

GW - 21

MONITORING REPORTS

DATE:

1996



**Marathon
Oil Company**

P.O. Box 552
Midland, TX 79702-0552
Telephone 915/682-1626

May 7, 1996

Mr. Roger C. Anderson
Environmental Bureau Chief
State of New Mexico
Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, New Mexico 87505

RECEIVED

MAY 13 1996

Environmental Bureau
Oil Conservation Division

Dear Mr. Anderson:

Enclosed is the First Quarter 1996 Indian Basin Remediation Project Report. This report is submitted on behalf of the Indian Basin Gas Plant owners in accordance with the Indian Basin Treatment Project Plan prepared by Marathon and approved by the Oil Conservation Division on April 2, 1992. Preparation of this report is also in accordance with the April 2, 1992 New Mexico Oil Conservation Division (OCD) directive for quarterly reporting of remediation project activities. If you have any questions, please contact me (915-687-8312).

Sincerely,

A handwritten signature in cursive script that reads 'Robert J. Menzie, Jr.'.

Robert J. Menzie, Jr.
Advanced Environmental & Safety Representative

Attachment

c: F. D. Searle
T. L. Guillory
T. C. Lowry
William C. Olson, Hydrogeologist, Oil Conservation Division, Santa Fe
R. F. Unger

File 572-00

**INDIAN BASIN GAS PLANT
REMEDATION PROJECT
QUARTERLY REPORT**

**FIRST QUARTER 1996
JANUARY, FEBRUARY, AND MARCH**

**Submitted by
Marathon Oil Company
on behalf of the
Indian Basin Gas Plant Owners**

May 7, 1996

EXECUTIVE SUMMARY

The pump-and-treat groundwater remediation system is fully operational and functioning as set forth in the Treatment Project Plan (March 1992). During the quarterly sampling event in January 1996, light nonaqueous phase liquid (condensate) was observed in 13 Lower Queen wells. During the quarter, total fluid recovery from 8 Lower Queen recovery wells averaged 94 gallons per minute (20,651 barrels per week), a 34% increase from the prior quarter as a result of three additional groundwater extraction wells being installed. Dissolved-phase volatile hydrocarbon compounds were removed by air stripping. Lower Queen dissolved benzene concentrations in five downgradient wells range from less than 0.5 to 14 micrograms per liter ($\mu\text{g/L}$) or parts per billion. Chloride concentrations in all Lower Queen wells are below the State maximum allowable concentration of 250 milligrams per liter (mg/L).

Two Shallow zone wells contained condensate in January. Shallow zone pumping continues from one well. During the quarter, fluid recovery from this well averaged 0.009 gallons per minute (2.1 barrels per week). Dissolved benzene concentrations in the Shallow zone aquifer range from less than 0.5 to 1000 $\mu\text{g/L}$. Seven Shallow zone wells sampled in January indicate chloride concentrations at or above the State maximum allowable concentration of 250 mg/L .

Concentrations of benzene, toluene, ethylbenzene, total xylene, and chloride in groundwater collected from a rancher well completed in the Shallow alluvium, a rancher well completed in the Seven Rivers Formation, and surface water from the Upper Indian Hills Spring West (Rocky Arroyo spring) have not exceeded State or Federal drinking water standards.

Condensate recovery from the Lower Queen and Shallow zone for the First Quarter was 172.2 barrels, a 608% increase from the prior quarter. Excluding the volume volatilized by the air stripper and vapor extraction system, cumulative recovery is 3,801.6 barrels or 10.9% of the total estimated spill volume.

The vapor extraction system was not operated during the First Quarter.

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INTRODUCTION

This report summarizes groundwater and unsaturated zone treatment activities conducted during the First Quarter of 1996 in accordance with the Indian Basin Environmental Treatment Project Plan submitted on March 5, 1992 by Marathon Oil Company on behalf of the Indian Basin Gas Plant owners. Preparation of this report is also in accordance with the April 2, 1992 New Mexico Oil Conservation Division (OCD) directive for quarterly reporting of remediation project activities. Remediation activities are continuing to reduce the impact of a liquid gas condensate and brine production pipeline spill discovered in April 1991 near the Indian Basin Gas Plant.

GROUNDWATER ELEVATION

Lower Queen Aquifer

Depth-to-water measurements were acquired from nonpumping Lower Queen monitoring wells in January 1996. Table 1 presents groundwater and product elevations calculated from casing elevation data, depth-to-water measurements, and depth-to-product (light nonaqueous phase liquid; LNAPL) measurements. Figure 1 is a potentiometric map of the Lower Queen aquifer based on January gauging data. First Quarter data indicate both increasing and decreasing groundwater elevations (Figure 2).

Shallow Zone

A potentiometric map was constructed using depth-to-water measurements collected from Shallow zone monitoring wells in January 1996 (Figure 3). Table 2 shows depth-to-water and depth-to-LNAPL measurements, calculated groundwater and LNAPL elevations, and LNAPL thickness in Shallow zone wells. These Shallow zone data indicate increasing and decreasing groundwater elevations during the quarter (Figure 4). Groundwater elevation changes are the result of changes in recharge from rainfall and subsurface and surface inflow to the project area.

Groundwater Recharge (Rainfall)

Daily rainfall is gauged at the gas plant. Monthly rainfall for January, February, and March was 0.1, 0.0, and 0.0 inches, respectively (Table 1). Cumulative rainfall for the First Quarter was 0.10 inches.

QUARTERLY SAMPLING LABORATORY RESULTS

On January 16, 17, 18, and 19, 1996, 38 Shallow zone and 22 Lower Queen monitoring wells were gauged. Appendix A contains summary tables of groundwater gauging, purging, and sampling data prepared by Groundwater Technology, Inc. (GTI) from notes recorded during field

activities. Water samples were collected by GTI using Environmental Protection Agency (EPA) sampling protocol. Analytical Technologies, Inc. performed BTEX (EPA Method 8020) and chloride (EPA Method 325.2) analyses.

Twenty-three Lower Queen wells were sampled in January including the plant water supply well, SW-1. Except for MW-61A, all Lower Queen groundwater recovery wells contained measurable condensate (measurements from piezometers installed in select large-diameter wells) or yielded condensate when a sample was drawn from the wellhead sampling port (Table 1 and 3). Lower Queen monitoring wells MW-58, MW-59, MW-62, MW-73, MW-74, and MW-76 contain condensate.

Thirteen Shallow zone wells were sampled in January. Seven of the twenty-five Shallow zone monitoring wells (including two sumps in Rocky Arroyo) designated for quarterly sampling (compliance wells) in the Treatment Project Plan were sampled (see ***bolded and italicized*** well designations in Table 4). The remaining 18 Shallow zone compliance wells were either dry or bailed dry during purging and did not recharge enough to be sampled. Six Shallow zone wells other than those designated in the Treatment Project Plan were sampled (MW-41, MW-43, MW-49, MW-61, MW-77, and MW-79). Seven Shallow zone wells sampled in January indicate chloride concentrations at or above the State maximum allowable concentration of 250 mg/L (MW-41, MW-43, MW-44, MW-49, MW-50, MW-55, and MW-61).

Tables 3 and 4 are historical summaries of quarterly benzene concentration data since September 1991 for the Lower Queen and Shallow zone wells, respectively. Benzene concentration (in $\mu\text{g/l}$) versus time graphs for each well sampled in January are provided in Appendix B.

Groundwater samples were also collected from two downgradient off-site wells and a natural spring in Rocky Arroyo where the Shallow zone aquifer discharges (Upper Indian Hills Spring West; Hendrickson and Jones, 1952). Concentrations of BTEX and chloride in groundwater collected from the Lyman and Biebelle wells and surface water from the natural spring did not exceed State or Federal drinking water standards during the quarter (Table 4). Laboratory reports for the off-site wells and natural spring for January are included in Appendix C. Appendix D are the laboratory reports for the off-site wells and natural spring for March sampling.

GROUNDWATER PUMPING

Fluid recovery from the Lower Queen aquifer and Shallow zone is metered and reported to the State Engineer Office (SEO) in Roswell, New Mexico on a monthly basis per SEO directive.

The reports filed with the SEO for First Quarter 1996 are attached in Appendix E. Figures 5, 6, and 7 are stacked bar graphs depicting weekly Lower Queen fluid recovery, weekly Shallow zone fluid recovery, and combined weekly fluid recovery from both zones, respectively.

Eight Lower Queen wells (MW-61A, MW-65A, MW-68, MW-72, MW-75, MW-81, MW-82 and MW-83) were pumped for the purpose of plume containment and free-phase condensate recovery. Weekly fluid recovery for each well and the plant supply well, SW-1, is shown in Figure 5. Free-phase hydrocarbon recovered from these wells during the quarter totaled 171.0 barrels. Weekly Shallow zone water and condensate recovery from MW-69 is shown in Figure 6. Free-phase hydrocarbon (condensate) recovery from MW-69 during the First Quarter totaled 1.2 barrels.

GROUNDWATER TREATMENT AND PRODUCT RECOVERY

Contaminated groundwater and free-phase hydrocarbon (condensate) from eight Lower Queen recovery wells are pumped through underground piping to the treatment compound. The treatment compound includes two aboveground tanks, an oil/water separator used as a storage vessel, and an air stripper. Condensate is skimmed from one of the two aboveground tanks and transferred to the oil/water separator which serves as a condensate storage vessel. Groundwater containing dissolved-phase hydrocarbon is transferred from the first tank to the second aboveground tank. Groundwater from the second tank is pumped through the air stripper to remove dissolved-phase volatile organic compounds. Stripped volatile organic compounds are vented to the atmosphere through a stack. Treated groundwater is transferred from the air stripper to the 1200-barrel aboveground steel tank and is used as process water for the gas plant.

The measured volume of condensate recovered from Lower Queen groundwater during the First Quarter was 171.0 barrels. Cumulative condensate recovered by the total fluids system since treatment system startup in April 1992 is 336.3 barrels. Cumulative condensate recovered to date excluding the volume volatilized by the air stripper and vapor extraction system is 3,801.6 barrels or 10.9% of the total estimated spill volume.

VAPOR EXTRACTION SYSTEM

The vapor extraction system was not operated during the First Quarter. On May 5, 1994, the vapor extraction system ceased operation when Marathon determined that a New Mexico Air Pollution Control Bureau 702 air emission permit is required for system operation. The system has not operated since then and is being stored at the gas plant. A draft air permit for a barrier vapor extraction system was prepared by GTI during the First Quarter 1996. Marathon intends to finalize and submit the draft air permit application to the New Mexico Air Pollution Control Bureau during the Second Quarter 1996.

OTHER ACTIVITIES

On January 19 and 20, 1996, a rancher stock well, located in the NE/4 of Section 24, T21S, R23E and which is completed in the Shallow aquifer, was bailed dry in order to remove silt and unconsolidated debris from the well. Prior to bailing, unconsolidated material filled the well to a depth of approximately 28 feet below top of casing. Top of casing is 2.38 feet above grade. Depth-to-groundwater was approximately 28.40 feet below top of casing prior to bailing. Approximately 22 feet of unconsolidated material were removed from the well by bailing. Total depth of the well was 50.45 feet from top of casing after bailing to a hard well bottom. Groundwater in the well recovered to approximately 28 feet below top of casing before water samples were collected using a disposable bailer. Samples were analyzed for benzene, toluene, ethylbenzene, xylenes, select metals, and total dissolved solids. Laboratory results are contained in Appendix F.

REFERENCES CITED

Hendrickson, G. E., and Jones, R. S., 1952, Geology and Ground-water Resources of Eddy County, New Mexico: New Mexico Bureau of Mines & Mineral Resources Ground-water Report 3, 169 p., 4 pls.

TABLES

TABLE 1. LOWER QUEEN DEPTH-TO-WATER, GROUNDWATER ELEVATION,
CONDENSATE THICKNESS, AND RAINFALL DATA

LOWER QUEEN WELL	Well Use	Top of Casing (TOC) Elev. (ft AMSL)	Top of 1.25-inch Piezometer Piping Elev. (ft AMSL)	Total Depth from TOC (ft)	Jan./16, 17/1996				Feb-96	Mar-96
					Depth to water (ft)	Ground- water Elev. (ft)	Corrected Groundwater Elev. (ft)	Depth to product (ft)		
MW-57	monitor	3787.70		177.20	159.67	3628.03				
MW-58	monitor	3824.31		218.03	NG					
MW-59	monitor	3819.59		211.29	192.56	3627.03		192.49		
MW-60	monitor	3815.28		223.00	187.76	3627.52				
MW-61A	recovery	3815.97		215.67	NG					
MW-62	monitor	3819.90		224.69	192.04	3627.86	3627.87	192.03		
MW-63	monitor	3826.16		220.49	198.90	3627.26				
MW-64	monitor	3798.57		201.89	170.87	3627.70				
MW-65A	recovery	3763.26		168.56	136.11	3627.15		134.81		
MW-66	monitor	3828.98		235.18	200.89	3628.09				
MW-67	monitor	3765.87		165.77	138.02	3627.85				
MW-68	recovery	3797.83		203.43						
MW-70	monitor	3822.57		225.07	194.68	3627.89				
MW-71	monitor	3778.05		233.49	151.36	3626.69				
MW-72	recovery	3819.32		236.55	216.76	3602.56		200.26		
MW-73	monitor	3820.09		222.5	192.66	3627.43				
MW-74	monitor	3820.82		222.5	188.65	3632.17				
MW-75	recovery	3816.12		222.5	197.10	3619.02		193.00		
MW-76	monitor	3796.01		222.5	168.85	3627.16	3628.02	167.90		
MW-81	recovery	3816.99	3817.03	228.45	199.04	3617.95		194.75		
MW-82	recovery	3825.04	3825.07	231.30	209.62	3615.42				
MW-83	recovery	3794.09	3794.12	205.80	189.30	3604.79		172.50		
SW-1	recovery	3808.19		255.00						
SW-2	monitor	3808.79		292.00	182.21	3626.58				
Monthly Rainfall (in)							0.10		0.00	0.00

AMSL = Above Mean Sea Level

NG = Not Gauged

**TABLE 2. SHALLOW ZONE DEPTH-TO-WATER,
GROUNDWATER ELEVATION, AND CONDENSATE THICKNESS**

Shallow Zone Well	TOC Elev. (ft AMSL)	Total Depth from TOC (ft)	January 16 and 17, 1996				
			Depth to water (ft)	Ground- water Elev. (ft)	Corrected Groundwater Elev. (ft)	Depth to product (ft)	Condensate thickness (ft)
MW-1	3792.50	16.10	not gauged				
MW-2	3788.82	15.52	not gauged				
MW-3	3787.50	16.97	DRY				
MW-4	3785.88	18.68	not gauged				
MW-5	3801.69	13.05	DRY				
MW-6	3785.17	14.25	DRY				
MW-7	3784.46	17.35	DRY				
MW-8	3795.04	17.38	DRY				
MW-9	3807.85	13.79	DRY				
MW-10	3790.78	18.52	DRY				
MW-11	3806.96	24.85	23.91	3783.05			
MW-12	3809.86	25.21	not gauged				
MW-13	3801.58	22.07	19.83	3781.75	3781.82	19.75	0.08
MW-14	3803.93	24.30	not gauged				
MW-15	3803.59	19.47	not gauged				
MW-16	3801.04	22.66	not gauged				
MW-17	3799.55	19.75	not gauged				
MW-18	3795.82	17.42	not gauged				
MW-19	3797.21	19.11	DRY				
MW-20	3797.59	16.89	not gauged				
MW-21	3798.21	23.31	not gauged				
MW-22	3799.20	17.30	not gauged				
MW-23	3794.48	12.08	not gauged				
MW-24	3794.09	13.30	DRY				
MW-25	3786.97	10.27	not gauged				
MW-26	3793.01	21.11	not gauged				
MW-27	3790.93	18.23	not gauged				
MW-28	3797.03	18.59	not gauged				
MW-29	3794.06	14.76	DRY				
MW-30	3788.30	14.82	not gauged				
MW-31	3791.15	19.93	not gauged				
MW-32	3797.47	15.70	DRY				
MW-33	3802.48	20.29	not gauged				
MW-34	3806.00	19.97	not gauged				
MW-35	3800.81	20.71	not gauged				
MW-36	3792.94	8.77	not gauged				
MW-37	3795.03	20.83	not gauged				
MW-38	3797.32	20.57	DRY				
MW-39	3796.20	20.54	20.29	3775.91			
MW-40	3803.12	14.07	not gauged				
MW-41	3799.04	24.04	20.06	3778.98			
MW-42	3804.73	23.59	not gauged				
MW-43	3802.05	24.55	21.75	3780.30			
MW-44	3804.14	25.24	21.86	3782.28			
MW-45	3808.68	26.62	not gauged				
MW-46	3805.54	20.24	19.48	3786.06			
MW-47	3805.09	21.79	DRY				
MW-48	3806.18	19.98	DRY				
MW-49	3805.61	25.91	22.55	3783.06			
MW-50	3813.35	37.15	27.20	3786.15			
MW-51	3810.86	20.06	not gauged				
MW-52	3817.49	21.44	DRY				
MW-53	3809.92	15.32	DRY				
MW-54	3823.86	78.15	46.79	3777.07			
MW-55	3794.40	66.32	30.74	3763.66			
MW-56	3782.45	43.76	DRY				
MW-61	3816.20	57.97	36.26	3779.94			
MW-65	3763.31	57.35	DRY				
MW-69p	3805.11	51.27	37.54	3767.57	3771.34	33.35	4.19
MW-77	3775.48	82.20	79.84	3695.64			
MW-78	3785.82	86.62	DRY				
MW-79	3788.39	82.90	78.31	3710.08			
MW-80	3821.64	91.80	DRY				
Sump A10	3800.99	13.42	DRY				
Sump 16A	3785.14	17.45	16.30	3768.84			
Lyman	3670	70	36	3634			

p = pump present in well

AMSL = Above Mean Sea Level
TOC = Top of Casing datum

TABLE 3. HISTORICAL SUMMARY OF BENZENE CONCENTRATION IN LOWER QUEEN GROUNDWATER

WELL	Benzene (ug/L) using EPA Method 8020 unless indicated otherwise															
	Sep-91	Dec-91	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95
MW-57	1600	350	150	948**	15.1*	21*	8*	6*	<0.5	<0.5	<0.5	0.7	1.1	4.3	<0.5	<0.5
MW-58	40	90	202**	178**	190*	192*	55*	25*	50*	FP	<2.5	2.0	6.7	FP	2.2	FP
MW-59	540	420	40.4**	268**	98.8*	26*	10*	FP	10*	FP	<2.5	13	4.1	FP	FP	FP
MW-60	33	<1	3.5**	19**	31.7*	138*	17*	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-61A	190	10	5.0**	359**	470.1*	585*	2821*	FP	FP	FP	<0.5	4.8	13	16	FP	FP
MW-62	2200	1400	257.5**	357**	212.3*	78*	33*	98*	10*	4.1	<2.5	4.3	13	FP	7.5	FP
MW-63	<1	<1	4.1**	12**	4.3*	12*	7*	4*	14*	<0.5	<0.5	1.0	<0.5	<0.5	<0.5	<0.5
MW-64	150	130	233**	115**	14	15*	5*	2	18*	1.7	<0.5	<0.5	<0.5	12	18	17
MW-65A	680	150	25.3**	413**	10.6*	3*	4*	<1*	7*	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	NS
MW-66	<1	<1	3.3**	8**	12.1*	3*	<3*	8*	13*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-67	280	320	4.3*	103**	2.6*	8*	7*	7*	<0.5	<0.5	<0.5	<0.5	<0.5	1.0	1.8	6.1
MW-68	240	1900	1865**	160**	2208.2**	376*	1890*	150	374*	3000	120	260	FP	FP	FP	FP
MW-70	<1	<1	1.7**	<1	10.7*	<3*	9*	<1*	25*	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5
MW-71	NI	NI	NI	NI	NI	NI	NI	NI	8*	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5
MW-72	NI	NI	NI	NI	NI	NI	NI	NI	FP	FP	<2.5	18	FP	FP	FP	FP
MW-73	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	FP	FP	FP
MW-74	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	FP	FP	FP
MW-75	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	FP	FP	FP
MW-76	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	FP	FP	FP
MW-81	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW-82	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW-83	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
SW-1	<1	<1	5*	17.5*	15.7*	6*	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SW-2	<1	<1	7.9*	7*	69.4*	47*	4	NS	NS	NS	NS	NS	NS	NS	NS	NS
Max. Conc.	2200	1900	1865	948	2208	585	2821	2821	2821	3000	120	260	FP	FP	FP	FP

* High Performance Liquid Chromatography (HPLC)

** Average of more than one sample result using HPLC.

FP = Free Product (Condensate)

NS = Not Sampled

NI = Not Installed

TABLE 4. HISTORICAL SUMMARY OF BENZENE IN SHALLOW GROUNDWATER

Benzene (ug/L) using EPA Method 8020 unless indicated otherwise																			
WELL	Sep-91	Dec-91	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	
MW-1	250	200	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-4	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-5	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-6	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	DRY	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-7	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-8	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-9	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-10	2300	2300	1780**	1842**	2100	NS	NS	DRY	DRY	BD	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-11	3000	3800	3087**	2199**	2942*	2746*	FP	FP	FP	FP	FP	FP	1800	DRY	NS	95	NS	1000	
MW-12	3800	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-13	3100	3000	3492**	2708**	NS	NS	PUMP	PUMP	PUMP	PUMP	PUMP	PUMP	PUMP	FP	FP	FP	FP	FP	FP
MW-14	5100**	NS	NS	NS	NS	NS	PUMP	PUMP	FP	FP	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-15	5100	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-16	1700	NS	NS	NS	NS	NS	514*	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-17	2000	NS	NS	NS	NS	NS	1500	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-18	4300	NS	2639**	2700	3300	NS	NS	DRY	VE	VE	VE	VE	NS	NS	NS	NS	NS	NS	NS
MW-19	4700	NS	3195**	3000	3032*	NS	3926*	DRY	VE	VE	VE	VE	MS	MS	NS	NS	MS	DRY	
MW-20	110	NS	NS	NS	NS	NS	NS	DRY	VE	VE	VE	VE	NS	NS	NS	NS	NS	NS	NS
MW-21	1000	1100	NS	NS	NS	NS	114*	FP	NS	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-22	4	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-23	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-24	3400	NS	NS	4353**	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-25	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-26	3100	3000	NS	2000	1992*	1708*	861*	FP	FP	FP	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-27	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-28	2200	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-29	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS
MW-30	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	DRY	DRY	DRY	DRY	DRY
MW-31	<1	NS	NS	332**	9*	NS	NS	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-32	200	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-33	6300	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-34	2500	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-35	5700	NS	NS	NS	NS	NS	NS	FP	FP	FP	NS	NS	NS	NS	NS	NS	NS	NS	NS

Bolded italicized well numbers = Designated wells for quarterly sampling in Marathon Treatment Plan (March 1992)

* High Performance Liquid Chromatography (HPLC)

** Average of more than one sample result using HPLC.

NI = Not Installed

OCI = only Chloride sample
FP = Free Product (condensate)

NS = Not Sampled

VE = Vapor Extraction well

TABLE 4. HISTORICAL SUMMARY OF BENZENE IN SHALLOW GROUNDWATER (Continued)

Benzene (ug/L) using EPA Method 8020 unless indicated otherwise																		
WELL	Sep-91	Dec-91	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96
MW-36	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS
MW-37	150	NS	NS	NS	NS	NS	NS	27*	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-38	15	15	51**	37*	166**	NS	NS	DRY	BD	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-39	880	NS	NS	NS	NS	14	29*	24*	DRY	<2.5	<0.5	<0.5	DRY	<5.0	NS	NS	NS	NS
MW-40	NS	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS
MW-41	200	170	NS	NS	NS	NS	NS	22*	DRY	5.3	0.6	1.4	3.2	13	4.8	<0.5	1.8	<5.0
MW-42	<1	<1	NS	NS	NS	NS	NS	NS	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-43	320	NS	NS	NS	NS	NS	NS	25*	DRY	<0.5	<0.5	<0.5	0.8	3	0.6	3	1.2	1.4
MW-44	59	NS	10**	97**	12	14	7*	6*	3*	12	22	36	130	63	19	5.8	120	51
MW-45	<1	<1	NS	NS	NS	NS	NS	<3*	<3*	<0.5	<0.5	<0.5	NS	NS	NS	NS	NS	NS
MW-46	140	25	NS	NS	NS	NS	NS	NS	DRY	NS	NS	DRY	NS	NS	NS	NS	NS	NS
MW-47	2600	2200	NS	NS	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-48	<1	<1	NS	47**	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-49	35	NS	NS	NS	NS	NS	NS	210*	68*	13	82	150	78	220	120	17	240	160
MW-50	<1	<1	4**	4**	8*	8*	<1	<3*	9*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-51	800	<1	NS	NS	NS	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS
MW-52	<1	NS	NS	5**	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-53	<1	NS	NS	NS	NS	NS	NS	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-54	<1	<1	9**	8**	62*	14*	10*	<3*	17*	8.6	<0.5	15	19	<0.5	<0.5	<0.5	0.7	<0.5
MW-55	940	400	296**	483**	215*	390	412*	625*	581*	290	370	360	910	650	420	350	100	650
MW-56	2200	1000	NS	1114**	1026*	1128*	VE	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-61	<1	NS	NS	NS	NS	NS	NS	NS	NS	1.4	<0.5	3.2	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5
MW-65	<1	NS	NS	NS	NS	NS	NS	<3*	DRY	DRY	DRY	NS	<0.5	NS	NS	NS	NS	NS
MW-69	2400	2100	NS	568*	1598*	1284*	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
MW-77	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NS	NS	<0.5	NS	<0.5
MW-78	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	DRY	DRY	DRY	DRY	DRY
MW-79	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	110	14	<5	16	10
MW-80	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	DRY	DRY	DRY	DRY	DRY
SUMP A10	FP	FP	FP	FP	FP	FP	FP	DRY	DRY	DRY	DRY	NS	OCI	DRY	DRY	DRY	<0.5	DRY
SUMP A11	1400	2900	3033**	1258**	2815*	NS	NS	DRY	DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS
SUMP 16A	240	2000	1233**	1495**	632*	741**	707*	DRY	DRY	DRY	DRY	DRY	170	2.0	NS	DRY	130	NS
Lynan								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
U. Indian Hills Spring West	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Biebel								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

OCI = only Chloride sample
 FP = Free Product (condensate)
 NS = Not Sampled
 VE = Vapor Extraction well

Bolded Italicized well numbers = Designated wells for quarterly sampling in Marathon Treatment Plan (March 1992)
 * High Performance Liquid Chromatography (HPLC)
 ** Average of more than one sample result using HPLC.
 NI = Not Installed

FIGURES

Figure 1.
January 1996 Lower Queen Potentiometric Surface

Contoured using SURFER 5.0 Kriging Function
Contour Interval = 0.2 feet
Datum is Mean Sea Level

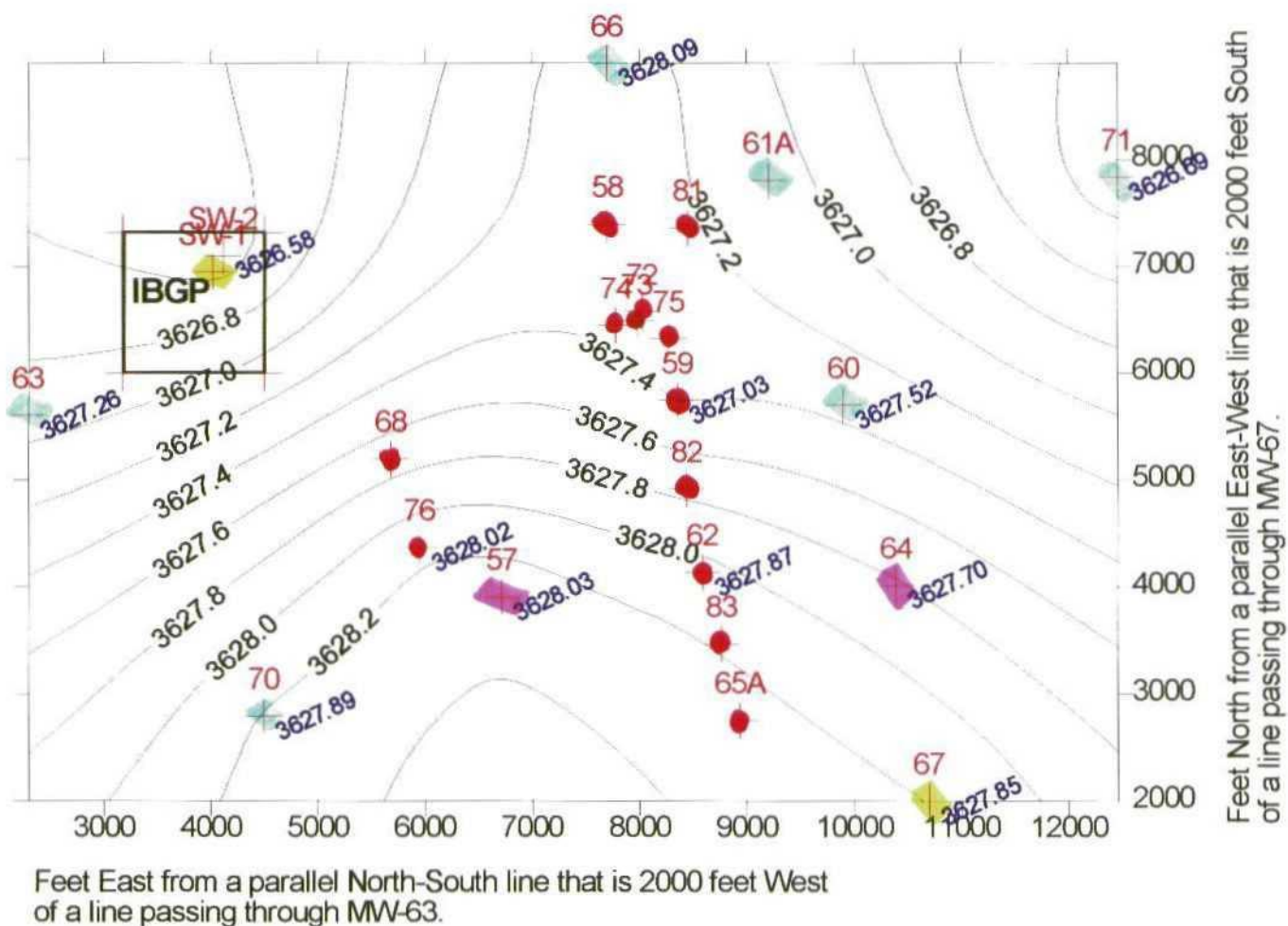


Figure 2. Lower Queen Groundwater Elevation vs. Time

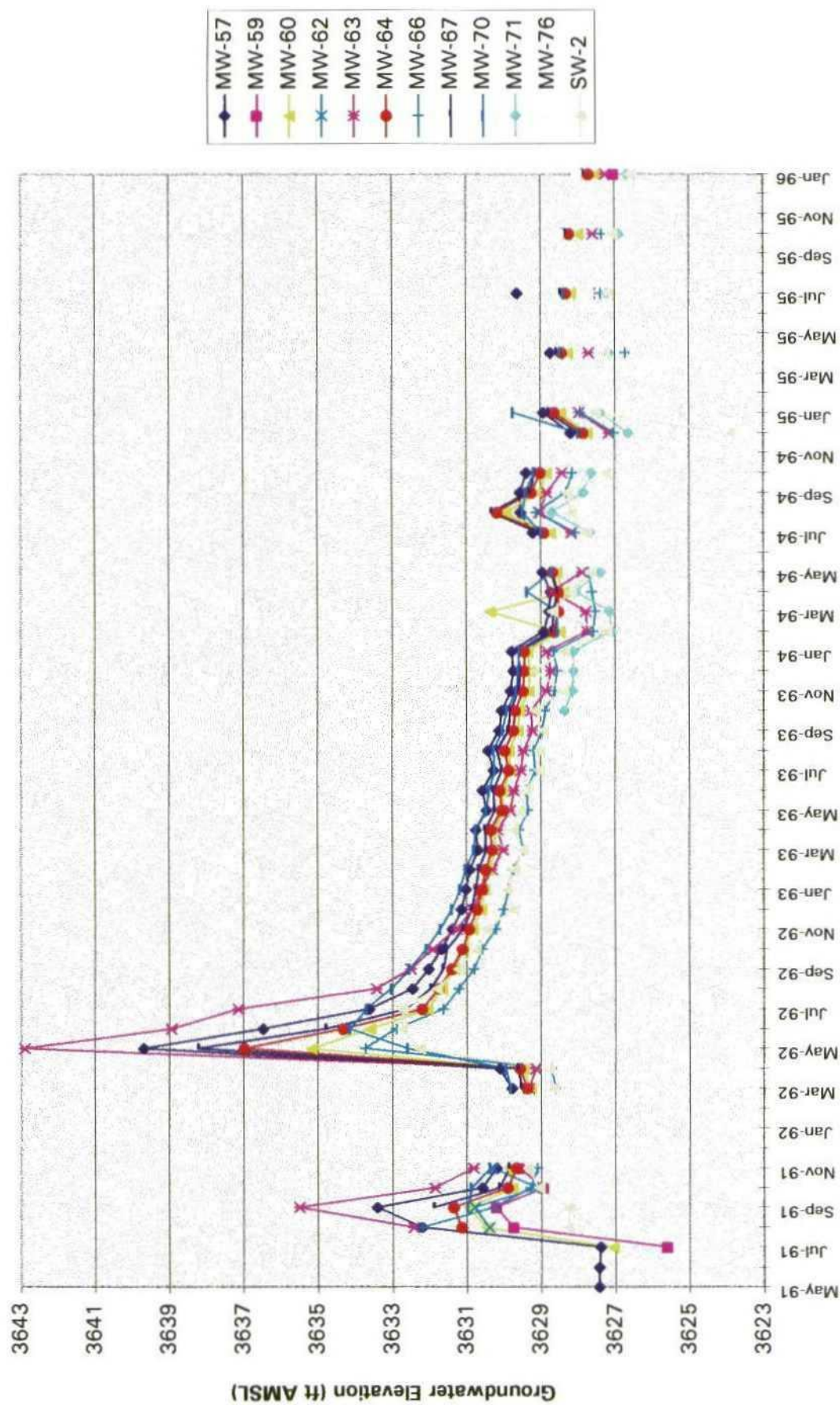
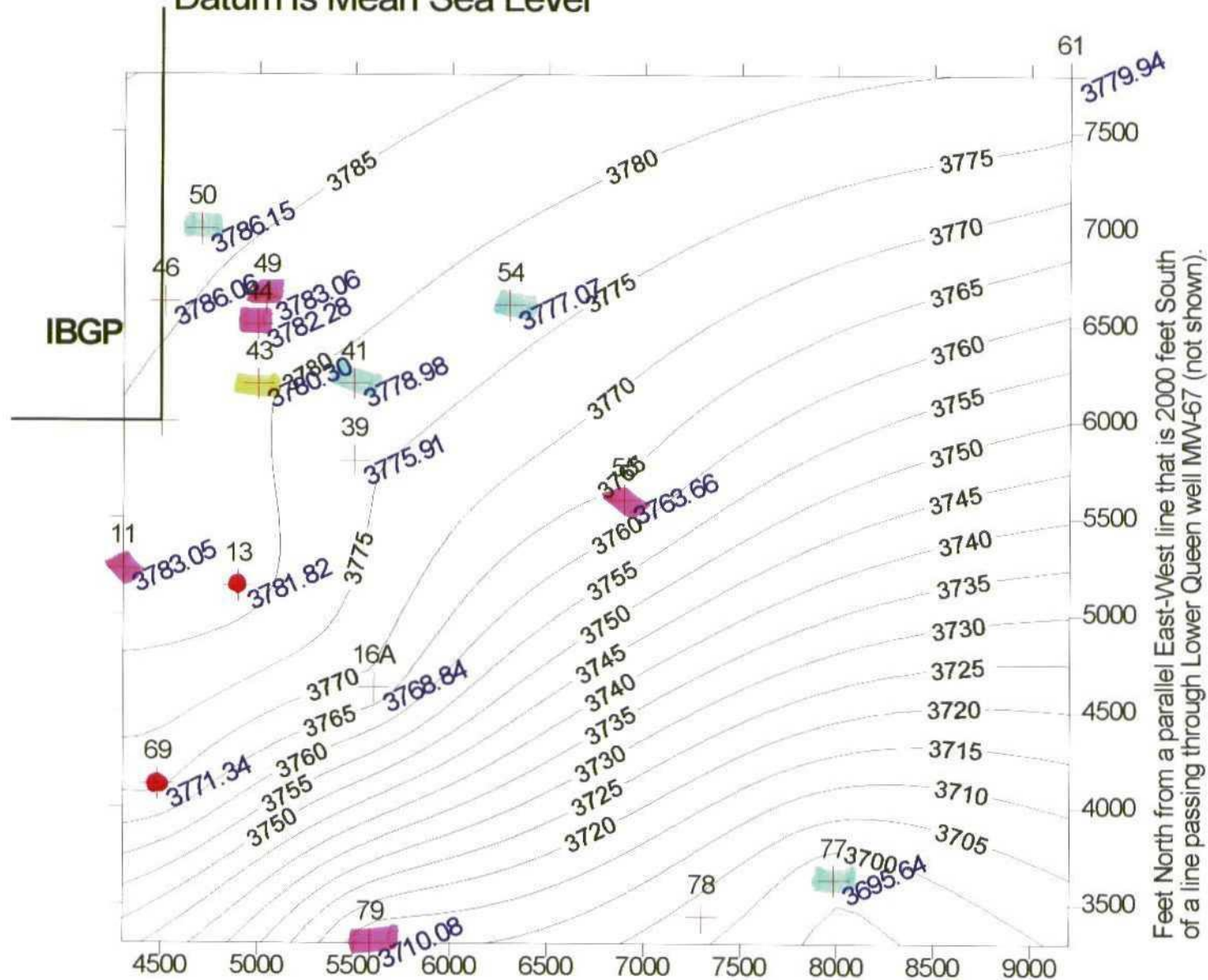


Figure 3.
January 1996 Shallow zone Potentiometric Surface

Contoured using SURFER 5.0 Kriging Function
Contour Interval = 5 feet
Datum is Mean Sea Level



Feet East from a parallel North-South line that is 2000 feet West
of a line passing through Lower Queen well MW-63 (not shown).

Figure 4. Shallow Groundwater Elevation vs. Time

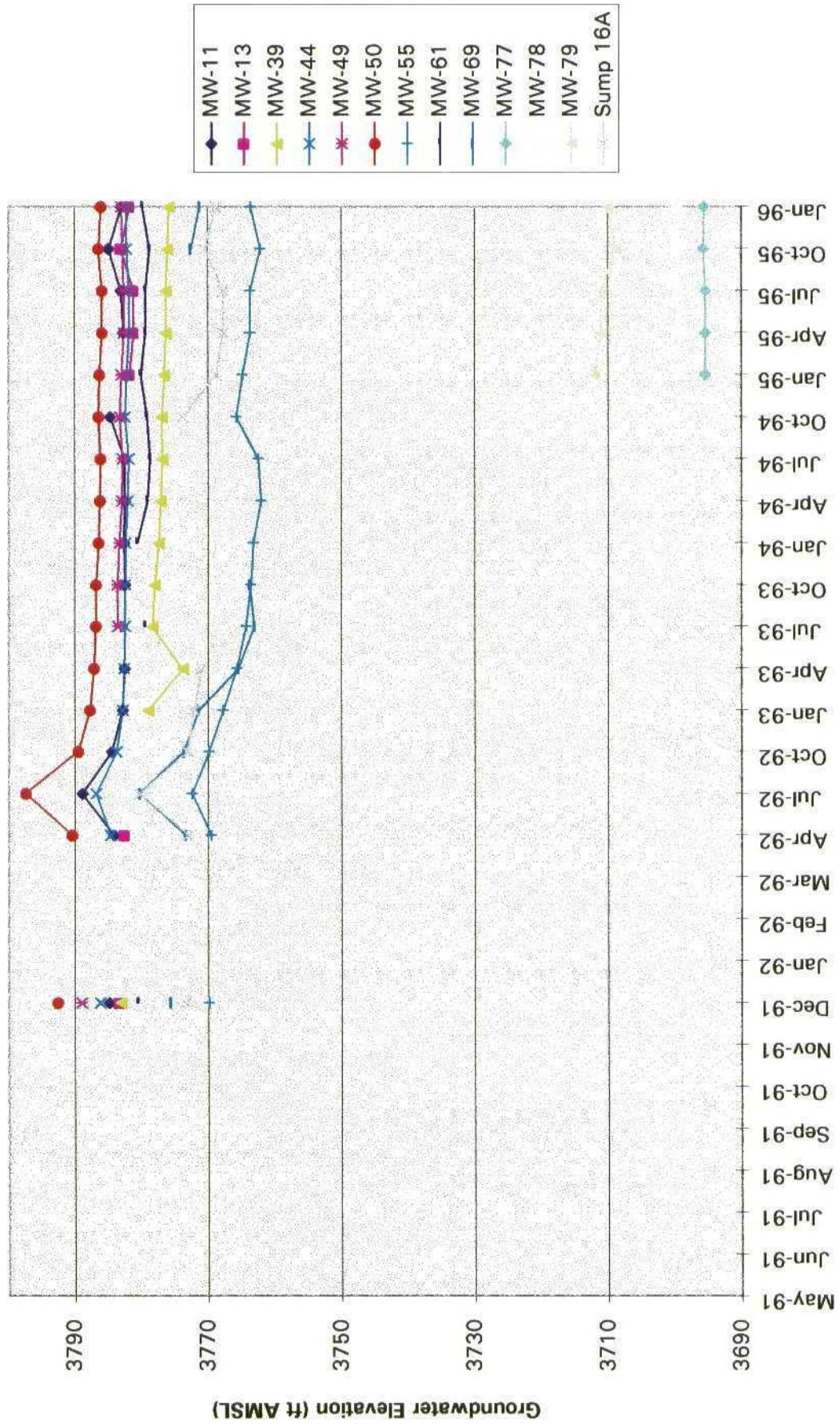
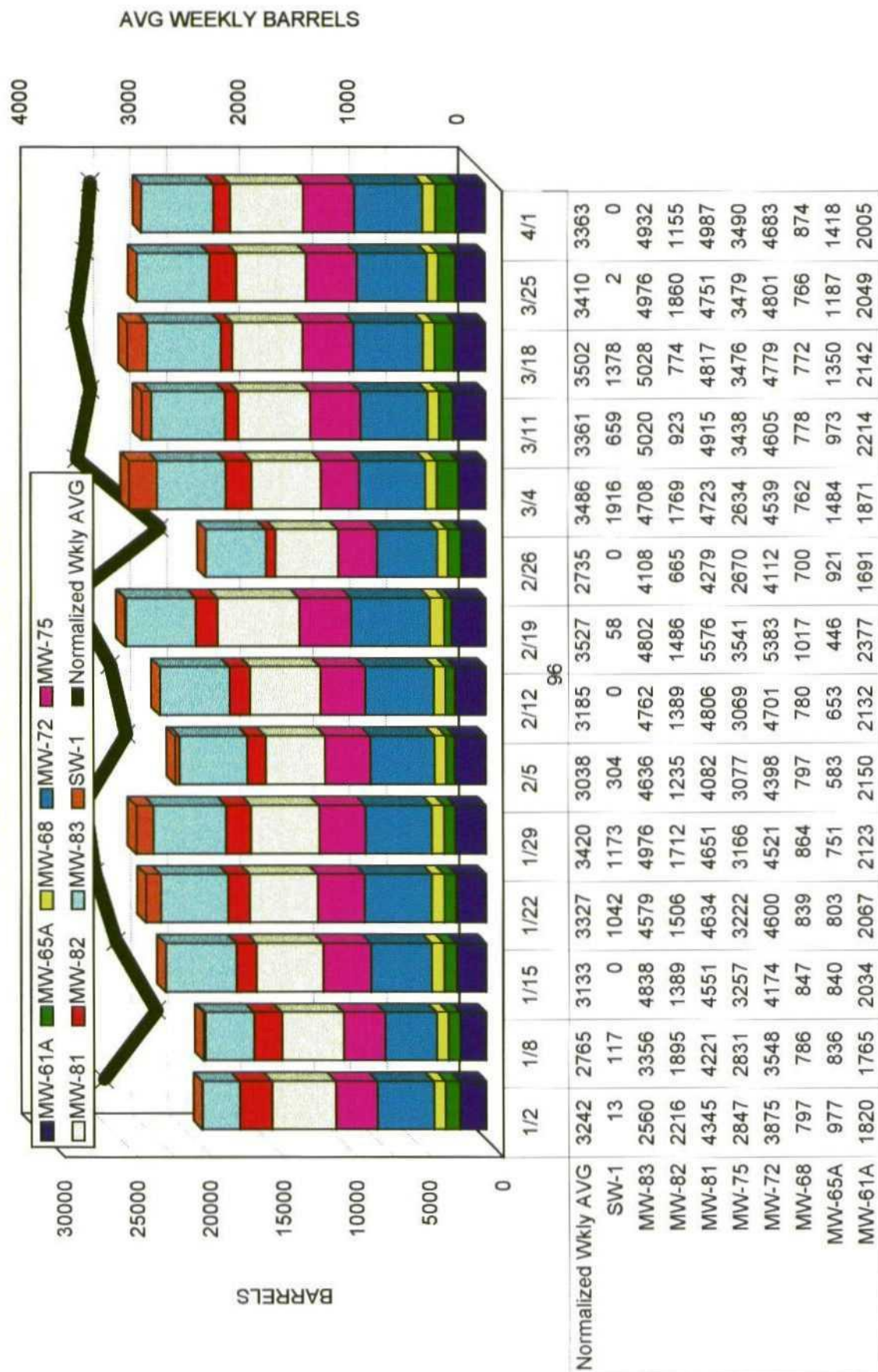


FIGURE 5
WEEKLY LOWER QUEEN FLUID RECOVERY
FIRST QUARTER 1996



METER RECORDING DATE

FIGURE 6

WEEKLY SHALLOW ZONE FLUID RECOVERY FIRST QUARTER 1996

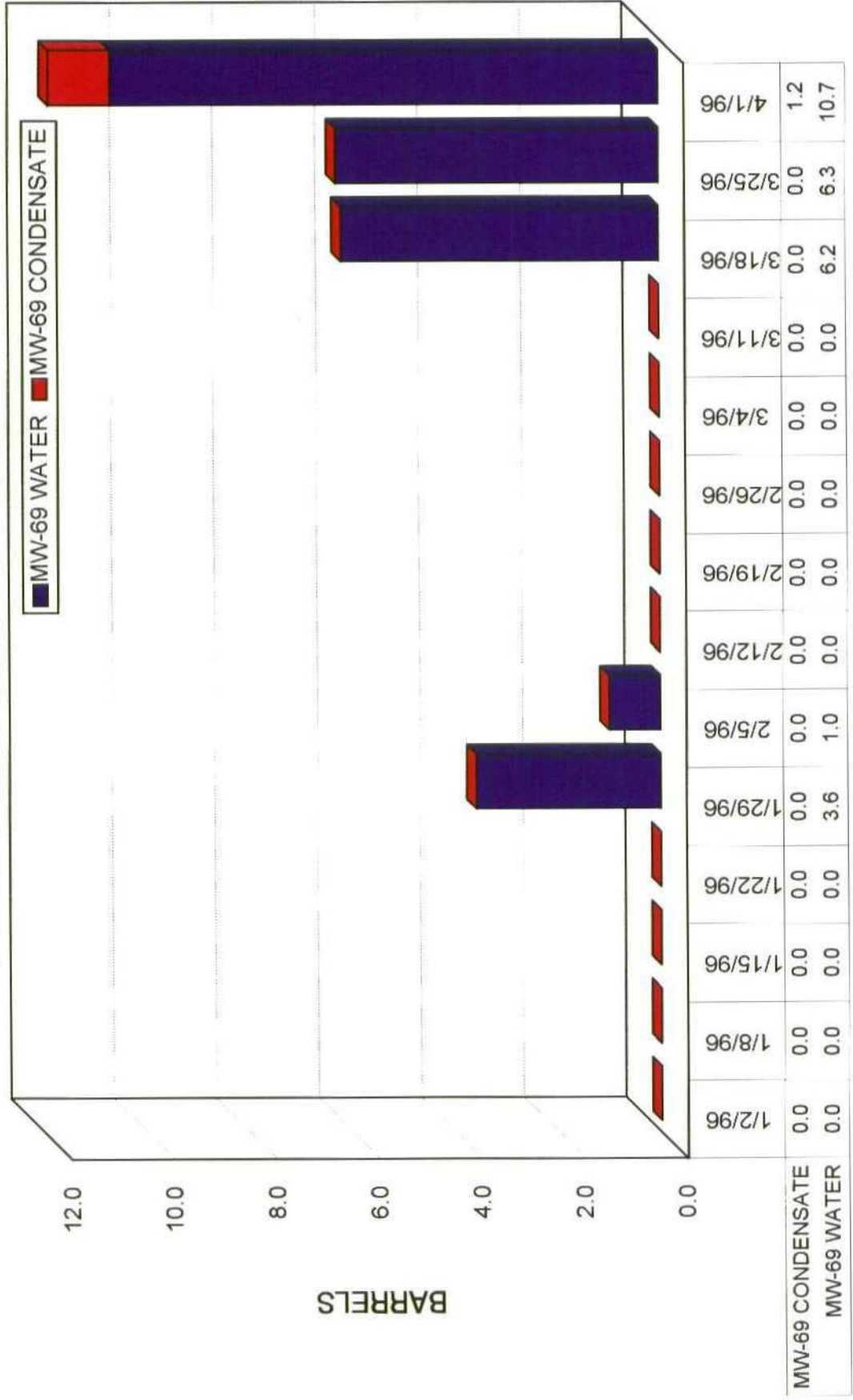
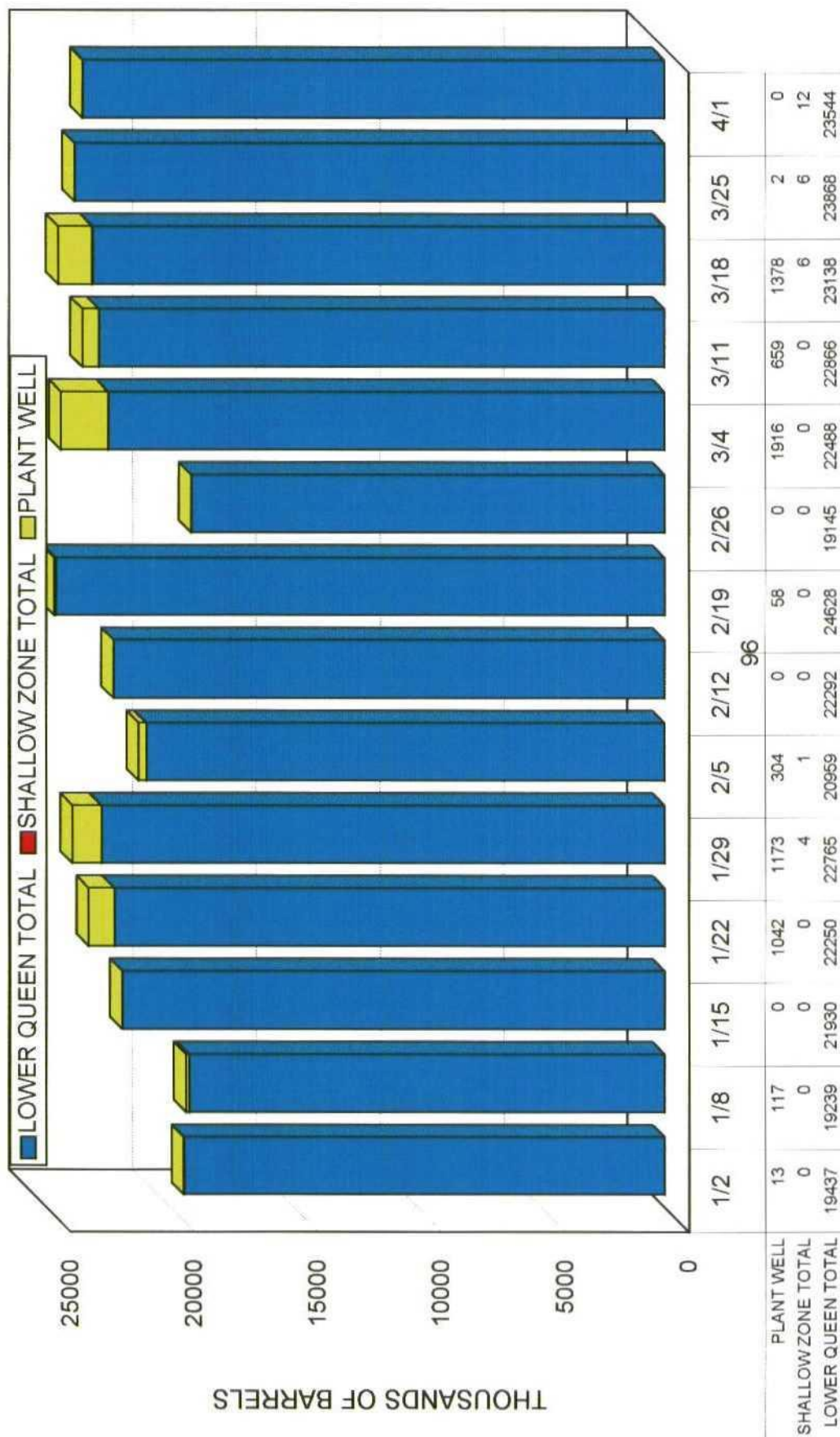


FIGURE 7

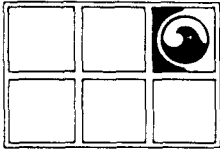
WEEKLY TOTAL FLUID RECOVERY FIRST QUARTER 1996



METER RECORDING DATE

APPENDIX A

JANUARY 1996 GAUGING, PURGING, AND SAMPLING FIELD SUMMARY



GROUNDWATER TECHNOLOGY®

Groundwater Technology, Inc.

