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STAGE 1 & 2 WORKPLANS

DATE:

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ARCADIS GERAGHTY & MILLER

Stage 1 Abatement Plan

Former Bertha Barber Tank Battery
Lea County, New Mexico

PREPARED FOR

Marathon Oil Company

ARCADIS GERAGHTY & MILLER

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Former Bertha Barber Tank Battery
Lea County, New Mexico

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1. Introduction

ARCADIS Geraghty & Miller, Inc. has prepared this Stage 1 Abatement Plan on behalf of Marathon Oil Company (Marathon). The Stage 1 Abatement Plan presents the proposed scope of work for site investigation activities to be completed at the former Bertha Barber Tank Battery (BBTB) located in Lea County, New Mexico (site). The location of the former BBTB is depicted on Figure 1. This Stage 1 Abatement Plan has been prepared in accordance with the requirements of the New Mexico Energy, Minerals, and Natural Resources Department, Oil Conservation Division (OCD) Rule No. 19 *Prevention and Abatement of Water Pollution* (19 NMAC 15.A.19). It should be noted that there is a salt water disposal system junction box located along the southeast boundary of the former BBTB. The junction box is operated by Rice Operating Company of Hobbs, New Mexico and not by Marathon. Marathon has not investigated this appurtenance as a source of hydrocarbons or chlorides, nor does this Stage 1 Abatement Plan propose to do so.

The following section presents a site summary, including a description of the site history, physical setting, geology/hydrogeology, and an inventory of property owners within a one-mile radius. The remaining sections of the Stage 1 Abatement Plan discuss the results of preliminary site investigation activities, the proposed scope of additional site investigation activities, and the implementation schedule.

2. Site Summary

2.1 Site History

The former BBTB was reportedly constructed during the 1930s to condition raw crude oil prior to its transport to be refined into useable product. The major features of the former BBTB were a battery of above-ground storage tanks, an oil/water separator, heater treaters, and two pits used to receive solids accumulated at the bottoms of the tanks during periodic cleanouts ("tank bottoms"). The tank bottoms pits were reportedly taken out of service over twenty years ago and covered with native soil. As shown on Figure 2, aboveground tanks were located along the eastern edge of the former BBTB, with heater treaters and an oil/water separator at the southern end of the tank pad. A sluice box was installed running north-south along the western edge of the tank pad, then west to the former pit locations. The former BBTB was operated until early 1998 at which time a new tank battery was constructed.

2.2 Physical Setting

The former BBTB is located approximately 1.5 miles south of Monument, in the southeast corner of New Mexico. As depicted on Figure 1, the former BBTB is

situated in Lea County, Section 5, Township 20 South, Range 37 East. The surrounding region is characterized by a dry, desert climate, with little or no rainfall on an annual basis. The former BBTB is currently unimproved vacant land, overgrown with low vegetation. The former BBTB and the larger area surrounding it are also used for grazing by livestock herds.

The United States Geological Survey (USGS) maps the former BBTB at an elevation of approximately 3,560 feet above mean sea level. The topography at the former BBTB is relatively level, with regional topography sloping gradually to the southeast. The major topographic feature in the vicinity of the former BBTB is the Monument Draw, which is located approximately three miles to the south.

2.3 Geology/Hydrogeology

2.3.1 Regional

The former BBTB is located near the fall line between the Laguna Valley and the Eunice Plain physiographic regions. This area (southern Lea County) overlies part of a large subsurface feature known as the Permian Basin, which extends beneath southeastern New Mexico and most of western Texas. The geology of the Permian Basin is complex, consisting of rocks ranging from Permian to Precambrian in age (245-1,600 million years old), and is the source of local oil production. Published geologic mapping of southern Lea County indicates that the oldest surface formations are Triassic in age (208-245 million years old) and consist of red siltstone, shale, and sandstone cemented with gypsum, commonly referred to as the "Red Beds" (United States Geologic Survey [USGS], *Geology and Groundwater Conditions in Southern Lea County, New Mexico*, May 1961).

Overlying the Permian Basin and the Red Beds in the area of the former BBTB are two geologic formations known as the Quaternary Alluvium and the Ogalalla Formation. The Quaternary Alluvium is primarily comprised of silt, sand, and gravel along dry channels and lake beds. The Ogalalla Formation is the major water-bearing formation in the area and is primarily comprised of sand that is poorly to well cemented with calcium carbonate. The Ogalalla Formation also contains some clay, silt, and gravel; and is capped in most places by caliche.

Reports by the USGS indicate that in the area of the former BBTB (east end of the Laguna Valley/boundary of the Eunice Plain), the Quaternary Alluvium and the Ogallalla Formation form a continuous aquifer. Wells installed in the area typically yield less than 30 gallons per minute (gpm). The shallow portions of these aquifers are highly permeable and reportedly have better groundwater quality, thus most wells are

typically completed in the shallowest zone that will produce the desired quantity of water.

2.3.2 Site Specific

A review of soil boring logs indicates that the lithology at the former BBTB corresponds with that identified for the region. The former BBTB is underlain by sand of varying colors, grain sizes, and sorting. At most locations, the sand is mixed with some gravel, the presence of which tends to increase with depth. At many locations (primarily the north and east portions of the former BBTB), the surficial sands and gravel are underlain by caliche at depths ranging from 4 to 9 feet below land surface (bls).

Based on depth-to-water measurements collected on December 30, 1998 and March 31, 1999, groundwater at the former BBTB is encountered between approximately 35 and 38 feet bls. Groundwater appears to flow in a south/southwesterly direction with a nearly flat horizontal hydraulic gradient of approximately 0.000196 feet per foot. Groundwater elevation contours from the March 1999 gauging event are shown on Figure 3.

2.4 Adjacent Property Owners

In accordance with the requirements of OCD Rule 19, surface owners of record within one mile of the former BBTB perimeter have been identified. Following approval of the Stage 1 Abatement Plan, Marathon intends to provide written notification to the identified surface owners regarding the completion of an Abatement Plan for the former BBTB. A plat depicting the surrounding property boundaries and the respective owner names is included as Figure 4.

3. Preliminary Site Investigation Activities

In order to be proactive in addressing potential environmental issues at the former BBTB, Marathon initiated a preliminary investigation at the former BBTB in August 1998. The investigation activities involved the completion of a soil and groundwater investigation. The following sections present the results of these activities.

3.1 Soil Investigation

3.1.1 Soil Boring Installation

In November 1998, a total of 36 soil borings were drilled at the former BBTB under the supervision of Marathon personnel. As shown on Figure 5, the borings were advanced within and adjacent to five major features, as follows: seventeen borings were advanced in the area of the large tank bottoms pit; six borings were advanced in the area of the small tank bottoms pit; six borings were advanced in the area of the former tank pad; two borings were advanced in and around the area of the former oil/water separator; and five borings were advanced in an area of hardpan west of the oil/water separator. The borings were completed by TEG, Inc. of Corpus Christie, Texas using a direct-push sampling system. Each boring was advanced to a point of refusal and four-foot macro-core® samples were continuously collected. Boring intervals that exhibited staining and/or petroleum odors were field screened using a Photoionization Detector (PID). The soil borings were abandoned by filling them with bentonite pellets. The boring logs for each of the 36 locations are presented in Appendix A.

A total of fifteen soil samples were collected from the 36 borings. The soil samples were transported (on ice) under proper chain of custody to Pinnacle Laboratories of Albuquerque, New Mexico. Each sample was submitted to be analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) using United States Environmental Protection Agency (USEPA) Method 8021; total petroleum hydrocarbons/diesel and gasoline range organics (TPH/DRO and TPH/GRO) using USEPA Method 8015; and for chloride. One reagent blank, matrix spike, and matrix spike duplicate were also analyzed for quality assurance and control.

3.1.2 November 1998 Analytical Results

A summary of the analytical results from the November 1998 soil sampling event is presented in Table 1. The complete laboratory analytical report is provided in Appendix B.

The laboratory analytical results identified TPH concentrations above the regulatory guideline of 100 milligrams per kilogram (mg/kg, equivalent to parts-per-million) in ten of the fifteen soil samples submitted for analysis (GP2, 7 feet bls; GP9, 8 feet bls; GP9, 20 feet bls; GP14, 15 feet bls; GP18, 16 feet bls; GP23, 9 feet bls; GP24, 23 feet bls; GP24, 35 feet bls; GP27, 22 feet bls; and GP30, 17 feet bls). Each of the ten samples were located within the five features targeted for sampling. Laboratory speciation of the hydrocarbon ranges based on molecular weight indicate that the bulk

of the residual hydrocarbons present in the former BBTB soil are in the C10 to C22 range.

Benzene concentrations in all of the 15 samples submitted for laboratory analysis were below the regulatory guideline of 10 mg/kg and ranged from below laboratory detection limits to a high of 1.6 mg/kg. Total BTEX concentrations ranged from below laboratory detection limits to a high of 88.6 mg/kg in sample GP24, 23 feet bls and were above the regulatory guideline in only two of the 15 samples analyzed (GP-24, 23 feet bls and GP-30, 17 feet bls). Total Chloride concentrations ranged from below laboratory detection limits to a high of 200 mg/kg in sample GP18, 16 feet bls.

3.2 Groundwater Investigation

3.2.1 Monitoring Well Installation

In order to evaluate groundwater quality at the former BBTB, five of the November 1998 soil boring locations were converted into monitoring wells between December 14 and December 17, 1998 (GP-9, GP-21, GP-24, GP-27, and GP-30). As shown on Figure 6, the monitoring wells were installed within each of the five major features targeted by the soil sampling event. A summary of the monitoring well completion details is presented in Table 2. The boring logs and well completion reports are provided in Appendix C.

The monitoring wells were installed by Rhino Environmental Services of Hobbs, New Mexico using a hollow-stem auger drill rig. During drilling, soil samples were collected at 5-foot intervals and field screened for volatile organic vapors using a PID. Each well was constructed of 4-inch diameter, Schedule 40 PVC, with 0.01-inch slot screen. Silica sand filter pack was placed in the annulus between the PVC screen and the borehole to approximately three feet above the top of the screen. A 2-foot layer of bentonite slurry was placed above the sand pack and the remainder of the borehole grouted to land surface. The wells were developed to remove fine material from the screen by purging until the discharge was sediment-free.

Within 24 hours of development, groundwater samples were collected from each of the new monitoring wells using disposable, Teflon® bailers. The groundwater samples were transported (on ice) under proper chain of custody to Pinnacle Laboratories of Albuquerque, New Mexico to be analyzed for BTEX using USEPA Method 8020; polynuclear aromatic hydrocarbons (PAHs) using USEPA Method 8310; metals (total); and general chemistry parameters.

3.2.2 December 1998 Analytical Results

A summary of the analytical results for the December 1998 groundwater sampling event is presented in Table 3. The complete laboratory analytical report is provided in Appendix D. Selected highlights of the analytical results are as follows:

- The only BTEX constituent detected at concentrations above its respective regulatory threshold of 10 micrograms per liter (µg/L) was benzene. Benzene was detected at a concentration of 32 µg/L in MW-3; 16 µg/L in MW-4, and 180 µg/L in MW-5;
- Total concentrations of naphthalene and mononaphthalene PAHs were detected above the regulatory threshold of 30 µg/L in only two wells (MW-1 and MW-4). Total naphthalene and mononaphthalene PAHs were detected at concentrations of 47 µg/L in MW-1 and 34 µg/L in MW-4;
- Total dissolved solids concentrations were above the regulatory threshold of 1,000 milligrams per liter (mg/L), ranging from 1,900 mg/L in MW-4 to 7,000 mg/L in MW-1; and
- Chloride concentrations were above the regulatory threshold of 250 mg/L, ranging from 700 mg/L in MW-4 to 2,900 mg/L in MW-1.

In addition to the above, three metals (barium, iron, and manganese) were detected at concentrations slightly above their respective regulatory thresholds (1.0 mg/L for barium and iron, 0.20 mg/L for manganese). Fluoride was also detected at a concentration slightly above its standard in one well (MW-2).

4. Proposed Site Investigation Workplan

4.1 Soil and Groundwater Delineation

4.1.1 Soil

Preliminary investigation of soil quality in November 1998 identified TPH concentrations above the regulatory guideline of 100 mg/kg in the subsurface beneath five major features (Section 3.2).

To complete the vertical and horizontal delineation of residual hydrocarbons, additional soil borings will be advanced around the former BBTB perimeter. It is estimated that a total of 7 additional borings will be completed for soil delineation purposes. The general locations of the proposed borings are shown on Figure 7, however, the exact locations will be determined in the field.

To complete vertical delineation of soil within the saturated zone, the borings will extend below the soil/groundwater interface (approximately 35 feet bls). During drilling, soil samples will be continuously collected. Each boring interval will be lithologically characterized and field-screened using a PID. Samples will be collected for laboratory analysis from boring intervals selected based on visual observation and PID screening results. Soil samples will be analyzed for BTEX using USEPA method 8020, TPH/GRO and TPH/DRO using USEPA Method 8015, and chloride.

4.2.2 Groundwater

Preliminary investigation of groundwater quality beneath the five major features in December 1998 identified concentrations of benzene, naphthalene-related PAHs, TDS, chloride, barium, and iron above their respective regulatory thresholds (Section 3.3).

The installation of additional monitoring wells will be required to complete the delineation of groundwater quality at the former BBTB. In order to optimize the locations of the proposed monitoring wells and further characterize hydrogeology, groundwater at each of the soil boring locations will first be screened using temporary piezometers. The proposed borings have been positioned so that one piezometer will be in an upgradient/background position at the northwest boundary of the former BBTB; two piezometers will be in downgradient positions at the east and southeast boundaries of the former BBTB; three piezometers will be positioned to the north,south, and west of target features at the former BBTB; and one piezometer will be placed between target features near the center of the former BBTB. The general locations of the piezometers corresponds with the proposed soil boring locations depicted on Figure 7.

In each piezometer location, the depth to water will be gauged with an oil/water interface probe. If separate-phase hydrocarbons are detected, the thickness will be measured but no groundwater sample will be collected. If no separate-phase hydrocarbons are detected, a groundwater sample will be collected. Groundwater samples collected from the piezometer locations will be analyzed for BTEX using USEPA Method 8020, PAHs using USEPA Method 8310, TDS, and chloride.

As shown on Figure 7, it is anticipated that up to three piezometer locations will be converted into permanent monitoring wells. The monitoring well locations will be based on the analytical results from the delineation sampling. Following development, the newly installed wells will be sampled as part of a regularly scheduled groundwater monitoring event for BTEX using USEPA Method 8020, PAHs using USEPA Method 8310, selected metals (iron, manganese, and barium - dissolved), TDS, and chloride.

4.3 Additional Site Investigation Activities

In accordance with the requirements of OCD Rule 19 regarding the development of a Site Investigation Workplan, the following investigation tasks will also be conducted:

- Hydraulic conductivity values for the former BBTB will be estimated at several boring locations using the Hazen Method. This method of calculating hydraulic conductivity is primarily applicable to sandy soil such as that identified at the former BBTB and involves a determination of grain size;
- An inventory of potable water supply wells within a one-mile radius of the former BBTB will be obtained from the New Mexico State Engineer's Office. Based on the information obtained, a determination will made as to the number and location of wells potentially affected by conditions at the former BBTB;
- An evaluation of local hydrology will be completed to determine local rainfall amounts, streamflow characteristics (if any), and groundwater/surface water relationships (if any).

5. Implementation Schedule

5.1 Site Investigation Activities

A summary of the anticipated implementation schedule for the Site Investigation Workplan is presented in Table 4.

As shown in Table 4, Marathon expects to initiate the contractor bidding process within 30 days (July 1999) and the Site Investigation activities within 90 days (August 1999) of receiving OCD approval of the Stage 1 Abatement Plan. It is anticipated that the field activities will require one month to complete. Within 30 days of receiving the laboratory analytical results from the field activities, the proposed permanent monitoring wells will be installed at the selected locations, developed, and sampled (September 1999). Following installation of the new monitoring wells, a Site Investigation Report will be completed and filed with the OCD by January 2000.

5.2 Groundwater Monitoring

Proposed groundwater monitoring at the former BBTB will be completed on a quarterly basis (March, June, September, and December). The monitoring program will involve each of the existing monitoring wells (MW-1, MW-2, MW-3, MW-4, and MW-5) as well as select new monitoring wells installed at the former BBTB as part of the Site Investigation. The quarterly groundwater monitoring events are included in Table 4. As indicated in Table 4, the initial sampling of the new monitoring wells has

been tentatively scheduled to coincide with the September 1999 quarterly groundwater monitoring event.

During each monitoring event, a site-wide gauging event will be completed prior to sampling. No groundwater sample will be collected from wells that are found to contain measurable amounts of separate-phase hydrocarbons. At each well, the volume of the water column within the well will be calculated using the depth to water measurements obtained during the gauging event, the total well depth, and the well diameter. To ensure collection of representative groundwater samples, three volumes will be purged from each well using a submersible pump and dedicated tubing prior to sampling. If a well runs dry during purging, a sample will be collected after it has adequately recharged. Groundwater samples will be collected directly from the submersible pump using the dedicated tubing.

Groundwater samples collected during each quarterly event (March, June, September, and December) will be analyzed for BTEX using USEPA Method 8020. On an annual basis (September), groundwater samples will be analyzed for PAHs using USEPA Method 8310, chloride, TDS, and selected metals (iron, manganese, and barium – dissolved). For quality assurance/quality control (QA/QC) purposes, one rinsate sample (field blank), and one replicate sample will be submitted during each sampling event. One trip blank will also be submitted for each cooler utilized to transport samples to the laboratory. A Quality Assurance Project Plan has been submitted as Appendix E.

Table 1. Laboratory Analytical Results for Soil Samples Collected in November 1998, Former Bertha Barber Tank Battery, Lea County, New Mexico.

Sample Location	Parameter: Sample Depth (feet)	TPH/GRO Method 8015 C6-C14	TPH/DRO Method 8015 C6-C10	C10-C22	C22-C36	Total TPH	BTEX Method 8021 Benzene	Toluene	Ethylbenzene	Xylenes	Total BTEX	Chloride
GP-1	12	6.5	< 10	< 5	< 5	<10	< 0.025	< 0.025	< 0.025	0.08	0.080	25
GP-2	7	**690**	2,000	21,000	15,000	**38,000**	< 0.25	0.87	2.0	9.9	12.77	< 10
GP-2	9	< 5	<10	31	19	50	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	51
GP-5	6	9	< 10	< 5	< 5	<10	0.05	0.07	0.11	< 0.13	0.23	< 10
GP-6	10	< 5	< 10	14	9	23	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	73
GP-9	8	92	160	4,700	3,600	**8,460**	0.24	0.13	0.51	1.5	2.38	15
GP-9	20	**530**	530	4,900	2,300	**7,730**	0.23	0.51	0.84	4.0	5.58	130
GP-14	15	**250**	320	2,300	1,100	**3,720**	< 0.25	0.31	< 0.250	1.8	2.11	< 10
GP-16	15	< 5	< 10	< 5	< 5	<10	< 0.025	< 0.025	0.30	< 0.13	0.30	60
GP-18	16	**710**	380	4,600	2,100	**7,080**	< 0.5	< 0.5	0.50	4.9	5.4	200
GP-23	9	**270**	< 100	1,100	420	**1,520**	< 0.025	0.10	0.40	1.1	1.6	25
GP-24	23	**5,200**	8,800	12,000	3,600	**24,400**	1.6	17.0	70.0	< 2.6	**88.6**	30
GP-24	35	**740**	1,200	2,500	930	**4,630**	0.26	1.6	1.6	11.0	14.46	33
GP-27	22	**440**	530	980	290	**1,800**	< 0.250	0.43	3.2	6.7	10.33	56
GP-30	17	**2,000**	5,000	3,700	1,300	**10,000**	1.2	9.8	21.0	55.0	**87.0**	< 25

Notes:

Results expressed in milligrams per kilogram (mg/kg), equivalent to parts per million

TPH/DRO	Total petroleum hydrocarbons, diesel range organics
TPH/GRO	Total petroleum hydrocarbons, gasoline range organics
C10-C22	Speciation of hydrocarbons by number of carbon atoms in molecule (indicator of molecular weight)
530	Indicates result above regulatory guideline

Regulatory guidelines for soil (mg/kg)	
benzene	10
total BTEX	50
TPH	100

Table 2. Monitoring Well Construction Details,
Former Bertha Barber Tank Battery, Lea County, New Mexico.

	Installation Date	TOC Elevation (feet amsl)	Casing Type	Diameter (inches)	Total Depth (feet bls)	Screen Length (feet)
MW-1	12/14/98	3561.18	Sch-40 PVC	4	50	40
MW-2	12/15/98	3561.69	Sch-40 PVC	4	50	40
MW-3	12/16/98	3562.98	Sch-40 PVC	4	50	40
MW-4	12/16/98	3563.01	Sch-40 PVC	4	50	45
MW-5	12/17/98	3561.08	Sch-40 PVC	4	50	40

Notes:

feet amsl	Feet above mean sea level
TOC	Top of casing
feet bls	Feet below land surface
Sch-40 PVC	Schedule 40 polyvinyl chloride

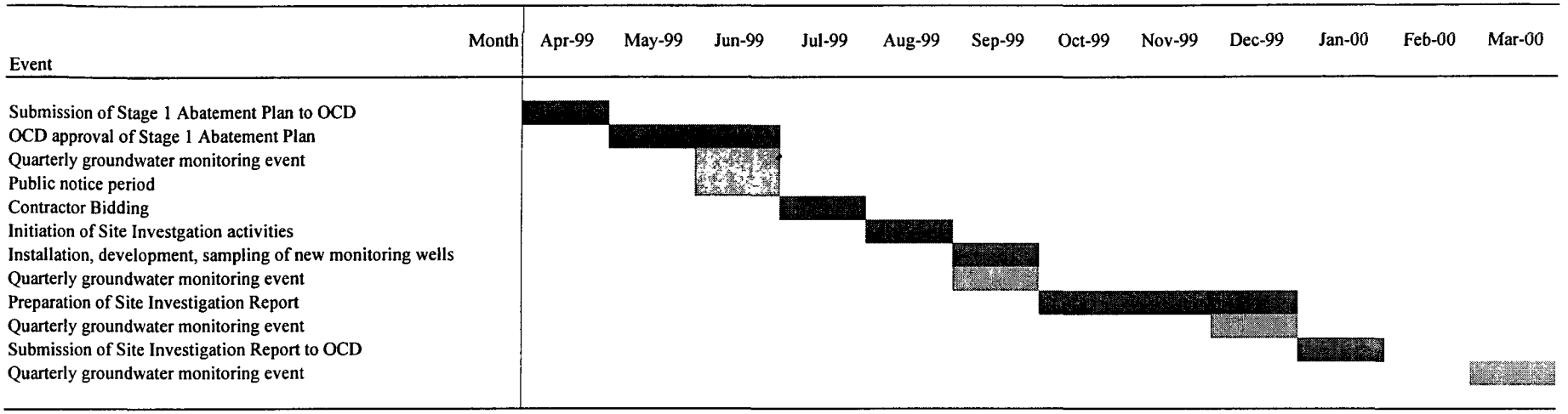
Table 3. Summary of Laboratory Analytical Results for Groundwater Samples Collected in December 1998, Former Bertha Barber Tank Battery, Lea County, New Mexico.

Parameters	Regulatory Limit	MW-1 12/30/98	MW-2 12/29/98	MW-3 12/28/98	MW-4 12/29/98	MW-5 12/29/98
VOCs						
Benzene (ug/l)	10	2.8	1.1	**32.0**	**16.0**	**180.0**
Toluene (ug/l)	750	1.1	0.6	2.1	15.0	41.0
Ethylbenzene (ug/l)	750	0.7	1.7	26.0	2.7	67.0
Xylenes (ug/l)	620	2.1	2.0	21.0	28.0	43.0
PAHs						
Acenaphthene (ug/l)		< 1.0	< 1.0	< 2.50	< 1.0	< 1.0
Acenaphthylene (ug/l)		< 1.0	< 1.0	< 2.50	< 1.0	2.0
Anthracene (ug/l)		< 1.0	< 1.0	< 0.60	< 1.0	< 1.0
Benzo(a)anthracene (ug/l)		< 5.0	< 1.0	< 0.02	< 5.0	< 1.0
Benzo(a)pyrene (ug/l)	0.7	< 1.0	< 1.0	< 0.02	< 1.0	< 1.0
Benzo(b)fluoranthene (ug/l)		< 1.0	< 1.0	< 0.02	< 1.0	< 1.0
Benzo(g,k,i)perylene (ug/l)		< 1.0	< 1.0	< 0.03	< 1.0	< 1.0
Benzo(k)fluoranthene (ug/l)		< 1.0	< 1.0	< 0.03	< 1.0	< 1.0
Chrysene (ug/l)		1.0	< 1.0	< 0.02	< 1.0	< 1.0
Dibenzo(a,h)anthracene (ug/l)		< 1.0	< 1.0	< 0.04	< 1.0	< 1.0
Fluoranthene (ug/l)		3.0	< 1.0	< 0.30	3.0	< 1.0
Fluorene (ug/l)		3.0	< 1.0	< 0.02	1.0	< 1.0
Indeno(1,2,3-cd)pyrene (ug/l)		< 1.0	< 1.0	< 0.08	< 1.0	< 1.0
Naphthalene (ug/l)		5.0	< 1.0	< 2.50	5.0	< 1.0
Phenanthrene (ug/l)		2.0	< 1.0	< 0.60	2.0	< 1.0
Pyrene (ug/l)		3.0	< 1.0	< 0.30	3.0	< 1.0
1-Methylnaphthalene (ug/l)		32.0	2.0	5.30	17.0	4.0
2-Methylnaphthalene (ug/l)		10.0	2.0	4.10	12.0	1.0
PAHs: Naphthalene plus monomethylnaphthalenes	30	**47.0**	4.0	9.4	**34.0**	5.0
General Chemistry						
Total Dissolved Solids (mg/l)	1,000	**7,000**	**5,200**	**3,590**	**1,900**	**4,200**
pH	6 < pH < 9	6.88	7.15	6.95	7.04	6.98
Alkalinity, Bicarbonate (as CaCO3) mg/l		380	400	280	390	510
Alkalinity, Carbonate (as CaCO3) mg/l		< 5	< 5	< 5	< 5	< 5
Bromide (mg/l)		1.2	1.9	7.8	< 5	6.9
Chloride (mg/l)	250	**2,900**	**2,500**	**1,900**	**700**	**1,900**
Specific Conductance (umhos/cm)		5400	4700	3900	1800	3700
Fluoride (mg/l)	1.6	1.3	**1.8**	1.3	1.5	1.3
Nitrate & Nitrite (mg/l)	10	< 0.05	< 0.05	< 0.05	0.07	< 0.05
Silica, Free (as SiO2)		27	24	24	23	25
Sulfate (mg/l)	600	53	73	170	120	63
Metals						
Aluminum (mg/l)	5.00	1.10	0.48	0.48	1.60	1.90
Antimony (mg/l)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Arsneic (mg/l)	0.1	< 0.005	0.01	0.024	< 0.005	< 0.005
Barium (mg/l)	1.00	**2.90**	0.25	0.23	0.21	**7.70**
Beryllium (mg/l)			< 0.002	< 0.002	< 0.002	< 0.002
Boron (mg/l)	0.75	0.55	0.61	0.43	0.33	0.49
Cadmium (mg/l)	0.010	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Calcium (mg/l)		660	410	470	270	470
Chromium (mg/l)	0.050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cobalt (mg/l)	0.050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Copper (mg/l)	1.000	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Iron (mg/l)	1.00	**1.00**	0.49	0.79	**1.20**	**1.20**
Lead (mg/l)	0.050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium (mg/l)		210	150	150	62	160
Manganese (mg/l)	0.20	**0.27**	**0.25**	**0.25**	0.12	0.19
Molybdenum (mg/l)	1.000	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Nickel (mg/l)	0.2000	< 0.0050	0.0054	< 0.0050	< 0.0050	< 0.0050
Potassium (mg/l)		37	51	18	14	14
Selenium (mg/l)	0.0500	< 0.0050	< 0.0050	< 0.0050	< 0.0050	0.0069
Silver (mg/l)	0.050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Sodium (mg/l)		900	810	530	230	510
Thallium (mg/l)		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Vanadium (mg/l)		< 0.0050	< 0.0050	< 0.0050	0.0084	0.0086
Zinc (mg/l)		0.013	0.014	< 0.005	0.019	0.015

Notes:

VOCs	Volatile organic compounds
PAHs	Polynuclear aromatic hydrocarbons
ug/L	micrograms per liter
mg/L	milligrams per liter
7.70	Indicates result above standard

Table 4. Site Investigation Implementation Schedule and Groundwater Monitoring Plan, Former Bertha Barber Tank Battery, Lea County, New Mexico.

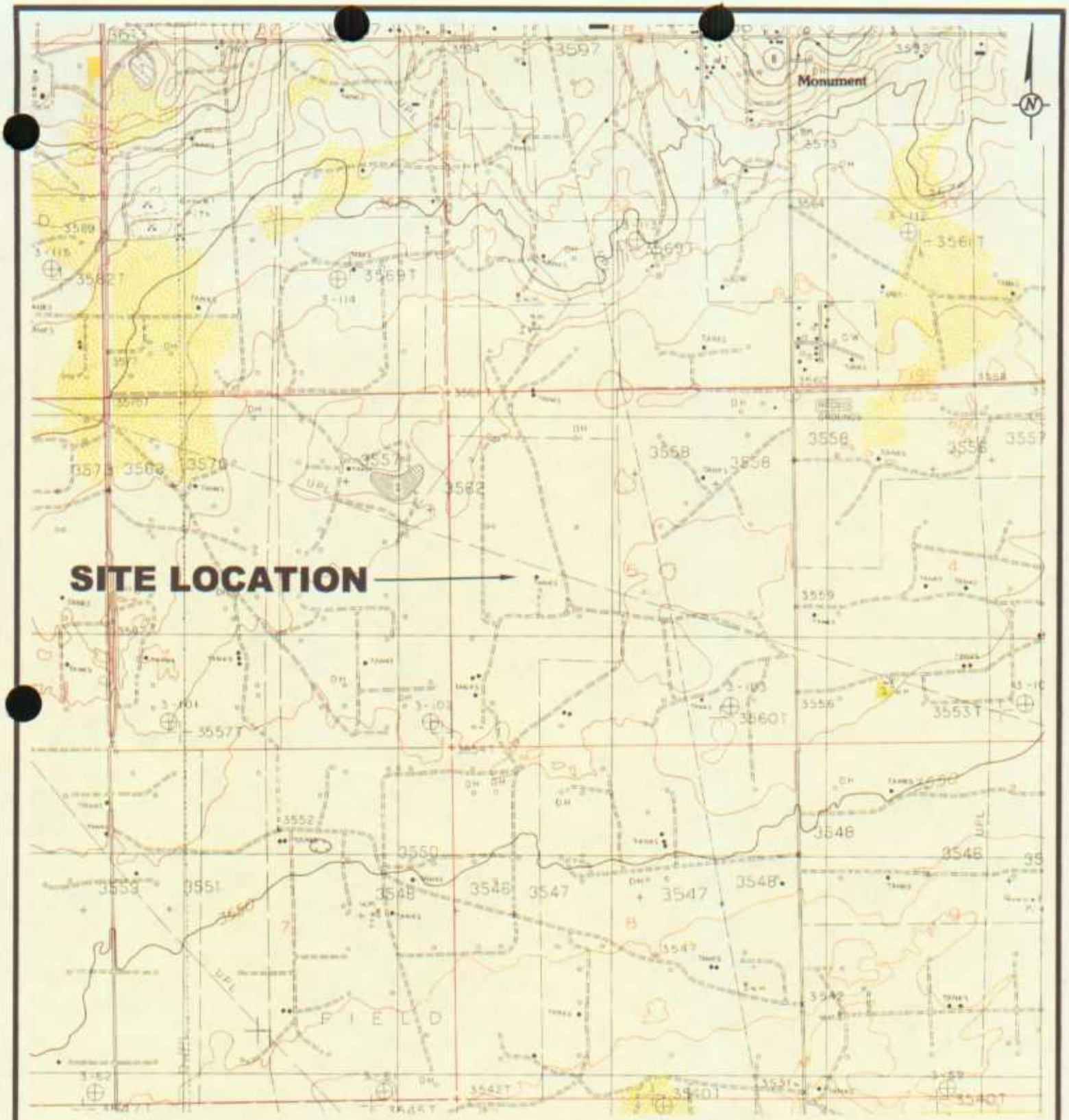


Groundwater Monitoring Plan:

Month	Wells	Analytical Parameters
June	MW-1, MW-2, MW-3, MW-4, MW-5	BTEX
September	MW-1, MW-2, MW-3, MW-4, MW-5 + new wells	BTEX, PAHs, chloride, TDS, selectec metals (iron, manganese, barium - dissolved)
December	MW-1, MW-2, MW-3, MW-4, MW-5 + new wells	BTEX
March	MW-1, MW-2, MW-3, MW-4, MW-5 + new wells	BTEX

Notes:

BTEX	Benzene, toluene, ethylbenzene, total xylenes
PAH	Polunuclear aromatic hydrocarbons
TDS	Total dissolved solids
WQCC	New Mexico Water Quality Control Commission
OCD	New Mexico Energy, Minerals, and Natural Resources Department, Oil Conservation Division

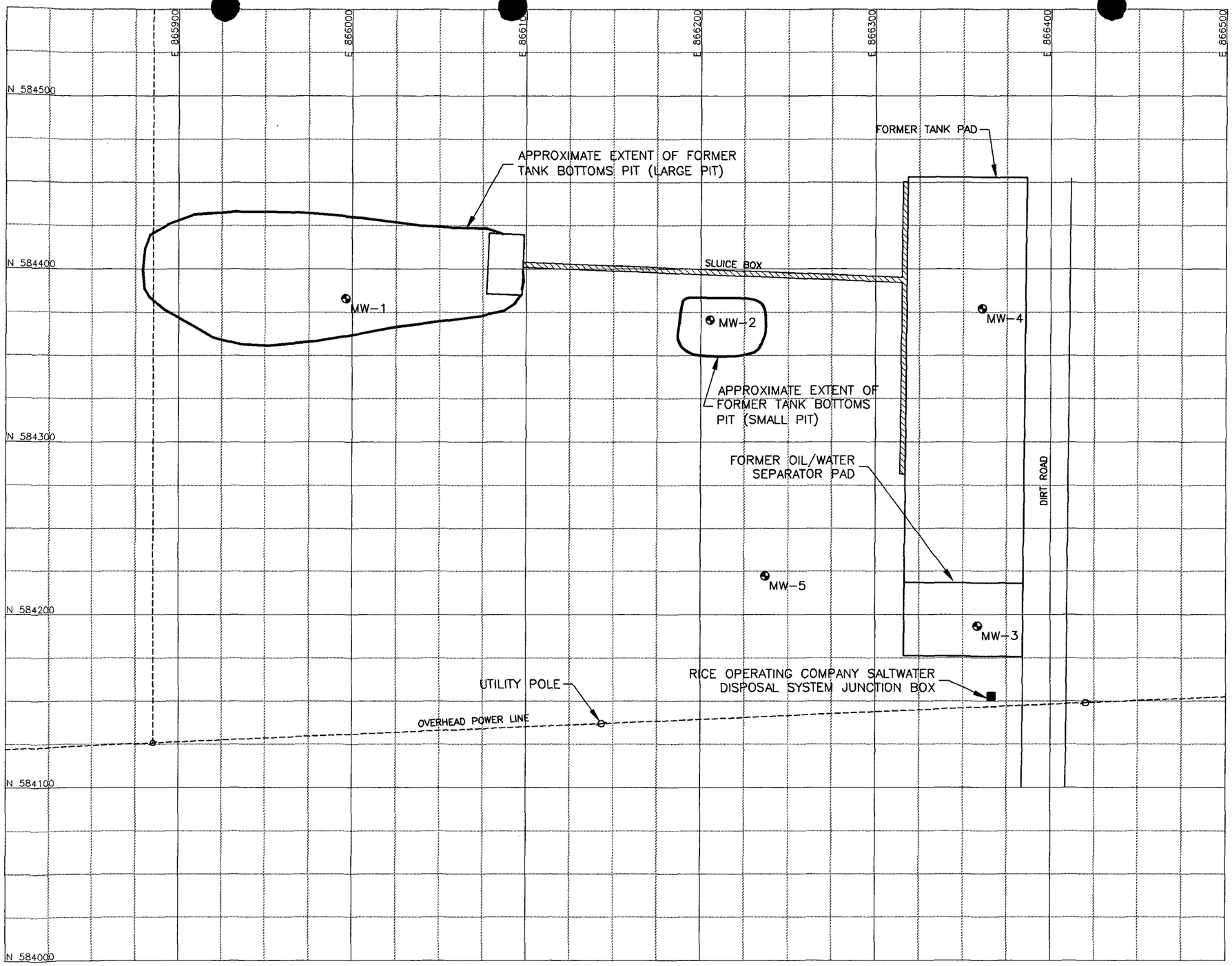


SOURCE: USGS 7.5 MIN. TOPOGRAPHICAL QUADRANGLE:
MONUMENT SOUTH, N. MEX., 1985

0 2000
SCALE IN FEET

ARCADIS
GERAGHTY & MILLER

DRAWN: M. WASILEWSKI	DATE: 3/26/99	PROJECT MANAGER: P. MILIONIS	DEPARTMENT MANAGER: D. SOUSA
SITE LOCATION		LEAD DESIGN PROF.: M. HANSEN	CHECKED: J. HORST
FORMER BERTHA BARBER TANK BATTERY LEA COUNTY, NEW MEXICO		PROJECT NUMBER: NP000449.0001	DRAWING NUMBER: 1



LEGEND:

MW-1 ⊕ EXISTING MONITORING WELL

STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM, 1927, NEW MEXICO EAST ZONE

25 FOOT GRID INTERVAL

G:\APROJECT\MARATHON\BERTHA BARBER\CADD\BB-3.DWG

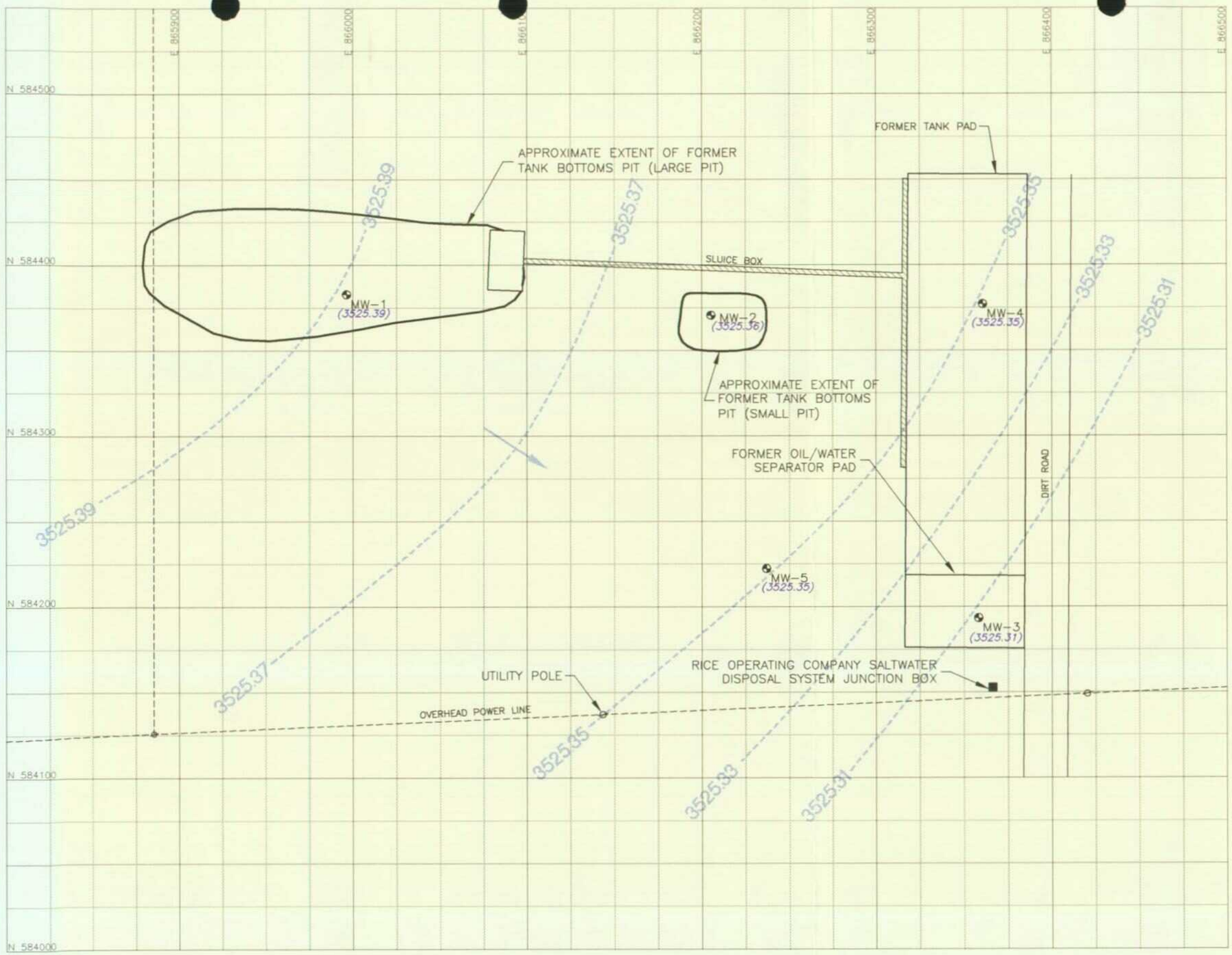
0 60
SCALE IN FEET

NO.	DATE	REVISION DESCRIPTION	BY / CKD

ARCADIS GERAGHTY & MILLER
3000 Cabot Blvd West
Suite 3004, Langhorne, Pa 19047
Tel: 215/752-6840 Fax: 215/752-6879

FORMER BERTHA BARBER TANK BATTERY
LEA COUNTY, NEW MEXICO

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	3/25/99	P. MILIONIS	D. SOUSA
		LEAD DESIGN PROF. M. HANSEN	CHECKED J. HORST
SITE LAYOUT		PROJECT NUMBER NP000449.0001	DRAWING NUMBER 2



LEGEND:

- MW-1 — EXISTING MONITORING WELL
- --3525.35-- — GROUNDWATER ELEVATION CONTOUR LINE (CONTOUR INTERVAL 0.02 FEET)
- DIRECTION OF GROUNDWATER FLOW
- (3525.25) — GROUNDWATER ELEVATION, IN FEET ABOVE MEAN SEA LEVEL
- STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM, 1927, NEW MEXICO EAST ZONE
- 25 FOOT GRID INTERVAL

0 60
SCALE IN FEET

NO.	DATE	REVISION DESCRIPTION	BY / CKD

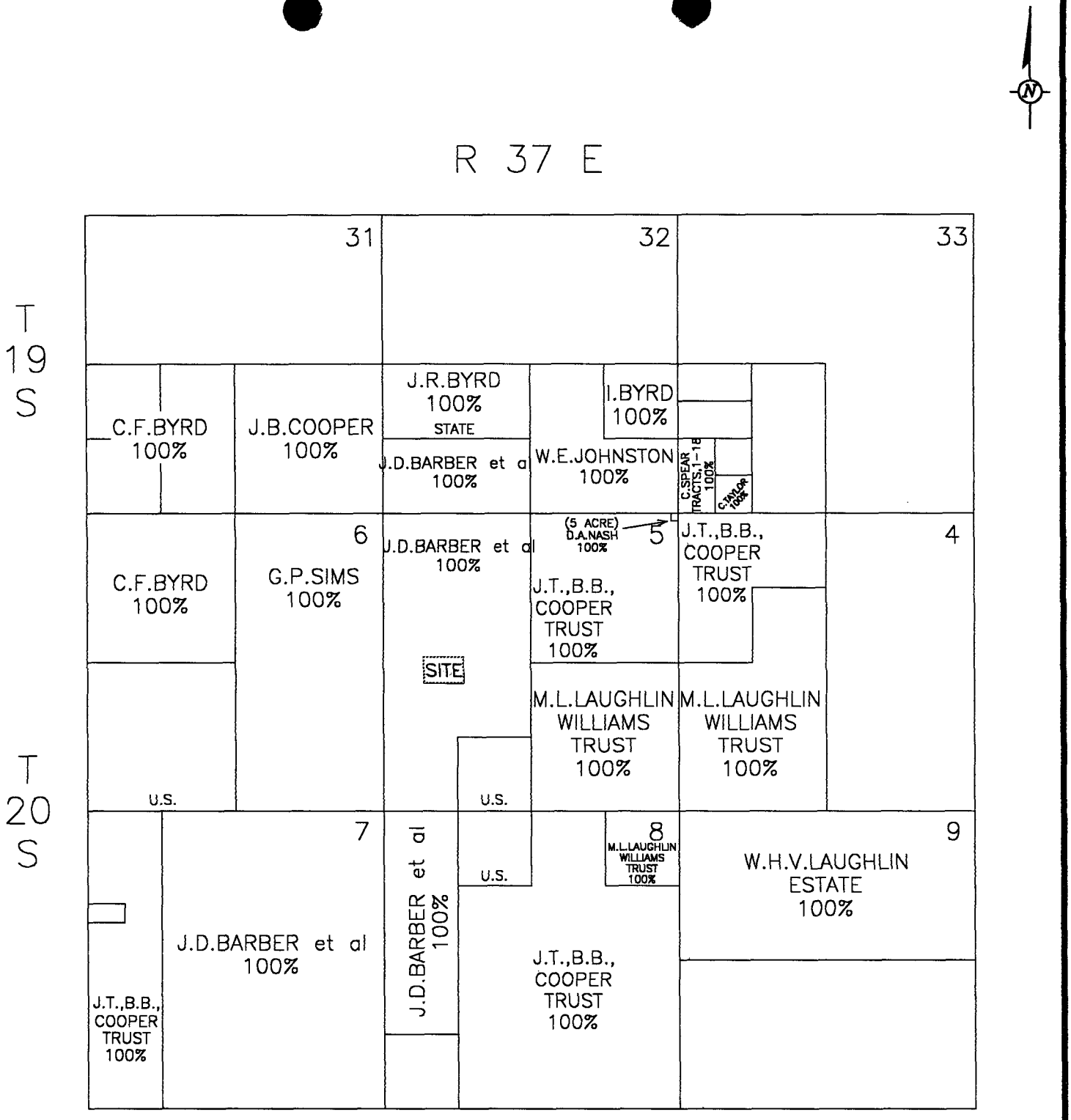
ARCADIS GERAGHTY & MILLER
3000 Cabot Blvd West
Suite 3004, Langhorne, Pa 19047
Tel: 215/752-6840 Fax: 215/752-6879

FORMER BERTHA BARBER TANK BATTERY
LEA COUNTY, NEW MEXICO

GROUNDWATER ELEVATION CONTOURS
MARCH 1999

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	3/25/99	P. MILIONIS	D. SOUSA
		LEAD DESIGN PROF. M. HANSEN	CHECKED J. HORST
		PROJECT NUMBER NP000449.0001	DRAWING NUMBER 3

G:\APROJECT\...\BERTHA BARBER\CADD\BB-4.DWG

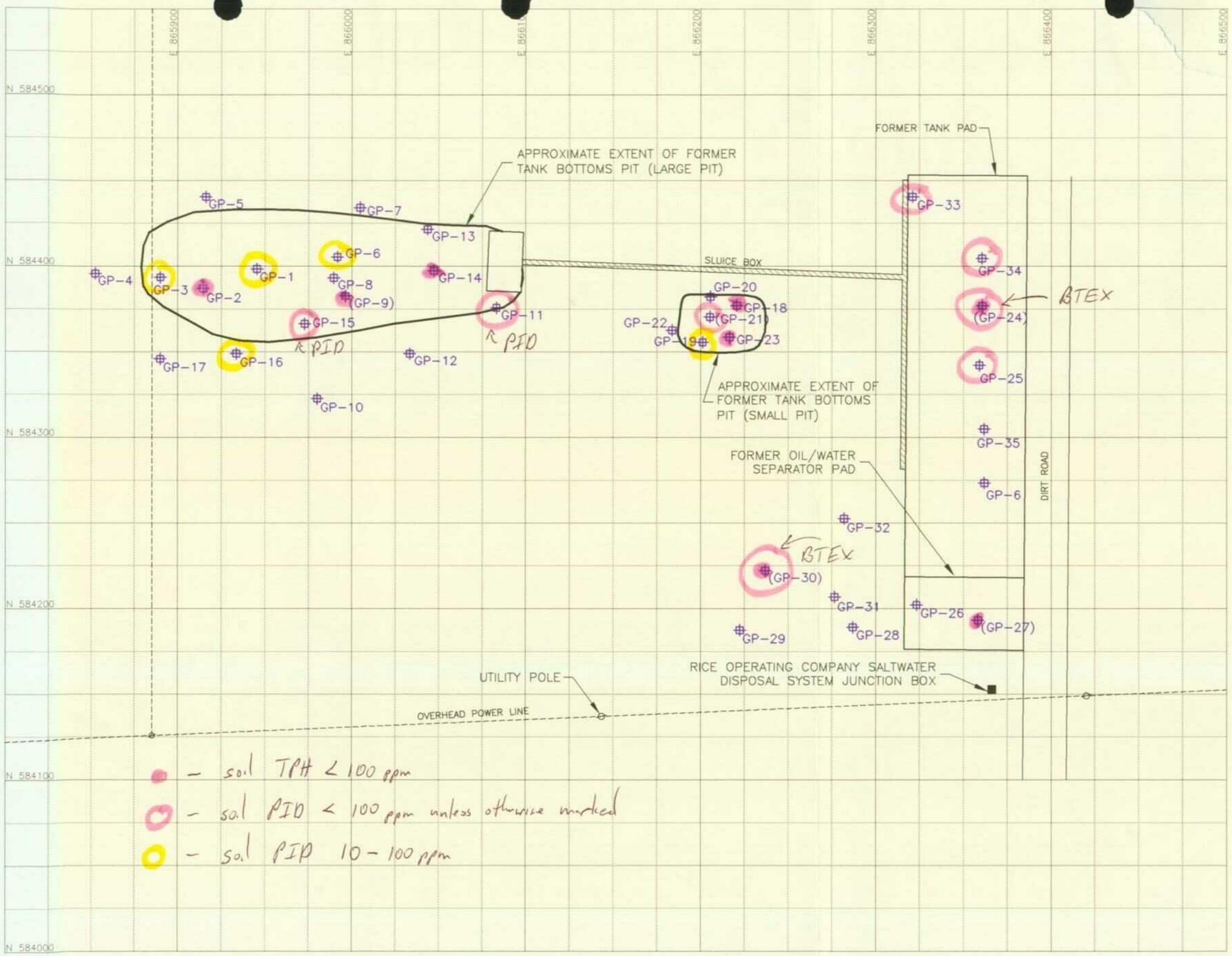


0 2500
SCALE IN FEET

G:\APROJECT\MARATHON\BERTHA BARBER\CADD\OWNERS.DWG

ARCADIS GERAGHTY & MILLER

DRAWN M. WASILEWSKI	DATE 4/7/99	PROJECT MANAGER P. MILIONIS	DEPARTMENT MANAGER D. SOUSA
ADJACENT PROPERTY OWNERS		LEAD DESIGN PROF. M. HANSEN	CHECKED J. HORST
FORMER BERTHA BARBER TANK BATTERY LEA COUNTY, NEW MEXICO		PROJECT NUMBER NP000449.0001	DRAWING NUMBER 4



LEGEND:

GP-30 ⊕ BORING INSTALLED NOVEMBER 1998

(GP-9) ⊕ INDICATES BORING WAS SELECTED TO BE CONVERTED TO PERMANENT MONITORING WELL.

STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM, 1927, NEW MEXICO EAST ZONE

25 FOOT GRID INTERVAL

G:\APROJECT\...THON\BERTHA BARBER\CADD\BB-7.DWG

0 60
SCALE IN FEET

NO.	DATE	REVISION DESCRIPTION	BY CKD

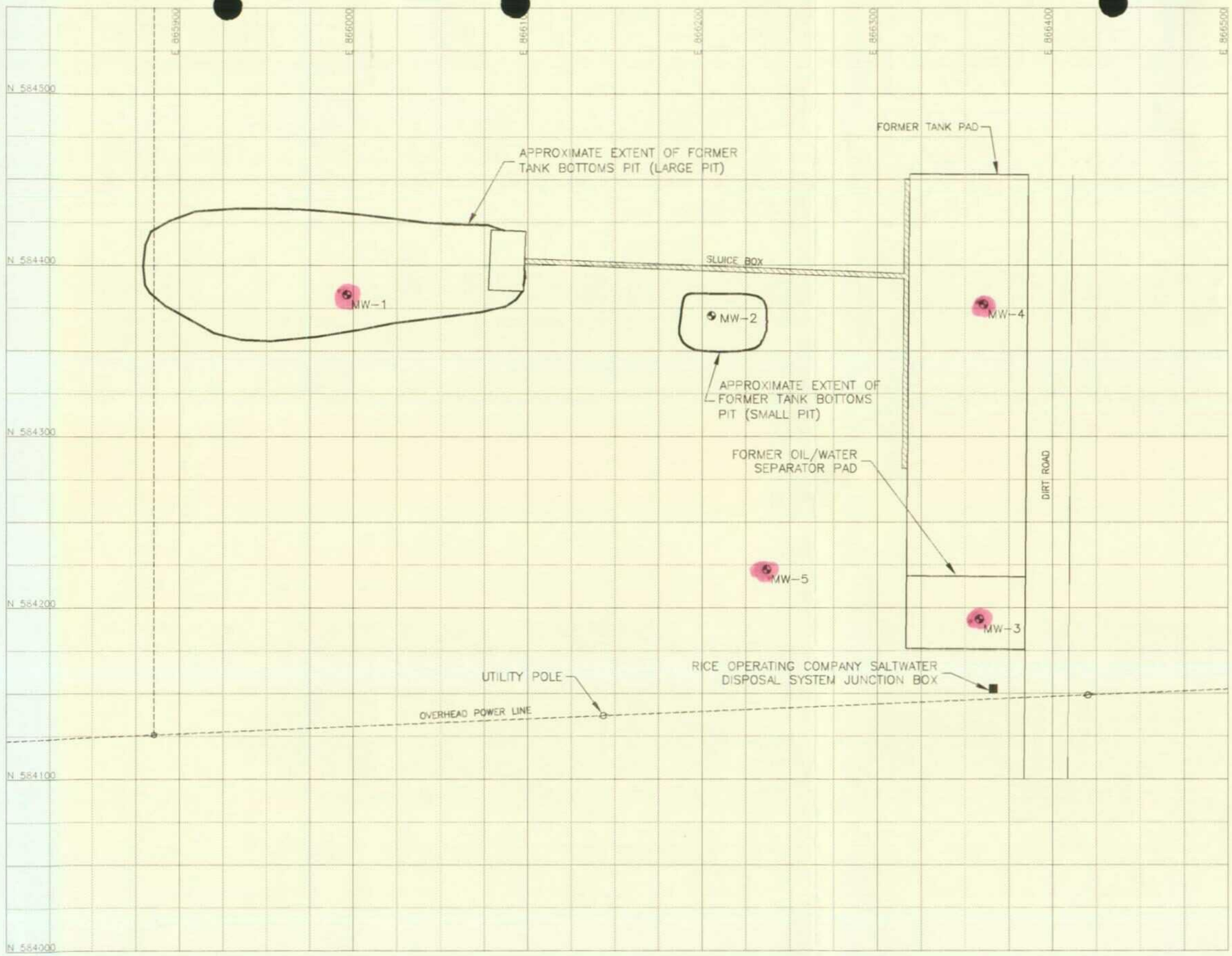
ARCADIS GERAGHTY & MILLER
3000 Cabot Blvd West
Suite 3004, Langhorne, Pa 19047
Tel: 215/752-6840 Fax: 215/752-6879

FORMER BERTHA BARBER TANK BATTERY
LEA CONTY, NEW MEXICO

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	3/25/99	P. MILIONIS	D. SOUSA
		LEAD DESIGN PROF. M. HANSEN	CHECKED J. HORST

SOIL BORING LOCATIONS, NOVEMBER 1998 SAMPLING EVENT

PROJECT NUMBER	DRAWING NUMBER
NP000449.0001	5



LEGEND:

MW-1 EXISTING MONITORING WELL

STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM, 1927, NEW MEXICO EAST ZONE

25 FOOT GRID INTERVAL

NOTE:

GEOPROBE BORINGS INSTALLED NOVEMBER 1998 WERE CONVERTED TO MONITORING WELLS AS FOLLOWS:

- GP-9 → MW-1
- GP-21 → MW-2
- GP-27 → MW-3
- GP-24 → MW-4
- GP-30 → MW-5

0 60
SCALE IN FEET

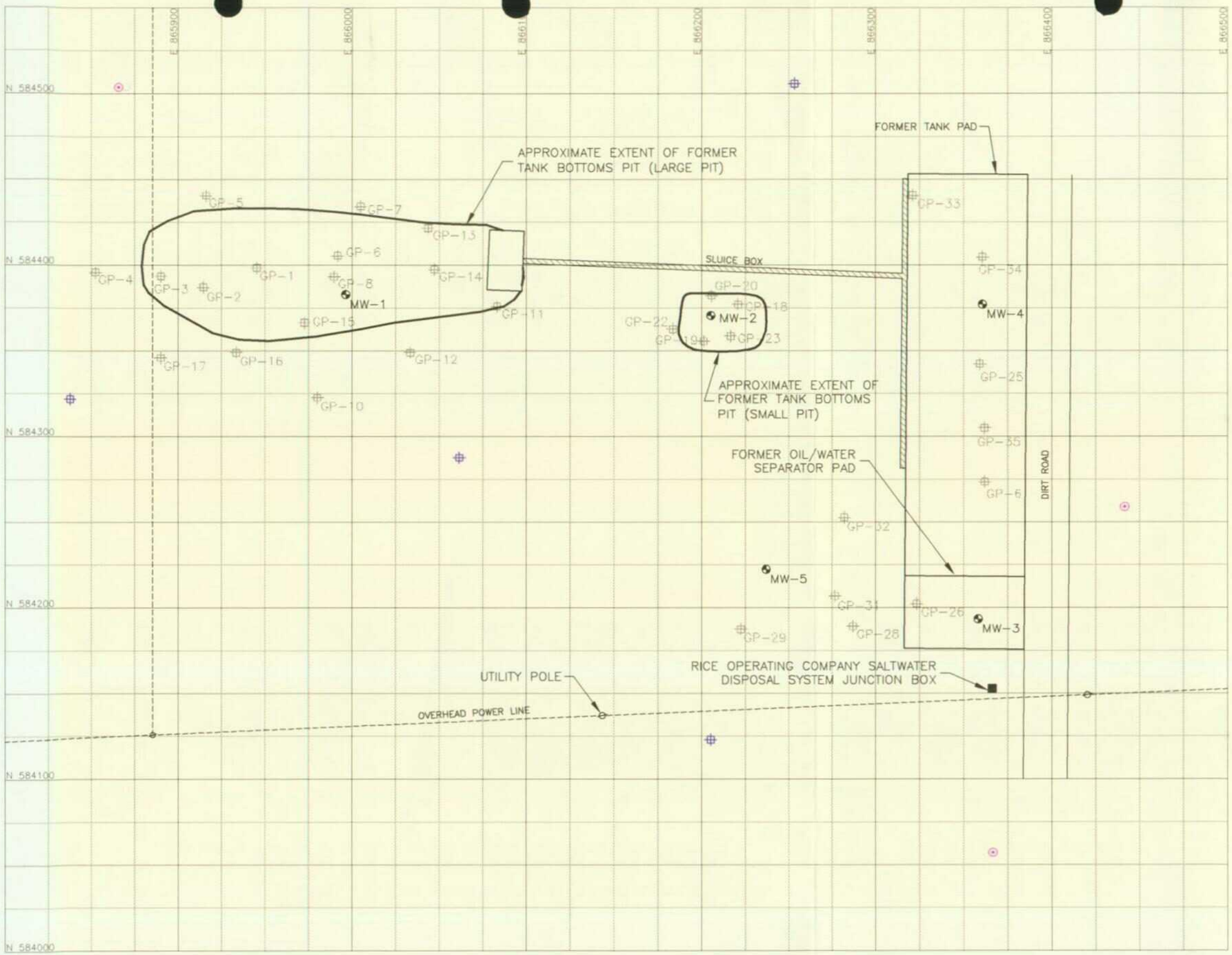
NO.	DATE	REVISION DESCRIPTION	BY / CKD

ARCADIS GERAGHTY & MILLER
3000 Cabot Blvd West
Suite 3004, Langhorne, Pa 19047
Tel: 215/752-6840 Fax: 215/752-6879

FORMER BERTHA BARBER TANK BATTERY
LEA COUNTY, NEW MEXICO

MONITORING WELL LOCATIONS

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	3/25/99	P. MILIONIS	D. SOUSA
		LEAD DESIGN PROF. M. HANSEN	CHECKED J. HORST
		PROJECT NUMBER NP000449.0001	DRAWING NUMBER 6



LEGEND:

- MW-1 EXISTING MONITORING WELL
- GP-30 BORING INSTALLED NOVEMBER 1998
- PROPOSED BORING/PIEZOMETER LOCATION TO BE CONVERTED TO PERMANENT MONITORING WELL
- PROPOSED BORING/PIEZOMETER LOCATION
- STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM, 1927, NEW MEXICO EAST ZONE
- 25 FOOT GRID INTERVAL

0 60
SCALE IN FEET

NO.	DATE	REVISION DESCRIPTION	BY / CKD

ARCADIS GERAGHTY & MILLER
3000 Cabot Blvd West
Suite 3004, Langhorne, Pa 19047
Tel: 215/752-6840 Fax: 215/752-6879

FORMER BERTHA BARBER TANK BATTERY
LEA COUNTY, NEW MEXICO

PROPOSED SOIL BORING AND PIEZOMETER LOCATIONS

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	3/25/99	P. MILIONIS	D. SOUSA
		LEAD DESIGN PROF. M. HANSEN	CHECKED J. HORST
		PROJECT NUMBER NP000449.0001	DRAWING NUMBER 7

G:\APROJECT\...ATHON\BERTHA BARBER\CADD\BB-5.DWG

Appendix A

Soil Boring Logs

Geoprobe Data GP-1
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	1		Brown Sand
2			Brown Sand
3	1		Brown Sand
4	0		Brown Sand
5	1		Brown Sand
6	5		Black Hydrocarbon Saturated Sand
7	12		Grey Hydrocarbon Stained Sand
8	6		Brown Sand
9	1		White Caliche
10			White Caliche
11			White Caliche
12		GP-1 @ 12 ft	White Caliche

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-2
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	1		Brown Sand
2	1		Brown Sand
3	0.3		Brown Sand
4			Brown Sand
5			Brown Sand
6	63		Black Hydrocarbon Saturated Sand
7		GP-2 @ 7 ft	Grey Hydrocarbon Stained Sand
8	50		Grey Hydrocarbon Stained Sand
9	28	GP-2 @ 9 ft	White Caliche

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-3
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2	1		Brown Sand
3	0		Brown Sand
4	2		Grey Hydrocarbon Stained Sand
5	17		Grey Hydrocarbon Stained Sand
6	23		Grey Hydrocarbon Stained Sand
7	9		White Caliche
8	11		White Caliche
9	10		White Caliche

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-4
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	1		Brown Sand
2	0		Brown Sand
3	0		Brown Sand
4	3		Brown Sand
5	1		Brown Sand
6	1		Brown Sand
7			White Caliche

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-5
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	1		Brown Sand
2	1.4		Brown Sand
3	0.8		Brown Sand
4	1		Brown Sand
5	1		Brown Sand
6	1.5	GP-5 @ 6 ft	White Caliche

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-6
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2	1.2		Brown Sand
3	1		Brown Sand
4	0.8		Brown Sand
5	0.2		3" Hydrocarbon Stained Brown Sand
6	0		Brown Sand
7			Brown Sand
8	29		Black Hydrocarbon Saturated Sand
9			Grey Hydrocarbon Stained Sand
10		GP-6 @ 10 ft	White Caliche

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-7
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	1.9		Brown Sand
2	3.2		Brown Sand
3	1.6		Brown Sand
4	2.2		Brown Sand
5	1.6		Brown Sand
6	1.9		Brown Sand
7	1.6		Brown Sand
8	2.6		White Caliche
9	3		White Caliche

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-9
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	3		Brown Sand
2	1		Brown Sand
3	1.8		Brown Sand
4	2		Brown Sand
5	2.8		Brown Hydrocarbon Stained Sand
6	21		Black Hydrocarbon Saturated Sand
7			
8		GP-9 @ 8 ft	Black Hydrocarbon Saturated Sand
9	169		Grey Hydrocarbon Stained Sand
10			
11			
12	153		Grey Hydrocarbon Stained Sand & Rocks
13			Grey Hydrocarbon Stained Sand & Rocks
14	151		Grey Hydrocarbon Stained Sand & Rocks
15	157		Grey Hydrocarbon Stained Sand & Rocks
16	160		Grey Hydrocarbon Stained Sand & Rocks
17	163		Grey Hydrocarbon Stained Sand & Rocks
18	207		Grey Hydrocarbon Stained Sand & Rocks
19			Grey Hydrocarbon Stained Sand & Rocks
20	291	GP-9 @ 20 ft	Grey Hydrocarbon Stained Sand & Rocks

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-10
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2			Brown Sand
3			Brown Sand
4			Light Brown Sand
5			Light Brown Sand
6			White Sand
7			White Sand
8			White Sand
9			White Sand
10			White Sand
11			White Sand
12			White Sand

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-11
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2	142		Black Hydrocarbon Saturated Sand
3			Brown Sand
4			Brown Hydrocarbon Stained Sand
5	15		Brown Hydrocarbon Stained Sand
6			Brown Hydrocarbon Stained Sand
7			Brown Hydrocarbon Stained Sand
8			White Caliche
9			White Caliche

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-12
Former Bertha Barber Tank Battery

Deptn (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2	0.7		Brown Sand
3			Brown Sand
4	1.8		Brown Sand
5	0.2		Light Brown Sand
6			Light Brown Sand
7			White Caliche
8	0.7		White Caliche
9			White Caliche

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-13
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	0		Hydrocarbon Stained Sand
2	0		Hydrocarbon Stained Sand/Brown Sand
3	0		Brown Sand
4			Light Brown Sand
5			Light Brown Sand
6			Light Brown Sand
7			White Caliche
8			White Caliche
9			White Caliche

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P J. Reynolds
Soil Samples Collected by TEG. Inc.

Geoprobe Data GP-14
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	0		Hydrocarbon Stained Sand
2			Brown Sand
3			Brown Sand
4	0		Brown Sand
5			Brown Sand
6			Brown Sand
7			Brown Sand
8			Brown Hydrocarbon Stained Sand
9	106		Brown Hydrocarbon Stained Sand
10			Brown Sand /White Sand
11	145		White Sand
12	102		White Sand
13			White Sand
14			White Sand
15	208	GP-14 @ 15 ft	White Sand

Data Colleted on 11/16/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-15
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	2		Hydrocarbon Stained Sand
2	0		Brown Sand
3	0		Brown Sand
4	1		Brown Sand
5	0		Brown Sand
6	0		Brown Sand
7			
8	37		Black Hydrocarbon Saturated Sand
9	113		Grey Hydrocarbon Stained Sand & Rocks
10			
11	29		Grey Hydrocarbon Stained Sand & Rocks
12	16		Grey Hydrocarbon Stained Sand & Rocks
13	76		Grey Hydrocarbon Stained Sand & Rocks
14	98		Grey Hydrocarbon Stained Sand & Rocks
15	53		Grey Hydrocarbon Stained Sand & Rocks
16	157		Grey Hydrocarbon Stained Sand & Rocks
17	144		Grey Hydrocarbon Stained Sand & Rocks
18	128		Grey Hydrocarbon Stained Sand & Rocks

Data Colleted on 11/17/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-16
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	1.6		Hydrocarbon Stained Sand
2	2.3		Brown Sand
3	1.8		Brown Sand
4	1.1		Brown Sand
5	14		Brown Hydrocarbon Stained Sand
6	6		Brown Hydrocarbon Stained Sand & Rocks
7	1		Brown Hydrocarbon Stained Sand & Rocks
8	1.5		White Hydrocarbon Stained Sand
9	3.1		White Hydrocarbon Stained Sand
10	5.4		Brown Hydrocarbon Stained Sand
11	11		Brown Hydrocarbon Stained Sand
12	44		Grey Hydrocarbon Stained Sand & Rocks
13	3.1		Light Stained Caliche
14	2		Light Stained Caliche
15		GP-16 @ 15 ft	Light Stained Caliche

Data Colleted on 11/17/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-17
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	2.7		Hydrocarbon Stained Sand
2	4.3		Brown Sand
3	2.1		Brown Sand
4	0.7		Brown Sand
5	1.4		White Sand
6	1.6		White Sand
7			
8			
9	1.1		White Caliche

Data Colleted on 11/17/98
Data Colleted by M. P. Peacock and P J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-18
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	2.8		Hydrocarbon Stained Sand
2	1.1		Brown Sand
3	0.7		Brown Sand
4			
5			
6	6.9		Grey Hydrocarbon Stained Sand
7	5.4		Grey Hydrocarbon Stained Sand
8	2.8		Grey Hydrocarbon Stained Sand
9	3		Grey Hydrocarbon Stained Sand
10	2		Grey Hydrocarbon Stained Sand
11	28		Grey Hydrocarbon Stained Sand
12	128		Light Grey Hydrocarbon Stained Sand
13	125		Light Grey Hydrocarbon Stained Sand
14	201		Light Grey Hydrocarbon Stained Sand
15	158		Light Grey Hydrocarbon Stained Sand
16	158	GP-18 @ 16 ft	Light Grey Hydrocarbon Stained Sand & Rocks

Data Colleted on 11/17/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-19
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	3.4		Brown Sand
2	2.7		Brown Hydrocarbon Stained Sand
3	9		Brown Hydrocarbon Stained Sand
4	66		Brown Hydrocarbon Stained Sand
5	79		Grey Hydrocarbon Stained Sand
6	9		Grey Hydrocarbon Stained Sand
7			Grey Hydrocarbon Stained Sand
8			Grey Hydrocarbon Stained Sand
9	84		Grey Hydrocarbon Stained Sand

Data Colleted on 11/17/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-20
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2			Brown Sand
3			Brown Sand
4			Brown Sand
5			White Caliche
6			White Caliche

Data Colleted on 11/17/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-21
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2	5.2		Brown Sand
3	100		4" Black Hydrocarbon Saturated Sand
4	193		Brown Hydrocarbon Stained Sand
5	184		Grey Hydrocarbon Stained Sand
6	128		Grey Hydrocarbon Stained Sand

Data Colleted on 11/17/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-22
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2			White Sand
3			White Sand
4			White Sand
5			White Sand
6			White Sand
7			White Sand
8			White Sand
9			White Sand

Data Colleted on 11/17/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-23
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2			Brown Sand
3	34		3" Black Hydrocarbon Saturated Sand
4	47		Brown Hydrocarbon Stained Sand
5	64		Brown Hydrocarbon Stained Sand
6	109		Brown Hydrocarbon Stained Sand
7	113		Grey Hydrocarbon Stained Sand
8	120		Grey Hydrocarbon Stained Sand
9	174	GP-23 @ 9 ft	Grey Hydrocarbon Stained Sand

Data Colleted on 11/17/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-24
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			
2	161		Brown Hydrocarbon Stained Sand
3			Dark Brown Hydrocarbon Stained Sand
4	427		Brown Hydrocarbon Stained Sand
5	459		Brown Hydrocarbon Stained Sand
6	467		Brown Hydrocarbon Stained Sand
7	450		Dark Brown Hydrocarbon Stained Sand
8	430		Dark Brown Hydrocarbon Stained Sand
9	329		Dark Brown Hydrocarbon Stained Sand
10	455		Dark Brown Hydrocarbon Stained Sand & Rocks
11	403		Brown Hydrocarbon Stained Sand & Rocks
12	423		Brown Hydrocarbon Stained Sand & Rocks
13	388		Light Brown Hydrocarbon Stained Sand & Rocks
14	347		Light Brown Hydrocarbon Stained Sand & Rocks
15	406		Light Brown Hydrocarbon Stained Sand & Rocks
16	424		Light Brown Hydrocarbon Stained Sand & Rocks
17	437		Grey Hydrocarbon Stained Sand & Rocks
18	434		Grey Hydrocarbon Stained Sand & Rocks
19	421		Light Grey Hydrocarbon Stained Sand & Rocks
20	385		Light Grey Hydrocarbon Stained Sand & Rocks
21	399		Light Grey Hydrocarbon Stained Sand & Rocks
22			Light Grey Hydrocarbon Stained Sand & Rocks
23	384	GP-24 @ 23 ft	Light Grey Hydrocarbon Stained Sand & Rocks
24			Light Grey Hydrocarbon Stained Sand & Rocks
25	391		Light Grey Hydrocarbon Stained Sand & Rocks
26			Light Grey Hydrocarbon Stained Sand & Rocks
27	370		Light Grey Hydrocarbon Stained Sand & Rocks
28			Light Grey Hydrocarbon Stained Sand & Rocks
29	425		Light Grey Hydrocarbon Stained Sand & Rocks
30	398		Light Grey Hydrocarbon Stained Sand & Rocks
31	322		Light Grey Hydrocarbon Stained Sand & Rocks
32			Light Grey Hydrocarbon Stained Sand & Rocks
33	306		Light Grey Hydrocarbon Stained Sand & Rocks
34	382		Light Grey Hydrocarbon Stained Sand & Rocks
35		GP-24 @ 23 ft	Small Layer of Hydrocarbons on the Saturated Zone
36		GP-24 @ 23 ft	Saturated Zone - Sand and Rocks

Data Colleted on 11/17/98 & 11/18/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-25
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			
2	8.4		Brown Sand
3	4.5		Moist Brown Sand
4	2.2		Moist Sand and Rocks
5	2		Moist Sand and Rocks
6	1.6		Moist Sand and Rocks
7	1.5		Moist Sand
8	3.4		Moist Sand
9	19		Moist Sand and Rocks
10	78		Grey Hydrocarbon Stained Sand & Rocks
11	163		Grey Hydrocarbon Stained Sand & Rocks
12	215		Grey Hydrocarbon Stained Sand & Rocks

Data Colleted on 11/17/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-26
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	0		Brown Hydrocarbon Stained Sand
2	2.2		Brown Hydrocarbon Stained Sand
3	0		Brown Hydrocarbon Stained Sand
4	0		White Sand
5	0		White Sand
6	0		White Sand
7	1		White Sand
8	0		White Sand
9	1		White Sand

Data Colleted on 11/17/98
Data Colleted by M. P Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-27
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2			Brown Sand
3			Brown Sand
4	4.2		White Hydrocarbon Stained Sand
5	183		White Hydrocarbon Stained Sand
6	239		White Hydrocarbon Stained Sand
7	330		White Hydrocarbon Stained Sand
8	372		Brown Hydrocarbon Stained Sand
9	384		Brown Hydrocarbon Stained Sand
10	457		Grey Hydrocarbon Stained Sand
11	405		Grey Hydrocarbon Stained Sand
12	478		Grey Hydrocarbon Stained Sand
13	500		Grey Hydrocarbon Stained Sand
14	473		Grey Hydrocarbon Stained Sand
15	467		Grey Hydrocarbon Stained Sand
16	460		Grey Hydrocarbon Stained Sand
17	475		Grey Hydrocarbon Stained Sand
18	466		Grey Hydrocarbon Stained Sand
19	509		Grey Hydrocarbon Stained Sand & Rocks
20	441		Grey Hydrocarbon Stained Sand & Rocks
21	477		Grey Hydrocarbon Stained Sand & Rocks
22	Refusal	GP-27 @ 22 ft	Grey Hydrocarbon Stained Sand & Rocks

Data Colleted on 11/17/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-28
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	3.2		Brown Sand
2	3		Brown Sand
3	3.2		White Sand
4			White Sand
5	1.8		White Sand
6	4.2		White Sand
7	2.5		White Sand
8	1.8		White Sand
9	1.7		White Sand
10			White Sand
11			White Sand
12	2		White Sand

Data Colleted on 11/18/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-29
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	4.2		Brown Sand
2	1.8		Brown Sand
3	1.3		White Sand
4	2		White Sand
5	2.8		White Sand
6	2.5		White Sand
7	3.2		White Sand
8	1.5		White Sand
9	1.3		White Sand

Data Colleted on 11/18/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-30
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	5		Brown Sand
2	3		Brown Sand
3	2		White Sand
4	2		White Sand
5	2		White Sand
6	2.7		White Sand
7	2		White Sand
8	39		White Sand
9	359		White Sand with Black Hydrocarbon Stains
10			
11	511		White Sand with Black Hydrocarbon Stains
12	538		Brown Hydrocarbon Stained Sand
13	544		Brown Hydrocarbon Stained Sand
14	530		Brown Hydrocarbon Stained Sand
15	522		Brown Hydrocarbon Stained Sand
16	525		Light Brown Hydrocarbon Stained Sand and Rocks
17	496	GP-30 @ 17 ft	Light Brown Hydrocarbon Stained Sand and Rocks
18	480		Light Brown Hydrocarbon Stained Sand and Rocks
19	418		Light Brown Hydrocarbon Stained Sand and Rocks
20			Light Brown Hydrocarbon Stained Sand and Rocks

Data Colleted on 11/18/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-31
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	2.5		Brown Sand
2	2.5		Brown Sand
3	2.3		White Sand
4	2.8		White Sand
5	2.3		White Sand
6	2		White Sand
7	2.3		White Sand
8	2		White Sand
9	2.7		White Sand & Rocks
10	3		White Sand & Rocks
11	3		White Sand & Rocks
12	2		White Sand & Rocks
13	1.5		White Sand & Rocks
14	1.7		White Sand & Rocks
15	1.7		White Sand & Rocks
16	1.8		White Sand & Rocks

Data Colleted on 11/18/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG. Inc.

Geoprobe Data GP-32
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2			White Sand
3			White Sand
4			White Sand
5			White Sand
6			White Sand
7			White Sand & Rocks
8			White Sand & Rocks
9			White Sand & Rocks
10			White Sand & Rocks
11			White Sand & Rocks

Data Colleted on 11/18/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-33
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1	2		Brown Sand
2	2		Brown Sand
3	1.8		Brown Sand
4	1.8		Light Brown Sand
5	2		Light Brown Sand
6	2		Light Brown Sand
7	2.8		Light Brown Sand
8	2		Light Brown Sand
9	2		Light Brown Sand
10	2.3		Light Brown Sand
11	33		Grey Hydrocarbon Stained Sand
12	4		Light Brown Sand
13	193		Light Brown Sand & Rocks
14	212		Dark Brown Hydrocarbon Stained Sand & Rocks
15	252		Dark Brown Hydrocarbon Stained Sand & Rocks
16	255		Light Brown Hydrocarbon Stained Sand & Rocks
17	15		Light Brown Sand & Rocks
18	5		Light Brown Sand & Rocks

Data Colleted on 11/18/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-34
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2	1.5		Brown Sand
3	2.2		Light Brown Sand
4	2.5		Light Brown Sand
5	1.5		Light Brown Sand
6	2.3		Light Brown Sand
7	3.2		Light Brown Sand
8	2.3		Light Brown Sand
9	1.7		Light Brown Sand
10	16.7		Grey Hydrocarbon Stained Sand
11	195		Grey Hydrocarbon Stained Sand & Rocks
12	288		Grey Hydrocarbon Stained Sand & Rocks

Data Colleted on 11/18/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-35
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2			Brown Sand
3			Light Brown Sand
4			Light Brown Sand
5			Light Brown Sand
6			Light Brown Sand
7			Light Brown Sand
8			Light Brown Sand
9			Light Brown Sand
10			White Sand
11			White Sand
12			White Sand & Rocks

Data Colleted on 11/18/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Geoprobe Data GP-36
Former Bertha Barber Tank Battery

Depth (feet)	PID Readings VOC (ppm)	Sample Number	Geology
1			Brown Sand
2			Brown Sand
3			Brown Sand
4			Light Brown Sand
5			Light Brown Sand
6			Light Brown Sand
7			Light Brown Sand
8			Light Brown Sand
9			Light Brown Sand
10			Light Brown Sand
11			Light Brown Sand
12			White Sand
13			White Sand
14			White Sand
15			White Sand
16			White Sand
17			White Sand
18			White Sand

Data Colleted on 11/18/98
Data Colleted by M. P. Peacock and P. J. Reynolds
Soil Samples Collected by TEG, Inc.

Appendix B

Laboratory Analytical Results,
November 1998 Soil Sampling Event

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

PINNACLE LABORATORIES

Pinnacle Lab ID number **811075**
December 08, 1998

MARATHON OIL COMPANY
P O. BOX 552
MIDLAND. TX 79702-0552

Project Name BERTHA BARBER
Project Number (none)

Attention: PAUL PEACOCK

On 11/21/98 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.

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

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

MCR

DEC 10 1998

Environmental & Safe.

PINNACLE LABORATORIES

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

CLIENT	MARATHON OIL COMPANY	PINNACLE ID	811075
PROJECT #	(none)	DATE RECEIVED	11/21/98
PROJECT NAME	BERTHA BARBER	REPORT DATE	12/8/98

LAB ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	GP-27 @ 22 FEET	NON-AQ	11/18/98
02	GP-30 @ 17 FEET	NON-AQ	11/18/98
03	GP-9 @ 8 FEET	NON-AQ	11/16/98
04	GP-2 @ 9 FEET	NON-AQ	11/16/98
05	GP-2 @ 7 FEET	NON-AQ	11/16/98
06	GP-14 @ 15 FT	NON-AQ	11/17/98
07	GP-24-WATER	AQUEOUS	11/18/98
08	GP-6 @ 10 FT	NON-AQ	11/16/98
09	GP-9 @ 20 FT	NON-AQ	11/16/98
10	GP-24 @ 35 FT	NON-AQ	11/18/98
11	GP-24 @ 23 FT	NON-AQ	11/18/98
12	GP-16 @ 15 FT	NON-AQ	11/17/98
13	GP-5 @ 6 FT	NON-AQ	11/16/98
14	GP-1 @ 12 FT	NON-AQ	11/16/98
15	GP-23 @ 9 FT	NON-AQ	11/17/98
16	GP-18 @ 16 FT	NON-AQ	11/17/98
17	TRIP BLANK	AQUEOUS	11/10/98

PINNACLE LABORATORIES

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

GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED / 8015 GRO
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	GP-27 @ 22 FEET	NON-AQ	11/18/98	11/24/98	11/24/98	10
02	GP-30 @ 17 FEET	NON-AQ	11/18/98	11/24/98	11/24/98	20
03	GP-9 @ 8 FEET	NON-AQ	11/16/98	11/24/98	11/25/98	1

PARAMETER	DET. LIMIT	UNITS	01	02	03
FUEL HYDROCARBONS	5.0	**MG/KG**	**440**	**2000**	**92**
HYDROCARBON RANGE			C6-C14	C6-C14	C6-C14
HYDROCARBONS QUANTITATED USING			GASOLINE	GASOLINE	GASOLINE
BENZENE	0.025	**MG/KG**	< 0.25	**1.2**	**0.24**
TOLUENE	0.025	**MG/KG**	**0.43**	**9.8**	**0.13**
ETHYLBENZENE	0.025	**MG/KG**	**3.2**	**21**	**0.51**
TOTAL XYLENES	0.025	**MG/KG**	**6.7**	**55**	**1.5**
SURROGATE:					
BROMOFLUOROBENZENE (%)			160 *	540 *	102
SURROGATE LIMITS	(65 - 120)				
C6-C8			7.2	22.0	16.4
C8-C10			39.3	53.9	26.9
C10-C12			34.1	17.7	22.7
C12-C14			16.6	5.3	21.7
>C14			2.9	1.1	12.3
TOTAL %			100	100	100

CHEMIST NOTES:
*= HIGH SURROGATE RECOVERY DUE TO MATRIX EFFECT.

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED / 8015 GRO
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	GP-2 @ 9 FEET	NON-AQ	11/16/98	11/24/98	11/25/98	1
05	GP-2 @ 7 FEET	NON-AQ	11/16/98	11/24/98	11/25/98	10
06	GP-14 @ 15 FEET	NON-AQ	11/17/98	11/24/98	11/25/98	10

PARAMETER	DET. LIMIT	UNITS	04	05	06
FUEL HYDROCARBONS	5.0	**MG/KG**	< 5.0	**690**	**250**
HYDROCARBON RANGE			C6-C14	C6-C14	C6-C14
HYDROCARBONS QUANTITATED USING			GASOLINE	GASOLINE	GASOLINE
[illegible]ZENE	0.025	MG/KG	< 0.025	< 0.25	< 0.25
TOLUENE	0.025	**MG/KG**	< 0.025	**0.87**	**0.31**
ETHYLBENZENE	0.025	**MG/KG**	< 0.025	**2.0**	< 0.25
TOTAL XYLENES	0.025	**MG/KG**	< 0.025	**9.9**	**1.8**
SURROGATE.					
BROMOFLUOROBENZENE (%)			95	240 *	89
SURROGATE LIMITS	(65 - 120)				
C6-C8				28.9	5.8
C8-C10				40.9	19.6
C10-C12				14.7	30.3
C12-C14				8.2	30.3
>C14				7.2	14.0
TOTAL %				100	100

CHEMIST NOTES:
*= HIGH SURROGATE RECOVERY DUE TO MATRIX EFFECT.

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 / 8015 GRO
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
08	GP-6 @ 10 FT	NON-AQ	11/16/98	11/24/98	11/24/98	1
09	GP-9 @ 20 FT	NON-AQ	11/16/98	11/24/98	11/24/98	10
10	GP-24 @ 35 FT	NON-AQ	11/18/98	11/24/98	11/24/98	10

PARAMETER	DET. LIMIT	UNITS	08	09	10
FUEL HYDROCARBONS	5.0	**MG/KG**	< 5.0	**530**	**740**
HYDROCARBON RANGE			C6-C14	C6-C14	C6-C14
HYDROCARBONS QUANTITATED USING			GASOLINE	GASOLINE	GASOLINE
BENZENE	0.025	**MG/KG**	< 0.025	< 0.25	**0.26**
TOLUENE	0.025	**MG/KG**	< 0.025	**0.51**	**1.6**
ETHYLBENZENE	0.025	**MG/KG**	< 0.025	**0.84**	**1.9**
TOTAL XYLENES	0.025	**MG/KG**	< 0.025	**4.0**	**11**
SURROGATE:					
BROMOFLUOROBENZENE (%)			107	130 *	131 *
SURROGATE LIMITS	(65 - 120)				
C6-C8				4.1	18.4
C8-C10				23.0	36.8
C10-C12				29.0	25.0
C12-C14				30.9	16.5
>C14				13.1	3.5
TOTAL %				100	100

CHEMIST NOTES:
*= HIGH SURROGATE RECOVERY DUE TO MATRIX EFFECT.

PINNACLE LABORATORIES

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Phone (505) 344-3777
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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED / 8015 GRO
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
11	GP-24 @ 23 FT	NON-AQ	11/18/98	11/24/98	11/25/98	20
12	GP-16 @ 15 FT	NON-AQ	11/17/98	11/24/98	11/24/98	1
13	GP-5 @ 6 FT	NON-AQ	11/16/98	11/24/98	11/24/98	1

PARAMETER	DET. LIMIT	UNITS	11	12	13
FUEL HYDROCARBONS	5.0	**MG/KG**	**5200**	< 5.0	**9.0**
HYDROCARBON RANGE			C6-C14	C6-C14	C6-C14
HYDROCARBONS QUANTITATED USING			GASOLINE	GASOLINE	GASOLINE
BENZENE	0.025	**MG/KG**	**1.6**	< 0.025	**0.046**
TOLUENE	0.025	**MG/KG**	**17**	< 0.025	**0.067**
ETHYLBENZENE	0.025	**MG/KG**	**70**	**0.034**	**0.11**
TOTAL XYLENES	0.025	**MG/KG**	**130**	**0.060**	**0.29**
SURROGATE:					
BROMOFLUOROBENZENE (%)			1200 *	108	102
SURROGATE LIMITS	(65 - 120)				
C6-C8			23.3		12.2
C8-C10			45.4		50.5
C10-C12			22.1		24.0
C12-C14			7.5		10.3
>C14			1.7		3.1
TOTAL %			100		100

CHEMIST NOTES:
*= HIGH SURROGATE RECOVERY DUE TO MATRIX EFFECT.

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED / 8015 GRO
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
14	GP-1 @ 12 FT	NON-AQ	11/16/98	11/24/98	11/24/98	1
15	GP-23 @ 9 FT	NON-AQ	11/17/98	11/24/98	11/25/98	1
16	GP-18 @16 FT	NON-AQ	11/17/98	11/24/98	12/1/98	20

PARAMETER	DET. LIMIT	UNITS	14	15	16
FUEL HYDROCARBONS	5.0	**MG/KG**	**6.5**	**270**	**710**
HYDROCARBON RANGE			C6-C14	C6-C14	C6-C14
HYDROCARBONS QUANTITATED USING			GASOLINE	GASOLINE	GASOLINE
BENZENE	0.025	**MG/KG**	< 0.025	< 0.025	< 0.5
TOLUENE	0.025	**MG/KG**	< 0.025	**0.12**	< 0.5
ETHYLBENZENE	0.025	**MG/KG**	< 0.025	**0.40**	**0.5**
TOTAL XYLENES	0.025	**MG/KG**	**0.083**	**1.1**	**4.9**
SURROGATE.					
BROMOFLUOROBENZENE (%)			96	107	160 *
SURROGATE LIMITS	(65 - 120)				
C6-C8			17.4	2.1	4.94
C8-C10			57.0	14.5	26.8
C10-C12			14.5	39.9	32.2
C12-C14			7.7	36.1	28.1
>C14			3.5	7.4	8.0
TOTAL %			100	100	100

CHEMIST NOTES:
*= HIGH SURROGATE RECOVERY DUE TO MATRIX EFFECT.

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 / 8015 GRO
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
07	GP-24-WATER	AQUEOUS	11/18/98	NA	11/24/98	10
17	GP-23 @ 9 FT	AQUEOUS	11/17/98	NA	11/25/98	1

PARAMETER	DET. LIMIT	UNITS	07	17
FUEL HYDROCARBONS	50	**UG/L**	**6000**	< 50
HYDROCARBON RANGE			C6-C14	C6-C14
HYDROCARBONS QUANTITATED USING			GASOLINE	GASOLINE
BENZENE	0.5	**UG/L**	**77**	< 0.5
TOLUENE	0.5	**UG/L**	**78**	< 0.5
ETHYLBENZENE	0.5	**UG/L**	**61**	< 0.5
TOTAL XYLENES	0.5	**UG/L**	**90**	< 0.5
SURROGATE:				
BROMOFLUOROBENZENE (%)			108	118
SURROGATE LIMITS	(65 - 120)			
C6-C8			46.3	
C8-C10			27.3	
C10-C12			12.0	
C12-C14			11.5	
>C14			2.9	
TOTAL %			100	

CHEMIST NOTES:
N/A

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Albuquerque, New Mexico 87107
Phone (505) 344-3777
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PINNACLE LABORATORIES

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	EPA 8021 MODIFIED / 8015 GRO		
BLANK I.D.	112498	PINNACLE I.D.	811075
CLIENT	MARATHON OIL COMPANY	DATE EXTRACTED	NA
PROJECT #	(none)	DATE ANALYZED	11/24/98
PROJECT NAME	BERTHA BARBER	SAMPLE MATRIX	AQUEOUS

PARAMETER	UNITS	
FUEL HYDROCARBONS	UG/L	<50
HYDROCARBON RANGE	C6-C14	-
HYDROCARBONS QUANTITATED USING	GASOLINE	-
BENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
ETHYLBENZENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5
SURROGATE.		
BROMOFLUOROBENZENE (%)		110
SURROGATE LIMITS	(80 - 120)	

CHEMIST NOTES.
N/A

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
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Phone (505) 344-3777
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GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: EPA 8021 MODIFIED / 8015 GRO		
MSMSD #	: 811083-04	PINNACLE I.D.	: 811075
CLIENT	: MARATHON OIL COMPANY	DATE EXRACTED	: NA
PROJECT #	: (none)	DATE ANALYZED	: 11/25/98
PROJECT NAME	: BERTHA BARBER	SAMPLE MATRIX	: AQUEOUS
		UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	**1.2**	10.0	9.2	80	9.5	95	3	(80 - 120)	20
TOLUENE	**0.7**	10.0	9.3	86	9.5	95	2	(80 - 120)	20
ETHYLBENZENE	**0.7**	10.0	9.4	87	10.3	103	9	(70 - 133)	20
TOTAL XYLENES	**1.3**	30.0	26.5	84	30.5	102	14	(80 - 120)	20
M[illegible]L-t-BUTYL ETHER	**40**	20.0	55	75	59	295	7	(70 - 133)	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 : MARATHON OIL COMPANY PINNACLE I.D.: 811075
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	GP-27 @ 22 FEET	NON-AQ	11/18/98	11/25/98	11/26/98	1
02	GP-30 @ 17 FEET	NON-AQ	11/18/98	11/25/98	11/26/98	10
03	GP-9 @ 8 FEET	NON-AQ	11/16/98	11/25/98	11/26/98	10

PARAMETER	DET. LIMIT	UNITS	01	02	03
FUEL HYDROCARBONS, C6-C10	10	**MG/KG**	**530**	**5000**	**160**
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	**980**	**3700**	**4700**
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	**290**	**1300**	**3600**
CALCULATED SUM:			**1800**	**10000**	**8460**
SURROGATE:					
O-TERPHENYL (%)			98	110	136
SURROGATE LIMITS	(66 - 151)				

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY PINNACLE I.D.: 811075
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	GP-2 @ 9 FEET	NON-AQ	11/16/98	11/25/98	11/26/98	1
05	GP-2 @ 7 FEET	NON-AQ	11/16/98	11/25/98	11/26/98	50
06	GP-14 @ 15 FT	NON-AQ	11/17/98	11/25/98	11/26/98	10

PARAMETER	DET. LIMIT	UNITS	04	05	06
FUEL HYDROCARBONS, C6-C10	10	MG/KG	< 10	**2000**	**320**
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	**31**	**21000**	**2300**
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	**19**	**15000**	**1100**
CULATED SUM:			**50**	**38000**	**3720**
SURROGATE:					
O-TERPHENYL (%)			88	N/A *	104
SURROGATE LIMITS	(66 - 151)				

CHEMIST NOTES:
* - SURROGATE RECOVERY NOT OBTAINABLE, DUE TO NECESSARY SAMPLE DILUTON.

