10/27/99
PROJECT #	: (none)	DATE ANALYZED	: 10/27/99
PROJECT NAME	: HOBBS, NM	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	0.85	85	0.93	93	9	(68 - 120)	20
TOLUENE	<0.025	1.00	0.84	84	0.91	91	8	(64 - 120)	20
ETHYLBENZENE	<0.025	1.00	0.81	81	0.89	89	9	(49 - 127)	20
TOTAL XYLENES	<0.025	3.00	2.48	83	2.76	92	11	(58 - 120)	20

CHEMIST NOTES:
N/A

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

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

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 910076
PROJECT # : (none)
PROJECT NAME : HOBBS, NM

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	MW-2	AQUEOUS	10/20/99	10/31/99	10/31/99	1
02	MW-3	AQUEOUS	10/20/99	10/31/99	10/31/99	1
03	MW-10	AQUEOUS	10/20/99	10/31/99	10/31/99	1

PARAMETER	DET. LIMIT	UNITS	MW-2	MW-3	MW-10
FUEL HYDROCARBONS, C6-C10	2.0	MG/L	< 2.0	< 2.0	< 2.0
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:					
SURROGATE:					
O-TERPHENYL (%)			83	82	83
SURROGATE LIMITS	(79 - 124)				

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.: 910076
PROJECT # : (none)
PROJECT NAME : HOBBS, NM

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	MW-9	NON-AQ	10/20/99	10/31/99	10/31/99	1
05	MW-12	NON-AQ	10/20/99	10/31/99	10/31/99	1
06	MW-11	NON-AQ	10/20/99	10/31/99	10/31/99	1

PARAMETER	DET. LIMIT	UNITS	MW-9	MW-12	MW-11
FUEL HYDROCARBONS, C6-C10	2.0	MG/L	< 2.0	< 2.0	< 2.0
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:					
SURROGATE:					
O-TERPHENYL (%)			83	84	85
SURROGATE LIMITS	(79 - 124)				

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : HIGGINS & ASSOCIATES, L.L.C PINNACLE I.D.: 910076
PROJECT # : (none)
PROJECT NAME : HOBBS, NM

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
07	MW-11-14'-16'	NON-AQ	10/19/99	11/1/99	11/2/99	1
08	MW-11-30'-32'	NON-AQ	10/19/99	11/1/99	11/2/99	1
09	MW-12-14'-16'	NON-AQ	10/19/99	11/1/99	11/2/99	1

PARAMETER	DET. LIMIT	UNITS	MW-11-14'-16'	MW-11-30'-32'	MW-12-14'-16'
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 (%)			92	94	95
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.: 910076
PROJECT # : (none)
PROJECT NAME : HOBBS, NM

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	MW-12-30'-32'	NON-AQ	10/19/99	11/1/99	11/2/99	1

PARAMETER	DET. LIMIT	UNITS	MW-12-30'-32'
FUEL HYDROCARBONS, C6-C10	10	MG/KG	< 10
FUEL HYDROCARBONS, C10-C22	5.0	MG/KG	< 5.0
FUEL HYDROCARBONS, C22-C36	5.0	MG/KG	< 5.0
CALCULATED SUM:			
SURROGATE:			
TERPHENYL (%)			92
SURROGATE LIMITS	(66 - 151)		

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8015 MODIFIED (DIRECT INJECT)		
BLANK I.D.	: 103199	PINNACLE I.D.	: 910076
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXTRACTED	: 10/31/99
PROJECT #	: (none)	DATE ANALYZED	: 10/31/99
PROJECT NAME	: HOBBS, NM	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:		
O-TERPHENYL (%)		81
SURROGATE LIMITS	(78 - 128)	

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8015 MODIFIED (DIRECT INJECT)		
BLANK I.D.	: 110199	PINNACLE I.D.	: 910076
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXTRACTED	: 11/1/99
PROJECT #	: (none)	DATE ANALYZED	: 11/1/99
PROJECT NAME	: HOBBS, NM	SAMPLE MATRIX	: NON-AQ

PARAMETER	UNITS	
FUEL HYDROCARBONS, C6-C10	MG/L	< 10
FUEL HYDROCARBONS, C10-C22	MG/L	< 5.0
FUEL HYDROCARBONS, C22-C36	MG/L	< 5.0

SURROGATE:		
O-TERPHENYL (%)		83
SURROGATE LIMITS	(80 - 151)	

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: EPA 8015 MODIFIED (DIRECT INJECT)		
MSMSD #	: 103199	PINNACLE I.D.	: 910076
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXTRACTED	: 10/31/99
PROJECT #	: (none)	DATE ANALYZED	: 10/31/99
PROJECT NAME	: HOBBS, NM	SAMPLE MATRIX	: AQUEOUS
		UNITS	: MG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS
FUEL HYDROCARBONS	<1.0	33.3	30.7	92	33.0	99	7	(64 - 127)

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 QUALITY CONTROL
MSMSD

TEST	: EPA 8015 MODIFIED (DIRECT INJECT)		
MSMSD #	: 910095-25	PINNACLE I.D.	: 910076
CLIENT	: HIGGINS & ASSOCIATES, L.L.C	DATE EXTRACTED	: 11/1/99
PROJECT #	: (none)	DATE ANALYZED	: 11/2/99
PROJECT NAME	: HOBBS, NM	SAMPLE MATRIX	: NON-AQ
		UNITS	: MG/KG

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS
FUEL HYDROCARBONS	<5.0	100	95	95	97	97	2	(56 - 148)

CHEMIST NOTES:
N/A

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

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

Environmental Services Laboratory, Inc. E S L

11400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

November 02, 1999

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

RE: 910076 Order No.: 9910106

Dear Kim McNeill,

Environmental Services Laboratory received 6 samples on 10/25/99 for the analyses presented in the following report.

The Samples were analyzed for the following tests:
CHLORIDE (Chloride)

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

Keith Hunter
Technical Review

Environmental Services Laboratory

Date: *02-Nov-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	910076-01
Lab Order:	9910106	**Tag Number:**	
Project:	910076	**Collection Date:**	10/20/99
Lab ID:	9910106-01A MW-2	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
CHLORIDE		**CHLORIDE**				Analyst: **sld**
Chloride	180	50		mg/L	100	11/1/99

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: *02-Nov-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	910076-02
Lab Order:	9910106	**Tag Number:**	
Project:	910076	**Collection Date:**	10/20/99
Lab ID:	9910106-02A MW-3	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
CHLORIDE		**CHLORIDE**				Analyst: **sld**
Chloride	120	50		mg/L	100	11/1/99

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: *02-Nov-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	910076-03
Lab Order:	9910106	**Tag Number:**	
Project:	910076	**Collection Date:**	10/20/99
Lab ID:	9910106-03A mw-10	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
CHLORIDE		**CHLORIDE**				Analyst: **sld**
Chloride	120	50		mg/L	100	11/1/99

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: *02-Nov-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	910076-04
Lab Order:	9910106	**Tag Number:**	
Project:	910076	**Collection Date:**	10/20/99
Lab ID:	9910106-04A MW-9	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
CHLORIDE		**CHLORIDE**				Analyst: **sld**
Chloride	110	25		mg/L	50	11/1/99

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: *02-Nov-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	910076-05
Lab Order:	9910106	**Tag Number:**	
Project:	910076	**Collection Date:**	10/20/99
Lab ID:	9910106-05A MW-12	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
CHLORIDE		**CHLORIDE**				Analyst: sld
Chloride	140	25		mg/L	50	11/1/99

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: *02-Nov-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	910076-06
Lab Order:	9910106	**Tag Number:**	
Project:	910076	**Collection Date:**	10/20/99
Lab ID:	9910106-06A MW-11	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
CHLORIDE		**CHLORIDE**				Analyst: **sld**
Chloride	120	25		mg/L	50	11/1/99

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: *02-Nov-99*

CLIENT: Pinnacle Laboratories
Work Order: 9910106
Project: 910076

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 CL A-11/1/** Test Code: **Chloride** Units: **mg/L** Analysis Date **11/1/99** Prep Date:

Client ID: **9910106** Run ID: **HIT MAN_991101A** SeqNo: **26734**

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

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

Environmental Services Laboratory

Date: *02-Nov-99*

CLIENT: Pinnacle Laboratories
Work Order: 9910106
Project: 910076

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 CL A-11/1/	Test Code: Chloride	Units: mg/L	Analysis Date 11/1/99	Prep Date:
Client ID:	9910106	Run ID: HIT MAN_991101A		SeqNo: 26735	

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: LCSD	Batch ID: 01 CL A-11/1/	Test Code: Chloride	Units: mg/L	Analysis Date 11/1/99	Prep Date:
Client ID:	9910106	Run ID: HIT MAN_991101A		SeqNo: 26736	

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	10	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

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 10/25 Page: 1 of 1

Network Project Manager: Kimberly D. McNeill

ANALYSIS REQUEST

Pinnacle Laboratories, Inc.
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Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals-TAL	Chlordane	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	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
910076-01	10/20	1:30p	AQ						X																			
-02	"	2:15p	AQ						X																			
-03		2:50p	AQ						X																			
-04		3:25	AQ						X																			
-05		4:00	AQ						X																			
-06	V	4:30	AQ						X																			

PROJECT INFORMATION	SAMPLE RECEIPT	SAMPLES SENT TO	RELINQUISHED BY: 1	RELINQUISHED BY: 2
PROJECT #: 910076	Total Number of Containers	PENSACOLA - STL-FL	Signature: Time: 18 02	Signature: Time:
PROJ. NAME: HWBGS	Chain of Custody Seals	PORTLAND - ESL-OR X	Printed Name: Date: 10/22	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:	Signature: Time:
DUE DATE:	COMMENTS:	BARRINGER	Printed Name: Date: 10/23/97	Printed Name: Date:
RUSH SURCHARGE:		SEQUOIA	Company	Company
CLIENT DISCOUNT:				
SPECIAL CERTIFICATION REQUIRED: YES NO				

Pinnacle Laboratories Inc.