2501 Yale Boulevard, SE, Suite 204, Albuquerque, NM 87106 USA
Tel: (505) 242-3113 Fax: (505) 242-1103

February 15, 1996

Project No. 053350107

Mr. Robert J. Menzie, Jr.
Marathon Oil Company
P.O. Box 552
Midland, TX 79702-5233

RE: Transmittal of Groundwater Monitoring and Sampling Reports, Quarter 1 Data

Dear Mr. Menzie:

Enclosed for your use are summary tables of groundwater monitoring and sampling data collected in January 1996 during the 1st Quarter groundwater sampling event. For your information, Groundwater Technology has tentatively scheduled 2nd Quarter sampling for the week of April 1, 1996. If you have any questions regarding this data, or require any additional information or services, please do not hesitate to contact me at (505) 242-3113.

Sincerely,

Groundwater Technology, Inc.

Sara C. Brothers, CPG 9525
Senior Project Manager

cc: Project File

Well Gauging Data Form

Client: Marathon Oil Company
 Site: Indian Basin Remediation Project
 Project #: 053350107.61
 Date: 1/16/96

Recorded By: K. Cook
 Interface Probe (IP) #: Keck 1663
 IP Correction: Minus 1 foot (values in table are corrected)
 Weather: Sunny/windy

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	H ₂ S CONC. (ppm)	HYDROCARBON VAPOR CONC. (ppm)	COMMENTS
MW-03	2	14:40	16.90	Dry	--	--	--	Dry	0	0020	
MW-05	2	11:42	12.77	Dry	--	--	--	Dry	0	0020	
MW-06	2	10:15	14.18	Dry	--	--	--	Dry	0	000	
MW-07	2	09:59	17.33	Dry	--	--	--	Dry	0	000	
MW-08	2	09:43	17.24	Dry	--	--	--	Dry	0	060	
MW-09	2	09:25	13.65	Dry	--	--	--	Dry	0	000	
MW-10	4	14:24	18.21	Dry	--	--	--	Dry	0	000	
MW-11	4	12:05	24.85	23.91	--	0.00	0.00	23.91	0	0020	
MW-13	2	12:00	22.07	19.83	19.75	0.08	0.06	19.77	0	000	No cap on well (NS - PSH)
MW-19	4	11:34	19.11	19.04	--	0.00	0.00	19.04	0	0020	
MW-24	2	11:37	13.18	Dry	--	--	--	Dry	0	0020	
MW-29	2	14:29	14.76	Dry	--	--	--	Dry	0	000	
MW-32	2	11:53	15.70	Dry	--	--	--	Dry	0	0020	
MW-38	4	11:25	20.57	Dry	--	--	--	Dry	0	004	
MW-39	4	11:29	20.54	20.29	--	0.00	0.00	20.29	0	0040	
MW-41	4	11:22	24.04	20.06	--	0.00	0.00	20.06	0	000	
MW-43	4	11:20	24.55	21.75	--	0.00	0.00	21.75	0	000	
MW-44	4	11:17	25.24	21.86	--	0.00	0.00	21.86	0	000	
MW-45	2	12:39	26.62	--	--	--	--	--	--	--	Did not gauge - piping in well
MW-46	4	12:35	19.80	19.48	--	--	--	19.48	0	040	
MW-47	2	12:31	21.79	Dry	--	--	--	Dry	0	020	

Well Gauging Data Form

Client: Marathon Oil Company
 Site: Indian Basin Remediation Project
 Project #: 053350107.61
 Date: 1/16-17/96

Recorded By: K. Cook
 Interface Probe (IP) #: Keck #1663
 IP Correcton: Minus 1 foot (values in table corrected) OR 300' Water Level Indicator (WLI)
 Weather: Sunny

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	H ₂ S CONC. (ppm)	HYDROCARBON VAPOR CONC. (ppm)	COMMENTS
MW-48	2	12:28	19.98	Dry	--	--	--	Dry	0	000	NS - dry
MW-49	2	11:12	25.91	22.55	--	0.00	0.00	22.55	0	000	
MW-50	2	11:07	37.15	27.20	--	0.00	0.00	27.20	0	000	
MW-52	2	12:16	21.19	Dry	--	--	--	Dry	0	000	NS - dry
MW-53	2	10:25	15.20	Dry	--	--	--	Dry	0	000	NS - dry
MW-54	4	12:49	78.15	46.79	--	0.00	0.00	46.79	0	000	
MW-55	4	14:20	66.32	30.74	--	0.00	0.00	30.74	0	620	
MW-56	4	14:46	43.76	Dry	--	--	--	Dry	0	020	NS - dry
MW-57	4	14:52	179.30	159.67	--	0.00	0.00	159.67	0	000	
MW-60	4	09:56	226.08	187.76	--	0.00	0.00	187.76	0	000	
MW-61	4	14:07	57.97	36.26	--	0.00	0.00	36.26	0	200	
MW-61A	4	14:08	215.67	--	--	--	--	--	--	--	Pump in well no access NS (WLI)
MW-63	4	12:22	221.88	198.90	--	0.00	0.00	198.90	0	000	
MW-64	4	10:06	204.38	170.87	--	0.00	0.00	170.87	0	2720	
MW-65	4	15:00	57.69	57.25	--	0.00	0.00	57.25	0	420	NS - insuf. water
MW-66	4	14:00	237.66	200.89	--	0.00	0.00	200.89	0	040	
MW-67	4	10:15	168.54	138.02	--	0.00	0.00	138.02	0	10,000+	Over 100 LEL
MW-69	4	13:17	51.27	37.54	33.35	4.19	3.06	34.48	0	000	Removed pump to gauge
MW-70	4	09:00	228.14	194.68	--	0.00	0.00	194.68	0	000	

Well Gauging Data Form

Client:	Marathon Oil Company	Recorded By:	K. Cook
Site:	Indian Basin Remediation Project	Interface Probe (IP) #:	Keck #1663
Project #:	053350107.61	IP Correction:	Minus 1 foot (values in table corrected) OR 300' Water Level Indicator (WLI)
Date:	1/16-17/96	Weather:	Sunny

[illegible]

Well Gauging Data Form

Client:	Marathon Oil Company	Recorded By:	K. Cook
Site:	Indian Basin Remediation Project	Interface Probe (IP) #:	Keck # 1663
Project #:	053350107.61	IP Correcton:	Minus 1 foot (values in table corrected) OR 300' Water Level Indicator (WLI)
Date:	1/16-17/96	Weather:	Sunny

[illegible]

LOWER QUEEN MONITORING WELL GAUGING, PURGING, AND SAMPLING FORM

Project Name/Location: MOC/IBRP Carlsbad, New Mexico Date: 1/18 - 19/96

Project Number: 053350107 Technician: K. Cook

Well Number	Well Diameter (in)	Well Depth (ft)	DTW from TOC (ft)	Purge volume (gal)	Purge Method (pump/bail)	Time purging began (hh:mm)	Actual volume purged (gal)	Depth of pump (ft)	Pumping rate (gpm)	Date/time sample collected (dd/mm/yy, HH:MM)	Final pH	Final Spec. Cond. (mohm s/cm)	Final Temp. (F)	Sample ID
MW-70	4	228.14	194.68	68	Pump	11:37	68+	220	4	1/18/96 12:35	7.84	410	55.9	MW-70
MW-63	4	221.88	198.90	46	Pump	15:00	46+	218	3	1/18/96 15:55	7.92	423	54.9	MW-63
MW-87	6.5	#	--	--	--	--	--	--	--	NS-well not drilled	--	--	--	NS
MW-71	4	235.41	151.36	166	Pump	16:25	150	231	0.5-2	1/18/96 18:00	7.75	833	44.8	MW-71
MW-88	6.5	#	--	--	--	--	--	--	--	NS-well not drilled	--	--	--	NS
MW-89	6.5	#	--	--	--	--	--	--	--	NS-well not drilled	--	--	--	NS
MW-66	4	237.66	200.89	74	Pump	08:40	74+	230	3	1/19/96 09:35	7.37	745	59.2	MW-66
MW-60	4	226.08	187.76	78	Pump	10:25	78+	220	5	1/19/95 11:10	7.69	1004	62.0	MW-60
MW-64	4	204.38	170.87	68	Pump	12:20	68+	200	6	1/19/96 13:05	7.80	891	62.4	MW-64

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic).
- 2 - Purge amounts are 3 well casing volumes.
- 3 - NS: Not sampled due to insufficient recharge. NA: Not Applicable # - Won't be drilled until after January 19, 1996

LOWER QUEEN MONITORING WELL GAUGING, PURGING, AND SAMPLING FORM

Project Name/Location: MOC/IBRP Carlsbad, New Mexico Date: 1/19-20/96

Project Number: 053350107 Technician: K. Cook

Well Number	Well Diameter (in)	Well Depth (ft)	DTW from TOC (ft)	Purge volume (gal)	Purge Method (pump/bail)	Time purging began (hh:mm)	Actual volume purged (gal)	Depth of pump (ft)	Pumping rate (gpm)	Date/time sample collected (dd/mm/yy, HH:MM)	Final pH	Final Spec. Cond. (mohm s/cm)	Final Temp. (F)	Sample ID
MW-67	4	168.54	138.02	60	Pump	13:35	60 +	160	8	1/19/96 14:15	7.72	756	62.6	MW-67
MW-57	4	179.30	159.67	40	Pump	14:50	40 +	170	5	1/19/96 15:35	7.67	792	62.1	MW-57
MW-76	7.875	222.50	168.85	--	--	--	--	--	--	NS-PSH	--	--	--	NS
MW-58	4	218.03	--	--	--	--	--	--	--	NS-dry	--	--	--	NS
MW-73	7.875	222.50	192.66	--	--	--	--	--	--	NS-condensate	--	--	--	NS
MW-74	7.875	222.50	188.65	--	--	--	--	--	--	NS-condensate	--	--	--	NS
MW-59	4	211.29	192.56	--	--	--	--	--	--	NS-PSH	--	--	--	NS
MW-62	4	224.69	192.04	--	--	--	--	--	--	NS-PSH	--	--	--	NS
MW-65A	4	168.56	136.11	--	--	--	--	--	--	NS-PSH	--	--	--	NS

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic).
- 2 - Purge amounts are 3 well casing volumes.
- 3 - NS: Not sampled due to insufficient recharge. NA: Not Applicable.

SHALLOW ZONE MONITORING WELL GAUGING, PURGING, AND SAMPLING FORM

Project Name/Location: MOC/IBRP Carlsbad, New Mexico Date: 1/20/96

Project Number: 053350107 Technician: K. Cook

Well Number	Well Diameter (in)	Well Depth (ft)	DTW from TOC (ft)	Purge volume (gal)	Purge Method (pump/bail)	Time purging began (hh:mm)	Actual volume purged (gal)	Depth of pump (ft)	Pumping rate (gpm)	Date/time sample collected (dd/mm/yy, HH:MM)	Final pH	Final Spec. Cond. (mohm s/cm)	Final Temp (F)	Sample ID
MW-11	4	24.85	23.91	2	Hand	--	1	NA	NA	1/20/96 14:25	7.33	1150	64.1	MW-11
MW-13	2	22.07	19.83	--	--	--	--	--	--	NS-PSH present	--	--	--	NS
MW-19	4	19.11	19.04	--	--	--	--	--	--	NS-insuf. Water	--	--	--	NS
MW-38	4	20.57	Dry	--	--	--	--	--	--	NS-dry	--	--	--	NS
MW-39	4	20.54	20.29	--	--	--	--	--	--	NS-insuf. Water	--	--	--	NS
MW-41	4	24.04	20.06	8	Hand	--	4.5	NA	NA	1/20/96 14:10	7.02	1770	66.5	MW-41
MW-43	4	24.55	21.75	6	Hand	--	6	NA	NA	1/20/96 14:00	7.40	2400	64.2	MW-43
MW-44	4	25.24	21.86	7	Hand	--	7	NA	NA	1/20/96 11:45	6.85	2940	63.9	MW-44
MW-46	4	20.80	19.48	--	--	--	--	--	--	NS-insuf. Water	--	--	--	NS
MW-47	2	21.79	Dry	--	--	--	--	--	--	NS-dry	--	--	--	NS

Comments:

1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic).

2 - Purge amounts are 3 well casing volumes

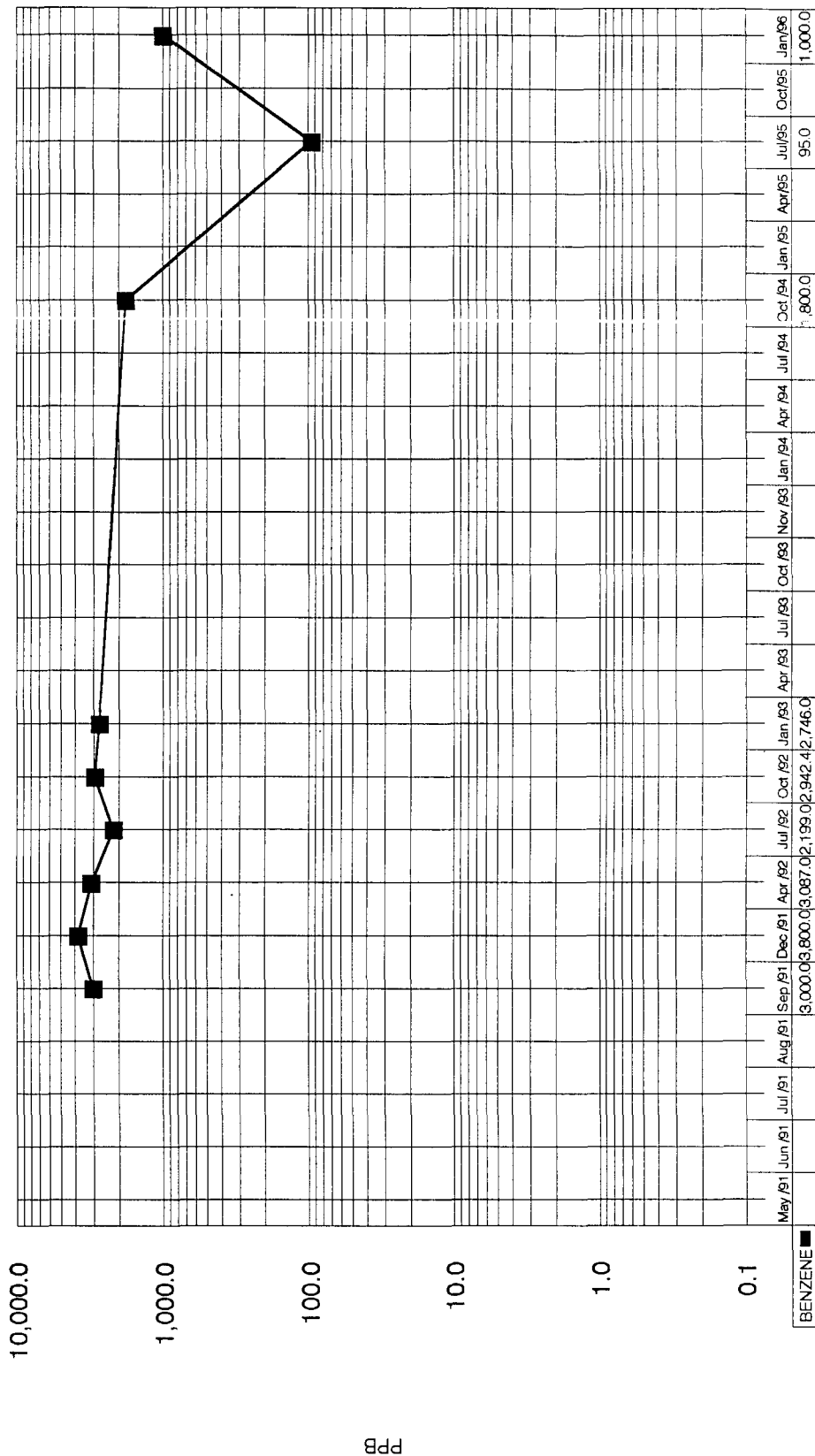
3 - NS: Not sampled due to insufficient recharge, NA: Not Applicable