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY PINNACLE I.D.: 811075
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
08	GP-6 @ 10 FT	NON-AQ	11/16/98	11/25/98	11/26/98	1
09	GP-9 @ 20 FT	NON-AQ	11/16/98	11/30/98	12/1/98	5
10	GP-24 @ 35 FT	NON-AQ	11/18/98	11/25/98	11/27/98	10

PARAMETER	DET. LIMIT	UNITS	08	09	10
FUEL HYDROCARBONS, C6-C10	10	**MG/KG**	< 10	**530**	**1200**
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	**14**	**4900**	**2500**
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	**9.2**	**2300**	**930**
CULATED SUM:			**23.2**	**7730**	**4630**
SURROGATE:					
O-TERPHENYL (%)			94	126	99
SURROGATE LIMITS	(66 - 151)				

CHEMIST NOTES.
N/A

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY PINNACLE I.D.: 811075
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
11	GP-24 @ 23 FT	NON-AQ	11/18/98	11/25/98	11/27/98	50
12	GP-16 @ 15 FT	NON-AQ	11/17/98	11/25/98	11/26/98	1
13	GP-5 @ 6 FT	NON-AQ	11/16/98	11/25/98	11/26/98	1

PARAMETER	DET. LIMIT	UNITS	11	12	13
FUEL HYDROCARBONS, C6-C10	10	**MG/KG**	**8800**	< 10	< 10
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	**12000**	< 5.0	< 5.0
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	**3600**	< 5.0	< 5.0
CULATED SUM:			**24400**		
SURROGATE:					
O-TERPHENYL (%)			N/A *	95	94
SURROGATE LIMITS	(66 - 151)				

CHEMIST NOTES:
* - SURROGATE RECOVERY NOT OBTAINABLE, DUE TO NECESSARY SAMPLE DILUTON.

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY PINNACLE I.D.: 811075
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
14	GP-1 @ 12 FT	NON-AQ	11/16/98	11/30/98	11/30/98	1
15	GP-23 @ 9 FT	NON-AQ	11/17/98	11/25/98	11/27/98	10
16	GP-18 @ 16 FT	NON-AQ	11/17/98	11/25/98	11/27/98	10

PARAMETER	DET. LIMIT	UNITS	14	15	16
FUEL HYDROCARBONS, C6-C10	10	**MG/KG**	< 10	< 100	**380**
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	< 5.0	**1100**	**4600**
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	< 5.0	**420**	**2100**
CALCULATED SUM:				**1520**	**7080**
SURROGATE:					
O-TERPHENYL (%)			81	89	**125**
SURROGATE LIMITS	(66 - 151)				

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8015 MODIFIED (DIRECT INJECT)		
BLANK I.D.	: 112598	PINNACLE I.D.	: 811075
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: 11/25/98
PROJECT #	: (none)	DATE ANALYZED	: 11/25/98
PROJECT NAME	: BERTHA BARBER	SAMPLE MATRIX	: NON-AQ

PARAMETER	UNITS	
FUEL HYDROCARBONS, C6-C10	MG/KG	< 10
FUEL HYDROCARBONS, C10-C22	MG/KG	< 5.0
FUEL HYDROCARBONS, C22-C36	MG/KG	< 5.0
SURROGATE:		
[redacted]RPHENYL (%)		91
S[redacted]ROGATE LIMITS	(80 - 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.	: 113098	PINNACLE I.D.	: 811075
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: 11/30/98
PROJECT #	: (none)	DATE ANALYZED	: 11/30/98
PROJECT NAME	: BERTHA BARBER	SAMPLE MATRIX	: NON-AQ

PARAMETER	UNITS	
FUEL HYDROCARBONS, C6-C10	MG/KG	< 10
FUEL HYDROCARBONS, C10-C22	MG/KG	< 5.0
FUEL HYDROCARBONS, C22-C36	MG/KG	< 5.0
SURROGATE:		
[illegible]ERPHENYL (%)		84
[illegible]RROGATE LIMITS	(80 - 151)	

CHEMIST NOTES:
N/A

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GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: EPA 8015 MODIFIED (DIRECT INJECT)		
MSMSD #	: 811075-12	PINNACLE I.D.	: 811075
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: 11/25/98
PROJECT #	: (none)	DATE ANALYZED	: 11/26/98
PROJECT NAME	: BERTHA BARBER	SAMPLE MATRIX	: NON-AQ
		UNITS	: MG/KG

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
FUEL HYDROCARBONS	<5.0	100	133	133	131	131	2	(56 - 148)	20

CHEMIST NOTES:
N/

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

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

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PINNACLE I.D.: 811075
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	GP-27 @ 22 FEET	NON-AQ	11/18/98	11/25/98	11/26/98	1

PARAMETER	01			
	% AREA		NORMALIZED	
C7-C8	2.8	7.0	5.8	G
C8-C10	10.6	26.5	22.1	G
[illegible]C12	13.5	13.5	11.3	D
C12-C14	13.8	13.8	11.5	D
C14-C16	11.9	11.9	9.9	D
C16-C18	11.2	11.2	9.3	D
C18-C20	9.0	9.0	7.5	D
C20-C22	7.6	7.6	6.3	D
C22-C24	5.6	5.6	4.7	D
C24-C26	4.5	4.5	3.8	D
C26-C28	3.6	3.6	3.0	D
C28-C30	2.6	2.6	2.2	D
C30-C32	1.6	1.6	1.3	D
C32-C34	1.0	1.0	0.8	D
C34-C36	0.5	0.5	0.4	D
C36+	0.1	0.1	0.1	D
TOTAL	99.9	120	100.0	

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY PINNACLE I.D.: 811075
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
02	GP-30 @ 17 FEET	NON-AQ	11/18/98	11/25/98	11/26/98	10

PARAMETER	02			
	% AREA		NORMALIZED	
C7-C8	11.7	29.3	20.5	G
C8-C10	16.5	41.3	29.0	G
C10-C12	10.8	10.8	7.6	D
C12-C14	9.9	9.9	7.0	D
C14-C16	9.3	9.3	6.5	D
C16-C18	8.4	8.4	5.9	D
C18-C20	7.4	7.4	5.2	D
C20-C22	6.5	6.5	4.6	D
C22-C24	5.0	5.0	3.5	D
C24-C26	4.4	4.4	3.1	D
C26-C28	3.4	3.4	2.4	D
C28-C30	2.5	2.5	1.8	D
C30-C32	2.1	2.1	1.5	D
C32-C34	1.3	1.3	0.9	D
C34-C36	0.8	0.8	0.6	D
C36+	0.1	0.1	0.1	D
TOTAL	100.1	142.4	100.0	

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	GP-2 @ 9 FEET	NON-AQ	11/16/98	11/25/98	11/26/98	1

PARAMETER	04			
	% AREA		NORMALIZED	
C7-C8				G
C8-C10				G
C[redacted]12	3.2	3.2	3.6	D
C[redacted]14	6.9	13.3	15.1	D
C14-C16	11.1	13.7	15.6	D
C16-C18	14.6	12.9	14.7	D
C18-C20	23.6	10.0	11.3	D
C20-C22	12.7	16.7	19.0	D
C22-C24	9.1	5.7	6.5	D
C24-C26	8.5	8.2	9.3	D
C26-C28	5.9	2.7	3.0	D
C28-C30	4.4	1.6	1.8	D
C30-C32				D
C32-C34				D
C34-C36				D
C36+				D
TOTAL	100.0	88.0	100.0	

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE I.D. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
03	GP-9 @ 8 FEET	NON-AQ	11/16/98	11/25/98	11/26/98	10

PARAMETER	03			
	% AREA		NORMALIZED	
C7-C8	0.5	1.3	1.2	G
C8-C10	0.5	1.3	1.2	G
C[redacted]12	1.2	1.2	1.2	D
C12-C14	3.6	3.6	3.5	D
C14-C16	8.9	8.9	8.8	D
C16-C18	14.7	14.7	14.5	D
C18-C20	15.3	15.3	15.1	D
C20-C22	12.3	12.3	12.1	D
C22-C24	10.6	10.6	10.4	D
C24-C26	9.5	9.5	9.4	D
C26-C28	8.2	8.2	8.1	D
C28-C30	5.8	5.8	5.7	D
C30-C32	4.4	4.4	4.3	D
C32-C34	2.8	2.8	2.8	D
C34-C36	1.5	1.5	1.5	D
C36+	0.3	0.3	0.3	D
TOTAL	100.1	101.6	100.0	

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
05	GP-2 @ 7 FEET	NON-AQ	11/16/98	11/25/98	11/26/98	50

PARAMETER	05			
	% AREA	NORMALIZED		
C7-C8	0.9	2.3	2.2	G
C8-C10	1.3	3.3	3.2	G
[illegible]C12	1.2	1.2	1.2	D
[illegible]C14	3.4	3.4	3.3	D
C14-C16	8.9	8.9	8.6	D
C16-C18	15.7	15.7	15.3	D
C18-C20	16.3	16.3	15.8	D
C20-C22	13.8	13.8	13.4	D
C22-C24	11.1	11.1	10.8	D
C24-C26	9.2	9.2	8.9	D
C26-C28	7.5	7.5	7.3	D
C28-C30	5.1	5.1	5.0	D
C30-C32	3.4	3.4	3.3	D
C32-C34	1.8	1.8	1.7	D
C34-C36				D
C36+				D
TOTAL	99.6	102.9	100.0	

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
06	GP-14 @ 15 FT	NON-AQ	11/17/98	11/25/98	11/26/98	10

PARAMETER	06			
	% AREA	NORMALIZED		
C7-C8	2.7	6.8	6.2	G
C8-C10	2.9	7.3	6.7	G
C[redacted]12	5.8	5.8	5.4	D
C[redacted]14	10.8	10.8	10.0	D
C14-C16	12.5	12.5	11.6	D
C16-C18	13.1	13.1	12.1	D
C18-C20	11.9	11.9	11.0	D
C20-C22	9.8	9.8	9.1	D
C22-C24	7.2	7.2	6.7	D
C24-C26	7.8	7.8	7.2	D
C26-C28	5.2	5.2	4.8	D
C28-C30	4.5	4.5	4.2	D
C30-C32	3.2	3.2	3.0	D
C32-C34	1.8	1.8	1.7	D
C34-C36	0.5	0.5	0.5	D
C36+				D
TOTAL	99.7	108.1	100.0	

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
08	GP-6 @ 10 FT	NON-AQ	11/16/98	11/25/98	11/26/98	1

PARAMETER	08			
	% AREA	NORMALIZED		
C7-C8	1.0	2.5	2.4	G
C8-C10	2.1	5.3	5.0	G
C10-C12	6.9	6.9	6.6	D
C12-C14	11.7	11.7	11.2	D
C14-C16	13.3	13.3	12.7	D
C16-C18	12.4	12.4	11.9	D
C18-C20	11.7	11.7	11.2	D
C20-C22	9.4	9.4	9.0	D
C22-C24	8.0	8.0	7.7	D
C24-C26	7.0	7.0	6.7	D
C26-C28	5.1	5.1	4.9	D
C28-C30	4.4	4.4	4.2	D
C30-C32	3.3	3.3	3.2	D
C32-C34	2.1	2.1	2.0	D
C34-C36	1.2	1.2	1.1	D
C36+	0.3	0.3	0.3	D
TOTAL	99.9	104.6	100.0	

PINNACLE LABORATORIES

3709-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 : MARATHON OIL COMPANY PINNACLE I.D.: 811075
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

SAMPLE D. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
09	GP-9 @ 20 FT	NON-AQ	11/16/98	11/30/98	12/1/98	5

PARAMETER	09			
	% AREA	NORMALIZED		
C7-C8	0.9	2.3	2.2	G
C8-C10	2.0	5.0	4.8	G
C10-C12	5.7	5.7	5.5	D
C12-C14	11.9	11.9	11.4	D
C14-C16	13.0	13.0	12.5	D
C16-C18	14.4	14.4	13.8	D
C18-C20	10.1	10.1	9.7	D
C20-C22	10.5	10.5	10.1	D
C22-C24	7.2	7.2	6.9	D
C24-C26	7.8	7.8	7.5	D
C26-C28	5.6	5.6	5.4	D
C28-C30	4.3	4.3	4.1	D
C30-C32	2.9	2.9	2.8	D
C32-C34	2.0	2.0	1.9	D
C34-C36	1.2	1.2	1.1	D
C36+	0.5	0.5	0.5	D
TOTAL	100.0	104.4	100.0	

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PINNACLE LABORATORIES

GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	GP-24 @ 35 FT	NON-AQ	11/18/98	11/25/98	11/27/98	10

PARAMETER	10			
	% AREA		NORMALIZED	
C7-C8	4.5	11.3	9.5	G
C8-C10	7.8	19.5	16.5	G
C10-C12	10.1	10.1	8.5	D
C12-C14	13.5	13.5	11.4	D
C14-C16	12.4	12.4	10.5	D
C16-C18	11.4	11.4	9.6	D
C18-C20	9.7	9.7	8.2	D
C20-C22	7.8	7.8	6.6	D
C22-C24	6.2	6.2	5.2	D
C24-C26	5.4	5.4	4.6	D
C26-C28	4.2	4.2	3.5	D
C28-C30	3.0	3.0	2.5	D
C30-C32	2.2	2.2	1.9	D
C32-C34	1.3	1.3	1.1	D
C34-C36	0.5	0.5	0.4	D
C36+				D
TOTAL	100.0	118.5	100.0	

PINNACLE LABORATORIES

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

GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
11	GP-24 @ 23 FT	NON-AQ	11/18/98	11/25/98	11/27/98	50

PARAMETER	11			
	% AREA		NORMALIZED	
C7-C8	7.8	19.5	14.9	G
C8-C10	12.6	31.5	24.1	G
C10-C12	12.4	12.4	9.5	D
C12-C14	12.2	12.2	9.3	D
C14-C16	10.7	10.7	8.2	D
C16-C18	10.5	10.5	8.0	D
C18-C20	8.3	8.3	6.4	D
C20-C22	7.1	7.1	5.4	D
C22-C24	4.8	4.8	3.7	D
C24-C26	5.0	5.0	3.8	D
C26-C28	3.2	3.2	2.5	D
C28-C30	2.6	2.6	2.0	D
C30-C32	1.5	1.5	1.1	D
C32-C34	0.9	0.9	0.7	D
C34-C36	0.3	0.3	0.2	D
C36+				D
TOTAL	99.9	130.5	100.0	

PINNACLE LABORATORIES

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

GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
12	GP-16 @ 15 FT	NON-AQ	11/17/98	11/25/98	11/26/98	1

PARAMETER	12		
	% AREA	NORMALIZED	
C7-C8	N/A	N/A	G
C8-C10	N/A	N/A	G
C[illegible]12	N/A	N/A	D
C[illegible]14	N/A	N/A	D
C14-C16	N/A	N/A	D
C16-C18	N/A	N/A	D
C18-C20	N/A	N/A	D
C20-C22	N/A	N/A	D
C22-C24	N/A	N/A	D
C24-C26	N/A	N/A	D
C26-C28	N/A	N/A	D
C28-C30	N/A	N/A	D
C30-C32	N/A	N/A	D
C32-C34	N/A	N/A	D
C34-C36	N/A	N/A	D
C36+	N/A	N/A	D
TOTAL			

PINNACLE LABORATORIES

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Phone (505) 344-3777
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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
13	GP-5 @ 6 FT	NON-AQ	11/16/98	11/25/98	11/26/98	1

PARAMETER	13		
	% AREA	NORMALIZED	
C7-C8	N/A	N/A	G
C8-C10	N/A	N/A	G
C10-C12	N/A	N/A	D
C12-C14	N/A	N/A	D
C14-C16	N/A	N/A	D
C16-C18	N/A	N/A	D
C18-C20	N/A	N/A	D
C20-C22	N/A	N/A	D
C22-C24	N/A	N/A	D
C24-C26	N/A	N/A	D
C26-C28	N/A	N/A	D
C28-C30	N/A	N/A	D
C30-C32	N/A	N/A	D
C32-C34	N/A	N/A	D
C34-C36	N/A	N/A	D
C36+	N/A	N/A	D
TOTAL			

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PINNACLE LABORATORIES

GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
14	GP-1 @ 12 FT	NON-AQ	11/16/98	11/30/98	11/30/98	1

PARAMETER	14		
	% AREA	NORMALIZED	
C7-C8	N/A	N/A	G
C8-C10	N/A	N/A	G
C[illegible]12	N/A	N/A	D
C12-C14	N/A	N/A	D
C14-C16	N/A	N/A	D
C16-C18	N/A	N/A	D
C18-C20	N/A	N/A	D
C20-C22	N/A	N/A	D
C22-C24	N/A	N/A	D
C24-C26	N/A	N/A	D
C26-C28	N/A	N/A	D
C28-C30	N/A	N/A	D
C30-C32	N/A	N/A	D
C32-C34	N/A	N/A	D
C34-C36	N/A	N/A	D
C36+	N/A	N/A	D
TOTAL			

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
15	GP-23 @ 9 FT	NON-AQ	11/17/98	11/25/98	11/27/98	10

PARAMETER	15			
	% AREA	NORMALIZED		
C7-C8				G
C8-C10				G
C10-C12	6.4	6.4	6.4	D
C12-C14	12.1	12.1	12.1	D
C14-C16	13.8	13.8	13.8	D
C16-C18	13.8	13.8	13.8	D
C18-C20	12.1	12.1	12.1	D
C20-C22	10.5	10.5	10.5	D
C22-C24	8.0	8.0	8.0	D
C24-C26	6.9	6.9	6.9	D
C26-C28	6.0	6.0	6.0	D
C28-C30	3.7	3.7	3.7	D
C30-C32	3.2	3.2	3.2	D
C32-C34	2.0	2.0	2.0	D
C34-C36	1.2	1.2	1.2	D
C36+				D
TOTAL	99.7	99.7	100.0	

PINNACLE LABORATORIES

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GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 811075

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
16	GP-18 @ 16 FT	NON-AQ	11/17/98	11/25/98	11/27/98	10

PARAMETER	16			
	% AREA	NORMALIZED		
C7-C8	1.0	2.5	2.4	G
C8-C10	2.1	5.3	5.0	G
C10-C12	6.9	6.9	6.6	D
C12-C14	11.7	11.7	11.2	D
C14-C16	13.3	13.3	12.7	D
C16-C18	12.4	12.4	11.9	D
C18-C20	11.7	11.7	11.2	D
C20-C22	9.4	9.4	9.0	D
C22-C24	8.0	8.0	7.7	D
C24-C26	7.0	7.0	6.7	D
C26-C28	5.1	5.1	4.9	D
C28-C30	4.4	4.4	4.2	D
C30-C32	3.3	3.3	3.2	D
C32-C34	2.1	2.1	2.0	D
C34-C36	1.2	1.2	1.1	D
C36+	0.3	0.3	0.3	D
TOTAL	99.9	104.6	100.0	

Environmental Services Laboratory, Inc. E S L

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

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 12/01/1998
ESL Account No.: 90147
ESL Job Number: 98.02265

Project: 811075 / MOC
Location: Bertha Barber

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Sample Number	Sample Description	Matrix Type	Date Taken	Date Received
107430	811075-01	SOIL	11/18/1998	11/24/1998
107431	811075-02	SOIL	11/18/1998	11/24/1998
107432	811075-03	SOIL	11/18/1998	11/24/1998
107433	811075-04	SOIL	11/18/1998	11/24/1998
107434	811075-05	SOIL	11/18/1998	11/24/1998
107435	811075-06	SOIL	11/17/1998	11/24/1998
107436	811075-08	SOIL	11/18/1998	11/24/1998
107437	811075-09	SOIL	11/18/1998	11/24/1998
107438	811075-10	SOIL	11/18/1998	11/24/1998
107439	811075-11	SOIL	11/18/1998	11/24/1998
107440	811075-12	SOIL	11/17/1998	11/24/1998
107441	811075-13	SOIL	11/18/1998	11/24/1998
107442	811075-14	SOIL	11/18/1998	11/24/1998
107443	811075-15	SOIL	11/17/1998	11/24/1998
107444	811075-16	SOIL	11/17/1998	11/24/1998

Approved by:

Andi Hoevet
Project Manager
ESL, INC.

Technical Review
ESL, INC.

ANALYTICAL SERVICES FOR THE ENVIRONMENT

ANALYTICAL REPORT

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

12/01/1998
Job No.: 98.02265

Project Name: 811075 / MOC
Date Received: 11/24/1998

Sample Number: 107430 — Sample Description: 811075-01

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	96	2.5	mg/Kg	12/01/1998	DIL

Sample Number: 107431 — Sample Description: 811075-02

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	ND	25	mg/Kg	12/01/1998	DIL

Sample Number: 107432 — Sample Description: 811075-03

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	15	10	mg/Kg	12/01/1998	DIL

Sample Number: 107433 — Sample Description: 811075-04

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	51	2	mg/Kg	12/01/1998	DIL

Sample Number: 107434 — Sample Description: 811075-05

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	ND	10	mg/Kg	12/01/1998	DIL

Sample Number: 107435 — Sample Description: 811075-06

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	ND	10	mg/Kg	12/01/1998	DIL

A sample result of ND indicates the parameter was Not Detected at the reporting limit.
mg = ppm ug = ppb su = standard units

ANALYTICAL REPORT

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

12/01/1998
Job No.: 98.02265

Project Name: 811075 / MOC
Date Received: 11/24/1998

Sample Number	Sample Description
107436	811075-08

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	73	2.5	mg/Kg	12/01/1998	DIL

Sample Number	Sample Description
107437	811075-09

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	130	50	mg/Kg	12/01/1998	DIL

Sample Number	Sample Description
107438	811075-10

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	33	5	mg/Kg	12/01/1998	DIL

Sample Number	Sample Description
107439	811075-11

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	30	5	mg/Kg	12/01/1998	DIL

Sample Number	Sample Description
107440	811075-12

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	60	10	mg/Kg	12/01/1998	DIL

Sample Number	Sample Description
107441	811075-13

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	ND	10	mg/Kg	12/01/1998	DIL

A sample result of ND indicates the parameter was Not Detected at the reporting limit.
mg = ppm ug = ppb su = standard units

ANALYTICAL REPORT

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

12/01/1998
Job No.: 98.02265

Project Name: 811075 / MOC
Date Received: 11/24/1998

Sample Number 107442 — Sample Description 811075-14

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	25	10	mg/Kg	12/01/1998	DIL

Sample Number 107443 — Sample Description 811075-15

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	25	10	mg/Kg	12/01/1998	DIL

Sample Number 107444 — Sample Description 811075-16

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Chloride	325.3	200	5	mg/Kg	12/01/1998	DIL

A sample result of ND indicates the parameter was Not Detected at the reporting limit.
mg = ppm ug = ppb su = standard units

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 12/01/1998

Job Number: 98.02265

Contact: Kim McNeill
Project: 811075 / MOC

Analyte	CCV True Concentration	Concentration Found	Percent Recovery	Date Analyzed
Chloride	10.0	10.0	100.0	12/01/1998

CCV - Continuing Calibration Verification

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 12/01/1998

Job Number: 98.02265

Contact: Kim McNeill
Project: 811075 / MOC

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD	Flags
Chloride	525	ND	500	mg/Kg	105.0	525	500	mg/Kg	105.0	0.0	DIL

QC Sample:

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

QUALITY CONTROL REPORT
BLANKS

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 12/01/1998

Job Number: 98.02265

Contact: Kim McNeill
Project: 811075 / MOC
Location: Bertha Barber

Analyte	Blank Analysis	Report Limit	Units	Date Analyzed
Chloride	ND	10	mg/Kg	12/01/1998

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

QUALITY CONTROL REPORT
DUPLICATES

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 12/01/1998

Job Number: 98.02265

Contact: Kim McNeill
Project: 811075 / MOC

Analyte	Original Analysis	Duplicate Analysis	Units	RPD	Date Analyzed	Flag
Chloride	ND	ND	mg/Kg		12/01/1998	DIL

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

FLAG GLOSSARY

A	This sample does not have a typical gasoline pattern.
B1	This sample does not have a typical diesel pattern.
B	Analyte found in the associated blank as well as the sample.
C	The sample contains a lighter hydrocarbon than gasoline.
CN	See case narrative
CS	Outside control limits or unusual matrix; see case narrative.
D	The sample extends to a heavier hydrocarbon range than gasoline.
d	Results on a dry weight basis
DIL	Result was calculated from dilution.
E	The sample extends to a lighter hydrocarbon range than diesel.
F	The sample extends to a heavier hydrocarbon range than diesel.
G	The positive result for gasoline is due to single component contamination.
H	The sample extends to a lighter hydrocarbon range than oil.
I	The oil pattern for this sample is not typical.
J	The result for this compound is an estimated concentration.
L	The LCS recovery exceeded control limits. See the LCS page of this report.
LM	The LCS recovery exeeded control limits; the MS/MSD were in control validating the batch.
M	MS and/or MSD percent recovery exceeds control limits.
MD	Unable to calculate MS/MSD recovery due to high amount of analyte; greater than 4 times spike level.
MR	The MS/MSD RPD is greater than method critera. The sample was re-extracted and re-analyzed with similar results indicating a non-homogeneous sample.
MV	The Matrix Spike exceeded control limits; LCS was in control validating the batch.
MI	Outside control limits due to matrix interference.
N	Manual integration performed on sample for quantification.
N/A	Not Applicable.
NC	Not calcuable.
ND	Not Analyzed.
P	A post digestion spike was analyzed, and recoveries were within control limits.
Q	Detection limits elevated due to sample matrix
QJ	Detection limits elevated due to high levels of non-target compounds. Sample was run at a dilution.
R	The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample.
RI	The duplicate RPD was greater than 20%. Visual inspection showed the sample to be non-homogeneous.
RD	RPD not applicable for results less than five times the reporting limit.
RH	The Relative Percent Difference (RPD) between two columns was greater than 40%, the higher result was reported.
RL	The Relative Percent Difference (RPD) between two columns was greater than 40%, the lower result was reported due to obvious interference with the higher result.
RP	MS/MSD RPD is greater than 20%
SR	Surrogate recovery outside control limits. See the surrogate page of the report.
SD	Unable to quantitate surrogate due to sample dilution.
SC	Sample not provided to laboratory in proper sampling container.
V	Volatile analysis was requested, sample container received with headspace.
X1	The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.
X	Sample was analyzed outside recommended holding times.
Y	The result for this parameter was greater than the TCLP regulatory limit.
Z	The pattern seen for the parameter being analyzed is not typical.

Pinnacle Laboratories, Inc.

Interlab Chain of Custody

Date: 11/23 Page: 1 of 2

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
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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		TOX	TOC	Gen Chemistry: Chloride		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
811075-01	11/18	1200	NAQ									X																
-02	↓	1000										X																
-03	11/16	1330										X																
-04		0924										X																
-05	↓	0914										X																
-06	11/17	0820										X																
-08	11/16	1110										X																
-04	↓	1353										X																
-10	11/18	1400										X																
-11	↓	1230	↓									X																

PROJECT INFORMATION

PROJECT # 811075
PROJ. NAME: MOC
QC LEVEL: (STD) IV
QC REQUIRED: MS MSD BLANK
TAT: (STANDARD) RUSH!!

SAMPLE RECEIPT

Total Number of Containers
Chain of Custody Seals
Received Intact?
Received Good Cond /Cold
LAB NUMBER: 98 22265

SAMPLES SENT TO

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

RELINQUISHED BY: 1.

Signature: Francine Tonio Time: 1700
Printed Name: Francine Tonio Date: 11/23/98
Pinnacle Laboratories, Inc.

RECEIVED BY: 1.

Signature: [illegible] Time: 1000
Printed Name: [illegible] Date: 11/24/98
Company

RELINQUISHED BY: 2.

Signature Time
Printed Name Date
Company

RECEIVED BY: 2

Signature Time
Printed Name Date
Company

DUE DATE: 12/4
RUSH SURCHARGE: —
CLIENT DISCOUNT: —
SPECIAL CERTIFICATION REQUIRED: YES (NO)

COMMENTS: Please watch Hold Times!

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 11/23 Page: 2 of 2

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		TOX	TOC	Gen Chemistry : Chloride		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
811075-12	11/17	0925	NAQ									X																
-13	11/16	1035										X																
-14	↓	0925										X																
-15	11/17	1310										X																
-16	↓	1108	↓									X																

PROJECT INFORMATION

PROJECT # 811075
PROJ. NAME: MCC
QC LEVEL: (STD) IV
QC REQUIRED: MS MSD BLANK
TAT: (STANDARD) RUSH!!

SAMPLE RECEIPT

Total Number of Containers
Chain of Custody Seals
Received Intact?
Received Good Cond./Cold
LAB NUMBER: 98.02265

SAMPLES SENT TO

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

RELINQUISHED BY: 1.

Signature Time: Francine Trivio 1700
Printed Name Date: Francine Trivio 11/23/98
Pinnacle Laboratories, Inc

RECEIVED BY: 1.

Signature Time: 1000
Printed Name Date: 11/24/98
Company

RELINQUISHED BY: 2

Signature Time
Printed Name Date
Company

RECEIVED BY: 2

Signature Time
Printed Name Date
Company

DUE DATE: 12/4
RUSH SURCHARGE: —
CLIENT DISCOUNT: —
SPECIAL CERTIFICATION REQUIRED: YES (NO)

COMMENTS: Please watch Hold Times!

American Environmental Network (NM), Inc.

CHAIN OF CUSTODY

DATE 11/20/98 PAGE 1 OF 3

AEN(NM) Accession #: 811075

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER:

COMPANY: Marathon Oil Company
ADDRESS: P.O. Box 552
Midland, TX 79702
PHONE: 915/687-8378
FAX: 915/687-8305
BILL TO: Same As Above
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	(M8015) Gas/Purge & Trap	8021 (BTEX)/8015 (Gasoline)	8021 (BTEX) = MTBE = TMB = PCE	8021 (TCL)	8021 (EDX)	8021 (HALO)	8021 (CUST)	504.1 EDB = DBCP =	Chloride	8260 (TCL) Volatile Organics	8260 (Full) Volatile Organics	8260 (CUST) Volatile Organics	8260 (Landfill) Volatile Organics	Pesticides /PCB (608/8081)	Herbicides (615/8151)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Polynuclear Aromatics (610/8310)	General Chemistry:			Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:		NUMBER OF CONTAINERS
GP-27 @ 22 feet	11/18/98	12:00pm	Soil	-01		X	X	X							X																	2
GP-27 @ 22 feet (Dplct)	11/18/98	12:00pm	Soil	-01		X	X	X							X																	
GP-30 @ 17 feet	11/18/98	10:00am	Soil	-02		X	X	X							X																	2
GP-30 @ 17 feet (Dplct)	11/18/98	10:00am	Soil	-02		X	X	X							X																	
GP-9 @ 8 feet	11/16/98	13:30	Soil	-03		X	X	X							X																	2
GP-9 @ 8 feet (Dplct)	11/16/98	13:30	Soil	-03		X	X	X							X																	
GP-2 @ 9 feet	11/16/98	09:24	Soil	-04		X	X	X							X																	2
GP-2 @ 9 feet (Dplct)	11/16/98	09:24	Soil	-04		X	X	X							X																	
GP-2 @ 7 feet	11/16/98	09:14	Soil	-05		X	X	X							X																	2
GP-2 @ 7 feet (Dplct)	11/16/98	09:14	Soil	-05		X	X	X							X																	

PROJECT INFORMATION

PROJ NO: ~~Bertha Barber~~
PROJ NAME: Bertha Barber
PO NO:
SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	10
CUSTODY SEALS	Y / N / NA
RECEIVED INTACT	Y
BLUE ICE	2.5°

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

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

CERTIFICATION REQUIRED NM SDWA OTHER

METHANOL PRESERVATION

COMMENTS: FIXED FEE
HC breakdown --> Gas / Diesel

RELINQUISHED BY: 1.

Signature: Pat Reynolds Time: 4:00pm
Printed Name: Pat Reynolds Date: 11-20-98
Company: MARATHON

RECEIVED BY: 1.

Signature Time
Printed Name Date
Company

RELINQUISHED BY: 2.

Signature Time
Printed Name Date
Company

RECEIVED BY: (LAB) 2.

Signature: Time: 1400
Printed Name: Date: 11/21/98
American Environmental Network (NM), Inc.

American Environmental Network (NM), Inc.

CHAIN OF CUSTODY

DATE 11-20-98 PAGE 2 OF 3

AEN(NM) Accession #: 811075

PLEASE FILL THIS FORM IN COMPLETELY. SHADED AREAS ARE FOR LAB USE ONLY.

PROJECT MANAGER:

COMPANY Marathon Oil Co

ADDRESS Po. Box 552
Midland Tx 79702

PHONE 915 682-8398

FAX 915 687-8305

BILL TO Same as above

COMPANY

ADDRESS

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	(M8015) Gas/Purge & Trap	8021 (BTEX)/8015 (Gasoline)	8021 (BTEX) = MTBE = TMB = PCE	8021 (TCL)	8021 (EDX)	8021 (HALO)	8021 (CUST)	504.1 EDB = DBCP =	Chloride	8260 (TCL) Volatile Organics	8260 (Full) Volatile Organics	8260 (CUST) Volatile Organics	8260 (Landfill) Volatile Organics	Pesticides /PCB (608/8081)	Herbicides (615/8151)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Polynuclear Aromatics (610/8310)	General Chemistry:			Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:		NUMBER OF CONTAINERS
GP14 @ 15FT	11-17-98	8:20am	Soil	-06		X	X	X							X																	1
GP24 - WATER	11-18-98	14:15	WATER	-07				X																								1
GW- (Duplicate)	11-18-98	14:15	WATER	-07				X																								1
GP6 @ 10FT	11-16-98	11:10	Soil	-08		X	X	X							X																	1
GP9 @ 20FT	11-16-98	13:53	Soil	-09		X	X	X							X																	1
GP9 @ 20FT (Duplicate)	11-16-98	13:53	Soil	-09		X	X	X							X																	1
GP24 @ 35FT	11-18-98	14:00	Soil	-10		X	X	X							X																	1
GP24 @ 23FT	11-18-98	12:30	Soil	-11		X	X	X							X																	1
GP6 @ 10FT	11-16-98	11:10	Soil	-08		X	X	X							X																	1
GP16 @ 15FT	11-17-98	9:25	Soil	-12		X	X	X							X																	1

PROJECT INFORMATION

PROJ NO

PROJ NAME Barnhart Basin

PO NO

SHIPPED VIA

SAMPLE RECEIPT

NO. CONTAINERS	
CUSTODY SEALS	Y/N/NA
RECEIVED INTACT	Y
BLUE ICE	2.5°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

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

CERTIFICATION REQUIRED NM SDWA OTHER

METHANOL PRESERVATION

COMMENTS FIXED FEE

RELINQUISHED BY: 1.

Signature Time
Pat Reynolds 4:00 Pm
Printed Name Date
Pat Reynolds 11-20-98
Company
Marathon

RECEIVED BY: 1.

Signature Time

Printed Name Date

Company

RELINQUISHED BY: 2.

Signature Time

Printed Name Date

Company

RECEIVED BY: (LAB) 2.

Signature: Time: 1400

Printed Name: Date: 11/21

American Environmental Network (NM), Inc.

American Environmental Network (NM), Inc.

CHAIN OF CUSTODY

DATE 11-20-98 PAGE 3 OF 3

AEN(NM) Accession #: 811075

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER:

COMPANY: Marathon Oil Co.
ADDRESS: P.O. Box 552
Midland, Tx 79702
PHONE: 915 687-8398
FAX: 915 687-8305
BILL TO: Same as Above
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	(M8015) Gas/Purge & Trap	8021 (BTEX)/8015 (Gasoline)	8021 (BTEX) X MTBE = TMB = PCE	8021 (TCL)	8021 (EDX)	8021 (HALO)	8021 (CUST)	5041 EDB = DBCP =	Chloride	8260 (TCL) Volatile Organics	8260 (Full) Volatile Organics	8260 (CUST) Volatile Organics	8260 (Landfill) Volatile Organics	Pesticides /PCB (608/8081)	Herbicides (615/8151)	Base/Neutral/Acid Compounds GCMS (625/8270)	Polynuclear Aromatics (610/8310)	General Chemistry:	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:	NUMBER OF CONTAINERS
GP5 D 6FT	11-16-98	10:35	Soil	-13		X	X	X							X															1
GP1 D 12FT	11-16-98	9:25	Soil	1-14		X	X	X							X															1
GP16 D 15FT (Duplicate)	11-17-98	8:40	Soil	-12		X	X	X							X															1
GP23 D 9FT	11-17-98	13:10	Soil	-15		X	X	X							X															1
GP18 D 16FT	11-17-98	11:08	Soil	-16		X	X	X							X															1
GP14 D 15FT (Duplicate)	11-17-98	8:20	Soil	-06		X	X	X							X						-06									1
TRIP Blank	11/10	1610	AQ	-17					X																					1

PROJECT INFORMATION

PROJ. NO:
PROJ. NAME: Britt Barber
PO NO:
SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	
CUSTODY SEALS	Y/N/NA
RECEIVED INTACT	Y
BLUE ICE	2.5°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) 24hr 48hr 72hr 1 WEEK (NORMAL)
CERTIFICATION REQUIRED NM SDWA OTHER
METHANOL PRESERVATION
COMMENTS FIXED FEE

RELINQUISHED BY: 1.

Signature: Pat Reynolds Time: 4:00pm
Printed Name: Pat Reynolds Date: 11-20-98
Company: MARATHON

RECEIVED BY: 1.

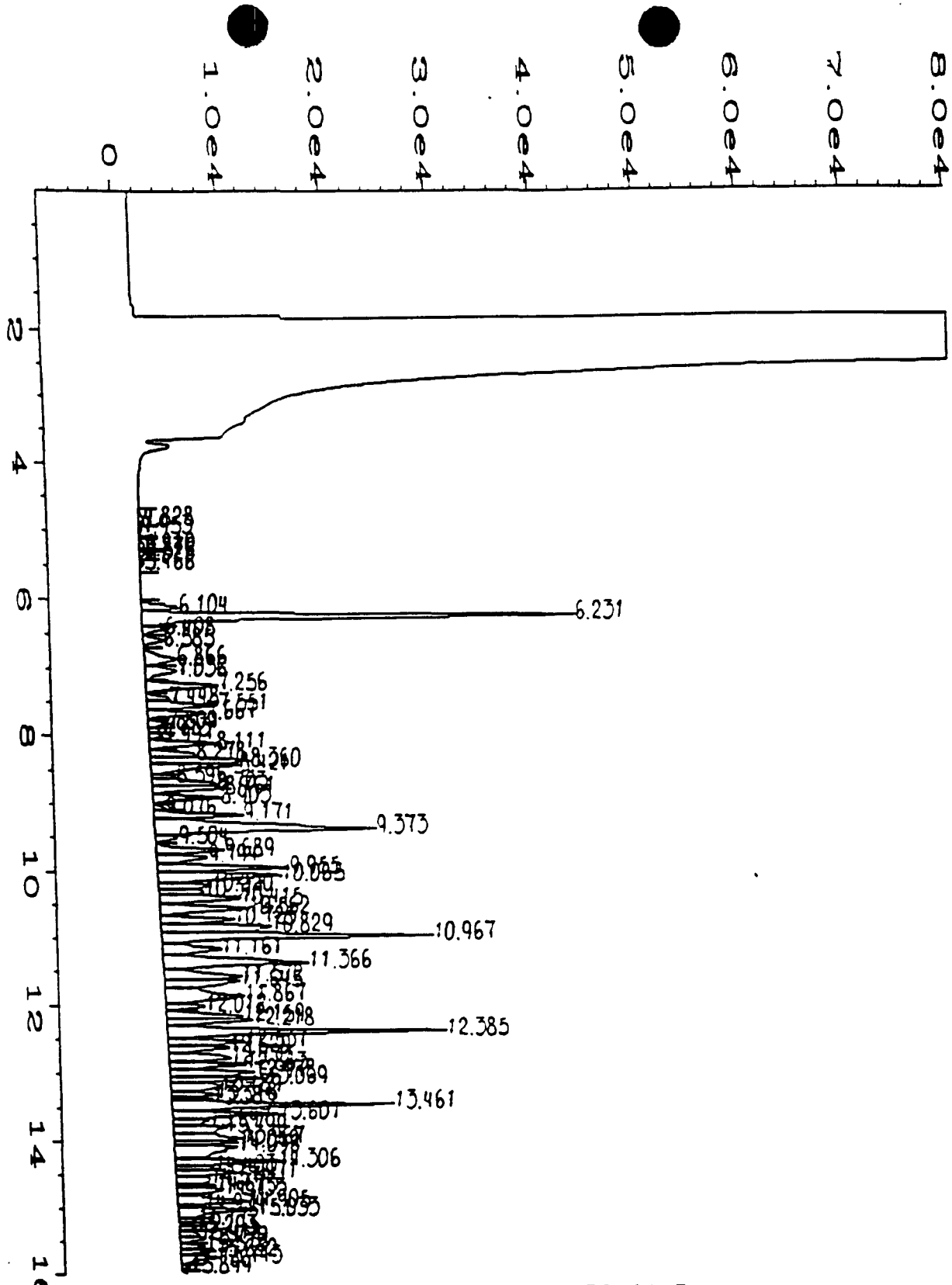
Signature Time
Printed Name Date
Company

RELINQUISHED BY: 2.

Signature Time
Printed Name Date
Company

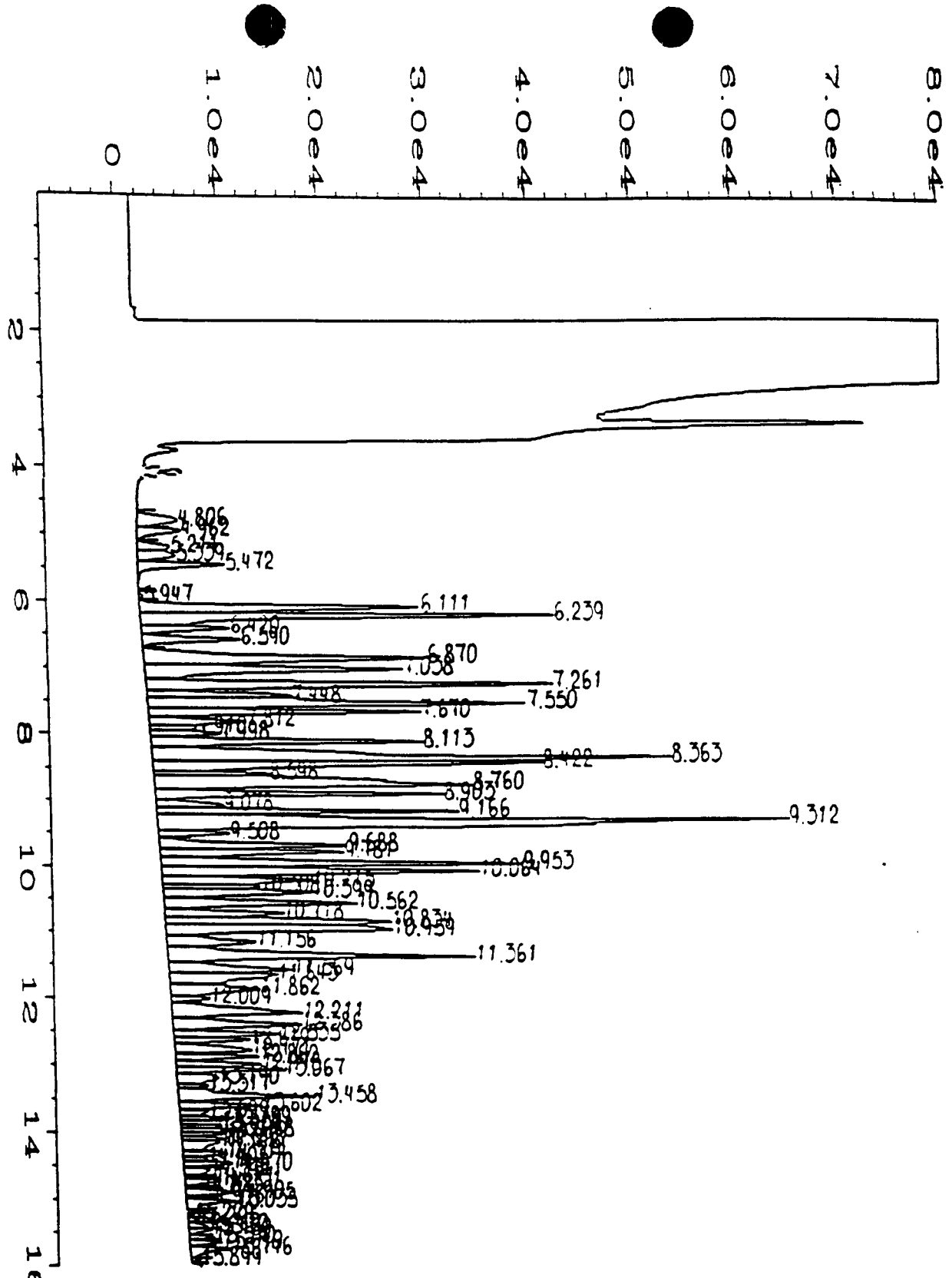
RECEIVED BY: (LAB) 2.

Signature: Time: 1400
Printed Name: Date: 11/21
American Environmental Network (NM), Inc.