CHAIN OF CUSTODY

DATE: 10-21-99 PAGE: 1 OF 1

PLI Accession #: 910075

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER:

COMPANY: Higgins and Associates
ADDRESS: 9440 E. Castilla dr. suite B
Englewood, CO. 80112
PHONE: (703) 708-9846
FAX: (303) 708-9848
BILL TO: (Addres above)
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	BTEX /TPH ☆	(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:	Chloride ☆	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:		NUMBER OF CONTAINERS
MW-2	10-20-99	1:30 pm	water	-01			X																		X							6
MW-3	10-20-99	2:15 pm	water	-02			X																		X							6
MW-10	10-20-99	2:50 pm	water	-03			X																		X							6
MW-9	10-20-99	3:25 pm	water	-04			X																		X							6
MW-12	10-20-99	4:00 pm	water	-05			X																		X							6
MW-11	10-20-99	4:30 pm	water	-06			X																		X							6
MW-11-14'-16'	10-19-99	10:30	soil	-07			X																									1
MW-11-30'-32'	10-19-99	10:40	soil	-08			X																									1
MW-12-14'-16'	10-19-99	12:20	soil	-09			X																									1
MW-12-30'-32'	10-19-99	12:40	soil	-10			X																									1

PROJECT INFORMATION

PROJ. NO.:
PROJ. NAME: Hobbs, N.M.
P.O. NO.:
SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	47
CUSTODY SEALS	Y / N / (NA)
RECEIVED INTACT	Y
BLUE ICE/ICE	20

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☑

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

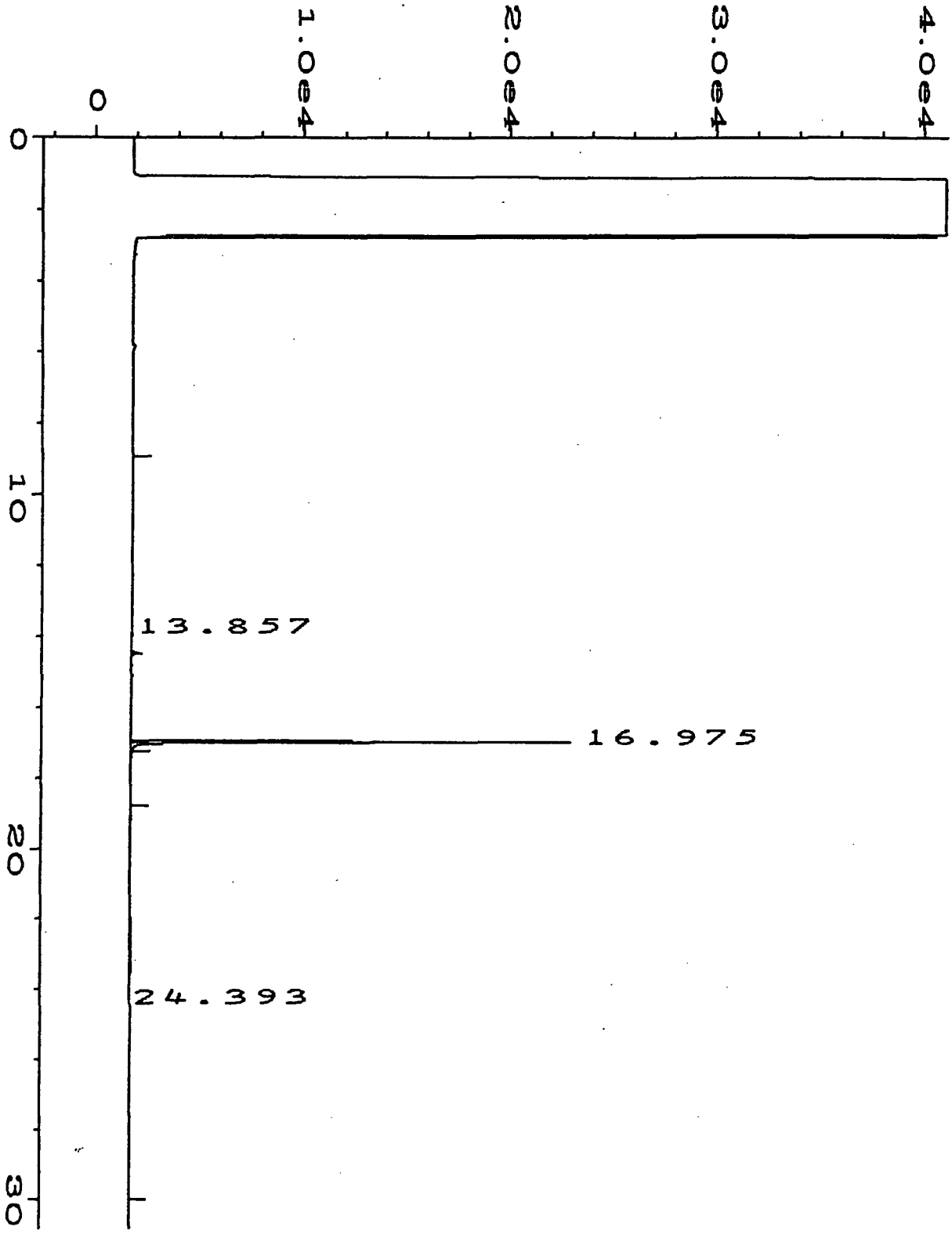
COMMENTS: FIXED FEE ☐

☆ As per PPL Hobbs N.M. quote

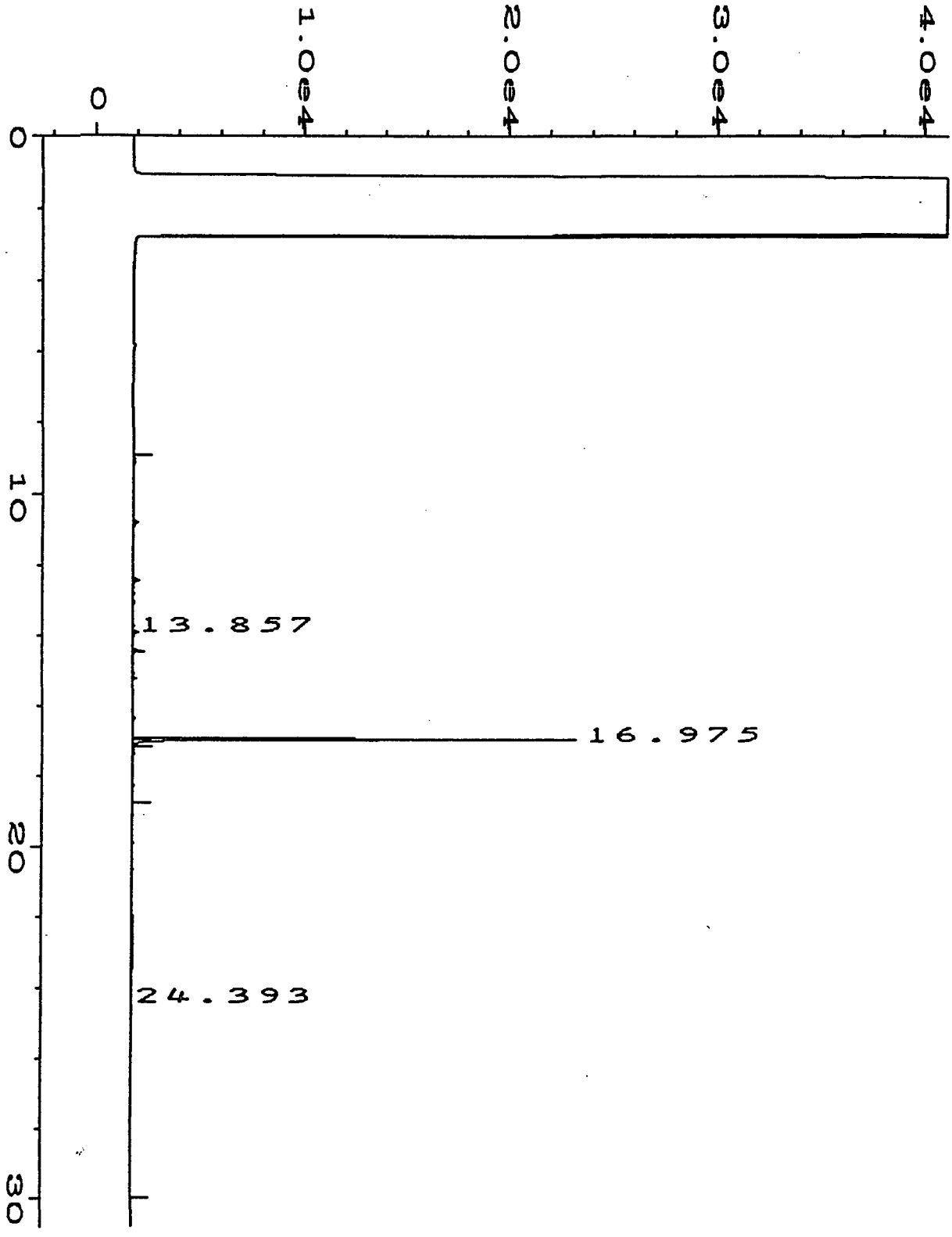
P.O.C. - Chris Higgins

TRIP BLANK -11 (10/14 1520)

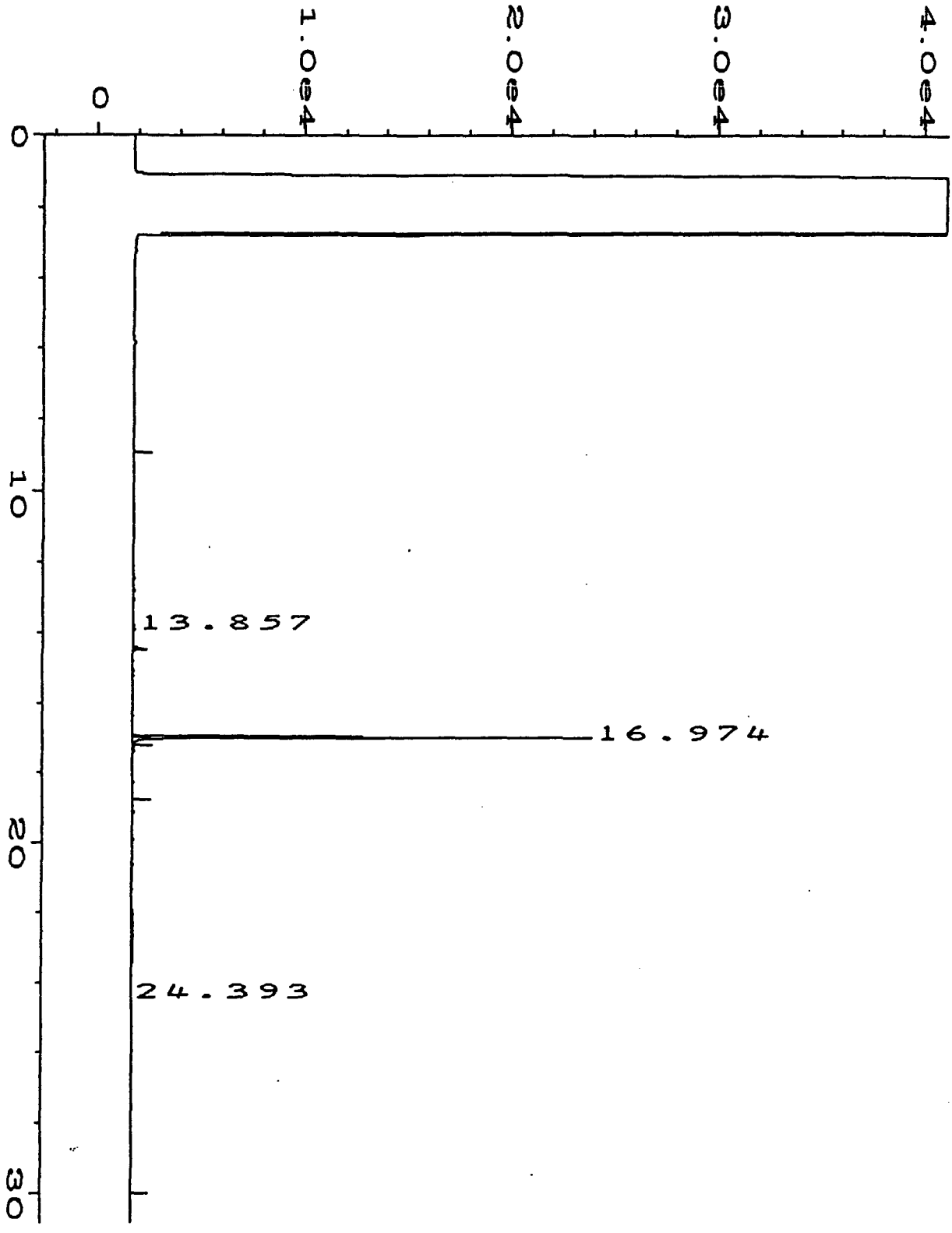
RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
Signature: Time: 9:00 a.m.	Signature: Time:
Printed Name: Kris J. Petersen Date: 10-21-99	Printed Name: Date:
Company: Higgins & Associates (See reverse side (Force Magure))	Company:
RECEIVED BY: 1.	**RECEIVED BY: (LAB) 2.**
Signature: Time:	Signature: Time: 1330
Printed Name: Date:	Printed Name: Date: 10/22/99
Company:	Pinnacle Laboratories Inc.