APPENDIX B

BENZENE CONCENTRATION IN GROUNDWATER VS. TIME GRAPHS

BENZENE IN GROUNDWATER

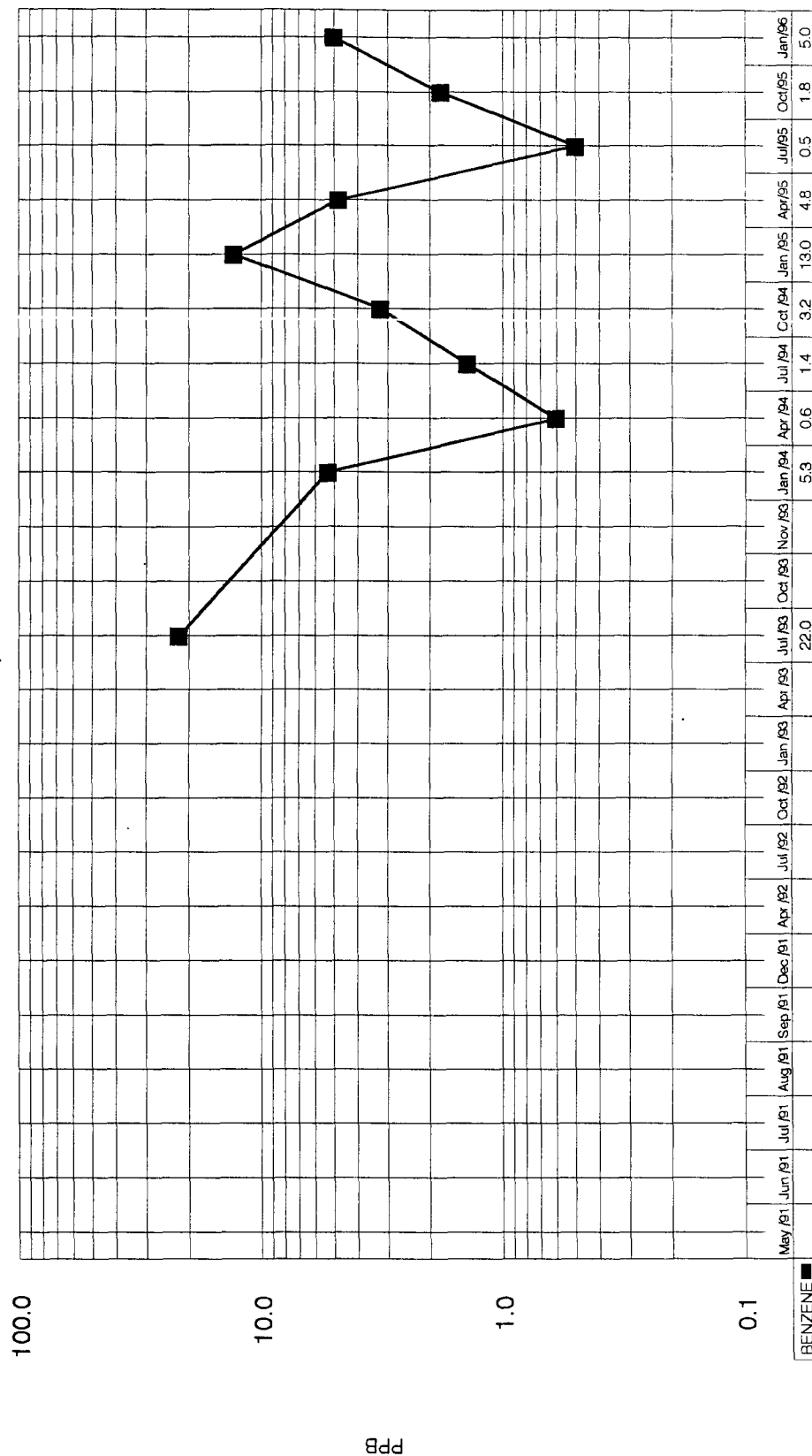
MW-11



DATE SAMPLED

BENZENE IN GROUNDWATER

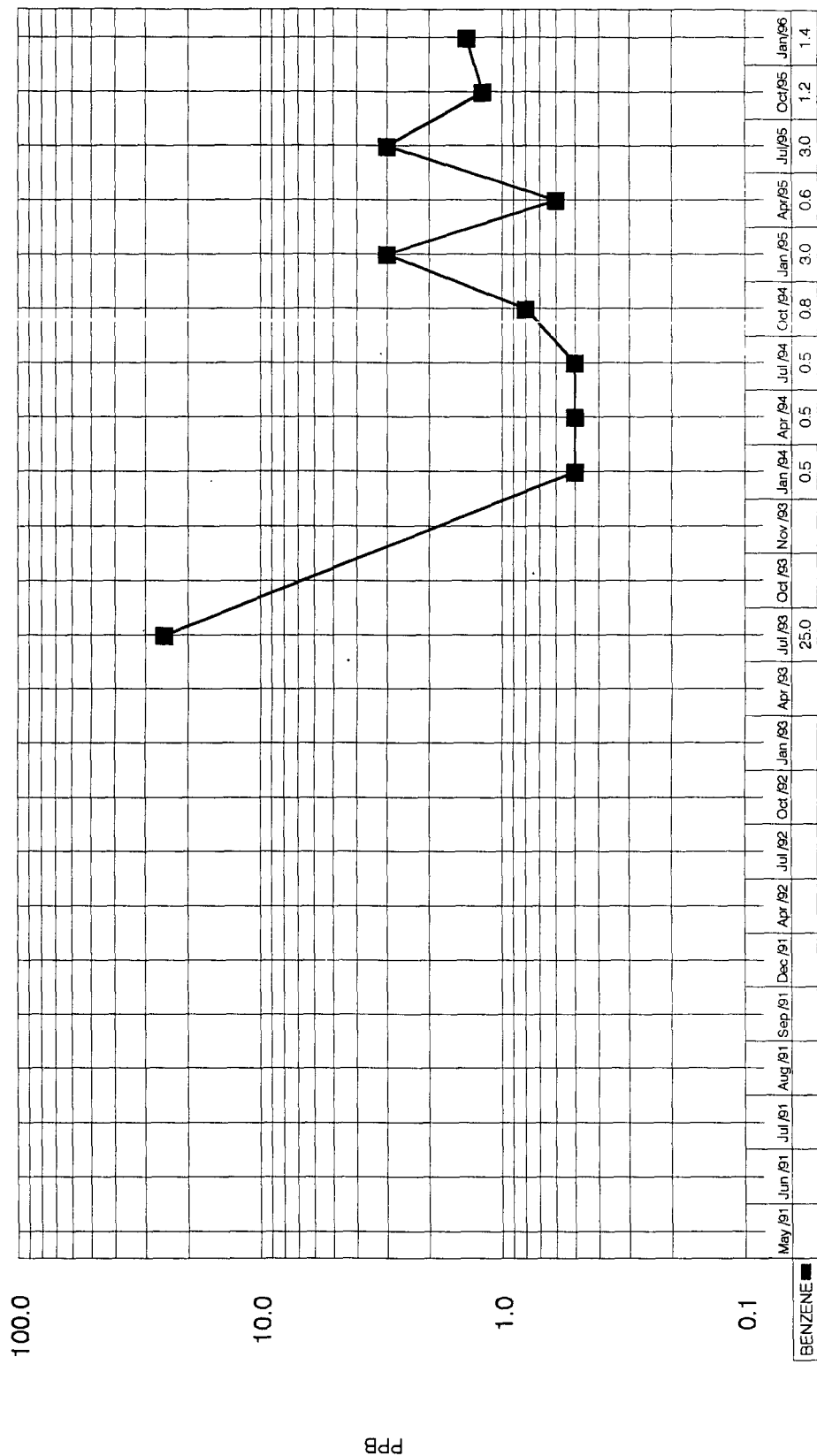
MW-41



DATE SAMPLED

BENZENE IN GROUNDWATER

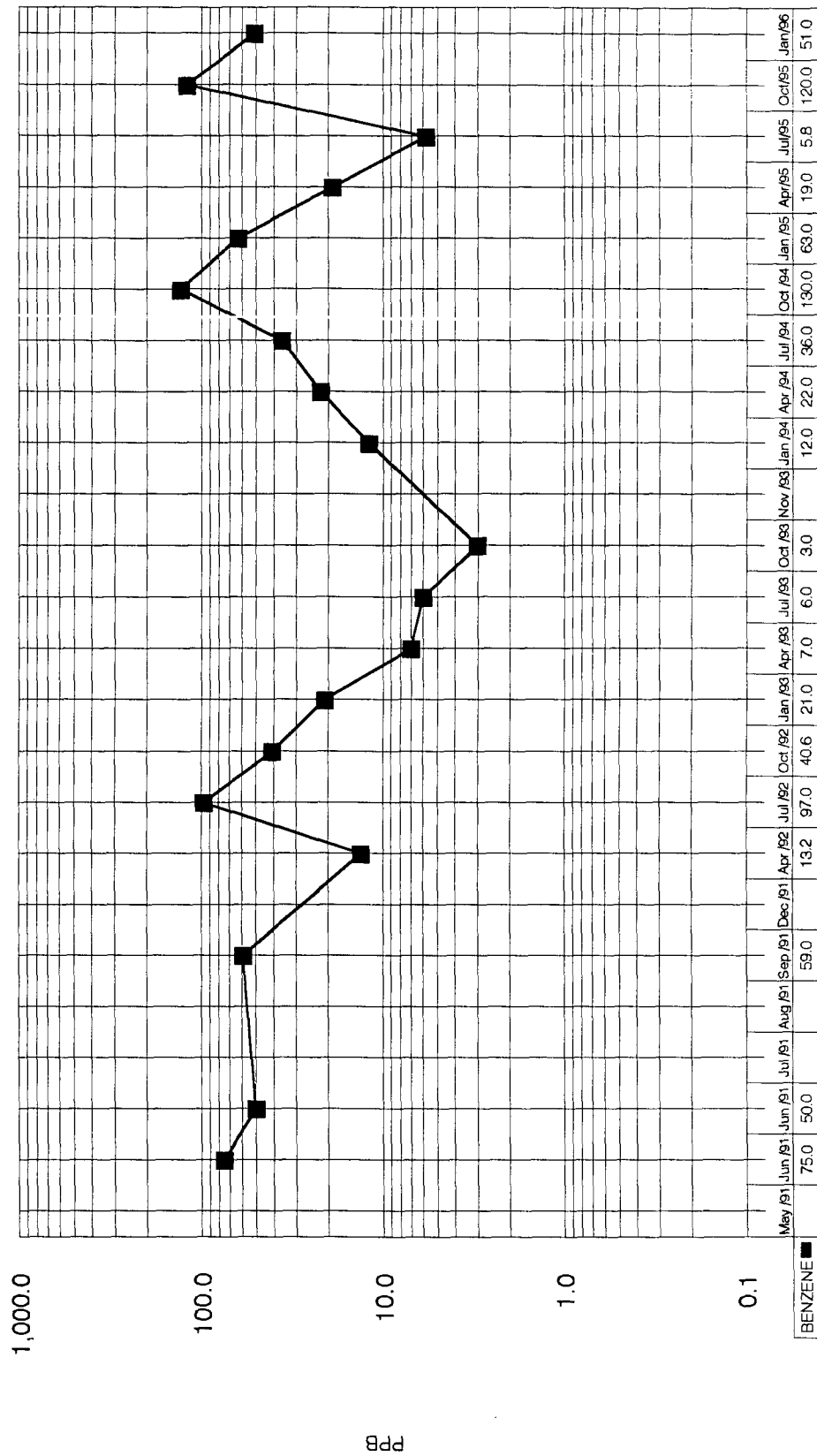
MW-43



DATE SAMPLED

BENZENE IN GROUNDWATER

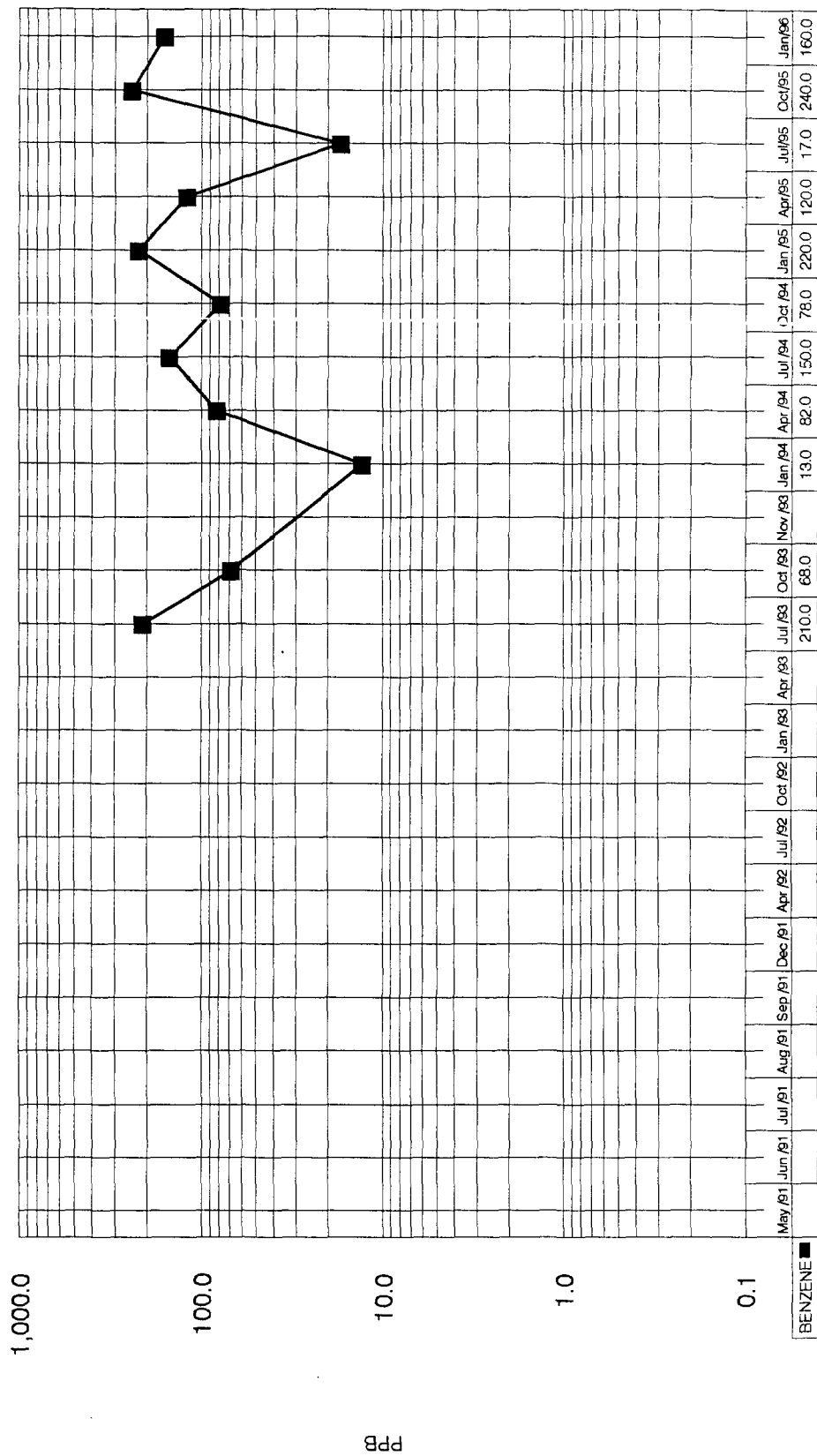
MW-44



DATE SAMPLED

BENZENE IN GROUNDWATER

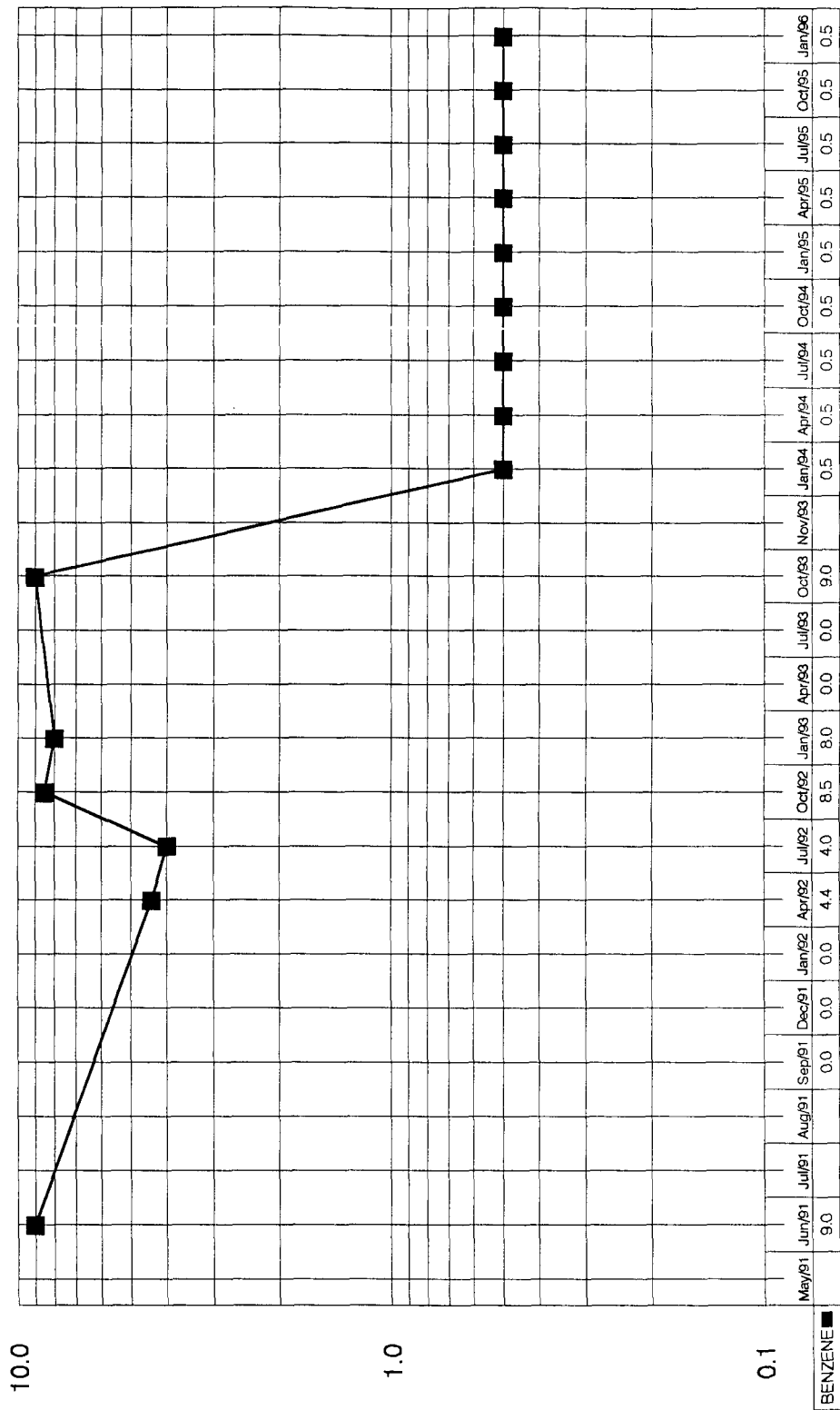
MW-49



DATE SAMPLED

BENZENE IN GROUNDWATER

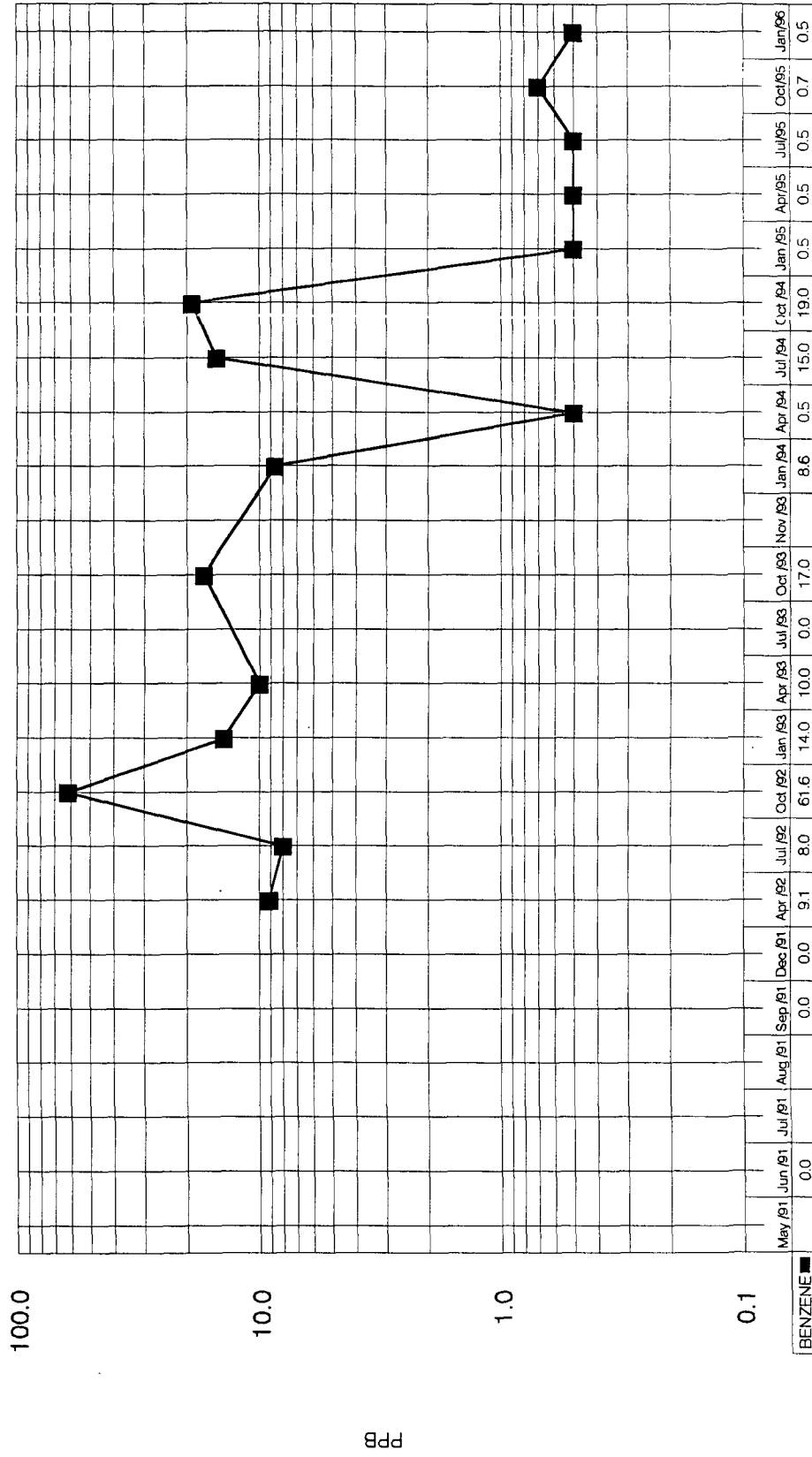
MW-50



DATE SAMPLED

BENZENE IN GROUNDWATER

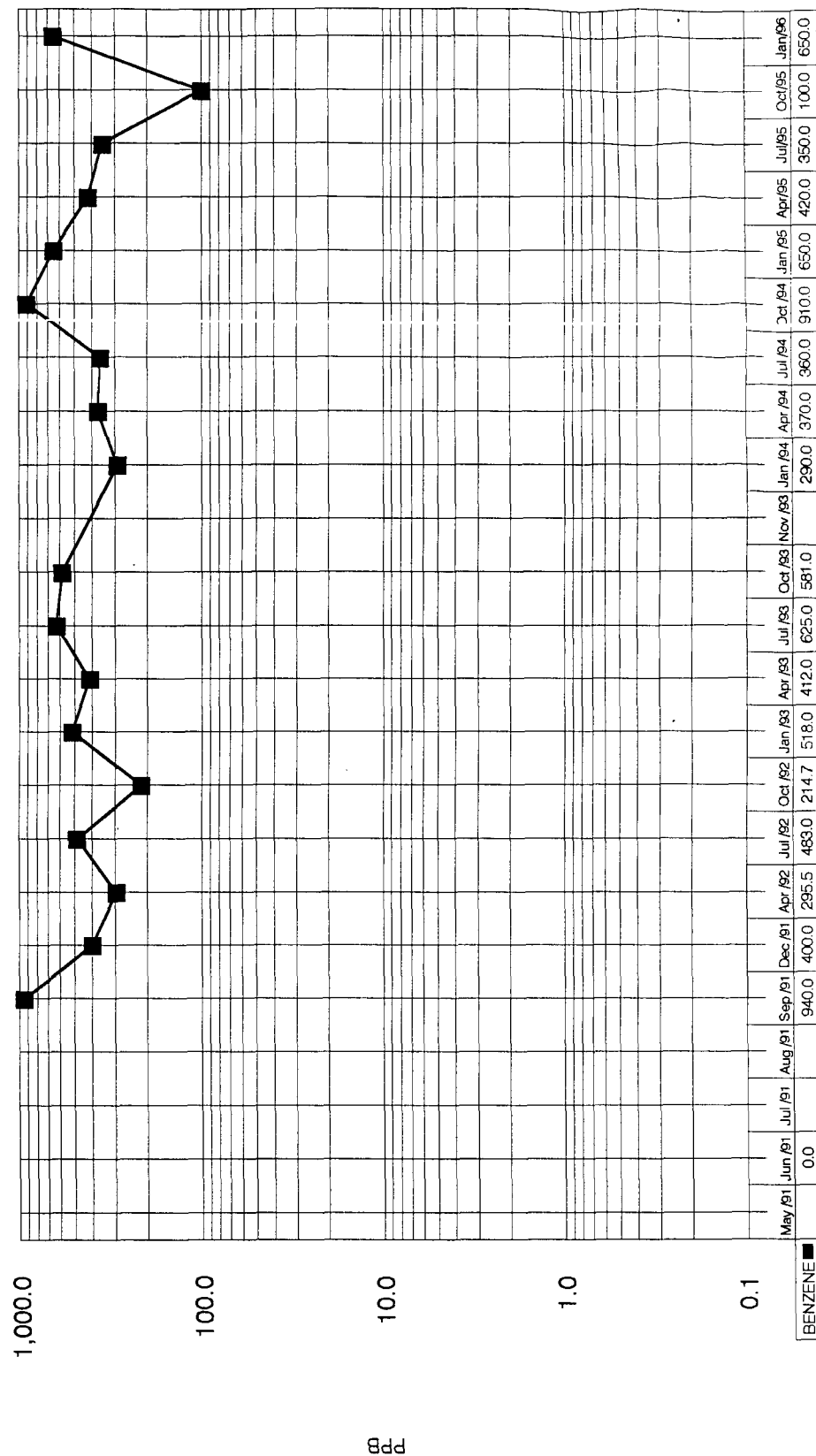
MW-54



DATE SAMPLED

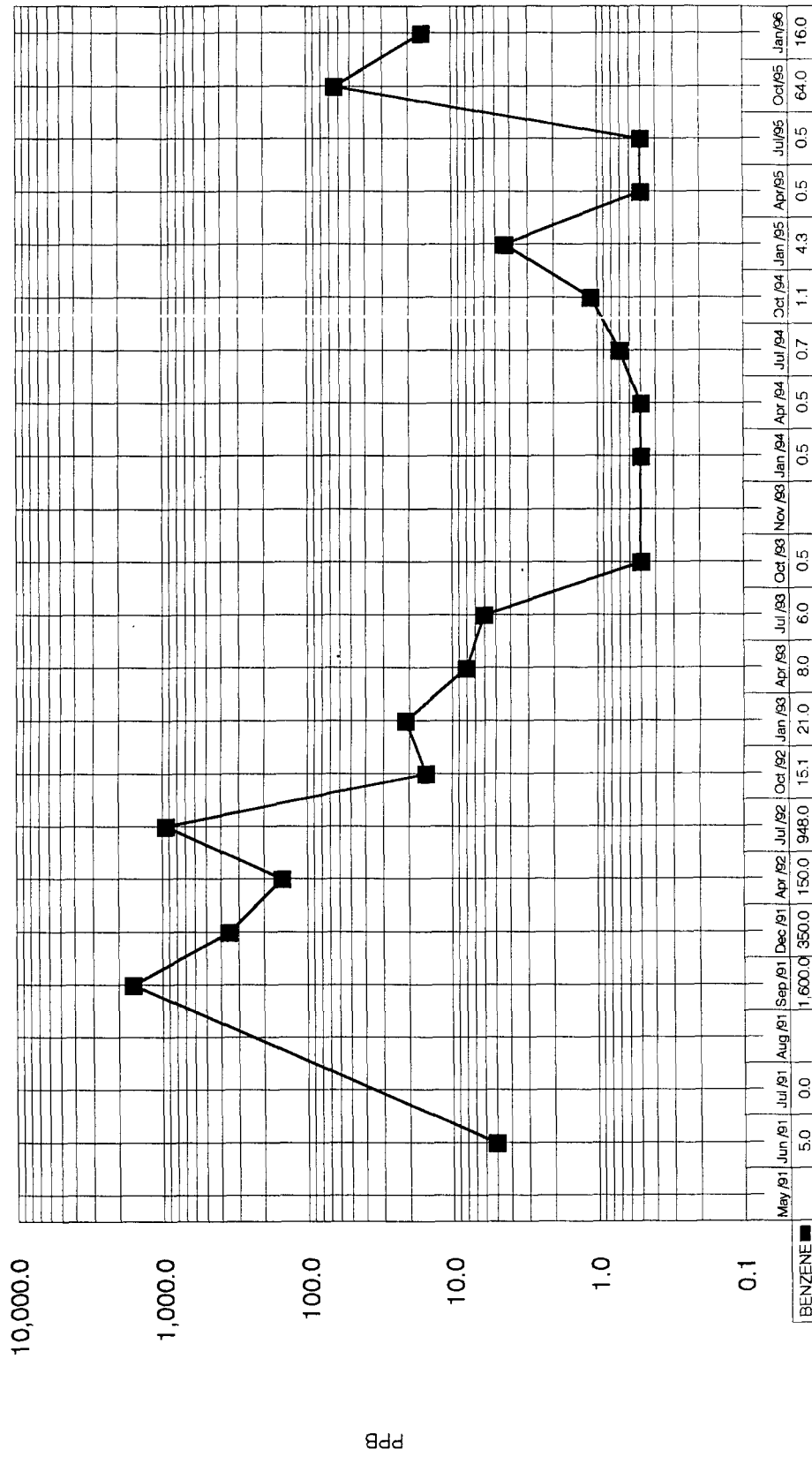
BENZENE IN GROUNDWATER

MW-55



DATE SAMPLED

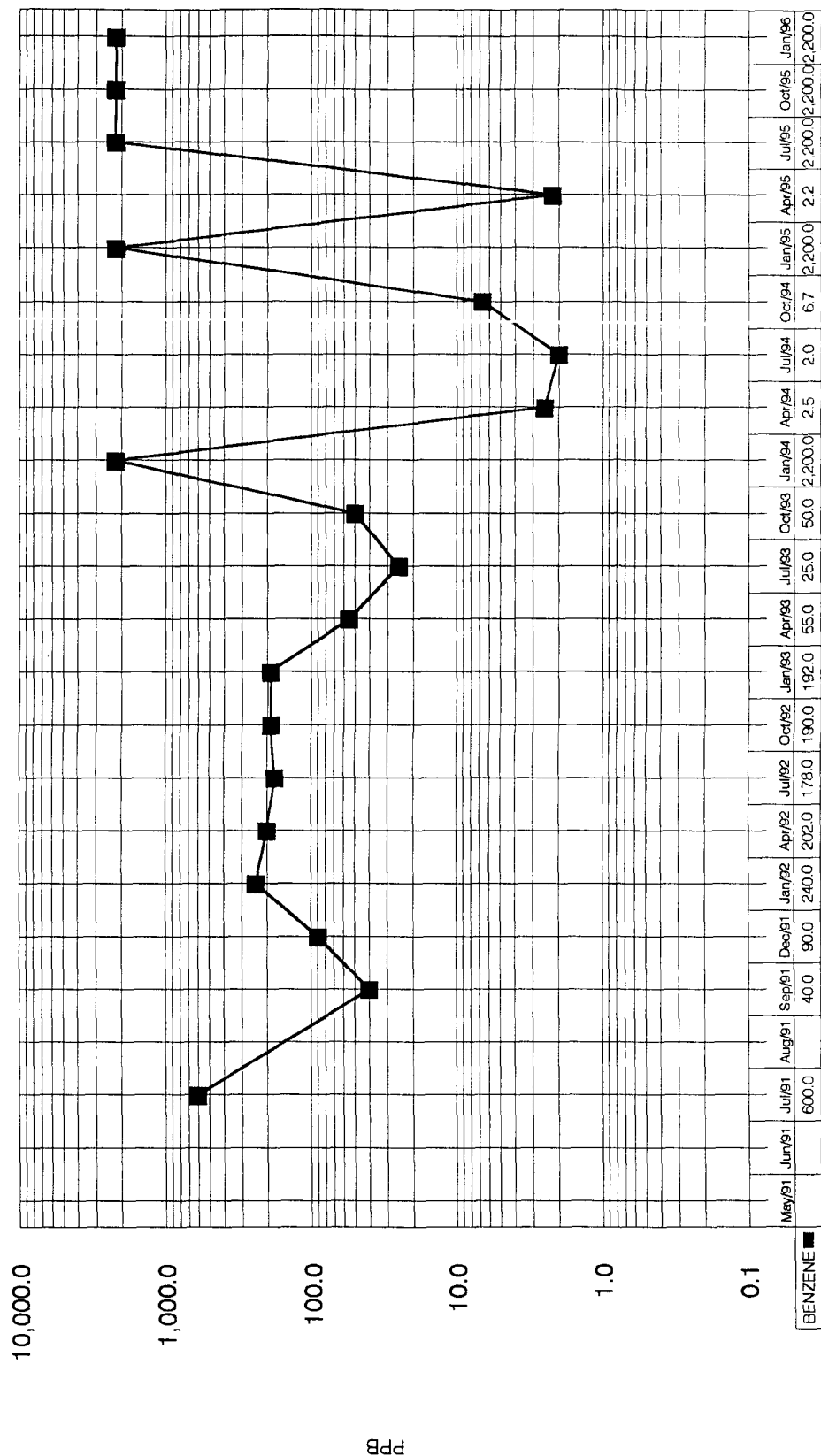
BENZENE IN GROUNDWATER MW-57



DATE SAMPLED

BENZENE IN GROUNDWATER

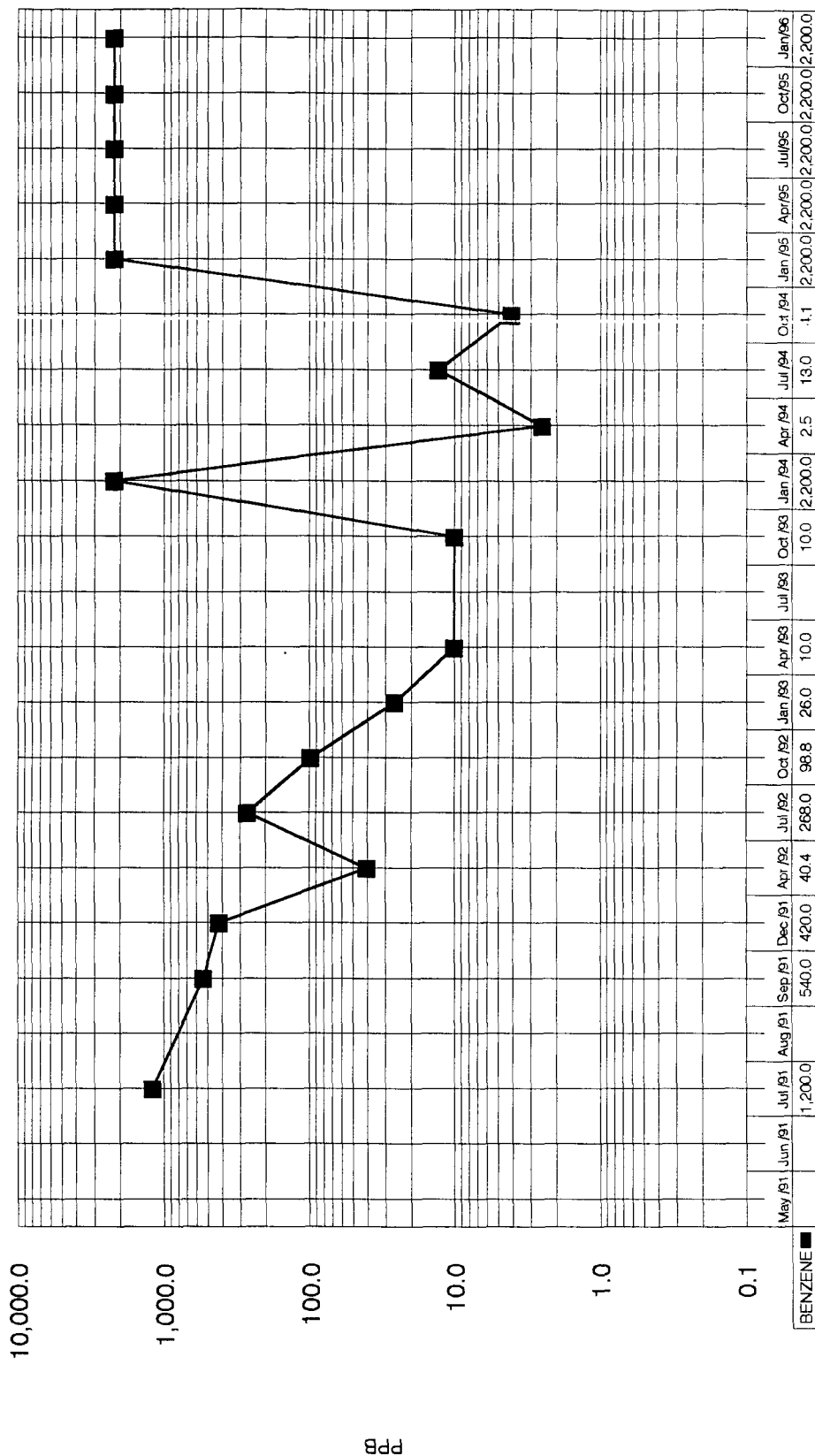
MW-58



DATE SAMPLED

Note: Free-phase condensate = 2200 ppb benzene

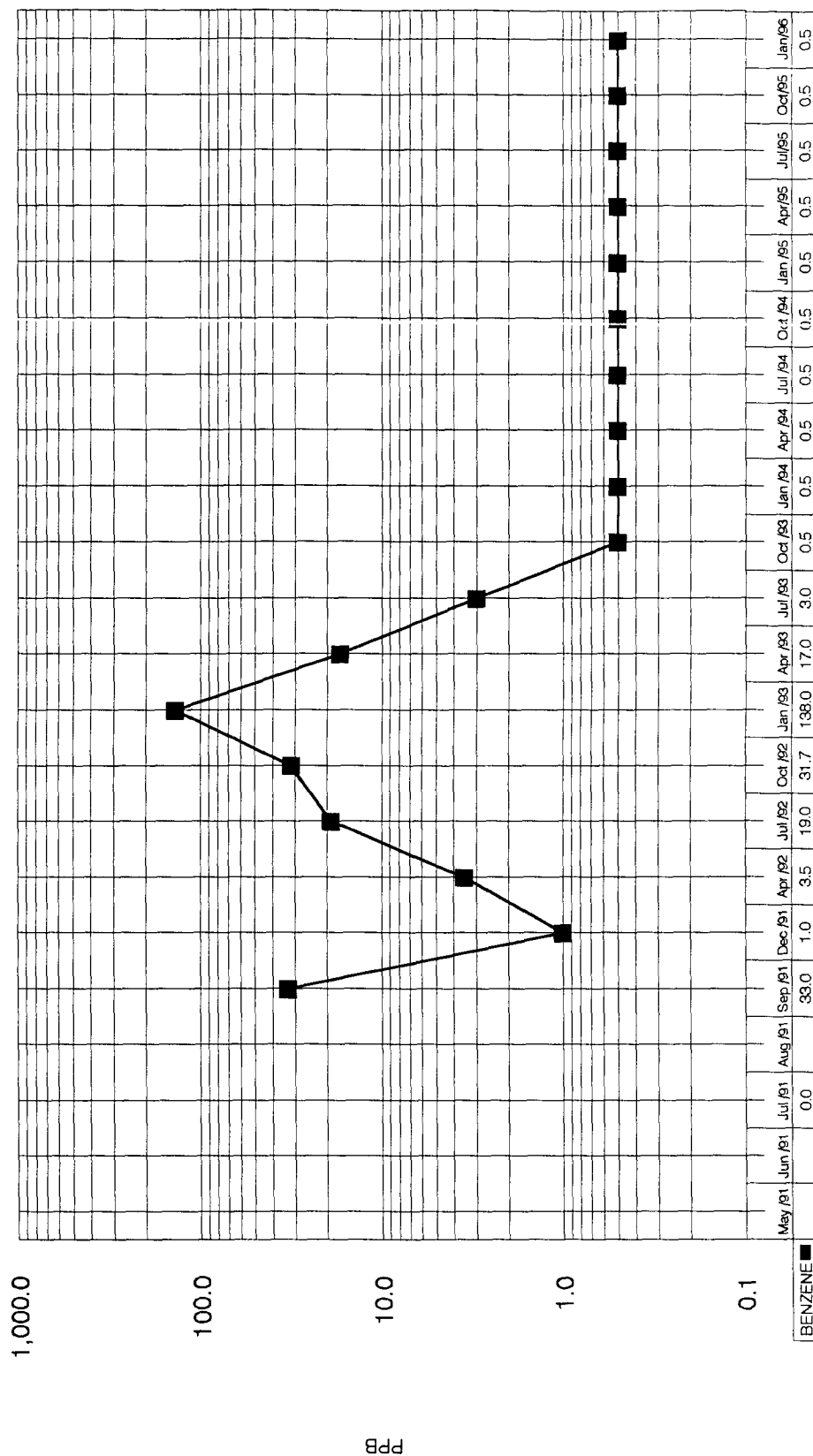
BENZENE IN GROUNDWATER MW-59



DATE SAMPLED

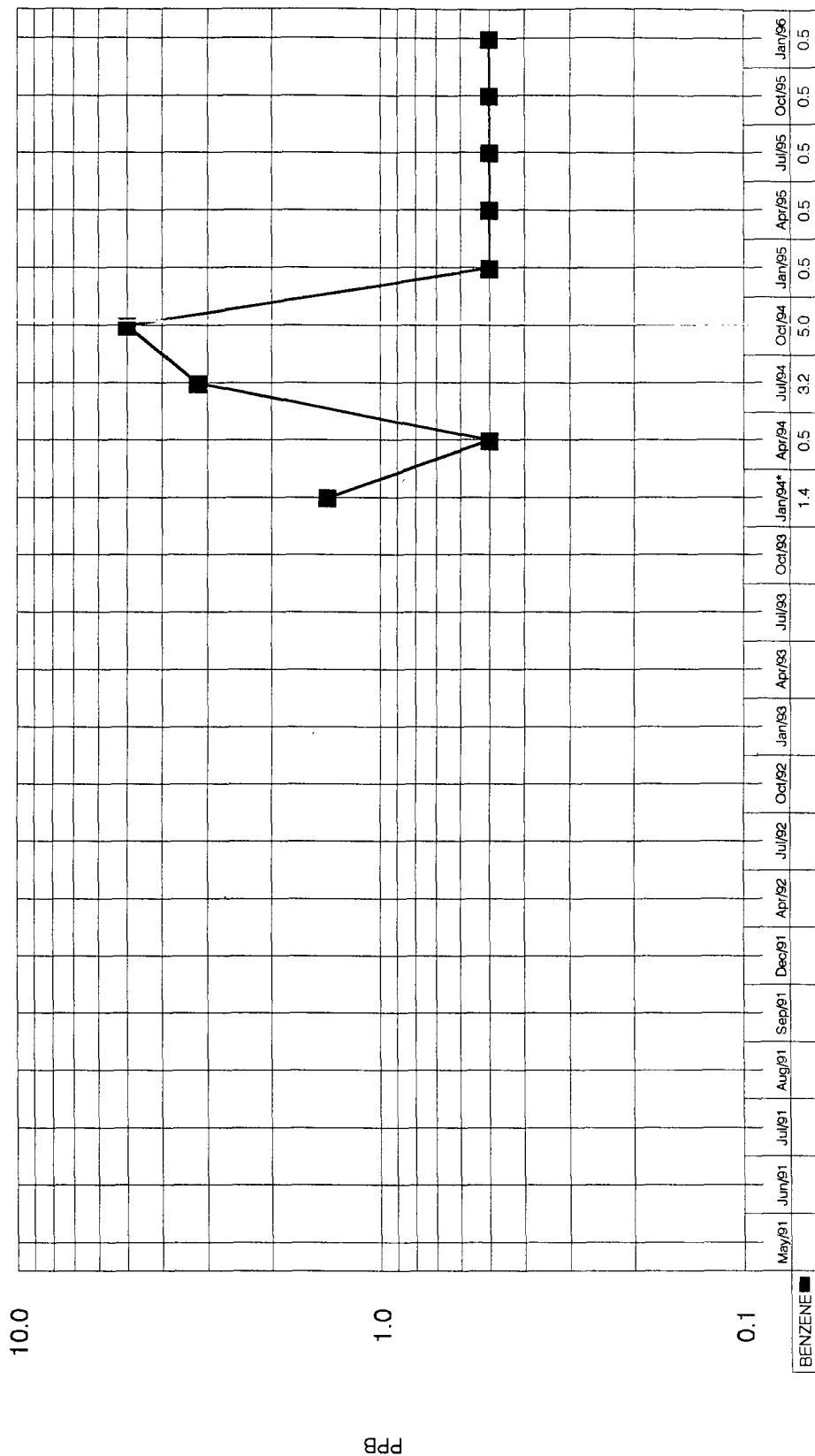
Note: Free-phase condensate = 2200 ppb benzene

BENZENE IN GROUNDWATER MW-60



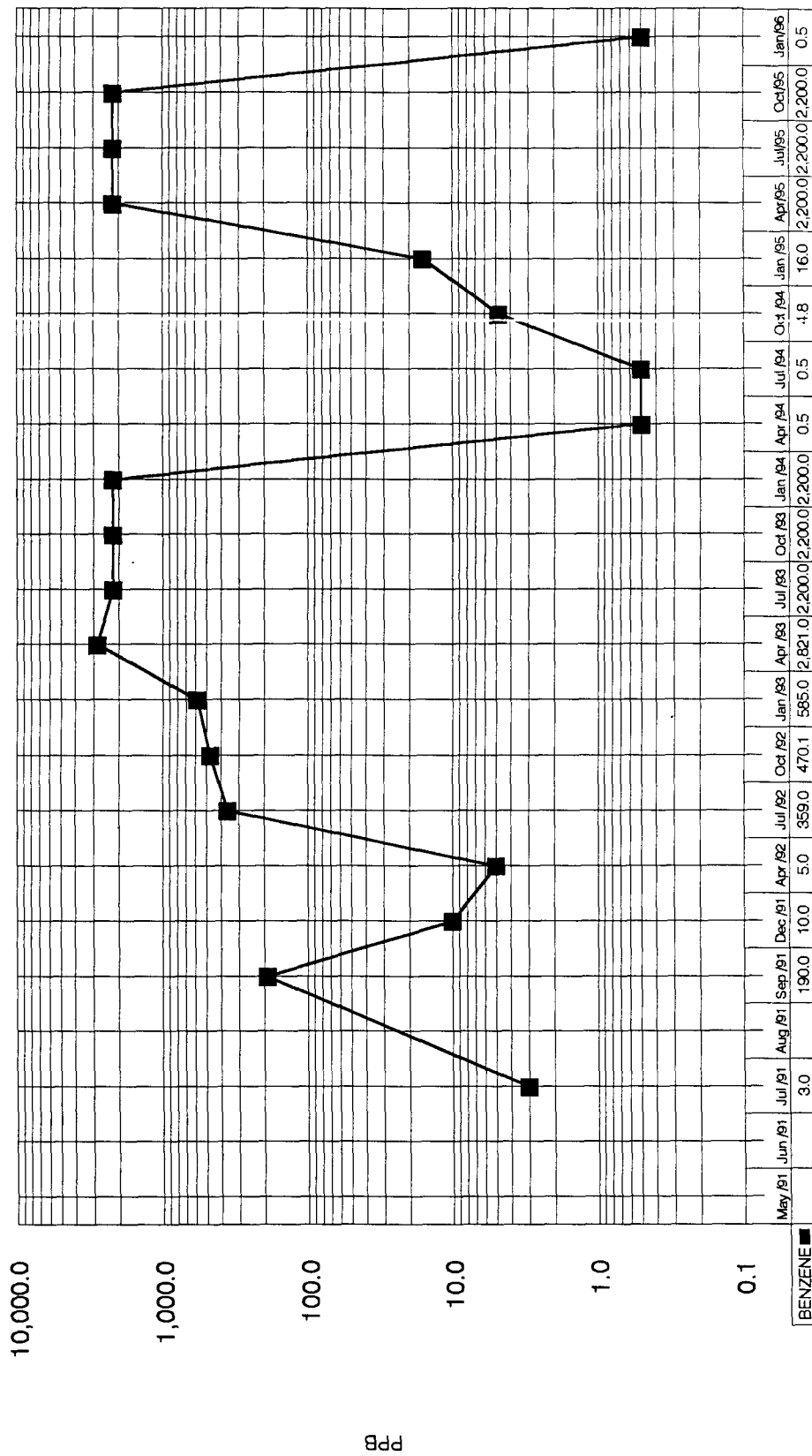
DATE SAMPLED

BENZENE IN GROUNDWATER MW-61



* - Jan. 1994 was the first time this well was sampled.

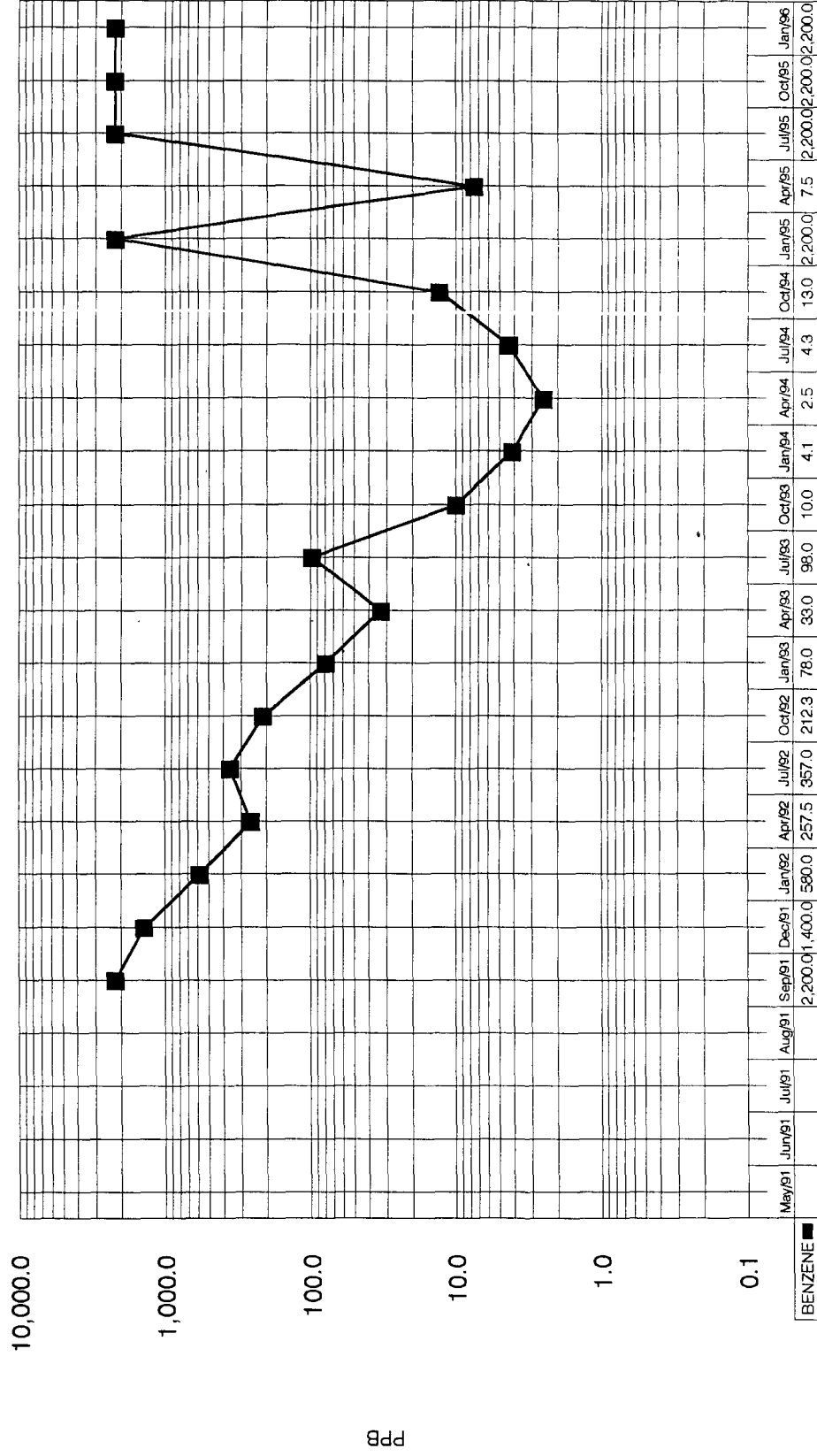
BENZENE IN GROUNDWATER MW-61A



DATE SAMPLED

Note: Free-phase condensate = 2200 ppb benzene

BENZENE IN GROUNDWATER MW-62

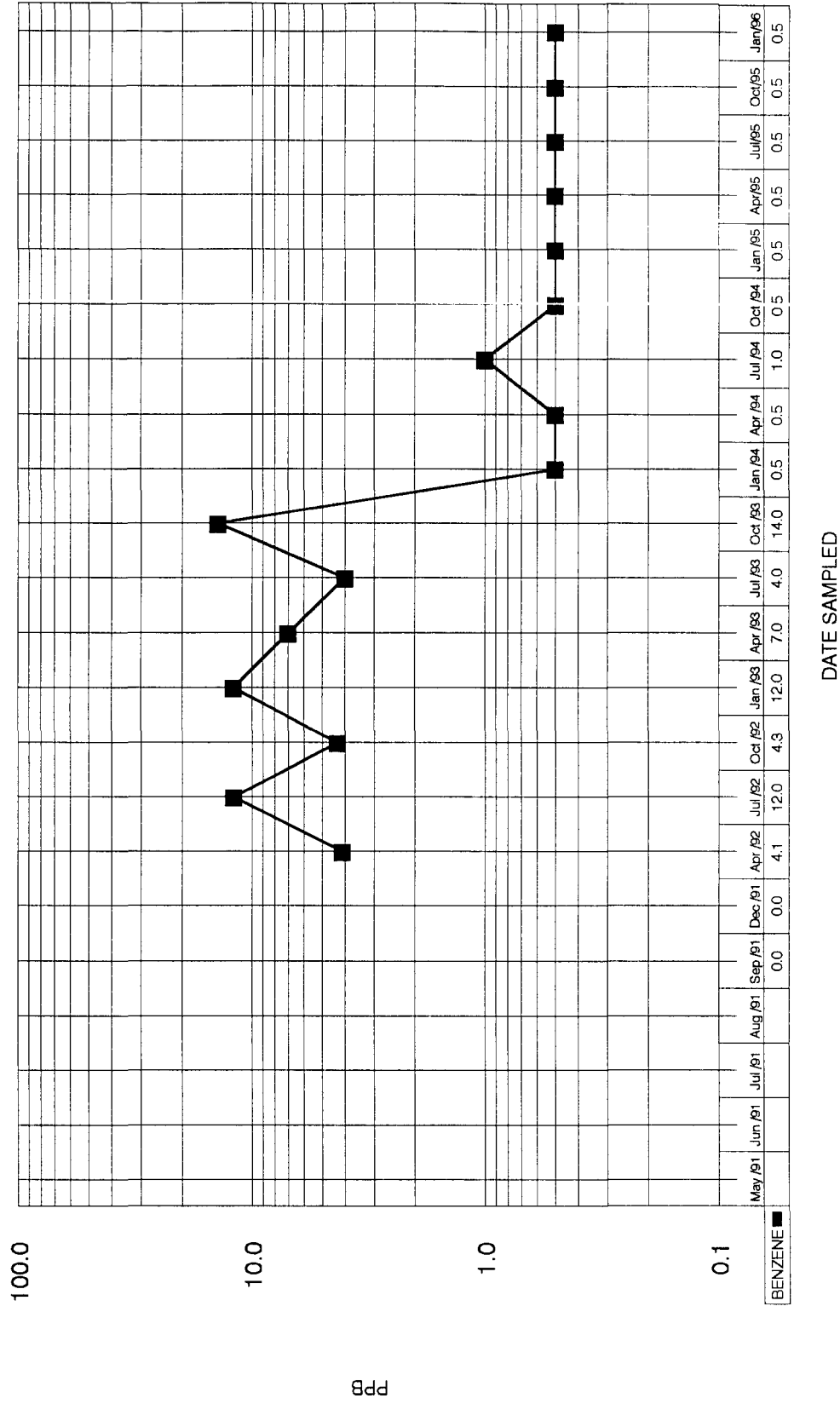


DATE SAMPLED

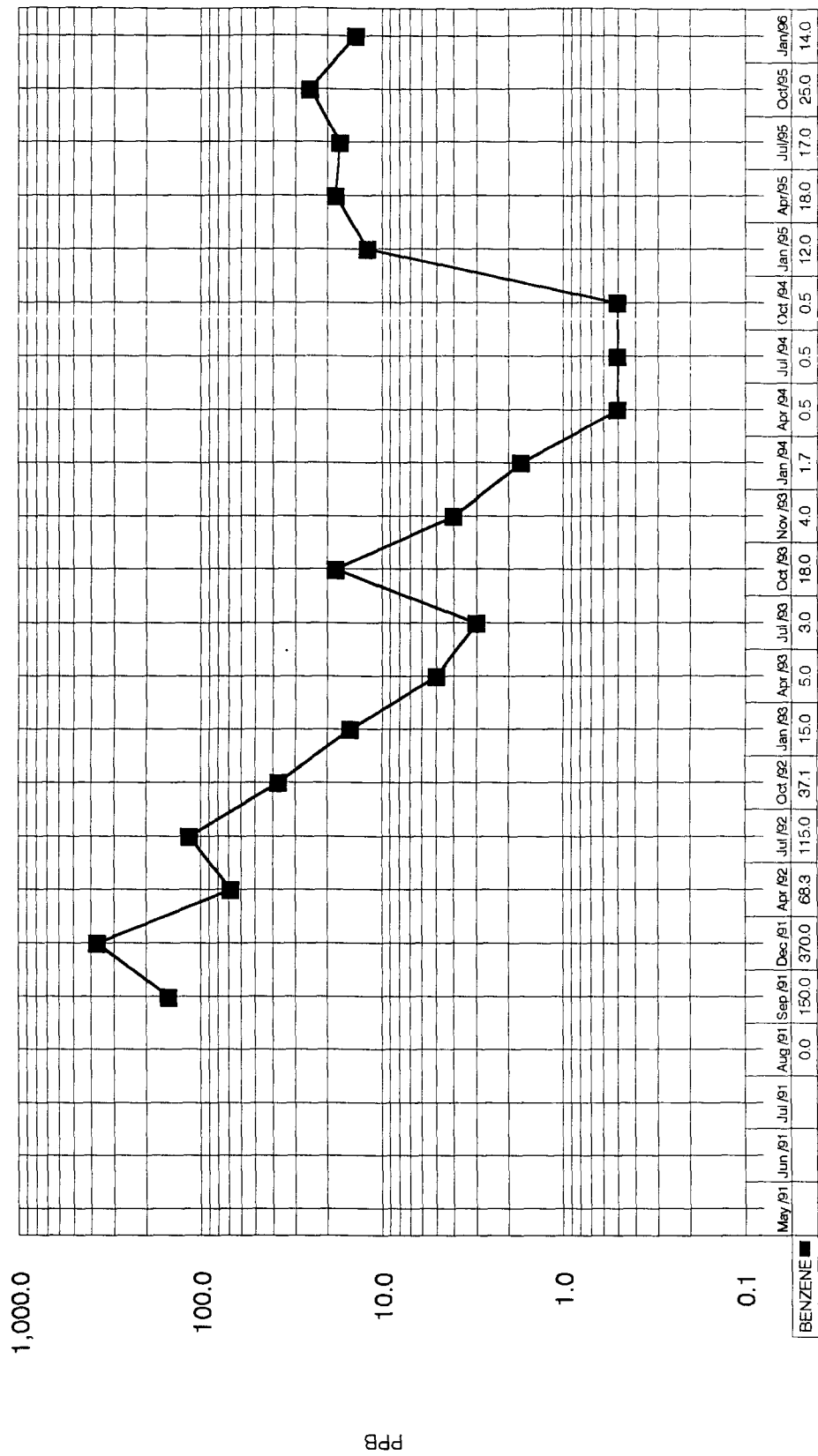
Note: Free-phase condensate = 2200 ppb benzene