Data File Name : C:\HPCHEM\2\DATA\24nov98\010R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-01@10
Run Time Bar Code:
Acquired on : 24 Nov 98 02:03 PM
Report Created on: 24 Nov 98 02:20 PM
Multiplier : 10

Page Number : 1
Vial Number : 10
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



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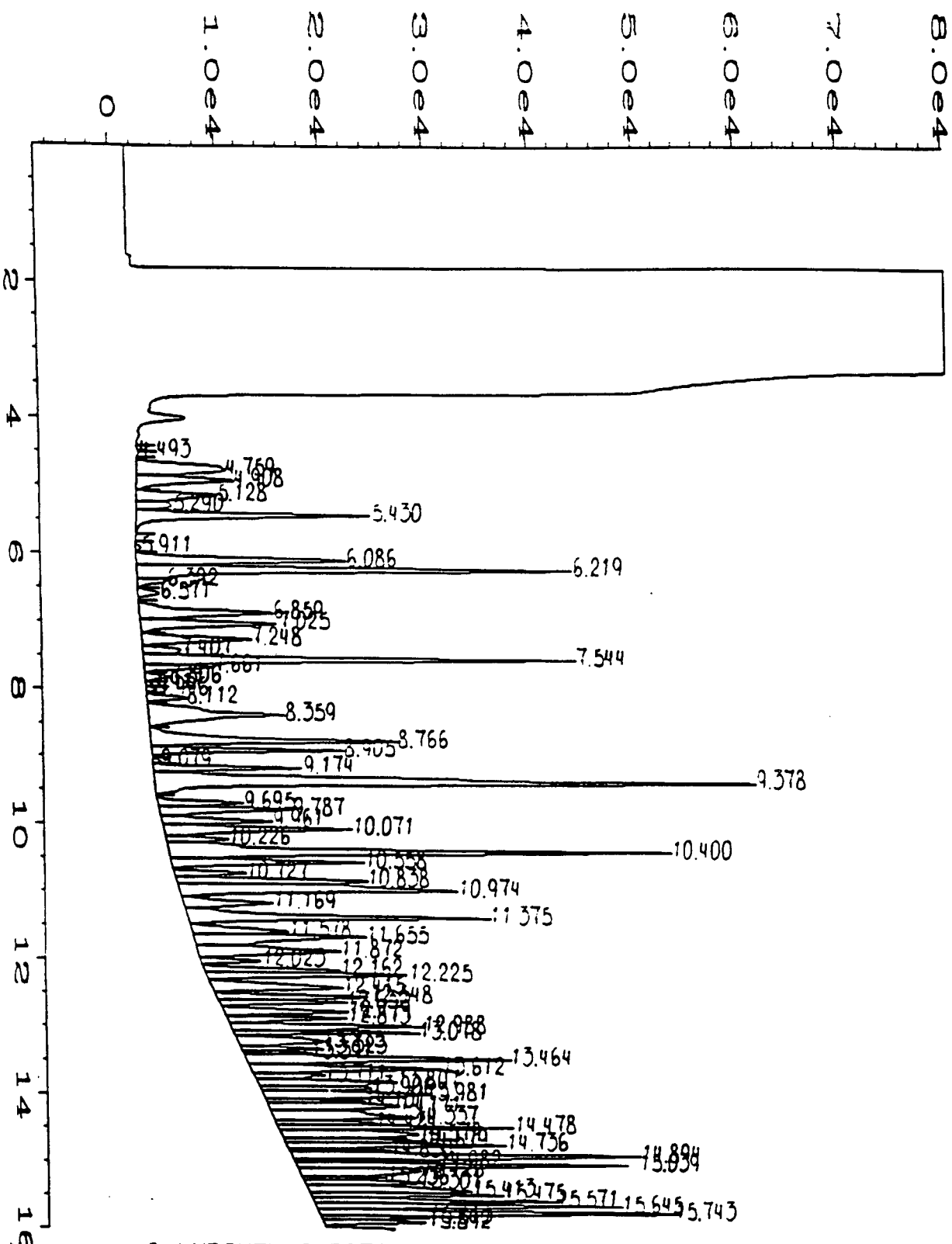
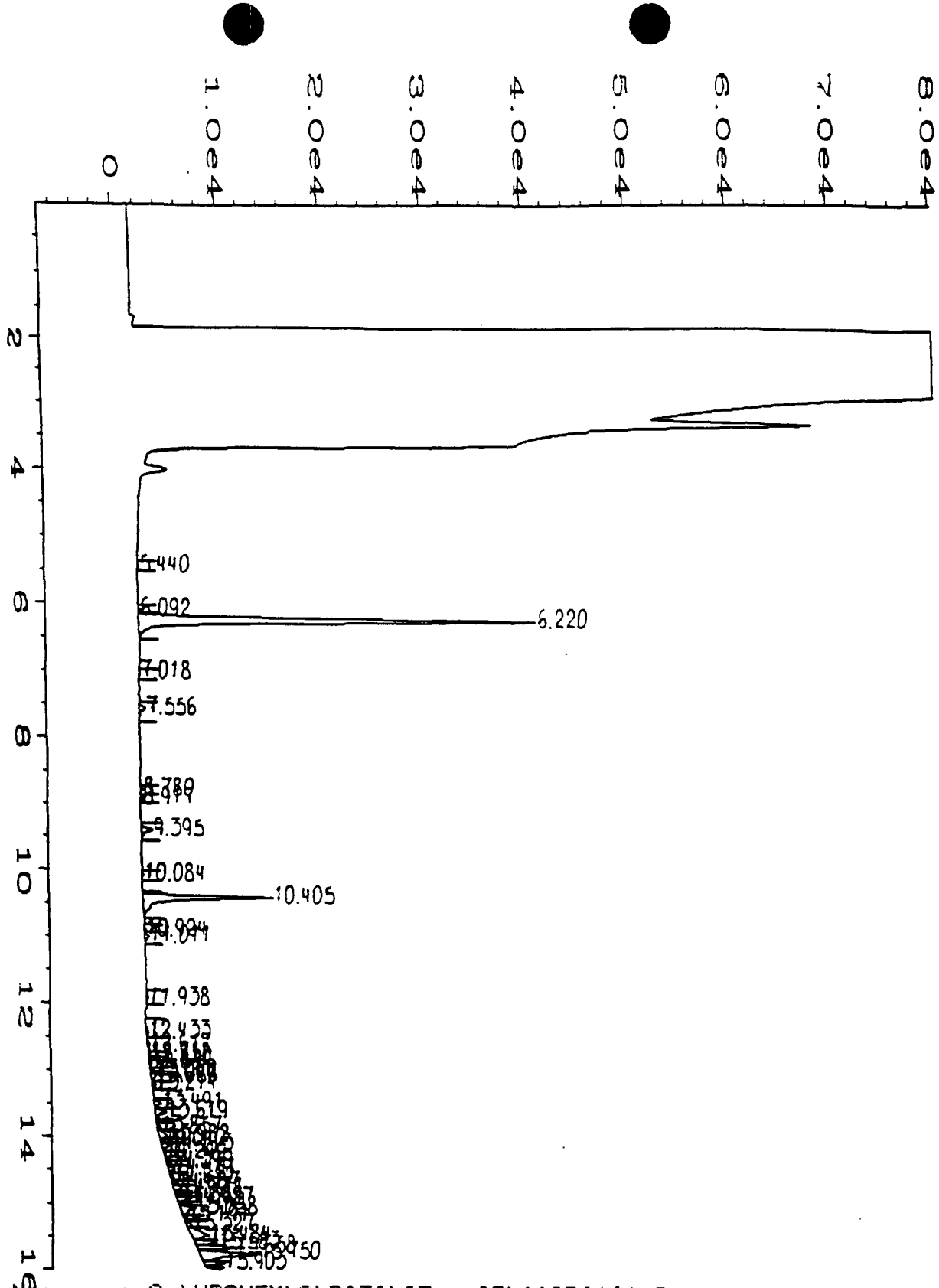
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-02@20
Run Time Bar Code:
Acquired on : 24 Nov 98 01:38 PM
Report Created on: 24 Nov 98 02:54 PM
Multiplier : 20

Page Number : 1
Vial Number : 9
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



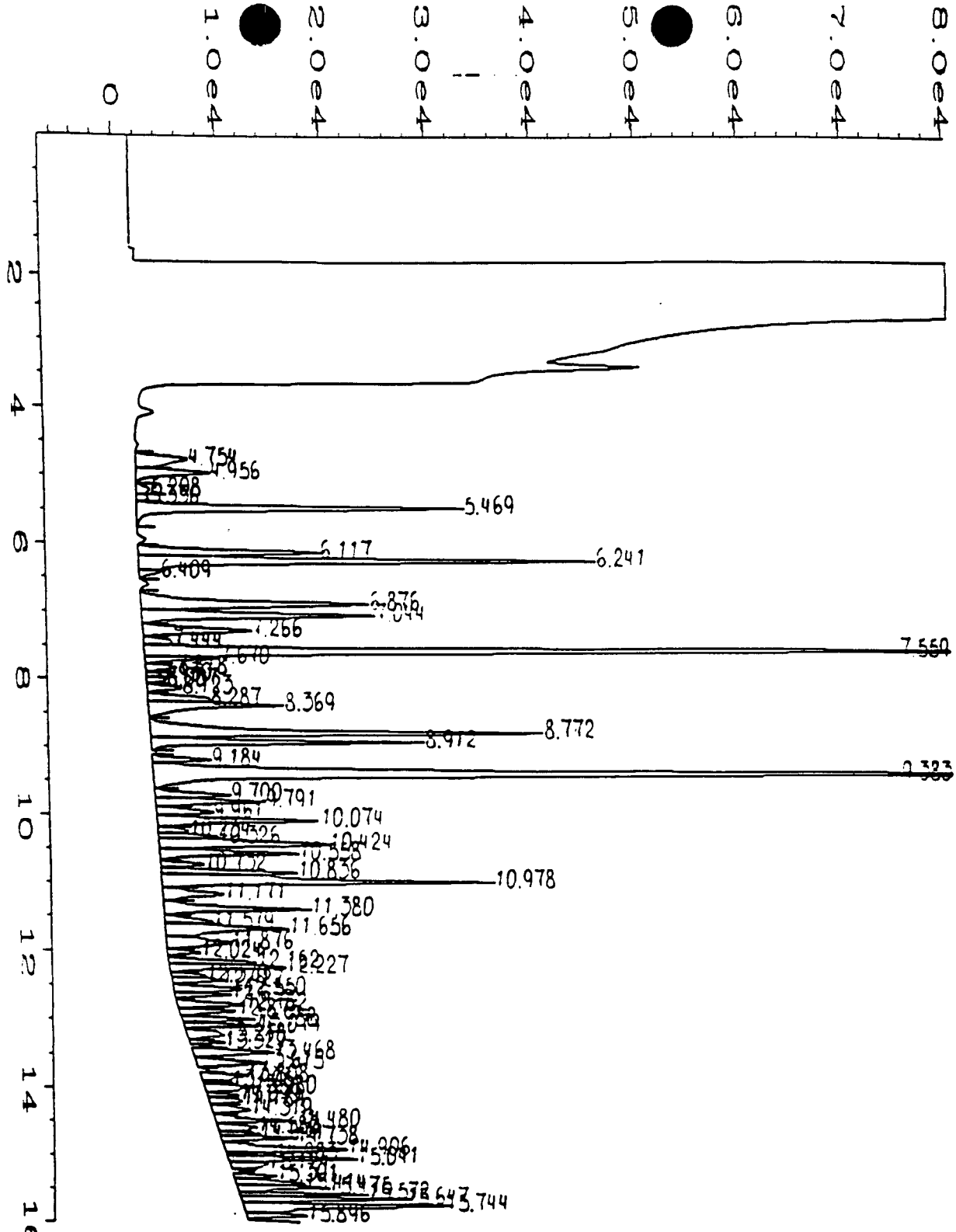
Data File Name : C:\HPCHEM\2\DATA\25nov98\008R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-03
Time Bar Code:
Acquired on : 25 Nov 98 12:26 PM
Report Created on: 30 Nov 98 10:24 AM

Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



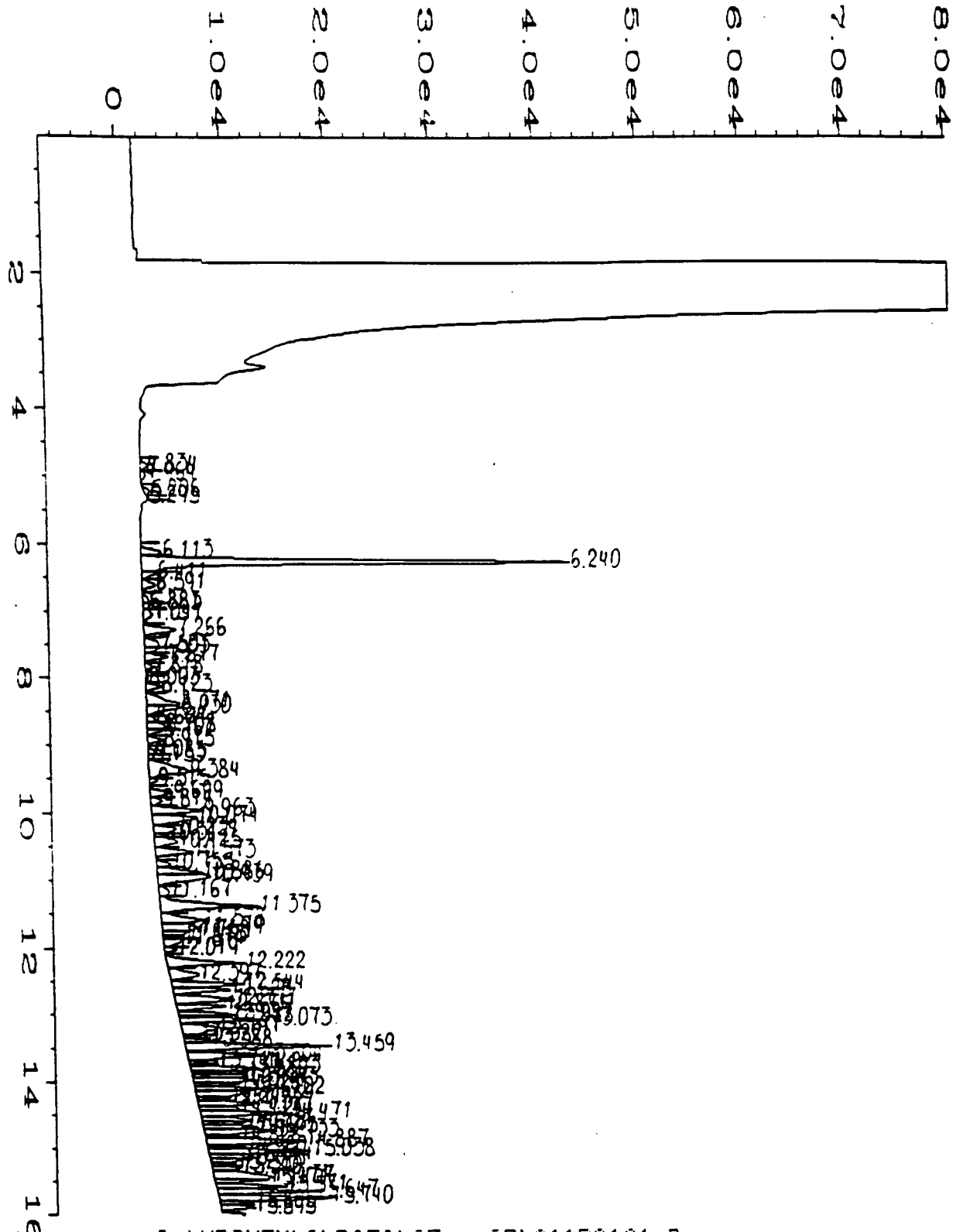
Data File Name : C:\HPCHEM\2\DATA\25nov98\009R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-04
Time Bar Code:
Acquired on : 25 Nov 98 12:50 PM
Report Created on: 30 Nov 98 10:33 AM

Page Number : 1
Vial Number : 9
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



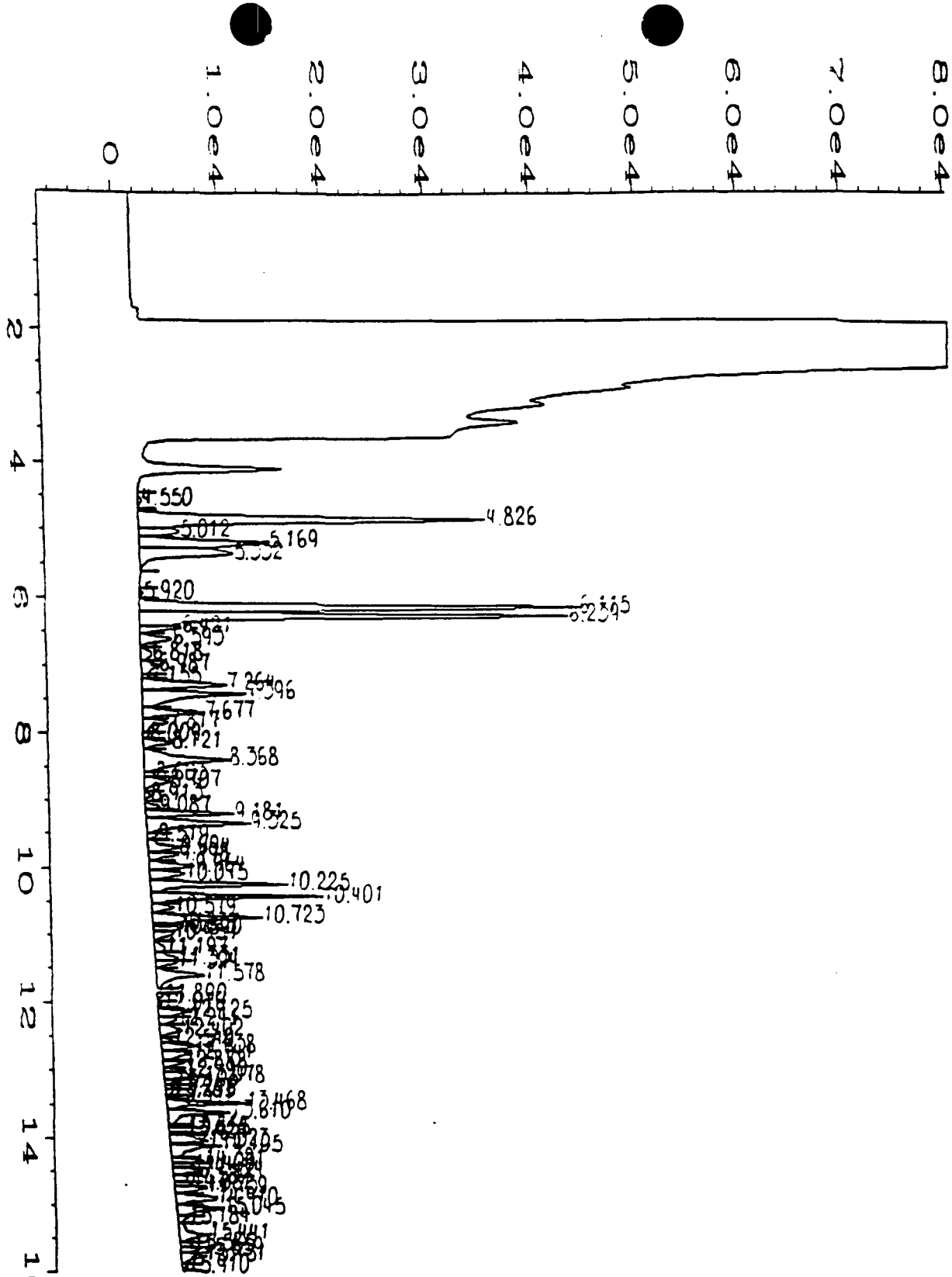
Data File Name : C:\HPCHEM\2\DATA\25nov98\010R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-05@10
Run Time Bar Code:
Acquired on : 25 Nov 98 01:15 PM
Report Created on: 25 Nov 98 01:32 PM
Multiplier : 10

Page Number : 1
Vial Number : 10
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



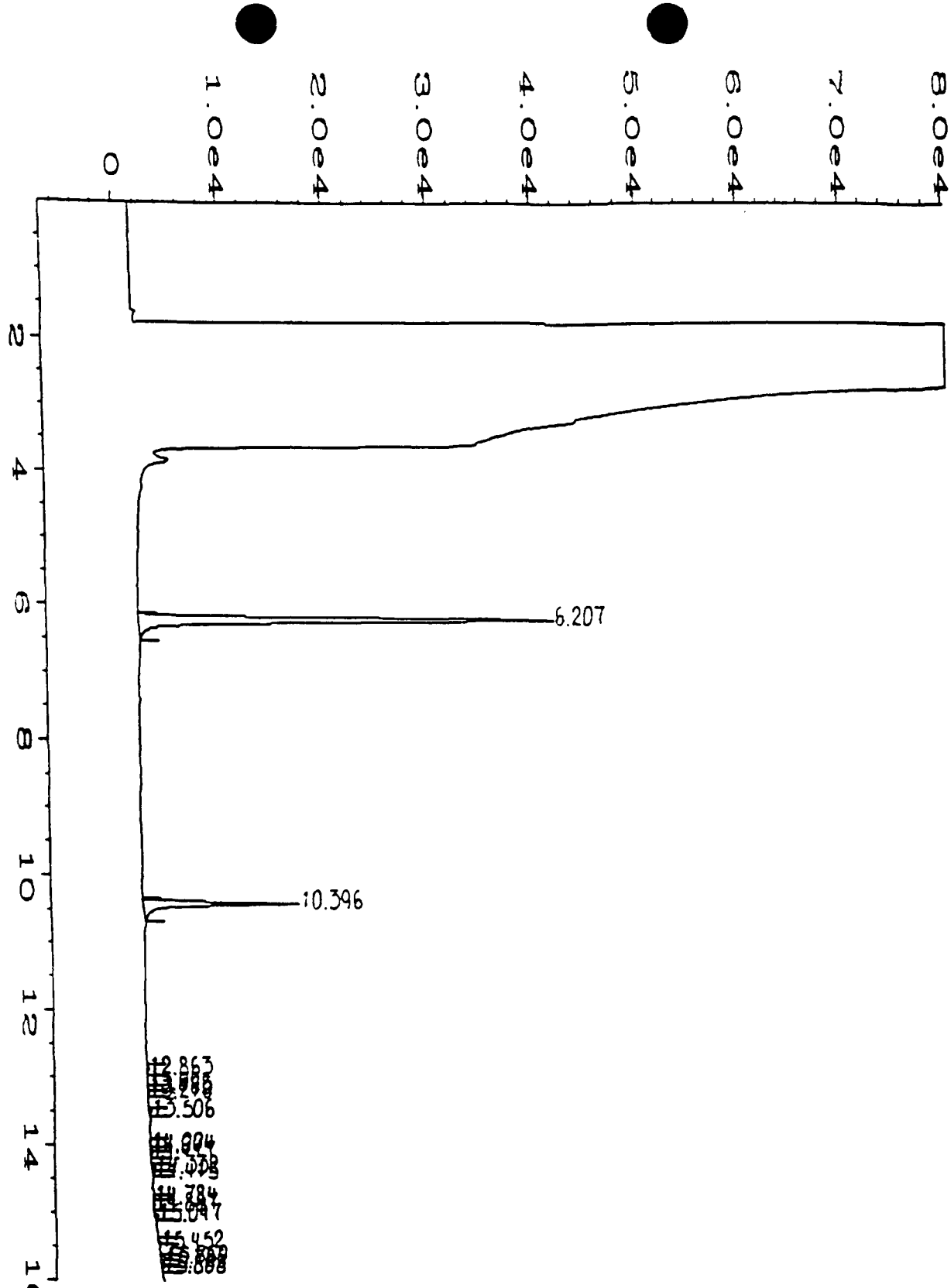
Data File Name : C:\HPCHEM\2\DATA\25nov98\011R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-06@10
Run Time Bar Code:
Acquired on : 25 Nov 98 01:33 PM
Report Created on: 25 Nov 98 01:57 PM
Multiplier : 10

Page Number : 1
Vial Number : 11
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0922.MTH
Analysis Method : PEAKS10.MTH



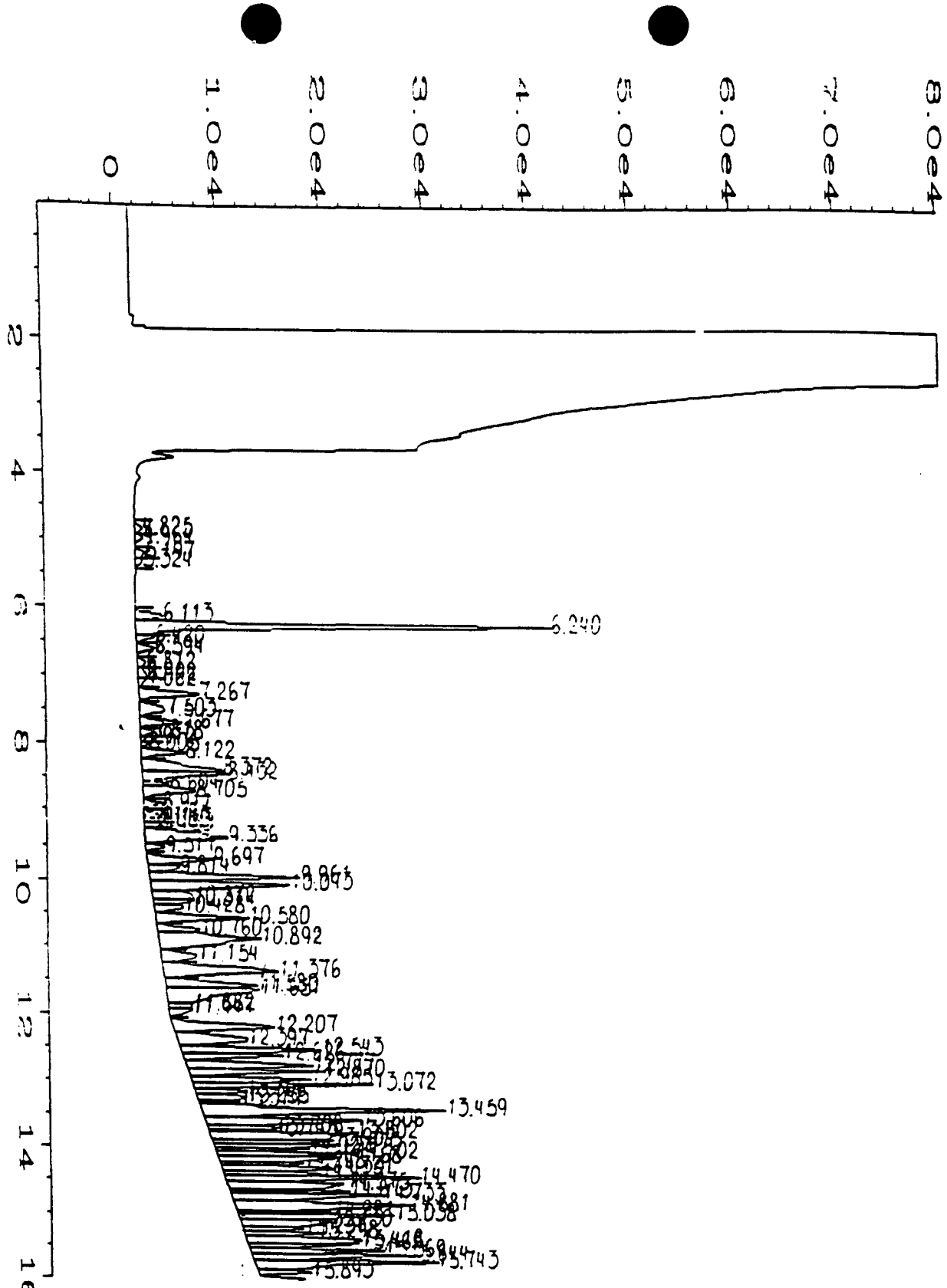
Data File Name : C:\HPCHEM\2\DATA\30nov98\010B0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-07@10
Run Time Bar Code:
Acquired on : 30 Nov 98 02:37 PM
Report Created on: 30 Nov 98 02:54 PM
Multiplier : 10

Page Number : 1
Vial Number : 10
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



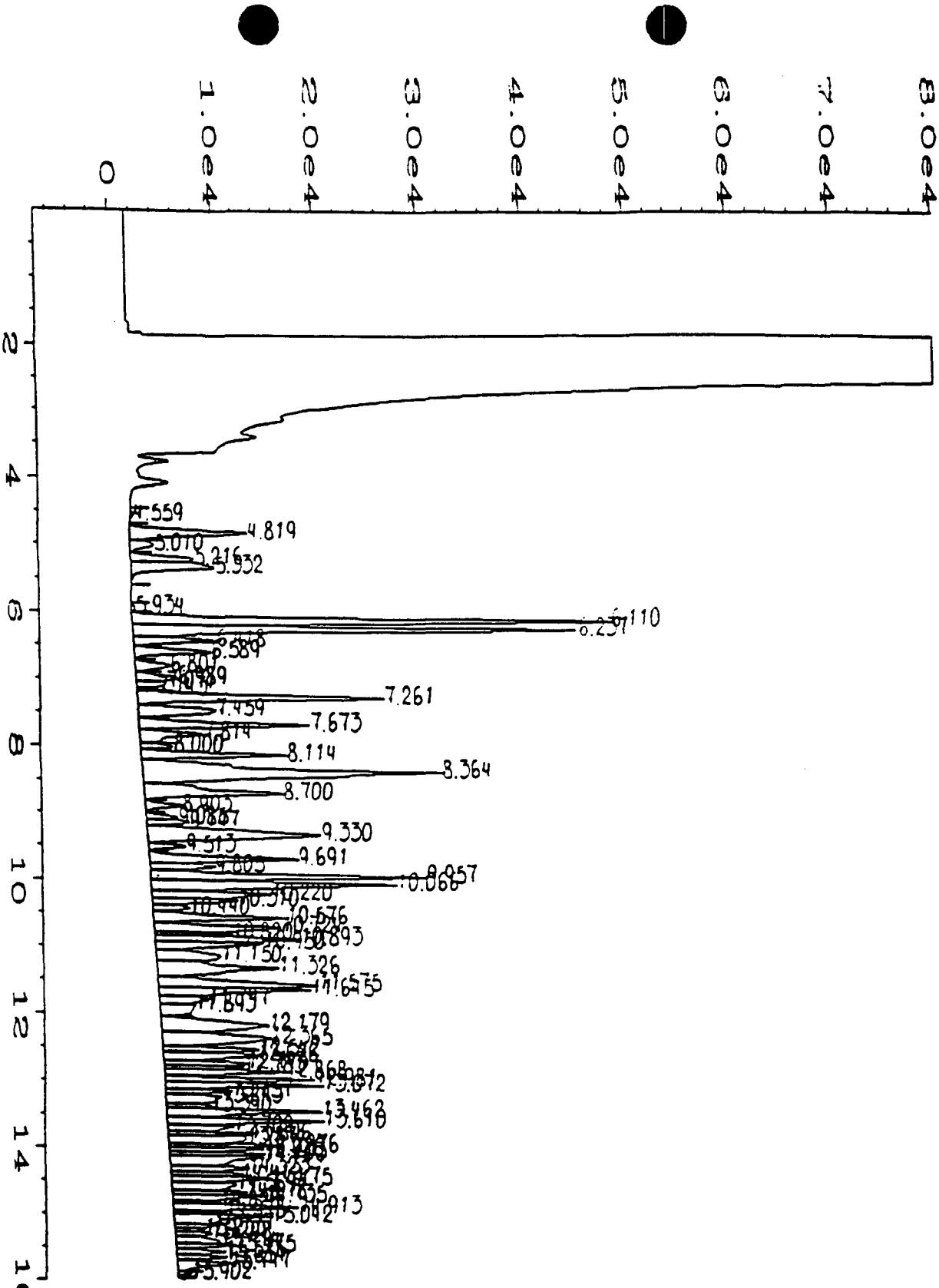
Data File Name : C:\HPCHEM\2\DATA\24nov98\018R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-08
Time Bar Code:
Acquired on : 24 Nov 98 05:38 PM
Report Created on: 24 Nov 98 05:56 PM

Page Number : 1
Vial Number : 18
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVE0923.MTH
Analysis Method : PEAKS10.MTH



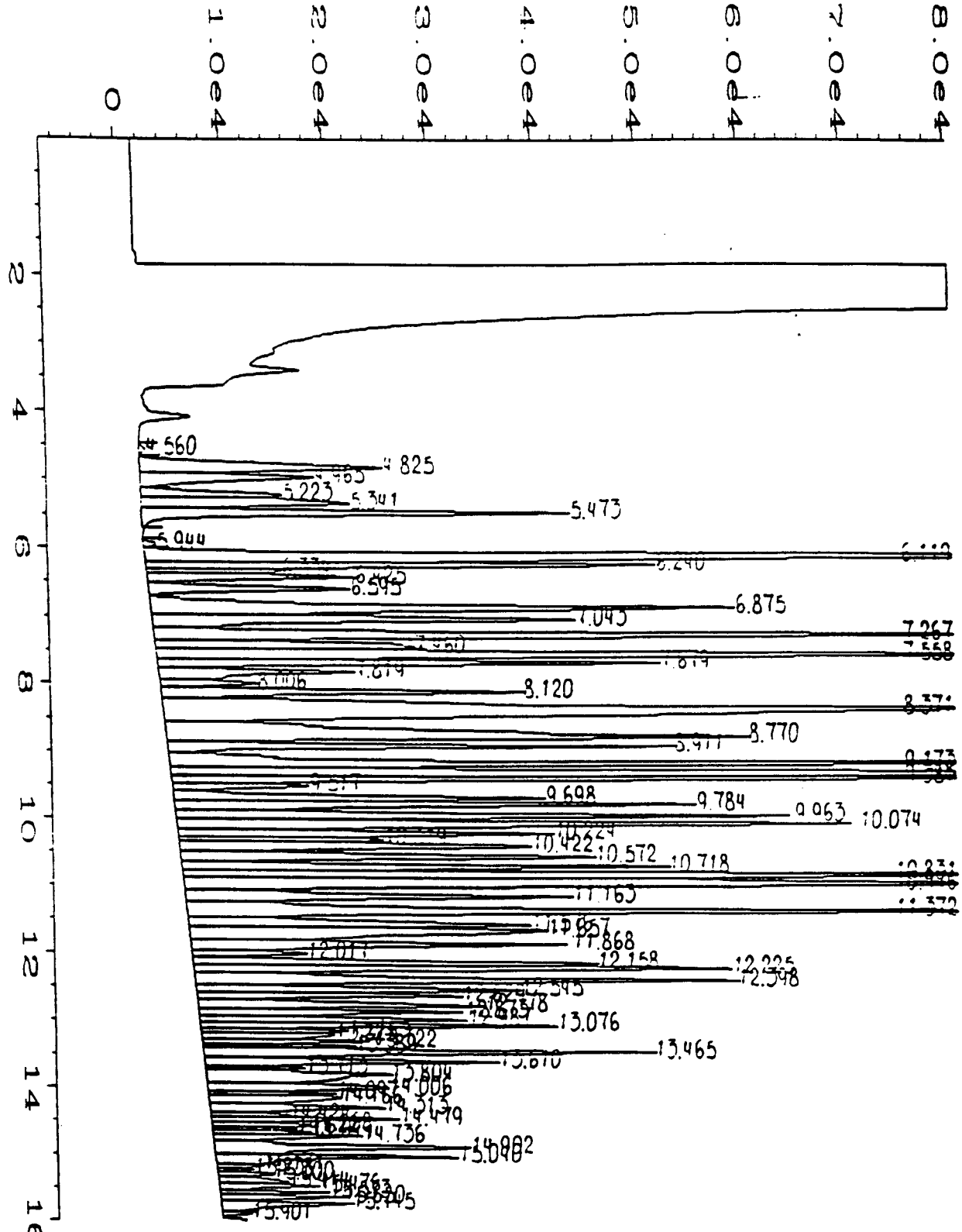
Data File Name : C:\HPCHEM\2\DATA\24NOV98\019R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-03@10
Bar Code Time Bar Code:
Acquired on : 24 Nov 98 06:03 PM
Report Created on: 30 Nov 98 10:29 AM

Page Number : 1
Vial Number : 19
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



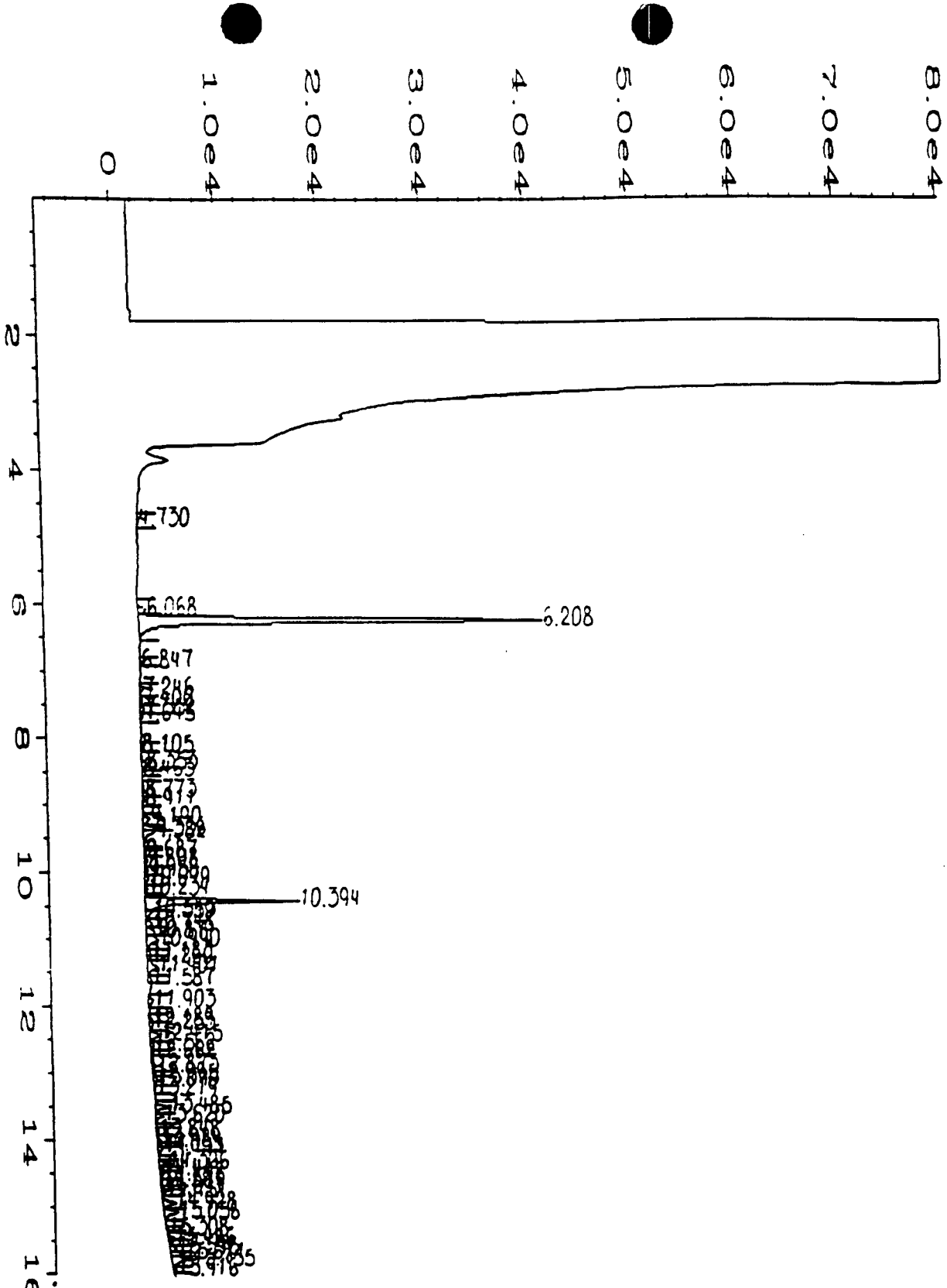
Data File Name : C:\HPCHEM\2\DATA\24nov98\020R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-10@10
Real Time Bar Code:
Acquired on : 24 Nov 98 06:28 PM
Report Created on: 24 Nov 98 06:45 PM
Multiplier : 10

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



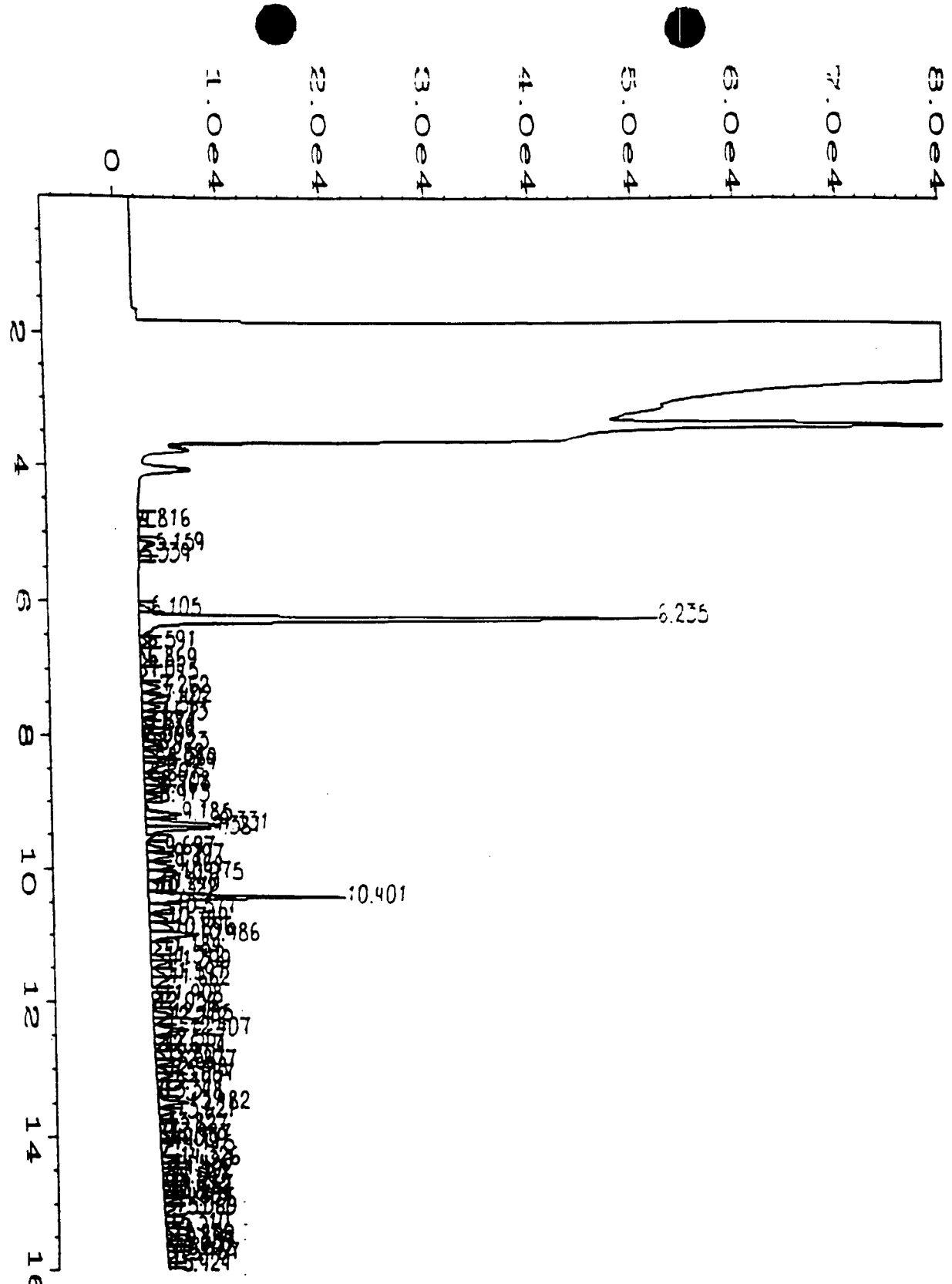
Data File Name : C:\HPCHEM\2\DATA\25NOV98\012F0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-11@20
Run Time Bar Code:
Acquired on : 25 Nov 98 02:04 PM
Report Created on: 01 Dec 98 02:57 PM

Page Number : 1
Vial Number : 12
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



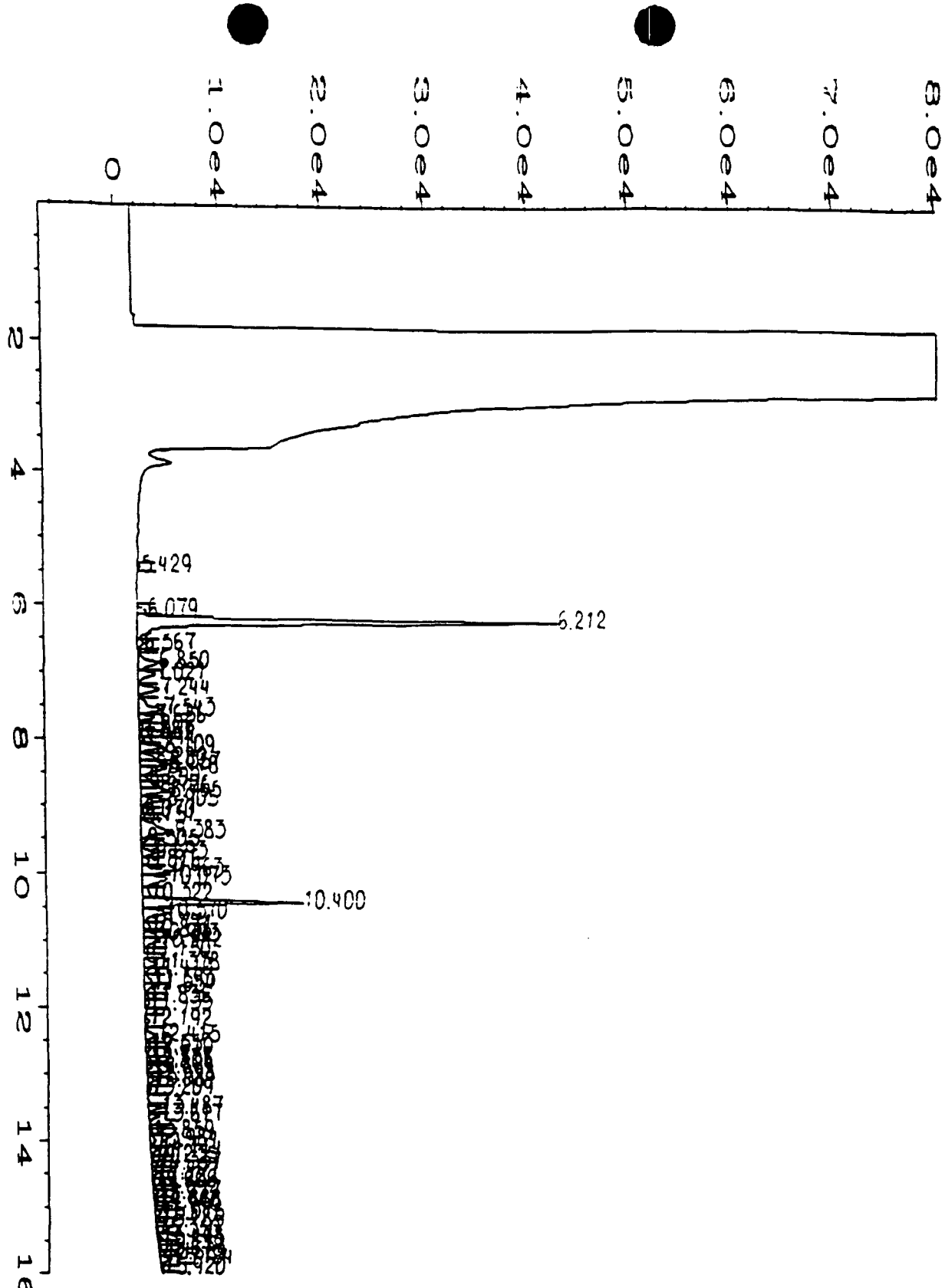
Data File Name : C:\HPCHEM\2\DATA\24nov98\022R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-12
Run Time Bar Code:
Acquired on : 24 Nov 98 07:18 PM
Report Created on: 24 Nov 98 07:36 PM

Page Number : 1
Vial Number : 22
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



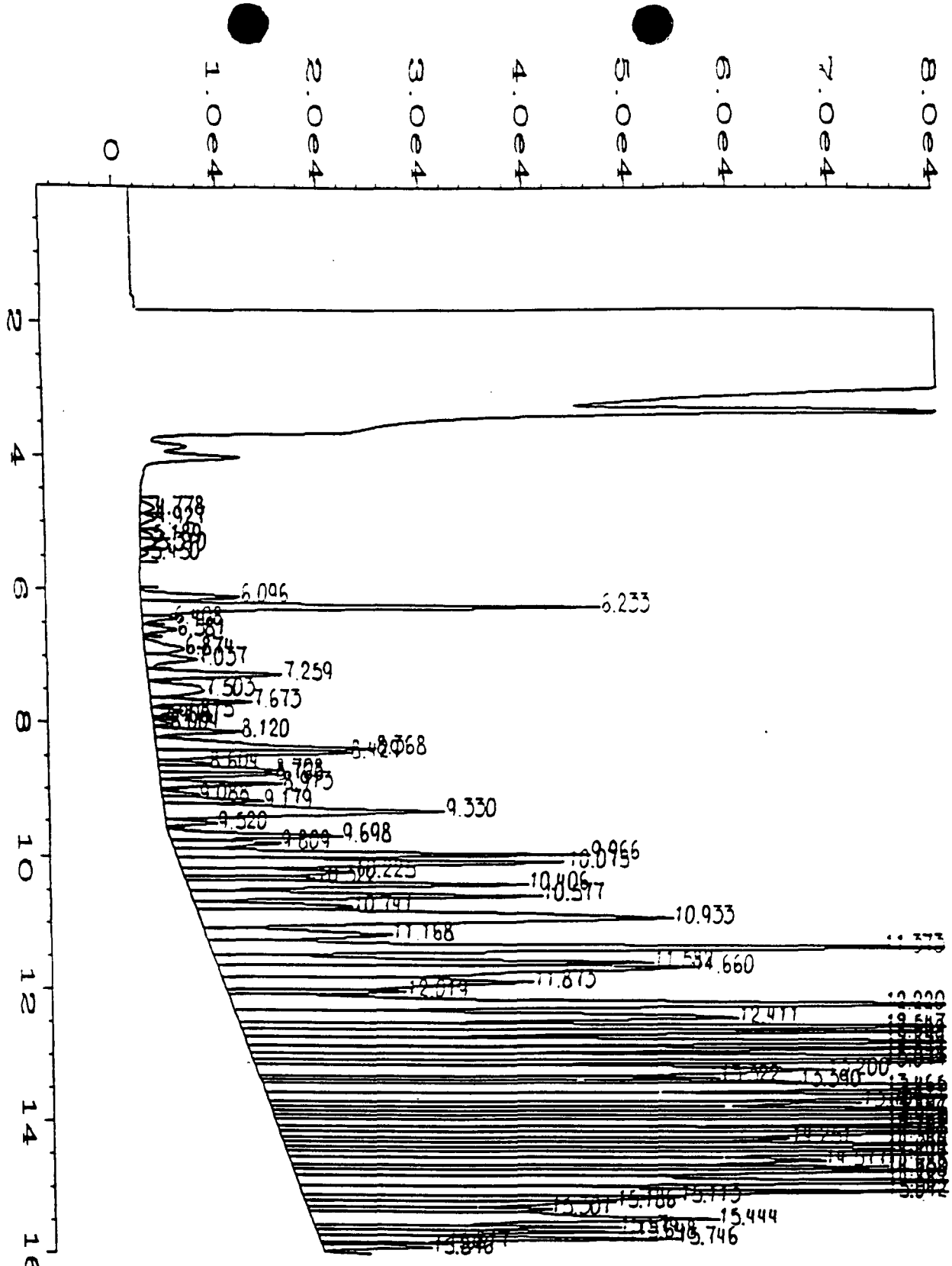
Data File Name : C:\HPCHEM\2\DATA\24nov98\024R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-13
Run Time Bar Code:
Acquired on : 24 Nov 98 08:08 PM
Report Created on: 24 Nov 98 08:25 PM