Data File Name	: C:\HPCHEM\2\DATA\31OCT99\007R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 7
Sample Name	: 910076-01	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 31 Oct 99 06:54 PM	Instrument Method	: HX071599.MTH
Report Created on	: 01 Nov 99 09:35 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\31OCT99\008R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 8
Sample Name	: 910076-02	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 31 Oct 99 07:43 PM	Instrument Method	: HX071599.MTH
Report Created on	: 01 Nov 99 09:38 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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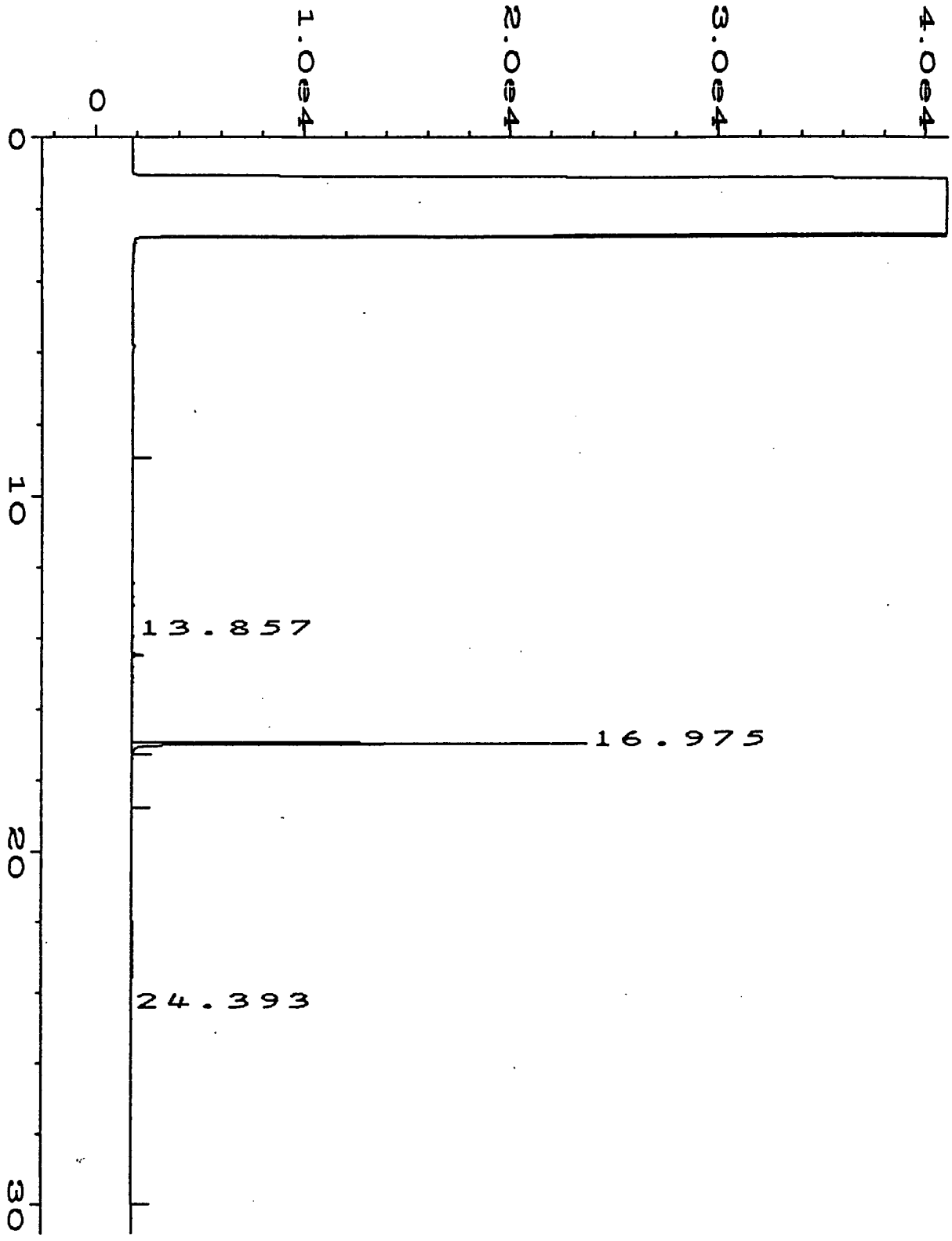
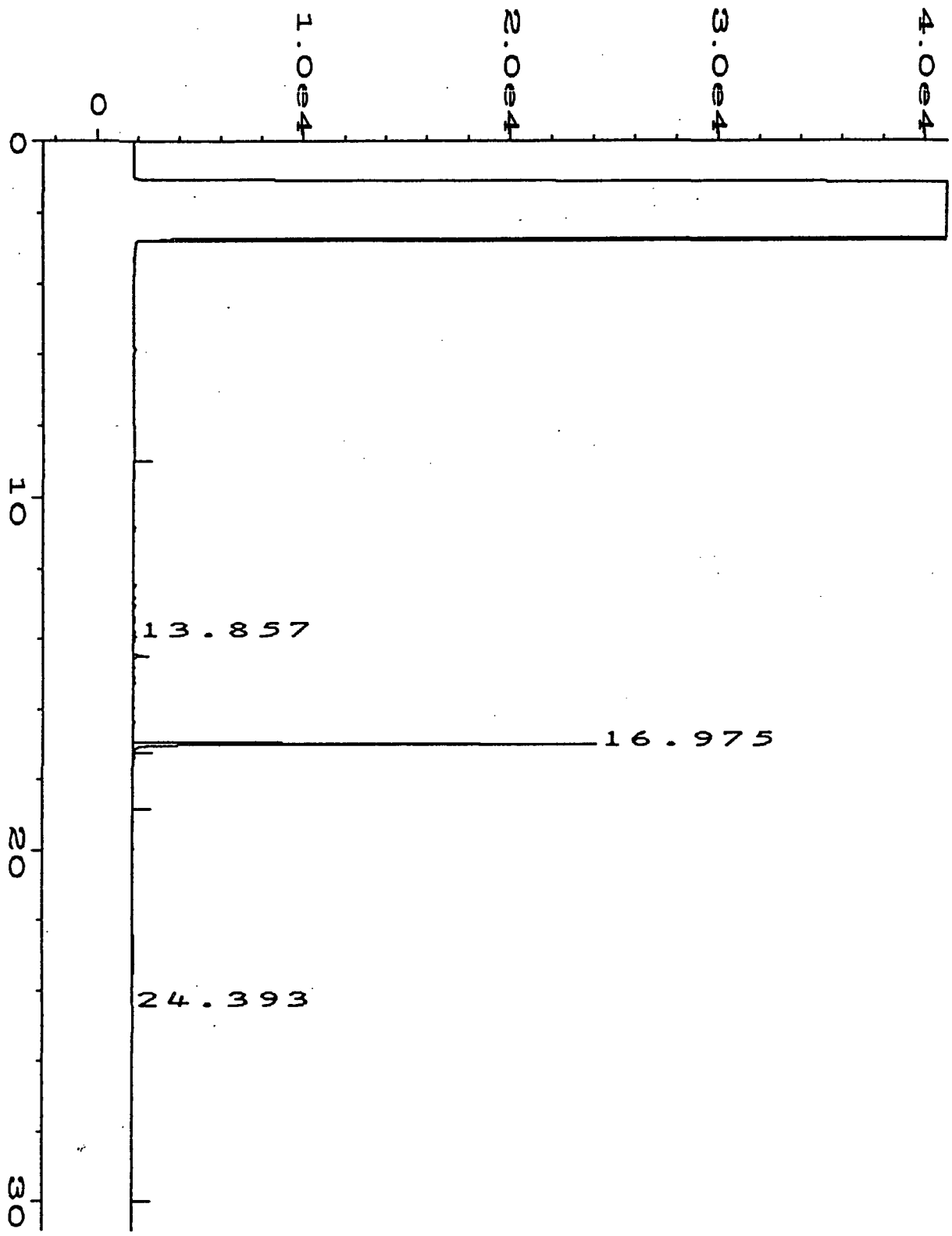
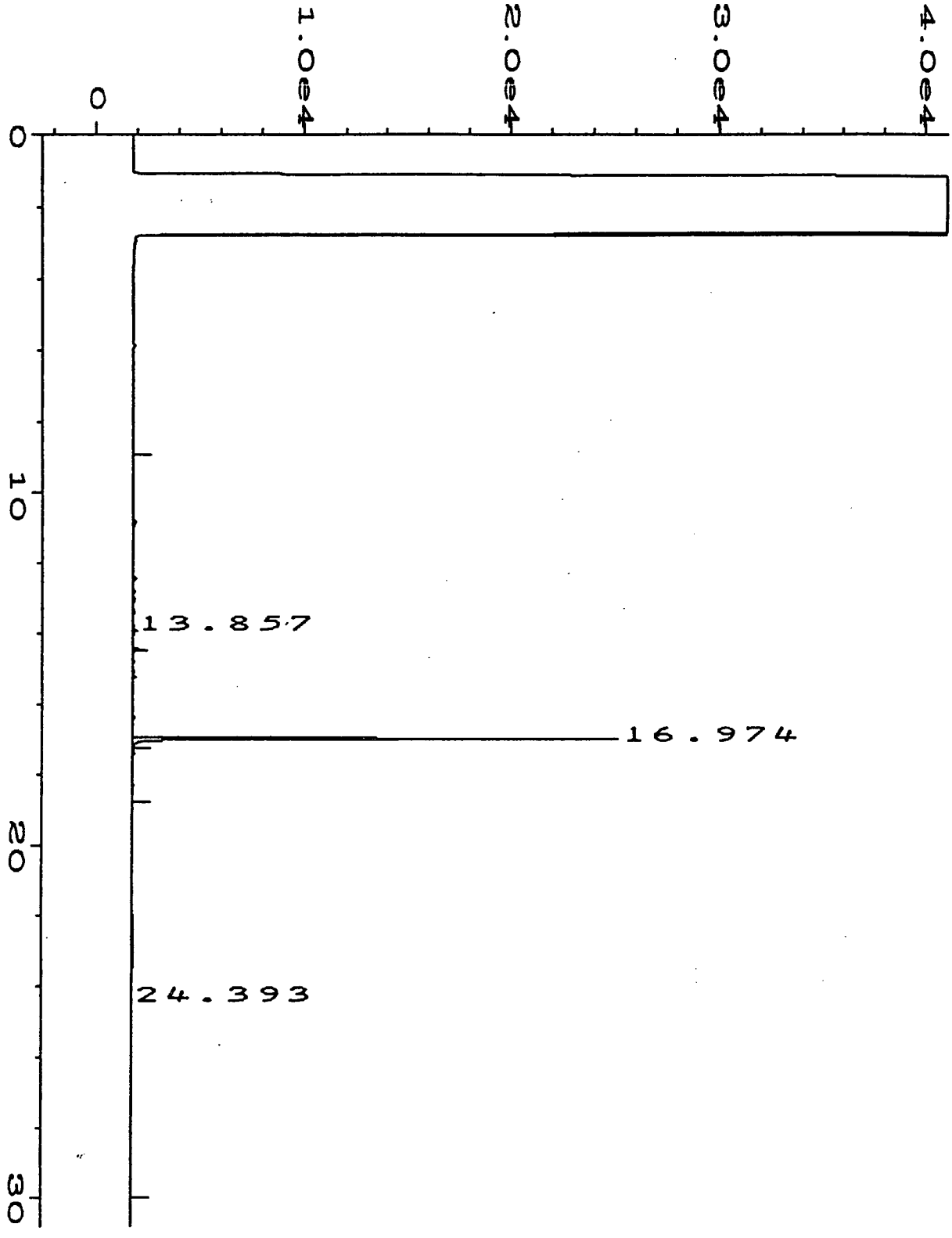
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 9
Sample Name	: 910076-03	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 31 Oct 99 08:32 PM	Instrument Method	: HX071599.MTH
Report Created on	: 01 Nov 99 09:43 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