BENZENE IN GROUNDWATER

MW-63

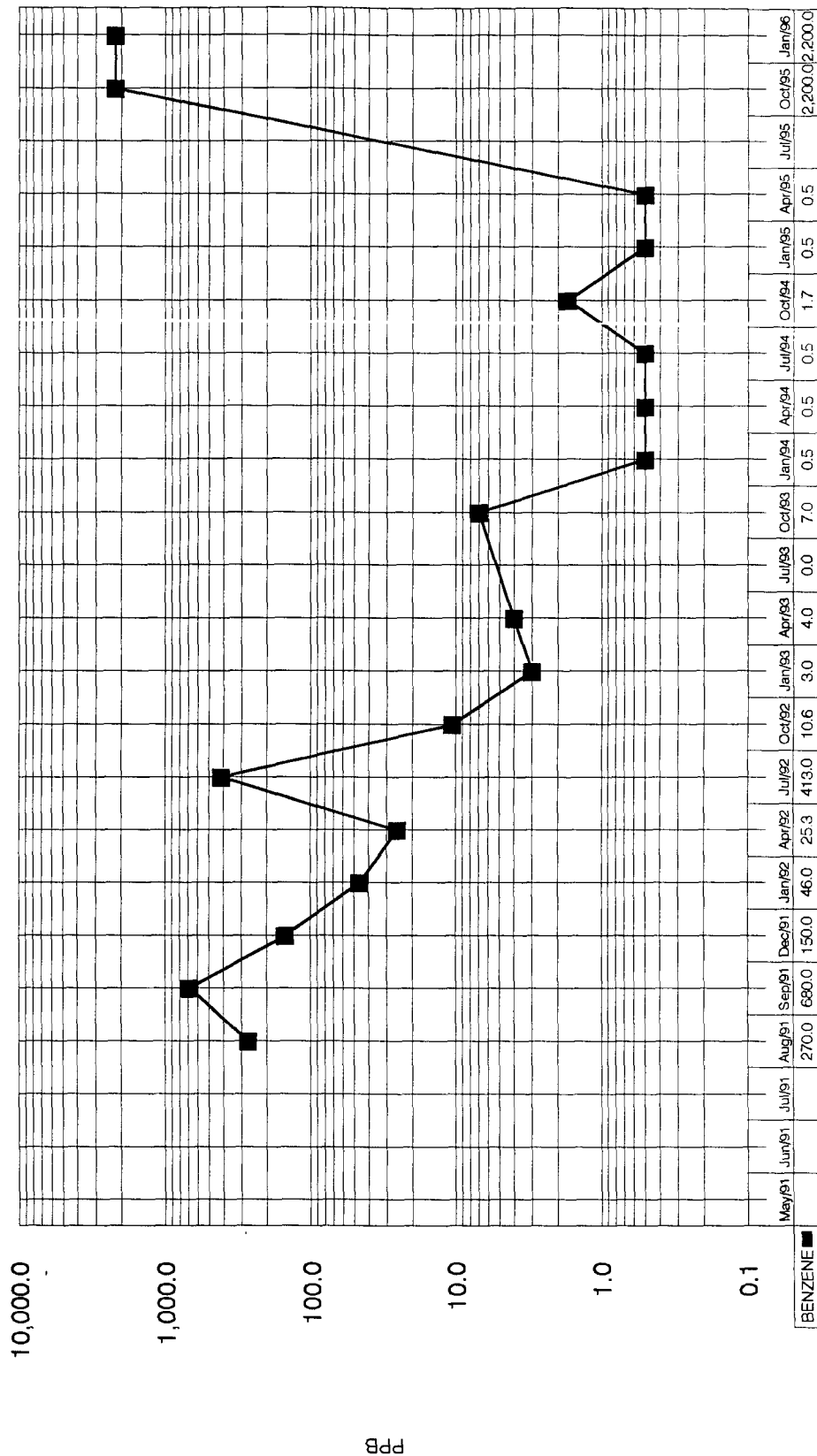


BENZENE IN GROUNDWATER MW-64



DATE SAMPLED

BENZENE IN GROUNDWATER MW-65A

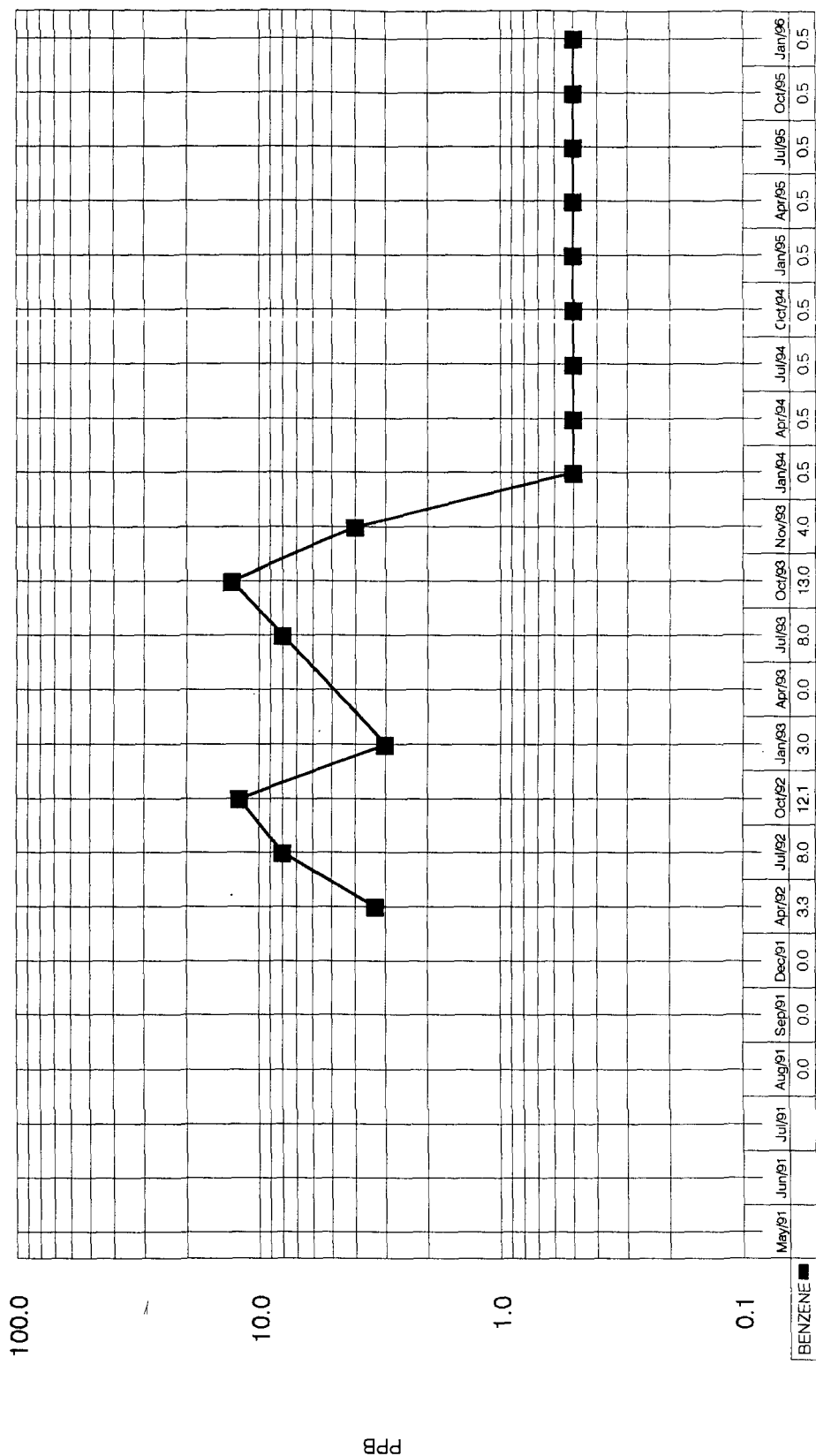


DATE SAMPLED

Note: Free-phase condensate = 2200 ppb benzene

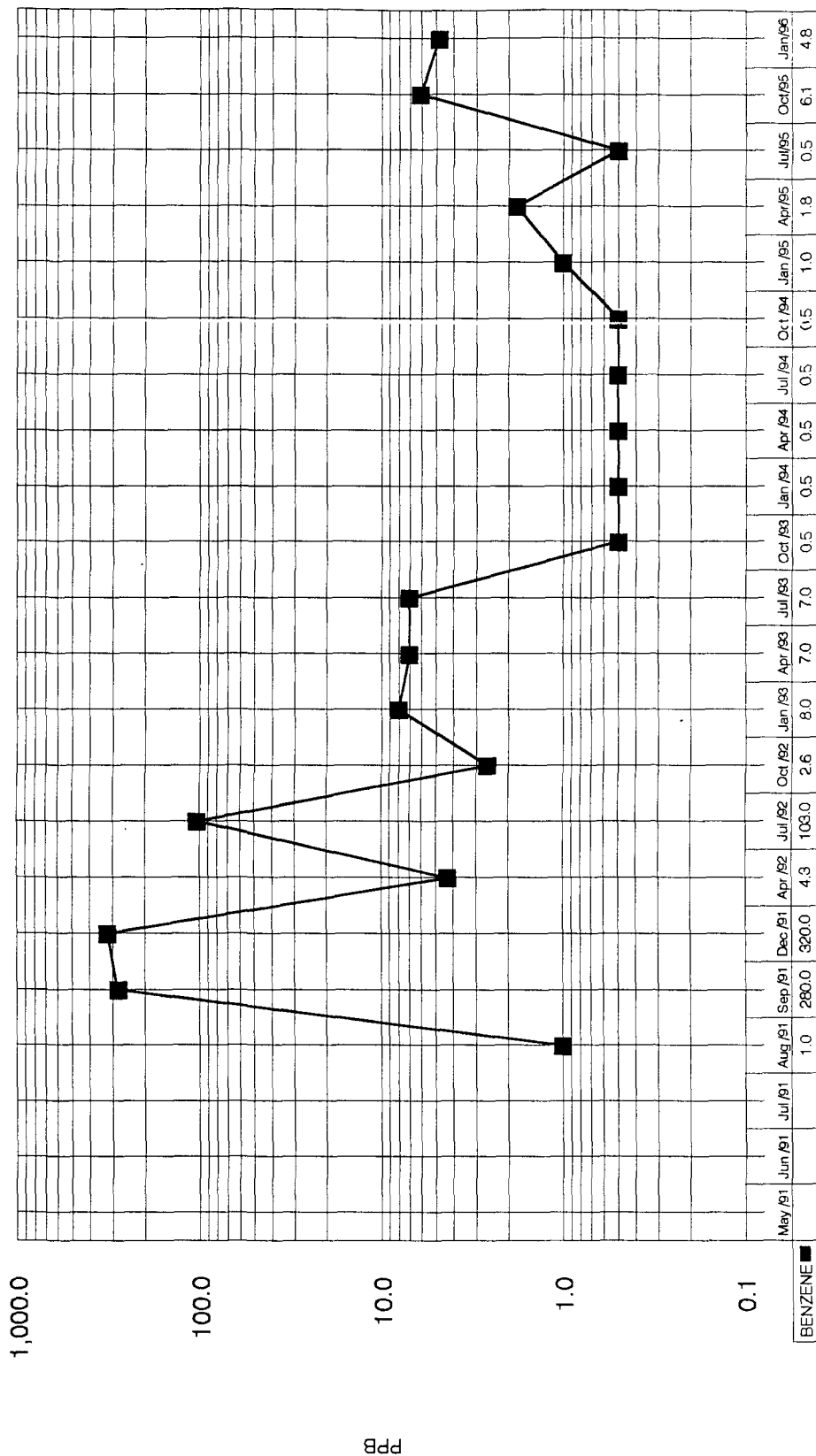
BENZENE IN GROUNDWATER

MW-66



DATE SAMPLED

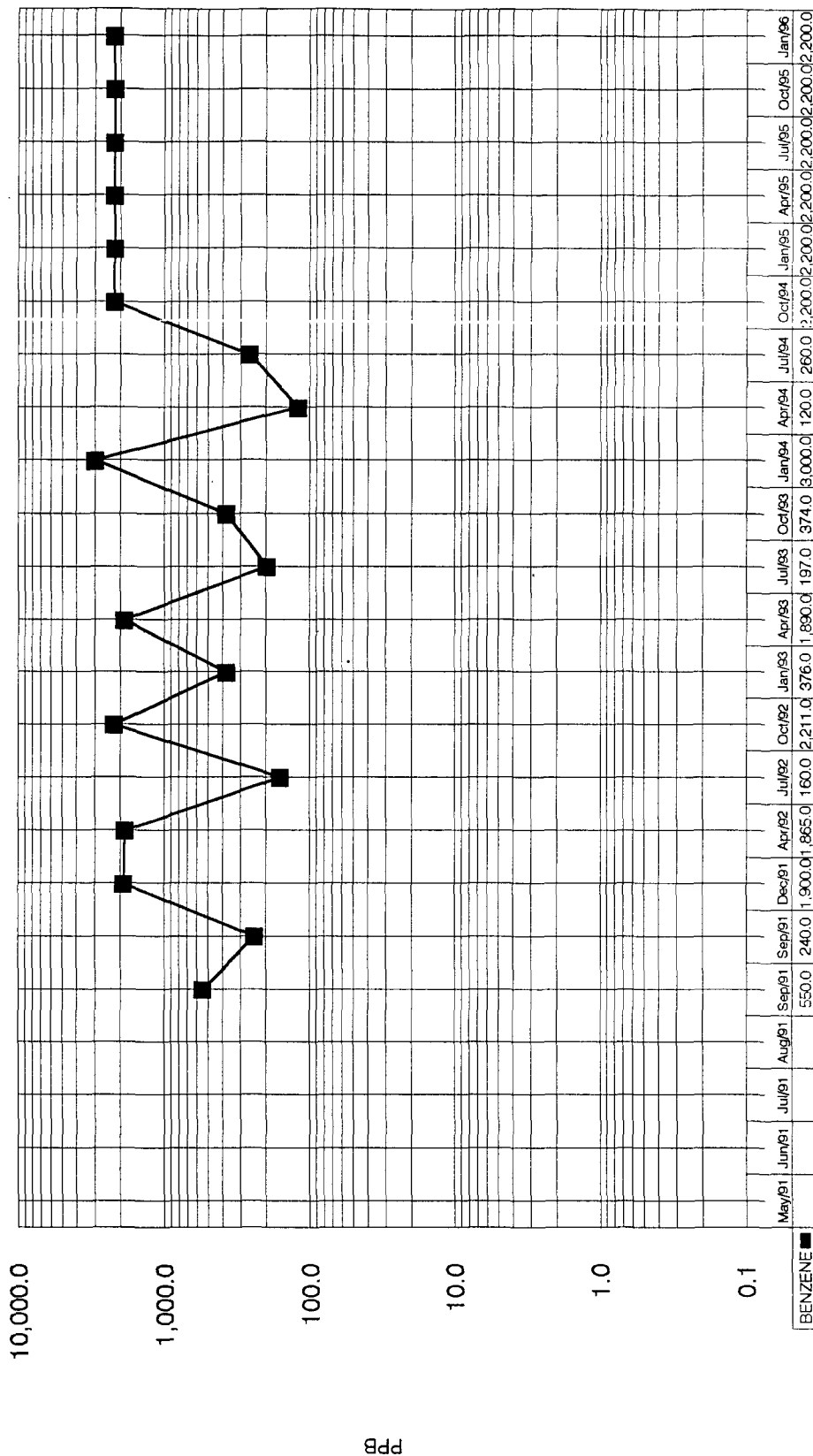
BENZENE IN GROUNDWATER MW-67



DATE SAMPLED

BENZENE IN GROUNDWATER

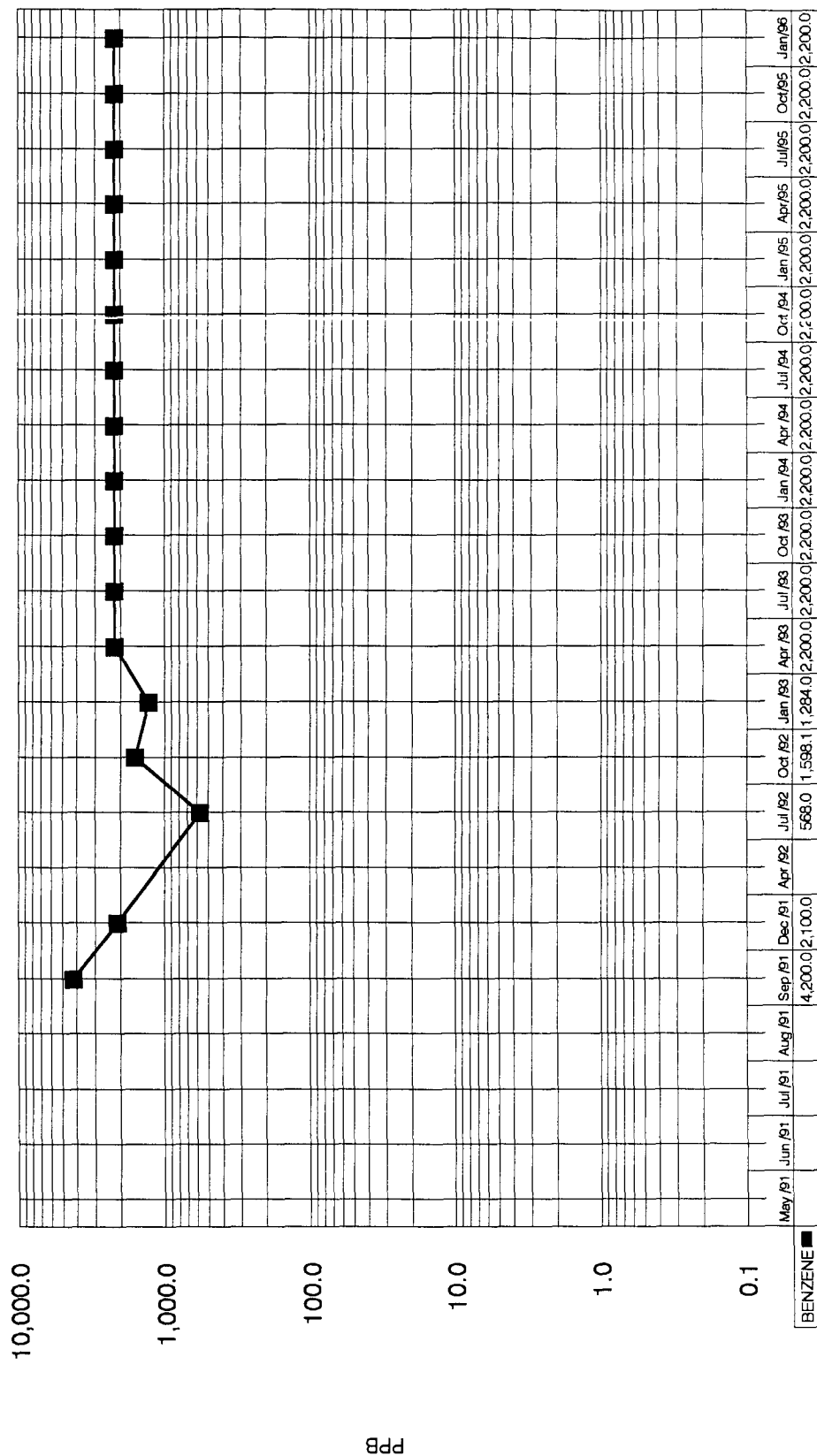
MW-68



DATE SAMPLED

Note: Free-phase condensate = 2200 ppb benzene

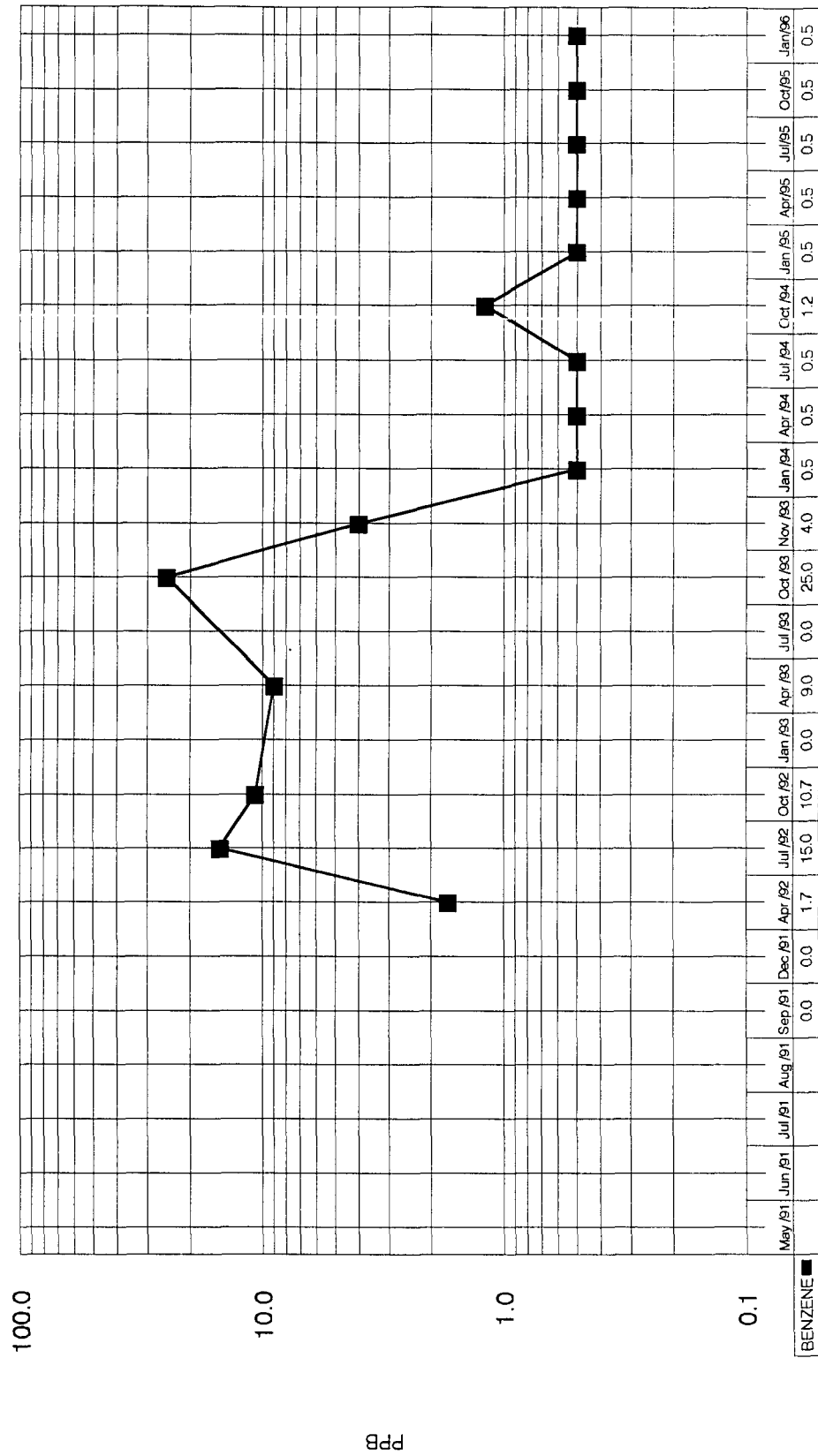
BENZENE IN GROUNDWATER MW-69



DATE SAMPLED

Note: Free-phase condensate = 2200 ppb benzene

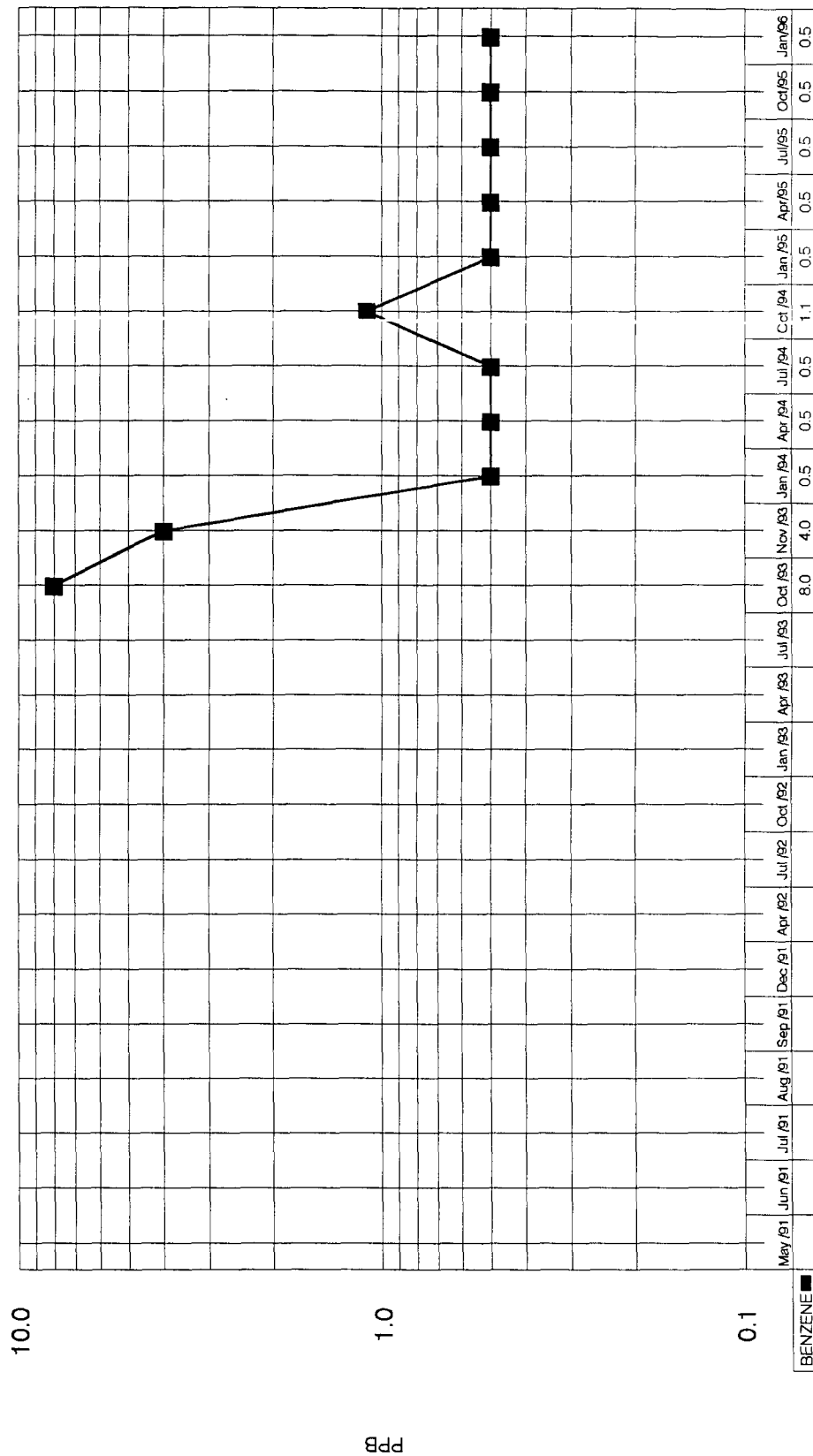
BENZENE IN GROUNDWATER MW-70



DATE SAMPLED

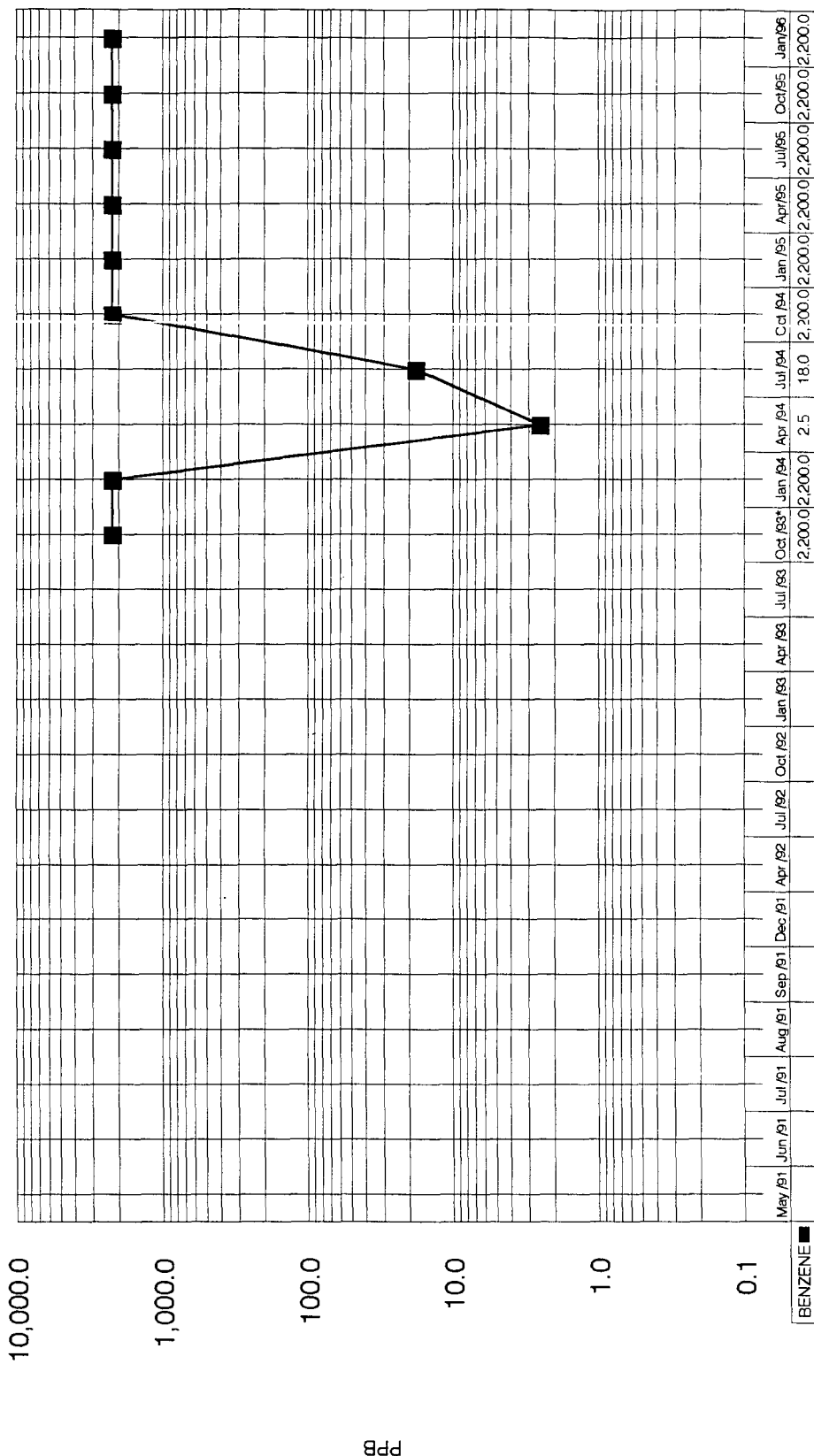
BENZENE IN GROUNDWATER

MW-71



DATE SAMPLED

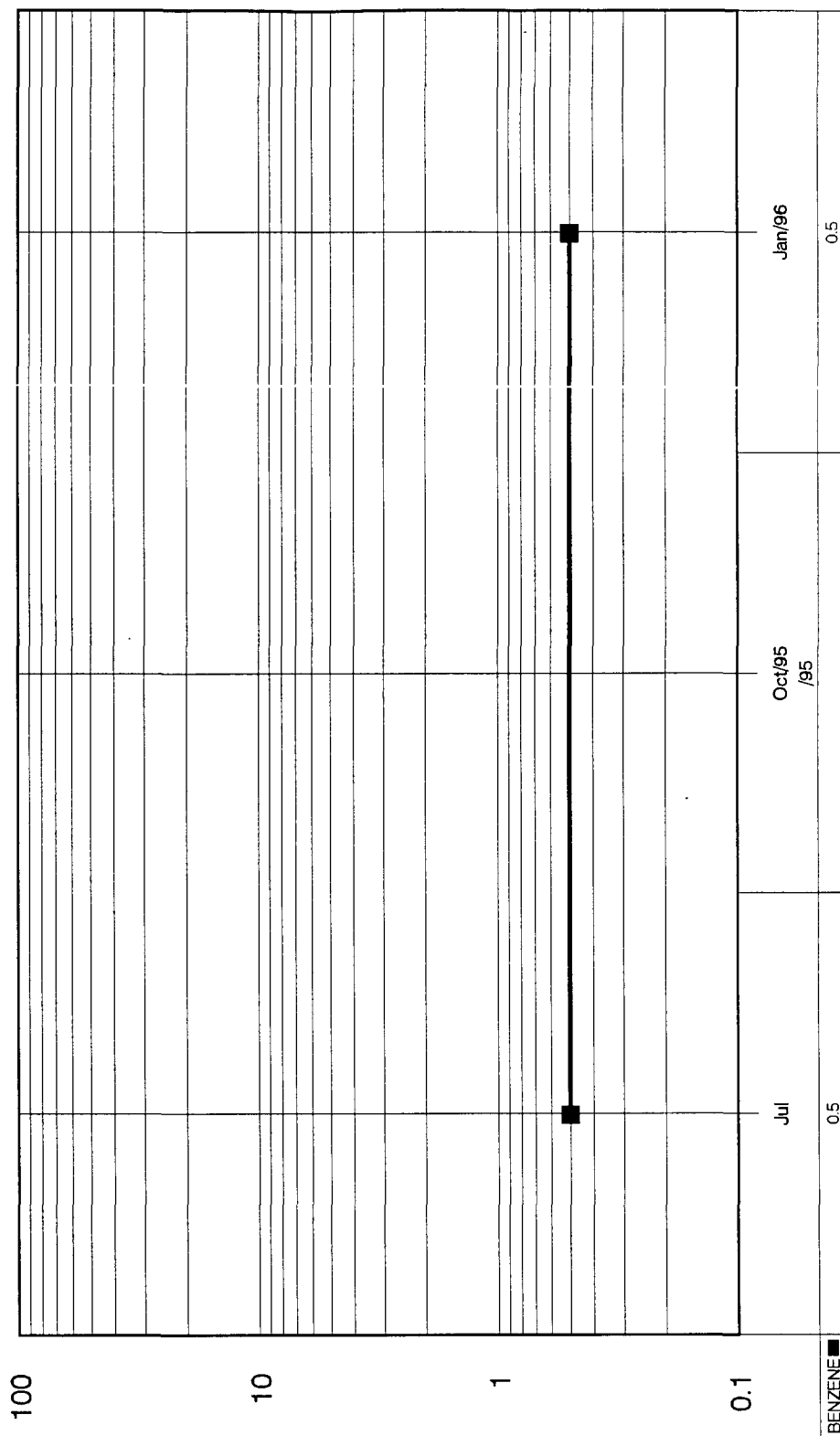
BENZENE IN GROUNDWATER MW-72



*October 1993 was the first time this well was sampled.
Note: Free-phase condensate = 2200 ppb benzene

BENZENE IN GROUNDWATER

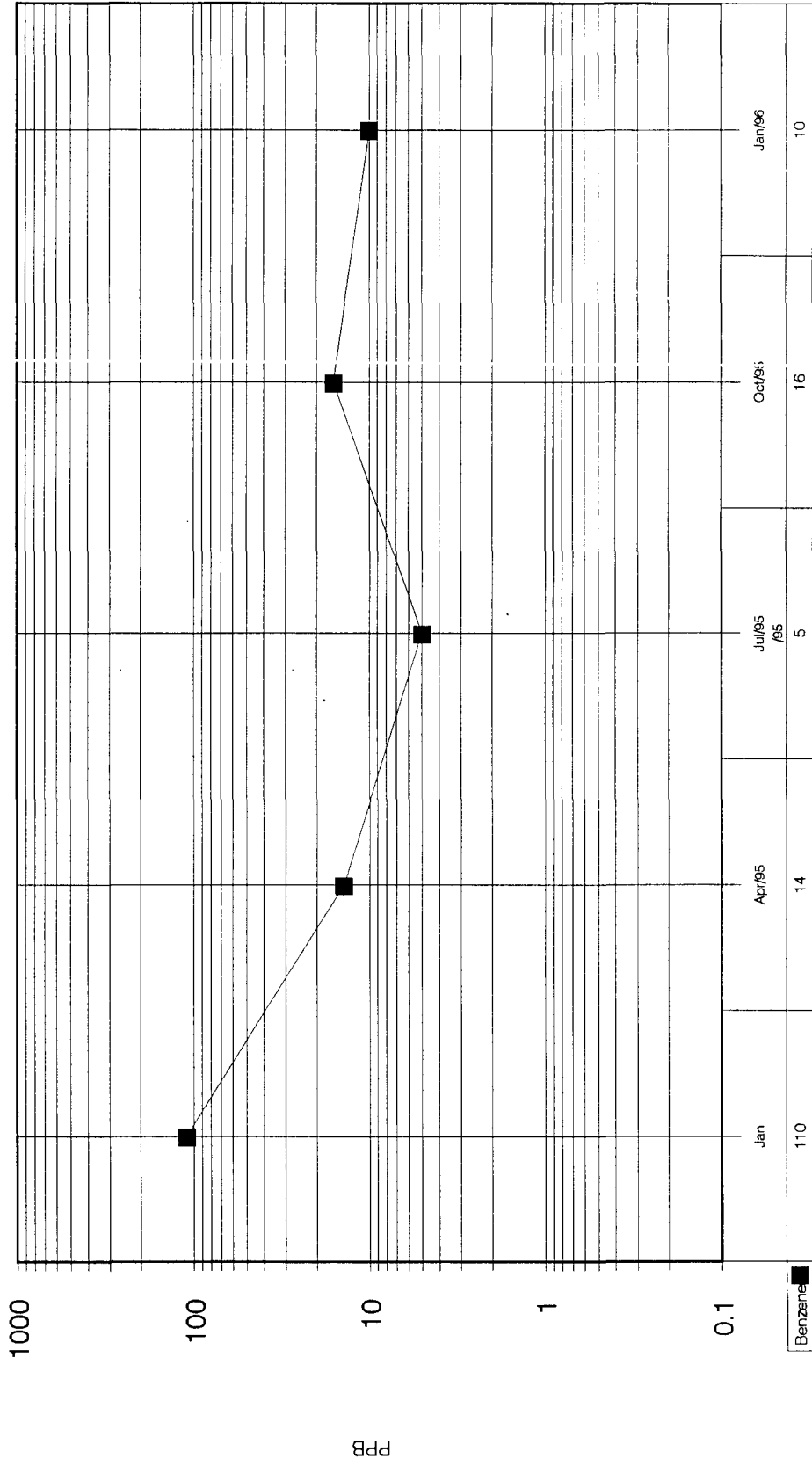
MW-77



DATE SAMPLED

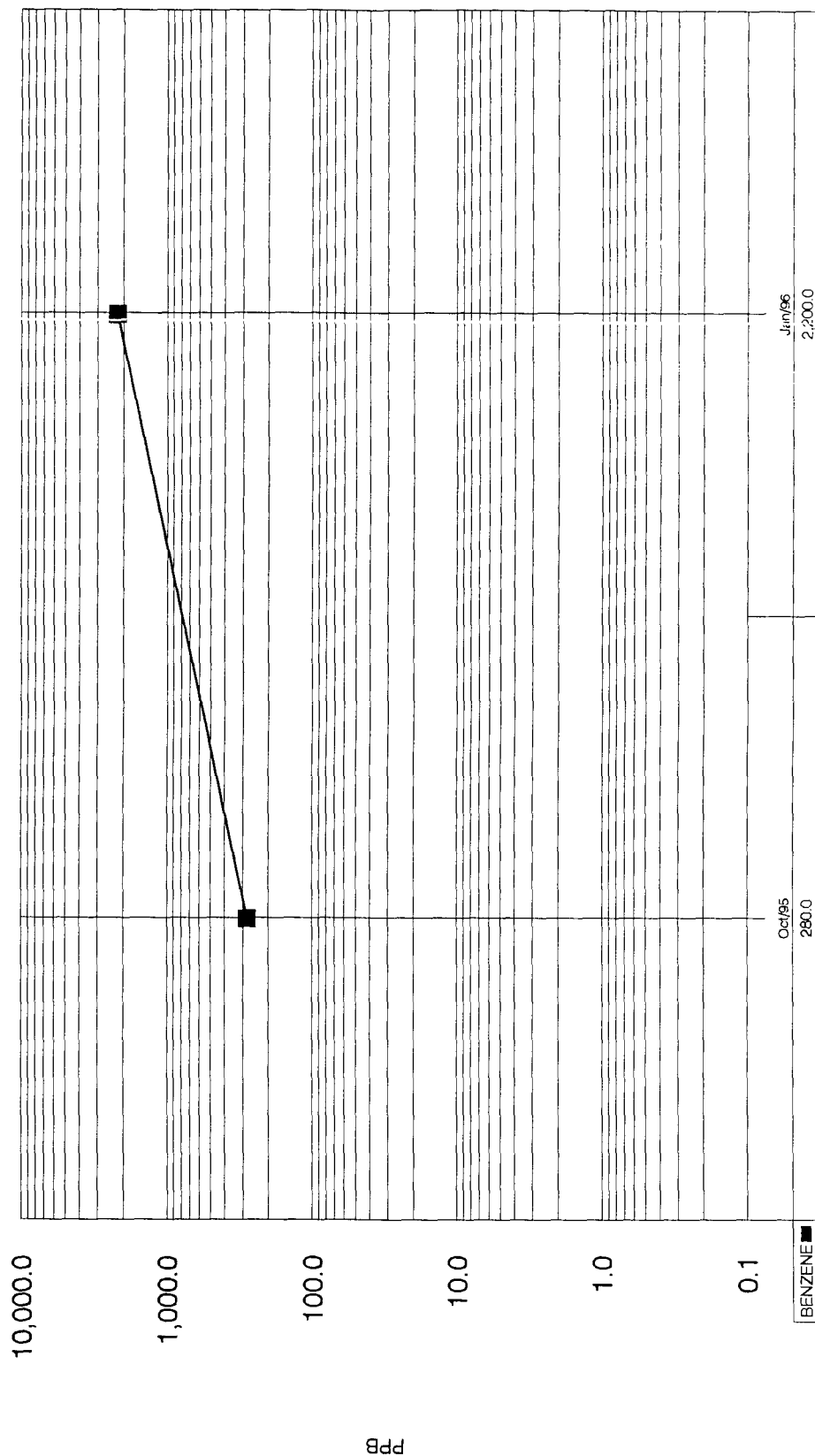
BENZENE IN GROUNDWATER

MW-79



Date Sampled

BENZENE IN GROUNDWATER MW-82



*October 1995 was the first time this well was sampled.
Note: Free-phase condensate = 2200 ppb benzene

APPENDIX C

**JANUARY 1996 LABORATORY RESULTS -
NATURAL SPRING, MONITORING, RANCHER, AND PLANT SUPPLY WELLS**



Analytical **Technologies**, Inc.

2709-D Pan American Freeway, NE Albuquerque NM 87107
Phone (505) 344-3777 FAX (505) 344-4413

ATI I.D. 601370

February 5, 1996

Marathon Oil Company
P.O. Box 552
Midland, TX 79702

Project Name/Number: IB REMEDIATION 44999

Attention: Bob Menzie

On 01/22/96, Analytical Technologies, of New Mexico Inc., (ADHS License No. AZ0015), 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.

Primarily the hits for Xylenes in these samples are for the isomer Ortho-Xylene.

EPA method 8020 analyses were performed by Analytical Technologies, Inc., Albuquerque, NM.

All other analyses were performed by Analytical Technologies, Inc., 11 East Olive Road, Pensacola, FL.

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.
Laboratory Manager

MR:jt

Enclosure



Analytical Technologies, Inc.

CLIENT : MARATHON OIL COMPANY

DATE RECEIVED : 01/22/96

PROJECT # : 44999

PROJECT NAME : IB REMEDIATION

REPORT DATE : 02/05/96

ATI ID: 601370

	ATI ID #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	601370-01	PW 196	AQUEOUS	01/15/96
02	601370-02	DI 196	AQUEOUS	01/15/96
03	601370-03	RB-1-17-96	AQUEOUS	01/17/96
04	601370-04	RBMW-70	AQUEOUS	01/18/96
05	601370-05	MW-70	AQUEOUS	01/18/96
06	601370-06	MW-79	AQUEOUS	01/18/96
07	601370-07	RBMW-63	AQUEOUS	01/18/96
08	601370-08	MW-63	AQUEOUS	01/18/96
09	601370-09	RBMW-71	AQUEOUS	01/18/96
10	601370-10	MW-71	AQUEOUS	01/18/96
11	601370-11	RBMW-66	AQUEOUS	01/19/96
12	601370-12	MW-66	AQUEOUS	01/19/96
13	601370-13	RBMW-60	AQUEOUS	01/19/96
14	601370-14	MW-60	AQUEOUS	01/19/96
15	601370-15	RBMW-64	AQUEOUS	01/19/96
16	601370-16	MW-64	AQUEOUS	01/19/96
17	601370-17	RBMW-67	AQUEOUS	01/19/96
18	601370-18	MW-67	AQUEOUS	01/19/96
19	601370-19	RBMW-57	AQUEOUS	01/19/96
20	601370-20	MW-57	AQUEOUS	01/19/96
21	601370-21	RBMW-55	AQUEOUS	01/19/96
22	601370-22	MW-55	AQUEOUS	01/19/96
23	601370-23	MW-50	AQUEOUS	01/20/96
24	601370-24	MW-49	AQUEOUS	01/20/96
25	601370-25	RBMW-54	AQUEOUS	01/20/96
26	601370-26	MW-54	AQUEOUS	01/20/96
27	601370-27	RBMW-61	AQUEOUS	01/20/96
28	601370-28	MW-61	AQUEOUS	01/20/96
29	601370-29	MW-44	AQUEOUS	01/20/96
30	601370-30	MW-77	AQUEOUS	01/20/96
31	601370-31	MW-43	AQUEOUS	01/20/96
32	601370-32	MW-41	AQUEOUS	01/20/96
33	601370-33	MW-11	AQUEOUS	01/20/96
34	601370-34	BIEBBLE WELL	AQUEOUS	01/19/96
35	601370-35	ARROYO	AQUEOUS	01/19/96



Analytical Technologies, Inc.

CLIENT : MARATHON OIL COMPANY DATE RECEIVED : 01/22/96
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION REPORT DATE : 02/05/96

ATI ID: 601370

	ATI ID #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
36	601370-36	LYMAN	AQUEOUS	01/19/96
37	601370-37	STRIPPER OUTLET	AQUEOUS	01/19/96
38	601370-38	STIPPER INLET	AQUEOUS	01/19/96
39	601370-39	SW-1	AQUEOUS	01/19/96
40	601370-40	MW 61A	AQUEOUS	01/20/96
41	601370-41	MW 65A	AQUEOUS	01/20/96

---TOTALS---

<u>MATRIX</u>	<u>#SAMPLES</u>
AQUEOUS	41

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	PW 196	AQUEOUS	01/15/96	NA	01/24/96	1
02	DI 196	AQUEOUS	01/15/96	NA	01/24/96	1
03	RB-1-17-96	AQUEOUS	01/17/96	NA	01/24/96	1
PARAMETER			UNITS	01	02	03
BENZENE			UG/L	<0.5	<0.5	<0.5
TOLUENE			UG/L	<0.5	1.0	<0.5
ETHYLBENZENE			UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES			UG/L	<0.5	8.9	15

SURROGATE:

BROMOFLUOROBENZENE (%)	88	89	87
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Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	RBMW-70	AQUEOUS	01/18/96	NA	01/24/96	1
05	MW-70	AQUEOUS	01/18/96	NA	01/24/96	1
06	MW-79	AQUEOUS	01/18/96	NA	01/24/96	1
PARAMETER			UNITS	04	05	06
BENZENE			UG/L	<0.5	<0.5	10
TOLUENE			UG/L	<0.5	<0.5	6.7
ETHYLBENZENE			UG/L	<0.5	<0.5	1.4
TOTAL XYLENES			UG/L	13	<0.5	4.9

SURROGATE:

BROMOFLUOROBENZENE (%)	93	91	74*
------------------------	----	----	-----

*OUTSIDE ATI QUALITY CONTROL LIMITS DUE TO MATRIX INTERFERENCE



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
07	RBMW-63	AQUEOUS	01/18/96	NA	01/24/96	1
08	MW-63	AQUEOUS	01/18/96	NA	01/24/96	1
09	RBMW-71	AQUEOUS	01/18/96	NA	01/24/96	1
PARAMETER			UNITS	07	08	09
BENZENE			UG/L	<0.5	<0.5	<0.5
TOLUENE			UG/L	<0.5	<0.5	<0.5
ETHYLBENZENE			UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES			UG/L	11	<0.5	13

SURROGATE:

BROMOFLUOROBENZENE (%)	92	89	92
------------------------	----	----	----



Analytical**Technologies**,Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	MW-71	AQUEOUS	01/18/96	NA	01/26/96	1
11	RBMW-66	AQUEOUS	01/19/96	NA	01/24/96	1
12	MW-66	AQUEOUS	01/19/96	NA	01/24/96	1
PARAMETER			UNITS	10	11	12
BENZENE			UG/L	<0.5	<0.5	<0.5
TOLUENE			UG/L	<0.5	<0.5	<0.5
ETHYLBENZENE			UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES			UG/L	<0.5	13	<0.5

SURROGATE:

BROMOFLUOROBENZENE (%)	89	88	89
------------------------	----	----	----



Analytical**Technologies**,Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
13	RBMW-60	AQUEOUS	01/19/96	NA	01/24/96	1
14	MW-60	AQUEOUS	01/19/96	NA	01/24/96	1
15	RBMW-64	AQUEOUS	01/19/96	NA	01/24/96	1
PARAMETER			UNITS	13	14	15
BENZENE			UG/L	<0.5	<0.5	<0.5
TOLUENE			UG/L	<0.5	<0.5	<0.5
ETHYLBENZENE			UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES			UG/L	13	<0.5	15

SURROGATE:

BROMOFLUOROBENZENE (%)	90	91	92
------------------------	----	----	----



Analytical**Technologies**, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
16	MW-64	AQUEOUS	01/19/96	NA	01/25/96	1
17	RBMW-67	AQUEOUS	01/19/96	NA	01/25/96	1
18	MW-67	AQUEOUS	01/19/96	NA	01/25/96	1

PARAMETER	UNITS	16	17	18
BENZENE	UG/L	14	<0.5	4.8
TOLUENE	UG/L	2.2	<0.5	3.6
ETHYLBENZENE	UG/L	9.3	<0.5	0.6
TOTAL XYLENES	UG/L	23	15	4.7

SURROGATE:

BROMOFLUOROBENZENE (%)	88	91	86
------------------------	----	----	----



Analytical**Technologies**, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
19	RBMW-57	AQUEOUS	01/19/96	NA	01/25/96	1
20	MW-57	AQUEOUS	01/19/96	NA	01/25/96	1
21	RBMW-55	AQUEOUS	01/19/96	NA	01/25/96	1

PARAMETER	UNITS	19	20	21
BENZENE	UG/L	<0.5	16	3.6
TOLUENE	UG/L	<0.5	1.5	<0.5
ETHYLBENZENE	UG/L	<0.5	1.0	4.1
TOTAL XYLENES	UG/L	13	4.2	14

SURROGATE:

BROMOFLUOROBENZENE (%)	88	80	91
------------------------	----	----	----



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
22	MW-55	AQUEOUS	01/19/96	NA	01/25/96	10
23	MW-50	AQUEOUS	01/20/96	NA	01/25/96	1
24	MW-49	AQUEOUS	01/20/96	NA	01/25/96	25
PARAMETER			UNITS	22	23	24
BENZENE			UG/L	650	<0.5	160
TOLUENE			UG/L	15	<0.5	130
ETHYLBENZENE			UG/L	430	<0.5	120
TOTAL XYLENES			UG/L	29	<0.5	570
SURROGATE:						
BROMOFLUOROBENZENE (%)				87	89	95



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
25	RBMW-54	AQUEOUS	01/20/96	NA	01/25/96	1
26	MW-54	AQUEOUS	01/20/96	NA	01/25/96	1
27	RBMW-61	AQUEOUS	01/20/96	NA	01/26/96	1
PARAMETER			UNITS	25	26	27
BENZENE			UG/L	1.2	<0.5	<0.5
TOLUENE			UG/L	<0.5	<0.5	<0.5
ETHYLBENZENE			UG/L	1.1	<0.5	<0.5
TOTAL XYLENES			UG/L	5.5	<0.5	8.5

SURROGATE:

BROMOFLUOROBENZENE (%)	88	89	81
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Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
28	MW-61	AQUEOUS	01/20/96	NA	01/26/96	1
29	MW-44	AQUEOUS	01/20/96	NA	01/30/96	10
30	MW-77	AQUEOUS	01/20/96	NA	01/25/96	1

PARAMETER	UNITS	28	29	30
BENZENE	UG/L	<0.5	51	<0.5
TOLUENE	UG/L	<0.5	14	3.1
ETHYLBENZENE	UG/L	<0.5	130	<0.5
TOTAL XYLENES	UG/L	<0.5	15	7.1

SURROGATE:

BROMOFLUOROBENZENE (%)	87	79	85
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Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
31	MW-43	AQUEOUS	01/20/96	NA	01/26/96	1
32	MW-41	AQUEOUS	01/20/96	NA	01/26/96	10
33	MW-11	AQUEOUS	01/20/96	NA	01/26/96	50

PARAMETER	UNITS	31	32	33
BENZENE	UG/L	1.4	<5.0	1000
TOLUENE	UG/L	3.1	10	32
ETHYLBENZENE	UG/L	6.6	<5.0	190
TOTAL XYLENES	UG/L	5.3	14	2800

SURROGATE:

BROMOFLUOROBENZENE (%)	101	86	96
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Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
34	BIEBBLE WELL	AQUEOUS	01/19/96	NA	01/26/96	1
35	ARROYO	AQUEOUS	01/19/96	NA	01/26/96	1
36	LYMAN	AQUEOUS	01/19/96	NA	01/26/96	1
PARAMETER			UNITS	34	35	36
BENZENE			UG/L	<0.5	<0.5	<0.5
TOLUENE			UG/L	<0.5	<0.5	<0.5
ETHYLBENZENE			UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES			UG/L	<0.5	<0.5	<0.5

SURROGATE:

BROMOFLUOROBENZENE (%)	88	89	91
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Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
37	STRIPPER OUTLET	AQUEOUS	01/19/96	NA	01/26/96	1
38	STRIPPER INLET	AQUEOUS	01/19/96	NA	01/26/96	100
39	SW-1	AQUEOUS	01/19/96	NA	01/26/96	1

PARAMETER	UNITS	37	38	39
BENZENE	UG/L	3.4	170	0.8
TOLUENE	UG/L	13	61	4.5
ETHYLBENZENE	UG/L	4.1	280	1.5
TOTAL XYLENES	UG/L	23	1200	8.7

SURROGATE:

BROMOFLUOROBENZENE (%)	87	100	87
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Analytical **Technologies, Inc.**

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601370
PROJECT # : 44999
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
40	MW 61A	AQUEOUS	01/20/96	NA	01/26/96	1
41	MW 65A	AQUEOUS	01/20/96	NA	01/26/96	1

PARAMETER	UNITS	40	41
BENZENE	UG/L	<0.5	<0.5
TOLUENE	UG/L	<0.5	<0.5
ETHYLBENZENE	UG/L	<0.5	<0.5
TOTAL XYLENES	UG/L	0.8	0.5

SURROGATE:

BROMOFLUOROBENZENE (%)	90	87
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Analytical**Technologies**, Inc.

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 601370
BLANK I.D.	: 012396	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: 44999	DATE ANALYZED	: 01/23/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

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 (%)	93
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Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 601370
BLANK I.D.	: 012496	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: 44999	DATE ANALYZED	: 01/24/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

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 (%)	90
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Analytical**Technologies**, Inc.