Page Number : 1
Vial Number : 24
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



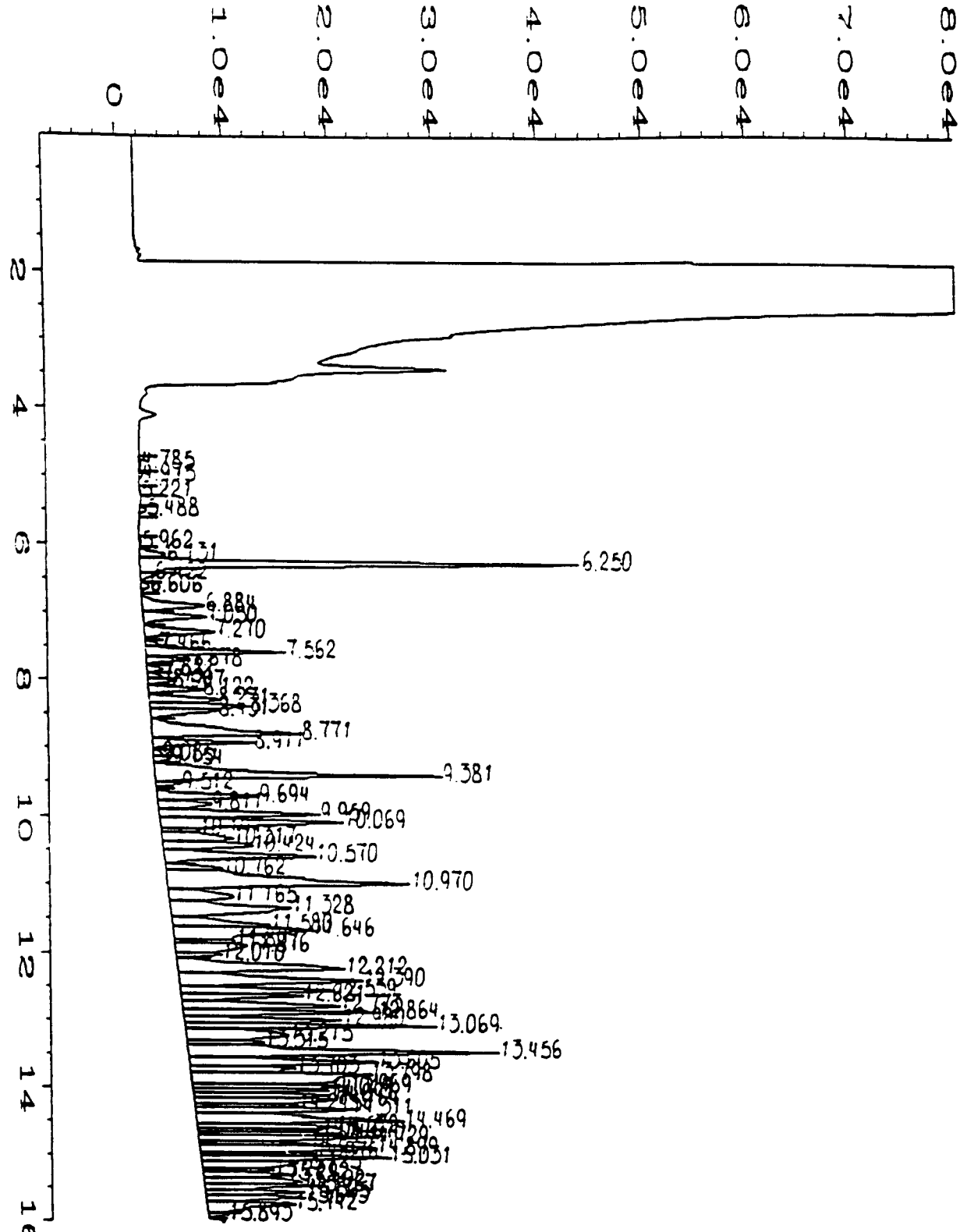
Data File Name : C:\HPCHEM\2\DATA\24nov98\025R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-14
Time Bar Code:
Acquired on : 24 Nov 98 08:33 PM
Report Created on: 24 Nov 98 08:50 PM

Page Number : 1
Vial Number : 25
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



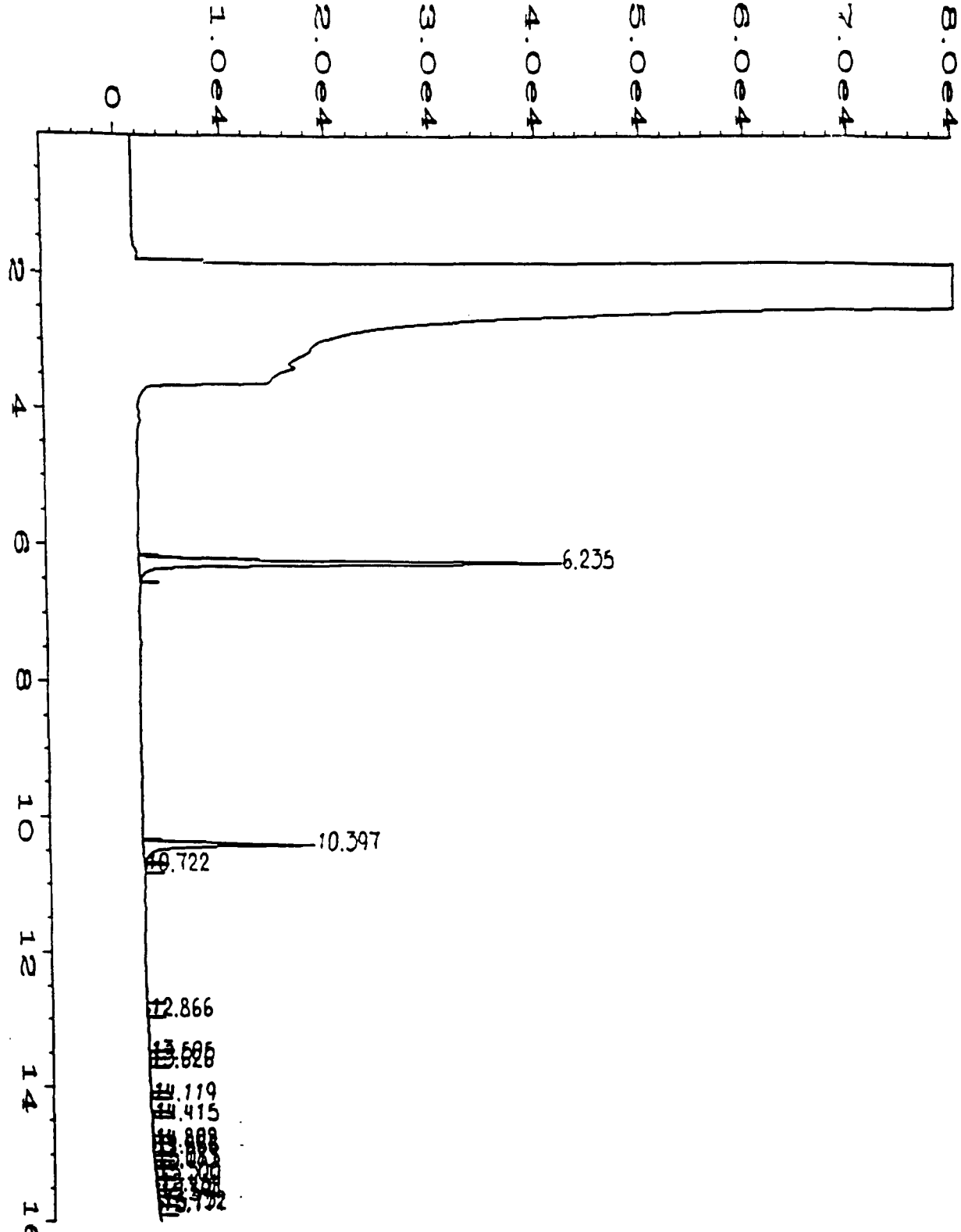
Data File Name : C:\HPCHEM\2\DATA\24nov98\004R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-15
Run Time Bar Code:
Acquired on : 25 Nov 98 09:59 AM
Report Created on: 25 Nov 98 10:17 AM

Page Number : 1
Vial Number : 4
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



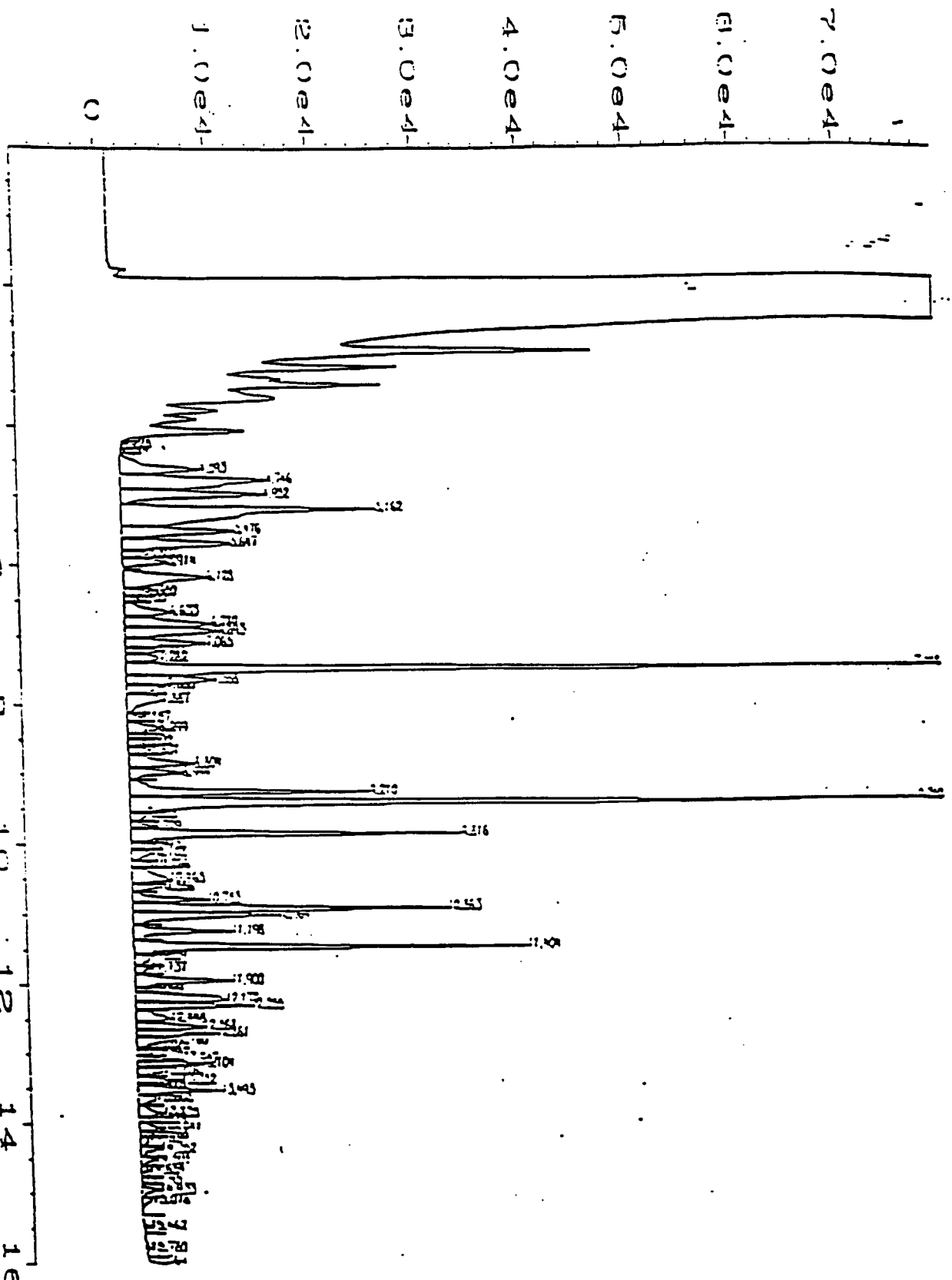
Data File Name : C:\HPCHEM\2\DATA\01DEC98\010R0101.D
Operator : Pinnacle Labs : MB
Instrument : FID-FID1
Sample Name : 811075-16@10
Run Time Bar Code:
Acquired on : 01 Dec 98 02:35 PM
Report Created on: 01 Dec 98 02:52 PM
Multiplier : 10

Page Number : 1
Vial Number : 10
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH

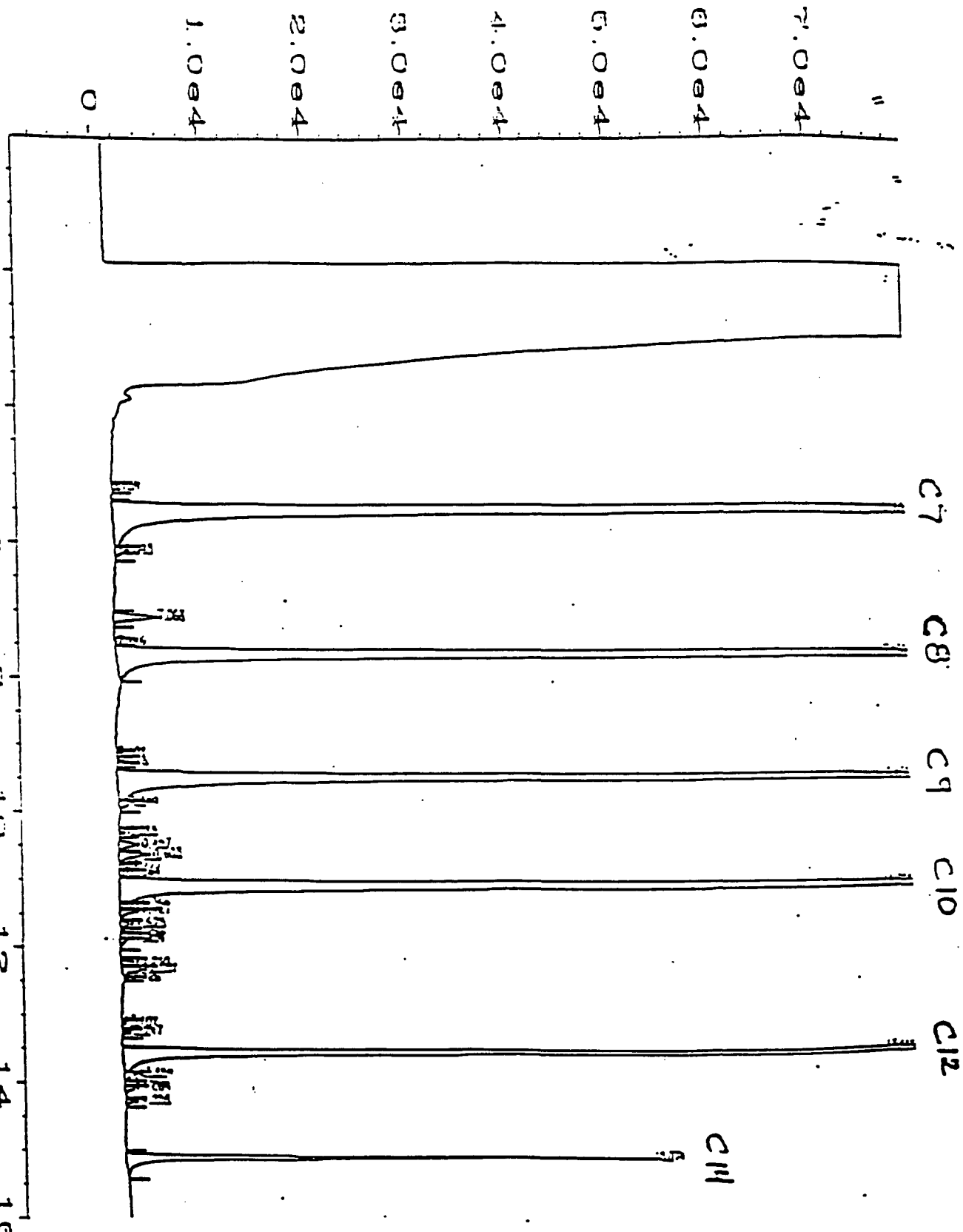


Data File Name : C:\HPCHEM\2\DATA\24nov98\007R0101.D
Operator : Pinnacle Labs : MB
Instrument : PID-FID1
Sample Name : 811075-17
Run Time Bar Code:
Acquired on : 24 Nov 98 12:07 PM
Report Created on: 24 Nov 98 12:24 PM

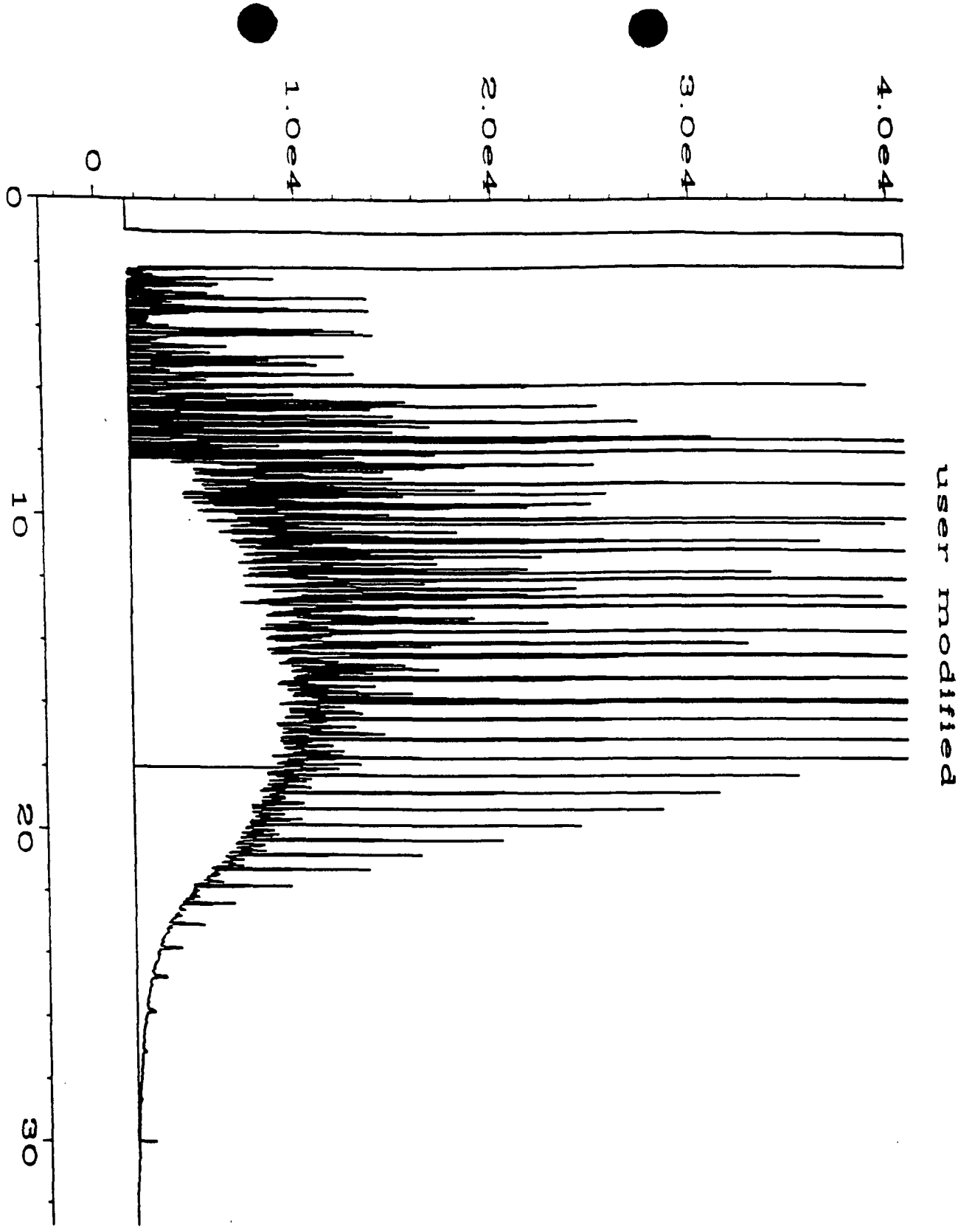
Page Number : 1
Vial Number : 7
Injection Number : 1
Sequence Line : 1
Instrument Method: WAVG0923.MTH
Analysis Method : PEAKS10.MTH



Data File Name : C:\HPCHEM\2\DATA\25APR97\003R0101.D
Operator : AEN NM GC # 2 Page Number : 1
Instrument : 5890A-#2 Vial Number : 1
Sample Name : GAS VERIFICATION Injection Number : 1
Run Time Bar Code: Sequence Line : 1
Acquired on : 25 Apr 97 08:14 AM Instrument Method: HAVG0401.MTH
Report Created on: 07 May 97 07:46 AM Analysis Method : PEAKS497.MTH

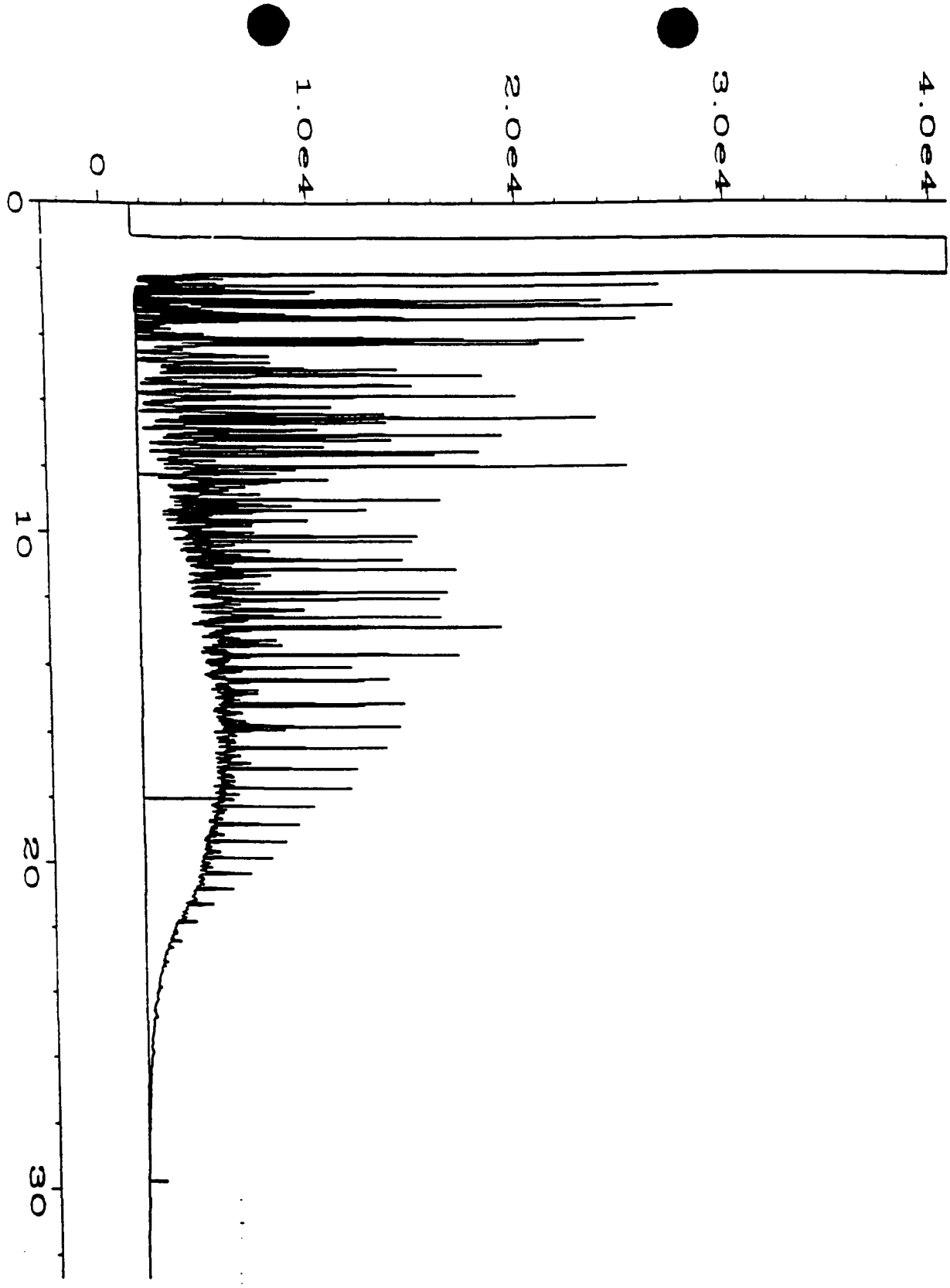


Data File Name	: C:\HPCHEM\2\DATA\28APR97\002R0101.D		
Operator	: AEN NM GC # 2	Page Number	: 1
Instrument	: 5890A-#2	Vial Number	: 2
Sample Name	: RETENTION TIME	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 28 Apr 97 01:54 PM	Instrument Method	: HAVG0401.MTH
Report Created on	: 07 May 97 07:47 AM	Analysis Method	: PEAKS497.MTH



Data File Name : C:\HPCHEM\2\DATA\24NOV98\070F0101.D
Operator : Pinnacle - mb & cff
Instrument : FID-FID1
Sample Name : 811075-01
Time Bar Code:
Acquired on : ~~25 Oct 98~~ 24 Nov 98 01:21 PM
Report Created on: ~~26 Oct 98~~ 25 Nov 98 01:59 PM

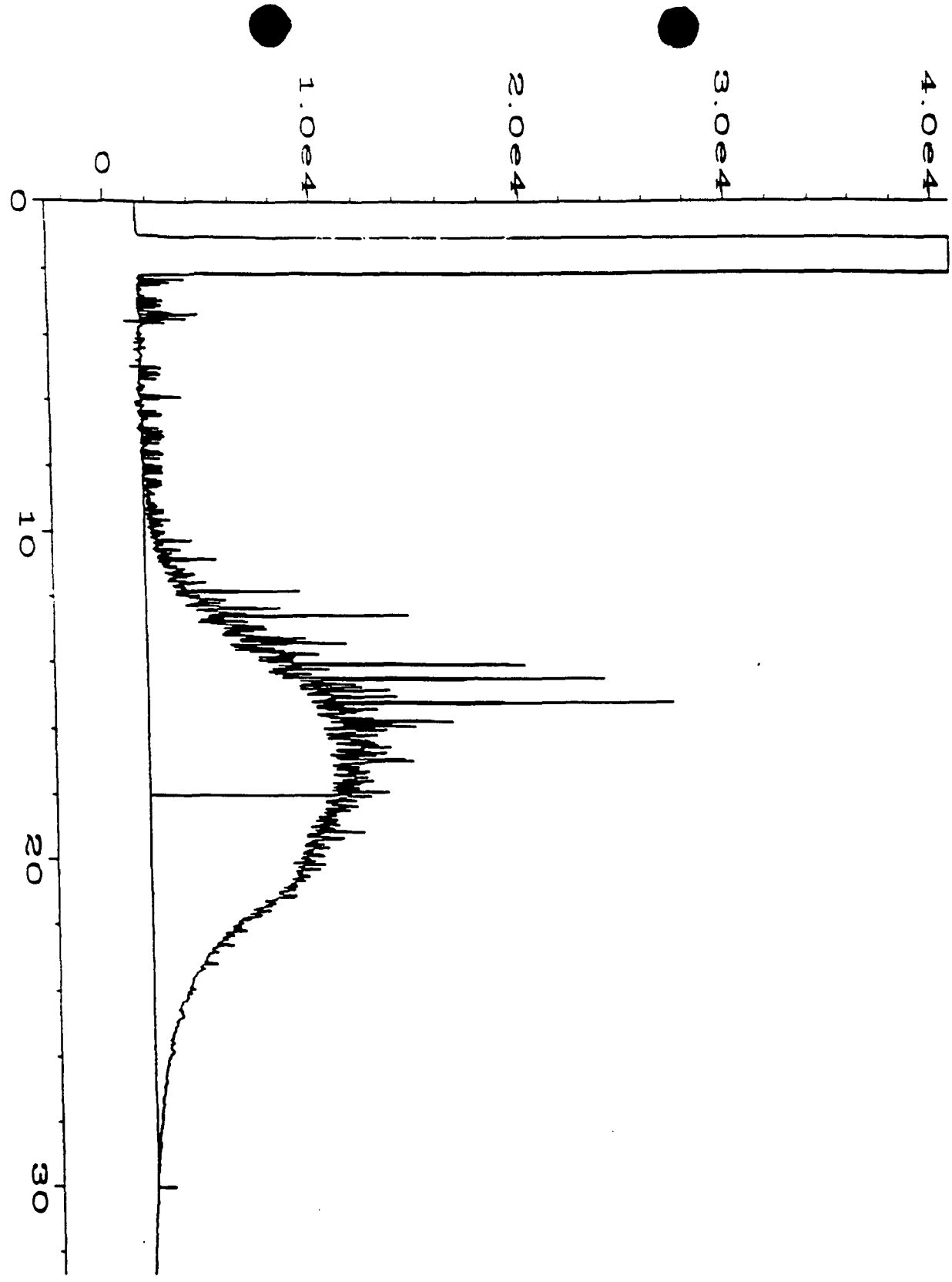
Page Number : 1
Vial Number : 70
Injection Number : 1
Sequence Line : 1
Instrument Method: RT061698.MTH
Analysis Method : RT061698.MTH



user modified

Data File Name : C:\HPCHEM\2\DATA\24NOV98\071F0101.D
Operator : Pinnacle - mb & cff
Instrument : FID-FID1
Sample Name : 811075-02*10
Time Bar Code:
Acquired on : ~~25 Oct 98~~ 26 Nov. 98 02:03 PM
Report Created on: ~~26 Oct 98~~ 27 Nov. 98 02:02 PM

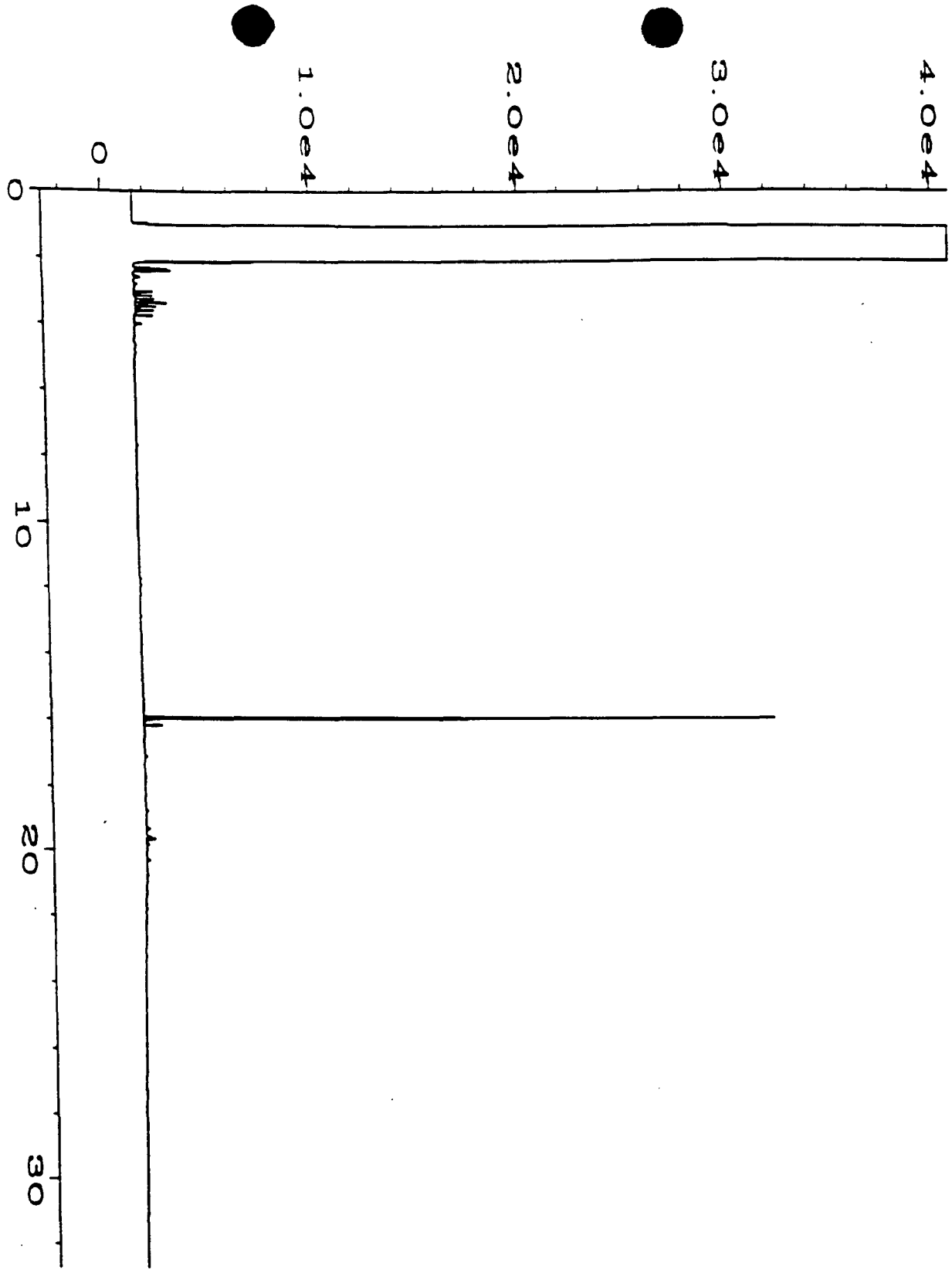
Page Number : 1
Vial Number : 71
Injection Number : 1
Sequence Line : 1
Instrument Method: RT061698.MTH
Analysis Method : RT061698.MTH



user modified

Data File Name : C:\HPCHEM\2\DATA\24NOV98\072F0101.D
Operator : Pinnacle - mb & cff
Instrument : FID-FID1
Sample Name : 811075-03*10
Run Time Bar Code:
Acquired on : ~~25 Oct 98~~ 26 Nov. 98 02:46 PM
Report Created on: ~~26 Oct 98~~ 27 Nov. 98 02:03 PM

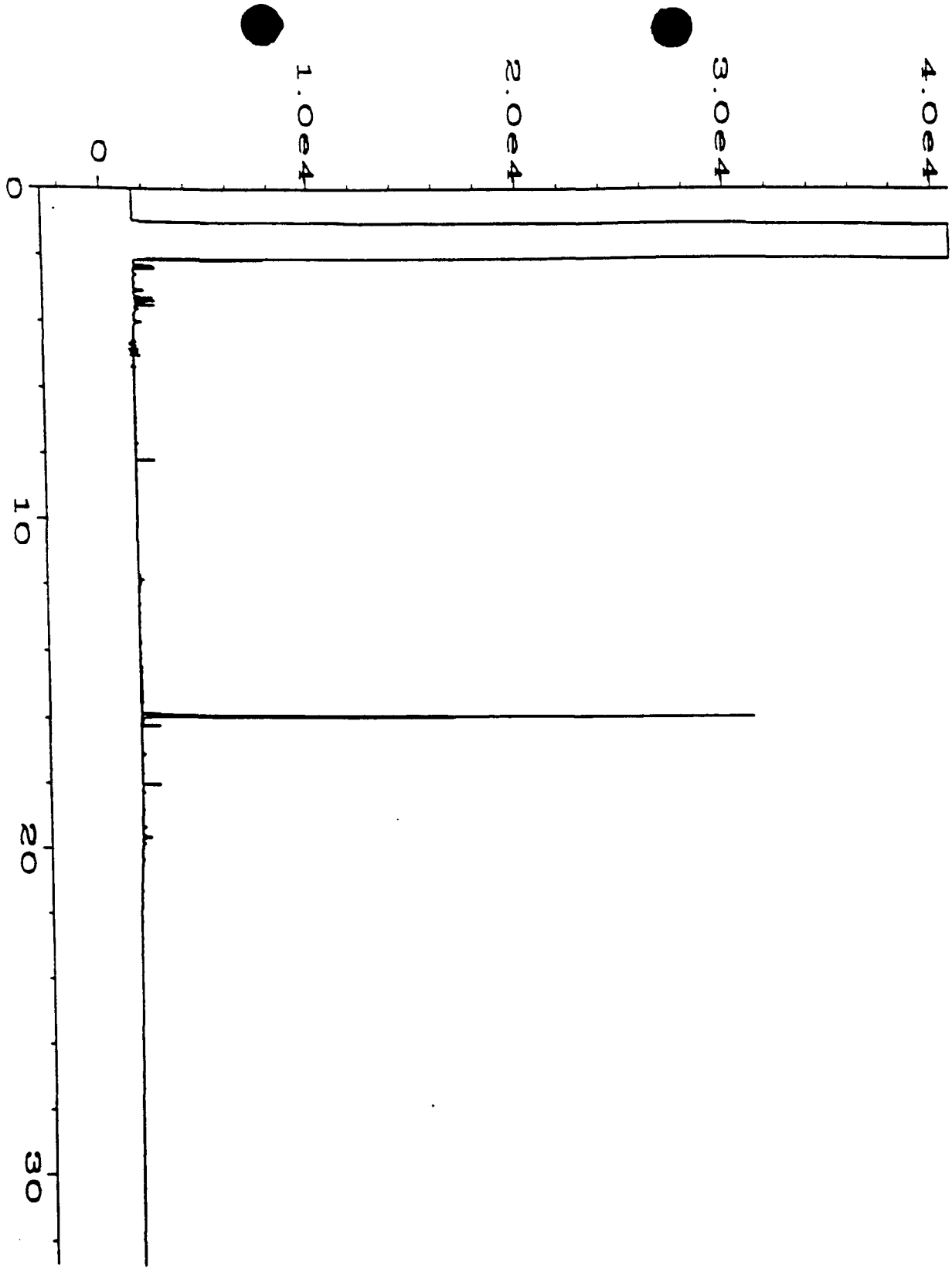
Page Number : 1
Vial Number : 72
Injection Number : 1
Sequence Line : 1
Instrument Method: RT061698.MTH
Analysis Method : RT061698.MTH



user modified

Data File Name : C:\HPCHEM\2\DATA\24NOV98\082F0101.D
Operator : Pinnacle - mb & cff
Instrument : FID-FID1
Sample Name : 811075-12
Run Time Bar Code:
Acquired on : ~~25~~ 26 Nov. ~~Oct~~ ~~97~~ 98 09:51 PM
Report Created on: ~~26~~ 27 Nov. ~~Oct~~ ~~97~~ 98 02:12 PM

Page Number : 1
Vial Number : 82
Injection Number : 1
Sequence Line : 1
Instrument Method: RT061698.MTH
Analysis Method : RT061698.MTH



user modified

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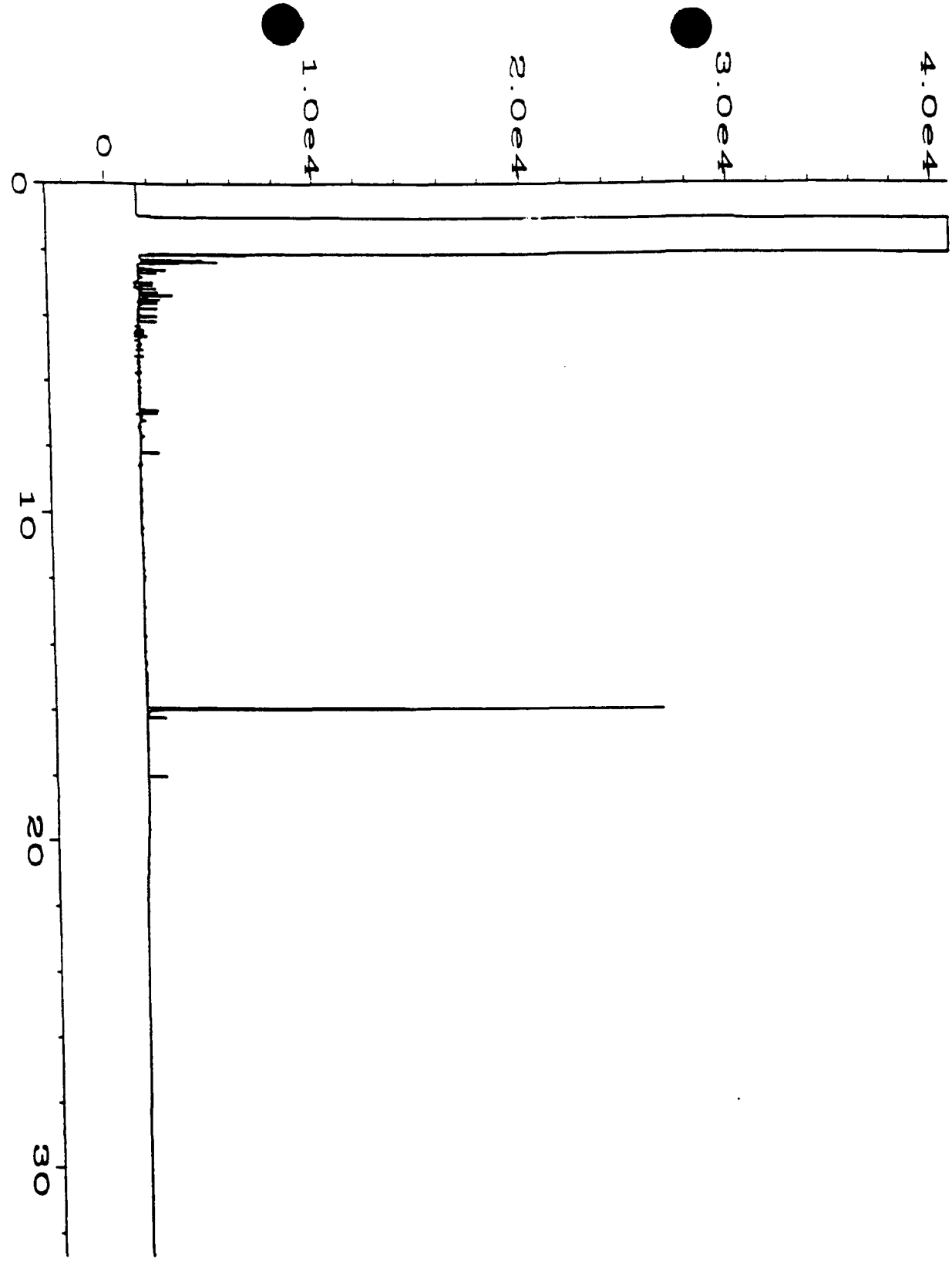
Operator : Pinnacle - mb & cff
Instrument : FID-FID1
Sample Name : 811075-13
Run Time Bar Code:
Acquired on : ~~25~~ 26 Nov. 98 ~~Oct 98~~ 11:58 PM
Report Created on: ~~26~~ 27 Nov. 98 ~~Oct 98~~ 02:19 PM 11/30/98

Page Number : 1
Vial Number : 85
Injection Number : 1
Sequence Line : 1
Instrument Method: RT061698.MTH
Analysis Method : RT061698.MTH



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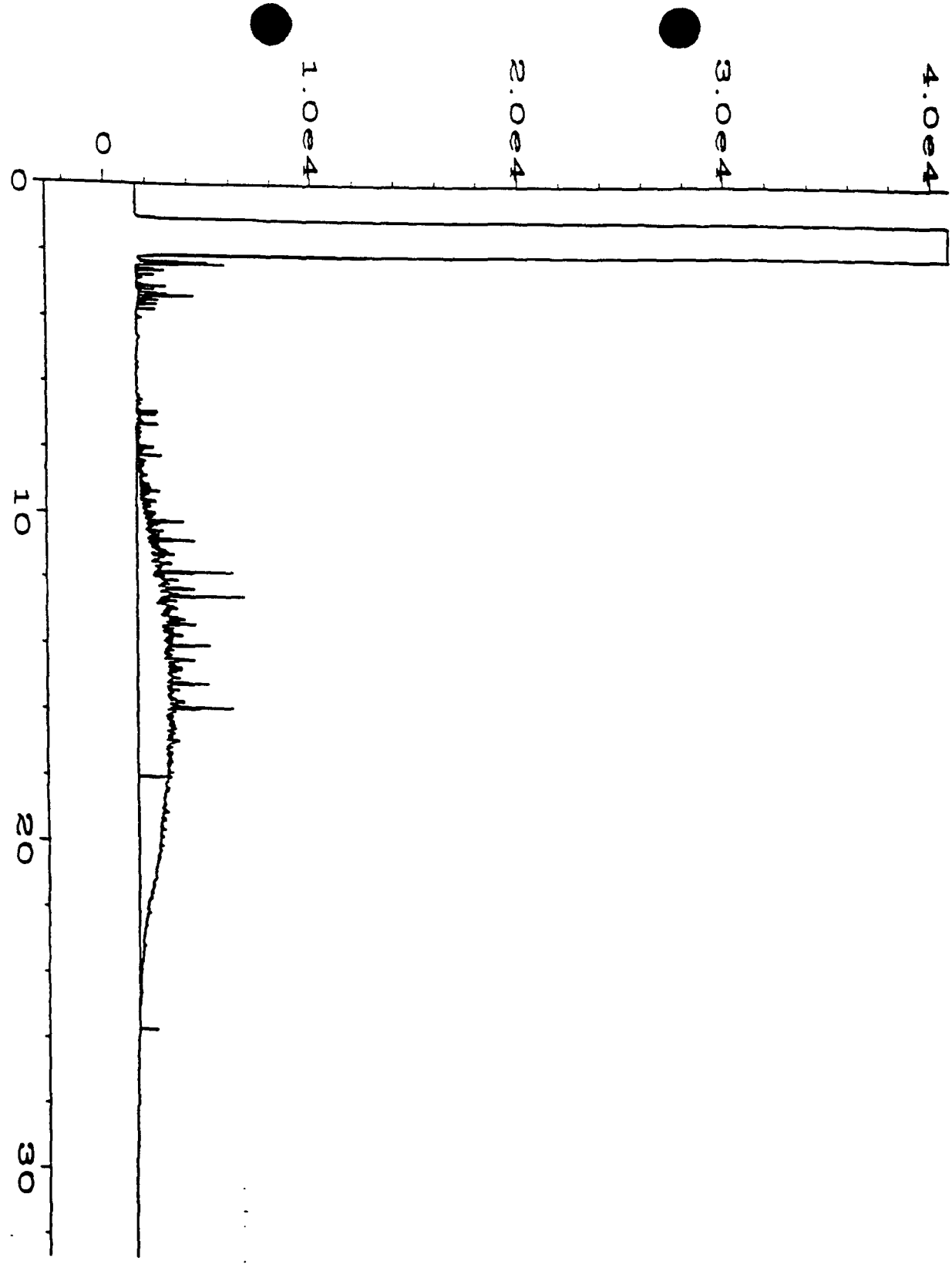
ata File Name	: C:\HPCHEM\2\DATA\30NOV98\010F0101.D		
Operator	: Pinnacle - mb & cff	Page Number	: 1
Instrument	: FID-FID1	Vial Number	: 10
ample Name	: 811075-14	Injection Number	: 1
un Time Bar Code:		Sequence Line	: 1
A ired on	: 30 Nov 98 05:18 PM	Instrument Method	: RT061698.MTH
eport Created on	: 01 Dec 98 01:19 PM	Analysis Method	: RT061698.MTH