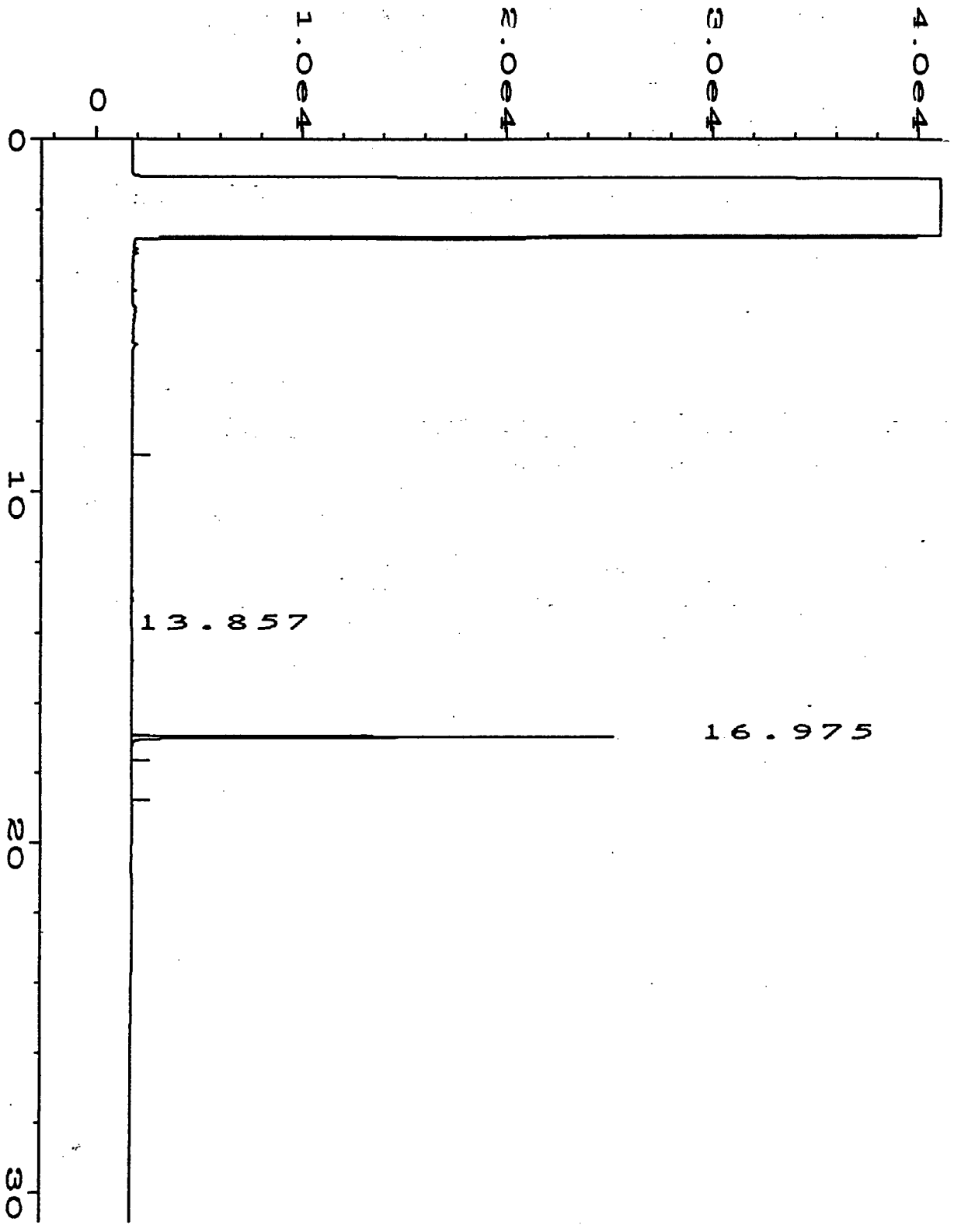
Data File Name	: C:\HPCHEM\2\DATA\31OCT99\010R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 10
Sample Name	: 910076-04	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 31 Oct 99 09:21 PM	Instrument Method	: HX071599.MTH
Report Created on	: 01 Nov 99 09:44 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



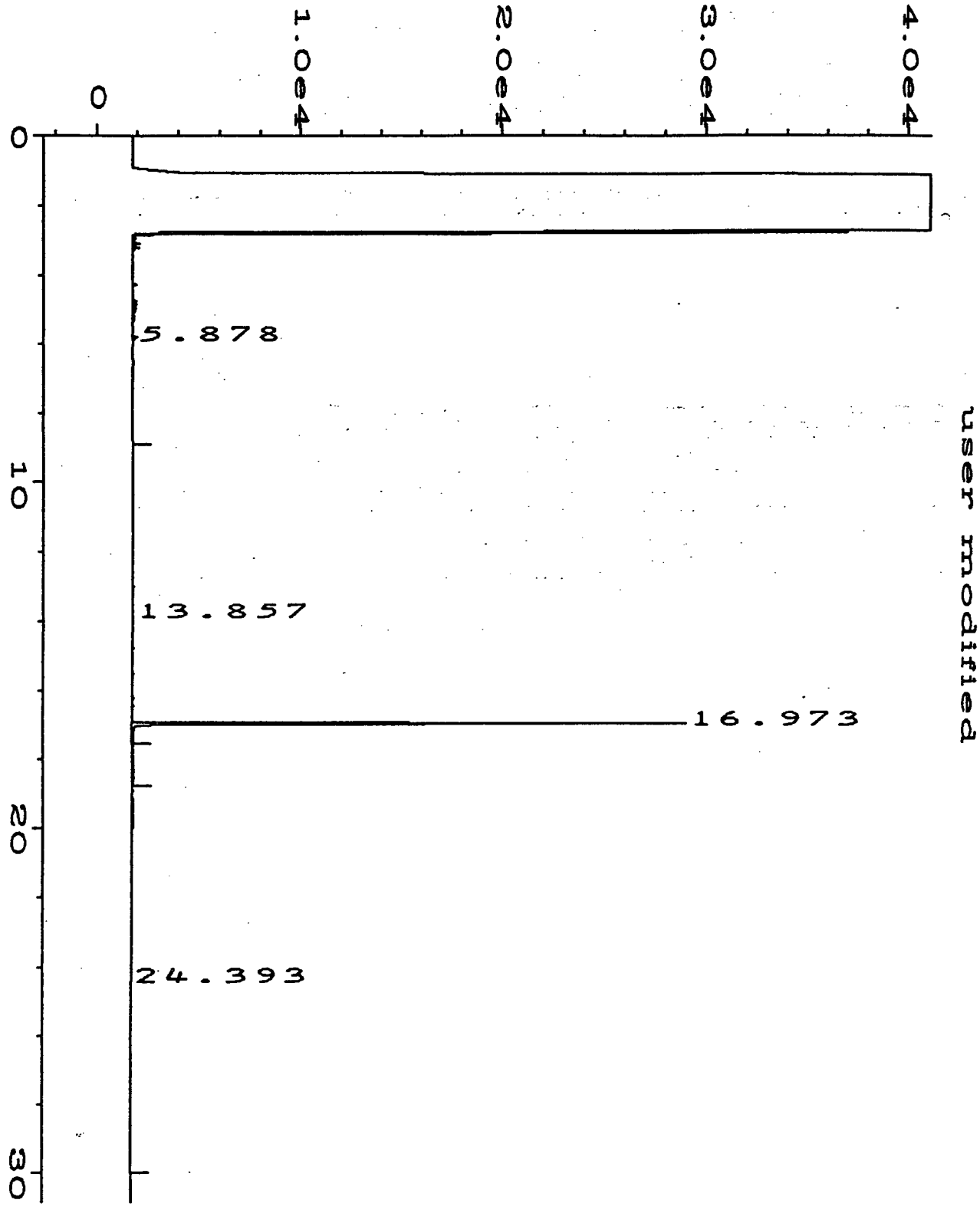
Data File Name	: C:\HPCHEM\2\DATA\31OCT99\011R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 11
Sample Name	: 910076-05	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 31 Oct 99 10:10 PM	Instrument Method	: HX071599.MTH
Report Created on	: 01 Nov 99 09:45 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



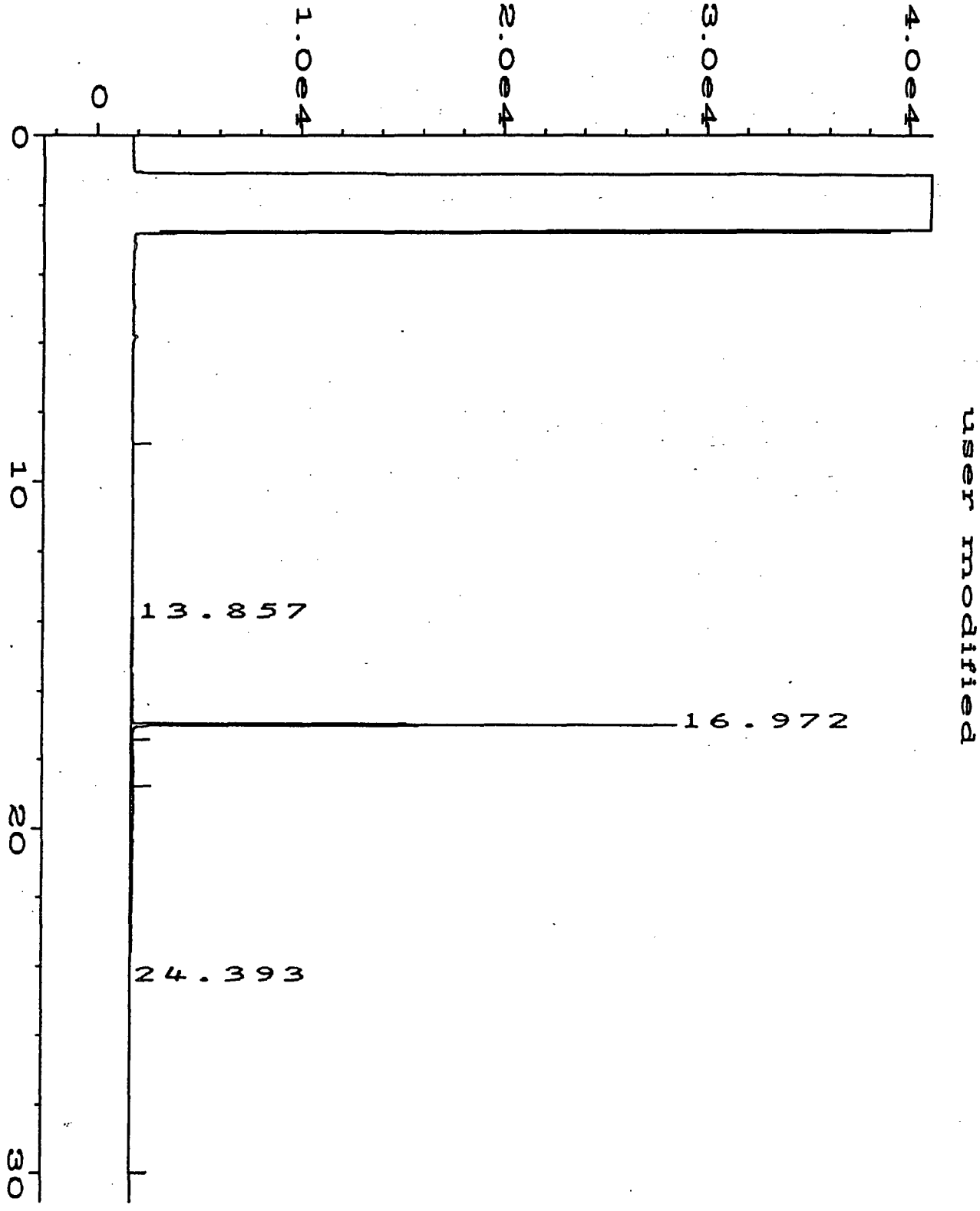
Data File Name	: C:\HPCHEM\2\DATA\31OCT99\012R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 12
Sample Name	: 910076-06	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 31 Oct 99 10:59 PM	Instrument Method	: HX071599.MTH
Report Created on	: 01 Nov 99 09:45 AM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