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 601370
BLANK I.D.	: 012596	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: 44999	DATE ANALYZED	: 01/25/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

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 (%)	89
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GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 601370
BLANK I.D.	: 012696	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: 44999	DATE ANALYZED	: 01/26/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

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 (%)	90
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Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 601370
BLANK I.D.	: 012696B	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: 44999	DATE ANALYZED	: 01/26/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

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 (%)	93
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GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 601370
BLANK I.D.	: 013096	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: 44999	DATE ANALYZED	: 01/30/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

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 (%)

94



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 601370
BLANK I.D.	: 013196	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: 44999	DATE ANALYZED	: 01/31/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

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 (%)	91
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Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 60137026 ATI I.D. : 601370
CLIENT : MARATHON OIL COMPANY DATE EXTRACTED : NA
PROJECT # : 44999 DATE ANALYZED : 01/30/96
01/31/96
PROJECT NAME : IB REMEDIATION SAMPLE MATRIX : AQUEOUS
REF. I.D. : 60137026 UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10.0	9.5	95	9.2	92	3
TOLUENE	<0.5	10.0	9.5	95	9.1	91	4
ETHYLBENZENE	<0.5	10.0	9.6	96	9.5	95	1
TOTAL XYLENES	<0.5	30.0	27.7	92	27.4	91	1

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

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



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 60136702 ATI I.D. : 601370
CLIENT : MARATHON OIL COMPANY DATE EXTRACTED : NA
PROJECT # : 44999 DATE ANALYZED : 01/23/96
PROJECT NAME : IB REMEDIATION SAMPLE MATRIX : AQUEOUS
REF. I.D. : 60136702 UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10.0	9.7	97	10.2	102	5
TOLUENE	<0.5	10.0	9.6	96	10.1	101	5
ETHYLBENZENE	<0.5	10.0	9.5	95	9.9	99	4
TOTAL XYLENES	<0.5	30.0	28.9	96	30.1	100	4

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

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



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 60137005 ATI I.D. : 601370
CLIENT : MARATHON OIL COMPANY DATE EXTRACTED : NA
PROJECT # : 44999 DATE ANALYZED : 01/26/96
PROJECT NAME : IB REMEDIATION SAMPLE MATRIX : AQUEOUS
REF. I.D. : 60137005 UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10.0	9.1	91	9.2	92	1
TOLUENE	<0.5	10.0	9.2	92	9.1	91	1
ETHYLBENZENE	<0.5	10.0	9.0	90	9.1	91	1
TOTAL XYLENES	<0.5	30.0	27.4	91	27.5	92	0

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

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



Analytical**Technologies**,Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 601440
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 601370
Project Name: MARATHON OIL
Project Location: IB REMEDIATION
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 601370-05			Lab ID: 001		
CHLORIDE (325.3)	MG/L	11	1	CIW004	
Comments:					
Client ID: 601370-06			Lab ID: 002		
CHLORIDE (325.3)	MG/L	23	1	CIW004	
Comments:					
Client ID: 601370-08			Lab ID: 003		
CHLORIDE (325.3)	MG/L	10	1	CIW004	
Comments:					
Client ID: 601370-10			Lab ID: 004		
CHLORIDE (325.3)	MG/L	18	1	CIW004	
Comments:					
Client ID: 601370-12			Lab ID: 005		
CHLORIDE (325.3)	MG/L	10	1	CIW004	
Comments:					
Client ID: 601370-14			Lab ID: 006		
CHLORIDE (325.3)	MG/L	16	1	CIW004	
Comments:					
Client ID: 601370-16			Lab ID: 007		
CHLORIDE (325.3)	MG/L	12	1	CIW004	
Comments:					
Client ID: 601370-18			Lab ID: 008		
CHLORIDE (325.3)	MG/L	11	1	CIW004	



Analytical Technologies, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 601440
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 601370
Project Name: MARATHON OIL
Project Location: IB REMEDIATION
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 601370-20			Lab ID: 009		
CHLORIDE (325.3)	MG/L	44	1	CIW004	
Comments:					
Client ID: 601370-22			Lab ID: 010		
CHLORIDE (325.3)	MG/L	370	10	CIW004	+
Comments:					
Client ID: 601370-23			Lab ID: 011		
CHLORIDE (325.3)	MG/L	290	10	CIW004	+
Comments:					
Client ID: 601370-24			Lab ID: 012		
CHLORIDE (325.3)	MG/L	410	10	CIW004	+
Comments:					
Client ID: 601370-26			Lab ID: 013		
CHLORIDE (325.3)	MG/L	120	10	CIW004	+
Comments:					
Client ID: 601370-28			Lab ID: 014		
CHLORIDE (325.3)	MG/L	420	10	CIW004	+
Comments:					
Client ID: 601370-29			Lab ID: 015		
CHLORIDE (325.3)	MG/L	580	10	CIW004	+
Comments:					
Client ID: 601370-30			Lab ID: 016		
CHLORIDE (325.3)	MG/L	120	1	CIW004	



Analytical Technologies, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 601440
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 601370
Project Name: MARATHON OIL
Project Location: IB REMEDIATION
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 601370-31			Lab ID: 017		
CHLORIDE (325.3)	MG/L	280	10	CIW004	+
Comments:					
Client ID: 601370-32			Lab ID: 018		
CHLORIDE (325.3)	MG/L	270	10	CIW004	+
Comments:					
Client ID: 601370-33			Lab ID: 019		
CHLORIDE (325.3)	MG/L	120	10	CIW004	+
Comments:					
Client ID: 601370-34			Lab ID: 020		
CHLORIDE (325.3)	MG/L	9	1	CIW004	
Comments:					
Client ID: 601370-35			Lab ID: 021		
CHLORIDE (325.3)	MG/L	10	1	CIW005	
Comments:					
Client ID: 601370-36			Lab ID: 022		
CHLORIDE (325.3)	MG/L	9	1	CIW005	
Comments:					
Client ID: 601370-39			Lab ID: 023		
CHLORIDE (325.3)	MG/L	25	1	CIW005	
Comments:					
Client ID: 601370-40			Lab ID: 024		
CHLORIDE (325.3)	MG/L	9	1	CIW005	



Analytical**Technologies**, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 601440
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 601370
Project Name: MARATHON OIL
Project Location: IB REMEDIATION
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 601370-41			Lab ID: 025		
CHLORIDE (325.3)	MG/L	93	1	CIW005	

Comments:



Analytical Technologies, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 601440
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 601370
Project Name: MARATHON OIL
Project Location: IB REMEDIATION
Test: Group of Single Wetchem

Client ID:	Lab Matrix: ID:	Date/Time Sampled:	Date Received:
601370-05	001 WATER	18-JAN-96 1435	23-JAN-96
601370-06	002 WATER	18-JAN-96 1435	23-JAN-96
601370-08	003 WATER	18-JAN-96 1555	23-JAN-96
601370-10	004 WATER	18 JAN-96 1800	23-JAN-96
601370-12	005 WATER	19-JAN-96 0935	23-JAN-96
601370-14	006 WATER	19-JAN-96 1110	23-JAN-96
601370-16	007 WATER	19-JAN-96 1305	23-JAN-96
601370-18	008 WATER	19-JAN-96 1415	23-JAN-96
601370-20	009 WATER	19-JAN-96 1535	23-JAN-96
601370-22	010 WATER	19-JAN-96 1630	23-JAN-96
601370-23	011 WATER	20-JAN-96 0825	23-JAN-96
601370-24	012 WATER	20-JAN-96 0855	23-JAN-96
601370-26	013 WATER	20-JAN-96 0915	23-JAN-96
601370-28	014 WATER	20-JAN-96 1050	23-JAN-96
601370-29	015 WATER	20-JAN-96 1145	23-JAN-96
601370-30	016 WATER	20-JAN-96 1345	23-JAN-96
601370-31	017 WATER	20-JAN-96 1400	23-JAN-96
601370-32	018 WATER	20-JAN-96 1410	23-JAN-96
601370-33	019 WATER	20-JAN-96 1425	23-JAN-96
601370-34	020 WATER	19-JAN-96 0940	23-JAN-96
601370-35	021 WATER	19-JAN-96 1010	23-JAN-96
601370-36	022 WATER	19-JAN-96 1030	23-JAN-96
601370-39	023 WATER	19-JAN-96 0930	23-JAN-96
601370-40	024 WATER	20-JAN-96 1150	23-JAN-96
601370-41	025 WATER	20-JAN-96 1215	23-JAN-96



Analytical**Technologies**,Inc.

"Method Report Summary"

Accession Number: 601440
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 601370
Project Name: MARATHON OIL
Project Location: IB REMEDIATION
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
601370-05	CHLORIDE (325.3)	MG/L	11
601370-06	CHLORIDE (325.3)	MG/L	23
601370-08	CHLORIDE (325.3)	MG/L	10
601370-10	CHLORIDE (325.3)	MG/L	18
601370-12	CHLORIDE (325.3)	MG/L	10
601370-14	CHLORIDE (325.3)	MG/L	16
601370-16	CHLORIDE (325.3)	MG/L	12
601370-18	CHLORIDE (325.3)	MG/L	11
601370-20	CHLORIDE (325.3)	MG/L	44
601370-22	CHLORIDE (325.3)	MG/L	370
601370-23	CHLORIDE (325.3)	MG/L	290
601370-24	CHLORIDE (325.3)	MG/L	410
601370-26	CHLORIDE (325.3)	MG/L	120
601370-28	CHLORIDE (325.3)	MG/L	420
601370-29	CHLORIDE (325.3)	MG/L	580
601370-30	CHLORIDE (325.3)	MG/L	120
601370-31	CHLORIDE (325.3)	MG/L	280
601370-32	CHLORIDE (325.3)	MG/L	270
601370-33	CHLORIDE (325.3)	MG/L	120



Analytical Technologies, Inc.

"Method Report Summary"

Accession Number: 601440
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 601370
Project Name: MARATHON OIL
Project Location: IB REMEDIATION
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
601370-34	CHLORIDE (325.3)	MG/L	9
601370-35	CHLORIDE (325.3)	MG/L	10
601370-36	CHLORIDE (325.3)	MG/L	9
601370-39	CHLORIDE (325.3)	MG/L	25
601370-40	CHLORIDE (325.3)	MG/L	9
601370-41	CHLORIDE (325.3)	MG/L	93



Analytical**Technologies**, Inc.

"WetChem Quality Control Report"

Parameter:	CHLORIDE	CHLORIDE
Batch Id:	CIW004	CIW005
Blank Result:	<1	<1
Anal. Method:	325.3	325.3
Prep. Method:	N/A	N/A
Analysis Date:	29-JAN-96	30-JAN-96
Prep. Date:	29-JAN-96	30-JAN-96

Sample Duplication

Sample Dup:	601440-1	601526-4
Rept Limit:	<1	<1
Sample Result:	11.49	22.97
Dup Result:	11.08	22.56
Sample RPD:	4	2
Max RPD:	6	6
Dry Weight%	N/A	N/A

Matrix Spike

Sample Spiked:	601440-2	601526-4
Rept Limit:	<1	<1
Sample Result:	23.38	22.97
Spiked Result:	83.51	76.78
Spike Added:	55.00	55.00
% Recovery:	109	98
% Rec Limits:	89-110	89-110
Dry Weight%	N/A	N/A

ICV

ICV Result:	92	93
True Result:	100	100
% Recovery:	92	93
% Rec Limits:	90-110	90-110

LCS

LCS Result:		
True Result:		
% Recovery:		
% Rec Limits:		



Analytical**Technologies**, Inc.

"Quality Control Comments"

Batch Id:

Comments:

CIW005

MS/MSD [601538-1] 110, 108 RPD = 2



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

N/A = NOT APPLICABLE.
N/S = NOT SUBMITTED.
N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW ATI REPORTING LIMIT;
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.
N/D = NOT DETECTED.
DISS. OR D = DISSOLVED
T & D = TOTAL AND DISSOLVED
R = REACTIVE
T = TOTAL
G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X ATI REPORTING LIMIT AND
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT
OR BELOW ATI REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".
Q = THE ANALYTICAL (POST-DIGESTION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY
BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DIGESTION) 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
TO ANALYSIS)
@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX. (DILUTION PRIOR TO
DIGESTION)
P = ANALYTICAL (POST DIGESTION) SPIKE.
I = DUPLICATE INJECTION.
& = AUTOMATED
F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
N/C+ = NOT CALCULABLE
N/C* = NOT CALCULABLE; SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X ATI REPORTING LIMIT AND THE
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE ATI 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 ATI REPORTING LIMIT
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE ATI
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".
SAMPLE IS NON-HOMOGENEOUS.
(*) = DETECTION LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.
(CA) = SEE CORRECTIVE ACTIONS FORM.

SW-846, 3rd Edition, September 1986 and Revision 1, July 1992.
EPA 600/4-79-020, Revised March 1983.
STANDARD METHODS, 17TH ED., 1989
NIOSH Manual of Analytical Methods, 3rd Edition.
ANNUAL BOOK OF ASTM STANDARDS, VOLUME 11.01, 1991.

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. IF FLASHPOINT IS LESS THAN 25
DEGREES CELSIUS, THE DETECTION LIMIT BECOMES THE INITIAL STARTING
TEMPERATURE.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION).

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

DPH = DOLLY P. HWANG	SG = SCOTT GRESHAM	RB = REBECCA BROWN
NC = NICOLE CALL	NSB = NANCY S. BUTLER	MM = MARY MOLONEY
CF = CHRISTINE FOSTER	ED = ESTHER DANTIN	AB = ANDY BROTHERTON
BF = BLANCA FACH		

CHAIN OF CUSTODY

ATI LAB I.D.

601370

DATE: 1/15-18/96 PAGE 1 OF 45

PROJECT MANAGER: Bob Menzies

COMPANY: Marathon Oil Co

ADDRESS: PO Box 552

PHONE: Midland, TX 79702

FAX: (915) 687-8312

BILL TO: (915) 687-8305

COMPANY: AS ABOVE

ADDRESS: Same

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
PW 196	1-15-96	1800	WATER	-01
DF 196	1-15-96	1805		-02
RB-1-17-96	1-17-96	0955		-03
RBmw-70	1-18-96	1230		-04
mw-70		1435		+05
mw-79		1435		-06
RBmw-63		1545		-07
mw-63		1555		-08
RBmw-71		1750		-09

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1)	Diesel/Gasoline/BTXE/MTBE (MOD 8015/8020)	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	SDWA Volatiles (502.1/503.1, 502.2 Reg. & Unreg.)	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	SDWA Primary Standards - Arizona	SDWA Secondary Standards - Arizona	SDWA Primary Standards - Federal	SDWA Secondary Standards - Federal	The 13 Priority Pollutant Metals	RCRA Metals by Total Digestion	RCRA Metals by TCLP (1311)	NUMBER OF CONTAINERS
																	2
																	2
																	2
																	2
																	3
																	3
																	2
																	3
																	2

PROJECT INFORMATION

PROJ. NO.: 44999

PROJ. NAME: IB Remediation

P.O. NO.:

SHIPPED VIA:

NO. CONTAINERS: 2

CUSTODY SEALS: 200 NA

RECEIVED INTACT: Y

RECEIVED COLD: 2.5

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒ 2 WEEK

Comments:

SAMPLED & RELINQUISHED BY: 1.		RELINQUISHED BY: 2.		RELINQUISHED BY: 3.	
Signature: <u>Reid</u>	Time: <u>1130</u>	Signature:	Time:	Signature:	Time:
Printed Name: <u>Kern Cook</u>	Date: <u>1-22-96</u>	Printed Name:	Date:	Printed Name:	Date:
Company: <u>ATI</u>	Phone: <u>242-3113</u>	Company:		Company:	
RECEIVED BY: 1.		RECEIVED BY: 2.		RECEIVED BY: (LAB) 3.	
Signature:	Time:	Signature:	Time:	Signature: <u>Andrew Baker</u>	Time: <u>1130</u>
Printed Name:	Date:	Printed Name:	Date:	Printed Name: <u>Andrew Baker</u>	Date: <u>1/22</u>
Company:		Company:		Company: <u>Analytical Technologies, Inc.</u>	

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



Analytical Technologies, Inc., Albuquerque, NM
San Diego • Phoenix • Seattle • Pensacola • Ft. Collins • Portland • Albuquerque

CHAIN OF CUSTODY

DATE: 11-19-96 PAGE 2 OF 45

ATI LAB I.D.

601370

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

PROJECT MANAGER: Bob Menzies

COMPANY: Marathon Oil Co
ADDRESS: PO Box 5552
Midland, TX 79702
PHONE: (915) 687-8312
FAX: (915) 687-8305

BILL TO: *AS per*
COMPANY:
ADDRESS:

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
MW-71	11/10/96	1800	water	-10
RB MW-66	11/19/96	0925		-11
MW-66		0935		-12
RB MW-60		1100		-13
MW-60		1110		-14
RB MW-64		1255		-15
MW-64		1305		-16
RB MW-67		1405		-17
MW-67		1415		-18

ANALYSIS REQUEST										NUMBER OF CONTAINERS	
Petroleum Hydrocarbons (418.1)											
(MOD 8015) Gas/Diesel											
Diesel/Gasoline/BT-XE/MTBE (MOD 8015/8020)											
BT-XE/MTBE (8020)											
Chlorinated Hydrocarbons (601/8010)											
Aromatic Hydrocarbons (602/8020)											
SDWA Volatiles (502.1/503.1), 502.2 Reg. & Unreg.											
Pesticides/PCB (608/8080)											
Herbicides (615/8150)											
Base/Neutral/Acid Compounds GC/MS (625/8270)											
Volatile Organics GC/MS (624/8240)											
Polynuclear Aromatics (610/8310)											
SDWA Primary Standards - Arizona											
SDWA Secondary Standards - Arizona											
SDWA Primary Standards - Federal											
SDWA Secondary Standards - Federal											
The 13 Priority Pollutant Metals											
RCRA Metals by Total Digestion											
RCRA Metals by TCLP (1311)											

PROJECT INFORMATION

PROJ. NO.: 44999

PROJ. NAME: T-6 Remediation

P.O. NO.:

SHIPPED VIA:

NO. CONTAINERS: 23

CUSTODY SEALS: Y (NA)

RECEIVED INTACT: Y

RECEIVED COLD: 25

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒ 2 WEEK

Comments:

SAMPLED & RELINQUISHED BY: 1.		RELINQUISHED BY: 2.		RELINQUISHED BY: 3.	
Signature: <i>Kevin Cook</i>	Time: 1130	Signature:	Time:	Signature:	Time:
Printed Name: Kevin Cook	Date: 1-22-96	Printed Name:	Date:	Printed Name:	Date:
Company: GFI	Phone: 242-3413	Company:		Company:	
RECEIVED BY: 1.		RECEIVED BY: 2.		RECEIVED BY: (LAB) 3.	
Signature:	Time:	Signature:	Time:	Signature: <i>Andrew Parker</i>	Time: 1100
Printed Name:	Date:	Printed Name:	Date:	Printed Name: Andrew Parker	Date: 1/12
Company:		Company:		Company: Analytical Technologies, Inc.	

PROJECT MANAGER:

COMPANY:

ADDRESS:

PHONE:

FAX:

BILL TO:

COMPANY:

ADDRESS:

SAMPLE ID

DATE TIME MATRIX LAB ID

88.01-57

5-1-8

RBW-55

mw-55

05-13-21

67-49

Kβmw-5L

ms-5

Kilm - 6

PROJECT INFO

NO.: 4407

NAME: LBK

NO.:

LED VOLT:

LA ☐ 244- ☐ 486-

ments:

Doc ID: 00000000

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

ATI Labs: San Diego (619) 458-9141 • Phoenix (602) 496-4400 • Seattle (206) 228-8335 • Pensacola (904) 474-1001 • Portland (503) 684-0447 • Albuquerque (505) 344-3777
DISTRIBUTION: White, Canary • ATI • Pink • ORIGINATOR

ANALYSIS REQUEST

PROJECT MANAGER: BOB MENZIE

COMPANY: MACARTHUR OIL CO

ADDRESS: PO BOX 552
MIDLAND, TX 79702

PHONE: (915) 687-8312

FAX: (915) 687-8305

BILL TO:

COMPANY: ABOVE

ADDRESS: PS
S. ARL

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
mw-61	1/20/96	1050	Water	-28
mw-44		1145		-29
mw-77		1345		-30
mw-43		1400		-31
mw-41		1410		-32
mw-11		1425		-33

[illegible]

PROJECT INFORMATION

PROJ. NO.: 44997	NO. CONTAINERS	18
PROJ. NAME: Is Remediation	CUSTODY SEALS	20 NA
P.O. NO.:	RECEIVED INTACT	✓
SHIPPED VIA:	RECEIVED COLD	25

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒ 2 WEEK

Comments:

SAMPLED & RELINQUISHED BY: 1.		RELINQUISHED BY: 2.		RELINQUISHED BY: 3.	
Signature: <i>AB-Cook</i>	Time: 1130	Signature:	Time:	Signature:	Time:
Printed Name: <i>KEVIN COOK</i>	Date: 1-22-96	Printed Name:	Date:	Printed Name:	Date:
Company: <i>GTE</i>	Phone: 242-3113	Company:		Company:	
RECEIVED BY: 1.		RECEIVED BY: 2.		RECEIVED BY: (LAB) 3.	
Signature:	Time:	Signature:	Time:	Signature: <i>Andrew Saker</i>	Time: 1130
Printed Name:	Date:	Printed Name:	Date:	Printed Name: <i>Andrew Saker</i>	Date: 1/22
Company:		Company:		Analytical Technologies, Inc.	



SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bob Menzie
COMPANY: Marathon Oil Co
ADDRESS: PO Box 552 Midvale TX 77022
PHONE: (915) 687-8312
FAX: (915) 687-8305
BILL TO: SAME AS ABOVE
COMPANY:
ADDRESS:

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
R-1050-LCM IMP	1-19-96	08:30	water	34
Bubble well	1-19-96	07:46	water	34
ARROYO	1-19-96	10:10	water	35
LYMAN	1-19-96	10:30	water	36
Stripper Outlet	1-19-96	09:45	water	37
Stripper Inlet	1-19-96	09:46	water	38
Silo-1	1-19-96	09:30	water	37
MW 61A	1-20-96	11:50	water	40
MW 65A	1-20-96	12:15	water	41

ANALYSIS REQUEST																			NUMBER OF CONTAINERS										
Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct/Inject	(M8015) Gas/Purge & Trap	Gasoline/BTEX & MTBE (M8015/8020)	BTEX/MTBE (8020)	BTEX & Chlorinated Aromatics (602/8020)	BTEX/MTBE/EDC & EDB (8020/8010/Short)	Chlorinated Hydrocarbons (601/8010)	Chloride	504 EDB ☐ / DBCP ☐	Polynuclear Aromatics (610/8310)	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		Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)								

PROJECT INFORMATION
PROJ. NO.: 44999
PROJ. NAME: TB Remediation
P.O. NO.:
SHIPPED VIA:
SAMPLE RECEIPT
NO. CONTAINERS: 20
CUSTODY SEALS: 20/NA
RECEIVED INTACT: Y
BLUE ICE: 25

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS
(RUSH) ☐ 124hr ☐ 148hr ☐ 172hr (NORMAL) ☒ 1 WEEK ☐ 2 WEEK ☐ OTHER
CERTIFICATION REQUIRED: ☐ NM ☐ OTHER
METHANOL PRESERVATION ☐
COMMENTS:
RELINQUISHED BY: 1. Signature: Thomas Parker 3:00 PM Time: 11:30
Printed Name: Thomas Parker Date: 1-22-96
Company: Marathon Oil Co
RECEIVED BY: (LAB) 2. Signature: Kevin Cook 11:30 Time: 11:30
Printed Name: Kevin Cook Date: 1-22-96
Company: ATI
Analytical Technologies of New Mexico

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

COMPANY: Analytical Technologies of New Mexico, Inc.

ADDRESS: 2709-D Pan American Freeway, NE
Albuquerque, NM 87107

CLIENT PROJECT MANAGER:

kim mcNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
601370-05	1/18	1435	AQ	1
-06	↓	1435	↓	2
-08	↓	1555	↓	3
-10	1/18	1800	↓	4
-12	1/19	0935	↓	5
-14	↓	1110	↓	6
-16	↓	1305	↓	7
-18	↓	1415	↓	8
-20	↓	1535	↓	9

[illegible]

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NUMBER:	601370	TOTAL NUMBER OF CONTAINERS	
PROJECT NAME:	IS Remediation	CHAIN OF CUSTODY SEALS	
QC LEVEL:	STD IV	INTACT?	
QC REQUIRED:	MS MSD BLANK	RECEIVED GOOD COND./COLD	
TAT:	STANDARD RUSH!	LAB NUMBER	
		IWO # KM 1122	

Iw@#kM 1122

DUE DATE:

RUSH SURCHARGE:

CLIENT DISCOUNT: Quote

SPECIAL CERTIFICATION REQUIRED: ☐ YES ☐ NO

SAMPLES SENT TO:		RELINQUISHED BY:		RELINQUISHED BY:	
SAN DIEGO		Signature:	Time:	1.	2.
FT. COLLINS		<i>Andrew Parker</i>	1200		
RENTON		Printed Name:	Date:		
PENSACOLA		<i>Andrew Parker</i>	1/22		
PORTLAND		Analytical Technologies of New Mexico, Inc.			
PHOENIX		Albuquerque			
		RECEIVED BY:		1.	2.
		Signature:	Time:		
		<i>Robert Espenman</i>	0941		
		Printed Name:	Date:		
		<i>R. ELSPERMAN</i>	1/23/86		
		Company:			
		ATI - FL			

NETWORK PROJECT MANAGER: KIMBERLY D MCNEILL

COMPANY: Analytical Technologies of New Mexico, Inc.
ADDRESS: 2709-D Pan American Freeway, NE
Albuquerque, NM 87107

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
510-601370-22	1/19	1630	AQ	10
-23	1/20	0825		11
-24		0855		12
-26		0915		13
-28		1050		14
-29		1145		15
-30		1345		16
-31		1400		17
-32		1410		18

[illegible]

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY:		RELINQUISHED BY:	
PROJECT NUMBER:	601370	TOTAL NUMBER OF CONTAINERS		SAN DIEGO	Signature:	1.	Signature:	1.	
PROJECT NAME:	IS Remediation	CHAIN OF CUSTODY SEALS		FT. COLLINS	Time:		Time:		
QC LEVEL:	STD IV	INTACT?		RENTON	Printed Name:		Printed Name:		
QC REQUIRED:	MS MSD BLANK	RECEIVED GOOD COND/COLD		PENSACOLA	Date:		Date:		
TAT:	STANDARD RUSH:	LAB NUMBER		PORTLAND	Company:		Company:		
				PHOENIX	Signature:	1.	Signature:	2.	
					Time:		Time:		
					Printed Name:		Printed Name:		
					Date:		Date:		
					Company:		Company:		

DUE DATE:	2/2
RUSH SURCHARGE:	no
CLIENT DISCOUNT:	Quote
SPECIAL CERTIFICATION REQUIRED:	☐ YES ☐ NO

Signature: Andrew Larky		Signature: R. ELSPERMAN	
Time: 1700		Time: 0941	
Printed Name: Andrew Larky		Printed Name: R. ELSPERMAN	
Date: 1/22		Date: 1/23/96	
Company: Analytical Technologies of New Mexico, Inc. Albuquerque		Company: ATI-FL	

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

COMPANY: Analytical Technologies of New Mexico, Inc.
ADDRESS: 2709-D Pan American Freeway, NE
Albuquerque, NM 87107

CLIENT PROJECT MANAGER:

kim mcNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
601370 -33	1/120	1425	AQ	19
-34	1/119	0940		20
-35	1/119	1010		21
-36	1/119	1030		22
-39	1/119	0930		23
-40	1/120	1150		24
-41	1/120	1215	↓	25

ANALYSIS REQUEST	NUMBER OF CONTAINERS
Metals - TAL	
Metals - PP List	
Metals - RCRA	
RCRA Metals by TCLP (1311)	
TOX	
TOC	
Gen Chemistry : Chloride only	
Oil and Grease	
BOD	
COD	
Pesticides/PCB (608/8080)	
Herbicides (615/8150)	
Base/Neutral Acid Compounds GC/MS (625/8270)	
Volatile Organics GC/MS (624/8240)	
Polynuclear Aromatics (610/8310)	
8240 (TCLP 1311) ZHE	
8270 (TCLP 1311)	
TO-14	
Gross Alpha/Beta	

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY:		RELINQUISHED BY:	
PROJECT NUMBER:	601370	TOTAL NUMBER OF CONTAINERS		SAN DIEGO		Signature:		Signature:	
PROJECT NAME:	IB Remediation	CHAIN OF CUSTODY SEALS		FT. COLLINS		Printed Name:		Printed Name:	
QC LEVEL:	STD IV	INTACT?		RENTON		Date:		Date:	
QC REQUIRED:	MS MSD BLANK	RECEIVED GOOD COND./COLD		PENSACOLA		Company:	Analytical Technologies of New Mexico, Inc.	Company:	
TAT:	STANDARD RUSH!	LAB NUMBER		PORTLAND		RECEIVED BY:	1.	RECEIVED BY: (LAB)	2.
Iw 0 # KM 1122				PHOENIX		Signature:	Time: 0941	Signature:	Time:
DUE DATE:	2/2					Printed Name:	Date: 1/23/96	Printed Name:	Date:
RUSH SURCHARGE:	No					Company:	R. ELSER	Company:	
CLIENT DISCOUNT:	Quote								
SPECIAL CERTIFICATION REQUIRED: ☐ YES ☐ NO									

APPENDIX D

LABORATORY RESULTS - NATURAL SPRING AND RANCHER, PLANT SUPPLY

WELLS

(MARCH)



Analytical**Technologies**, Inc.

2709-D Pan American Freeway, NE Albuquerque, NM 87107
Phone (505) 344-3777 FAX (505) 344-4413

ATI I.D. 603346

March 29, 1996

Marathon Oil Company
P.O. Box 552
Midland, TX 79702-0552

Project Name/Number: IB REMEDIATION

Attention: Robert J. Menzie Jr.

On 03/20/96, Analytical Technologies, of New Mexico Inc., (ADHS License No. AZ0015), 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 method 8020 analyses were performed by Analytical Technologies, Inc., Albuquerque, NM.

All other analyses were performed by American Environmental Network (FL) Inc., 11 East Olive Road, Pensacola, FL.

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.
Laboratory Manager

MR:jt

Enclosure



Analytical Technologies, Inc.

CLIENT : MARATHON OIL COMPANY
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

DATE RECEIVED : 03/20/96

REPORT DATE : 03/29/96

ATI ID: 603346

	ATI ID #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	603346-01	SW-1	AQUEOUS	03/18/96
02	603346-02	STRIPPER INLET	AQUEOUS	03/18/96
03	603346-03	STRIPPER OUTLET	AQUEOUS	03/18/96
04	603346-04	ARROYO	AQUEOUS	03/18/96
05	603346-05	LYMAN	AQUEOUS	03/18/96

---TOTALS---

MATRIX
AQUEOUS

#SAMPLES
5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical**Technologies**, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 603363
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 603346
Project Name: IB REMEDIATION:MO
Project Location: N/S
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 603346-01			Lab ID: 001		
CHLORIDE (325.3)	MG/L	24	1	CIW019	

Comments:

Client ID: 603346-04			Lab ID: 002		
CHLORIDE (325.3)	MG/L	10	1	CIW019	

Comments:

Client ID: 603346-05			Lab ID: 003		
CHLORIDE (325.3)	MG/L	11	1	CIW019	

Comments:



Analytical**Technologies**,Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 603363
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 603346
Project Name: IB REMEDIATION:MO
Project Location: N/S
Test: Group of Single Wetchem

Client ID:	Lab Matrix: ID:	Date/Time Sampled:	Date Received:
603346-01	001 WATER	18-MAR-96 1725	21-MAR-96
603346-04	002 WATER	18-MAR-96 1750	21-MAR-96
603346-05	003 WATER	18-MAR-96 1805	21-MAR-96



Analytical**Technologies**, Inc.

"Method Report Summary"

Accession Number: 603363
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 603346
Project Name: IB REMEDIATION:MO
Project Location: N/S
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
603346-01	CHLORIDE (325.3)	MG/L	24
603346-04	CHLORIDE (325.3)	MG/L	10
603346-05	CHLORIDE (325.3)	MG/L	11



Analytical**Technologies**, Inc.

"WetChem Quality Control Report"

Parameter:	CHLORIDE
Batch Id:	CIW019
Blank Result:	<1
Anal. Method:	325.3
Prep. Method:	N/A
Analysis Date:	25-MAR-96
Prep. Date:	25-MAR-96

Sample Duplication

Sample Dup:	603300-9
Rept Limit:	<10+

Sample Result:	280
Dup Result:	296
Sample RPD:	6
Max RPD:	6
Dry Weight%	N/A

Matrix Spike

Sample Spiked:	603300-9
Rept Limit:	<10+
Sample Result:	280
Spiked Result:	833
Spike Added:	550
% Recovery:	101
% Rec Limits:	89-110
Dry Weight%	N/A

ICV

ICV Result:	101
True Result:	100
% Recovery:	101
% Rec Limits:	90-110

LCS

LCS Result:	
True Result:	
% Recovery:	
% Rec Limits:	



N/A = NOT APPLICABLE.
N/S = NOT SUBMITTED.
N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW ATI REPORTING LIMIT;
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.
N/D = NOT DETECTED.
DISS. OR D = DISSOLVED
T & D = TOTAL AND DISSOLVED
R = REACTIVE
T = TOTAL
G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X ATI REPORTING LIMIT AND
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT
OR BELOW ATI REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".
Q = THE ANALYTICAL (POST DIGESTION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY
BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DIGESTION) 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
TO ANALYSIS)
@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX. (DILUTION PRIOR TO
DIGESTION)
P = ANALYTICAL (POST DIGESTION) SPIKE.
I = DUPLICATE INJECTION.
& = AUTOMATED
F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
N/C+ = NOT CALCULABLE
N/C* = NOT CALCULABLE; SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X ATI REPORTING LIMIT AND THE
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE ATI 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 ATI REPORTING LIMIT
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE ATI
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".
SAMPLE IS NON-HOMOGENEOUS.
(*) = DETECTION LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.
(CA) = SEE CORRECTIVE ACTIONS FORM.

SW-846, 3rd Edition, September 1986 and Revision 1, July 1992.

EPA 600/4-79-020, Revised March 1983.

STANDARD METHODS, 17TH ED., 1989

NIOSH Manual of Analytical Methods, 3rd Edition.

ANNUAL BOOK OF ASTM STANDARDS, VOLUME 11.01, 1991.

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. IF FLASHPOINT IS LESS THAN 25
DEGREES CELSIUS, THE DETECTION LIMIT BECOMES THE INITIAL STARTING
TEMPERATURE.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION).

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

DPH = DOLLY P. HWANG
NC = NICOLE CALL
CF = CHRISTINE FOSTER
AMC = A. MICKEY CROW

SG = SCOTT GRESHAM
NSB = NANCY S. BUTLER
ED = ESTHER DANTIN
RH = RICKY HAGENDORFER

RB = REBECCA BROWN
MM = MARY MOLONEY
AB = ANDY BROTHERTON
BH = BARRY HICK



Analytical**Technologies**, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 603346
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	SW-1	AQUEOUS	03/18/96	NA	03/20/96	1
02	STRIPPER INLET	AQUEOUS	03/18/96	NA	03/20/96	100
03	STRIPPER OUTLET	AQUEOUS	03/18/96	NA	03/22/96	1

PARAMETER	UNITS	01	02	03
BENZENE	UG/L	<0.5	220	6.4
TOLUENE	UG/L	<0.5	57	15
ETHYLBENZENE	UG/L	<0.5	400	15
TOTAL XYLENES	UG/L	<0.5	2200	82

SURROGATE:

BROMOFLUOROBENZENE (%)	98	117	99
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Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 603346
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	ARROYO	AQUEOUS	03/18/96	NA	03/21/96	1
05	LYMAN	AQUEOUS	03/18/96	NA	03/21/96	1
PARAMETER			UNITS	04	05	
BENZENE			UG/L	<0.5	<0.5	
TOLUENE			UG/L	<0.5	<0.5	
ETHYLBENZENE			UG/L	<0.5	<0.5	
TOTAL XYLENES			UG/L	<0.5	<0.5	

SURROGATE:

BROMOFLUOROBENZENE (%) 101 101



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 603346
BLANK I.D.	: 032096	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: (NONE)	DATE ANALYZED	: 03/20/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
ETHYLBENZENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5

SURROGATE:

BROMOFLUOROBENZENE (%)	98
------------------------	----



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 603346
BLANK I.D.	: 032196	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: (NONE)	DATE ANALYZED	: 03/21/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

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 (%)	103
------------------------	-----



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 60334504 ATI I.D. : 603346
CLIENT : MARATHON OIL COMPANY DATE EXTRACTED : NA
PROJECT # : (NONE) DATE ANALYZED : 03/20/96
PROJECT NAME : IB REMEDIATION SAMPLE MATRIX : AQUEOUS
REF. I.D. : 60334504 UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10.0	10.0	100	10.0	100	0
TOLUENE	<0.5	10.0	10.1	101	10.2	102	1
ETHYLBENZENE	<0.5	10.0	10.3	103	10.3	103	0
TOTAL XYLENES	<0.5	30.0	31.4	105	31.8	106	1

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

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

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

PROJECT MANAGER: Robert J. Menzie, Jr.

COMPANY: Marathon Oil Company
ADDRESS: 125 W. Missouri St.
Midland, TX 79701
PHONE: 915-687-8312
FAX: 915-687-8305

BILL TO: Marathon Oil Company
COMPANY: Bob Menzie
ADDRESS: P.O. Box 552
Midland, TX 79702-0552

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
Siv-1	3/8/96	17:25	Water	-01
Stripper Inlet		17:34		-02
Stripper Outlet		17:37		-03
Arroyo		17:50		-04
Lyman		18:05		-05

SAMPLED & RELINQUISHED BY: 1.		RELINQUISHED BY: 2.		RELINQUISHED BY: 3.	
Signature: Robert J. Menzie	Time: 3:50p	Signature:	Time:	Signature:	Time:
Printed Name: Robert J. Menzie	Date: 3-19-96	Printed Name:	Date:	Printed Name:	Date:
Company: Marathon	Phone: 915-687-8312	Company:		Company:	

RECEIVED BY: 1. RECEIVED BY: 2. RECEIVED BY: 3. (LAB)

Signature: [Signature] Time: 1236
Printed Name: [Name] Date: 3/20
Company: Analytical Technologies, Inc.

ANALYSIS REQUEST	NUMBER OF CONTAINERS
Petroleum Hydrocarbons (418.1)	3
(MOD 8015) Gas/Diesel	
Diesel/Gasoline/BTXE/MTBE (MOD 8015/8020)	
BTXE/MTBE (8020)	
Chloride	
Chlorinated Hydrocarbons (601/8010)	
Aromatic Hydrocarbons (602/8020)	
SDWA Volatiles (502.1/503.1), 502.2 Reg. & Unreg.	
Pesticides/PCB (608/8080)	
Herbicides (615/8150)	
Base/Neutral/Acid Compounds GC/MS (625/8270)	
Volatile Organics GC/MS (624/8240)	
Polynuclear Aromatics (610/8310)	
SDWA Primary Standards - Arizona	
SDWA Secondary Standards - Arizona	
SDWA Primary Standards - Federal	
SDWA Secondary Standards - Federal	
The 13 Priority Pollutant Metals	
RCRA Metals by Total Digestion	
RCRA Metals by TCLP (1311)	

Interlab Chain of Custody

DATE: 3/20 PAGE: 1 OF 1

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

COMPANY: Analytical Technologies of New Mexico, Inc.

ADDRESS: 2709-D Pan American Freeway, NE
Albuquerque, NM 87107

603346-3

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals - TAL	Metals - PP List	Metals - RCRA	RCRA Metals by TCLP (1311)	TOX	TOC	Gen Chemistry : C1	Oil and Grease	BOD	COD	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	8240 (TCLP 1311) ZHE	8270 (TCLP 1311)	TO-14	Gross Alpha/Beta	NUMBER OF CONTAINERS
603346-01	3/18	1725	AQ																					
-04		1750																						
-05		1805																						

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

1.

RELINQUISHED BY:

2.

PROJECT NUMBER: 603346

TOTAL NUMBER OF CONTAINERS

SAN DIEGO

Signature: Andrew L. L. Time: 1500

Signature: Time:

PROJECT NAME: IIS Remediation: M0

CHAIN OF CUSTODY SEALS

FT. COLLINS

Printed Name: Date: 3/20

Printed Name: Date:

OC LEVEL: STD IV

INTACT?

RENTON

Signature: Time: 0935

Signature: Time:

QC REQUIRED: MS MSD BLANK

RECEIVED GOOD COND/COLD

PENSACOLA

Signature: Time: 0935

Signature: Time:

TAT: STANDARD RUSH:

LAB NUMBER

PHOENIX

Signature: Time: 0935

Signature: Time:

DUE DATE: 4/1

I2004 E41188

Signature: Time: 0935

Signature: Time:

RUSH SURCHARGE: NO

CLIENT DISCOUNT: 20%

Signature: Time: 0935

Signature: Time:

SPECIAL CERTIFICATION REQUIRED: ☐ YES ☐ NO

Signature: Time: 0935

Signature: Time:

APPENDIX E

STATE ENGINEER OFFICE FLUID RECOVERY REPORTS



**Marathon
Oil Company**

P.O. Box 552
Midland, TX 79702-0552
Telephone 915/682-1626

February 6, 1996

Mr. Ramon Torres
State Engineer Office
1900 West Second Street
Roswell, New Mexico 88201

Dear Mr. Torres:

This is the January report for SEO permits RA-5131 and RA-8015. The following table indicates recorded meter readings for fluid removed from Lower Queen recovery wells under permit RA-5131 as of Monday, February 5, 1996.

Recovery Well	Meter Serial Number	Initial Meter Start	Meter Units	Previously Metered Fluid Removed (gal)	Meter Turnover Additional Fluid Removed (gal)	Meter Reset @	1/2/96 Meter Reading	2/5/96 Meter Reading	Jan-96 Fluid Removed (gal)	Per-well Cumulative Fluid Removed (gal)	Cumulative Fluid Removed (Acre ft)
MW-58	10239118	0	gal	7463969	0		removed	removed	0	7463969	22.9
MW-59	10259114	0	bbl	6730626	0		removed	removed	0	6730626	20.7
MW-61A	10239116	0	gal	130850	10000000		66727	492587	425861	10623437	32.6
MW-62	10239115	0	gal	7213981	0		removed	removed	0	7213981	22.1
MW-65A	10239117	0	gal	39774	10000000		1146166	1306054	159888	11345828	34.8
MW-68	2209213	122618	gal	2484076	0		5542343	5715923	173580	8077381	24.8
MW-72	2881532	470	gal		0		15777312	16669440	892128	16668970	51.2
MW-75	2877269	1291	bbl	0	0		59629	75184	653293	3103489	9.5
MW-81	203092	0	gal	1000000	1000000		223062	152916	929854	2223062	6.8
MW-82	203095	0	gal	0		469042	255052	110966	324956	793998	2.4
MW-83	203091	0	gal	0	1000000		368115	308320	940205	1308320	4.0
TOTAL									4499765	75553062	231.9

The following table indicates recorded meter readings for fluid removed from Shallow zone recovery wells under permit RA-8015 as of Monday, February 5, 1996.

Recovery Well	Meter Serial Number	Initial Meter Start	Meter Units	Previously	Meter Turnover		1/2/96 Meter Reading	2/5/96 Meter Reading	Jan-96	Per-well	Cumulative
				Metered	Additional	Fluid Removed (gal)			Fluid Removed (gal)	Fluid Removed (gal)	Cumulative Fluid removed (ga)
MW-1	-	-	gal	6713	0	-	-	0	6713		0.02
MW-13	2209212	98236	gal	243999	0	226324	removed	0	243999		0.75
MW-14	2209214	0	gal	398391	0	398204	removed	0	398391		1.22
MW-21	-	-	gal	189	0	-	-	0	189		0.00
MW-35	2209212	1882	gal	98303	0	-	-	0	98303		0.30
MW-45	10239114	2421861	gal	0	0	2421861	2421861	0	0		0.00
MW-51	2209214	398208	gal	0	0	398208	398208	0	0		0.00
MW-69	-	-	-	84020	0	-	-	193	84213		0.26
TOTAL								193	831808		2.55

If you have any questions or require additional information, please contact me (915-687-8312).

Sincerely,

Robert J. Menzie, Jr.
Advanced Environmental & Safety Representative

c: C. K. Curlee
T. L. Guillory
T. C. Lowry
C. M. Schweser
R. F. Unger

File 576-01



P.O. Box 552
Midland, TX 79702-0552
Telephone 915/682-1626

March 19, 1996

Mr. Ramon Torres
State Engineer Office
1900 West Second Street
Roswell, New Mexico 88201

Dear Mr. Torres:

This is the February report for SEO permits RA-5131 and RA-8015. The following table indicates recorded meter readings for fluid removed from Lower Queen recovery wells under permit RA-5131 as of Monday, March 4, 1996.

Recovery Well	Meter Serial Number	Initial Meter Start	Meter Units	Previously Metered Fluid Removed (gal)	Meter Turnover Additional Fluid Removed (gal)	Meter Changed @	2/5/96 Meter Reading	3/4/96 Meter Reading	Feb-96 Fluid Removed (gal)	Per-well Cumulative Fluid Removed (gal)	Cumulative Fluid Removed (Acre ft)
MW-58	10239118	0	gal	7463969	0		removed	removed	0	7463969	22.9
MW-59	10259114	0	bbl	6730626	0		removed	removed	0	6730626	20.7
MW-61A	10239116	0	gal	130850	10000000		492587	831538	338951	10962388	33.6
MW-62	10239115	0	gal	7213981	0		removed	removed	0	7213981	22.1
MW-65A	10239117	0	gal	39774	10000000		1306054	1452914	146860	11492688	35.3
MW-68	2209213	122618	gal	2484076	0		5715923	5852739	136816	8214197	25.2
MW-72	2881532	470	gal		0		16669440	17456264	786824	17455794	53.6
MW-75	2877269	1291	bbl	0	0		75184	87101	500493	3603999	11.1
MW-81	203092	0	gal	1000000	1000000		152916	967029	814113	2814113	8.6
MW-82	207111	0	gal	793998	0	122691	110966	66698	78423	872421	2.7
MW-83	203091	0	gal	0	2000000		308320	80270	771950	2080270	6.4
TOTAL									3574429	78904445	242.2

The following table indicates recorded meter readings for fluid removed from Shallow zone recovery wells under permit RA-8015 as of Monday, March 4, 1996.

Recovery Well	Meter Serial Number	Initial Meter Start	Meter Units	Previously Metered	Meter Turnover	2/5/96 Meter Reading	3/4/96 Meter Reading	Feb-96 Fluid	Per-well Cumulative	Cumulative
				Fluid Removed (gal)	Additional Fluid Removed (gal)			Removed (gal)	Fluid removed (ga)	Fluid Removed (Acre ft)
MW-1	-	-	gal	6713	0	-	-	0	6713	0.02
MW-13	2209212	98236	gal	243999	0	226324	removed	0	243999	0.75
MW-14	2209214	0	gal	398391	0	398204	removed	0	398391	1.22
MW-21	-	-	gal	189	0	-	-	0	189	0.00
MW-35	2209212	1882	gal	98303	0	-	-	0	98303	0.30
MW-45	10239114	2421861	gal	0	0	2421861	2421861	0	0	0.00
MW-51	2209214	398208	gal	0	0	398208	398208	0	0	0.00
MW-69	-	-	-	84213	0	-	-	0	84213	0.26
TOTAL								0	831808	2.55

If you have any questions or require additional information, please contact me (915-687-8312).

Sincerely,

Robert J. Menzie, Jr.
Advanced Environmental & Safety Representative

c: C. K. Curlee
T. L. Guillory
T. C. Lowry
C. M. Schweser
R. F. Unger

File 576-01



P.O. Box 552
Midland, TX 79702-0552
Telephone 915/682-1626

April 9, 1996

Mr. Ramon Torres
State Engineer Office
1900 West Second Street
Roswell, New Mexico 88201

Dear Mr. Torres:

This is the March report for SEO permits RA-5131 and RA-8015. The following table indicates recorded meter readings for fluid removed from Lower Queen recovery wells under permit RA-5131 as of Monday, April 1, 1996.