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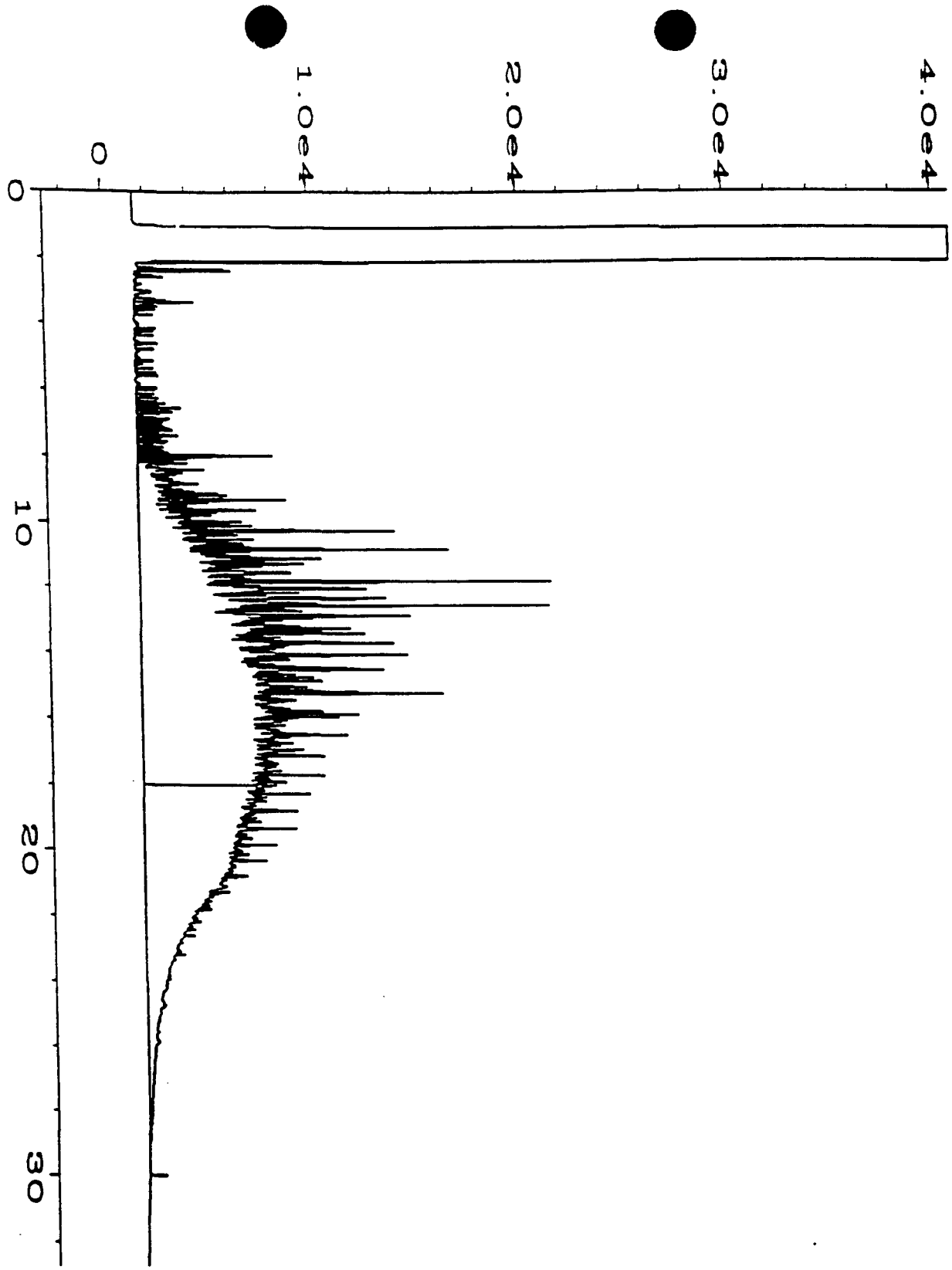
ata File Name : C:\HPCHEM\2\DATA\24NOV98\089F0101.D
perator : Pinnacle - mb & cff
Instrument : FID-FID1
ample Name : 811075-15*10
in Time Bar Code:
A ired on : ~~26 Oct 98~~ 27 Nov. 98 02:46 AM
o rt Created on: ~~26 Oct 98~~ 27 Nov. 98 02:21 PM

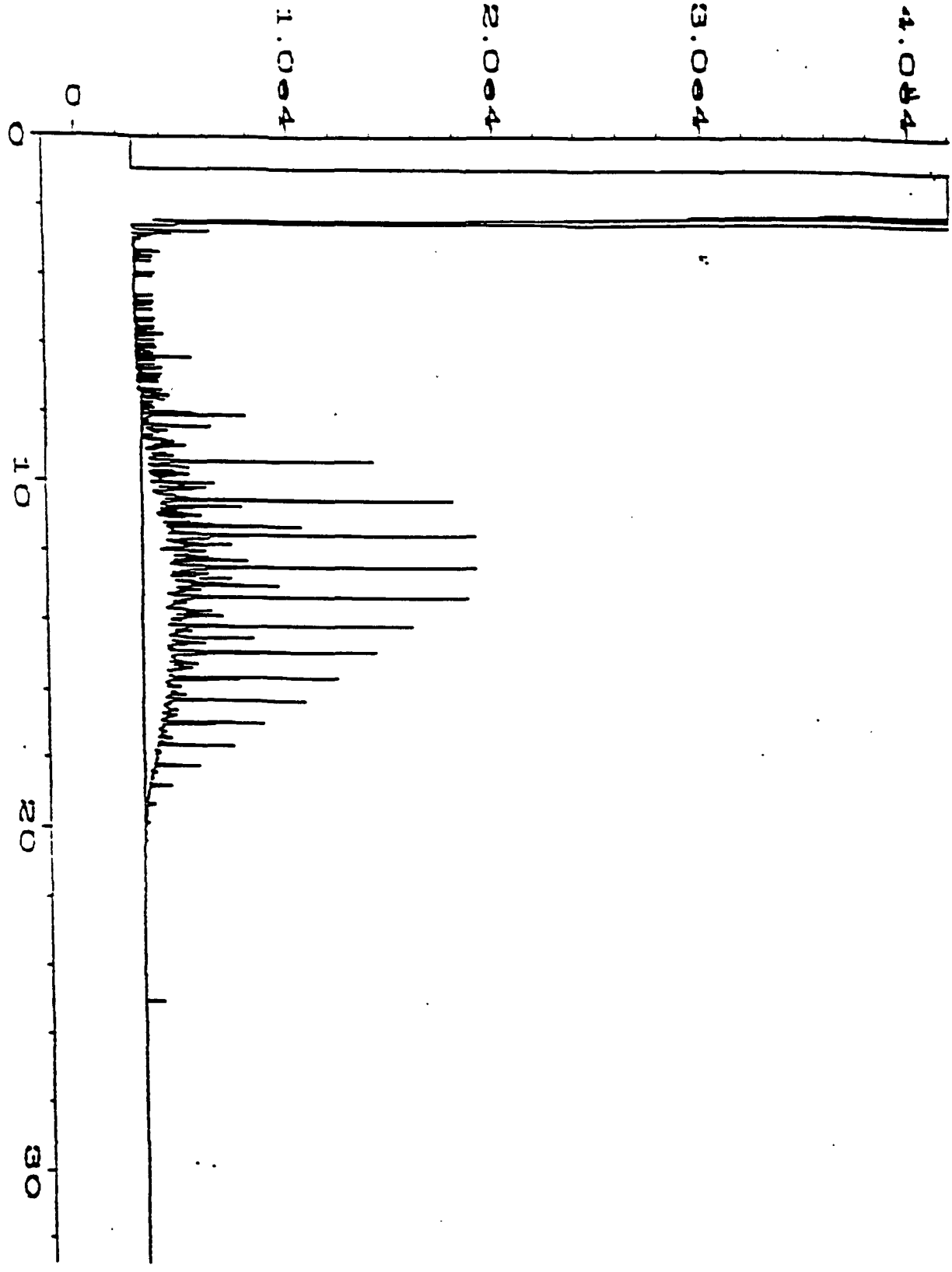
Page Number : 1
Vial Number : 89
Injection Number : 1
Sequence Line : 1
Instrument Method: RT061698.MTH
Analysis Method : RT061698.MTH



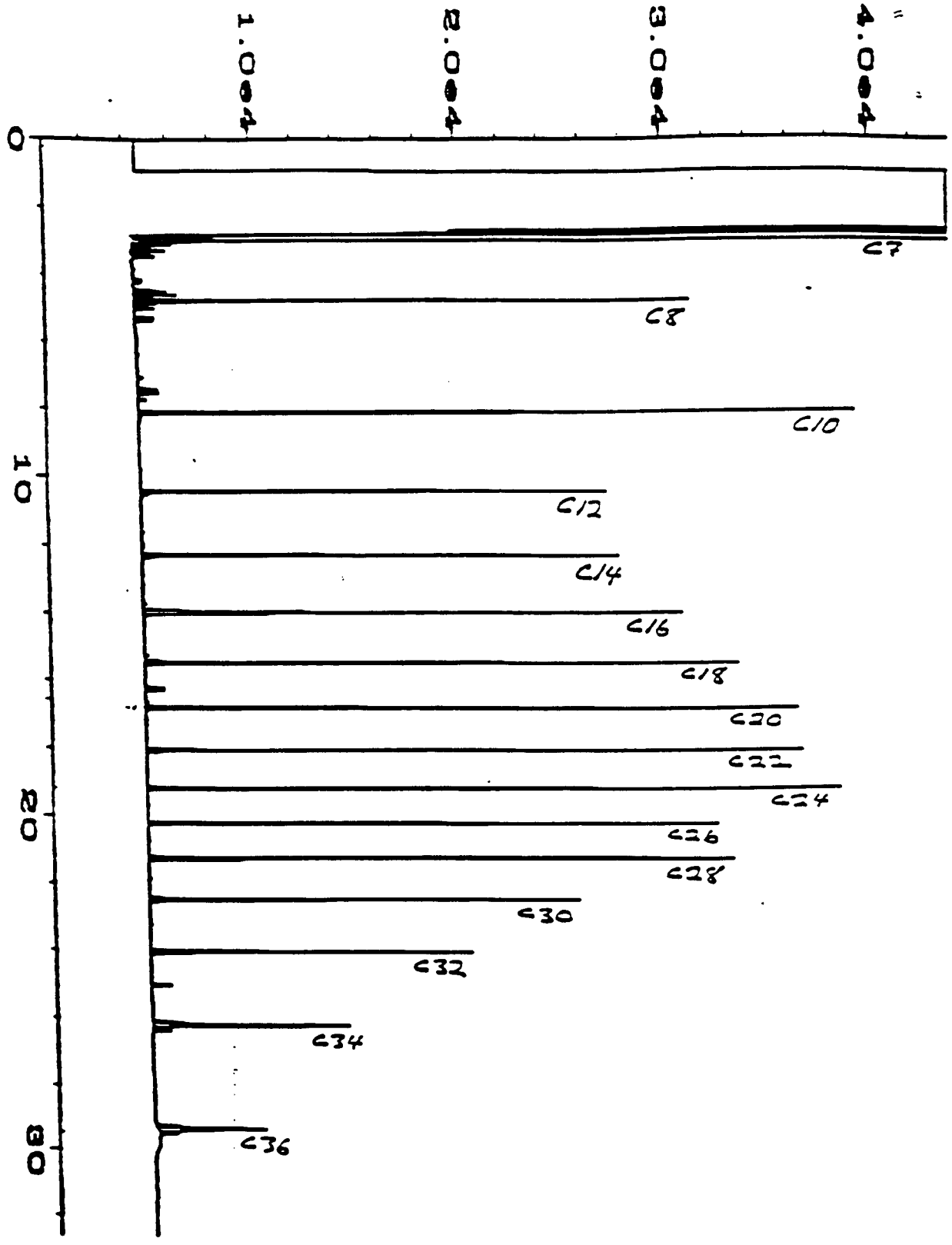
user modified

Data File Name : C:\HPCHEM\2\DATA\24NOV98\090F0101.D
Operator : Pinnacle - mb & cff
Instrument : FID-FID1
Sample Name : 811075-16*10
Run Time Bar Code:
Acquired on : ~~26 Oct 98~~ 27 Nov. 98 03:28 AM
Report Created on: ~~26 Oct 98~~ 27 Nov. 98 02:22 PM

Page Number : 1
Vial Number : 90
Injection Number : 1
Sequence Line : 1
Instrument Method: RT061698.MTH
Analysis Method : RT061698.MTH



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



Data File Name : C:\HPCHEM\1\DATA\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: 11 Apr 96 01:53 PM

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

Appendix C

Monitoring Well Boring Logs and Completion Details

Company Drilled for:
Marathon Oil Co.

Location:
Bertha Barber Battery

RHINO ENVIRONMENTAL SERVICES, INC.
1 (800) 762-0241

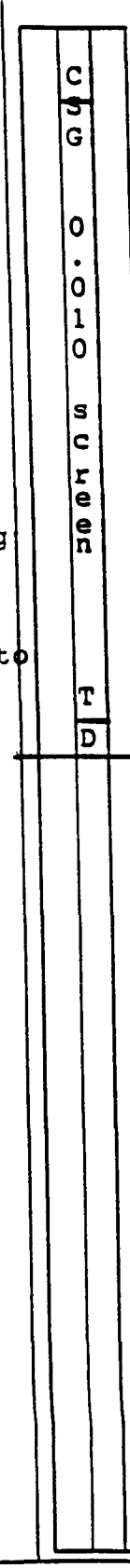
Drilling Log

Well/Bore Number:	Date Drilled:	Driller:	Logged By:
MW-1	12-14-98	A. Hodge	A. Hodge

Drilling Method:	Depth of Boring:	Depth of Well:	Length of Casing:	Length of Screen:
Hollow Stm. Aug.	TD-50'	47'	GL-6'	40'

Bore Diameter:	Casing Diameter:	Screen Diameter:	Slot Size:	Well Material:
7.75"	4" Sch. 40	4" Sch. 40	0.010"	Sch. 40 PVC

Depth	Lithology	Sample Type	PID (PPM)	Remarks
0	Top soil, red to brown sand	Split Spoon		3.0 @ 1' 1.0 @ 2' 1.8 @ 3' 2.0 @ 4' 2.8 @ 5'
	Black Hydrocarbon Stained			21 @ 6'
10	Dark Hydocarbon Stained Grey			169 @ 9' 153 @12' 151 @14' 157 @15'
20	Light Grey Hydrocarbon Stained Soil	23'-25' 25'-27' 27'-29' 29'-31' 31'-32'	231 264 307 258 280	160 @16' 163 @17' 207 @18' 291 @20'
30	Tan to Pink/White Caliche clay	32'-34'	216	Readings in ppm From GP-9 Geoprobe Sampling
	Top of Water @ 37'			
40	Pink to White Caliche Clay Water Sand			Sample from 32' to 34' had free oil EPA 418.1 = 483
50				



★ 8155

Company Drilled for:
Marathon Oil Co.

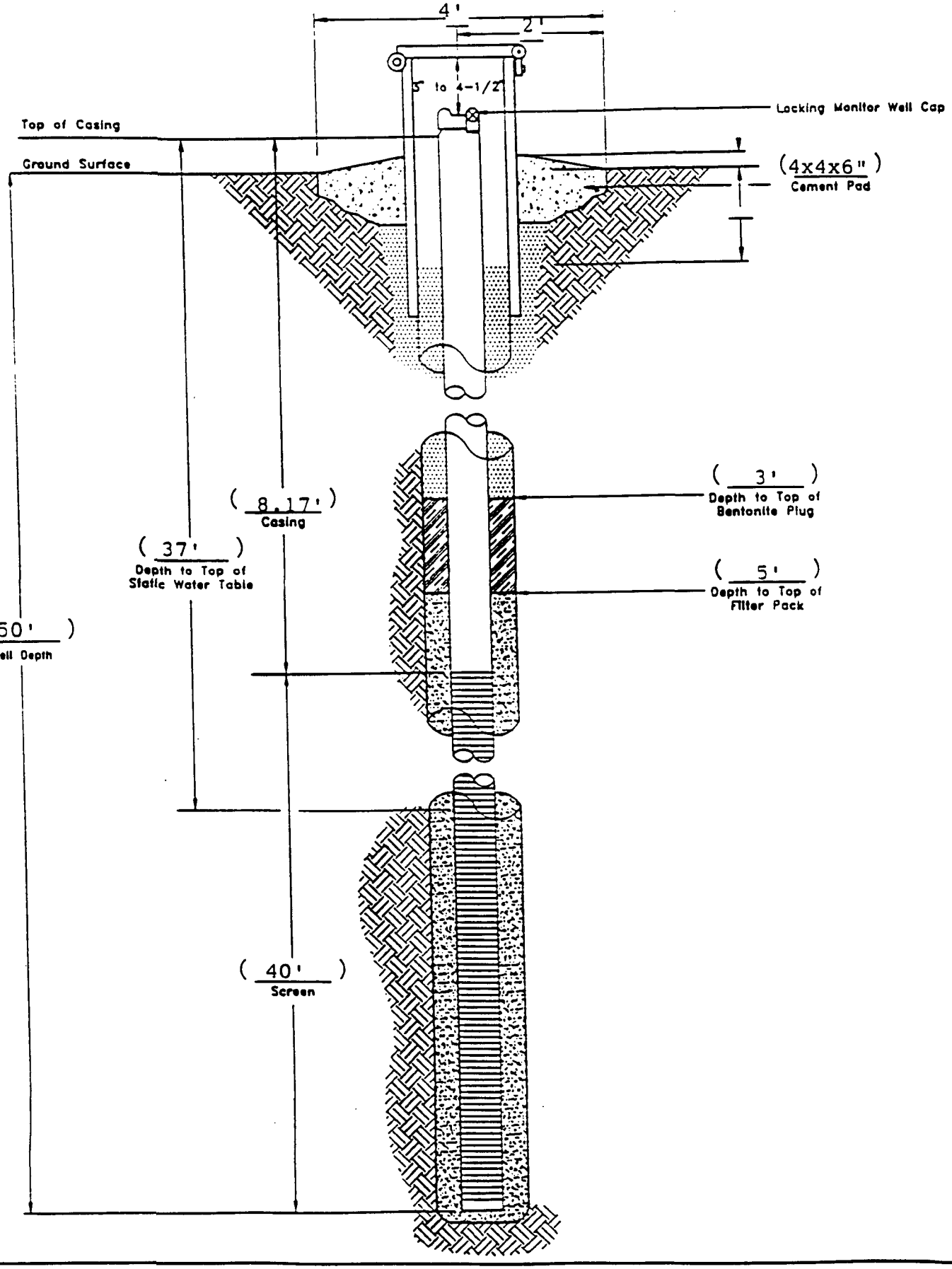
Location:
Bertha Barber Tank Battery

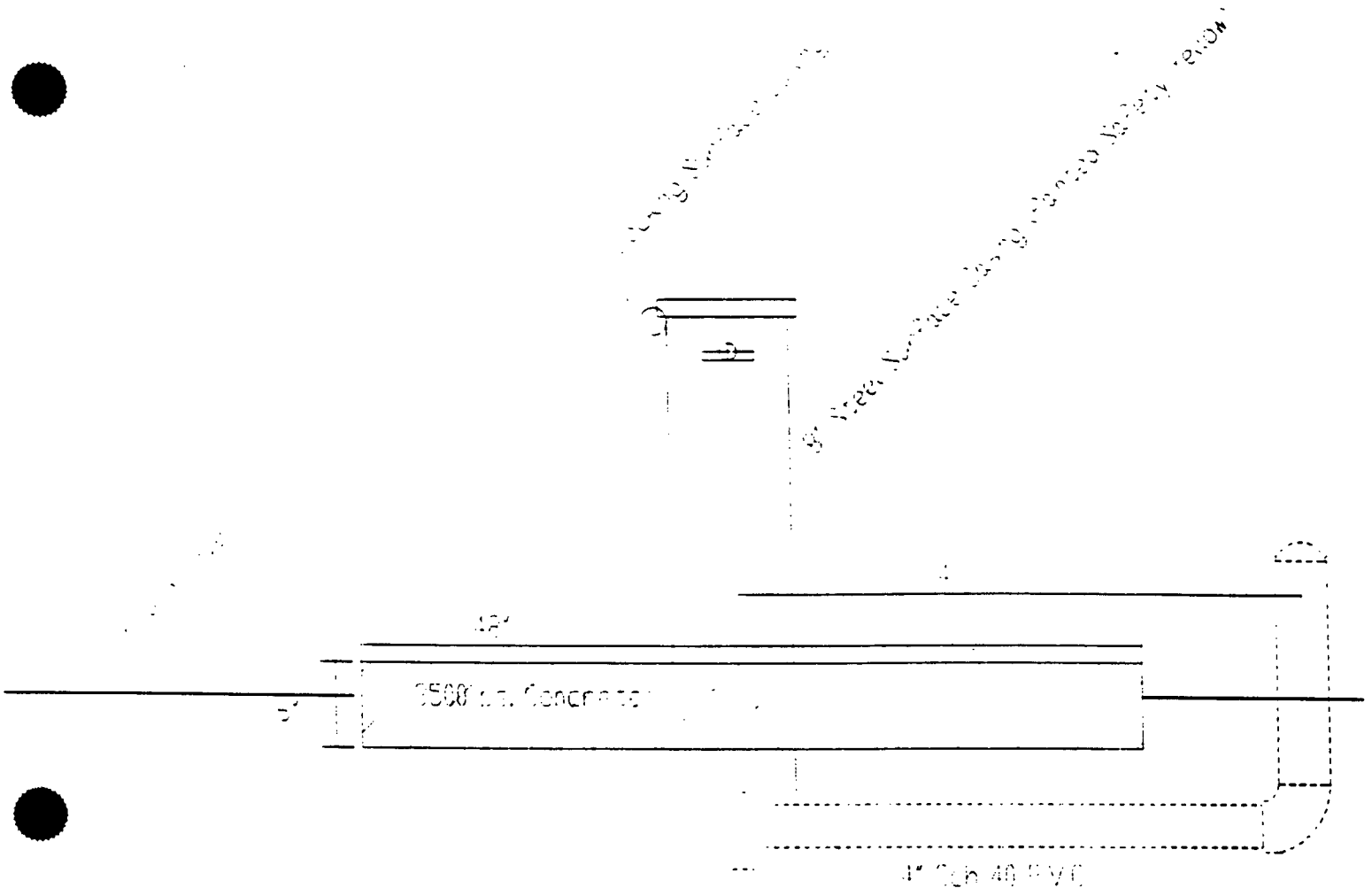
RHINO ENVIRONMENTAL SERVICES, INC.
1 (800) 762-0241

Monument Type Monitor Well Diagram

Job Number:	Installation Date:	Monitor Well Number:
RH-98-AH-17	12-14-98	MW-1

Depth:	Bore Size:	Casing Size:	Casing Elevation:	Screen Size:	Top of Water Elevation:
D-50'	7.75"	4"-SCH-40	+2.17 GL	0.010"	37'





NOT TO SCALE

Rhino Environmental Services, Inc.		
Marathon Oil Co. Bertha Barber Battery		
AS-BUILT DRAWING	1-6-99	E.J.M.

Company Drilled for:
Marathon Oil Co.

Location:
Bertha Barber Tank Battery

RHINO ENVIRONMENTAL SERVICES, INC.
1 (800) 762-0241

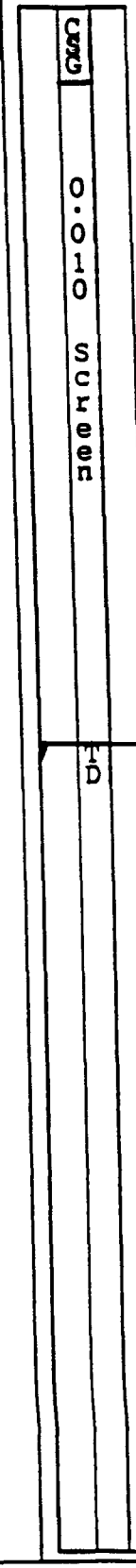
Drilling Log

Well/Bore Number:	Date Drilled:	Driller:	Logged By:
MW-2	12-15-98	A. Hodge	A. Hodge

Drilling Method:	Depth of Boring:	Depth of Well:	Length of Casing:	Length of Screen:
Hollow Stm.Aug.	50'	45'	GL-5'	40'

Bore Diameter:	Casing Diameter:	Screen Diameter:	Slot Size:	Well Material:
7.75"	4" - SCH-40	4" - SCH-40	0.010	SCH - 40

0	Top soil Red to Brown Sand	Split Spoon	5.2 @ 2' 100 @ 3' 193 @ 4' 184 @ 5' 128 @ 6'
5	Black Hydrocarbon Stained		
10	Grey to light Grey Hydrocarbon Stained Sand		
15			Readings in ppm From GP-21 Geoprobe
20		19'-20' 154	
25		24'-25' 306 317	
	Grey to Brown Sand W/rock	28' 182	
30	Top of Water @ 32.5'	29' 47 31'-33' 17	
35	Pink to White Calache Clay Water Sand		
40			
45			
50			
55			
60			
65			
70			
75			
80			
85			
90			
95			
100			
105			



★ 6155

Company Drilled for:
Marathon Oil Co.

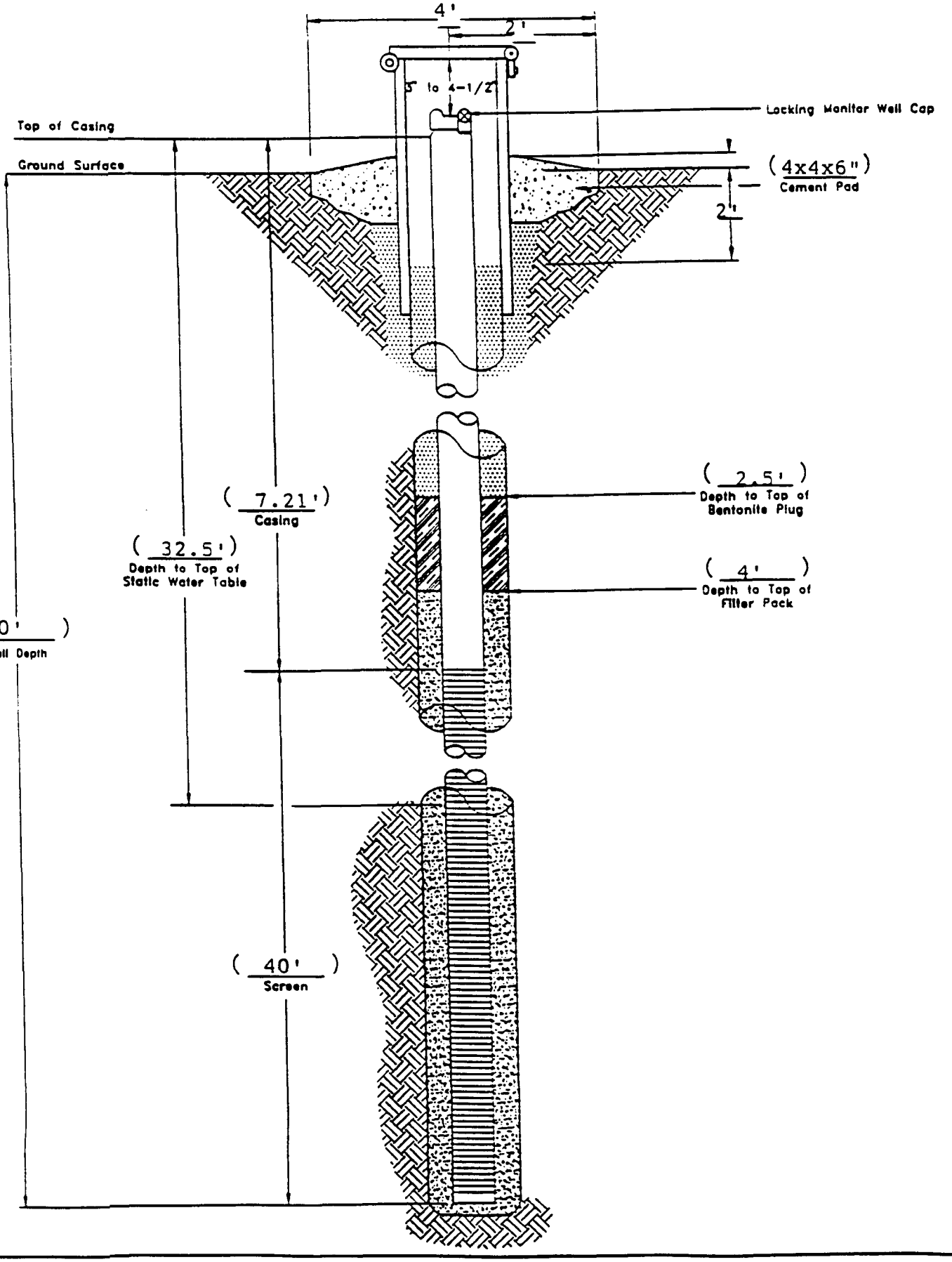
Location:
Bertha Barber Tank Battery

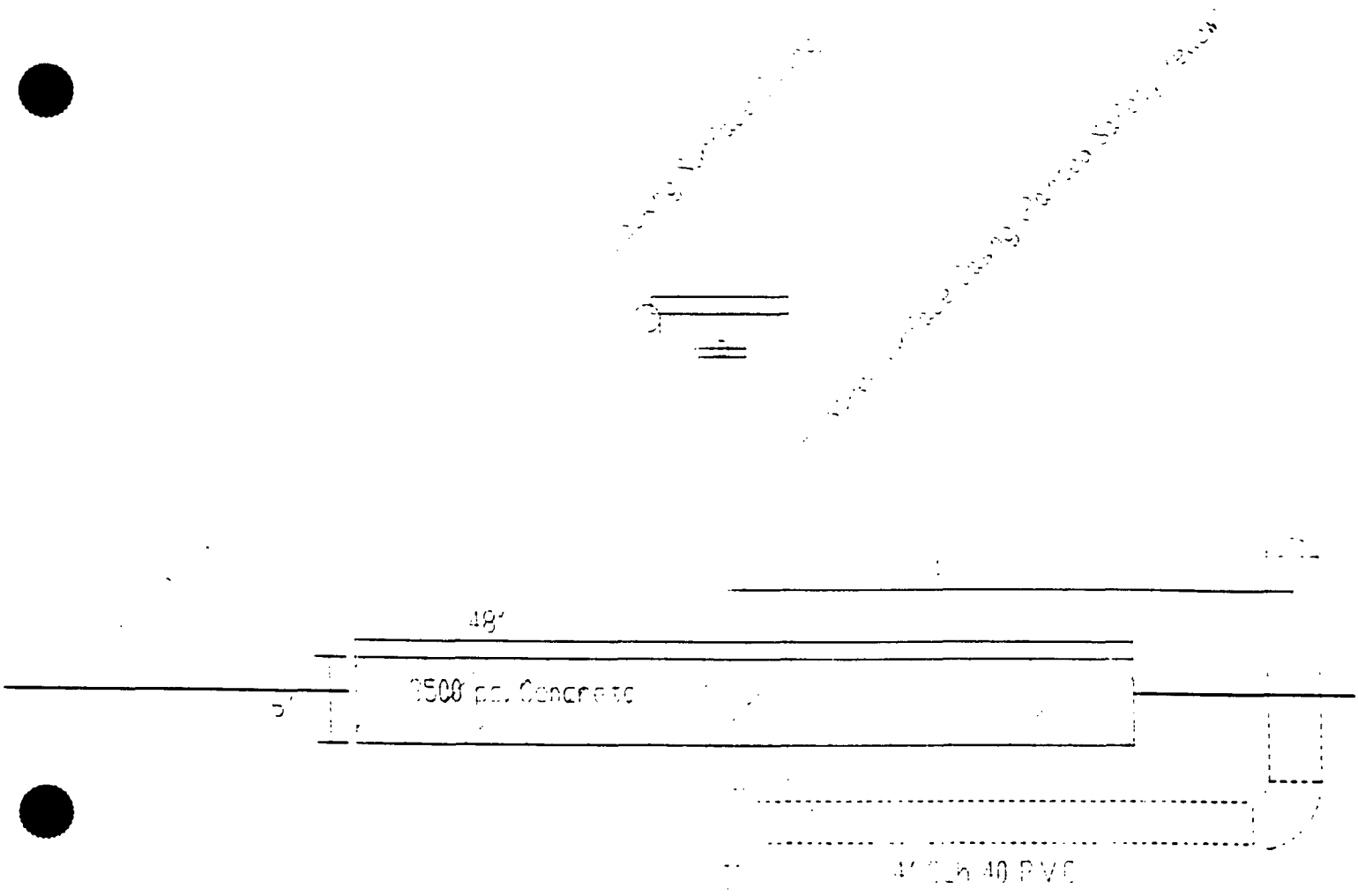
RHINO ENVIRONMENTAL SERVICES, INC.
1 (800) 762-0241

Monument Type Monitor Well Diagram

Job Number:	Installation Date:	Monitor Well Number:
RH-98-AH-17	12-15-98	MW-2

Dep 50'	Bore Size: 7.75"	Casing Size: 4" SCH-40	Casing Elevation: + 2.21 GL	Screen Size: 0.010"	Top of Water Elevation: 32.5'





NOT TO SCALE

Rhine Environmental Services, Inc.		
Marathon [illegible] Bertha Barber Battery		
AS-BUILT DRAWING	[illegible]-99	EJM

Company Drilled for: Marthon Oil Co.

Location: Bertha Barber Tank Battery

RHINO ENVIRONMENTAL SERVICES, INC.

1 (800) 762-0241

Drilling Log

Well/Bore Number:	Date Drilled:	Driller:	Logged By:
MW-3	12-16-98	A. Hodge	A. Hodge

Drilling [illegible]:	Depth of Boring:	Depth of Well:	Length of Casing:	Length of Screen:
Ho[illegible]ow Stm. Aug.	55'	50'	5'	45'

Bore Diameter:	Casing Diameter:	Screen Diameter:	Slot Size:	Well Material:
7.75"	4" - SCH-40	4"-SCH-40	0.010"	SCH-40 PVC

Depth	[illegible]	[illegible]	(PPM)	Remarks
0	Top Soil Red to Brown Sand	Split Spoon		4.2 @ 4' 183 @ 5'
5	White Hydrocarbon Stained			239 @ 6' 330 @ 7'
	Brown Hydrocarbon Stained			
10	Grey Hydrocarbon Stained Sand	20'-21' 20'-21'	588 423	372 @ 8' 384 @ 9' 457 @10' 405 @11' 478 @12' 500 @13' 478 @14' 467 @15' 460 @16'
25	Light Grey Hydrocarbon Stained Sand and Rock Stained-50% Top of Water @ 37'	25'-26' 26'-27' 30'-31' 31'-32-	467 468 463 470	475 @17' 466 @18' 509 @19' 441 @20' 477 @21' Refusal @22'
	Pink tp White Calache Clay Water Sand	35'-36' 36'-37'	266 200	Readings in ppm from GP-27 Geoprobe

CSG

0.010 Screen

TD

★ 8155

Company Drilled for:
Marathon Oil Co.

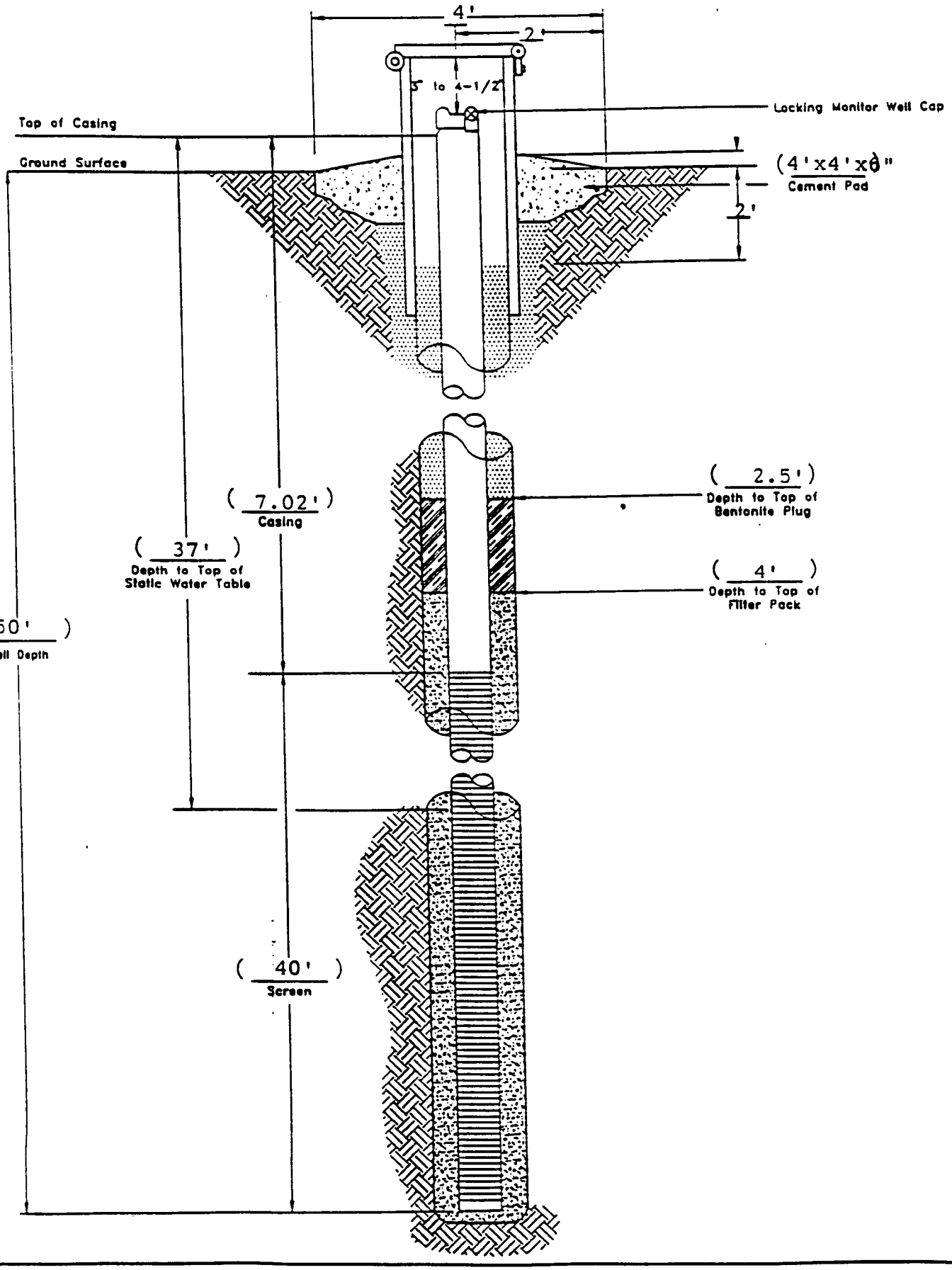
Location:
Bertha Barber Battery

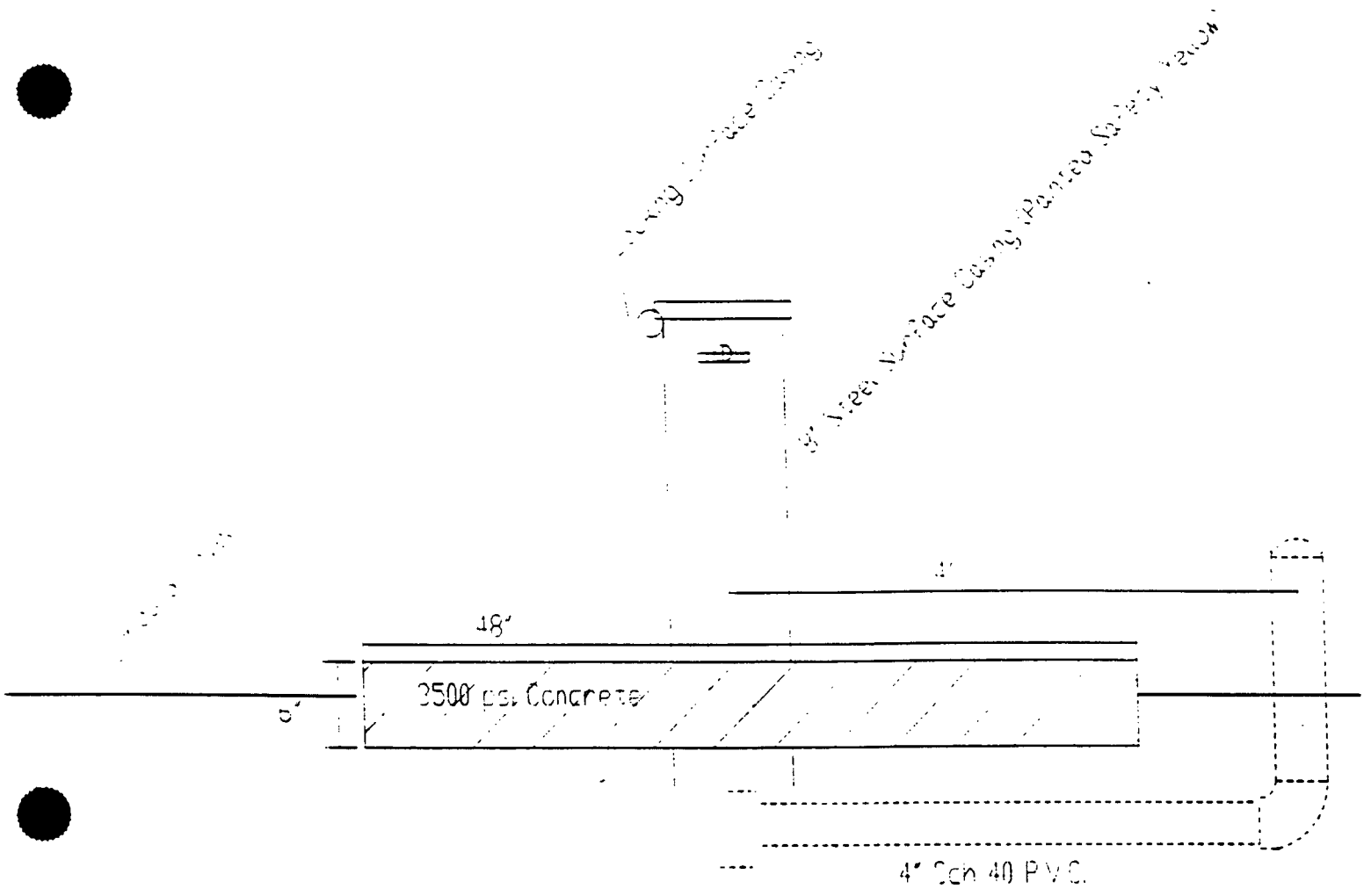
RHINO ENVIRONMENTAL SERVICES, INC.
1 (800) 762-0241

Monument Type Monitor Well Diagram

Job Number:	Installation Date:	Monitor Well Number:
RH-98-AH-17	12-16-98	MW-3

Dep[illegible]TD-50	Bore Size: 7.75"	Casing Size: 4" Sch 40	Casing Elevation: +2.02 GL	Screen Size: 0.010"	Top of Water Elevation: 37'





TYP. OF (5)

NOT TO SCALE

Rhino Environmental Services, Inc.		
Marathon Oil Co. Bertha Barber Battery		
AS-BUILT DRAWING	1-6-99	E.J.M.

Company Drilled for:

Marathon Oil CO.

Location:

Bertha Barber Battery

RHINO ENVIRONMENTAL SERVICES, INC.
1 (800) 762-0241

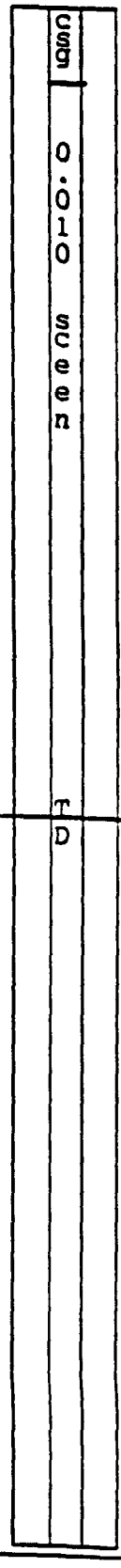
Drilling Log

Drilling Rig	Depth of Boring	Well/Bore Number	Date Drilled	Driller	Logged By
Ho[illegible]w Stm. Agr.		MW-4	12-16-98	A. Hodge	A. Hodge

Bore Diameter	Casing Diameter	Depth of Well	Length of Casing	Length of Screen
7.75"	4" Sch 40	TD-55'	5'	40'

Screen Diameter	Slot Size	Well Material
4" Sch 40	0.010"	Sch 40 PVC

Depth	Lithology	Sample Type	OVA (PPM)	Remarks
0	Dk Brown HC Stained Sand	Drill Blind to 55'		161 @ 2'
5				427 @ 4'
				459 @ 5'
				467 @ 6'
10				450 @ 7'
				430 @ 8'
				329 @ 9'
15				455 @10'
	Lt.brown HC Stained Sand			403 @11'
20				423 @12'
				388 @13'
25				347 @14'
				406 @15'
				424 @16'
30	Lt Grey HC Stained Sand			437 @17'
				434 @18'
35	Top of Water			421 @19'
				385 @20'
				399 @21'
40				384 @23'
				391 @25'
45				370 @27'
				425 @29'
50				398 @30'
				322 @31'
55				306 @33'
				382 @34'
60				Readings in ppm
				From GP-24
65				Geoprobe Sampling
70				
75				
80				
85				
90				
95				
100				
105				



* 8155

Company Drilled for:

Marathon Oil Co.