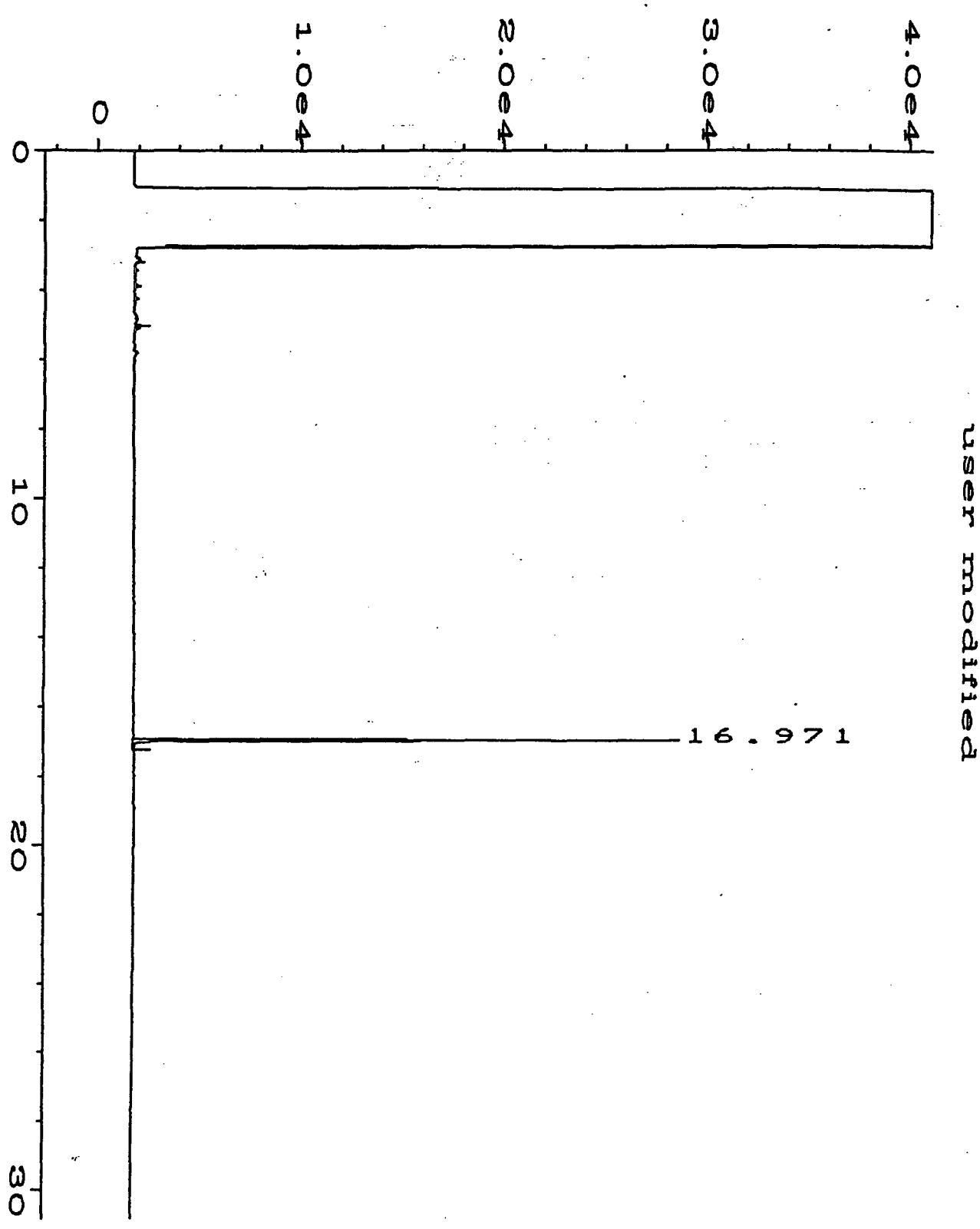
Data File Name	: C:\HPCHEM\2\DATA\01NOV99\029R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 29
Sample Name	: 910076-07	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 02 Nov 99 07:18 AM	Instrument Method	: HX071599.MTH
Report Created on	: 02 Nov 99 01:27 PM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



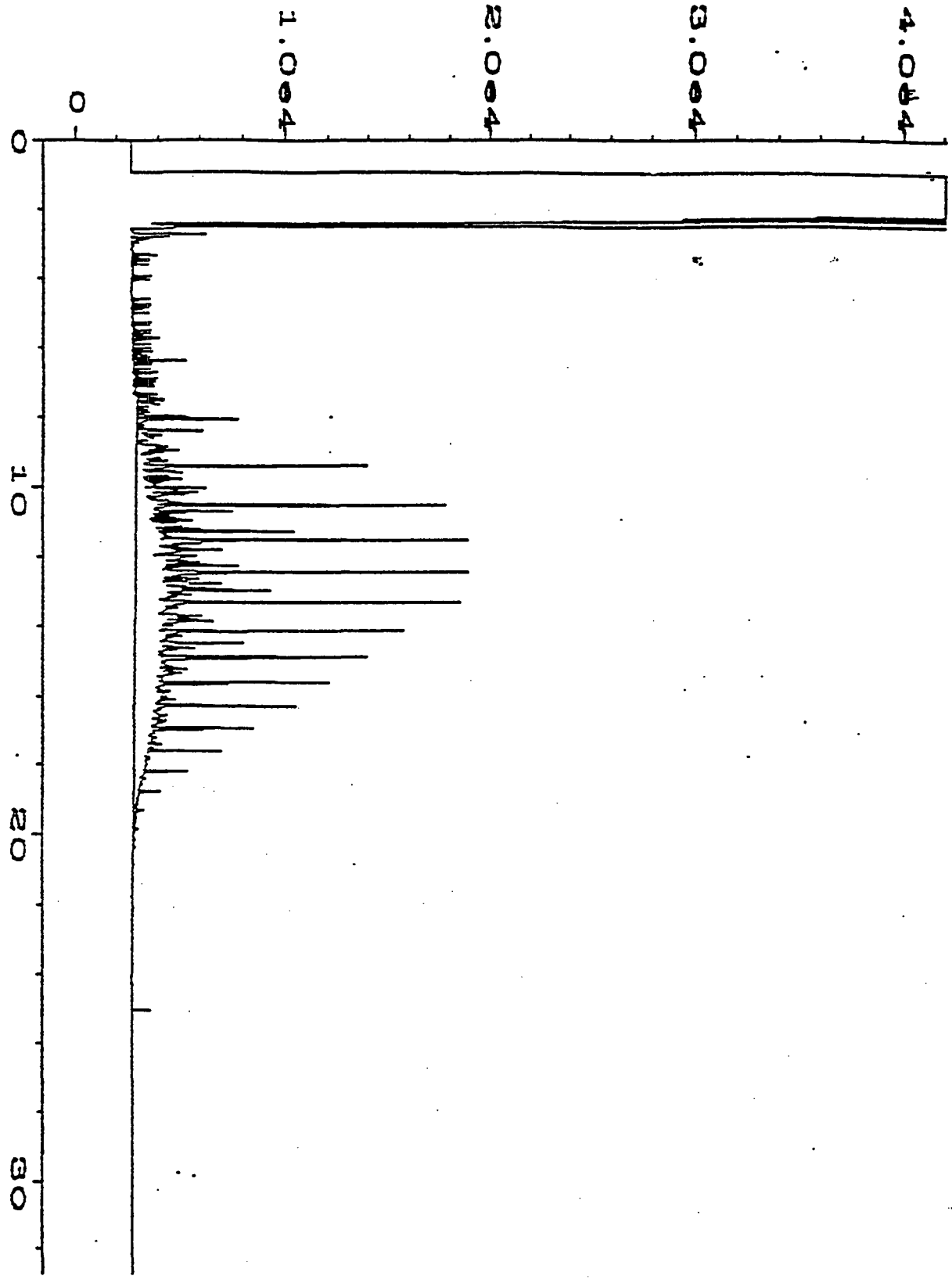
Data File Name	: C:\HPCHEM\2\DATA\01NOV99\030R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 30
Sample Name	: 910076-08	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 02 Nov 99 08:04 AM	Instrument Method	: HX071599.MTH
Report Created on	: 02 Nov 99 01:28 PM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



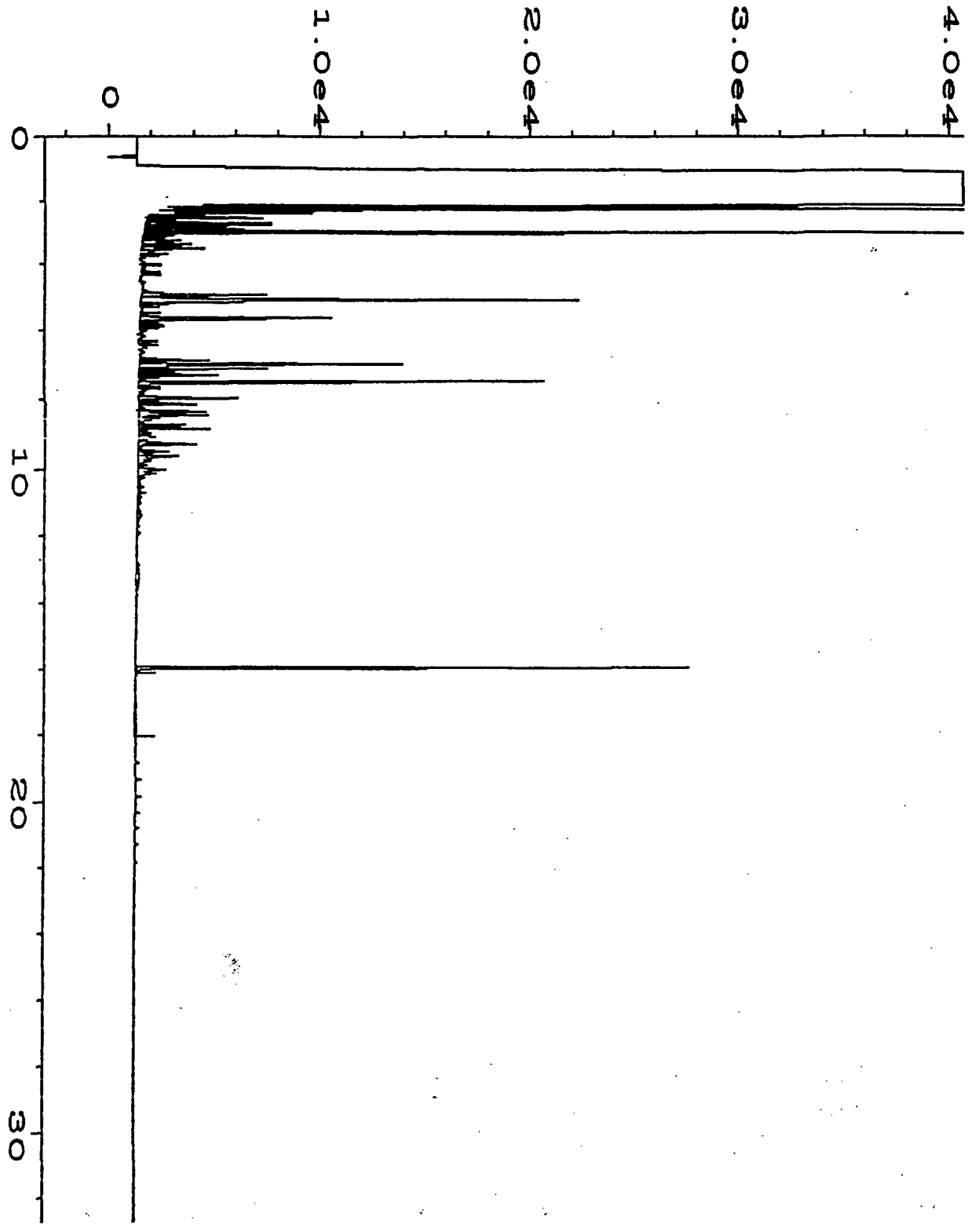
Data File Name	: C:\HPCHEM\2\DATA\01NOV99\031R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 31
Sample Name	: 910076-09	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 02 Nov 99 08:50 AM	Instrument Method	: HX071599.MTH
Report Created on	: 02 Nov 99 01:29 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\2\DATA\01NOV99\032R0101.D		
Operator	: Pinnacle - rg & cff	Page Number	: 1
Instrument	: FID1	Vial Number	: 32
Sample Name	: 910076-10	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 02 Nov 99 09:37 AM	Instrument Method	: HX071599.MTH
Report Created on	: 02 Nov 99 04:31 PM	Analysis Method	: HX071599.MTH
Last Recalib on	: 11 JAN 93 08:58 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