Recovery Well	Meter Serial Number	Initial Meter Start	Meter Units	Previously Metered Fluid Removed (gal)	Meter Turnover Additional Fluid Removed (gal)	3/4/96 Meter Reading	4/1/96 Meter Reading	Mar-96 Fluid Removed (gal)	Per-well Cumulative Fluid Removed (gal)	Cumulative Fluid Removed (Acre ft)
MW-58	10239118	0	gal	7463969	0	removed	removed	0	7463969	22.9
MW-59	10259114	0	bbi	6730626	0	removed	removed	0	6730626	20.7
MW-61A	10239116	0	gal	10130850	0	831538	1184774	353236	11315624	34.7
MW-62	10239115	0	gal	7213981	0	removed	removed	0	7213981	22.1
MW-65A	10239117	0	gal	10039774	0	1452914	1659884	206970	11699658	35.9
MW-68	2209213	122618	gal	2484076	0	5852739	5986716	133977	8348174	25.6
MW-72	2881532	470	gal		0	17456264	18248710	792446	18248240	56.0
MW-75	2877269	1291	bbi	0	0	87101	100983	583061	4187081	12.9
MW-81	203092	0	gal	2000000	1000000	967029	784719	817690	3817690	11.7
MW-82	207111	0	gal	793998	0	66698	264598	197900	1058596	3.2
MW-83	203091	0	gal	2000000	0	80270	918412	838142	2918412	9.0
TOTAL								3923421	83002050	254.7

The following table indicates recorded meter readings for fluid removed from Shallow zone recovery wells under permit RA-8015 as of Monday, April 1, 1996.

Recovery Well	Meter Serial Number	Initial Meter Start	Meter Units	Previously Metered Fluid Removed (gal)	Meter Turnover Additional Fluid Removed (gal)	3/4/96 Meter Reading	4/1/96 Meter Reading	Mar-96 Fluid Removed (gal)	Per-well Cumulative Fluid Removed (gal)	Cumulative Fluid Removed (Acre ft)
MW-1	-	-	gal	6713	0	-	-	0	6713	0.02
MW-13	2209212	98236	gal	243999	0	226324	removed	0	243999	0.75
MW-14	2209214	0	gal	398391	0	398204	removed	0	398391	1.22
MW-21	-	-	gal	189	0	-	-	0	189	0.00
MW-35	2209212	1882	gal	98303	0	-	-	0	98303	0.30
MW-45	10239114	2421861	gal	0	0	2421861	2421861	0	0	0.00
MW-51	2209214	398208	gal	0	0	398208	398208	0	0	0.00
MW-69	-	-	-	84213	0	-	-	1025	85238	0.26
TOTAL								1025	832833	2.56

If you have any questions or require additional information, please contact me (915-687-8312).

Sincerely,

Robert J. Mezzie, Jr.
Advanced Environmental & Safety Representative

c: T. L. Guillory
T. C. Lowry
C. M. Schweser
F. D. Searle
R. F. Unger

File 576-01

APPENDIX F

LABORATORY RESULTS - SECTION 24 RANCHER STOCK WELL



Analytical Technologies, Inc.

2709-D Pan American Freeway, NE Albuquerque NM 87107
Phone (505) 344-3777 FAX (505) 344-4413

ATI I.D. 601369

February 5, 1996

Marathon Oil Company
P.O. Box 552
Midland, TX 79702

Project Name/Number: WINDMILL WELL

Attention: Bob Menzie

On 01/22/96, Analytical Technologies, of New Mexico Inc., (ADHS License No. AZ0015), received a request to analyze **aqueous** sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

On 01/25/96, Bob Menzie requested ion balance be analyzed; however, due to limited sample volume, only Metals and Total Dissolved Solids were able to be analyzed.

EPA method 8020 analyses were performed by Analytical Technologies, Inc., Albuquerque, NM.

All other analyses were performed by Analytical Technologies, Inc., 11 East Olive Road, Pensacola, FL.

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.
Laboratory Manager

MR:jt

Enclosure



Analytical Technologies, Inc.

CLIENT : MARATHON OIL COMPANY DATE RECEIVED : 01/22/96
PROJECT # : (NONE)
PROJECT NAME : WINDMILL WELL REPORT DATE : 02/05/96

ATI ID: 601369

	ATI ID #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	601369-01	R-WSW-WM	AQUEOUS	01/19, 20/96

---TOTALS---

<u>MATRIX</u>	<u>#SAMPLES</u>
AQUEOUS	1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 601369
PROJECT # : (NONE)
PROJECT NAME : WINDMILL WELL

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	R-WSW-WM	AQUEOUS	01/19/96	NA	01/25/96	1
PARAMETER			UNITS	01		
BENZENE			UG/L	<0.5		
TOLUENE			UG/L	<0.5		
ETHYLBENZENE			UG/L	<0.5		
TOTAL XYLENES			UG/L	<0.5		

SURROGATE:

BROMOFLUOROBENZENE (%) 89



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 601369
BLANK I.D.	: 012596	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: (NONE)	DATE ANALYZED	: 01/25/96
PROJECT NAME	: WINDMILL WELL	DILUTION FACTOR	: 1

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 (%)	89
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Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 601369
BLANK I.D.	: 012396	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: (NONE)	DATE ANALYZED	: 01/23/96
PROJECT NAME	: WINDMILL WELL	DILUTION FACTOR	: 1

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 (%)	93
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Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 60136702 ATI I.D. : 601369
CLIENT : MARATHON OIL COMPANY DATE EXTRACTED : NA
PROJECT # : (NONE) DATE ANALYZED : 01/23/96
PROJECT NAME : WINDMILL WELL SAMPLE MATRIX : AQUEOUS
REF. I.D. : 60136702 UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10.0	9.7	97	10.2	102	5
TOLUENE	<0.5	10.0	9.6	96	10.1	101	5
ETHYLBENZENE	<0.5	10.0	9.5	95	9.9	99	4
TOTAL XYLENES	<0.5	30.0	28.9	96	30.1	100	4

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

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



Analytical Technologies, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 601444
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 601369
Project Name: MARATHON OIL
Project Location: WINDMILL WELL
Test: Group of Single Wetchem
Matrix: WATER
QC Level: II

Lab ID: 001
Client Sample Id: 601369-01

Sample Date/Time: 20-JAN-96 1100
Received Date: 23-JAN-96

Parameters:	Units:	Results:	Rpt Lmts:	Q:	Batch:	Analyst:
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1600	5		TDW007	ED

Comments:



Analytical**Technologies**, Inc.

"Method Report Summary"

Accession Number: 601444
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 601369
Project Name: MARATHON OIL
Project Location: WINDMILL WELL
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
601369-01	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1600



Analytical**Technologies**, Inc.

"WetChem Quality Control Report"

Parameter:	TDS
Batch Id:	TDW007
Blank Result:	<5
Anal. Method:	160.1
Prep. Method:	N/A
Analysis Date:	29-JAN-96
Prep. Date:	26-JAN-96

Sample Duplication

Sample Dup:	601444-1
Rept Limit:	<5

Sample Result:	1646
Dup Result:	1596
Sample RPD:	4
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:	272
True Result:	293
% Recovery:	93
% Rec Limits:	66-122



N/A = NOT APPLICABLE.
N/S = NOT SUBMITTED.
N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW ATI REPORTING LIMIT;
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.
N/D = NOT DETECTED.
DISS. OR D = DISSOLVED
T & D = TOTAL AND DISSOLVED
R = REACTIVE
T = TOTAL
G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X ATI REPORTING LIMIT AND
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT
OR BELOW ATI REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".
Q = THE ANALYTICAL (POST-DIGESTION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY
BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DIGESTION) 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
TO ANALYSIS)
@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX. (DILUTION PRIOR TO
DIGESTION)
P = ANALYTICAL (POST DIGESTION) SPIKE.
I = DUPLICATE INJECTION.
& = AUTOMATED
F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
N/C+ = NOT CALCULABLE
N/C* = NOT CALCULABLE; SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X ATI REPORTING LIMIT AND THE
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE ATI 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 ATI REPORTING LIMIT
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE ATI
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".
SAMPLE IS NON-HOMOGENEOUS.
(*) = DETECTION LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.
(CA) = SEE CORRECTIVE ACTIONS FORM.

SW-846, 3rd Edition, September 1986 and Revision 1, July 1992.
EPA 600/4-79-020, Revised March 1983.
STANDARD METHODS, 17TH ED., 1989
NIOSH Manual of Analytical Methods, 3rd Edition.
ANNUAL BOOK OF ASTM STANDARDS, VOLUME 11.01, 1991.

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. IF FLASHPOINT IS LESS THAN 25
DEGREES CELSIUS, THE DETECTION LIMIT BECOMES THE INITIAL STARTING
TEMPERATURE.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION).

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

DPH = DOLLY P. HWANG	SG = SCOTT GRESHAM	RB = REBECCA BROWN
NC = NICOLE CALL	NSB = NANCY S. BUTLER	MM = MARY MOLONEY
CF = CHRISTINE FOSTER	ED = ESTHER DANTIN	AB = ANDY BROTHERTON
BF = BLANCA FACH		



Analytical Technologies, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 601444
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 601369
Project Name: MARATHON OIL
Project Location: WINDMILL WELL
Test: Group of Single Metals
Matrix: WATER
QC Level: II

Lab Id: 001
Client Sample Id: 601369-01

Sample Date/Time: 20-JAN-96 1100
Received Date: 23-JAN-96

Parameters:	Units:	Results:	Rpt Lmts:	Q:	Batch:	Analyst:
ALUMINUM (200.7)	MG/L	0.09	0.06		LOW015	JR
CALCIUM (200.7)	MG/L	210	1		IOW015	JR
COPPER (200.7)	MG/L	ND	0.01		FOW015	JR
IRON (200.7)	MG/L	1.0	0.02		NOW015	JR
POTASSIUM (200.7)	MG/L	4	2		XOW015	JR
MAGNESIUM (200.7)	MG/L	160	0.2		JOW015	JR
MANGANESE (200.7)	MG/L	0.03	0.01		GOW015	JR
SODIUM (200.7)	MG/L	90	0.2		IOW015	JR
ZINC (200.7)	MG/L	ND	0.02		5OW015	JR

Comments:



Analytical**Technologies**, Inc.

"Method Report Summary"

Accession Number: 601444
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 601369
Project Name: MARATHON OIL
Project Location: WINDMILL WELL
Test: Group of Single Metals

Client Sample Id:	Parameter:	Unit:	Result:
601369-01	ALUMINUM (200.7)	MG/L	0.09
	CALCIUM (200.7)	MG/L	210
	IRON (200.7)	MG/L	1.0
	POTASSIUM (200.7)	MG/L	4
	MAGNESIUM (200.7)	MG/L	160
	MANGANESE (200.7)	MG/L	0.03
	SODIUM (200.7)	MG/L	90



Analytical Technologies, Inc.

"Metals Quality Control Report"

Parameter:	ALUMINUM	CALCIUM	COPPER	IRON	POTASSIUM	MAGNESIUM
Batch Id:	LOW015	IOW015	FWO015	NOW015	XOW015	JOW015
Blank Result:	<0.06	<1	<0.01	<0.02	<2	<0.2
Anal. Method:	200.7	200.7	200.7	200.7	200.7	200.7
Prep. Method:	EPA 600	EPA 600	EPA 600	EPA 600	EPA 600	EPA 600
Analysis Date:	31-JAN-96	31-JAN-96	31-JAN-96	31-JAN-96	31-JAN-96	31-JAN-96
Prep. Date:	30-JAN-96	30-JAN-96	30-JAN-96	30-JAN-96	30-JAN-96	30-JAN-96

Sample Duplication

Sample Dup:	601434-1	601434-1	601434-1	601434-1	601434-1	601434-1
Rept Limit:	<0.06	<1	<0.01	<0.02	<2	<0.2
Sample Result:	2.1	42	2.1	2.1	24	35
Dup Result:	2.0	41	2.0	2.0	24	34
Sample RPD:	5	2	5	5	0	3
Max RPD:	20	20	20	20	20	20
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	601434-1	601434-1	601434-1	601434-1	601434-1	601434-1
Rept Limit:	<0.06	<1	<0.01	<0.02	<2	<0.2
Sample Result:	<0.06	20	0.07	0.02	4	14
Spiked Result:	2.1	42	2.1	2.1	24	35
Spike Added:	2.0	20	2.0	2.0	20	20
% Recovery:	105	110	102	104	100	105
% Rec Limits:	75-125	75-125	75-125	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

ICV

ICV Result:	5.0	10.1	5.0	5.3	48	5.1
True Result:	5.0	10	5.0	5.0	50	5.0
% Recovery:	100	101	100	106	96	102
% Rec Limits:	90-110	90-110	90-110	90-110	90-110	90-110

LCS

LCS Result:	2.0	20	1.9	2.0	20	20
True Result:	2.0	20	2.0	2.0	20	20
% Recovery:	100	100	95	100	100	100
% Rec Limits:	80-120	80-120	80-120	80-120	80-120	80-120



Analytical Technologies, Inc.

"Metals Quality Control Report"

Parameter:	MANGANESE	SODIUM	ZINC
Batch Id:	G0W015	10W015	50W015
Blank Result:	<0.01	<0.2	<0.02
Anal. Method:	200.7	200.7	200.7
Prep. Method:	EPA 600	EPA 600	EPA 600
Analysis Date:	31-JAN-96	31-JAN-96	31-JAN-96
Prep. Date:	30-JAN-96	30-JAN-96	30-JAN-96

Sample Duplication

Sample Dup:	601434-1	601434-1	601434-1
Rept Limit:	<0.01	<0.2	<0.02
Sample Result:	2.1	41	2.1
Dup Result:	2.0	39	2.0
Sample RPD:	5	5	5
Max RPD:	20	20	20
Dry Weight%	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	601434-1	601434-1	601434-1
Rept Limit:	<0.01	<0.2	<0.02
Sample Result:	<0.01	18	0.04
Spiked Result:	2.1	41	2.1
Spike Added:	2.0	20	2.0
% Recovery:	105	115	103
% Rec Limits:	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A

ICV

ICV Result:	4.9	9.8	5.0
True Result:	5.0	10	5.0
% Recovery:	98	98	100
% Rec Limits:	90-110	90-110	90-110

LCS

LCS Result:	2.0	22	2.0
True Result:	2.0	20	2.0
% Recovery:	100	110	100
% Rec Limits:	80-120	80-120	80-120



Batch Id: Comments:

LOW015	ANALYST: JR
LOW015	The results reported under "Sample Duplication" are the MS/MSD.
IOW015	ANALYST: JR
IOW015	The results reported under "Sample Duplication" are the MS/MSD.
FOW015	ANALYST: JR
FOW015	The results reported under "Sample Duplication" are the MS/MSD.
NOW015	ANALYST: JR
NOW015	The results reported under "Sample Duplication" are the MS/MSD.
XOW015	ANALYST: JR
XOW015	The results reported under "Sample Duplication" are the MS/MSD.
JOW015	ANALYST: JR
JOW015	The results reported under "Sample Duplication" are the MS/MSD.
GOW015	ANALYST: JR
GOW015	The results reported under "Sample Duplication" are the MS/MSD.
10W015	ANALYST: JR
10W015	The results reported under "Sample Duplication" are the MS/MSD.
50W015	ANALYST: JR
50W015	The results reported under "Sample Duplication" are the MS/MSD.



N/A = NOT APPLICABLE.
N/S = NOT SUBMITTED.
N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW ATI REPORTING LIMIT;
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.
N/D = NOT DETECTED.
DISS. OR D = DISSOLVED
T & D = TOTAL AND DISSOLVED
R = REACTIVE
T = TOTAL
G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X ATI REPORTING LIMIT AND
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT
OR BELOW ATI REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".
Q = THE ANALYTICAL (POST-DIGESTION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY
BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DIGESTION) 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
TO ANALYSIS)
@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX. (DILUTION PRIOR TO
DIGESTION)
P = ANALYTICAL (POST DIGESTION) SPIKE.
I = DUPLICATE INJECTION.
& = AUTOMATED
F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
N/C+ = NOT CALCULABLE
N/C* = NOT CALCULABLE; SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X ATI REPORTING LIMIT AND THE
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE ATI 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 ATI REPORTING LIMIT
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE ATI
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".
SAMPLE IS NON-HOMOGENEOUS.
J = (FLORIDA DEP 'J' FLAG) - MATRIX SPIKE AND POST SPIKE RECOVERY IS OUT OF
THE ACCEPTABLE RANGE. SEE OUT OF CONTROL EVENTS FORM.
U = (FLORIDA DEP 'U' FLAG) - THE COMPOUND WAS ANALYZED FOR, BUT NOT DETECTED.
S = METHOD OF STANDARD ADDITIONS (MSA) WAS PERFORMED ON THIS SAMPLE.

FROM ANALYSIS REPORT:

RL= REPORTING LIMIT BASED ON METHOD DETECTION LIMIT STUDIES.

Q= QUALIFIER (FOOTNOTE)

FROM QUALITY CONTROL REPORT:

RPD= RELATIVE PERCENT DEVIATION.

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

NOTE: THE UNITS REPORTED ON THE QUALITY CONTROL REPORT ARE REPORTED ON AN AS
RUN BASIS.

SW-846, 3rd Edition, September 1986 and Revision 1, July 1992.

EPA 600/4-79-020, Revised March 1983.

NIOSH Manual of Analytical Methods, 3rd Edition.

GJ = GARY JACOBS
JLH = JAMES L. HERED

JR = JOHN REED
LV = LASSANDRA VON APPEN



Albuquerque, New Mexico

DATE: 1/13 PAGE: 1 OF 1

[illegible]



**Marathon
Oil Company**

P.O. Box 552
Midland, TX 79702-0552
Telephone 915/682-1626

December 12, 1996

Mr. Roger Anderson
Environmental Bureau Chief
State of New Mexico
Oil Conservation Division
2040 Pacheco St.
Santa Fe, New Mexico 87505

RECEIVED

DEC 16 1996

Environmental Bureau
Oil Conservation Division

Dear Mr. Anderson:

Attached is the Third Quarter 1996 Indian Basin Remediation Project Report. This report is submitted on behalf of the Indian Basin Gas Plant owners in accordance with the Indian Basin Treatment Project Plan prepared by Marathon and approved by the Oil Conservation Division (OCD) on April 2, 1992. Preparation of this report is also in accordance with conditions contained within the April 2, 1992 and May 7, 1996 OCD correspondence regarding quarterly reporting of remediation project activities.

During our telephone conversation on November 7, your approval to submit this report late was received. If you have any questions please contact me (915-687-8312).

Sincerely,

A handwritten signature in cursive script that reads 'Robert J. Menzie, Jr.'.

Robert J. Menzie, Jr.
Advanced Environmental & Safety Specialist

Attachment

c: S. Fields, Fluor Daniel GTI, Albuquerque
S. P. Guidry
S. B. Hinchman
T. C. Lowry
William C. Olson, Oil Conservation Division, Santa Fe
F. D. Searle

File: 572-00

Shallow zone Pumping

Total fluid recovery from the Shallow zone during the quarter averaged 1.03 gallons per minute (34.9 barrels per day) from recovery wells MW-69 and MW-86. Shallow zone product recovery from MW-69 and MW-86 was 0.0 and 25.0 barrels, respectively.

Lower Queen Pump-and-Treat System

Total fluid recovery from the Lower Queen aquifer during the quarter averaged 134.3 gallons per minute (4605 barrels per day) from thirteen recovery wells. The product tank at the groundwater treatment compound at the Indian Basin Gas Plant separated 66.2 barrels of condensate from groundwater containing hydrocarbons withdrawn from the thirteen Lower Queen recovery wells. Dissolved-phase hydrocarbon compounds are removed by two air strippers operated in parallel. Infiltration of treated water into Lower Queen infiltration well IW-2 was 102,573 barrels (1123 barrels per day or 32.8 gallons per minute). Infiltration of treated water into Shallow zone infiltration wells was not conducted during the quarter. Cumulative condensate recovery from the Shallow zone and Lower Queen aquifers is 4174.1 barrels or 11.9% of the total estimated spill volume.

Quarterly Gauging and Groundwater Sampling Episode

During the quarterly groundwater sampling episode in July 1996, condensate was observed in seventeen Lower Queen and two Shallow zone wells (Appendix A). Shallow zone and Lower Queen groundwater and product elevations calculated from casing elevation data, depth-to-groundwater and depth-to-product measurements, and monthly rainfall data are shown in Tables 1 and 2, respectively. Figures 1 and 2 are water table elevation maps of the Shallow zone and Lower Queen aquifers, respectively. Figures 3 and 4 are product thickness maps of the Shallow zone and Lower Queen aquifers, respectively.

Laboratory Results of Groundwater Samples

Shallow zone dissolved benzene concentrations in project wells range from less than 0.5 to 800 micrograms per liter (ug/L) or parts per billion (Appendix B). Chloride concentrations in Shallow zone wells range from 5 to 480 milligrams per liter (mg/L) or parts per million. The New Mexico maximum allowable concentration for chloride is 250 mg/L. Figures 5 and 6 are isoconcentration maps of benzene and chloride in Shallow zone groundwater. Shallow zone downgradient receptors monitored include the Lyman well, Upper Indian Hills Spring West, and the Biebelle well. Concentrations of benzene, toluene, ethylbenzene, total xylene, and chloride in groundwater and surface water from these receptors have not exceeded New Mexico or Environmental Protection Agency groundwater quality standards.

Lower Queen dissolved benzene concentrations in the five downgradient wells range from less than 0.5 to 95 micrograms per liter (ug/L) or parts per billion. One downgradient monitoring well (MW-64) contains free-phase product. Chloride concentrations in Lower Queen wells range from 6 to 63 and are below New Mexico maximum allowable concentration of 250 milligrams per liter (mg/L) or parts per million. Figures 7 and 8 are isoconcentration maps of benzene and chloride in Lower Queen groundwater, respectively.

Vapor Extraction System

The vapor extraction system was not operated during the Third Quarter.

TABLE 1. SHALLOW ZONE DEPTH-TO-WATER, AND GROUNDWATER ELEVATION

Shallow Zone Well	Well Use	TOC Elev. (ft AMSL)	Total Depth from TOC (ft)	July 15-16, 1996	
				Depth to water (ft)	Ground- water Elev. (ft)
MW-1	monitor	3792.50	16.10	not gauged	
MW-2	monitor	3788.82	15.52	not gauged	
MW-3	monitor	3787.50	16.97	DRY	
MW-4	monitor	3785.88	18.68	not gauged	
MW-5	monitor	3801.69	13.05	DRY	
MW-6	monitor	3785.17	14.25	not gauged	
MW-7	monitor	3784.46	17.35	DRY	
MW-8	monitor	3795.04	17.38	DRY	
MW-9	monitor	3807.85	13.79	DRY	
MW-10	monitor	3790.78	18.52	DRY	
MW-11	monitor	3806.96	24.85	20.05	3786.91
MW-12	monitor	3809.86	25.21	not gauged	
MW-13	monitor	3801.58	22.07	17.09	3784.49
MW-14	monitor	3803.93	24.30	not gauged	
MW-15	monitor	3803.59	19.47	not gauged	
MW-16	monitor	3801.04	22.66	not gauged	
MW-17	monitor	3799.55	19.75	not gauged	
MW-18	monitor	3795.82	17.42	not gauged	
MW-19	monitor	3797.21	19.11	DRY	
MW-20	monitor	3797.59	16.89	not gauged	
MW-21	monitor	3798.21	23.31	not gauged	
MW-22	monitor	3799.20	17.30	not gauged	
MW-23	monitor	3794.48	12.08	not gauged	
MW-24	monitor	3794.09	13.30	DRY	
MW-25	monitor	3786.97	10.27	not gauged	
MW-26	monitor	3793.01	21.11	not gauged	
MW-27	monitor	3790.93	18.23	not gauged	
MW-28	monitor	3797.03	18.59	not gauged	
MW-29	monitor	3794.06	14.76	DRY	
MW-30	monitor	3788.30	14.82	not gauged	
MW-31	monitor	3791.15	19.93	not gauged	
MW-32	monitor	3797.47	15.70	DRY	
MW-33	monitor	3802.48	20.29	not gauged	
MW-34	monitor	3806.00	19.97	not gauged	
MW-35	monitor	3800.81	20.71	not gauged	
MW-36	monitor	3792.94	8.77	not gauged	
MW-37	monitor	3795.03	20.83	not gauged	
MW-38	monitor	3797.32	20.57	DRY	
MW-39	monitor	3796.20	20.54	20.30	3775.90
MW-40	monitor	3803.12	14.07	not gauged	
MW-41	monitor	3799.04	24.04	20.06	3778.98
MW-42	monitor	3804.73	23.59	not gauged	
MW-43	monitor	3802.05	24.55	21.44	3780.61
MW-44	monitor	3804.14	25.24	21.75	3782.39
MW-45	monitor	3808.68	26.62	not gauged	
MW-46	monitor	3805.54	20.24	19.41	3786.13
MW-47	monitor	3805.09	21.79	DRY	
MW-48	monitor	3806.18	19.98	DRY	
MW-49	monitor	3805.61	25.91	22.76	3782.85
MW-50	monitor	3813.35	37.15	27.04	3786.31
MW-51	monitor	3810.86	20.06	not gauged	
MW-52	monitor	3817.49	21.44	DRY	
MW-53	monitor	3809.92	15.32	DRY	
MW-54	monitor	3823.86	78.15	48.74	3775.12
MW-55	monitor	3794.40	66.32	28.85	3765.55
MW-56	monitor	3782.45	43.76	DRY	
MW-61	monitor	3816.20	57.97	37.90	3778.30
MW-65	monitor	3763.31	57.69	56.01	3707.30
MW-69	recovery	3805.11	51.27	31.00	3774.11
MW-77	monitor	3775.48	82.20	79.42	3696.06
MW-78	monitor	3785.82	86.62	86.41	3699.41
MW-79	monitor	3788.39	82.90	81.09	3707.30
MW-80	monitor	3821.64	91.80	DRY	
Sump A10	monitor	3800.99	13.42	DRY	
Sump 16A	monitor	3785.14	17.45	16.85	3768.29

TABLE 2. LOWER QUEEN DEPTH-TO-WATER, GROUNDWATER ELEVATION,
CONDENSATE THICKNESS, AND RAINFALL DATA

LOWER QUEEN WELL	Well Use	Top of Casing (TOC) Elev. (ft AMSL)	Top of 1.25-inch Piezometer Piping Elev. (ft AMSL)	Total Depth from TOC (ft)	July 15-16 & August 22, 1996				Aug-96	Sep-96
					Depth to water (ft)	Ground- water Elev. (ft)	Corrected Groundwater Elev. (ft)	Depth to product (ft)		
MW-57	monitor	3787.70		177.20	162.02	3625.68				
MW-58	monitor	3824.31		173.40	DRY					
MW-59	monitor	3819.59		211.29	193.40	3626.19	3627.23	191.98		
MW-60	monitor	3815.28		223.00	188.04	3627.24				
MW-61A	recovery	3815.97		215.67	NG					
MW-62	monitor	3819.90		224.69	192.34	3627.56	3627.57	192.32		
MW-63	monitor	3826.16		220.49	198.91	3627.25				
MW-64	monitor	3798.57		201.89	171.27	3627.30				
MW-65A	recovery	3763.26		168.56	NG					
MW-66	monitor	3828.98		235.18	202.45	3626.53				
MW-67	monitor	3765.87		165.77	138.14	3627.73				
MW-68	recovery	3797.83		203.43	NG					
MW-70	monitor	3822.57		225.07	194.70	3627.87				
MW-71	monitor	3778.05		233.49	151.69	3626.36				
MW-72	recovery	3819.32		236.55	201.95	3617.37				
MW-73	monitor	3820.09		222.5	193.91	3626.18				
MW-74	monitor	3820.82		222.5	186.52	3634.30				
MW-75	recovery	3816.12		222.5	190.40	3625.72				
MW-76	recovery	3796.01		222.5	167.04	3628.97				
MW-81	recovery	3816.99	3817.03	228.45	204.26	3612.77	3619.61	194.89		
MW-82	recovery	3825.04	3825.07	231.30	222.80	3602.27				
MW-83	recovery	3794.09	3794.12	205.80	176.36	3617.76	3618.17	175.80		
MW-84	recovery		3759.60	170.90	131.50	3628.10	3628.38	131.11		
MW-85	recovery		3824.93	239.80	200.62	3624.31	3639.95	179.20		
MW-87	monitor	3740.50		168.35	113.11	3627.39				
MW-87A	monitor	3739.53		132.90	124.91	3614.62				
MW-88	monitor	3789.70		177.65	163.59	3626.11				
MW-89	monitor	3827.68		232.53	201.41	3626.27				
MW-94	recovery		3821.48	230.10	194.15	3627.33				
IW-1	recovery	3808.55		232.50	182.41	3626.14	3628.26	179.50		
IW-2	infiltration	3835.86		299.89	207.22	3628.64				
SW-1	recovery	3808.19		255.00	NG					
SW-2	monitor	3808.79		292.00	182.24	3626.55				
SW-3	monitor	3842.29		232.70	215.52	3626.77				
Monthly Rainfall (in)					0.60				7.75	2.40

AMSL = Above Mean Sea Level

NG = Not Gauged

Figure 1
 Shallow zone Water Table Elevation Map
 July 1996
 Contour Interval = 10 feet
 Elevation Units = feet above mean sea level

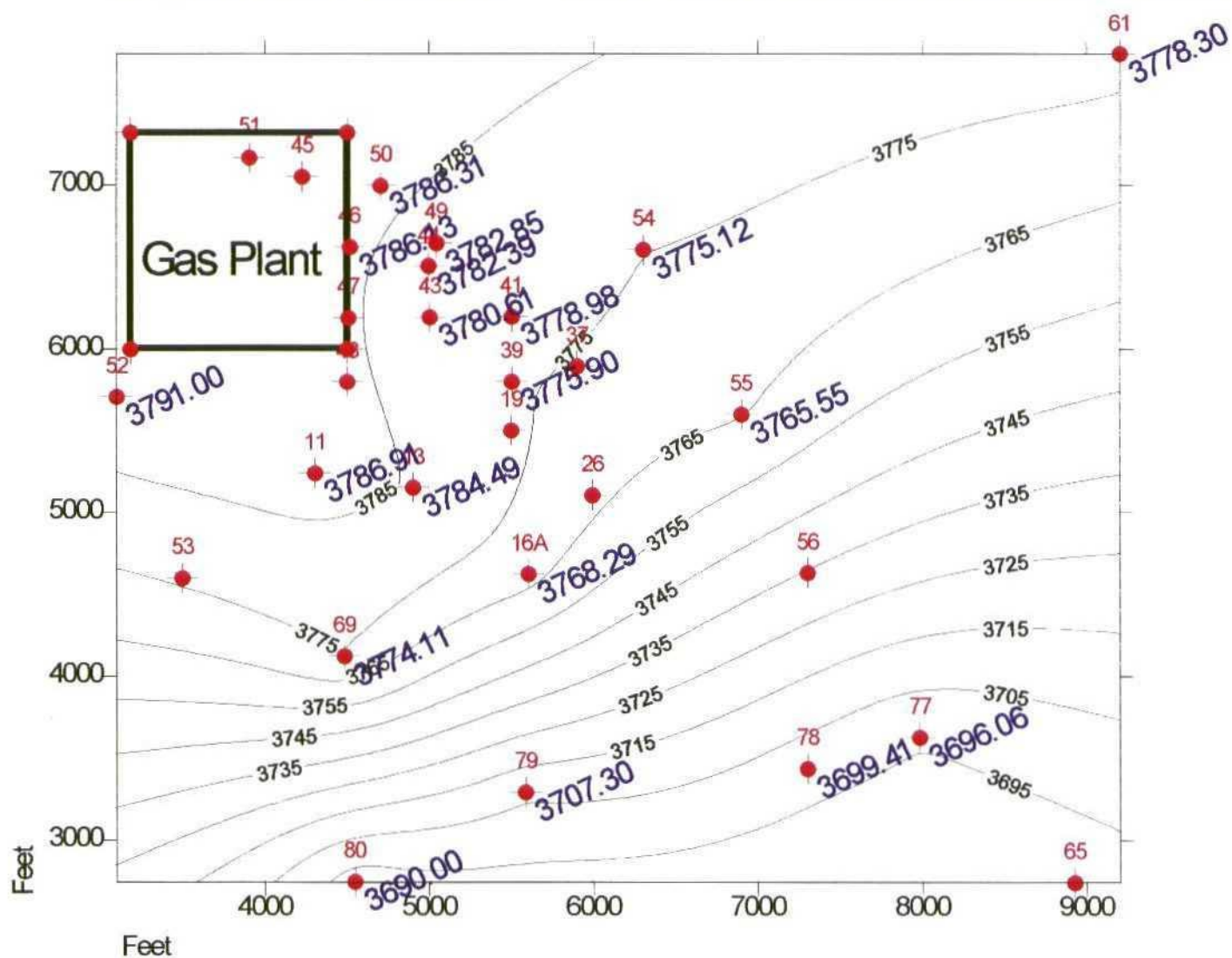


Figure 2
 Lower Queen Water Table Elevation Map
 July 1996
 Contour Interval = 0.2 feet
 Elevation Units = feet above mean sea level

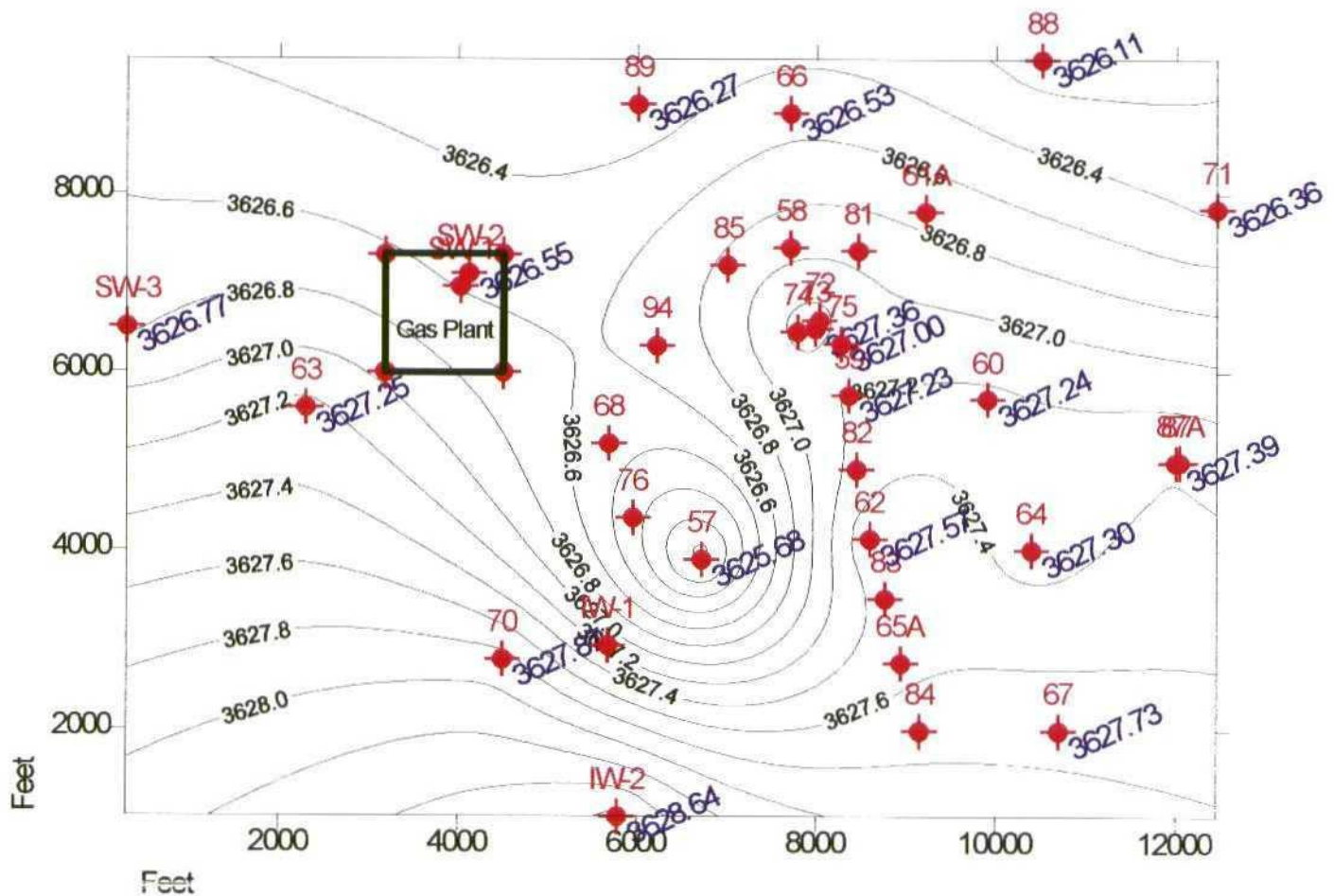


Figure 3
 Shallow zone Product Thickness Map
 July 1996
 Contour Interval = 0.1 feet

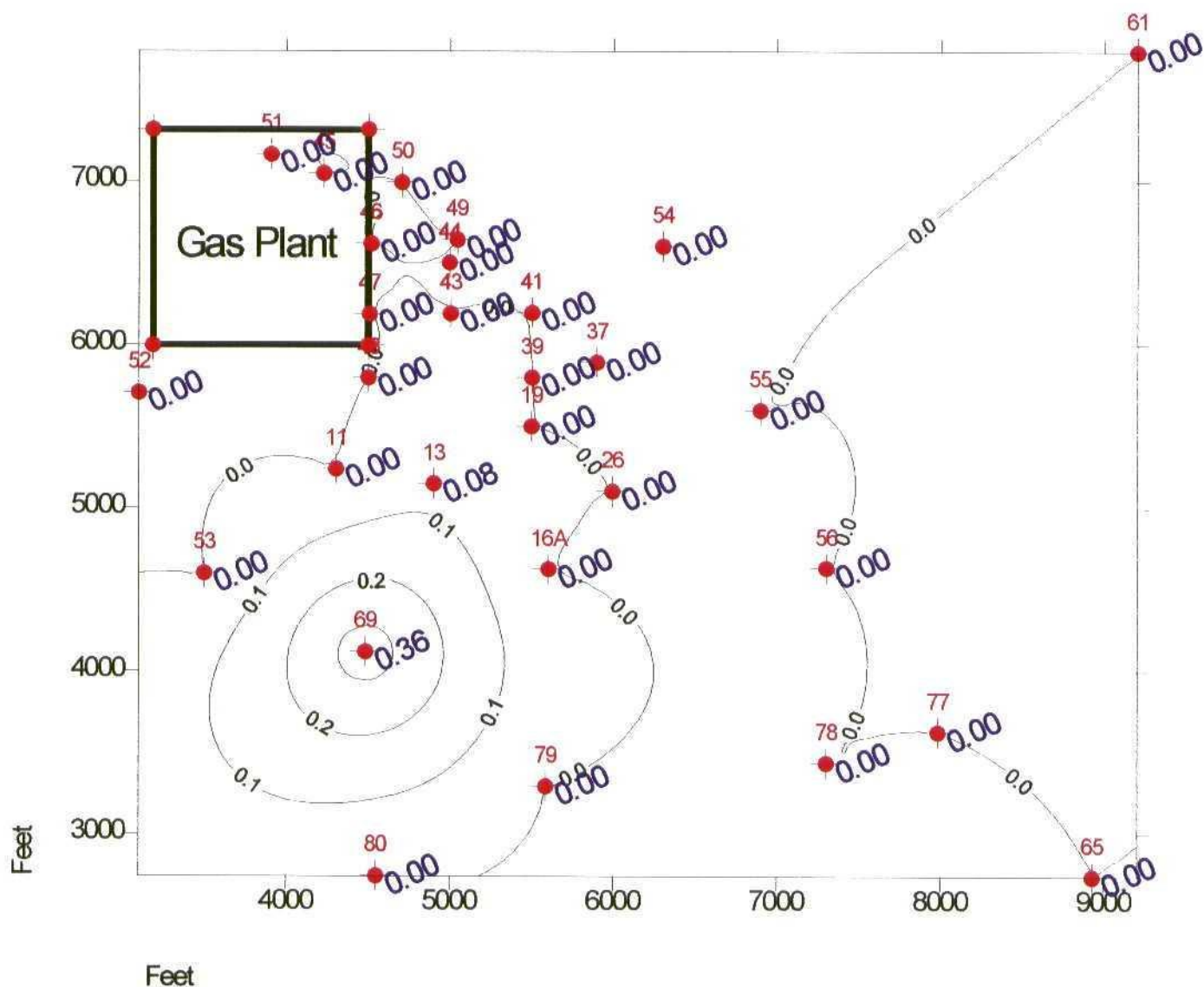


Figure 4
 Lower Queen Product Thickness Map
 July 1996
 Contour Interval = 2 feet

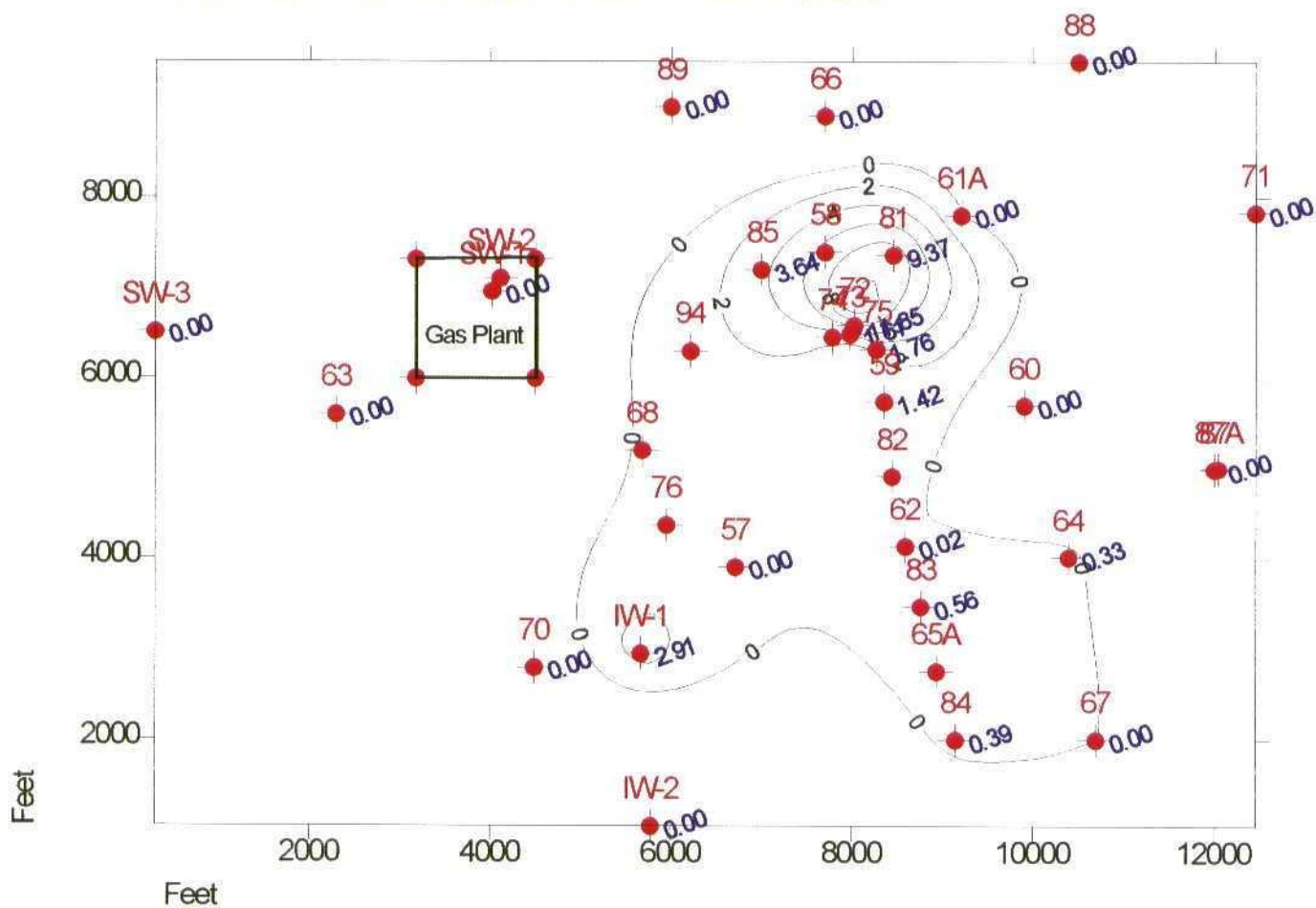


Figure 5
 Shallow zone Benzene Isoconcentration Map
 July 1996
 Contour Interval = 100 ppb

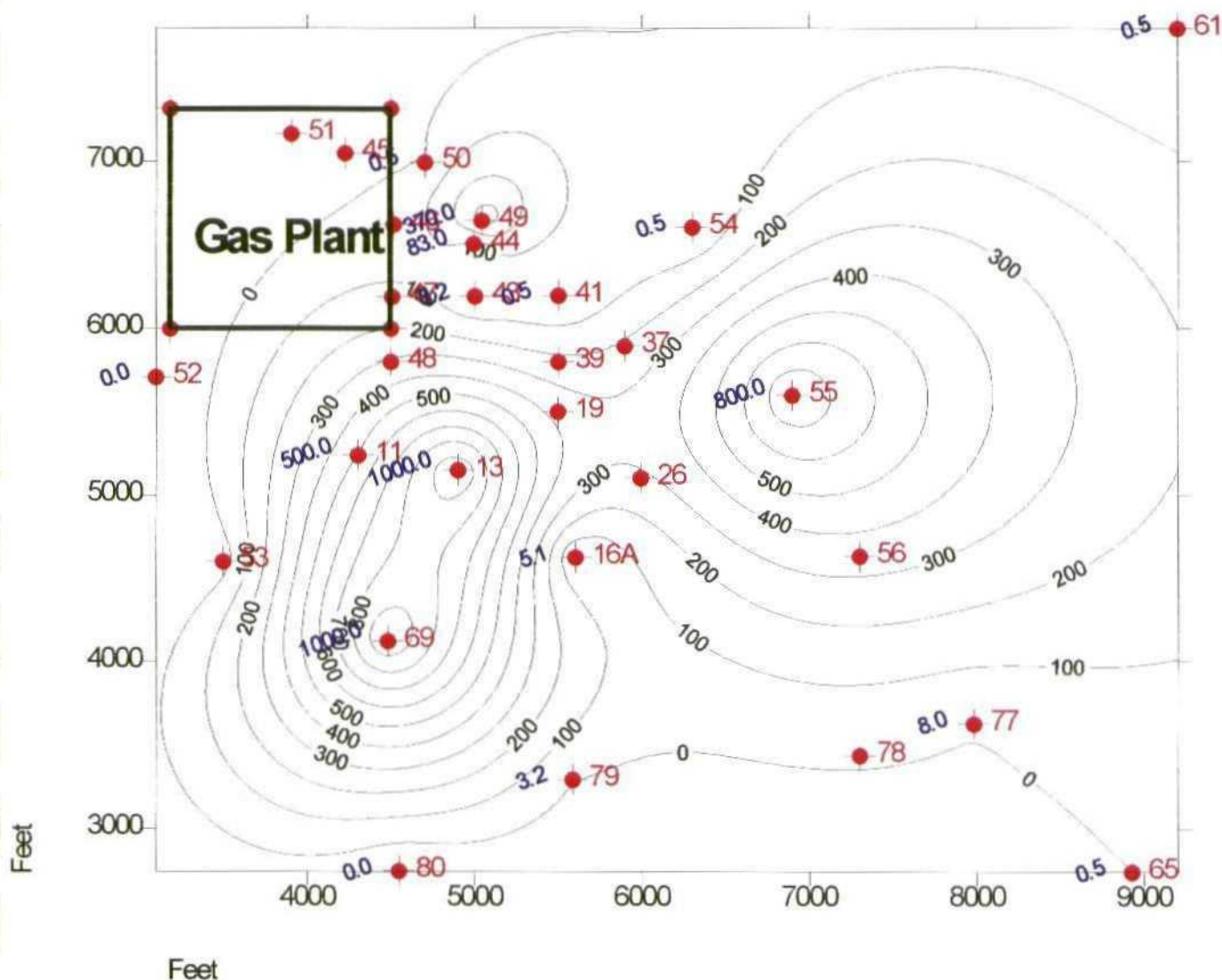


Figure 6
Shallow zone Chloride Isoconcentration Map
July 1996
Contour Interval = 100 ppm