Location:

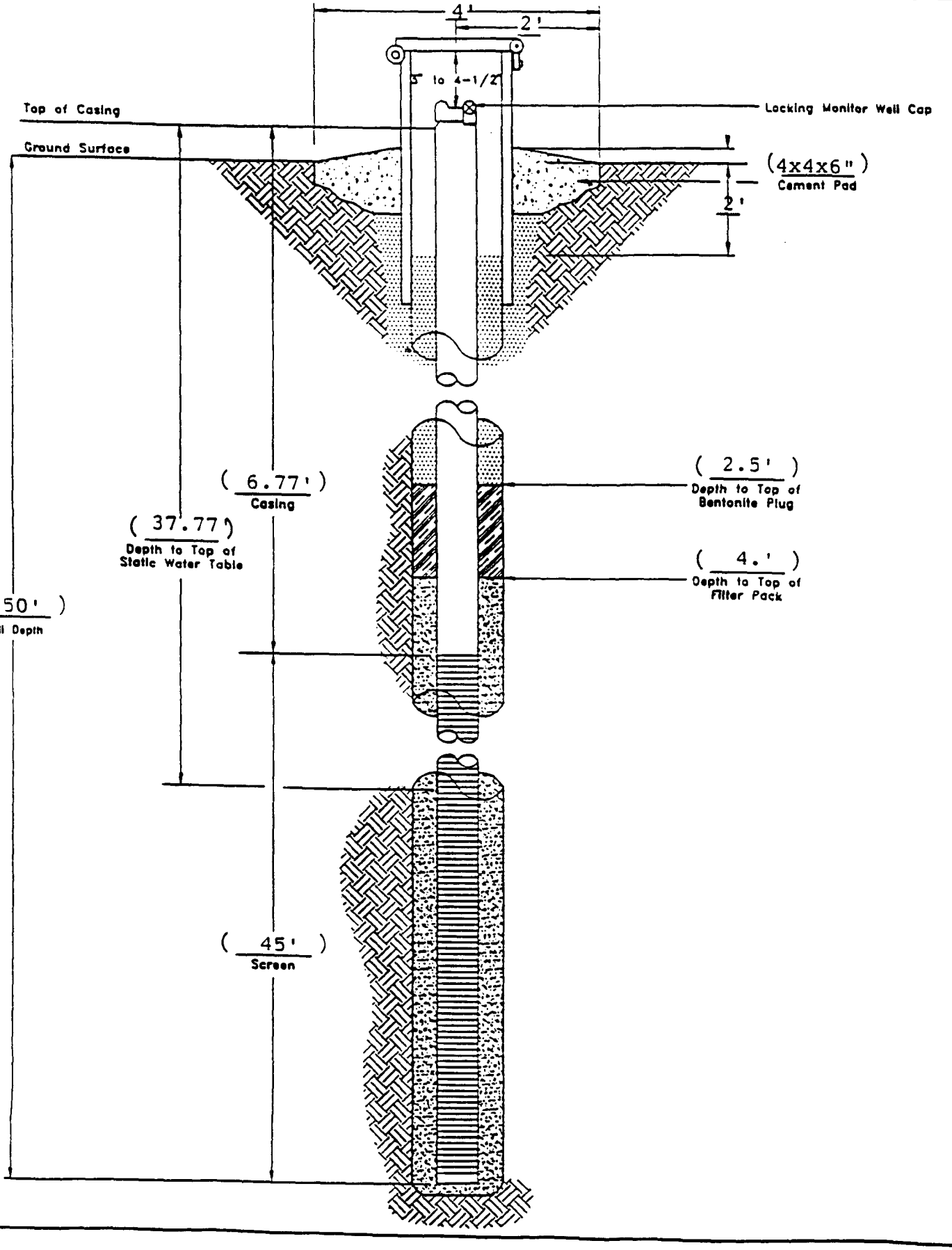
Bertha Barber Battery

RHINO ENVIRONMENTAL SERVICES, INC.
(800) 762-0241

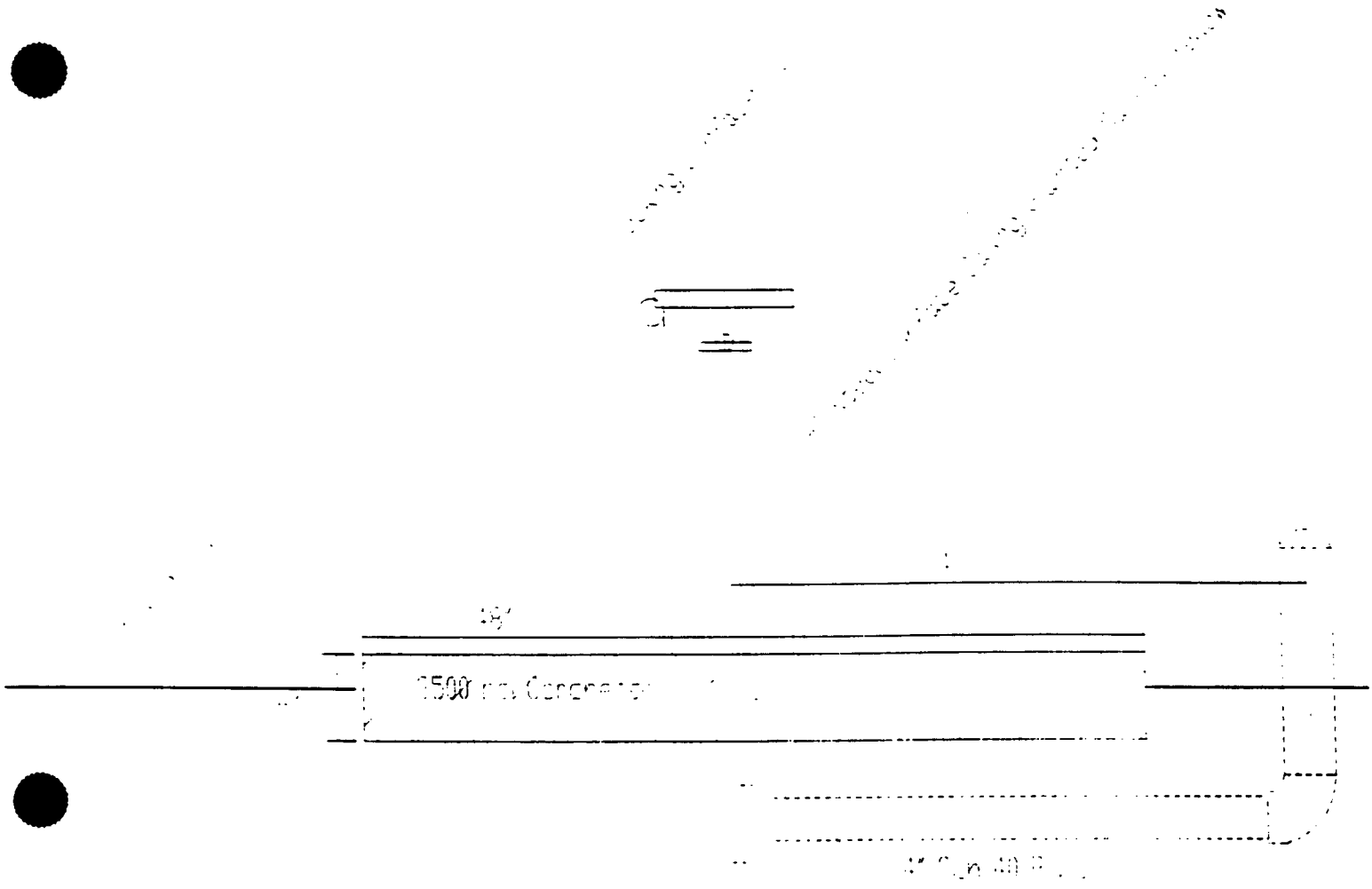
Monument Type Monitor Well Diagram

Job Number:	Installation Date:	Monitor Well Number:
RH-98-AH-17	12-16-98	MW-4

De[illegible]5'	Bore Size: 7.75"	Casing Size: 4"Sch.40	Casing Elevation: +1.77 GL	Screen Size: 0.010"	Top of Water Elevation: 36'



★ 8157



NOT TO SCALE

Rhino Environmental Services, Inc.		
Marathon Oil Co. Bergen Burner Battery		
AS-BUILT DRAWING	[illegible]	E.M.

Company Drilled for: Marathon Oil Co.

Location: Bertha Barber Battery

RHINO ENVIRONMENTAL SERVICES, INC.
1 (800) 762-0241

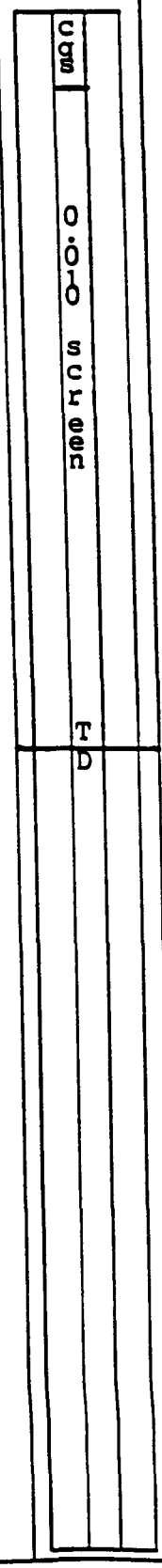
Drilling Log

Well/Bore Number:	Date Drilled:	Driller:	Logged By:
MW-5	12-17-98	A Hodge	A Hodge

Drilling Method:	Depth of Boring:	Depth of Well:	Length of Casing:	Length of Screen:
Hollow Stm. Aug.	50'	50'	5'	45'

Bore Diameter:	Casing Diameter:	Screen Diameter:	Slot Size:	Well Material:
7.75"	4" Sch. 40	4" Sch. 40	0.010"	Sch. 40 PVC

Depth	Lithology	Sample Type	OVA (PPM)	Remarks
0	Drill Blind to 24'			5 @ 1' 3 @ 2' 2 @ 3' 2 @ 4' 2 @ 5' 27 @ 6' 2 @ 7' 39 @ 8' 309 @ 9' 511 @11' 538 @12' 544 @13' 530 @14' 522 @15' 525 @16' 496 @17' 480 @18' 418 @19'
25	Lt. Brown Fine Sand W/ Rocks Hydrocarbon Stain			
30	Grey Stained Sand Top of Water			
35	Lt. Brown Fine Sand And Rock			Readings in ppm From GP-30 Geoprobe Sampling
40				
45				
50				
55				
60				
65				
70				
75				
80				
85				
90				
95				
100				
105				



Company Drilled for: Marathon Oil Co.

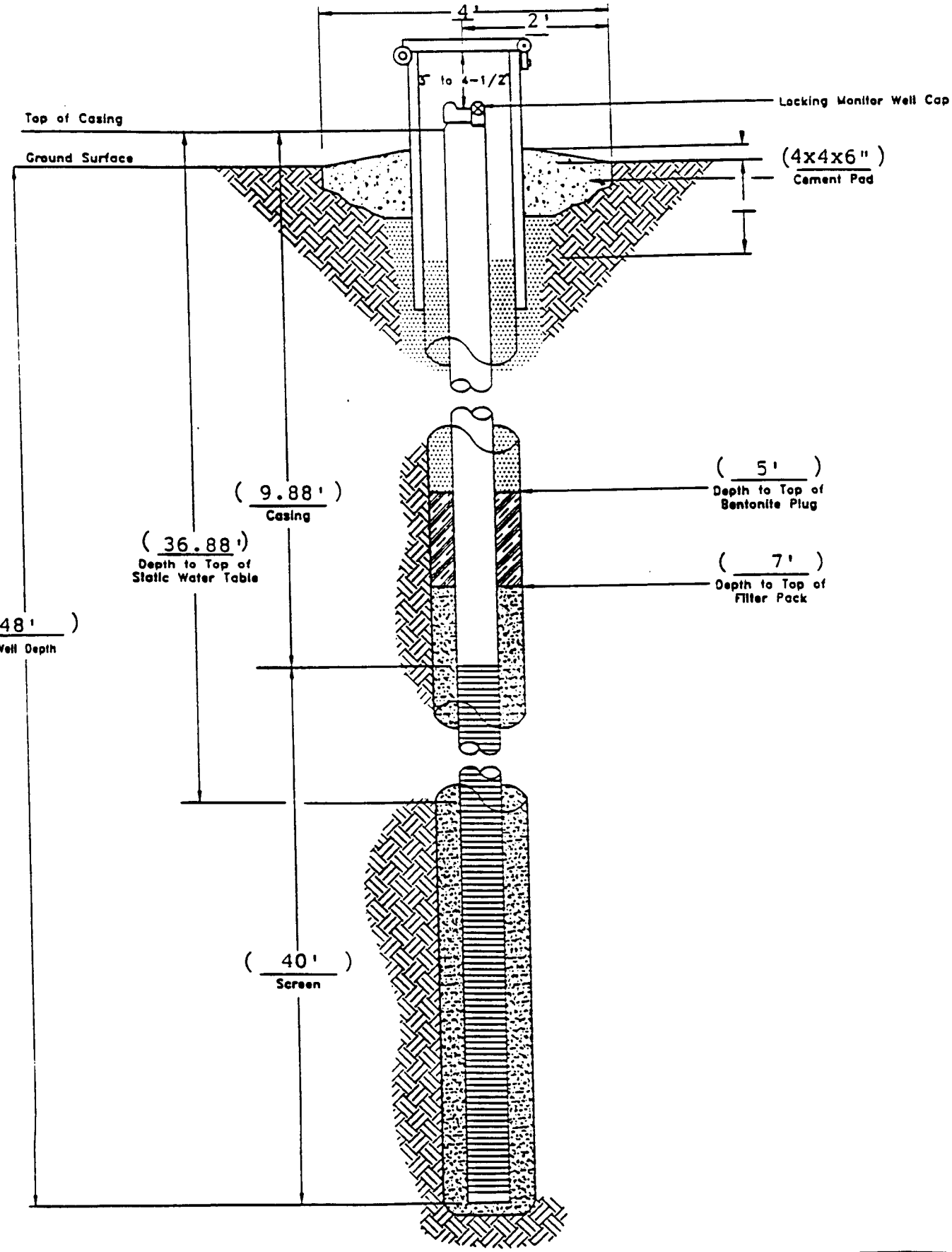
Location: Bertha Barber Battery

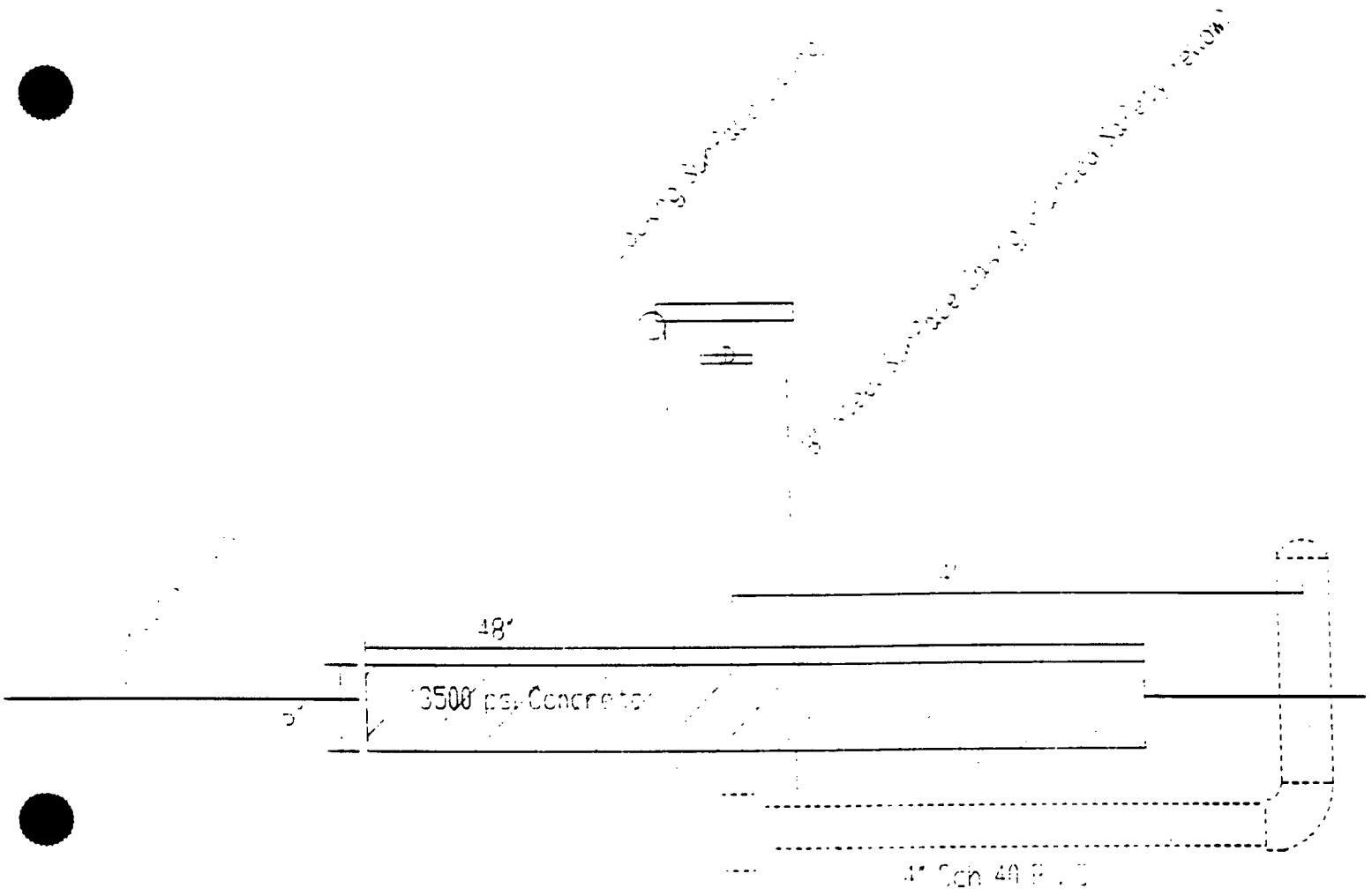
RHINO ENVIRONMENTAL SERVICES, INC.
1 (800) 762-0241

Monument Type Monitor Well Diagram

Job Number:	Installation Date:	Monitor Well Number:
Rh-98-AH-17	12-17-98	MW-5

D[illed]: 50'	Bore Size: 7.75"	Casing Size: 4" Sch. 40	Casing Elevation: +1.88 GL	Screen Size: 0.010"	Top of Water Elevation: 35'





NOT TO SCALE

Rhino Environmental Services, Inc.		
Marathon Oil Co. - Bertha Barker Battery		
AS-BUILT DRAWING	1-6-99	E.J.M.

Appendix D

Laboratory Analytical Results,
December 1998 Groundwater
Sampling Event

PINNACLE LABORATORIES

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

Pinnacle Lab ID number **812100**
January 22, 1999

MARATHON OIL COMPANY
P.O. BOX 552
MIDLAND, TX 79702-0552

Project Name BERTHA BARBER
Project Number (none)

Attention: PAUL PEACOCK

On 12/31/98 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous** 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.

EPA methods 150.1 and 8021 were performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

EPA methods 8310 and Total Dissolved Solids for sample MW-3 were performed by Hall Environmental Analysis Laboratory, Albuquerque, NM.

EPA methods 160.1 and 8310 were performed by STL, Pensacola, FL.

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	: MARATHON OIL COMPANY	PINNACLE ID	: 812100
PROJECT #	: (none)	DATE RECEIVED	: 12/31/98
PROJECT NAME	: BERTHA BARBER	REPORT DATE	: 1/22/99

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	MW-1	AQUEOUS	12/30/98
02	MW-2	AQUEOUS	12/29/98
03	MW-3	AQUEOUS	12/28/98
04	MW-4	AQUEOUS	12/29/98
05	MW-5	AQUEOUS	12/29/98

PINNACLE LABORATORIES

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

GENERAL CHEMISTRY RESULTS

CLIENT	: MARATHON OIL COMPANY	PINNACLE I.D.	: 812100
PROJECT #	: (none)	DATE RECEIVED	: 12/31/98
PROJECT NAME	: BERTHA BARBER		

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE ANALYZED
01	MW-1	AQUEOUS	12/30/98	1/4/99
02	MW-2	AQUEOUS	12/29/98	1/4/99
03	MW-3	AQUEOUS	12/28/98	1/4/99

PARAMETER	UNITS	MW-1	MW-2	MW-3
PH (150.1)	UNITS	6.88	7.15	6.95

CHEMIST NOTES:

PINNACLE LABORATORIES

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

GENERAL CHEMISTRY RESULTS

CLIENT	: MARATHON OIL COMPANY	PINNACLE I.D.	: 812100
PROJECT #	: (none)	DATE RECEIVED	: 12/31/98
PROJECT NAME	: BERTHA BARBER		

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE ANALYZED
04	MW-4	AQUEOUS	12/29/98	1/4/99
05	MW-5	AQUEOUS	12/29/98	1/4/99

PARAMETER	UNITS	MW-4	MW-5
PH (150.1)	UNITS	7.04	6.98

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT	: MARATHON OIL COMPANY	PINNACLE I.D.	: 812100
PROJECT #	: (none)	SAMPLE MATRIX	: AQ
PROJECT NAME	: BERTHA BARBER		

PARAMETER	UNITS	PINNACLE I.D.	SAMPLE RESULT	DUP. RESULT	% RPD
PH	UNITS	812100-02	7.15	7.14	0

CHEMIST NOTES:
N/A

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

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

PINNACLE LABORATORIES

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

GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 812100

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	MW-1	AQUEOUS	12/30/98	NA	1/4/99	1
02	MW-2	AQUEOUS	12/29/98	NA	1/4/99	1
03	MW-3	AQUEOUS	12/28/98	NA	1/4/99	1

PARAMETER	DET. LIMIT	UNITS	MW-1	MW-2	MW-3
BENZENE	0.5	**UG/L**	**2.8**	**1.1**	**32**
TOLUENE	0.5	**UG/L**	**1.1**	**0.6**	**2.1**
ETHYLBENZENE	0.5	**UG/L**	**0.7**	**1.7**	**26**
TOTAL XYLENES	0.5	**UG/L**	**2.1**	**2.0**	**21**

SURROGATE:				
BROMOFLUOROBENZENE (%)		104	116	115
SURROGATE LIMITS	(80 - 120)			

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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

GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED
CLIENT : MARATHON OIL COMPANY
PROJECT # : (none)
PROJECT NAME : BERTHA BARBER

PINNACLE I.D.: 812100

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	MW-4	AQUEOUS	12/29/98	NA	1/4/99	1
05	MW-5	AQUEOUS	12/29/98	NA	1/4/99	1

PARAMETER	DET. LIMIT	UNITS	MW-4	MW-5
BENZENE	0.5	**UG/L**	**16**	**180**
TOLUENE	0.5	**UG/L**	**15**	**41**
ETHYLBENZENE	0.5	**UG/L**	**2.7**	**67**
TOTAL XYLENES	0.5	**UG/L**	**28**	**43**

SURROGATE:

BROMOFLUOROBENZENE (%)		108	101
SURROGATE LIMITS	(80 - 120)		

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

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

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8021 MODIFIED	PINNACLE I.D.	: 812100
BLANK I. D.	: 010499	DATE EXTRACTED	: N/A
CLIENT	: MARATHON OIL COMPANY	DATE ANALYZED	: 1/4/99
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: BERTHA BARBER		

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 (%)		112
SURROGATE LIMITS:	(80 - 120)	

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 QUALITY CONTROL
MSMSD

TEST	: EPA 8021 MODIFIED		
MSMSD #	: 812100-02	PINNACLE I.D.	: 812100
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: N/A
PROJECT #	: (none)	DATE ANALYZED	: 1/4/99
PROJECT NAME	: BERTHA BARBER	SAMPLE MATRIX	: AQUEOUS
		UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	**1.1**	10.0	10.9	98	10.9	98	0	(80 - 120)	20
TOLUENE	**0.6**	10.0	10.6	100	10.7	101	1	(80 - 120)	20
ETHYLBENZENE	**1.7**	10.0	12.5	108	12.4	107	1	(80 - 120)	20
TOTAL XYLENES	**2.0**	30.0	33.6	105	33.5	105	0	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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

Hall Environmental
Analysis Laboratory

Hall Environmental Analysis Laboratory
4901 Hawkins NE, Suite A
Albuquerque, NM 87109

1/7/99

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Dear Mr. Mitch Rubenstein:

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely:

Andy Freeman
Assistant Laboratory Manager

Project: 9901001/MOC

Hall Environmental Analysis Laboratory

Client:	Pinnacle Laboratories, Inc.	**Date Collected:**	12/28/98
Project:	MOC	**Date Received:**	1/4/99
Project Manager:	Mitch Rubenstein	**Sample Matrix:**	Aqueous
Project Number:	812100	**Extraction Date:**	1/4/99

EPA Method 8310
Polynuclear Aromatic Hydrocarbons
Units (ug/L)

	Sample Name:	Extraction Blank	812100-03
	Lab Code:	-	9901001-1
	Date Analyzed:	1/5/99	1/5/99
Compound	**MRL**		
Naphthalene	2.5	ND	ND
1-Methylnaphthalene	2.5	ND	5.3
2-Methylnaphthalene	2.5	ND	4.1
Acenaphthylene	2.5	ND	ND
Acenaphthene	2.5	ND	ND
Fluorene	0.20	ND	ND
Phenanthrene	0.60	ND	ND
Anthracene	0.60	ND	ND
Fluoranthene	0.30	ND	ND
Pyrene	0.30	ND	ND
Benzo(a)anthracene	0.02	ND	ND
Chrysene	0.20	ND	ND
Benzo(b)flroranthene	0.02	ND	ND
Benzo(k)fluoranthene	0.02	ND	ND
Benzo(a)pyrene	0.02	ND	ND
Dibenzo(a,h)anthracene	0.04	ND	ND
Benzo(g,h,I)perylene	0.03	ND	ND
Indeno(1,2,3-cd)pyrene	0.08	ND	ND
% Benzo(e)pyrene:		87%	92%
Dilution:		1	1

4901Hawkins NE, Suite A, Albuquerque, NM 87109
Ph (505) 345-3975, Fax 345-4107

Hall Environmental Analysis Laboratory

Client:	Pinnacle Laboratories, Inc.	**Date Collected:**	12/28/98
Project:	MOC	**Date Received:**	1/4/98
Project Manager:	Mitch Rubenstein	**Sample Matrix:**	Aqueous
Project Number:	812100		

Inorganic Compounds

HEAL LAB ID	Sample ID	TDS (mg/L)
9901001-1	812100-03	3,590
Detection Limits		1
Method		160.1
Date Analyzed		1/4/99

Hall Environmental Analysis Laboratory

Client:	Pinnacle Laboratories, Inc.	**Date Collected:**	NA
Project:	MOC	**Date Received:**	NA
Project Manager:	Mitch Rubenstein	**Sample Matrix:**	Aqueous
Project Number:	812100	**Date Extracted:**	NA

8310 QC: BS/BSD 12/28

Compound	Sample Amount (ug/L)	Spike	Recovery	% Rec	Dup	% Dup	RPD
Naphthalene	<2.5	51.4	28.5	55	30.8	60	8
Acenaphthylene	<2.5	46.5	30.3	65	31.3	67	3
Acenaphthene	<2.5	49.4	32.7	66	32.9	67	1
Fluorene	<0.2	29.9	22.8	76	20.6	69	10
Phenanthrene	<0.60	4.0	3.21	80	3.40	85	6
Pyrene	<0.3	4.05	3.71	92	3.82	94	3
Benzo(g,h,i)perylene	<0.03	0.555	0.550	99	0.588	106	7

Pinnacle Laboratories, Inc. Interlab Chain of Custody Date: 1/4 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

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals-TAL		TOX	TOC	Gen Chemistry	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
812100-03	12/28	1200	AQ	990101-1									X							X								

PROJECT INFORMATION	SAMPLE RECEIPT	SAMPLES SENT TO:
PROJECT #: 812100	Total Number of Containers	PENSACOLA - STL-FL
PROJ. NAME: MOC	Chain of Custody Seals	PORTLAND - ESL-OR
QC LEVEL: (STD) IV	Received Intact?	STL - CT
QC REQUIRED: MS MSD BLANK	Received Good Cond./Cold	STL- NEW JERSEY
TAT: (STANDARD) RUSH!!	LAB NUMBER:	N. CREEK
		BARRINGER
		SEQUOIA
		Hall Environ. X

DUE DATE: 1/14
RUSH SURCHARGE: 100%
CLIENT DISCOUNT: —
SPECIAL CERTIFICATION REQUIRED: YES (NO)

COMMENTS: Sample goes out of hold TODAY 1/4!!

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
Signature: Francine Jaino Time: 1020	Signature: J Tenorio Time: 12:00
Printed Name: Francine Jaino Date: 1/4/99	Printed Name: J Tenorio Date: 01/04
Company: Pinnacle Laboratories, Inc.	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2**
Signature: A Mitchell Time: 1020	Signature: Time: 1/4/99
Printed Name: HM Rubenstein Date: 1/4/99	Printed Name: IAN CAMERON Date: 1/4/99
Company: Pinnacle	Company: HALL

Committed To *Your* Success

Severn Trent Laboratories
11 East Olive Road
Pensacola FL 32514

Tel: (850) 474-1001
Fax: (850) 478-2671

SIGNATURE PAGE

Reviewed by: ______________________
STL Project Manager

Client:	PINNACLE LABORATORIES ALBUQUERQUE, NEW MEXICO
Project Name:	MOC
Project Number:	812100
Project Location:	BERTHA BARBER
Accession Number:	901018
Project Manager:	KIMBERLY D. MCNEILL
Sampled By:	N/S

Committed To Your Success

SEVERN TRENT LABORATORIES, INC. – PENSACOLA, FLORIDA
STATE CERTIFICATIONS

Alabama Department of Environmental Management, Laboratory ID No. 40150 (Drinking Water by Reciprocity with FL)

Arizona Department of Health Services, Lab ID No. AZ0589 (Hazardous Waste & Wastewater)

State of California, Department of Health Services, Laboratory ID No. 1-2338 (Hazardous Waste and Wastewater)

State of Connecticut, Department of Health Services, Connecticut Lab Approval No. PH-0697 (Drinking Water, Hazardous Waste and Wastewater)

Delaware Health & Social Services, Division of Public Health, Laboratory ID No. FL094 (Drinking Water by Reciprocity with FL)

Florida DOH Laboratory ID No. 81142 (Drinking Water), Laboratory ID No. E81010 (Hazardous Waste and Wastewater)

Florida, Radioactive Materials License No. G0733-1

Foreign Soil Permit, Permit No. S-37599

Kansas Department of Health & Environment, Laboratory ID No. E10253 (Wastewater and Hazardous Waste)

Commonwealth of Kentucky, Natural Resources and Environmental Protection Cabinet; Laboratory ID No. 90043 (Drinking Water)

State of Louisiana, DHH, Office of Public Health Division of Laboratories, Laboratory ID No. 98-25 (Drinking Water)

State of Maryland, DH&MH Laboratory ID No. 233 (Drinking Water by Reciprocity with Florida)

Commonwealth of Massachusetts, DEP, Laboratory ID No. M-FL094 (Hazardous Waste and Wastewater)

State of Michigan, Bureau of E&OccH (No Laboratory ID No. assigned by state) (Drinking Water by Reciprocity with Florida)

New Hampshire DES, Laboratory ID No. 250598-A (Wastewater)

State of New Jersey, Department of Environmental Prptection & Energy, Laboratory ID No. 49006 (Wastewater)

New York State, Department of Health, Laboratory ID No. 11503 (Wastewater and Solids/Hazardous Waste)

North Carolina Department of Environment, Health, & Natural Resources, Laboratory ID No. 314 (Hazardous Waste and Wastewater)

North Dakota DH&Consol Labs, Laboratory ID No. R-108 (Hazardous Waste and Wastewater by Reciprocity with California)

State of Oklahoma, Oklahoma Department of Environmental Quality, Laboratory ID No. 9810 (Hazardous Waste and Wastewater)

Commonwealth of Pennsylvania, Department of Environmental Resources, Laboratory ID No. 68-467 (Drinking Water)

South Carolina DH&EC, Laboratory ID No. 96026 (Wastewater by Reciprocity with FL and Solids/Hazardous Waste by Reciprocity with CA)

Tennessee Department of Health & Environment, Laboratory ID No. 02907 (Drinking Water)

Tennessee Division of Underground Storage Tanks Approved Laboratory

Virginia Department of General Services, Laboratory ID No. 00008 (Drinking Water by Reciprocity with FL)

State of Washington, Department of Ecology, Laboratory ID No. C282 (Hazardous Waste and Wastewater)

West Virginia Division of Environmental Protection, Office of Water Resources, Laboratory ID No. 136 (Hazardous Waste and Wastewater by Reciprocity with FL)

American Industrial Hygiene Association (AIHA) Accredited Laboratory, Laboratory ID No. 9133

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Analysis Report

Analysis: Group of Single Wetchem

Accession:	901018
Client:	PINNACLE LABORATORIES
Project Number:	812100
Project Name:	MOC
Project Location:	BERTHA BARBER
Department:	WET CHEM

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Date 11-Jan-99

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 901018
Client: PINNACLE LABORATORIES
Project Number: 812100
Project Name: MOC
Project Location: BERTHA BARBER
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 812100-01			Lab ID: 001		
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	7000	5	TDW002	
Comments:					
Client ID: 812100-02			Lab ID: 002		
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	5200	5	TDW002	
Comments:					
Client ID: 812100-04			Lab ID: 003		
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1900	5	TDW002	
Comments:					
Client ID: 812100-05			Lab ID: 004		
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	4200	5	TDW002	
Comments:					

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 901018
Client: PINNACLE LABORATORIES
Project Number: 812100
Project Name: MOC
Project Location: BERTHA BARBER
Test: Group of Single Wetchem

Client ID:	Lab Matrix: ID:	Date/Time Sampled:	Date Received:
812100-01	001 WATER	30-DEC-98 0903	05-JAN-99
812100-02	002 WATER	29-DEC-98 1420	05-JAN-99
812100-04	003 WATER	29-DEC-98 1355	05-JAN-99
812100-05	004 WATER	29-DEC-98 1330	05-JAN-99

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

"Method Report Summary"

Accession Number: 901018
Client: PINNACLE LABORATORIES
Project Number: 812100
Project Name: MOC
Project Location: BERTHA BARBER
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
812100-01	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	7000
812100-02	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	5200
812100-04	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1900
812100-05	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	4200

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Analysis Report

Analysis: POLYNUCLEAR AROMATICS BY 8310

Accession:	901018
Client:	PINNACLE LABORATORIES
Project Number:	812100
Project Name:	MOC
Project Location:	BERTHA BARBER
Department:	SEMI-VOLATILE FUELS

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

"FINAL REPORT FORMAT - SINGLE"

Accession:	901018
Client:	PINNACLE LABORATORIES
Project Number:	812100
Project Name:	MOC
Project Location:	BERTHA BARBER
Test:	POLYNUCLEAR AROMATICS BY 8310
Analysis Method:	8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method:	3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix:	WATER
QC Level:	II

Lab Id:	001	Sample Date/Time:	30-DEC-98 0903
Client Sample Id:	812100-01	Received Date:	05-JAN-99
Batch: PAW002		Extraction Date:	05-JAN-99
Blank: A	Dry Weight %: N/A	Analysis Date:	09-JAN-99

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a)ANTHRACENE	UG/L	ND	5	
BENZO(a)PYRENE	UG/L	ND	1	
BENZO(b)FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i)PERYLENE	UG/L	ND	1	
BENZO(k)FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	1	1	
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	3	1	
FLUORENE	UG/L	3	1	
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	5	1	
PHENANTHRENE	UG/L	2	1	
PYRENE	UG/L	3	1	
1-METHYLNAPHTHALENE	UG/L	32	1	
2-METHYLNAPHTHALENE	UG/L	10	1	
5-CHLOROANTHRACENE	%REC/SURR	96	28-138	
ANALYST	INITIALS	HAH		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 901018
Client: PINNACLE LABORATORIES
Project Number: 812100
Project Name: MOC
Project Location: BERTHA BARBER
Test: POLYNUCLEAR AROMATICS BY 8310
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 002 Sample Date/Time: 29-DEC-98 1420
Client Sample Id: 812100-02 Received Date: 05-JAN-99

Batch: PAW002 Extraction Date: 05-JAN-99
Blank: A Dry Weight %: N/A Analysis Date: 09-JAN-99

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a)ANTHRACENE	UG/L	ND	1	
BENZO(a)PYRENE	UG/L	ND	1	
BENZO(b)FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i)PERYLENE	UG/L	ND	1	
BENZO(k)FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	ND	1	
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	2	1	
2-METHYLNAPHTHALENE	UG/L	2	1	
[illegible]CHLORCANTHRACENE	%REC./SURR	76	28-138	
ANALYST	INITIALS	HAH		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession:	901018
Client:	PINNACLE LABORATORIES
Project Number:	812100
Project Name:	MOC
Project Location:	BERTHA BARBER
Test:	POLYNUCLEAR AROMATICS BY 8310
Analysis Method:	8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method:	3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix:	WATER
QC Level:	II

Lab Id:	003	Sample Date/Time:	29-DEC-98 1355
Client Sample Id:	812100-04	Received Date:	05-JAN-99
Batch: PAW002		Extraction Date:	05-JAN-99
Blank: A	Dry Weight %: N/A	Analysis Date:	09-JAN-99

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a)ANTHRACENE	UG/L	ND	5	
BENZO(a)PYRENE	UG/L	ND	1	
BENZO(b)FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i)PERYLENE	UG/L	ND	1	
BENZO(k)FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	3	1	
FLUORENE	UG/L	1	1	
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	5	1	
PHENANTHRENE	UG/L	2	1	
PYRENE	UG/L	3	1	
1-METHYLNAPHTHALENE	UG/L	17	1	
2-METHYLNAPHTHALENE	UG/L	12	1	
1-CHLOROANTHRACENE	%REC/SURR	104	28-138	
ANALYST	INITIALS	HAH		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession:	901018
Client:	PINNACLE LABORATORIES
Project Number:	812100
Project Name:	MOC
Project Location:	BERTHA BARBER
Test:	POLYNUCLEAR AROMATICS BY 8310
Analysis Method:	8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method:	3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix:	WATER
QC Level:	II

Lab Id: 004 Sample Date/Time: 29-DEC-98 1330
Client Sample Id: 812100-05 Received Date: 05-JAN-99

Batch: PAW002 Extraction Date: 05-JAN-99
Blank: A Dry Weight %: N/A Analysis Date: 09-JAN-99

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	2	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a)ANTHRACENE	UG/L	ND	1	
BENZO(a)PYRENE	UG/L	ND	1	
BENZO(b)FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i)PERYLENE	UG/L	ND	1	
BENZO(k)FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	ND	1	
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	4	1	
2-METHYLNAPHTHALENE	UG/L	1	1	
2-CHLOROANTHRACENE	%REC/SURR	84	28-139	
ANALYST	INITIALS	HAH		

Comments:

"Method Report Summary"

Accession Number: 901018
Client: PINNACLE LABORATORIES
Project Number: 812100
Project Name: MOC
Project Location: BERTHA BARBER
Test: POLYNUCLEAR AROMATICS BY 8310

Client Sample Id:	Parameter:	Unit:	Result:
812100-01	CHRYSENE	UG/L	1
	FLUORANTHENE	UG/L	3
	FLUORENE	UG/L	3
	NAPHTHALENE	UG/L	5
	PHENANTHRENE	UG/L	2
	PYRENE	UG/L	3
	1-METHYLNAPHTHALENE	UG/L	32
	2-METHYLNAPHTHALENE	UG/L	23
812100-02	1-METHYLNAPHTHALENE	UG/L	3
	2-METHYLNAPHTHALENE	UG/L	2
812100-04	FLUORANTHENE	UG/L	1
	FLUORENE	UG/L	1
	NAPHTHALENE	UG/L	5
	PHENANTHRENE	UG/L	2
	PYRENE	UG/L	3
	1-METHYLNAPHTHALENE	UG/L	17
	2-METHYLNAPHTHALENE	UG/L	12
812100-05	ACENAPHTHYLENE	UG/L	2
	1-METHYLNAPHTHALENE	UG/L	4
	2-METHYLNAPHTHALENE	UG/L	1

Data Qualifiers for Final Report

STL-Pensacola Inorganic/Organic and AFCEE Projects (under QAPP)

J4	(For positive results)	Temperature limits exceeded ($\leq$2°C or $\geq$ 6°C)
J5	(TICs)	The reported value is quantitated as a TIC; therefore, it is estimated
	(For positive results)	LCS or Surrogate %R is > upper control limit (UCL) or < lower control limit (LCL)
	(For positive results)	The reported value is > the laboratory MDL and < lowest calibration standards; therefore, the quantitation is an estimation
J (AFCEE description)	The analyte was positively identified, the quantitation is an estimation	
R1	(For nondetects)	Temperature limits exceeded ($\leq$2°C or $\geq$ 6°C)
R2	Improper preservation, no preservative present in sample upon receipt	
R3	Improper preservation, incorrect preservative present in sample upon receipt	
R4	Holding time exceeded	
R5	Collection requirements not met, improper container used for sample	
R6	LCS or surrogate %R is < LCL and analyte is not detected or surrogate %R is < 10% for detects/nondetects	
R7	Internal standard area outside –50% to +100% of initial calibration midpoint standard.	
R8	Second source calibration verification exceeds acceptance criteria.	
R (AFCEE description)	The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria	
F	< laboratory or AFCEE RL and > laboratory MDL	
F (AFCEE description)	The analyte was positively identified but the associated numerical value is below the AFCEE or lab RL	
U2	$\leq$ Laboratory MDL (value for result will be the MDL, never below the MDL)	
U (AFCEE description)	The analyte was analyzed for but not detected. The associated numerical value is at or below the MDL	
B (AFCEE description)	The analyte was found in the associated blank, as well as in the sample	
@	Adjusted reporting limit due to sample matrix (dilution prior to digestion and/or analysis)	
+	Elevated reporting limit due to dilution into calibration range	
·	Elevated reporting limit due to matrix interference (dilution prior to digestion and/or analysis)	
#	Elevated reporting limit due to insufficient sample size	
D	Diluted out	
M	A matrix effect was present (sample was analyzed twice to confirm or chromatogram had interfering peaks)	
S	Incorrect sample amount was submitted to the laboratory for analysis	

ND = Not Detected at or above the STL-Pensacola reporting limit (RL) N/S = Not Submitted N/A = Not Applicable
IDL = Laboratory Instrument Detection Limit MDL = Laboratory Method Detection Limit
= Reporting Limit (AFCEE RLs are listed in the AFCEE QAPP)

Any time a sample arrives at the laboratory improperly preserved (at improper pH or temperature) or after holding time has expired or prepared or analyzed after holding time, client must be notified in writing (i.e. case narrative)

Florida Projects Inorganic/Organic

Y1	Improper preservation, no preservative present in sample upon receipt
Y2	Improper preservation, incorrect preservative present in sample upon receipt
Y3	Improper preservation, sample temperature exceeded EPA temperature limits of 2-6°C upon receipt
Y (FL description)	The analysis was from an unpreserved or improperly preserved sample. Data may not be accurate
Q	Sample held beyond the accepted holding time
I	The reported value is < Laboratory RL and > laboratory MDL
U1	The reported value is $\leq$ Laboratory MDL (value for sample result is reported as the MDL)
U (FL description)	Indicates the compound was analyzed for but not detected
T	The reported value is < Laboratory MDL (value shall not be used for statistical analysis)
V	The analyte was detected in both the sample and the associated method blank
J1	Surrogate recovery limits have been exceeded
J2	The sample matrix interfered with the ability to make any accurate determinations
J3	The reported value failed to meet the established quality control criteria for either precision or accuracy
J (FL description)	Estimated value; not accurate

ICR Projects Inorganic/Organic

A1 Acceptable R6 Rejected

Examples: ICR Flags

R6 = Laboratory extracted the sample but the refrigerator malfunctioned so the extract became warm and client was notified
R6 = Sample arrived in laboratory in good condition; however, the laboratory did not analyze it within EPA's established holding time limit

CLP and CLP-like Projects: Refer to referenced CLP Statement of Work (SOW) for explanation of data qualifiers

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Quality Control Report

Analysis: Group of Single Wetchem

Accession:	901018
Client:	PINNACLE LABORATORIES
Project Number:	812100
Project Name:	MOC
Project Location:	BERTHA BARBER
Department:	WET CHEM

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola Florida 32514 (850) 474-1001

"WetChem Quality Control Report"

Parameter:	TDS
Batch Id:	TDW002
Blank Result:	<5
Anal. Method:	160.1
Prep. Method:	N/A
Analysis Date:	08-JAN-99
Prep. Date:	05-JAN-99

Sample Duplication

Sample Dup:	901018-1
Rept Limit:	<5
Sample Result:	7025
Dup Result:	7015
Sample RPD:	0
Max RPD:	16
Dry Weight%	N/A

Matrix Spike

Sample Spiked:	N/A
Rept Limit:	N/A
Sample Result:	
Spiked Result:	
Spike Added:	
% Recovery:	
% Rec Limits:	
Dry Weight%	

ICV

ICV Result:	
True Result:	
% Recovery:	
% Rec Limits:	

LCS

LCS Result:	300
True Result:	293
% Recovery:	102
% Rec Limits:	77-129

----- Common Footnotes WetChem -----

N/A = NOT APPLICABLE.
N/S = NOT SUBMITTED.
N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW STL REPORTING LIMIT; THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.
N/D = NOT DETECTED AT OR ABOVE THE STL-PENSACOLA REPORTING LIMIT (RL).
R = REACTIVE
T = TOTAL
G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT AND THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT OR BELOW STL REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".
Q = THE ANALYTICAL (POST-DISTILLATION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DISTILLATION) SPIKE.
# = ELEVATED REPORTING LIMIT DUE TO INSUFFICIENT SAMPLE.
+ = ELEVATED REPORTING LIMIT DUE TO DILUTION INTO CALIBRATION RANGE.
* = ELEVATED REPORTING LIMIT DUE TO MATRIX INTERFERENCE (DILUTION PRIOR DIGESTION AND/OR ANALYSIS).
@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX (DILUTION PRIOR TO DIGESTION AND/OR ANALYSIS).
P = ANALYTICAL (POST DIGESTION) SPIKE.
I = DUPLICATE INJECTION.
& = AUTOMATED
F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
N/C+ = NOT CALCULABLE
H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE STL REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".
A = SAMPLE AND DUPLICATE RESULTS ARE "OUT OF CONTROL".
Z = THE SAMPLE RESULT FOR THE SPIKE IS BELOW THE REPORTING LIMIT. HOWEVER, THIS RESULT IS REPORTED FOR ACCURATE QC CALCULATIONS.
NH= SAMPLE AND / OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE STL REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL". SAMPLE IS NON-HOMOGENEOUS.
(*) = REPORTING LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.
(CA) = SEE CORRECTIVE ACTIONS FORM.
**= MATRIX INTERFERENCE
SW-846, 3rd Edition, latest EPA-approved edition.
EPA 600/4-79-020, Revised March 1983.
STANDARD METHODS, For the Examination of Water and Wastewater, latest EPA-approved edition.
NIOSH Manual of Analytical Methods, 4th Edition.
ANNUAL BOOK OF ASTM STANDARDS, VOLUMES 11.01 and 11.02, latest EPA-approved edition.
METHODS FOR THE DETERMINATION OF INORGANIC SUBSTANCES IN ENVIRONMENTAL SAMPLES, EPA600/R-93/100, AUGUST 1993
METHODS FOR SOIL ANALYSIS, PART 2, CHEMICAL AND MICROBILOGICAL PROPERTIES, 2ND EDITION.
STL-PN USES THE MOST CURRENT PROMULGATED METHODS FROM THE REFERENCES LISTED ABOVE.

1. COLIFORM. COLIFORM PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN THE LOGARITHM OF COLONIES PER 100 MLS OF SAMPLE ON DUPLICATE PLATES.
2. PH. PH PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE ANALYSIS.
3. FLASHPOINT. FLASHPOINT PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE ANALYSIS.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION).
RPD LMTS = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.