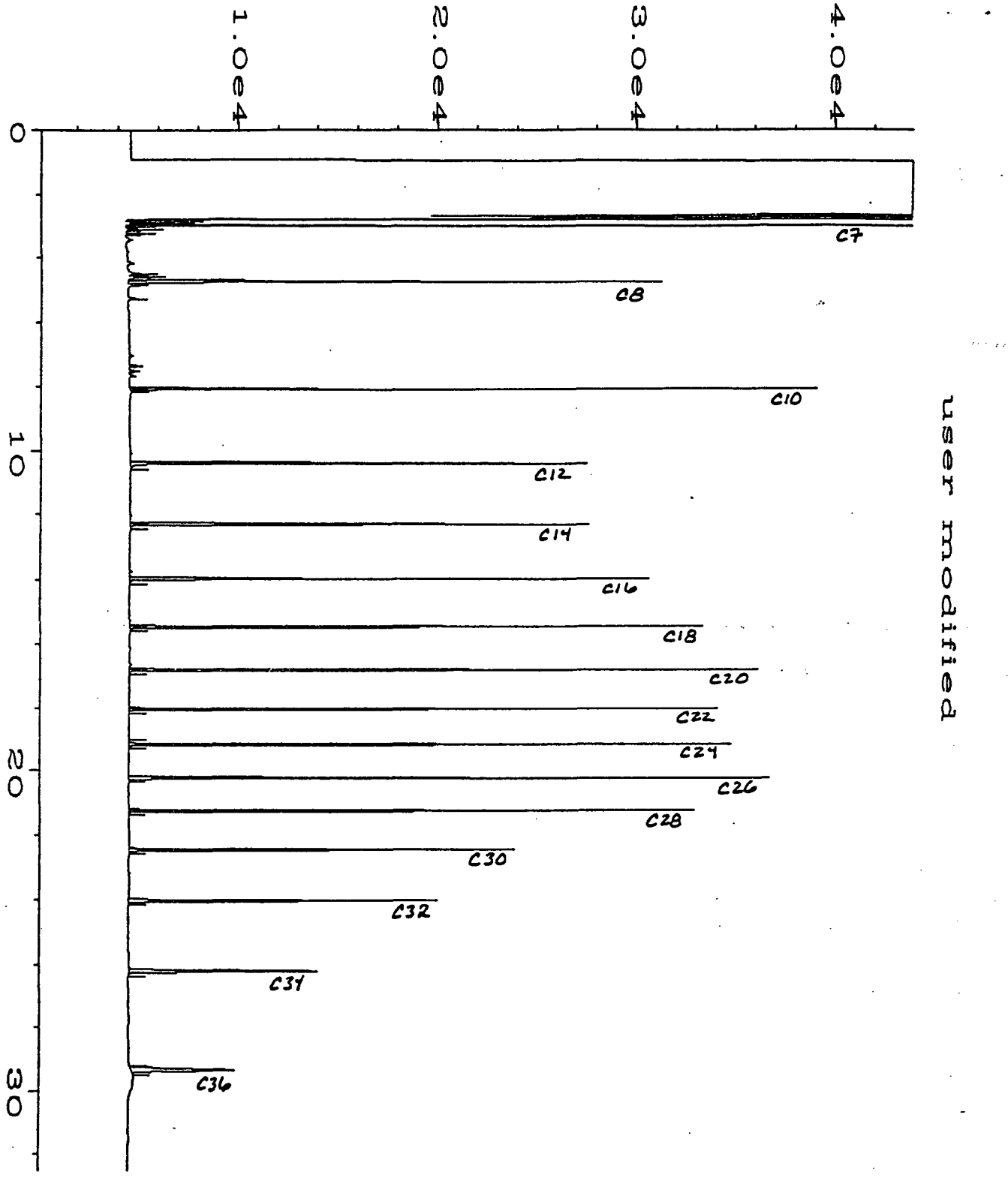


Data File Name	: C:\HPCHEM\1\DATA\16SEPT97\011F0101.D		
Operator	: AEN NM GC #1 FID DI	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	: 11
Sample Name	: DSL GC3-103-15	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Sep 97 08:50 PM	Instrument Method	: SDF0820.MTH
Report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



ata File Name : C:\HPCHEM\2\DATA\12FEB99\002F0101.D
perator : Pinnacle - mb & cff
ns ment : FID1
ample Name : gas gc3-141-23
un Time Bar Code:
cquired on : 12 Feb 99 10:38 AM
eport 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



Data File Name : B:\11APR96\004F0101.D
Operator : DJ
Instrument : GC#1 5890
Sample Name : RET TIME STAND
Run 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