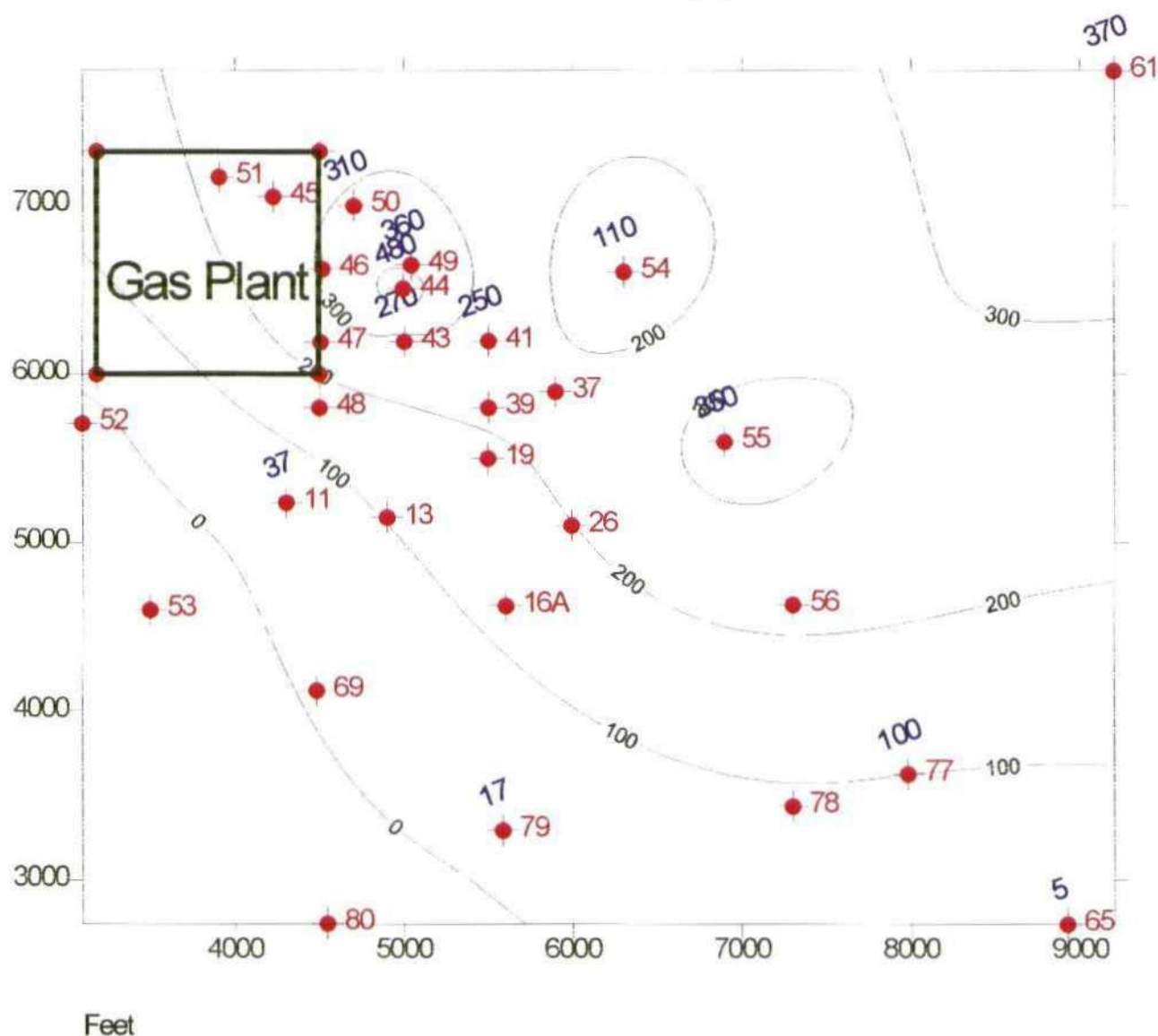
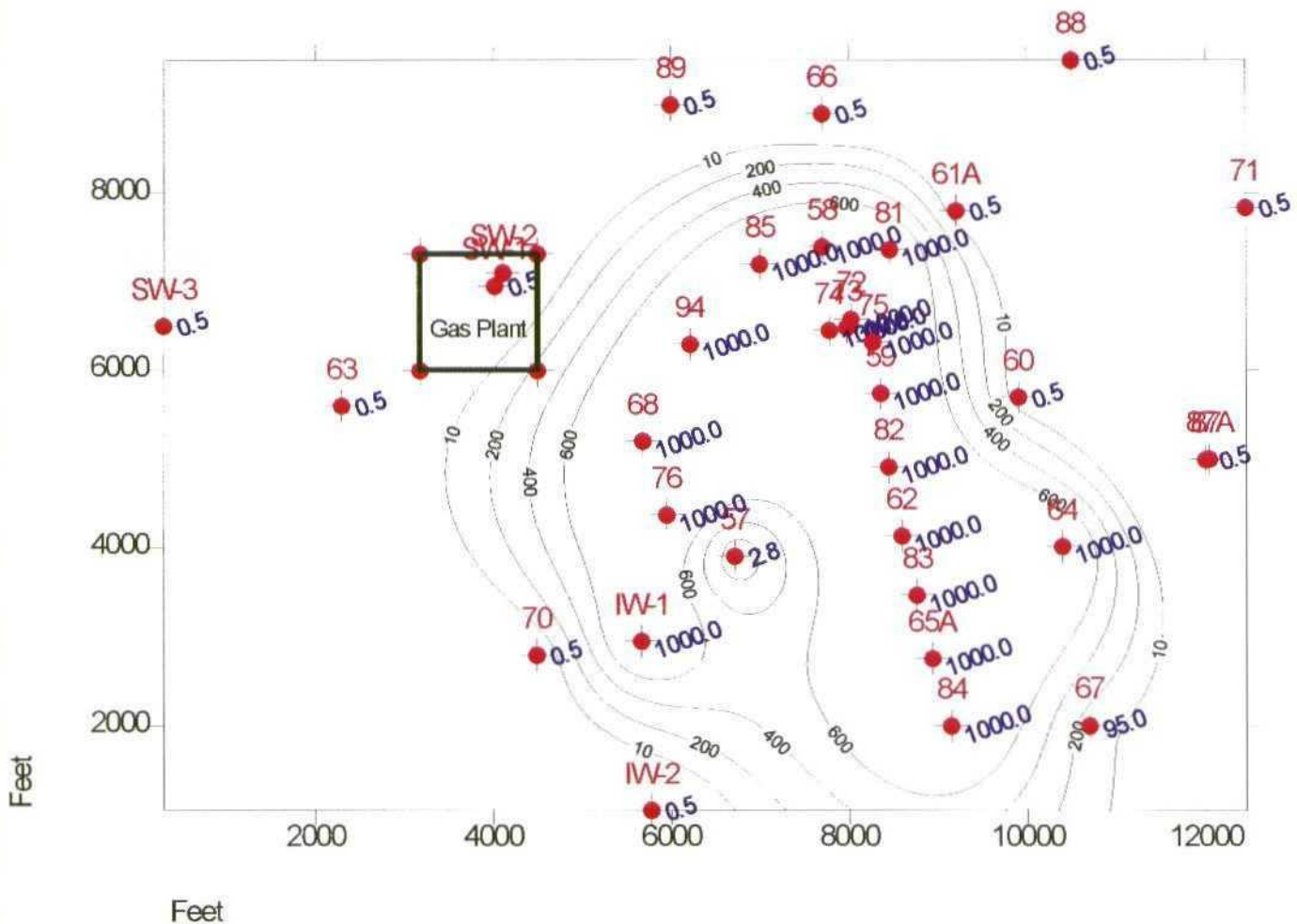
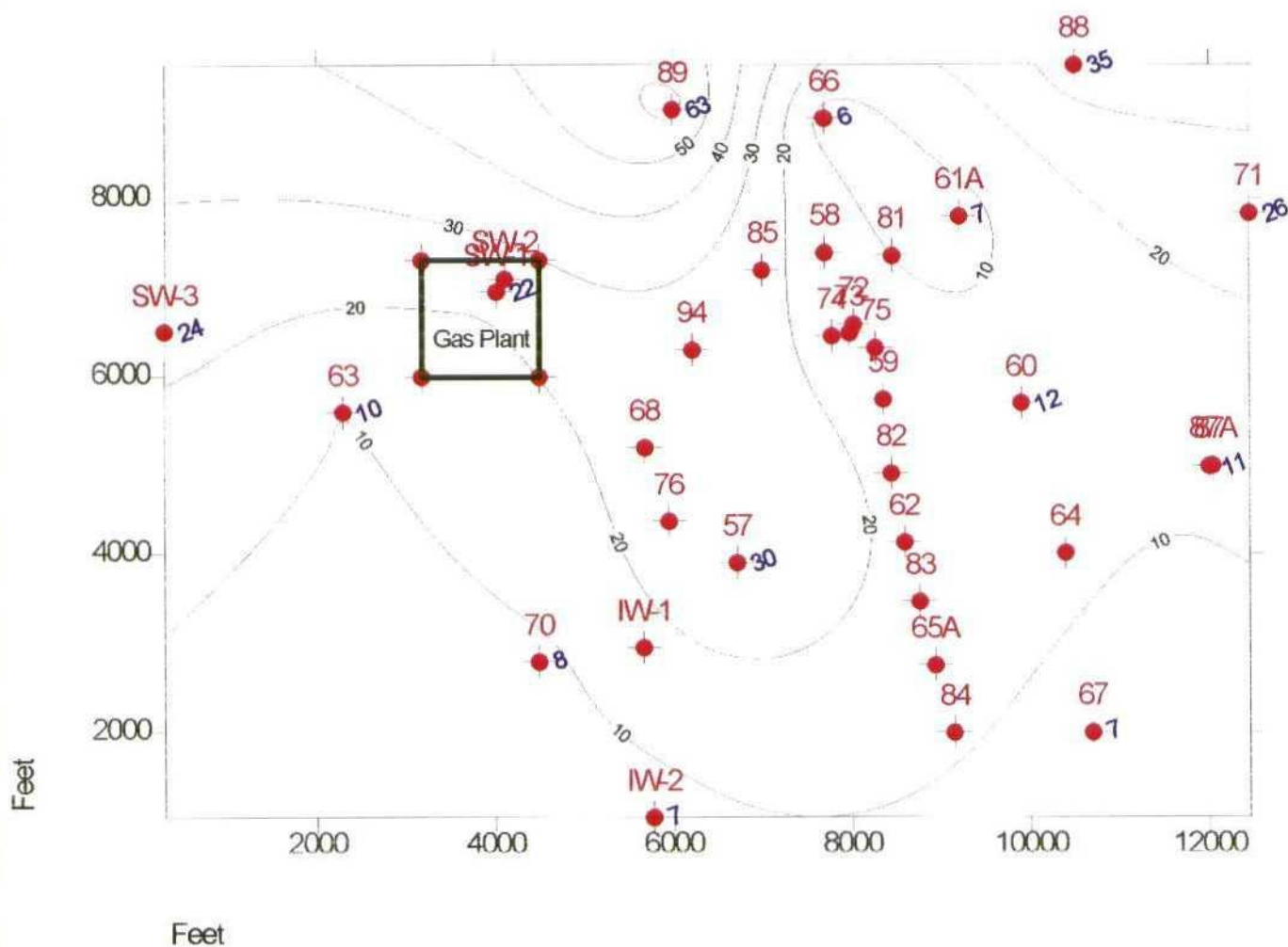


Figure 7
Lower Queen Benzene Isoconcentration Map
July 1996
Contour Interval = 100 ppb



Note: A default value of 1000 ppb is used for wells that free-phase product was observed.

Figure 8
 Lower Queen Chloride Isoconcentration Map
 July 1996
 Contour Interval = 10 ppm or mg/l



APPENDIX A

JULY 1996 GAUGING AND SAMPLING FIELD SUMMARY



FLUOR DANIEL GTI

July 24, 1996

Project No.: 053350107.63

Mr. Robert J. Menzie, Jr.
Marathon Oil Company
P.O. Box 552
Midland, TX 79702-5233

RE: Transmittal of Groundwater Monitoring and Sampling Reports, Quarter 3 Data

Dear Bob:

Enclosed for your use are summary tables of groundwater monitoring and sampling data collected in July 1996 during the 3rd quarter groundwater sampling event. If you have any questions regarding these data, or require any additional information or services, please do not hesitate to contact me at (505) 242-3113.

Sincerely,

Fluor Daniel GTI, Inc.

Susan Fields, P.E.
Operations Manager

c: Project File

dg/marathon-01/3rdqt96r.ltr

Well Gauging Data Form

Client:	Marathon	Recorded By:	Cook
Site:	IBGP	Interface Probe (IP) #:	ORS 9615115 & Solinst
Project #:	023350107	IP Corrector:	NA
Date:	7/15-16/96	Weather:	Cloudy and Hot

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	LEL READING %	PID READING (ppm)	COMMENTS
MW-03	2	14:41	16.90	DRY					0	0	7/16/96
MW-05	2	17:14	12.77	DRY					0	0	
MW-06	2	--	14.18	--					--	--	No gauge as per BM
MW-07	2	12:40	17.33	DRY					0	0	
MW-08	2	12:18	17.24	DRY					0	0	
MW-09	2	12:11	13.65	DRY					0	0	
MW-10	4	14:33	18.21	DRY					0	0	7/16/96
MW-11	4	14:45	24.85	20.05					0	0	
MW-13	2	14:53	22.07	17.15	17.07	0.08	0.06	17.09	0	20	
MW-19	4	16:34	19.11	19.04					0	0	7/16/96
MW-24	2	16:27	13.18	DRY					0	0	7/16/96
MW-29	2	14:27	14.76	DRY					0	0	
MW-32	2	14:58	15.70	DRY					0	0	
MW-38	4	16:56	20.57	DRY					0	0	
MW-39	4	17:02	20.54	20.30					0	0	
MW-41	4	16:51	24.04	20.06					0	0	
MW-43	4	16:45	24.55	21.44					0	0	
MW-44	4	16:40	25.24	21.75					0	40	

Well Gauging Data Form

Client:	Marathon	Recorded By:	Cook
Site:	IBGP	Interface Probe (IP) #:	ORS 9615115 & Solinst
Project #:	023350107	IP Corrector:	NA
Date:	7/15-16/96	Weather:	Cloudy and Hot

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	LEL READING %	PID READING (ppm)	COMMENTS
MW-45	2	15:29	26.62	--							Cannot gauge due to piping in well
MW-46	4	15:24	19.80	19.41					0	40	
MW-47	2	15:19	21.79	DRY					0	40	
MW-48	2	15:12	19.98	DRY					0	20	
MW-49	2	16:35	25.91	22.76					9	1000	
MW-50	2	16:29	37.15	27.04					0	20	
MW-52	2	14:20	21.19	DRY					0	0	
MW-53	2	13:10	15.20	DRY					0	0	
MW-54	4	17:09	78.15	48.74					0	0	
MW-55	4	14:56	66.32	28.85					0	0	7/16/96
MW-56	4	14:50	43.76	DRY					0	0	7/16/96
MW-57	4	14:07	179.30	162.02					0	0	7/16/96
MW-58	4	10:21	173.4	DRY					Over 100	Over 10000	7/16/96 - Solinst
MW-59	4	12:20		193.40	191.98	1.42	1.04	192.36	0	40	7/16/96
MW-60	4	11:07	226.08	188.04					0	40	7/16/96
MW-61	4	10:46	57.97	37.90					0	40	7/16/96
MW-61A	4	--	215.67	--							Pump in well no access
MW-62	4	12:04		192.34	192.32	0.02	0.01	192.33	0	0	7/16/96
MW-63	4	14:30	221.88	198.91					0	0	
MW-64	4	11:18	204.38	171.27	170.94	0.33			0	20	7/16/96



Well Gauging Data Form

Client: Marathon
 Site: IBGP
 Project #: 023350107
 Date: 7/15-16/96

Recorded By: Cook
 Interface Probe (IP) #: ORS 9615115 & Solinst
 IP Corrector: NA
 Weather: Cloudy and Hot

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	LEL READING %	PID READING (ppm)	COMMENTS
MW-65	4	11:45	57.69	56.01							
MW-65A	4	--	168.56	--					--	--	Pump in well, not able to gauge, plugged openings
MW-66	4	10:40	237.66	202.45					0	20	7/16/96
MW-67	4	11:30	168.54	138.14					20	0	7/16/96
MW-69	4	13:21	51.27	31.26	30.90	0.36	0.26	31.00	4	500	7/16/96
MW-70	4	12:00	228.14	194.70					0	40	
MW-71	4	10:55	235.41	151.69					0	20	7/16/96
MW-72	7.875	8:30		201.95	190.10	11.85	8.65	193.30			7/16/96
MW-73	7.875	12:52	222.5	193.91	192.30	1.61	1.18	192.73	7	840	Solinst - 7/16/96
MW-74	8	15:20	220.00	186.52					over 100	over 10000	Solinst - heavy condensate on probe; emulsion? static reading - 7/16/96
MW-75	8	12:31	220.00	190.40	188.64	1.76	1.28	189.12	over 100	over 10000	7/16/96
MW-76	8	14:20	222.30	167.04					over 100	over 10000	Solinst - unable to gauge due to condensate - 7/16/96
MW-77	8	13:45	82.20	79.42					0	20	7/16/96
MW-78	8	13:55	86.62	86.41					0	0	7/16/96
MW-79	8	12:31	82.90	81.09					0	80	Do not purge as per BM/sample only
MW-80	8	11:54	91.80	DRY					0	0	
MW-81	8	10:33		204.26	194.89	9.37	6.84	197.42	4	440	7/16/96
MW-82	8	12:12		222.80	?				59	6300	
MW-83	8	11:58		176.36	175.80	0.56	0.41	175.95	0	80	7/16/96
MW-84	8	13:30	170.9	131.50	131.11	0.39	0.28	131.22	0.00	20	Solinst - 7/16/96



Well Gauging Data Form

Client: Marathon
 Site: IBGP
 Project #: 023350107
 Date: 7/15-16/96

Recorded By: Cook
 Interface Probe (IP) #: ORS 9615115 & Solinst
 IP Correction: NA
 Weather: Cloudy and Hot

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	LEL READING %	PID READING (ppm)	COMMENTS
MW-85	8	15:50	239.8	200.62	196.98	3.64	2.66	197.96	0	20	Solinst - 7/16/96
MW-86	8	16:04	123.6	118.47	118.47				over 100	over 10000	Solinst - 7/16/96 - Emulsion, pumping
MW-87	6.5										Drill 9/96
MW-88	6.5										Drill 9/96
MW-89	6.5										Drill 9/96
MW-90	8										Drill 1/97
MW-91	8										Drill 1/97
MW-92	8										Drill 1/97
MW-93	8										Drill 1/97
SUMP-16A	24	15:04	17.45	16.85					0	0	
SUMP-A10	24	14:38	13.42	DRY					0	0	
*SW-02	10	15:35	292.00	182.24					1	120	
SW-03	8	16:00	232.7	215.52					0	20	
IW-01	11	9:40	232.5	182.41	179.50	2.91	2.12	180.29	0	20	Solinst - 7/16/96 - unsure of reading from 181.50 to 182.41
MW-94	8	16:20	230.1	194.15					over 100	over 10000	Solinst - 7/16/96
IW-02	11										Drill 7/96

*Heavy positive pressure in this well. Both doors should be opened and building monitored before entry.



LOWER QUEEN MONITORING WELL GAUGING, PURGING, AND SAMPLING FORM

Project Name/Location: MOC/IBRP Carlsbad, New Mexico

Date: 7/17-19/96

Project Number: 023350107

Technician: Cook

Well Number	Well Dia. (in)	Well Depth (ft)	DTW from TOC (ft)	Purge volume (gal)	Purge Method (pump/bail)	Actual volume purged (gal)	Depth of pump (ft)	Pumping rate (gpm)	Final pH	Final Spec. Cond. (microhms/cm)	Final Temp. (F)	Final DO (mg/l)	Date, time sample/comments
MW-57	4	179.30	162.02	34	Pump	34	170	5	6.65	327	71.3		7/18/96 1835
MW-58	4	218.03	DRY	--	--	--							Not sampled insuf. H2O
MW-59	4	211.29	193.40	--	--	--							Not sampled PSH
MW-60	4	226.08	188.04	72	Pump	72	220	3	7.18	649	72.2		7/18/96 1630
MW-62	4	224.69	192.34	--	--	--							Not sampled PSH
MW-63	4	221.88	198.91	46	Pump		218	3	7.34	440	74.2		7/18/96 0930
MW-64	4	204.38	171.27	--	--	--							Not sampled PSH
MW-65A	4	168.56	--	--	--	--							Not gauged, pump in well
MW-66	4	237.66	202.45	70	Pump	70	235	3	7.10	720	78.8		7/18/96 1355
MW-67	4	168.54	138.14	60	Pump	60	160	5	7.17	490	71.9		7/18/96 1750
MW-70	4	228.14	194.70	68	Pump	68	220	1.5	7.12	414	77.1		7/17/96 1325
MW-71	4	235.41	151.69	170	Pump	170	230	2	7.24	929	77.2		7/18/96 1235

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic).
- 2 - Purge amounts are 3 well casing volumes
- 3 - N/S: Not sampled due to insufficient recharge, NA: Not Applicable



FLUOR DANIEL GTI

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LOWER QUEEN MONITORING WELL GAUGING, PURGING, AND SAMPLING FORM

Project Name/Location: MOC/IBRP Carlsbad, New Mexico Date: 7/17-19/96
 Project Number: 023350107 Technician: Cook

Well Number	Well Dia. (in)	Well Depth (ft)	DTW from TOC (ft)	Purge volume (gal)	Purge Method (pump/bail)	Actual volume purged (gal)	Depth of pump (ft)	Pumping rate (gpm)	Final pH	Final Spec. Cond. (mohms/cm)	Final Temp. (F)	Final DO (mg/l)	Date, time sample/comments
MW-72	7.875		201.95	--	--								Gauge only as per workscope, not sampled PSH
MW-73	7.875	222.50	193.91	--	--								Not sampled PSH
MW-74	7.875	220	186.52	--	--								Not sampled, heavy condensate
MW-75	8	220	190.40	--	--								Not sampled PSH, gauge only as per workscope
MW-76	7.875	222.50	167.04		Not purged	sample	only	per BM					Not sampled due to PSH in bailer
MW-87	6.5	--											Not drilled
MW-88	6.5	--											Not drilled
MW-89	6.5	--											Not drilled
SW-02	10	292.00	182.24	--	--								Gauge only as per workscope
SW-03	8	232.70	215.52	135	Pump	135	230	2	7.28	500	75.7		7/17/96 1745
MW-94	8	230.1	194.15										Cannot sample, pump in well

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic).
- 2 - Purge amounts are 3 well casing volumes
- 3 - N/S: Not sampled due to insufficient recharge, NA: Not Applicable

dg/marathon-01/3rdqtr/qc.frm



FLUOR DANIEL GTI

SHALLOW ZONE MONITORING WELL GAUGING, PURGING, AND SAMPLING FORM

Project Name/Location: MOC/IBRP Carlsbad, New Mexico Date: 7/17-19/96
 Project Number: 023350107 Technician: Cook

Well Number	Well Dia. (in)	Well Depth (ft)	DTW from TOC (ft)	Purge volume (gal)	Purge Method (pump/bail)	Actual volume purged (gal)	Depth of pump (ft)	Pumping rate (gpm)	Final pH	Final Spec. Cond. (mohms/cm)	Final Temp. (F)	Final DO (mg/l)	Date/time sampled/comments
MW-11	4	24.85	20.05	9	Bail	9	--	--	6.84	980	80.2		7/19/96 1545
MW-13	2	22.07	17.15	--	--	--							Not sampled due to PSH
MW-19	4	19.11	19.04	--	--	--							Not sampled insuf. H2O
MW-38	4	20.57	DRY	--	--	--							Not sampled insuf. H2O
MW-39	4	20.54	20.30	--	--	--							Not sampled insuf. H2O
MW-41	4	24.04	20.06	8	Bail	5	--	--	7.04	1960	80.4		7/19/96 1555
MW-43	4	24.55	21.44	6	Bail	2	--	--	6.97	1920	83.1		7/19/96 1605
MW-44	4	25.24	21.75	7	Bail	7	--	--	6.81	2400	80.2		7/19/96 1615
MW-46	4	19.80	19.41	--	--	--							Not sampled insuf. H2O
MW-47	2	21.79	DRY	--	--	--							Not sampled insuf. H2O
MW-48	2	19.98	DRY	--	--	--							Not sampled insuf. H2O
MW-49	2	25.91	22.76	1.5	Bail	1.5			6.72	2280	79.5		7/19/96 1625
MW-50	2	37.15	27.04	5	Bail	.5	--	--	6.79	3040	80.0		7/19/96 1635

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic).
- 2 - Purge amounts are 3 well casing volumes
- 3 - N/S: Not sampled due to insufficient recharge, NA: Not Applicable



Project Name/Location: MOC/IBRP Carlsbad, New Mexico
 Date: 7/17-19/96
 Project Number: 023350107
 Technician: Cook

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic).
2 - Purge amounts are 3 well casing volumes
3 - N/S: Not sampled due to insufficient recharge. NA: Not Applicable

dg/marathon-01/3rdqtr1q.frm



FLUOR DANIEL GTI



FLUOR DANIEL GTI

September 3, 1996

Project No.: 023350107

Mr. Robert J. Menzie, Jr.
Marathon Oil Company
P.O. Box 552
Midland, TX 79702-0552

RE: Quarter 3 Sampling Results for New Wells at the Indian Basin Remediation Project

Dear Bob:

In accordance with your request, Fluor Daniel GTI sampled recently installed wells MW-87, MW-87A, MW-88, MW-89 and IW-2 on August 22, 1996. Attached are sampling and well gauging forms containing the field information from this sampling event.

Please note that MW-87A contained water at the time of gauging. However, the well did not recharge after purging, therefore no sample was collected. MW-87A was dry upon well installation so it is not surprising that it did not recharge. It should be monitored periodically, however, to determine whether it is simply located in a very low permeability zone.

Please don't hesitate to contact me if you have any comments or questions.

Sincerely,

Fluor Daniel GTI, Inc.

Susan Fields, P.E.
Senior Project Manager

c: file - MOC/Indian Basin/July 1996 GW Monitoring

LOWER QUEEN MONITORING WELL GAUGING, PURGING, AND SAMPLING FORM

Project Name/Location: MOC/IBRP Carlsbad, New Mexico Date: 8/22/96
 Project Number: Technician: Kevin Cook

Well Number	Well Dia. (in)	Well Depth (ft)	DTW from TOC (ft)	Purge volume (gal)	Purge Method (pump/bail)	Actual volume purged (gal)	Depth of pump (ft)	Pumping rate (gpm)	Final pH	Final Spec. Cond. (mohms/cm)	Final Temp. (F)	Final DO (mg/l)	Date, time sample/comments
MW-57	4	179.30											
MW-58	4	218.03											
MW-59	4	211.29											
MW-60	4	226.08											
MW-62	4	224.69											
MW-63	4	221.88											
MW-64	4	204.38											
MW-65A	4	168.56											
MW-66	4	237.66											
MW-67	4	168.54											
MW-70	4	228.14											
MW-71	4	235.41											

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic)
- 2 - Purge amounts are 3 well casing volumes
- 3 - N/S: Not sampled due to insufficient recharge, NA: Not Applicable



Project Name/Location: MOC/IBRP Carlsbad, New Mexico
 Project Number: _____
 Date: 8/22/96
 Technician: Kevin Cook

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 mL VOA's) and Chloride (1 x 250 mL plastic).
2 - Purge amounts are 3 well casing volumes
3 - N/S: Not sampled due to insufficient recharge. NA: Not Applicable

SHALLOW ZONE MONITORING WELL GAUGING, PURGING, AND SAMPLING FORM

Project Name/Location: MOC/IBRP Carlsbad, New Mexico

Date: 8/22/96

Technician: Kevin Cook

Well Number	Well Dia. (in)	Well Depth (ft)	DTW from TOC (ft)	Purge volume (gal)	Purge Method (pump/bail)	Actual volume purged (gal)	Depth of pump (ft)	Pumping rate (gpm)	Final pH	Final Spec. Cond. (microhms/cm)	Final Temp. (F)	Final DO (mg/l)	Date time sampled/comments
MW-11	4	24.85											
MW-13	2	22.07											
MW-19	4	19.11											
MW-38	4	20.57											
MW-39	4	20.54											
MW-41	4	24.04											
MW-43	4	24.55											
MW-44	4	25.24											
MW-46	4	19.80											
MW-47	2	21.79											
MW-48	2	19.98											
MW-49	2	25.91											
MW-50	2	37.15											

Comments:

1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic).

2 - Purge amounts are 3 well casing volumes.

3 - N/S: Not sampled due to insufficient recharge. NA: Not Applicable.

dg/marathon-01/4thqtr.frm

3 of 4



FLUOR DANIEL GTI

Project Name/Location: MOC/IBRP Carlsbad, New Mexico
 Project Number: _____
 Date: 8/22/96
 Technician: Kevin Cook

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 mL VOA's) and Chloride (1 x 250 mL plastic).
2 - Purge amounts are 3 well casing volumes.
3 - N/S: Not sampled due to insufficient recharge, NA: Not Applicable

Well Gauging Data Form

Client: MOC
 Site: IBGP
 Project #: 023350107.63
 Date: 08/22/96

Recorded By: Kevin Cook
 Interface Probe (IP) #: ORS 300' #9615115
 IP Correction: NA
 Weather: Sunny

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ. DTW (feet)	LEL READING %	PID READING (ppm)	COMMENTS
MW-03	2		16.90								
MW-05	2		12.77								
MW-06	2		14.18								
MW-07	2		17.33								
MW-08	2		17.24								
MW-09	2		13.65								
MW-10	4		18.21								
MW-11	4		24.85								
MW-13	2		22.07								
MW-19	4		19.11								
MW-24	2		13.18								
MW-29	2		14.76								
MW-32	2		15.70								
MW-38	4		20.57								
MW-39	4		20.54								
MW-41	4		24.04								
MW-43	4		24.55								
MW-44	4		25.24								



Well Gauging Data Form

Client: MOC
 Site: IBGP
 Project #: 023350107.63
 Date: 08/22/96

Recorded By: Kevin Cook
 Interface Probe (IP) #: ORS 300' #9615115
 IP Correction: NA
 Weather: Sunny

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	LEL READING %	PID READING (ppm)	COMMENTS
MW-45	2		26.62								
MW-46	4		19.80								
MW-47	2		21.79								
MW-48	2		19.98								
MW-49	2		25.91								
MW-50	2		37.15								
MW-52	2		21.19								
MW-53	2		15.20								
MW-54	4		78.15								
MW-55	4		66.32								
MW-56	4		43.76								
MW-57	4		179.30								
MW-58			173.4								
MW-59											
MW-60	4		226.08								
MW-61	4		57.97								
MW-61A	4		215.67								
MW-62											
MW-63	4		221.88								
MW-64	4		204.38								



Well Gauging Data Form

Client: MOC
 Site: IBGP
 Project #: 023350107.63
 Date: 08/22/96

Recorded By: Kevin Cook
 Interface Probe (IP) #: ORS 300' #9615115
 IP Correction: NA
 Weather: Sunny

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	LEL READING %	PID READING (ppm)	COMMENTS
MW-65	4		57.69								
MW-65A			168.56								
MW-66	4		237.66								
MW-67	4		168.54								
MW-69	4		51.27								
MW-70	4		228.14								
MW-71	4		235.41								
MW-72											
MW-73	7.875		222.5								
MW-74	8		220.00								
MW-75	8		220.00								
MW-76	8		220.00								
MW-77	8		82.20								
MW-78	8		86.62								
MW-79	8		82.90								
MW-80	8		91.80								
MW-81											
MW-82											
MW-83											
MW-84											



Client:	MOC	Recorded By:	Kevin Cook
Site:	IBGP	Interface Probe (IP) #:	ORS 300' #9615115
Project #:	023350107.63	IP Correction:	NA
Date:	08/22/96	Weather:	Sunny

[illegible]

***Heavy positive pressure in this well. Both doors should be opened and building monitored before entry.**

APPENDIX B
JULY 1996 LABORATORY RESULTS

American Environmental Network, Inc.

AEN I.D. 607341

August 7, 1996

Marathon O/C IBGP
PO Box 552
Midland TX 79702

Project Name IB REMEDIATION
Project Number 53350107

Attention: Bob Menzie

On 7/22/96 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), 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 method 325.3 (Chloride) analyses were performed by American Environmental Network (FL) Inc., 11 East Olive Road, Pensacola, FL.

All other analyses were performed by American Environmental Network (NM) Inc., Albuquerque, NM.

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



Kimberly D. McNeill
Project Manager

MR: mt

Enclosure



H. Mitchell Rubenstein, Ph. D.
Laboratory Manager

American Environmental Network, Inc.

CLIENT : MARATHON OIL COMPANY AEN I.D. : 607341
PROJECT # : 53350107 DATE RECEIVED : 7/22/96
PROJECT NAME : IB REMEDIATION REPORT DATE : 8/7/96

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	DIH2O	AQUEOUS	7/17/96
02	INTRB	AQUEOUS	7/17/96
03	MW-70RB	AQUEOUS	7/17/96
04	MW-70	AQUEOUS	7/17/96
05	SW-03RB	AQUEOUS	7/17/96
06	SW-03	AQUEOUS	7/17/96
07	MW-63RB	AQUEOUS	7/18/96
08	MW-63	AQUEOUS	7/18/96
09	MW-71-RB	AQUEOUS	7/18/96
10	MW-71	AQUEOUS	7/18/96
11	MW-66RB	AQUEOUS	7/18/96
12	MW-66	AQUEOUS	7/18/96
13	MW-60RB	AQUEOUS	7/18/96
14	MW-60	AQUEOUS	7/18/96
15	MW-67RB	AQUEOUS	7/18/96
16	MW-67	AQUEOUS	7/18/96
17	MW-57RB	AQUEOUS	7/18/96
18	MW-57	AQUEOUS	7/18/96
19	MW-55RB	AQUEOUS	7/18/96
20	MW-55	AQUEOUS	7/18/96
21	MW-54RB	AQUEOUS	7/19/96
22	MW-54	AQUEOUS	7/19/96
23	MW-61RB	AQUEOUS	7/19/96
24	MW-61	AQUEOUS	7/19/96
25	MW-77	AQUEOUS	7/19/96
26	MW-65	AQUEOUS	7/19/96
27	MW-79	AQUEOUS	7/19/96
28	Sump-16A	AQUEOUS	7/19/96

American Environmental Network, Inc.

CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D. : 607341
DATE RECEIVED : 7/22/96
REPORT DATE : 8/7/96

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
29	MW-11	AQUEOUS	7/19/96
30	MW-41	AQUEOUS	7/19/96
31	MW-43	AQUEOUS	7/19/96
32	MW-44	AQUEOUS	7/19/96
33	MW-49	AQUEOUS	7/19/96
34	MW-50	AQUEOUS	7/19/96
35	TRIP BLANK	AQUEOUS	6/28/96
36	SW-1	AQUEOUS	7/19/96
37	LYMAN	AQUEOUS	7/19/96
38	ARROYO	AQUEOUS	7/19/96
39	BIEBBLE	AQUEOUS	7/19/96
40	E. STRIPPER INLET	AQUEOUS	7/19/96
41	E. STRIPPER OUTLET	AQUEOUS	7/19/96
42	W. STRIPPER INLET	AQUEOUS	7/19/96
43	W. STRIPPER OUTLET	AQUEOUS	7/19/96
44	MW-61A	AQUEOUS	7/19/96

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 607474
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 607341
Project Name: IB REMEDIATION
Project Location: N/S
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 607341-04			Lab ID: 001		
CHLORIDE (325.3)	MG/L	8	1	CIW040	
Comments:					
Client ID: 607341-06			Lab ID: 002		
CHLORIDE (325.3)	MG/L	24	1	CIW040	
Comments:					
Client ID: 607341-08			Lab ID: 003		
CHLORIDE (325.3)	MG/L	10	1	CIW040	
Comments:					
Client ID: 607341-10			Lab ID: 004		
CHLORIDE (325.3)	MG/L	26	1	CIW040	
Comments:					
Client ID: 607341-12			Lab ID: 005		
CHLORIDE (325.3)	MG/L	6	1	CIW040	
Comments:					
Client ID: 607341-14			Lab ID: 006		
CHLORIDE (325.3)	MG/L	12	1	CIW040	
Comments:					
Client ID: 607341-16			Lab ID: 007		
CHLORIDE (325.3)	MG/L	7	1	CIW040	
Comments:					
Client ID: 607341-18			Lab ID: 008		
CHLORIDE (325.3)	MG/L	30	1	CIW040	
Comments:					

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 607474
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 607341
Project Name: IB REMEDIATION
Project Location: N/S
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 607341-20			Lab ID: 009		
CHLORIDE (325.3)	MG/L	350	10	CIW040	+
Comments:					
Client ID: 607341-22			Lab ID: 010		
CHLORIDE (325.3)	MG/L	110	1	CIW040	
Comments:					
Client ID: 607341-24			Lab ID: 011		
CHLORIDE (325.3)	MG/L	370	10	CIW040	+
Comments:					
Client ID: 607341-25			Lab ID: 012		
CHLORIDE (325.3)	MG/L	100	10	CIW040	+
Comments:					
Client ID: 607341-26			Lab ID: 013		
CHLORIDE (325.3)	MG/L	5	1	CIW040	
Comments:					
Client ID: 607341-27			Lab ID: 014		
CHLORIDE (325.3)	MG/L	17	1	CIW040	
Comments:					
Client ID: 607341-28			Lab ID: 015		
CHLORIDE (325.3)	MG/L	14	1	CIW040	
Comments:					
Client ID: 607341-29			Lab ID: 016		
CHLORIDE (325.3)	MG/L	37	1	CIW040	
Comments:					

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 607474
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 607341
Project Name: IB REMEDIATION
Project Location: N/S
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 607341-30			Lab ID: 017		
CHLORIDE (325.3)	MG/L	250	10	CIW041	+
Comments:					
Client ID: 607341-31			Lab ID: 018		
CHLORIDE (325.3)	MG/L	270	10	CIW041	+
Comments:					
Client ID: 607341-32			Lab ID: 019		
CHLORIDE (325.3)	MG/L	480	10	CIW041	+
Comments:					
Client ID: 607341-33			Lab ID: 020		
CHLORIDE (325.3)	MG/L	360	10	CIW041	+
Comments:					
Client ID: 607341-34			Lab ID: 021		
CHLORIDE (325.3)	MG/L	310	10	CIW041	+
Comments:					
Client ID: 607341-36			Lab ID: 022		
CHLORIDE (325.3)	MG/L	22	1	CIW041	
Comments:					
Client ID: 607341-37			Lab ID: 023		
CHLORIDE (325.3)	MG/L	9	1	CIW041	
Comments:					
Client ID: 607341-38			Lab ID: 024		
CHLORIDE (325.3)	MG/L	10	1	CIW041	
Comments:					

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 607474
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 607341
Project Name: IB REMEDIATION
Project Location: N/S
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 607341-39			Lab ID: 025		
CHLORIDE (325.3)	MG/L	11	1	CIW041	
Comments:					
Client ID: 607341-44			Lab ID: 026		
CHLORIDE (325.3)	MG/L	7	1	CIW041	
Comments:					

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 607474
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 607341
Project Name: IB REMEDIATION
Project Location: N/S
Test: Group of Single Wetchem

Client ID:	Lab Matrix: ID:	Date/Time Sampled:	Date Received:
607341-04	001 WATER	17-JUL-96 1325	23-JUL-96
607341-06	002 WATER	17-JUL-96 1745	23-JUL-96
607341-08	003 WATER	18-JUL-96 0930	23-JUL-96
607341-10	004 WATER	18-JUL-96 1235	23-JUL-96
607341-12	005 WATER	18-JUL-96 1354	23-JUL-96
607341-14	006 WATER	18-JUL-96 1630	23-JUL-96
607341-16	007 WATER	18-JUL-96 1730	23-JUL-96
607341-18	008 WATER	18-JUL-96 1835	23-JUL-96
607341-20	009 WATER	18-JUL-96 1930	23-JUL-96
607341-22	010 WATER	19-JUL-96 0920	23-JUL-96
607341-24	011 WATER	19-JUL-96 1120	23-JUL-96
607341-25	012 WATER	19-JUL-96 1450	23-JUL-96
607341-26	013 WATER	19-JUL-96 1500	23-JUL-96
607341-27	014 WATER	19-JUL-96 1520	23-JUL-96
607341-28	015 WATER	19-JUL-96 1535	23-JUL-96
607341-29	016 WATER	19-JUL-96 1545	23-JUL-96
607341-30	017 WATER	19-JUL-96 1555	23-JUL-96
607341-31	018 WATER	19-JUL-96 1605	23-JUL-96
607341-32	019 WATER	19-JUL-96 1615	23-JUL-96
607341-33	020 WATER	19-JUL-96 1625	23-JUL-96
607341-34	021 WATER	19-JUL-96 1635	23-JUL-96
607341-36	022 WATER	19-JUL-96 1000	23-JUL-96
607341-37	023 WATER	19-JUL-96 1208	23-JUL-96
607341-38	024 WATER	19-JUL-96 1230	23-JUL-96
607341-39	025 WATER	19-JUL-96 1245	23-JUL-96
607341-44	026 WATER	19-JUL-96 0800	23-JUL-96

American Environmental Network, Inc.

"Method Report Summary"

Accession Number: 607474
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 607341
Project Name: IB REMEDIATION
Project Location: N/S
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
607341-04	CHLORIDE (325.3)	MG/L	8
607341-06	CHLORIDE (325.3)	MG/L	24
607341-08	CHLORIDE (325.3)	MG/L	10
607341-10	CHLORIDE (325.3)	MG/L	26
607341-12	CHLORIDE (325.3)	MG/L	6
607341-14	CHLORIDE (325.3)	MG/L	12
607341-16	CHLORIDE (325.3)	MG/L	7
607341-18	CHLORIDE (325.3)	MG/L	30
607341-20	CHLORIDE (325.3)	MG/L	350
607341-22	CHLORIDE (325.3)	MG/L	110
607341-24	CHLORIDE (325.3)	MG/L	370
607341-25	CHLORIDE (325.3)	MG/L	100
607341-26	CHLORIDE (325.3)	MG/L	5
607341-27	CHLORIDE (325.3)	MG/L	17
607341-28	CHLORIDE (325.3)	MG/L	14
607341-29	CHLORIDE (325.3)	MG/L	37
607341-30	CHLORIDE (325.3)	MG/L	250
607341-31	CHLORIDE (325.3)	MG/L	270
607341-32	CHLORIDE (325.3)	MG/L	480

American Environmental Network, Inc.

"Method Report Summary"

Accession Number: 607474
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 607341
Project Name: IB REMEDIATION
Project Location: N/S
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
607341-33	CHLORIDE (325.3)	MG/L	360
607341-34	CHLORIDE (325.3)	MG/L	310
607341-36	CHLORIDE (325.3)	MG/L	22
607341-37	CHLORIDE (325.3)	MG/L	9
607341-38	CHLORIDE (325.3)	MG/L	10
607341-39	CHLORIDE (325.3)	MG/L	11
607341-44	CHLORIDE (325.3)	MG/L	7

American Environmental Network, Inc.

"WetChem Quality Control Report"

Parameter:	CHLORIDE	CHLORIDE
Batch Id:	CIW040	CIW041
Blank Result:	<1	<1
Anal. Method:	325.3	325.3
Prep. Method:	N/A	N/A
Analysis Date:	31-JUL-96	02-AUG-96
Prep. Date:	31-JUL-96	02-AUG-96

Sample Duplication

Sample Dup:	607472-5	607494-1
Rept Limit:	<1	<1
Sample Result:	3.75	3.04
Dup Result:	3.80	2.94
Sample RPD:	0.05G	0.1G
Max RPD:	1	1
Dry Weight%	N/A	N/A

Matrix Spike

Sample Spiked:	607472-3	607494-2
Rept Limit:	<1	<1
Sample Result:	5.68	6.93
Spiked Result:	60.4	60.7
Spike Added:	55.0	55.0
% Recovery:	99	98
% Rec Limits:	89-110	89-110
Dry Weight%	N/A	N/A

ICV

ICV Result:	92	95
True Result:	100	100
% Recovery:	92	95
% Rec Limits:	90-110	90-110

LCS

LCS Result:		
True Result:		
% Recovery:		
% Rec Limits:		

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

N/A = NOT APPLICABLE.
N/S = NOT SUBMITTED.
N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW AEN REPORTING LIMIT;
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.
N/D = NOT DETECTED.
DISS. OR D = DISSOLVED
T & D = TOTAL AND DISSOLVED
R = REACTIVE
T = TOTAL
G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT
OR BELOW AEN 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
TO ANALYSIS)
@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX. (DILUTION PRIOR TO
DIGESTION)
P = ANALYTICAL (POST DIGESTION) SPIKE.
I = DUPLICATE INJECTION.
A = AUTOMATED
F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
N/C+ = NOT CALCULABLE
N/C* = NOT CALCULABLE; SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND THE
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN 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 AEN REPORTING LIMIT
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".
SAMPLE IS NON-HOMOGENEOUS.
(*) = DETECTION 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 revision
EPA 600/4-79-020, Revised March 1983.
STANDARD METHODS, For the Examination of Water and Wastewater, 18TH ED., 1992
NIOSH Manual of Analytical Methods, 4th Edition.
ANNUAL BOOK OF ASTM STANDARDS, VOLUME 11.01, 1991.
METHODS FOR THE DETERMINATION OF INORGANIC SUBSTANCES IN ENVIRONMENTAL SAMPLES,
EPA600/R-93/100, AUGUST 1993

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. IF FLASHPOINT IS LESS THAN 25
DEGREES CELSIUS, THE DETECTION LIMIT BECOMES THE INITIAL STARTING
TEMPERATURE.