DPH = DOLLY P. HWANG
ED = ESTHER DANTIN
BE = BETTY EVERTON
RH = RICKY HAGENDORFER
RB = REBECCA BROWN
CR = CYNTHIA ROBERTS
PLD = PAULA L. DOUGHTY
LT = LISA TORRES
WH = WENDY HAGGARD
AB = AMY BRADLEY
JTZ = JONATHAN T. ZIENTARSKI

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Quality Control Report

Analysis: POLYNUCLEAR AROMATICS BY 8310

Accession:	901018
Client:	PINNACLE LABORATORIES
Project Number:	812100
Project Name:	MOC
Project Location:	BERTHA BARBER
Department:	SEMI VOLATILE FUELS

"QC Report"

Title: Water Blank
Batch: PAW002
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Blank Id: A Date Analyzed: 09-JAN-99 Date Extracted: 05-JAN-99

Parameters:	Units:	Results:	Reporting Limits:
ACENAPHTHENE	UG/L	ND	1
ACENAPHTHYLENE	UG/L	ND	1
ANTHRACENE	UG/L	ND	1
BENZO(a)ANTHRACENE	UG/L	ND	1
BENZO(a)PYRENE	UG/L	ND	1
BENZO(b)FLUORANTHENE	UG/L	ND	1
BENZO(g,h,i)PERYLENE	UG/L	ND	1
BENZO(k)FLUORANTHENE	UG/L	ND	1
CHRYSENE	UG/L	ND	1
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1
FLUORANTHENE	UG/L	ND	1
FLUORENE	UG/L	ND	1
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1
NAPHTHALENE	UG/L	ND	1
PHENANTHRENE	UG/L	ND	1
PYRENE	UG/L	ND	1
1-METHYLNAPHTHALENE	UG/L	ND	1
2-METHYLNAPHTHALENE	UG/L	ND	1
2-CHLOROANTHRACENE	%REC/SURR	61	28-138
ANALYST	INITIALS	HAH	

Comments:

"QC Report"

Title: Water LCS
Batch: PAW002
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

RS Date Analyzed: 09-JAN-99 RS Date Extracted: 05-JAN-99

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	Rec Lmts
ACENAPHTHYLENE	10.8	<1	5.9	55	45-127
BENZO(k)FLUORANTHENE	9.3	<1	7.4	80	68-131
CHRYSENE	9.7	<1	7.5	77	69-131
PHENANTHRENE	9.7	<1	6.6	68	63-124
PYRENE	9.5	<1	7.6	80	61-126
Surrogates:					
5-CHLOROANTHRACENE				81	28-138

Comments:

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/L = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

"QC Report"

Title: Water Matrix Spike/Matrix Spike Duplicate
Batch: PAW002
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Dry Weight %: N/A
Sample Spiked: 901018-3

MS Date Analyzed: 09-JAN-99
MSD Date Analyzed: 09-JAN-99

MS Date Extracted: 05-JAN-99
MSD Date Extracted: 05-JAN-99

Parameters:	Spike Added	Sample Conc	MS Conc	MS %Rec	MSD Conc	MSD %Rec	RPD	RPD Lmts	Rec Lmts
ACENAPHTHYLENE	10.8	<1	3.5	32	6.7	62	64*	51	18-146
BENZO(k)FLUORANTHENE	9.3	<1	7.3	78	7.9	85	9	40	26-137
CHRYSENE	9.7	<1	7.4	76	9.0	93	20	69	16-156
PHENANTHRENE	9.7	1.6	7.8	64	9.0	76	17	36	30-145
PYRENE	9.5	3.5	6.3	29*	10.4	73	86*	41	39-137
Surrogates:									
1-CHLOROANTHRACENE				88		100			28-138

Comments:
MATRIX SPIKE/MATRIX SPIKE DUPLICATE HAD RECOVERY(S) AND/OR RPD(S) OUTSIDE ACCEPTANCE LIMITS DUE TO MATRIX INTERFERENCE. REFER TO LCS DATA.

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/L = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

Common Notation for Organic Reporting

NS = NOT SUBMITTED
NA = NOT APPLICABLE
UG = MICROGRAMS
UG/L = PARTS PER BILLION
UG/KG = PARTS PER BILLION
MG/M3 = MILLIGRAM PER CUBIC METER
PPMV = PART PER MILLION BY VOLUME
MG/KG = PARTS PER MILLION
MG/L = PARTS PER MILLION
< = LESS THAN
ND = NOT DETECTED AT OR ABOVE THE STL-PENSACOLA REPORTING LIMIT (RL).
E = EXCEED THE CALIBRATION CURVE; THEREFORE, RESULTS ARE ESTIMATED.

VALUES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

ORGANIC SOILS ARE REPORTED ON A DRYWEIGHT BASIS.

RPT LMTS = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)

AEN GC/FID
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH FLAME IONIZATION DETECTOR (FID).

AEN GC/FIX
AEN GAS CHROMATOGRAPHIC METHOD FOR ANALYSIS OF FIXED GASES EMPLOYING DIRECT INJECTION ON COLUMN WITH THERMAL CONDUCTIVITY DETECTOR (TCD) AND FLAME IONIZATION DETECTOR (FID).

AEN GC/FPD
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH FLAME PHOTOMETRIC DETECTOR (FPD) IN SULFUR-SPECIFIC MODE.

AEN GC/PID
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH PHOTOIONIZATION DETECTOR (PID).

AEN GC/TCD
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH THERMAL CONDUCTIVITY DETECTOR (TCD).

METHOD 9020
PARTICULATE MATTER IS REMOVED BY ALLOWING PARTICULATES TO SETTLE IN THE SAMPLE CONTAINER AND DECANTING THE SUPERNATANT LIQUID. EXCESSIVE PARTICULATES ARE REMOVED BY FILTRATION OF THE SUPERNATANT LIQUID.

RSK 175
SAMPLE PREPARATION AND CALCULATIONS FOR DISSOLVED GAS ANALYSIS IN WATER SAMPLES USING A GC HEADSPACE EQUILIBRATION TECHNIQUE, RSK SOP-175, ROBERT S. KERR ENVIRONMENTAL RESEARCH LABORATORY, USEPA, AUGUST 11, 1994.

AEN-PN USES THE MOST CURRENT PROMULGATED METHODS CONTAINED IN THE REFERENCE MANUALS.

SW = STEVE WILHITE
RW = RITA WINGO
KS = KENDALL SMITH
LBL = LISA BIZZELL-LOWE
LP = LEVERNE PETERSON
PLD = PAULA DOUGHTY
DK = DARLENE KINCHEN
BT = BECKY TREMMEL
HAH = HOLLIE HOFFMAN
= HOLLY CHANCE

Severn Trent Laboratories of Florida

PROJECT SAMPLE INSPECTION FORM

Lab Accession #: 901018 Date Received: 05-Jan 99

	Was there a Chain of Custody?	(Yes)	No*	
2.	Was Chain of Custody properly filled out and relinquished?	(Yes)	No*	
3.	Were samples received cold? (Criteria: 2° - 6°C: STL-SOP 1055)	(Yes)	No*	N/A
4.	Were all samples properly labeled and identified?	(Yes)	No*	
5.	Did samples require splitting? Req By: PM Client Other*	Yes*	(No)	
6.	Were samples received in proper containers for analysis requested?	(Yes)	No*	
7.	Were all sample containers received intact?	(Yes)	No*	
8.	Were samples checked for preservative? *(Check pH of all H_2O requiring preservative (STL-PN SOP 917) except VOA vials that require zero headspace)**	(Yes)	No*	N/A
9.	Is there sufficient volume for analysis requested?	(Yes)	No*	N/A *(Can)*
10.	Were samples received within Holding Time? (REFER TO STL-SOP 1040)	(Yes)	No*	
11.	Is Headspace visible > ¼" in diameter in VOA vials?* If any headspace is evident, comment in out-of-control section.	Yes*	No	(N/A)
12.	If sent, were matrix spike bottles returned?	Yes	No*	(N/A)
13.	Was Project Manager notified of problems? (initials:_____)	Yes	No*	(N/A)

Airbill Number(s): 4412-6310-0563

Shipped By: FED EX

Cooler Number(s): THEIRS

Shipping Charges: N/A

Cooler Weight(s): 33

Cooler Temp(s) (°C): 3.5°C

CCK2

(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

Out of Control Events and Inspection Comments:

(USE BACK OF PSIF FOR ADDITIONAL NOTES AND COMMENTS)

Inspected By: AJP Date: 05-Jan 99 Logged By: [signature] Date: 05-JAN-99

* *Note all Out-of-Control and/or questionable events on Comment Section of this form.*

♦ *Note who requested the splitting of samples on the Comment Section of this form.*

All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (STL-SOP 938).

* *According to EPA, ¼" of headspace is allowed in 40 ml vials requiring volatile analysis, however, STL makes it policy to record any headspace as out-of-control (STL-SOP 938).*

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 1/4/99 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

901018

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals-TAL		TOX	TOC	Gen Chemistry	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
812100-01	12/30	0903	AQ										X							X								
-02	12/29	1420											X							X								
-04		1355											X							X								
-05		1330											X							X								

PROJECT INFORMATION

PROJECT #: 812100
PROJ. NAME: MOC
QC LEVEL: (STD) IV
QC REQUIRED: MS MSD BLANK
TAT: (STANDARD) RUSH!!

DUE DATE: 1/14
RUSH SURCHARGE: —
CLIENT DISCOUNT: —
SPECIAL CERTIFICATION REQUIRED: YES (NO)

SAMPLE RECEIPT

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

COMMENTS: 3 samples go out of hold time 1/5/99. the other 1/6/99.

SAMPLES SENT TO:

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

RELINQUISHED BY: 1.
Signature: Francine Trivio Time: 1705
Printed Name: Francine Trivio Date: 1/4/99
Company: Pinnacle Laboratories, Inc.

RECEIVED BY: 1.
Signature: Linda Kitt-Mercer Time: 1013
Printed Name: Linda Kitt-Mercer Date: 1/5/99
Company: STL FL

RELINQUISHED BY: 2.
Signature Time
Printed Name Date
Company

RECEIVED BY: 2
Signature Time
Printed Name Date
Company

Environmental Services Laboratory, Inc. E S L

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

January 20, 1999

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

RE: 812100 / MOC Order No.: 9901009

Dear Kim McNeill,

Environmental Services Laboratory received 5 samples on 1/5/99 for the analyses presented in the following report.

The Samples were analyzed for the following tests:

ALKALINITY (Alkalinity)
Bromide (Bromide)
CHLORIDE (Chloride)
CONDUCTANCE (E120.1)
Fluoride (Fluoride)
ICP Metals (ICPMET)
Nitrate/Nitrite (Nitrogen)
SILICA, Total (E370.1)
Sulfate (Sulfate)

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,

Andi Hoevet
Project Manager

Technical Review

Environmental Services Laboratory

Date: *20-Jan-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	812100-01
Lab Order:	9901009	**Tag Number:**	
Project:	812100 / MOC	**Collection Date:**	12/30/98
Lab ID:	9901009-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**ALKALINITY**				Analyst: **sld**
Alkalinity, Bicarbonate (As CaCO3)	380	5		mg/L CaCO3	1	1/8/99
Alkalinity, Carbonate (As CaCO3)	ND	5		mg/L CaCO3	1	1/8/99
BROMIDE		**BROMIDE**				Analyst: **sld**
Bromide	1.2	0.5		mg/L	1	1/6/99
CHLORIDE		**CHLORIDE**				Analyst: **sld**
Chloride	2900	50		mg/L	1	1/7/99
CONDUCTANCE		**E120.1**				Analyst: **sld**
Specific Conductance	5400	1		µmhos/cm	1	1/14/99
FLUORIDE		**FLUORIDE**				Analyst: **kmh**
Fluoride	1.3	0.2		mg/L	1	1/12/99
NITRATE/NITRITE		**NITROGEN**				Analyst: **sld**
Nitrogen, N+N	ND	0.05		mg/L	1	1/8/99
SILICA, TOTAL		**E370.1**				Analyst: **sld**
Silica, Free (as SiO2)	27	0.1		mg/L	2	1/15/99
SULFATE		**SULFATE**				Analyst: **sld**
Sulfate	53	25		mg/L	1	1/11/99
ICP METALS		**ICPMET**				Analyst: **jph**
Aluminum	1.1	0.05		mg/L	1	1/7/99
Antimony	ND	0.005		mg/L	1	1/7/99
Arsenic	ND	0.005		mg/L	1	1/7/99
Barium	2.9	0.005		mg/L	1	1/7/99
Boron	0.55	0.01		mg/L	1	1/7/99
Cadmium	ND	0.002		mg/L	1	1/7/99
Calcium	600	5		mg/L	100	1/7/99
Chromium	ND	0.005		mg/L	1	1/7/99
Cobalt	ND	0.005		mg/L	1	1/7/99
Copper	ND	0.005		mg/L	1	1/7/99
Iron	1	0.01		mg/L	1	1/7/99
Lead	ND	0.005		mg/L	1	1/7/99
Magnesium	210	0.05		mg/L	1	1/7/99
Manganese	0.27	0.005		mg/L	1	1/7/99
Molybdenum	ND	0.005		mg/L	1	1/7/99
Nickel	ND	0.005		mg/L	1	1/7/99
Potassium	37	20		mg/L	100	1/7/99
Selenium	ND	0.005		mg/L	1	1/7/99
Silver	ND	0.005		mg/L	1	1/7/99
Sodium	900	20		mg/L	100	1/7/99
Thallium	ND	0.01		mg/L	1	1/7/99
Vanadium	ND	0.005		mg/L	1	1/7/99
Zinc	0.013	0.005		mg/L	1	1/7/99

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: *20-Jan-99*

CLIENT:	Pinnacle Laboratories	Client Sample ID:	812100-02
Lab Order:	9901009	Tag Number:	
Project:	812100 / MOC	Collection Date:	12/29/98
Lab ID:	9901009-02A	Matrix:	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		ALKALINITY				Analyst: **sld**
Alkalinity, Bicarbonate (As CaCO3)	400	5		mg/L CaCO3	1	1/8/99
Alkalinity, Carbonate (As CaCO3)	ND	5		mg/L CaCO3	1	1/8/99
BROMIDE		BROMIDE				Analyst: **sld**
Bromide	1.9	0.2		mg/L	1	1/6/99
CHLORIDE		CHLORIDE				Analyst: **sld**
Chloride	2500	50		mg/L	1	1/7/99
CONDUCTANCE		E120.1				Analyst: **sld**
Specific Conductance	4700	1		µmhos/cm	1	1/14/99
FLUORIDE		FLUORIDE				Analyst: **kmh**
Fluoride	1.8	0.2		mg/L	1	1/12/99
NITRATE/NITRITE		NITROGEN				Analyst: **sld**
Nitrogen, N+N	ND	0.05		mg/L	1	1/8/99
SILICA, TOTAL		E370.1				Analyst: **sld**
Silica, Free (as SiO2)	24	0.1		mg/L	2	1/15/99
SULFATE		SULFATE				Analyst: **sld**
Sulfate	73	25		mg/L	1	1/11/99

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

Environmental Services Laboratory

Date: *20-Jan-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	812100-02
Lab Order:	9901009	**Tag Number:**	
Project:	812100 / MOC	**Collection Date:**	12/29/98
Lab ID:	9901009-02A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**ICPMET**				Analyst: **jph**
Aluminum	0.48	0.05		mg/L	1	1/7/99
Antimony	ND	0.005		mg/L	1	1/7/99
Arsenic	0.01	0.005		mg/L	1	1/7/99
Barium	0.25	0.005		mg/L	1	1/7/99
Beryllium	ND	0.002		mg/L	1	1/7/99
Boron	0.61	0.01		mg/L	1	1/7/99
Cadmium	ND	0.002		mg/L	1	1/7/99
Calcium	410	0.05		mg/L	1	1/7/99
Chromium	ND	0.005		mg/L	1	1/7/99
Cobalt	ND	0.005		mg/L	1	1/7/99
Copper	ND	0.005		mg/L	1	1/7/99
Iron	0.49	0.01		mg/L	1	1/7/99
Lead	ND	0.005		mg/L	1	1/7/99
Magnesium	150	0.05		mg/L	1	1/7/99
Manganese	0.25	0.005		mg/L	1	1/7/99
Molybdenum	ND	0.005		mg/L	1	1/7/99
Nickel	0.0054	0.005		mg/L	1	1/7/99
Potassium	51	20		mg/L	100	1/7/99
Selenium	ND	0.005		mg/L	1	1/7/99
Silver	ND	0.005		mg/L	1	1/7/99
Sodium	810	20		mg/L	100	1/7/99
Thallium	ND	0.01		mg/L	1	1/7/99
Vanadium	ND	0.005		mg/L	1	1/7/99
Zinc	0.014	0.005		mg/L	1	1/7/99

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: *20-Jan-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	812100-03
Lab Order:	9901009	**Tag Number:**	
Project:	812100 / MOC	**Collection Date:**	12/28/98
Lab ID:	9901009-03A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**ALKALINITY**				Analyst: **sld**
Alkalinity, Bicarbonate (As CaCO3)	280	5		mg/L CaCO3	1	1/8/99
Alkalinity, Carbonate (As CaCO3)	ND	5		mg/L CaCO3	1	1/8/99
BROMIDE		**BROMIDE**				Analyst: **sld**
Bromide	7.8	1		mg/L	1	1/6/99
CHLORIDE		**CHLORIDE**				Analyst: **sld**
Chloride	1900	100		mg/L	1	1/7/99
CONDUCTANCE		**E120.1**				Analyst: **sld**
Specific Conductance	3900	1		µmhos/cm	1	1/14/99
FLUORIDE		**FLUORIDE**				Analyst: **kmh**
Fluoride	1.3	0.2		mg/L	1	1/12/99
NITRATE/NITRITE		**NITROGEN**				Analyst: **sld**
Nitrogen, N+N	ND	0.05		mg/L	1	1/8/99
SILICA, TOTAL		**E370.1**				Analyst: **sld**
Silica, Free (as SiO2)	24	0.1		mg/L	2	1/15/99
SULFATE		**SULFATE**				Analyst: **sld**
Sulfate	170	62.5		mg/L	1	1/11/99

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: *20-Jan-99*

CLIENT:	Pinnacle Laboratories	Client Sample ID:	812100-03
Lab Order:	9901009	Tag Number:	
Project:	812100 / MOC	Collection Date:	12/28/98
Lab ID:	9901009-03A	Matrix:	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**ICPMET**				Analyst: jph
Aluminum	0.48	0.05		mg/L	1	1/7/99
Antimony	ND	0.005		mg/L	1	1/7/99
Arsenic	0.024	0.005		mg/L	1	1/7/99
Barium	0.23	0.005		mg/L	1	1/7/99
Beryllium	ND	0.002		mg/L	1	1/7/99
Boron	0.43	0.01		mg/L	1	1/7/99
Cadmium	ND	0.002		mg/L	1	1/7/99
Calcium	470	0.05		mg/L	1	1/7/99
Chromium	ND	0.005		mg/L	1	1/7/99
Cobalt	ND	0.005		mg/L	1	1/7/99
Copper	ND	0.005		mg/L	1	1/7/99
Iron	0.79	0.01		mg/L	1	1/7/99
Lead	ND	0.005		mg/L	1	1/7/99
Magnesium	150	0.05		mg/L	1	1/7/99
Manganese	0.25	0.005		mg/L	1	1/7/99
Molybdenum	ND	0.005		mg/L	1	1/7/99
Nickel	ND	0.005		mg/L	1	1/7/99
Potassium	18	2		mg/L	10	1/7/99
Selenium	ND	0.005		mg/L	1	1/7/99
Silver	ND	0.005		mg/L	1	1/7/99
Sodium	530	20		mg/L	100	1/7/99
Thallium	ND	0.01		mg/L	1	1/7/99
Vanadium	ND	0.005		mg/L	1	1/7/99
Zinc	ND	0.005		mg/L	1	1/7/99

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: *20-Jan-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	812100-04
Lab Order:	9901009	**Tag Number:**	
Project:	812100 / MOC	**Collection Date:**	12/29/98
Lab ID:	9901009-04A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**ALKALINITY**				Analyst: **kmh**
Alkalinity, Bicarbonate (As CaCO3)	390	5		mg/L CaCO3	1	1/12/99
Alkalinity, Carbonate (As CaCO3)	ND	5		mg/L CaCO3	1	1/12/99
BROMIDE		**BROMIDE**				Analyst: **sld**
Bromide	ND	5		mg/L	1	1/6/99
CHLORIDE		**CHLORIDE**				Analyst: **sld**
Chloride	700	100		mg/L	1	1/7/99
CONDUCTANCE		**E120.1**				Analyst: **sld**
Specific Conductance	1800	1		µmhos/cm	1	1/14/99
FLUORIDE		**FLUORIDE**				Analyst: **kmh**
Fluoride	1.5	0.2		mg/L	1	1/12/99
NITRATE/NITRITE		**NITROGEN**				Analyst: **sld**
Nitrogen, N+N	0.07	0.05		mg/L	1	1/8/99
SILICA, TOTAL		**E370.1**				Analyst: **sld**
Silica, Free (as SiO2)	23	0.1		mg/L	2	1/15/99
SULFATE		**SULFATE**				Analyst: **sld**
Sulfate	120	62.5		mg/L	1	1/11/99

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: *20-Jan-99*

CLIENT:	Pinnacle Laboratories	Client Sample ID:	812100-04
Lab Order:	9901009	Tag Number:	
Project:	812100 / MOC	Collection Date:	12/29/98
Lab ID:	9901009-04A	Matrix:	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**ICPMET**				Analyst: jph
Aluminum	1.6	0.05		mg/L	1	1/7/99
Antimony	ND	0.005		mg/L	1	1/7/99
Arsenic	ND	0.005		mg/L	1	1/7/99
Barium	0.21	0.005		mg/L	1	1/7/99
Beryllium	ND	0.002		mg/L	1	1/7/99
Boron	0.33	0.01		mg/L	1	1/7/99
Cadmium	ND	0.002		mg/L	1	1/7/99
Calcium	270	0.05		mg/L	1	1/7/99
Chromium	ND	0.005		mg/L	1	1/7/99
Cobalt	ND	0.005		mg/L	1	1/7/99
Copper	ND	0.005		mg/L	1	1/7/99
Iron	1.2	0.01		mg/L	1	1/7/99
Lead	ND	0.005		mg/L	1	1/7/99
Magnesium	62	0.05		mg/L	1	1/7/99
Manganese	0.12	0.005		mg/L	1	1/7/99
Molybdenum	ND	0.005		mg/L	1	1/7/99
Nickel	ND	0.005		mg/L	1	1/7/99
Potassium	14	0.2		mg/L	1	1/7/99
Selenium	ND	0.005		mg/L	1	1/7/99
Silver	ND	0.005		mg/L	1	1/7/99
Sodium	230	20		mg/L	100	1/7/99
Thallium	ND	0.01		mg/L	1	1/7/99
Vanadium	0.0084	0.005		mg/L	1	1/7/99
Zinc	0.019	0.005		mg/L	1	1/7/99

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: *20-Jan-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	812100-05
Lab Order:	9901009	**Tag Number:**	
Project:	812100 / MOC	**Collection Date:**	12/29/98
Lab ID:	9901009-05A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**ALKALINITY**				Analyst: **kmh**
Alkalinity, Bicarbonate (As CaCO3)	510	5		mg/L CaCO3	1	1/12/99
Alkalinity, Carbonate (As CaCO3)	ND	5		mg/L CaCO3	1	1/12/99
BROMIDE		**BROMIDE**				Analyst: **sld**
Bromide	6.9	1		mg/L	1	1/6/99
CHLORIDE		**CHLORIDE**				Analyst: **sld**
Chloride	1900	100		mg/L	1	1/7/99
CONDUCTANCE		**E120.1**				Analyst: **sld**
Specific Conductance	3700	1		µmhos/cm	1	1/14/99
FLUORIDE		**FLUORIDE**				Analyst: **kmh**
Fluoride	1.3	0.2		mg/L	1	1/12/99
NITRATE/NITRITE		**NITROGEN**				Analyst: **sld**
Nitrogen, N+N	ND	0.05		mg/L	1	1/8/99
SILICA, TOTAL		**E370.1**				Analyst: **sld**
Silica, Free (as SiO2)	25	0.1		mg/L	2	1/15/99
SULFATE		**SULFATE**				Analyst: **sld**
Sulfate	63	25		mg/L	1	1/11/99

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: *20-Jan-99*

CLIENT:	Pinnacle Laboratories	Client Sample ID:	812100-05
Lab Order:	9901009	Tag Number:	
Project:	812100 / MOC	Collection Date:	12/29/98
Lab ID:	9901009-05A	Matrix:	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**ICPMET**				Analyst: jph
Aluminum	1.9	0.05		mg/L	1	1/7/99
Antimony	ND	0.005		mg/L	1	1/7/99
Arsenic	ND	0.005		mg/L	1	1/7/99
Barium	7.7	0.005		mg/L	1	1/7/99
Beryllium	ND	0.002		mg/L	1	1/7/99
Boron	0.49	0.01		mg/L	1	1/7/99
Cadmium	ND	0.002		mg/L	1	1/7/99
Calcium	470	0.05		mg/L	1	1/7/99
Chromium	ND	0.005		mg/L	1	1/7/99
Cobalt	ND	0.005		mg/L	1	1/7/99
Copper	ND	0.005		mg/L	1	1/7/99
Iron	1.2	0.01		mg/L	1	1/7/99
Lead	ND	0.005		mg/L	1	1/7/99
Magnesium	160	0.05		mg/L	1	1/7/99
Manganese	0.19	0.005		mg/L	1	1/7/99
Molybdenum	ND	0.005		mg/L	1	1/7/99
Nickel	ND	0.005		mg/L	1	1/7/99
Potassium	14	2		mg/L	10	1/7/99
Selenium	0.0069	0.005		mg/L	1	1/7/99
Silver	ND	0.005		mg/L	1	1/7/99
Sodium	510	20		mg/L	100	1/7/99
Thallium	ND	0.01		mg/L	1	1/7/99
Vanadium	0.0086	0.005		mg/L	1	1/7/99
Zinc	0.015	0.005		mg/L	1	1/7/99

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: *20-Jan-99*

CLIENT: Pinnacle Laboratories
Work Order: 9901009
Project: 812100 / MOC

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-19** Batch ID: **19** Test Code: **ICPMET** Units: **mg/L** Analysis Date **1/7/99** Prep Date: **1/7/99**
Client ID: **9901009** Run ID: **ICP_990107A** SeqNo: **488**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	0.05									
Antimony	ND	0.005									
Arsenic	ND	0.005									
Barium	ND	0.005									
Beryllium	ND	0.002									
Boron	ND	0.01									
Cadmium	ND	0.002									
Calcium, 200.7	ND	0.05									
Chromium	ND	0.005									
Cobalt	ND	0.005									
Copper	ND	0.005									
Iron	ND	0.01									
Lead, 200.7	ND	0.005									
Magnesium	ND	0.05									
Manganese	ND	0.005									
Molybdenum	ND	0.005									
Nickel	ND	0.005									
Potassium	ND	0.2									
Selenium	ND	0.005									
Silver	ND	0.005									
Sodium	ND	0.2									
Thallium	ND	0.01									
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: 9901009
Project: 812100 / MOC

QC SUMMARY REPORT
Method Blank

Sample ID: PB	Batch ID: HIT MAN_990	Test Code: Bromide	Units: mg/L	Analysis Date 1/6/99	Prep Date:
Client ID:	9901009	Run ID: HIT MAN_990106A		SeqNo: 296	

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

Sample ID: PB	Batch ID: HIT MAN_990	Test Code: Nitrogen	Units: mg/L	Analysis Date 1/8/99	Prep Date:
Client ID:	9901009	Run ID: HIT MAN_990108A		SeqNo: 306	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, N+N	ND	0.05									

Sample ID: MBLK	Batch ID: HIT MAN_990	Test Code: Sulfate	Units: mg/L	Analysis Date 1/11/99	Prep Date:
Client ID:	9901009	Run ID: HIT MAN_990111A		SeqNo: 592	

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

Sample ID: MBLK	Batch ID: HIT MAN_990	Test Code: E370.1	Units: mg/L	Analysis Date 1/15/99	Prep Date:
Client ID:	9901009	Run ID: HIT MAN_990115A		SeqNo: 865	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silica, Free (as SiO2)	ND	0.05									

Sample ID: MBLK	Batch ID: NO INST_990	Test Code: Chloride	Units: mg/L	Analysis Date 1/7/99	Prep Date:
Client ID:	9901009	Run ID: NO INST_990107B		SeqNo: 394	

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

CLIENT: Pinnacle Laboratories
Work Order: 9901009
Project: 812100 / MOC

QC SUMMARY REPORT
Method Blank

Sample ID: MBLK	Batch ID: NO INST_990	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 1/8/99	Prep Date:
Client ID:	9901009	Run ID: NO INST_990108A		SeqNo: 564	

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									

Sample ID: MBLK	Batch ID: NO INST_990	Test Code: Fluoride	Units: mg/L	Analysis Date 1/12/99	Prep Date:
Client ID:	9901009	Run ID: NO INST_990112A		SeqNo: 580	

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

Sample ID: MBLK	Batch ID: NO INST_990	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 1/12/99	Prep Date:
Client ID:	9901009	Run ID: NO INST_990112C		SeqNo: 570	

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									

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: 9901009
Project: 812100 / MOC

QC SUMMARY REPORT
Sample Duplicate

Sample ID: 9901009-04A DUP Batch ID: HIT MAN_990 Test Code: Bromide Units: mg/L Analysis Date 1/6/99 Prep Date:
Client ID: 812100-04 9901009 Run ID: HIT MAN_990106A SeqNo: 302

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	ND	5	0	0	0.0%	0	0	0	0.0%	20	

Sample ID: 9901009-01A DUP Batch ID: HIT MAN_990 Test Code: E370.1 Units: mg/L Analysis Date 1/15/99 Prep Date:
Client ID: 812100-01 9901009 Run ID: HIT MAN_990115A SeqNo: 868

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silica, Free (as SiO2)	26	0.1	0	0	0.0%	80	120	27.2	4.5%	20	

Sample ID: 9901009-03A DUP Batch ID: NO INST_990 Test Code: Alkalinity Units: mg/L CaCO3 Analysis Date 1/8/99 Prep Date:
Client ID: 812100-03 9901009 Run ID: NO INST_990108A SeqNo: 569

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	290	5	0	0	0.0%	0	0	280	3.5%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	

Sample ID: 9901036-02A DUP Batch ID: NO INST_990 Test Code: Fluoride Units: mg/L Analysis Date 1/12/99 Prep Date:
Client ID: 9901009 Run ID: NO INST_990112A SeqNo: 583

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.2	0	0	0.0%	80	120	0	0.0%	20	

Sample ID: 9901009-04A DUP Batch ID: NO INST_990 Test Code: Alkalinity Units: mg/L CaCO3 Analysis Date 1/12/99 Prep Date:
Client ID: 812100-04 9901009 Run ID: NO INST_990112C SeqNo: 574

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	380	5	0	0	0.0%	0	0	390	2.6%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	380	5	0	0	0.0%	0	0	390	2.6%	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

Date: *20-Jan-99*

Environmental Services Laboratory

CLIENT: Pinnacle Laboratories
Work Order: 9901009
Project: 812100 / MOC

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: LCS-19 **Batch ID: 19** **Test Code: ICPMET** *Units: mg/L* Analysis Date **1/7/99** Prep Date: **1/7/99**

Client ID: **9901009** Run ID: **ICP_990107A** SeqNo: **487**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	4.641	0.05	5	0	92.8%	90	110	0			
Antimony	.4824	0.005	0.5	0	96.5%	90	110	0			
Arsenic	.4752	0.005	0.5	0	95.0%	90	110	0			
Barium	.4876	0.005	0.5	0	97.5%	90	110	0			
Beryllium	.4924	0.002	0.5	0	98.5%	90	110	0			
Boron	.4833	0.01	0.5	0	96.7%	90	110	0			
Cadmium	.4712	0.002	0.5	0	94.2%	90	110	0			
Calcium, 200.7	4.762	0.05	5	0	95.2%	90	110	0			
Chromium	.4937	0.005	0.5	0	98.7%	90	110	0			
Cobalt	.4793	0.005	0.5	0	95.9%	90	110	0			
Copper	.4978	0.005	0.5	0	99.6%	90	110	0			
Iron	1.894	0.01	2	0	94.7%	90	110	0			
Lead, 200.7	.4699	0.005	0.5	0	94.0%	90	110	0			
Magnesium	5.301	0.05	5	0	106.0%	90	110	0			
Manganese	.4793	0.005	0.5	0	95.9%	90	110	0			
Molybdenum	.4762	0.005	0.5	0	95.2%	90	110	0			
Nickel	.4765	0.005	0.5	0	95.3%	90	110	0			
Potassium	5.005	0.2	5	0	100.1%	90	110	0			
Selenium	.4609	0.005	0.5	0	92.2%	90	110	0			
Silver	.4757	0.005	0.5	0	95.1%	90	110	0			
Sodium	4.334	0.2	5	0	86.7%	90	110	0			S
Thallium	.4622	0.01	0.5	0	92.4%	90	110	0			
Vanadium	.4832	0.005	0.5	0	96.6%	90	110	0			
Zinc, 200.7	.4648	0.005	0.5	0	93.0%	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

CLIENT: Pinnacle Laboratories
Work Order: 9901009
Project: 812100 / MOC

QC SUMMARY REPORT
Laboratory Control Spike - generic

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: LCS Batch ID: HIT MAN_990 Test Code: E370.1 Units: mg/L Analysis Date 1/15/99 Prep Date:											
Client ID: 9901009 Run ID: HIT MAN_990115A SeqNo: 866											
Silica, Free (as SiO2)	10.3	0.05	10	0	103.0%	85	115	0			
Sample ID: LCS Batch ID: NO INST_990 Test Code: Alkalinity Units: mg/L CaCO3 Analysis Date 1/8/99 Prep Date:											
Client ID: 9901009 Run ID: NO INST_990108A SeqNo: 565											
Alkalinity, Total (As CaCO3)	175	5	157	0	111.5%	0	0	0			S
Sample ID: LCS Batch ID: NO INST_990 Test Code: Fluoride Units: mg/L Analysis Date 1/12/99 Prep Date:											
Client ID: 9901009 Run ID: NO INST_990112A SeqNo: 581											
Fluoride	6.8	0.2	7	0	97.1%	85	115	0			
Sample ID: LCS Batch ID: NO INST_990 Test Code: Alkalinity Units: mg/L CaCO3 Analysis Date 1/12/99 Prep Date:											
Client ID: 9901009 Run ID: NO INST_990112C SeqNo: 571											
Alkalinity, Total (As CaCO3)	220	5	211	0	104.3%	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

Environmental Services Laboratory

Date: *20-Jan-99*

CLIENT: Pinnacle Laboratories
Work Order: 9901009
Project: 812100 / MOC

QC SUMMARY REPORT
Initial Calibration Verification Standard

Sample ID: ICV | **Batch ID: HIT MAN_990** | **Test Code: Bromide** | **Units: mg/L** | **Analysis Date 1/6/99** | **Prep Date:**
Client ID: 9901009 | Run ID: HIT MAN_990106A | SeqNo: 297

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	.66	0	0.6	0	110.0%	85	115	0			

Sample ID: ICV | **Batch ID: HIT MAN_990** | **Test Code: Nitrogen** | **Units: mg/L** | **Analysis Date 1/8/99** | **Prep Date:**
Client ID: 9901009 | Run ID: HIT MAN_990108A | SeqNo: 307

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, N+N	.278	0.05	0.3	0	92.7%	0	0	0			S

Sample ID: ICV | **Batch ID: HIT MAN_990** | **Test Code: Sulfate** | **Units: mg/L** | **Analysis Date 1/11/99** | **Prep Date:**
Client ID: 9901009 | Run ID: HIT MAN_990111A | SeqNo: 593

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	72.1	5	71.9	0	100.3%	0	0	0			S

Sample ID: ICV | **Batch ID: NO INST_990** | **Test Code: Chloride** | **Units: mg/L** | **Analysis Date 1/7/99** | **Prep Date:**
Client ID: 9901009 | Run ID: NO INST_990107B | SeqNo: 395

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	11	0.5	10	0	110.0%	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

Pinnacle Laboratories, Inc. — Internal Chain of Custody — Date: 1/7 — 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

99.01009

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
812100-01	12/30	0903	AQ	-01
-02	12/29	1420		-02
-03	12/28	1200		-03
-04	12/29	1355		-04
-05	12/29	1330	↓	-05

SAMPLE ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals- Al, Sb, As, Ba, Be, B, Cd	Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn	Mo, Ni, K, Se, Si, Ag, Na	Tl, V, Zn, Bromide	Gen Chemistry: SO_4, Cl, F	Total NO_2/NO_3, Conductivity	Bicarb./Carb.	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
812100-01				X	X	X	X	X	X	X														
-02				X	X	X	X	X	X	X														
-03				X	X	X	X	X	X	X														
-04				X	X	X	X	X	X	X														
-05				X	X	X	X	X	X	X														

PROJECT INFORMATION

PROJECT #: 812100
PROJ. NAME: MOC
QC LEVEL: (STD) IV
QC REQUIRED: MS MSD BLANK
TAT: (STANDARD) RUSH!!

DUE DATE: 1/14
RUSH SURCHARGE: —
CLIENT DISCOUNT: —
SPECIAL CERTIFICATION REQUIRED: YES (NO)

COMMENTS

SAMPLE RECEIPT

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

SAMPLES SENT TO:

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

RELINQUISHED BY: 1.

Signature: Francine Tonne — Time: 1700
Printed Name: Francine Tonne — Date: 1/4/99
Pinnacle Laboratories, Inc.

RECEIVED BY: 1.

Signature: [signature] — Time: 930
Printed Name — Date: 1/5/99
Company

RELINQUISHED BY: 2.

Signature — Time
Printed Name — Date
Company

RECEIVED BY: 2

Signature — Time
Printed Name — Date
Company

American Environmental Network (NM), Inc.
Albuquerque • Phoenix • Pensacola • Portland • Pleasant Hills • Columbia

CHAIN OF CUSTODY

DATE: ________ PAGE: ___ OF ___

AEN LAB I.D. 8121

SHADED AREAS ARE FOR LAB USE ONLY.

PROJECT MANAGER:

COMPANY: Marathon Oil Company
ADDRESS: P.O. Box 552
Midland, TX 79707
PHONE: 915/687-8398
FAX: 915/687-8305
BILL TO: Same as above
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct/Inject	(M8015) Gas/Purge & Trap	Gasoline/BTEX & MTBE (M8015/8020)	BTXE/MTBE (8020)	BTEX & Chlorinated Aromatics (602/8020)	BTEX/MTBE/EDC & EDB (8020/8010/Short)	Chlorinated Hydrocarbons (601/8010)	504 EDB / DBCP	Polynuclear Aromatics (610/8310) PAH	Volatile Organics (624/8240) GC/MS	Volatile Organics (8260) GC/MS	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)	General Chemistry: pH, SO4, TDS	Chloride, Fluoride, Nitrate	Conductivity, Bromide, Bicarb/Carb	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals: NMED WQCC Metals	NUMBER OF CONTAINERS
MW-1	12/21/98	0903	Liquid	01				~~X~~	X					X						X	X	X					X	7
MW-2	12/21/98	2:20pm	Liquid	02				~~X~~	X					X						X	X	X					X	7
MW-3	12/21/98	12:00pm	Liquid	03				~~X~~	X					X						X	X	X					X	8
MW-4	12/21/98	1:55pm	Liquid	04				~~X~~	X					X						X	X	X					X	7
MW-5	12/21/98	1:30pm	Liquid	05				~~X~~	X					X						X	X	X					X	8

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT INFORMATION

PROJ. NO.:
PROJ. NAME: Bertha Barber
PO NO.:
SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	37
CUSTODY SEALS	(Y) / N / NA
RECEIVED INTACT	yes
BLUE ICE/(ICE)	3°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

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

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

METHANOL PRESERVATION [ ]

COMMENTS: FIXED FEE [ ]

Received 3 bottles broken.

RELINQUISHED BY: 1.
Signature: [signature] Time: 1200
Printed Name: Ernie McLeod Date: 12/30/98
Company: Irving Env. Svs. Inc.

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

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

RECEIVED BY: (LAB) 2.
Signature: Francine Tovino Time: 1030
Printed Name: Francine Tovino Date: 12/31/98
American Enviromental Network (NM), Inc.

DISTRIBUTION: White, Canary - AEN Pink - ORIGINATOR

4/1/96 AEN Inc.: American Environmental Network (NM), Inc. • 2709-D Pan American Freeway, NE • Albuquerque, New Mexico 87107

Quality Assurance Project Plan

The sampling techniques that will be employed at the former Bertha Barber Tank Battery site are detailed below. All efforts will be made to eliminate possible sample contamination and maximize the reliability of the analytical results. These efforts include proper use and cleaning of sampling equipment and sample containers to eliminate sample contamination; use of a quality assurance program to maximize accuracy and precision of the analytical results; and use of chain-of-custody procedures to track the samples from source to analysis and minimize the opportunity for tampering. This quality assurance project plan has been prepared in accordance with the requirements of New Mexico Energy, Minerals, and Natural Resources Department, Oil Conservation Division (OCD) Rule No. 19 *Prevention and Abatement of Water Pollution* (19 NMAC 15.A.19).

Project Scope

Collect groundwater and soil samples from select locations for purposes of delineation, collect groundwater samples from select monitoring wells for monitoring.

Project Coordination and Oversight

The people responsible for the coordination and oversight of this project are as follows:

Overall Project Coordination	Paul Peacock	(915) 687-8312
Sampling Activities	Mike Hansen	(215) 752-6840
Laboratory Activities	Les Arnold	(219) 464-2389

Laboratory Analysis of Samples

Core Laboratories, Inc., located in Valparaiso, Indiana, has been employed to analyze the groundwater samples collected from the site. This laboratory is capable of analyzing the samples and producing a data report in a manner consistent with the guidelines and requirements of 20 NMAC 6.107.B and with Section 1103 of the Water Quality Standards for Interstate and Intrastate Streams in New Mexico (20 NMAC 6.1).

Sampling Methodology

All sample collection activities will be conducted so as to obtain reliable information regarding subsurface conditions and representative samples for analysis.

Soil samples will be collected using a drilling rig equipped with a split-spoon sampling device. Selected samples will be removed from the sampling device with a decontaminated stainless steel scoop and will be transferred directly to the sample

container. The reusable soil sampling equipment will be decontaminated according to OCD-approved procedures prior to collecting the next sample.

Each monitoring well sampled will be purged of three to five times its initial water volume using a centrifugal pump and dedicated polyethylene plastic tubing. The depth to water and discharge rate will be monitored and adjusted during the purging process to prevent complete evacuation of water from the well, if possible. The well will be allowed to recharge as close to the initial static water level as possible or for a maximum of two hours prior to sampling. Groundwater samples will be collected with disposable polyethylene bailers and transferred into the appropriate sample container.

To prevent contamination of the sample bottles, each bottle will remain sealed until placed beneath the sampling tool for sample collection. After a sufficient amount of the sample is collected, the sample jar will be sealed with a screw cap. Each sample jar will have the following information recorded on it:

- Project name;
- Sample number;
- Time and date of sampling;
- Analysis to be performed; and
- Name of sampler.

Immediately following its collection, samples will be placed in a cooler chilled to 4° Centigrade. This temperature will be maintained until its arrival at the laboratory. The procedure will be repeated at each sample location.

Sample Equipment Decontamination Procedures

All non-disposable aqueous sampling equipment will be cleaned, wrapped and dedicated prior to the sampling event. The following steps will be followed for the field decontamination of non-aqueous sampling equipment:

- Laboratory grade glassware detergent and tap water scrub to remove visual contamination;
- Generous tap water rinse; and
- Distilled and deionized water rinse.

Water used during decontamination will be discharged to the ground surface.

Use of Quality Assurance Samples

Trip blanks, field blanks, and replicates serve as an independent check on the laboratory and on field sampling techniques. The purpose of the trip blank is to measure possible cross contamination of samples during shipping to and from the site. The trip blank is indicative of ambient conditions and/or equipment conditions that may effect the quality of the samples. The purpose of the field blank is to provide a

check for possible contamination resulting from sampling equipment, handling, preparation, storage and shipment. For each sampling event, quality assurance samples will be collected as follows:

- One field rinsate blank for each parameter submitted for analysis for each day of groundwater and soil sampling. For sampling events lasting more than one day, field blanks for non-aqueous sampling will be performed at a rate of 10 percent of the total number of samples collected throughout the event.

- One trip blank, consisting of distilled water and prepared by the laboratory, will be submitted for each sample shipment that includes volatile organic compound analysis, which will not exceed two consecutive field days. Each trip blank will be analyzed for the volatile organic compounds for which the groundwater samples will be analyzed and will only be included when samples are to be analyzed for volatile organic compounds.

one rinsate sample (field blank), and one replicate sample will be submitted (soil and groundwater). One trip blank will also be submitted for each cooler utilized to transport samples to the laboratory that include volatile organic compound analysis.

Each trip blank will consist of distilled water and will be prepared by the laboratory. Each field blank will consist of rinse-water from the final step of the equipment decontamination procedures. The trip and field blanks will be submitted for BTEX analysis.

Provision for Split Sampling with OCD

Prior to performance of any sampling activity, a minimum of 4 days notice will be given to the OCD so that a representative may observe field activities. If the OCD requests split samples, field personnel will provide the appropriate split sample to the OCD representative in accordance with the proposed sampling and QA/QC procedures set forth in this Appendix. Unless otherwise requested, the split sample will be relinquished to the OCD representative so the arrangements for analysis can be made.

Duplicate and Split Sampling Procedures

If duplicate and split samples are required by the OCD, aqueous duplicate and split samples will be obtained by alternately filling sample bottles for each parameter from the sampling device. For example, to obtain a duplicate groundwater sample, half of each bailer of groundwater obtained from the well will be used to fill the appropriate parameter container of each sample set. In addition, the appropriate parameter bottles from each set of sample bottles will be filled at the same time.

With the exception of samples for volatile organic analysis, duplicate or split soil samples will be properly homogenized prior to filling the sample containers. Homogenization will be performed as follows: a properly decontaminated stainless

steel bowl or tray will be filled with the sample and mixed using a decontaminated stainless steel scoop or Teflon instrument. The extent of mixing performed will depend on the nature of the sample and will achieve a consistent physical appearance prior to filling sample containers. Once the mixing is complete, the sample will be divided in half. The sample containers will be filled by scooping the sample material alternately from each half of the container.

Chain of Custody Procedures

The purpose of monitoring the chain of custody of a sample container is to ensure that proper handling requirements have been met for representative samples prior to their analysis. A Chain of Custody Record will be maintained and will accompany the laboratory container from the moment of the container's dedication until the time of the corresponding analyses. A laboratory's delivery of a sample container to the sampler therefore requires that a Chain of Custody Record be initiated by the authorized laboratory representative relinquishing the container, and time and date of the transfer be documented. The record of this transfer is proof that the containers which were used for sample storage have been dedicated by the laboratory prior to their delivery, and in accordance with the quality controls governing the analyses of the samples to be collected.

After their collection and storage, the necessary field and quality assurance samples will be preserved in the container until their transfer to the lab for analysis. The transfer will be accompanied by the same Chain of Custody Record, which was completed to identify the ID numbers, quantities and physical description of the samples, and the particular analyses requested. The name of the sampler who relinquishes the container, the time and date of the transfer, and the laboratory representative assuming responsibility for the container will be recorded.

Calibration and Preventative Maintenance Procedures for Field Instrumentation

All field analytical instrumentation will be calibrated prior to use in the field each day. Each instrument will be calibrated and maintained according to the manufacturer's instructions. In the event that an instrument is recalibrated in the field, this recalibration is performed only by personnel who have been trained in these calibration procedures.

Sample Storage Procedures

Immediately upon collection, samples are placed in a cooler and maintained at 4° Centigrade until delivery to the laboratory. Samples will be submitted to the laboratory no later than 24 hours after sample collection for a one day sampling event or 48 hours if an overnight carrier was required or if the sampling event exceeds one day.