Appendix D

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

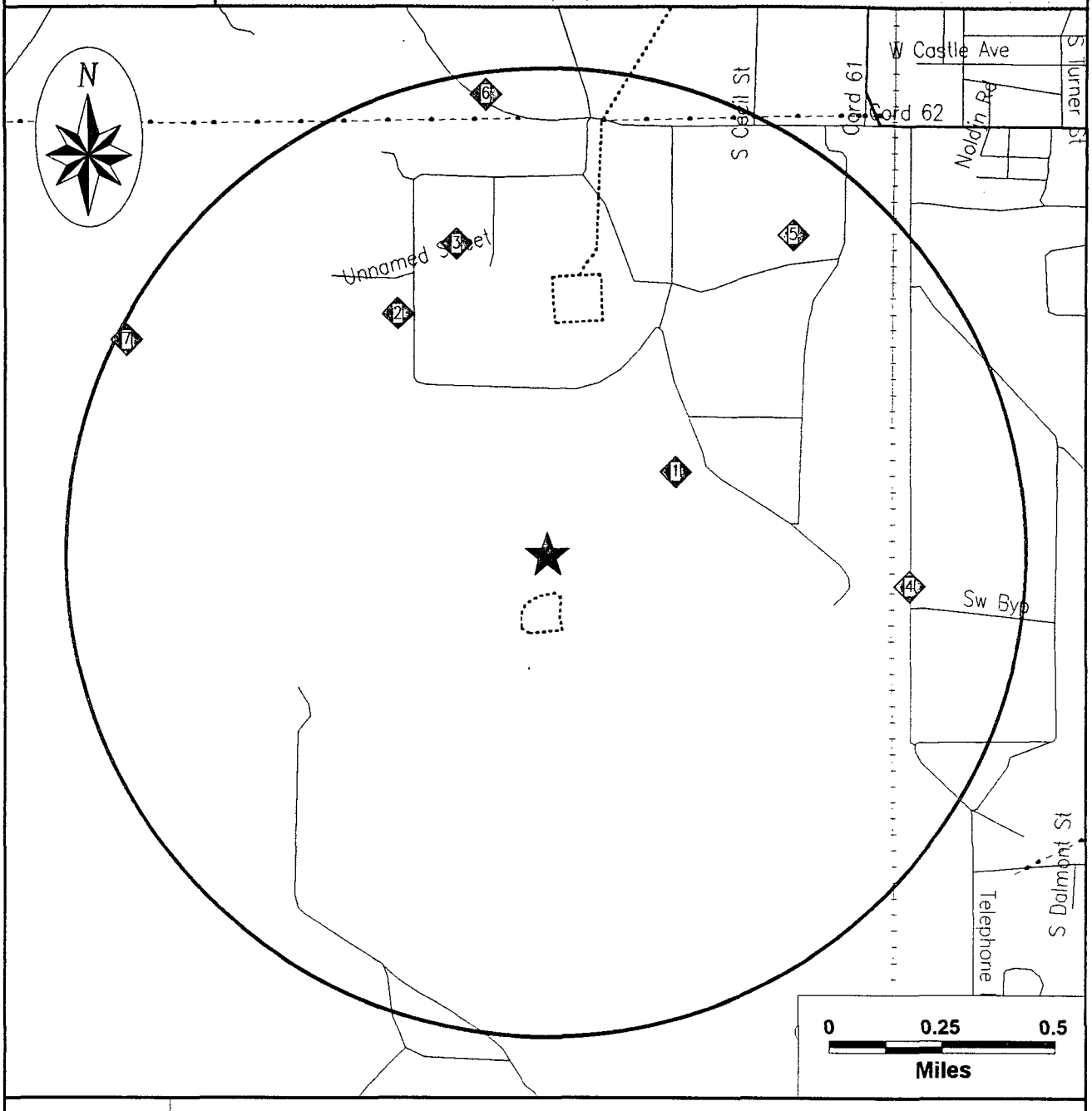
Site Distribution Summary

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

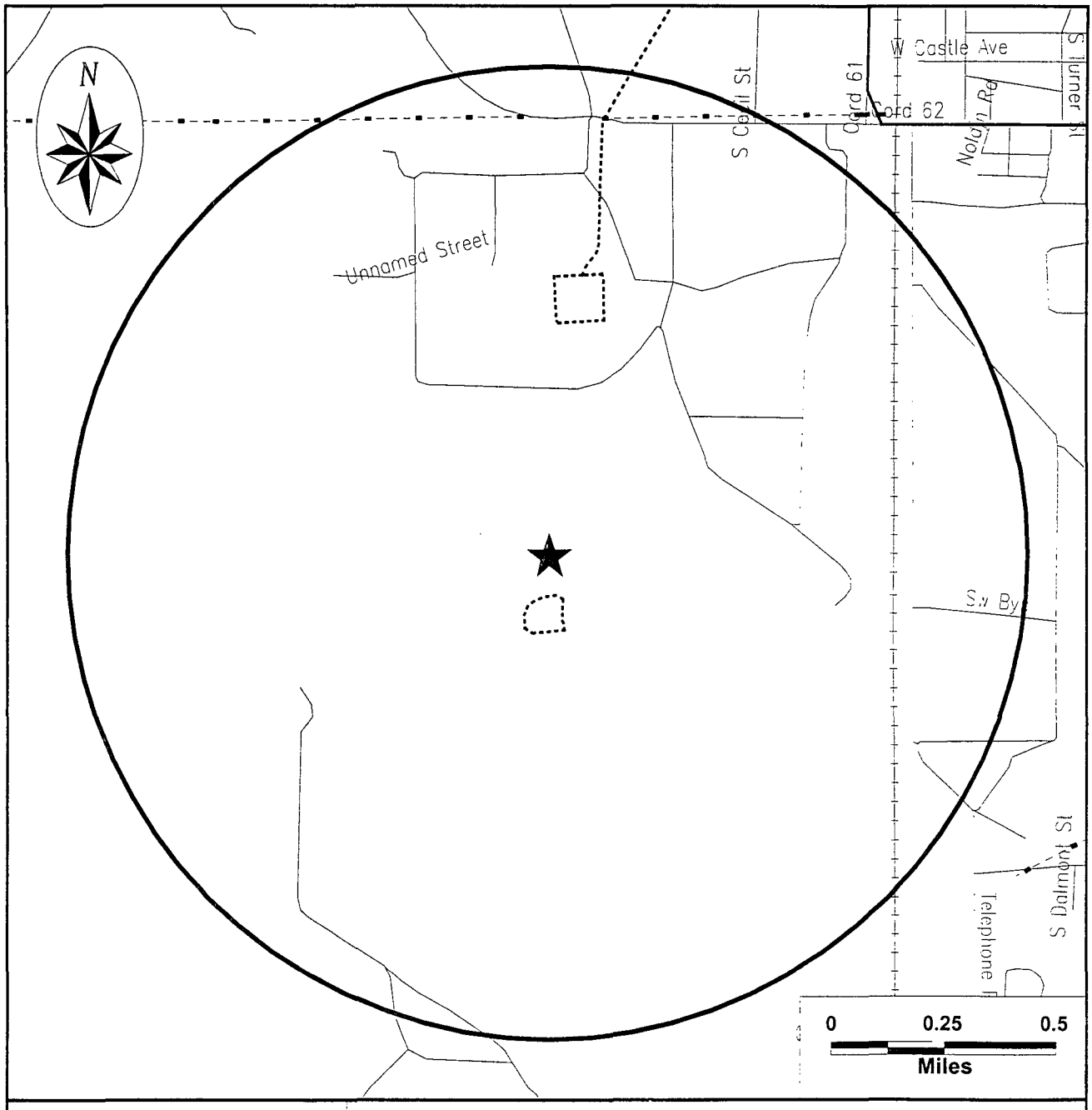
Multiple Sites

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	A 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 1
		Distance/Direction:	0.28 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:	*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 2
		Distance/Direction:	0.56 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:	*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 3
		Distance/Direction:	0.65 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:	*324042103093601*
Latitude:	*32.678333333333*
Longitude:	*-103.16*
Section Township Range:	*SWSWSW S04 T19S R38E*
Surface Elevation:	*3603.*
County FIPS:	*35025*

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	

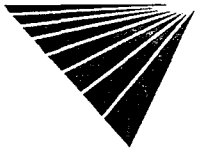
Agency Address:	*SAME AS ABOVE*
Well ID:	*324059103093201*
Use:	*STOCK*
Latitude:	*32.683055555555*
Longitude:	*-103.1588888888*
Quadrangle Name:	*TYRONE NM*
Section Township Range:	*NENWSW S04 T19S R38E*
Surface Elevation:	*3609.*
Static Water Level:	*393.59*
Date Well Drilled:	*08/01/1944*
County FIPS: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

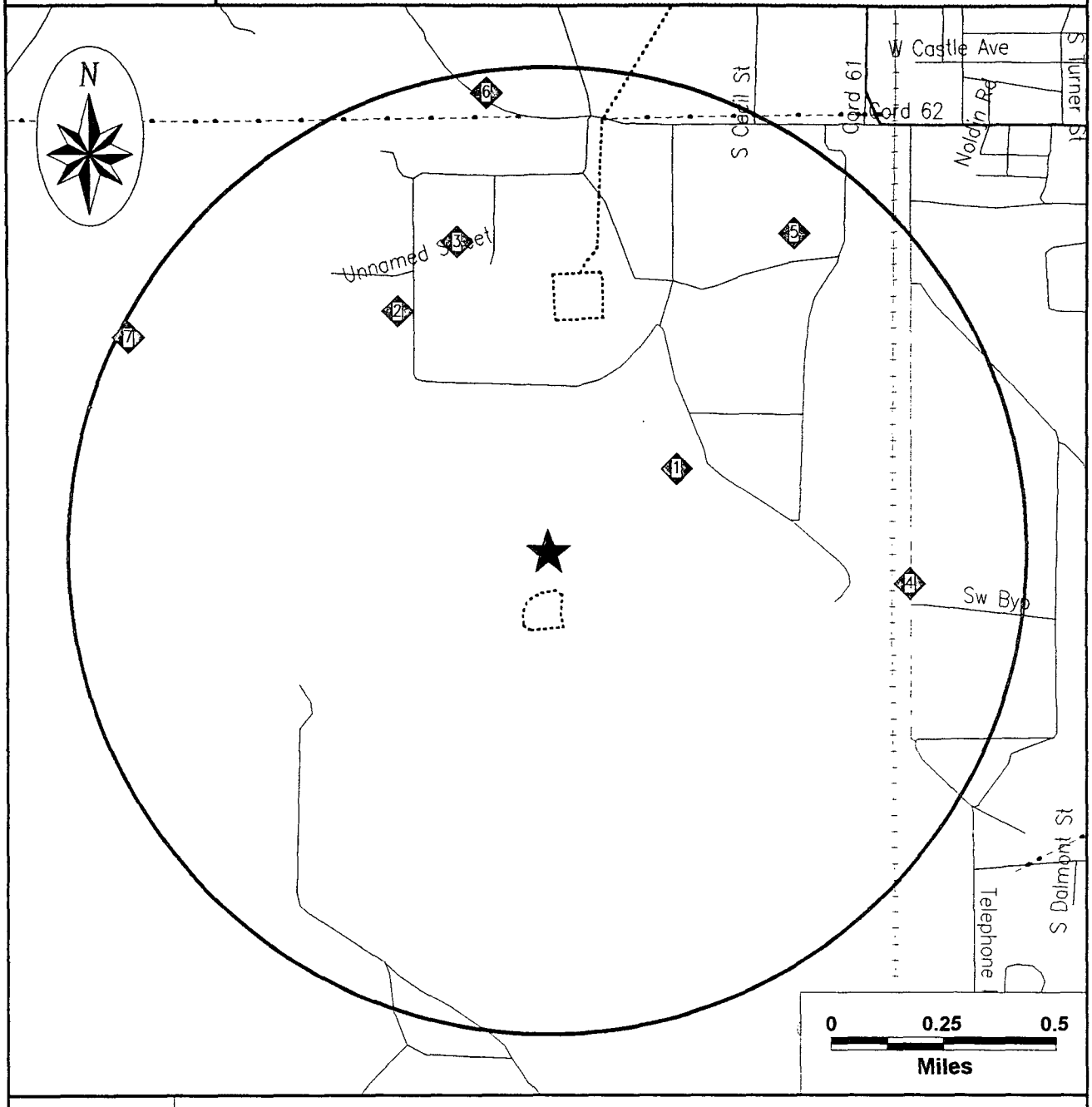
VISTA conducts a database search to identify all sites within 1 mile of your property.
The agency release date for FINDS was February, 1999.

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

USGS WELLS
(SEARCHED TO 1 MILE)

Map of Sites within 1 mile



Subject Site

Category: A

Single Sites

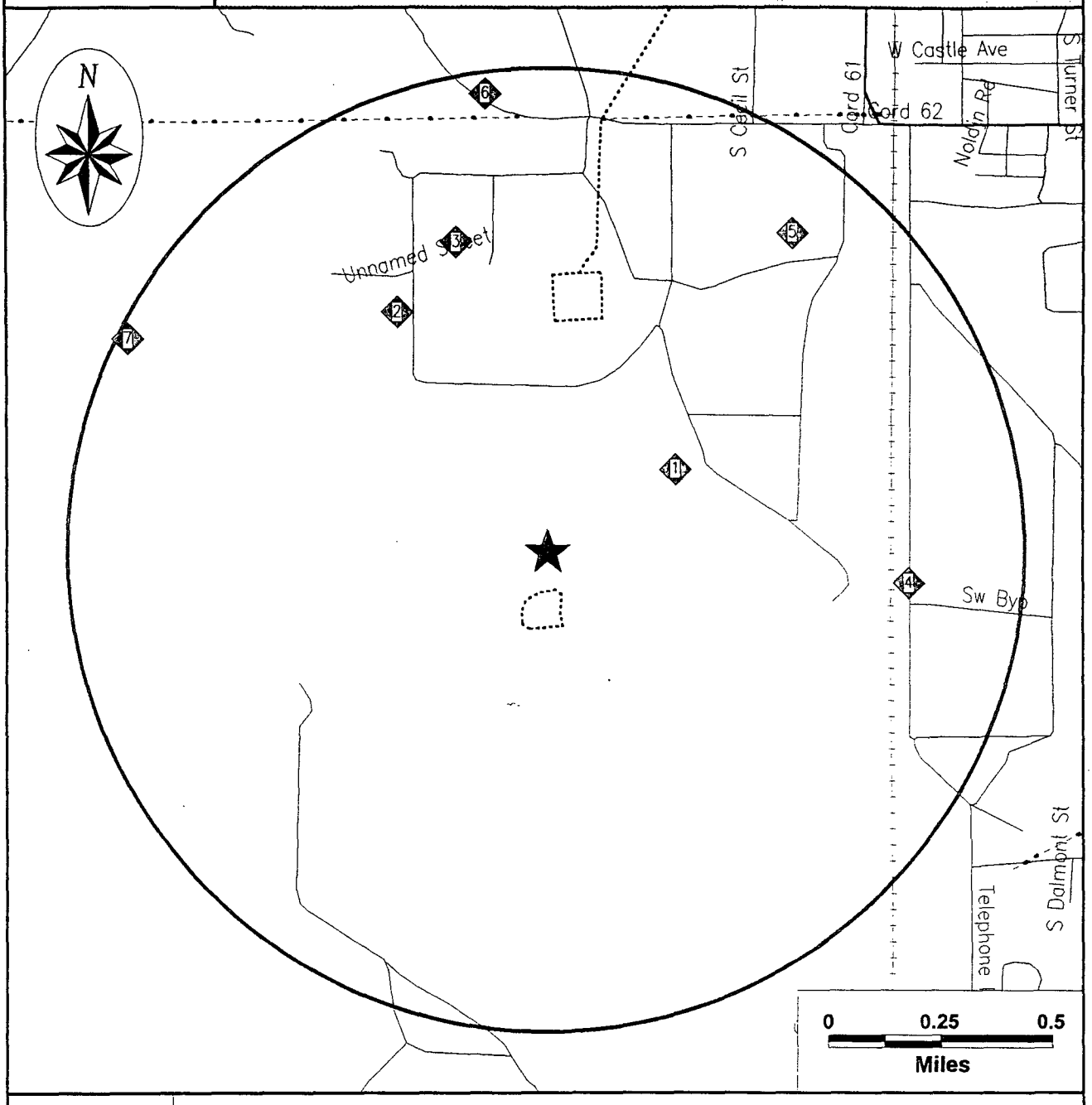
Multiple Sites

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)

Map of Sites within 1 mile



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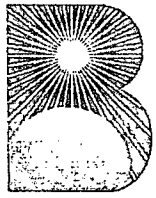

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Water Well Report™

October 1, 1999

CLIENT

Higgins and Associates

9940 East Costilla Avenue, Suite B

Englewood, CO 80112

SITE

Hobbs and East Hobbs

Sections 8 & 9

Hobbs, New Mexico

100199-044

P.O. Box 12851, Capitol Station, Austin, TX 78711

1701 Nueces, Austin, TX 78701

512.478.0059 FAX 512.478.1433 e-mail banks@banksinfo.com

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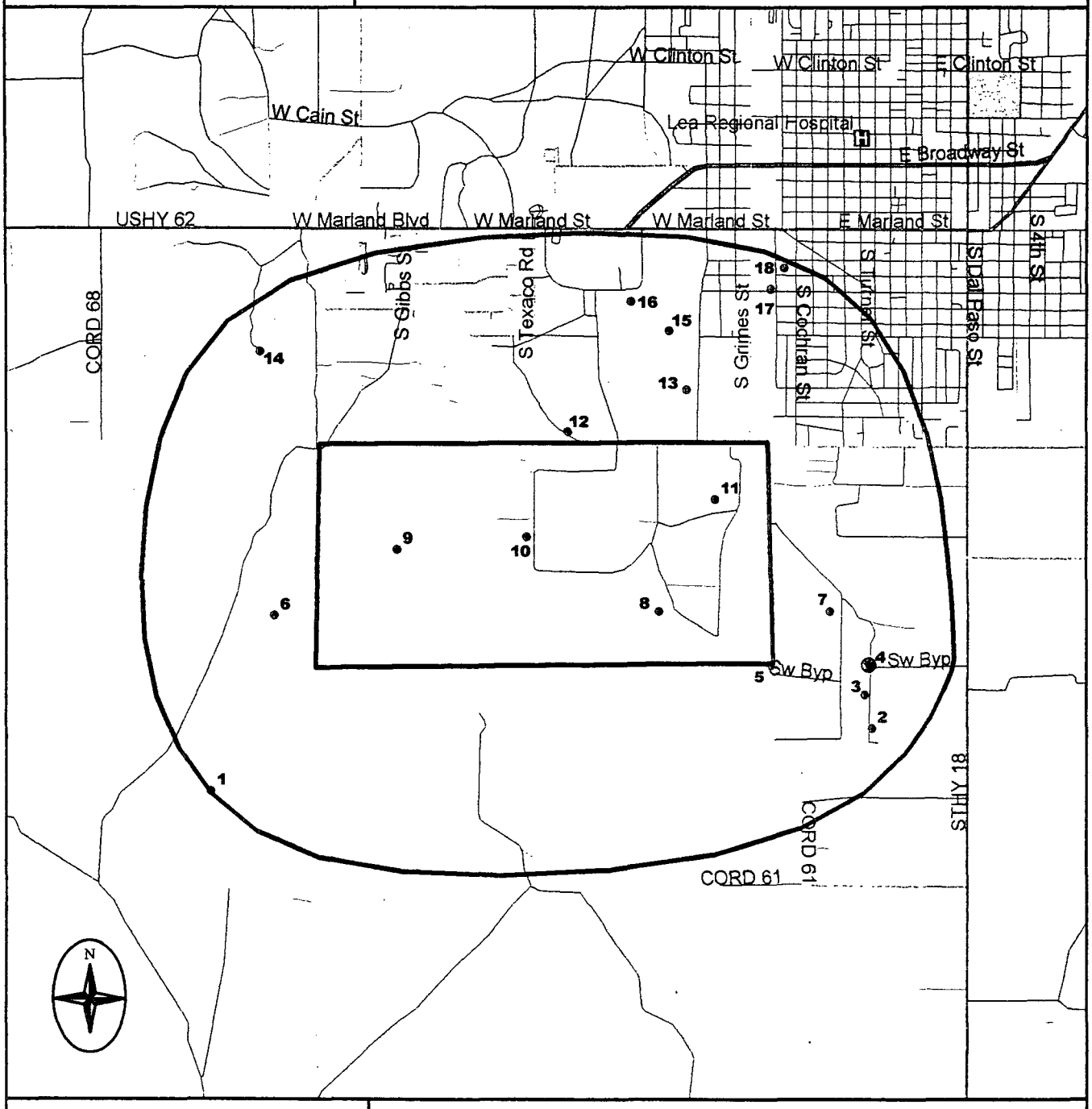
Map of Wells within Defined Polygon



Subject Site
Ground Water Wells (Cluster)
Ground Water Well
Airport
Hospital
Highway
Primary road
Secondary and connecting road
Local road
Access road
Water body
Park
State

0 0.464787 Miles

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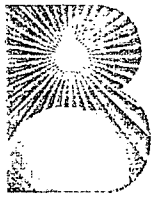
512-478-0059 FAX 512-478-1433 E Mail: BANKS@BANKSINFO.COM

October 1, 1999



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Water Well Report™

DETAILS

State ID	323933103111401	MAP ID
Banks ID	3502501220	1
Owner Of Well	COCHRAN, C.B.	
Type Of Well	Domestic	
Depth Drilled	N/A '	
Completion Date	N/A	
Longitude	-103.18722222	
Latitude	32.6591666667	

State ID	323948103080501	MAP ID
Banks ID	3502501233	2
Owner Of Well	WALKER OIL CORP.	
Type Of Well	Unused	
Depth Drilled	58 '	
Completion Date	N/A	
Longitude	-103.13472222	
Latitude	32.6633333333	

State ID	323956103080701	MAP ID
Banks ID	3502501238	3
Owner Of Well	MIDWEST OIL CO.	
Type Of Well	Unused	
Depth Drilled	N/A '	
Completion Date	N/A	
Longitude	-103.13527778	
Latitude	32.6655555556	

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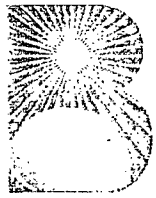

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Water Well Report™

DETAILS

State ID	324003103080601
Banks ID	3502501242
Owner Of Well	SHELL OIL CO.
Type Of Well	Unused
Depth Drilled	37 '
Completion Date	N/A
Longitude	-103.135
Latitude	32.6675

MAP ID
4

State ID	324003103080602
Banks ID	3502501243
Owner Of Well	SHELL OIL CO.
Type Of Well	Unused
Depth Drilled	49 '
Completion Date	N/A
Longitude	-103.135
Latitude	32.6675

MAP ID
4

State ID	324003103083401
Banks ID	3502501244
Owner Of Well	PAN AMERICAN PET.
Type Of Well	Unused
Depth Drilled	N/A '
Completion Date	N/A
Longitude	-103.14277778
Latitude	32.6675

MAP ID
5

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DETAILS

State ID	324015103105601
Banks ID	3502501249
Owner Of Well	COCHRAN,
Type Of Well	Stock
Depth Drilled	N/A '
Completion Date	N/A
Longitude	-103.18222222
Latitude	32.6708333333

MAP ID
6

State ID	324016103081701
Banks ID	3502501252
Owner Of Well	THORP, D.C.
Type Of Well	Irrigation
Depth Drilled	125 '
Completion Date	N/A
Longitude	-103.13805556
Latitude	32.6711111111

MAP ID
7

State ID	324016103090601
Banks ID	3502501253
Owner Of Well	TERRY, WILL
Type Of Well	Stock
Depth Drilled	N/A '
Completion Date	N/A
Longitude	-103.15166667
Latitude	32.6711111111

MAP ID
8

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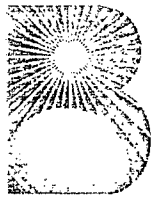

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Water Well Report™

DETAILS

State ID	324031103102101	MAP ID
Banks ID	3502501263	9
Owner Of Well	BYROM, W.K.	
Type Of Well	Unused	
Depth Drilled	N/A '	
Completion Date	N/A	
Longitude	-103.1725	
Latitude	32.6752777778	

State ID	324034103094401	MAP ID
Banks ID	3502501265	10
Owner Of Well	GACKLE, ALBERT	
Type Of Well	Unused	
Depth Drilled	N/A '	
Completion Date	N/A	
Longitude	-103.16222222	
Latitude	32.6761111111	

State ID	324043103085001	MAP ID
Banks ID	3502501273	11
Owner Of Well	AMOCO PRODUCTION CO.	
Type Of Well	Unused	
Depth Drilled	N/A '	
Completion Date	N/A	
Longitude	-103.14722222	
Latitude	32.6786111111	

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Water Well Report™

DETAILS

State ID	324059103093201
Banks ID	3502501282
Owner Of Well	TEXACO
Type Of Well	Unused
Depth Drilled	35 '
Completion Date	N/A
Longitude	-103.15888889
Latitude	32.6830555556

MAP ID: 12

State ID	324109103085801
Banks ID	3502501297
Owner Of Well	LAMBERT
Type Of Well	Unused
Depth Drilled	N/A '
Completion Date	N/A
Longitude	-103.14944444
Latitude	32.6858333333

MAP ID: 13

State ID	324118103110001
Banks ID	3502501303
Owner Of Well	FOWLER, CLARA
Type Of Well	Stock
Depth Drilled	N/A '
Completion Date	N/A
Longitude	-103.18333333
Latitude	32.6883333333

MAP ID: 14

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Water Well Report™

DETAILS

State ID	324123103090301	MAP ID
Banks ID	3502501309	15
Owner Of Well	STANOLIND OIL	
Type Of Well	Unused	
Depth Drilled	N/A '	
Completion Date	N/A	
Longitude	-103.15083333	
Latitude	32.6897222222	

State ID	324130103091401	MAP ID
Banks ID	3502501319	16
Owner Of Well	PECOS VALLEY OIL CO.	
Type Of Well	Domestic	
Depth Drilled	N/A '	
Completion Date	N/A	
Longitude	-103.15388889	
Latitude	32.6916666667	

State ID	324133103083401	MAP ID
Banks ID	3502501324	17
Owner Of Well	N/A	
Type Of Well	N/A	
Depth Drilled	N/A '	
Completion Date	N/A	
Longitude	-103.14277778	
Latitude	32.6925	

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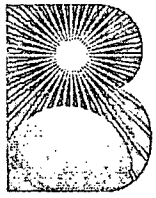

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Water Well Report™

DETAILS

State ID	324138103083001
Banks ID	3502501332
Owner Of Well	MR. PROLLACK
Type Of Well	Unused
Depth Drilled	70 '
Completion Date	N/A
Longitude	-103.14166667
Latitude	32.6938888889

MAP ID
18

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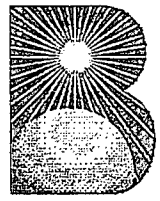

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Water Well Report™

SUMMARY

Water Well Report™ Research Mapping Protocol

Banks Information Solutions, Inc. Water Well Report™ is prepared from existing state water well databases and additional file data/records research conducted at the State Engineers Office located in Roswell, New Mexico. In New Mexico, water wells are located within a grid system using section, township, and range. The locations of these wells on the enclosed map were plotted using a GIS program, ArcView 3.0a, with the aid of the section, township, and range of the wells provided by the drillers logs.

Banks Information Solutions, Inc. has performed a thorough and diligent search of all groundwater well information provided and recorded with the New Mexico State Engineers Office. All mapped locations are based on information obtained from the NMSEO. Although Banks performs quality assurance and quality control on all research projects, we recognize that any inaccuracies of the records and mapped well locations could possibly be traced to the appropriate regulatory authority or the actual driller. It may be possible that some water well schedules and logs have never been submitted to the regulatory authority by the water driller and, thus, may explain the possible unaccountability of privately drilled wells. It is uncertain if the above listing provides 100% of the existing wells within the area of review. Therefore, Banks Information Solutions, Inc. cannot fully guarantee the accuracy of the data or well location(s) of those maps and records maintained by the New Mexico State Engineer regulatory authorities.

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