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

DPH = DOLLY P. HWANG	SG = SCOTT GRESHAM	RB = REBECCA BROWN
JL = JAN LECLEAR	NSB = NANCY S. BUTLER	MM = MIKE MCKENZIE
CF = CHRISTINE FOSTER	ED = ESTHER DANTIN	AB = ANDY BROTHERTON
PLD = PAULA L. DOUGHTY	RH = RICKY HAGENDORFER	BH = BARRY HICKS

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	DIH2O	AQUEOUS	7/17/96	NA	7/23/96	1
02	INTRB	AQUEOUS	7/17/96	NA	7/22/96	1
03	MW-70RB	AQUEOUS	7/17/96	NA	7/22/96	1

PARAMETER	DET. LIMIT	UNITS	01	02	03
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	1.5	< 0.5	< 0.5

SURROGATE:
BROMOFLUOROBENZENE (%) 107 105 105
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	MW-70	AQUEOUS	7/17/96	NA	7/22/96	1
05	SW-03RB	AQUEOUS	7/17/96	NA	7/22/96	1
06	SW-03	AQUEOUS	7/17/96	NA	7/22/96	1

PARAMETER	DET. LIMIT	UNITS	04	05	06
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)	113	109	106
SURROGATE LIMITS (80 - 120)			

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
07	MW-63RB	AQUEOUS	7/18/96	NA	7/23/96	1
08	MW-63	AQUEOUS	7/18/96	NA	7/23/96	1
09	MW-71-RB	AQUEOUS	7/18/96	NA	7/22/96	1

PARAMETER	DET. LIMIT	UNITS	07	08	09
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	< 0.5	< 0.5

SURROGATE:
BROMOFLUOROBENZENE (%) 103 100 100
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	MW-71	AQUEOUS	7/18/96	NA	7/22/96	1
11	MW-66RB	AQUEOUS	7/18/96	NA	7/22/96	1
12	MW-66	AQUEOUS	7/18/96	NA	7/23/96	1

PARAMETER	DET. LIMIT	UNITS	10	11	12
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	< 0.5	0.5

SURROGATE:

BROMOFLUOROBENZENE (%) 103 102 109
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
13	MW-60RB	AQUEOUS	7/18/96	NA	7/22/96	1
14	MW-60	AQUEOUS	7/18/96	NA	7/22/96	1
15	MW-67RB	AQUEOUS	7/18/96	NA	7/23/96	1

PARAMETER	DET. LIMIT	UNITS	13	14	15
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	< 0.5	0.5

SURROGATE:
BROMOFLUOROBENZENE (%) 97 100 110
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
16	MW-67	AQUEOUS	7/18/96	NA	7/22/96	1
17	MW-57RB	AQUEOUS	7/18/96	NA	7/23/96	1
18	MW-57	AQUEOUS	7/18/96	NA	7/23/96	1

PARAMETER	DET. LIMIT	UNITS	16	17	18
BENZENE	0.5	UG/L	95	< 0.5	2.8
TOLUENE	0.5	UG/L	110	< 0.5	1.0
ETHYLBENZENE	0.5	UG/L	28	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	280	< 0.5	1.4

SURROGATE:

BROMOFLUOROBENZENE (%)	119	104	95
SURROGATE LIMITS (80 - 120)			

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
19	MW-55RB	AQUEOUS	7/18/96	NA	7/23/96	1
20	MW-55	AQUEOUS	7/18/96	NA	7/23/96	5
21	MW-54RB	AQUEOUS	7/19/96	NA	7/24/96	1

PARAMETER	DET. LIMIT	UNITS	19	20	21
BENZENE	0.5	UG/L	< 0.5	800	< 0.5
TOLUENE	0.5	UG/L	< 0.5	35	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	520	< 0.5
TOTAL XYLENES	0.5	UG/L	3.6	99	2.6

SURROGATE:
BROMOFLUOROBENZENE (%) 107 117 106
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
22	MW-54	AQUEOUS	7/19/96	NA	7/23/96	1
23	MW-61RB	AQUEOUS	7/19/96	NA	7/24/96	1
24	MW-61	AQUEOUS	7/19/96	NA	7/24/96	1

PARAMETER	DET. LIMIT	UNITS	22	23	24
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	1.8	< 0.5

SURROGATE:
BROMOFLUOROBENZENE (%) 93 101 101
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
25	MW-77	AQUEOUS	7/19/96	NA	7/24/96	5
26	MW-65	AQUEOUS	7/19/96	NA	7/24/96	1
27	MW-79	AQUEOUS	7/19/96	NA	7/24/96	1

PARAMETER	DET. LIMIT	UNITS	25	26	27
BENZENE	0.5	UG/L	8.0	< 0.5	3.2
TOLUENE	0.5	UG/L	14	< 0.5	6.3
ETHYLBENZENE	0.5	UG/L	19	< 0.5	0.9
TOTAL XYLENES	0.5	UG/L	35	< 0.5	6.3

SURROGATE:
BROMOFLUOROBENZENE (%) 123* 100 90
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES: *SURROGATE OUTSIDE CONTROL LIMITS DUE TO MATRIX INTERFERENCE.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
28	Sump-16A	AQUEOUS	7/19/96	NA	7/24/96	1
29	MW-11	AQUEOUS	7/19/96	NA	7/24/96	10
30	MW-41	AQUEOUS	7/19/96	NA	7/25/96	1
PARAMETER	DET. LIMIT	UNITS	28	29	30	
BENZENE	0.5	UG/L	5.1	500	< 0.5	
TOLUENE	0.5	UG/L	0.9	46	6.1	
ETHYLBENZENE	0.5	UG/L	1.2	370	3.6	
TOTAL XYLENES	0.5	UG/L	7.7	2300	1.7	

SURROGATE:
BROMOFLUOROBENZENE (%) 110 114 110
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
31	MW-43	AQUEOUS	7/19/96	NA	7/24/96	1
32	MW-44	AQUEOUS	7/19/96	NA	7/24/96	50
33	MW-49	AQUEOUS	7/19/96	NA	7/24/96	50

PARAMETER	DET. LIMIT	UNITS	31	32	33
BENZENE	0.5	UG/L	8.2	83	370
TOLUENE	0.5	UG/L	5.7	99	220
ETHYLBENZENE	0.5	UG/L	4.4	280	190
TOTAL XYLENES	0.5	UG/L	7.0	310	630

SURROGATE:
BROMOFLUOROBENZENE (%) 131* 103 109
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES: *SURROGATE RECOVERY OUTSIDE CONTROL LIMITS DUE TO MATRIX INTERFERENCE.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
34	MW-50	AQUEOUS	7/19/96	NA	7/24/96	1
35	TRIP BLANK	AQUEOUS	6/28/96	NA	7/24/96	1

PARAMETER	DET. LIMIT	UNITS	34	35
BENZENE	0.5	UG/L	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	< 0.5

SURROGATE:
BROMOFLUOROBENZENE (%) 102 102
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
36	SW-1	AQUEOUS	7/19/96	NA	7/24/96	1
PARAMETER	DET. LIMIT	UNITS	36			
BENZENE	0.5	UG/L	< 0.5			
TOLUENE	0.5	UG/L	< 0.5			
ETHYLBENZENE	0.5	UG/L	< 0.5			
TOTAL XYLENES	0.5	UG/L	< 0.5			

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

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
37	LYMAN	AQUEOUS	7/19/96	NA	7/24/96	1
38	ARROYO	AQUEOUS	7/19/96	NA	7/24/96	1
39	BIEBBLE	AQUEOUS	7/19/96	NA	7/24/96	1

PARAMETER	DET. LIMIT	UNITS	37	38	39
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)	99	104	103
SURROGATE LIMITS (80 - 120)			

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
40	E. STRIPPER INLET	AQUEOUS	7/19/96	NA	7/24/96	1
41	E. STRIPPER OUTLET	AQUEOUS	7/19/96	NA	7/25/96	1
42	W. STRIPPER INLET	AQUEOUS	7/19/96	NA	7/25/96	1
PARAMETER	DET. LIMIT		UNITS	40	41	42
BENZENE	0.5		UG/L	120	28	120
TOLUENE	0.5		UG/L	10	5.2	18
ETHYLBENZENE	0.5		UG/L	94	22	100
TOTAL XYLENES	0.5		UG/L	430	130	450
SURROGATE:						
BROMOFLUOROBENZENE (%)				111	118	132*
SURROGATE LIMITS	(80 - 120)					

CHEMIST NOTES: *SURROGATE OUTSIDE CONTROL LIMITS DUE TO MATRIX INTERFERENCE.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107
PROJECT NAME : IB REMEDIATION

AEN I.D.: 607341

ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
43	W. STRIPPER OUTLET	AQUEOUS	7/19/96	NA	7/25/96	1
44	MW-61A	AQUEOUS	7/19/96	NA	7/25/96	1

PARAMETER	DET. LIMIT	UNITS	43	44
BENZENE	0.5	UG/L	29	< 0.5
TOLUENE	0.5	UG/L	16	< 0.5
ETHYLBENZENE	0.5	UG/L	32	< 0.5
TOTAL XYLENES	0.5	UG/L	170	< 0.5

SURROGATE:
BROMOFLUOROBENZENE (%) 119 105
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 607341
BLANK I. D.	: 072296		
CLIENT	: MARATHON OIL COMPANY	DATE ANALYZED	: 7/22/96
PROJECT #	: 53350107	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REMEDIATION		

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 (%) 99
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 607341
BLANK I. D.	: 072396		
CLIENT	: MARATHON OIL COMPANY	DATE ANALYZED	: 7/23/96
PROJECT #	: 53350107	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REMEDIATION		

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 (%) 107
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST : BTEX (EPA 8020) AEN I.D. : 607341
BLANK I. D. : 072496
CLIENT : MARATHON OIL COMPANY DATE ANALYZED : 7/24/96
PROJECT # : 53350107 SAMPLE MATRIX : AQUEOUS
PROJECT NAME : IB REMEDIATION

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 (%) 107
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 607341
BLANK I. D.	: 072496 B		
CLIENT	: MARATHON OIL COMPANY	DATE ANALYZED	: 7/24/96
PROJECT #	: 53350107	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REMEDIATION		

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 (%) 104
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST : BTEX (EPA 8020) AEN I.D. : 607341
BLANK I. D. : 072596
CLIENT : MARATHON OIL COMPANY DATE ANALYZED : 7/25/96
PROJECT # : 53350107 SAMPLE MATRIX : AQUEOUS
PROJECT NAME : IB REMEDIATION

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 (%) 106
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 607341-01 AEN I.D. : 607341
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107 DATE ANALYZED : 7/23/96
PROJECT NAME : IB REMEDIATION SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.5	10.0	9.9	99	10.2	102	3	(80 - 120)	20
TOLUENE	<0.5	10.0	10.0	100	10.3	103	3	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	9.8	98	10.1	101	3	(80 - 120)	20
TOTAL XYLENES	1.5	30.0	31.5	100	33.8	108	7	(80 - 120)	20

CHEMIST NOTES:

Hit for Xylenes in sample.

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

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

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 607341-22 AEN I.D. : 607341
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107 DATE ANALYZED : 7/24/96
PROJECT NAME : IB REMEDIATION SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.5	10.0	10.4	104	9.8	98	6	(80 - 120)	20
TOLUENE	<0.5	10.0	10.2	102	9.5	95	7	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	10.3	103	9.8	98	5	(80 - 120)	20
TOTAL XYLENES	<0.5	30.0	31.9	106	29.8	99	7	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 607341-39 AEN I.D. : 607341
CLIENT : MARATHON OIL COMPANY
PROJECT # : 53350107 DATE ANALYZED : 7/25/96
PROJECT NAME : IB REMEDIATION SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.5	10.0	8.8	88	10.0	100	13	(80 - 120)	20
TOLUENE	<0.5	10.0	8.8	88	10.0	100	13	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	8.7	87	10.0	100	14	(80 - 120)	20
TOTAL XYLENES	<0.5	30.0	26.8	89	31.1	104	15	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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

CHAIN OF CUSTODY

DATE: 7/17-8/96 PAGE: 1 OF 5

AEN LAB ID: 603341

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Rob Mezie

COMPANY: Marathon O/C T&E

ADDRESS: PO Box 552

Molave Tx 79702

PHONE: (915) 687-8312

FAX: (915) 687-8337

BILL TO:

COMPANY:

ADDRESS:

same as ABOVE

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct/Inject	CHLORIDE	(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)	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:	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:	NUMBER OF CONTAINERS
DEH ₂ O	7/17/96	0845	Water	-01																							2
INT RB		0900		-02																							2
MU-70RB		1310		-03																							2
MU-70		1325		-04																							2
SW-03 RB		1735		-05																							2
SW-03		1745		-06																							2
MU-63RB	7/18/96	0820		-07																							2
MU-63		0930		-08																							2
MU-71RB		1225		-09																							2
MU-71		1235		-10																							3

PROJECT INFORMATION

PROJ. NO.: 053380107

PROJ. NAME: IB Remediation

P.O. NO.:

SHIPPED VIA: Hand Delivered

SAMPLE RECEIPT

NO. CONTAINERS: 24

CUSTODY BEARS: Y/DINA

RECEIVED IN TAG: X

BLUE ICE/CE: 120

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

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

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: ☐ FIXED FEE ☐

ANALYSIS REQUEST

RELINQUISHED BY: 1.

Signature: Kevin Cook Time: 0945

Printed Name: Kevin Cook Date: 7/22/96

Company: Fluor Daniel

RECEIVED BY: 1.

Signature: [Signature] Time: [Time]

Printed Name: [Name] Date: [Date]

Company: [Company]

RELINQUISHED BY: 2.

Signature: [Signature] Time: [Time]

Printed Name: [Name] Date: [Date]

Company: [Company]

RECEIVED BY: (LAB) 2.

Signature: [Signature] Time: [Time]

Printed Name: [Name] Date: [Date]

Company: American Environmental Network (NM), Inc.

CHAIN OF CUSTODY

DATE: 7/18/96 PAGE: 2 OF 5

AEN LAB I.D.

607341

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bob MONTZIE		COMPANY: MARIANO O/C LABS ADDRESS: PO Box 552 MUELLEN TX 79702 PHONE: (915) 687-8312 FAX: (915) 687-8337 BILL TO: ABOVE COMPANY: Smed AS ADDRESS:	
PROJECT INFORMATION		ANALYSIS REQUEST	
PROJ. NO.:	PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS (RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒	Petroleum Hydrocarbons (418.1) TRPH (MOD.8015) Diesel/Direct/Inject Chloride (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) 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: Priority Pollutant Metals (13) Target Analyte List Metals (23) RCRA Metals (8) RCRA Metals by TCLP (Method 1311) Metals:	
PROJ. NAME: T8 Remediation	CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER	NUMBER OF CONTAINERS	
P.O. NO.:	METHANOL PRESERVATION ☐		
SHIPPED VIA: Air Delivery	COMMENTS: FIXED FEE ☐		
SAMPLE RECEIPT			
NO CONTAINERS: 25			
CUSTODY BEARS: AEN MA			
RECEIVED INACT: X			
BLUE ICE/ICE: 100			

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
MW-66 RB	7/18/96	1345	Water	-11
MW-66		1355		-12
MW-60 RB		1620		-13
MW-60		1630		-14
MW-67 RB		1740		-15
MW-67		1750		-16
MW-57 RB		1805		-17
MW-57		1835		-18
MW-55 RB		1820		-19
MW-55		1930		-20

RELINQUISHED BY: 1. Signature: Ken Good Time: 0945 Printed Name: Kevin Good Date: 7/22/96 Company: Fluor Daniel GTZ	RELINQUISHED BY: 2. Signature: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____
RECEIVED BY: 1. Signature: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____	RECEIVED BY (LAB): 2. Signature: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: <u>Bob Mezie</u>				
COMPANY: <u>Marathon</u> <u>CLC</u>				
ADDRESS: <u>PO Box 552</u>				
PHONE: <u>Melrose TX 79702</u>				
FAX: <u>(915) 667-8312</u>				
BILL TO: <u>(915) 687-8337</u>				
COMPANY: <u>ROSE</u>				
ADDRESS: <u>5 Ave</u>				
SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
<u>MU-SY RB</u>	<u>7/19/96</u>	<u>0910</u>	<u>Water</u>	<u>-21</u>
<u>MU-SY</u>		<u>0920</u>		<u>-22</u>
<u>MU-61 RB</u>		<u>1110</u>		<u>-23</u>
<u>MU-61</u>		<u>1120</u>		<u>-24</u>
<u>MU-77</u>		<u>1450</u>		<u>-25</u>
<u>MU-65</u>		<u>1500</u>		<u>-26</u>
<u>MU-79</u>		<u>1520</u>		<u>-27</u>
<u>Sample 10A</u>		<u>1535</u>		<u>-28</u>
<u>MU-11</u>		<u>1545</u>		<u>-29</u>
<u>PC-11</u>		<u>1555</u>		<u>-30</u>
Petroleum Hydrocarbons (418.1) TRPH (MOD.8015) Diesel/Direct/Inject <u>Chloride</u> (M8015) Gas/Purge & Trap Gasoline/BTEX & MTBE (M8015/8020) BTEX/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) 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: Priority Pollutant Metals (13) Target Analyte List Metals (23) RCRA Metals (8) RCRA Metals by TCLP (Method 1311) Metals: NUMBER OF CONTAINERS: <u>3</u>				
PROJECT INFORMATION		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS		
PROJ. NO.:	(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK	(NORMAL) ☒		
PROJ. NAME: <u>ILB Reclamation</u>	CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER			
P.O. NO.:	METHANOL PRESERVATION ☐			
SHIPPED VIA:	COMMENTS: ☐ FIXED FEE ☐			
SAMPLE RECEIPT		RELINQUISHED BY: 1.		
NO. CONTAINERS: <u>28</u>		Signature: <u>Heider</u>	Time: <u>0945</u>	
CUSTODY SEALS: <u>CRINA</u>		Printed Name: <u>Kevin Aik</u>	Date: <u>7/22/96</u>	
RECEIVED INTACT: <u>Y</u>		Company: <u>Fluor Daniel GTC</u>		
BLUE ICE: <u>NO</u>		RECEIVED BY: 1.		
		Signature: <u>David GTC</u>	Time: <u>674</u>	
		Printed Name: <u>David GTC</u>	Date: <u>7/22/96</u>	
		Company: <u>American Environmental Network (NM), Inc.</u>		
		RECEIVED BY: (LAB) 2.		
		Signature: <u>David GTC</u>	Time: <u>674</u>	
		Printed Name: <u>David GTC</u>	Date: <u>7/22/96</u>	
		Company: <u>American Environmental Network (NM), Inc.</u>		

CHAIN OF CUSTODY

AEN LAB I.D. 602341

DATE: 7/19/96 PAGE: 4 OF 5

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bob Mearse

COMPANY: Marshall O/C

ADDRESS: PO Box 552

PHONE: (915) 687-8312

FAX: (915) 687-8337

BILL TO:

COMPANY:

ADDRESS: Space AB Road

SAMPLE ID DATE TIME MATRIX LAB I.D.

mu-43	7/19/96	1605	WATER	-31
mu-44		1615		-32
mu-49		1625		-33
mu-50		1635		-34
TB	6/28/96	0531	X	-35

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

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

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

SHIPPED VIA: COMMENTS: FIXED FEE ☐

SAMPLE RECEIPT

NO CONTAINERS 13

CUSTODY BEARS CCA/INA

RECEIVED IN AGT Y

BLUE CEASE 10

RELINQUISHED BY: 1. Signature: Kevin Galt Time: 0945

Printed Name: Kevin Galt Date: 7/22/96

Company: Fluor Daniel CTR

RECEIVED BY: 1. Signature: [Signature] Time: [Time]

Printed Name: [Name] Date: [Date]

Company: American Environmental Network (NM), Inc.

RELINQUISHED BY: 2. Signature: [Signature] Time: [Time]

Printed Name: [Name] Date: [Date]

Company: American Environmental Network (NM), Inc.

RECEIVED BY: (LAB) 2. Signature: [Signature] Time: [Time]

Printed Name: [Name] Date: [Date]

Company: American Environmental Network (NM), Inc.

ANALYSIS REQUEST

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)

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:

Priority Pollutant Metals (13)

Target Analyte List Metals (23)

RCRA Metals (8)

RCRA Metals by TCLP (Method 1311)

Metals:

NUMBER OF CONTAINERS

American Environmental Network, Inc.

AEN I.D. 608350

September 10, 1996

MARATHON OIL CO.
P.O. BOX 552
MIDLAND, TX 79702

Project Name MOC IBGP
Project Number 44999

Attention: BOB MENZIE

On 8/23/96 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), 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 method 8020 analyses were performed by American Environmental Network (NM), Inc., Albuquerque, NM.

All other analyses were performed by American Environmental Network (FL), Inc., 11 East Olive Road, Pensacola, FL.

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

American Environmental Network, Inc.

CLIENT	: MARATHON OIL CO.	AEN I.D.	: 608350
PROJECT #	: 44999	DATE RECEIVED	: 8/23/96
PROJECT NAME	: MOC IBGP	REPORT DATE	: 9/10/96

AEN			
ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	INT RB	AQUEOUS	8/22/96
02	MW-89RB	AQUEOUS	8/22/96
03	MW-89	AQUEOUS	8/22/96
04	MW-88RB	AQUEOUS	8/22/96
05	MW-88	AQUEOUS	8/22/96
06	MW-87RB	AQUEOUS	8/22/96
07	MW-87	AQUEOUS	8/22/96
08	MW-87ARB	AQUEOUS	8/22/96
09	IW-2RB	AQUEOUS	8/22/96
10	IW-2	AQUEOUS	8/22/96
11	TB	AQUEOUS	8/16/96

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 608653
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 608350
Project Name: 44999
Project Location: MOCIB6P
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 608350-03			Lab ID: 001		
CHLORIDE (325.3)	MG/L	63	1	CIW046	
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	900	5	TDW066	
Comments:					
Client ID: 608350-05			Lab ID: 002		
CHLORIDE (325.3)	MG/L	35	1	CIW046	
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1200	5	TDW066	
Comments:					
Client ID: 608350-07			Lab ID: 003		
CHLORIDE (325.3)	MG/L	11	1	CIW046	
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	810	5	TDW066	
Comments:					
Client ID: 608350-10			Lab ID: 004		
CHLORIDE (325.3)	MG/L	7	1	CIW046	
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	370	5	TDW066	
Comments:					

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 608653
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 608350
Project Name: 44999
Project Location: MOCIB6P
Test: Group of Single Wetchem

Client ID:	Lab Matrix: ID:	Date/Time Sampled:	Date Received:
608350-03	001 WATER	22-AUG-96 1100	24-AUG-96
608350-05	002 WATER	22-AUG-96 1315	24-AUG-96
608350-07	003 WATER	22-AUG-96 1510	24-AUG-96
608350-10	004 WATER	22-AUG-96 2100	24-AUG-96

American Environmental Network, Inc.

"Method Report Summary"

Accession Number: 608653
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 608350
Project Name: 44999
Project Location: MOCIB6P
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
608350-03	CHLORIDE (325.3)	MG/L	63
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	900
608350-05	CHLORIDE (325.3)	MG/L	35
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1200
608350-07	CHLORIDE (325.3)	MG/L	11
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	810
608350-10	CHLORIDE (325.3)	MG/L	7
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	370

American Environmental Network, Inc.

"WetChem Quality Control Report"

Parameter:	CHLORIDE	TDS
Batch Id:	CIW046	TDW066
Blank Result:	<1	<5
Anal. Method:	325.3	160.1
Prep. Method:	N/A	N/A
Analysis Date:	03-SEP-96	27-AUG-96
Prep. Date:	03-SEP-96	26-AUG-96

Sample Duplication

Sample Dup:	608575-1	608653-1
Rept Limit:	<1	<5
Sample Result:	18.4	900
Dup Result:	18.3	820
Sample RPD:	1	9
Max RPD:	6	16
Dry Weight%	N/A	N/A

Matrix Spike

Sample Spiked:	608575-1	N/A
Rept Limit:	<1	N/A
Sample Result:	18.4	
Spiked Result:	73.9	
Spike Added:	55.0	
% Recovery:	101	
% Rec Limits:	89-110	
Dry Weight%	N/A	

ICV

ICV Result:	96	
True Result:	100	
% Recovery:	96	
% Rec Limits:	90-110	

LCS

LCS Result:	332	
True Result:	293	
% Recovery:	113	
% Rec Limits:	66-122	

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

N/A = NOT APPLICABLE.
N/S = NOT SUBMITTED.
N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW AEN REPORTING LIMIT;
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.
N/D = NOT DETECTED.
DISS. OR D = DISSOLVED
T & D = TOTAL AND DISSOLVED
R = REACTIVE
T = TOTAL
G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT
OR BELOW AEN 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
TO ANALYSIS)
@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX. (DILUTION PRIOR TO
DIGESTION)
P = ANALYTICAL (POST DIGESTION) SPIKE.
I = DUPLICATE INJECTION.
& = AUTOMATED
F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
N/C+ = NOT CALCULABLE
N/C* = NOT CALCULABLE; SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND THE
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN 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 AEN REPORTING LIMIT
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".
SAMPLE IS NON-HOMOGENEOUS.
(*) = DETECTION 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 revision
EPA 600/4-79-020, Revised March 1983.
STANDARD METHODS, For the Examination of Water and Wastewater, 18TH ED., 1992
NIOSH Manual of Analytical Methods, 4th Edition.
ANNUAL BOOK OF ASTM STANDARDS, VOLUME 11.01, 1991.
METHODS FOR THE DETERMINATION OF INORGANIC SUBSTANCES IN ENVIRONMENTAL SAMPLES,
EPA600/R-93/100, AUGUST 1993

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. IF FLASHPOINT IS LESS THAN 25
DEGREES CELSIUS, THE DETECTION LIMIT BECOMES THE INITIAL STARTING
TEMPERATURE.

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

DPH = DOLLY P. HWANG	SG = SCOTT GRESHAM	RB = REBECCA BROWN
JL = JAN LECLEAR	NSB = NANCY S. BUTLER	MM = MIKE MCKENZIE
CF = CHRISTINE FOSTER	ED = ESTHER DANTIN	AB = ANDY BROTHERTON
PLD = PAULA L. DOUGHTY	RH = RICKY HAGENDORFER	BH = BARRY HICKS

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : 44999
PROJECT NAME : MOC IBGP

AEN I.D.: 608350

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
01	INT RB	AQUEOUS	8/22/96	NA	8/27/96	1
02	MW-89RB	AQUEOUS	8/22/96	NA	8/27/96	1
03	MW-89	AQUEOUS	8/22/96	NA	8/23/96	1

PARAMETER	DET. LIMIT	UNITS	01	02	03
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	1.5	1.1	1.1
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)	108	110	103
SURROGATE LIMITS (80 - 120)			

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : 44999
PROJECT NAME : MOC IBGP

AEN I.D.: 608350

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	MW-88RB	AQUEOUS	8/22/96	NA	8/27/96	1
05	MW-88	AQUEOUS	8/22/96	NA	8/23/96	1
06	MW-87RB	AQUEOUS	8/22/96	NA	8/27/96	1

PARAMETER	DET. LIMIT	UNITS	04	05	06
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	1.1	< 0.5	1.6
ETHYLBENZENE	0.5	UG/L	< 0.5 D(1)	0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	1.0	< 0.5 D(1)A

SURROGATE:

BROMOFLUOROBENZENE (%)		106	112	114
SURROGATE LIMITS	(80 - 120)			

CHEMIST NOTES:

D(1)= ANALYZED 8/28/96.
D(1)A= ANALYZED 8/29/96.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : 44999
PROJECT NAME : MOC IBGP

AEN I.D.: 608350

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
07	MW-87	AQUEOUS	8/22/96	NA	8/23/96	1
08	MW-87ARB	AQUEOUS	8/22/96	NA	8/27/96	1
09	IW-2RB	AQUEOUS	8/22/96	NA	8/27/96	1

PARAMETER	DET. LIMIT	UNITS	07	08	09
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	20	1.3	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	0.5	< 0.5 D(1)	< 0.5 D(1)

SURROGATE:
BROMOFLUOROBENZENE (%) 106 103 116
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
D(1)=ANALYZED 8/29/96.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : 44999
PROJECT NAME : MOC IBGP

AEN I.D.: 608350

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	IW-2	AQUEOUS	8/22/96	NA	8/23/96	1
11	TB	AQUEOUS	8/16/96	NA	8/27/96	1

PARAMETER	DET. LIMIT	UNITS	10	11
BENZENE	0.5	UG/L	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	< 0.5

SURROGATE:
BROMOFLUOROBENZENE (%) 108 112
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 608350
BLANK I. D.	: 082396		
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 8/23/96
PROJECT #	: 44999	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: MOC IBGP		

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
ETHYLBENZENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5

SURROGATE:
BROMOFLUOROBENZENE (%) 98
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 608350
BLANK I. D.	: 082796		
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 8/27/96
PROJECT #	: 44999	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: MOC IBGP		

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 (%) 106
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 608350
BLANK I. D.	: 082896		
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 8/28/96
PROJECT #	: 44999	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: MOC IBGP		

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
ETHYLBENZENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5

SURROGATE:
TRIFLUOROTOLUENE (%) 99
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 608350-01 AEN I.D. : 608350
CLIENT : MARATHON OIL CO.
PROJECT # : 44999 DATE ANALYZED : 8/27/96
PROJECT NAME : MOC IBGP SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.5	10.0	9.8	98	9.5	95	3	(80 - 120)	20
TOLUENE	<0.5	10.0	11.2	112	11.2	112	0	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	9.8	98	10.1	101	3	(80 - 120)	20
TOTAL XYLENES	<0.5	30.0	31.2	104	35.1	117	12	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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

"FINAL REPORT FORMAT - SINGLE"

Accession: 608653
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 608350
Project Name: 44999
Project Location: MOCIB6P
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
Client Sample Id: 608350-03
Sample Date/Time: 22-AUG-96 1100
Received Date: 24-AUG-96

Batch: PAW163
Blank: B
Dry Weight %: N/A
Extraction Date: 28-AUG-96
Analysis Date: 02-SEP-96

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	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	92	28-138	
ANALYST	INITIALS	BV		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 608653
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 608350
Project Name: 44999
Project Location: MOCIB6P
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
Client Sample Id: 608350-05
Sample Date/Time: 22-AUG-96 1315
Received Date: 24-AUG-96
Batch: PAW163
Blank: B
Dry Weight %: N/A
Extraction Date: 28-AUG-96
Analysis Date: 02-SEP-96

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	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	86	28-138	
ANALYST	INITIALS	BV		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 608653
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 608350
Project Name: 44999
Project Location: MOCIB6P
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
Client Sample Id: 608350-07
Sample Date/Time: 22-AUG-96 1510
Received Date: 24-AUG-96
Batch: PAW163
Blank: B
Dry Weight %: N/A
Extraction Date: 28-AUG-96
Analysis Date: 02-SEP-96

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	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	103	28-138	
ANALYST	INITIALS	BV		

Comments:

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 608653
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 608350
Project Name: 44999
Project Location: MOCIB6P
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
Client Sample Id: 608350-10
Sample Date/Time: 22-AUG-96 2100
Received Date: 24-AUG-96

Batch: PAW163
Blank: B
Dry Weight %: N/A
Extraction Date: 28-AUG-96
Analysis Date: 02-SEP-96

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	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	122	28-138	
ANALYST	INITIALS	BV		

Comments:

American Environmental Network, Inc.

"QC Report"

Title: Water Blank
Batch: PAW163
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: B Date Analyzed: 02-SEP-96 Date Extracted: 28-AUG-96

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	85	28-138
ANALYST	INITIALS	JBT	

Comments:

American Environmental Network, Inc.

"QC Report"

Title: Water Reagent
Batch: PAW163
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: 30-AUG-96
RSD Date Analyzed: 30-AUG-96

RS Date Extracted: 27-AUG-96
RSD Date Extracted: 27-AUG-96

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	RSD Conc	RSD %Rec	RPD	RPD Lmts	Rec Lmts
ACENAPHTHYLENE	10.0	<1	7.6	76	6.7	67	13	46	46-110
BENZO (k) FLUORANTHENE	10.0	<1	9.2	92	8.8	88	4	30	58-128
CHRYSENE	10.0	<1	9.4	94	9.3	93	1	29	62-129
PHENANTHRENE	10.0	<1	9.0	90	9.0	90	0	28	61-116
PYRENE	10.0	<1	8.8	88	8.6	86	2	26	62-120
Surrogates:									
2-CHLOROANTHRACENE				94		94			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.

American Environmental Network, Inc.

"QC Report"

Title: Water Matrix
Batch: PAW163
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 MS Date Analyzed: 02-SEP-96 MS Date Extracted: 27-AUG-96
Sample Spiked: 608668-1 MSD Date Analyzed: 02-SEP-96 MSD Date Extracted: 27-AUG-96

Parameters:	Spike Added	Sample Conc	MS Conc	MS %Rec	MSD Conc	MSD %Rec	RPD	Rec Lmts
ACENAPHTHYLENE	10.0	<1	5.2	52	6.6	66	24	42 14-135
BENZO(k) FLUORANTHENE	10.0	<1	8.4	84	8.8	88	5	58 25-142
CHRYSENE	10.0	<1	8.9	89	9.4	94	5	51 3-176
PHENANTHRENE	10.0	<1	8.3	83	8.8	88	6	55 27-146
PYRENE	10.0	<1	8.3	83	8.7	87	5	47 15-157

Surrogates:
2-CHLOROANTHRACENE 86 92 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.

American Environmental Network, Inc.
Common notation for Organic reporting

N/S = NOT SUBMITTED
N/A = NOT APPLICABLE
D = DILUTED OUT
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 DETECTION LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS

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

ORGANIC SOILS ARE REPORTED ON A DRYWEIGHT BASIS.

ND = NOT DETECTED ABOVE REPORTING LIMIT.

RPT LIMIT = 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).

SW = STEVE WILHITE
PL = PAUL LESCHENSKY
RW = ROBERT WOLFE
BV = BEN VAUGHN
BC = BETH COLEMAN
KS = KENDALL SMITH
KK = KERRY KUST
DWB = DAVID W. BOWERS
RP = ROB PEREZ
JBT = JENNIFER TORRANCE

Interlab Chain of Custody

DATE: 8/23 PAGE: 1 OF 1

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

COMPANY: Analytical Technologies of New Mexico, Inc.
ADDRESS: 2709-D Pan American Freeway, NE
Albuquerque, NM 87107

CLIENT PROJECT MANAGER:

K McNeill

SAMPLE ID: DATE: TIME: MATRIX: LAB ID:

608350-05

8/22

1100

AQ

1

-05

1315

1

2

-07

1510

1

3

-10

2100

1

4

Metals - TAL

Metals - PP List

Metals - RCRA

RCRA Metals by TCLP (1311)

Chloride, TDS

TOX

TOC

Gen Chemistry

Oil and Grease

BOD

COD

Pesticides/PCB (608/8080)

Herbicides (615/8150)

Base/Neutral Acid Compounds GC/MS (625/8270)

Volatile Organics GC/MS (624/8240)

Polynuclear Aromatics (610/8310)

8240 (TCLP 1311) ZHE

8270 (TCLP 1311)

TO-14

Gross Alpha/Beta

NUMBER OF CONTAINERS

ANALYSIS REQUEST

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER: 608350

TOTAL NUMBER OF CONTAINERS

SAN DIEGO

Signature: [Signature] Time: 1700

Signature: [Signature] Time: [Time]

PROJECT NAME: MOC IBGP

CHAIN OF CUSTODY SEALS

FT. COLLINS

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

OC LEVEL: STD IV

INTACT?

RENTON

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

OC REQUIRED: MS MSD BLANK

RECEIVED GOOD COND/COLD

PENSACOLA

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

TAT: STANDARD RUSH

LAB NUMBER

PHOENIX

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

DUE DATE: 9/4

RUSH SURCHARGE:

CLIENT DISCOUNT: SPECIAL CERTIFICATION REQUIRED: YES NO

CHAIN OF CUSTODY

DATE: 8/22/96 PAGE: 1 OF 1

PROJECT MANAGER: Bob Mezzie

COMPANY:

ADDRESS:

PHONE:

FAX:

BILL TO:

COMPANY:

ADDRESS:

Marathon O.C.
 PO Box 552
 Midland TX, 79702
 (915) 687-8312
 (915) 687-8305
 Bill to: Above 60853
 Space Above 60853

SHADED AREAS ARE FOR LAB USE ONLY

PLEASE FILL THIS FORM IN COMPLETELY.

COMPANY:	MARATHON O.C.
ADDRESS:	PO Box 552
	Midland TX, 79702
PHONE:	(915) 687-8312
FAX:	(915) 687-8305
BILL TO:	
COMPANY:	
ADDRESS:	Space # ABOVE 60853

DATE	TIME	MATRIX	LAB ID	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:	Chloride, TDS	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:	NUMBER OF CONTAINERS
INT RB	8/22/96	0830	WATER	201																						2
MU-89RB		1045		202																						2
MU-89		1100		203																						2
MU-88RB		1255		204																						2
MU-88		1315		205																						2
MU-87RB		1455		206																						2
MU-87		1510		207																						2
MU-87A RB		1715		208																						2
IW-2 RB		2045		209																						2
IW-2		2100		210																						2

PROJECT INFORMATION

PROJ NO: 44999

PROJ NAME: MOC I 66P

P.O. NO: 44999-12

SHIPPED VIA:

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

TB 8/16/96 0805 am - 11:00 8/22/96

ANALYSIS REQUEST

RELINQUISHED BY:

Signature: [Signature] Time: 1040

Printed Name: Ken Cook Date: 8/22/96

Company: Fluor Daniel 671

RECEIVED BY:

Signature: [Signature] Time:

Printed Name:

Date:

Company:

RELINQUISHED BY:

Signature:

Printed Name:

Date:

Company:

RECEIVED BY: (LAB)

Signature:

Printed Name:

Date:

Company:

628350

NUMBER OF CONTAINERS

DISTRIBUTION: White, Canary - AEN Pink - ORIGINATOR

PROJECT INFORMATION		PRIORITY AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS		RELINQUISHED BY: 1.		RELINQUISHED BY: 2.	
PROJ. NO.:	44999	(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK	(NORMAL) ☒	Signature:	Time:	Signature:	Time:
PROJ. NAME:	MOC I 66P	CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER		Printed Name:	Date:	Printed Name:	Date:
P.O. NO.:	44999-12	METHANOL PRESERVATION ☐		Company:		Company:	
SHIPPED VIA:		COMMENTS: FIXED FEE !!!		Signature:	Time:	Signature:	Time:
SAMPLE RECEIPT		7B 8/16/96 0805 Am -11 20 8/23/96 1		RECEIVED BY:	1.	RECEIVED BY: (LAB)	2.
NO. CONTAINERS	32			Signature:	Time:	Signature:	Time:
CUSTODY SEALS	Y/N ☒			Printed Name:	Date:	Printed Name:	Date:
RECEIVED INTACT	Yes			Signature:	Time:	Signature:	Time:
BLUE ICE/CE	4			Printed Name:	Date:	Printed Name:	Date:
				Company:		Company:	

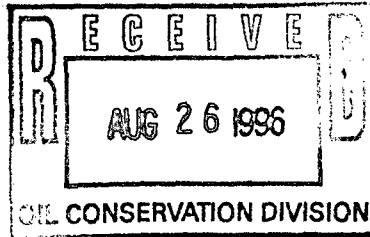


**Marathon
Oil Company**

P.O. Box 552
Midland, TX 79702-0552
Telephone 915/682-1626

August 8, 1996

Mr. Roger Anderson
Environmental Bureau Chief
State of New Mexico
Oil Conservation Division
2040 Pacheco St.
Santa Fe, New Mexico 87505



Dear Mr. Anderson:

Attached is the Second Quarter 1996 Indian Basin Remediation Project Report. This report is submitted on behalf of the Indian Basin Gas Plant owners in accordance with the Indian Basin Treatment Project Plan prepared by Marathon and approved by the Oil Conservation Division (OCD) on April 2, 1992. Preparation of this report is also in accordance with conditions contained within the April 2, 1992 and May 7, 1996 OCD correspondence regarding quarterly reporting of remediation project activities. If you have any questions please contact me (915-687-8312).

Sincerely,

A handwritten signature in cursive script that reads 'Robert J. Menzie, Jr.'.

Robert J. Menzie, Jr.
Advanced Environmental & Safety Representative

Attachment

c: S. Fields, Fluor Daniel GTI, Albuquerque
T. L. Guillory
T. C. Lowry
William C. Olson, Oil Conservation Division, Santa Fe
F. D. Searle
T. N. Tipton

File: 572-00

TABLE 1. SHALLOW ZONE DEPTH-TO-WATER, AND GROUNDWATER ELEVATION

Shallow Zone Well	TOC Elev. (ft AMSL)	Total Depth from TOC (ft)	April 16-19, 1996	
			Depth to water (ft)	Ground- water Elev. (ft)
MW-1	3792.50	16.10	not gauged	
MW-2	3788.82	15.52	not gauged	
MW-3	3787.50	16.97	DRY	
MW-4	3785.88	18.68	not gauged	
MW-5	3801.69	13.05	DRY	
MW-6	3785.17	14.25	not gauged	
MW-7	3784.46	17.35	DRY	
MW-8	3795.04	17.38	DRY	
MW-9	3807.85	13.79	DRY	
MW-10	3790.78	18.52	DRY	
MW-11	3806.96	24.85	23.97	3782.99
MW-12	3809.86	25.21	not gauged	
MW-13	3801.58	22.07	19.98	3781.60
MW-14	3803.93	24.30	not gauged	
MW-15	3803.59	19.47	not gauged	
MW-16	3801.04	22.66	not gauged	
MW-17	3799.55	19.75	not gauged	
MW-18	3795.82	17.42	not gauged	
MW-19	3797.21	19.11	DRY	
MW-20	3797.59	16.89	not gauged	
MW-21	3798.21	23.31	not gauged	
MW-22	3799.20	17.30	not gauged	
MW-23	3794.48	12.08	not gauged	
MW-24	3794.09	13.30	DRY	
MW-25	3786.97	10.27	not gauged	
MW-26	3793.01	21.11	not gauged	
MW-27	3790.93	18.23	not gauged	
MW-28	3797.03	18.59	not gauged	
MW-29	3794.06	14.76	DRY	
MW-30	3788.30	14.82	not gauged	
MW-31	3791.15	19.93	not gauged	
MW-32	3797.47	15.70	DRY	
MW-33	3802.48	20.29	not gauged	
MW-34	3806.00	19.97	not gauged	
MW-35	3800.81	20.71	not gauged	
MW-36	3792.94	8.77	not gauged	
MW-37	3795.03	20.83	not gauged	
MW-38	3797.32	20.57	DRY	
MW-39	3796.20	20.54	20.32	3775.88
MW-40	3803.12	14.07	not gauged	
MW-41	3799.04	24.04	20.10	3778.94
MW-42	3804.73	23.59	not gauged	
MW-43	3802.05	24.55	21.70	3780.35
MW-44	3804.14	25.24	21.88	3782.26
MW-45	3808.68	26.62	not gauged	
MW-46	3805.54	20.24	19.52	3786.02
MW-47	3805.09	21.79	DRY	
MW-48	3806.18	19.98	DRY	
MW-49	3805.61	25.91	22.59	3783.02
MW-50	3813.35	37.15	27.22	3786.13
MW-51	3810.86	20.06	not gauged	
MW-52	3817.49	21.44	DRY	
MW-53	3809.92	15.32	DRY	
MW-54	3823.86	78.15	48.97	3774.89
MW-55	3794.40	66.32	33.03	3761.37
MW-56	3782.45	43.76	DRY	
MW-61	3816.20	57.97	37.18	3779.02
MW-65	3763.31	57.69	57.35	3705.96
MW-69p	3805.11	51.27	36.60	3768.51
MW-77	3775.48	82.20	78.95	3696.53
MW-78	3785.82	86.62	86.29	3699.53
MW-79	3788.39	82.90	78.36	3710.03
MW-80	3821.64	91.80	DRY	
Sump A10	3800.99	13.42	DRY	
Sump 16A	3785.14	17.45	not gauged	

p = pump present in well

TABLE 2. LOWER QUEEN DEPTH-TO-WATER, GROUNDWATER ELEVATION,
CONDENSATE THICKNESS, AND RAINFALL DATA

LOWER QUEEN WELL	Well Use	Top of Casing (TOC) Elev. (ft AMSL)	Top of 1.25-inch Piezometer Piping Elev. (ft AMSL)	Total Depth from TOC (ft)	April/16, 17/1996				May-96	Jun-96
					Depth to water (ft)	Ground- water Elev. (ft)	Corrected Groundwater Elev. (ft)	Depth to product (ft)		
MW-57	monitor	3787.70		177.20	161.95	3625.75				
MW-58	monitor	3824.31		173.40	DRY					
MW-59	monitor	3819.59		211.29	193.37	3626.22		192.00		
MW-60	monitor	3815.28		223.00	187.83	3627.45				
MW-61A	recovery	3815.97		215.67	NG					
MW-62	monitor	3819.90		224.69	192.39	3627.51	3627.52	192.38		
MW-63	monitor	3826.16		220.49	199.23	3626.93				
MW-64	monitor	3798.57		201.89	170.98	3627.59				
MW-65A	recovery	3763.26		168.56	NG					
MW-66	monitor	3828.98		235.18	202.29	3626.69				
MW-67	monitor	3765.87		165.77	138.13	3627.74				
MW-68	recovery	3797.83		203.43	NG					
MW-70	monitor	3822.57		225.07	194.94	3627.63				
MW-71	monitor	3778.05		233.49	151.74	3626.31				
MW-72	recovery	3819.32		236.55	214.60	3604.72				
MW-73	monitor	3820.09		222.5	204.10	3615.99	3619.44	198.25		
MW-74	monitor	3820.82		222.5	187.30	3633.52	3617.66	202.24		
MW-75	recovery	3816.12		222.5	189.17	3626.95	3626.99	189.13		
MW-76	monitor	3796.01		222.5	169.59	3626.42	3627.31	168.60		
MW-81	recovery	3816.99	3817.03	228.45	204.35	3612.64	3621.60	194.40		
MW-82	recovery	3825.04	3825.07	231.30	209.12	3615.92				
MW-83	recovery	3794.09	3794.12	205.80	179.40	3614.69	3614.87	179.20		
SW-1	recovery	3808.19		255.00						
SW-2	monitor	3808.79		292.00	182.25	3626.54				
Monthly Rainfall (in)							0.60		0.00	3.95

AMSL = Above Mean Sea Level

NG = Not Gauged

Shallow zone Pumping

Total fluid recovery from the Shallow zone during the quarter averaged 0.06 gallons per minute (2.17 barrels per day) from two recovery wells. Shallow zone product recovery from MW-69 and MW-86 was 8.0 and 139.0 barrels, respectively.

Lower Queen Pump-and-Treat System

Total fluid recovery from the Lower Queen aquifer during the quarter averaged 82.1 gallons per minute (2815 barrels per day) from eight recovery wells. The product tank at the groundwater treatment compound at the Indian Basin Gas Plant separated 159.3 barrels of condensate from groundwater containing hydrocarbons collected from eight Lower Queen recovery wells. Dissolved-phase hydrocarbon compounds are removed by two air strippers operated in parallel. Infiltration of treated water into Lower Queen or Shallow zone infiltration wells was not conducted during the quarter. Cumulative condensate recovery from the Shallow zone and Lower Queen aquifers is 4107.9 barrels or 11.7% of the total estimated spill volume.

Quarterly Gauging and Groundwater Sampling Episode

During the quarterly groundwater sampling episode in April 1996, condensate was observed in ten Lower Queen and two Shallow zone wells (Appendix A). Shallow zone and Lower Queen groundwater and product elevations calculated from casing elevation data, depth-to-groundwater and depth-to-product measurements, and monthly rainfall data are shown in Tables 1 and 2, respectively. Figures 1 and 2 are water table elevation maps of the Shallow zone and Lower Queen aquifers, respectively. Figures 3 and 4 are product thickness maps of the Shallow zone and Lower Queen aquifers, respectively.

Laboratory Results of Groundwater Samples

Shallow zone dissolved benzene concentrations in project wells range from less than 0.5 to 650 micrograms per liter (ug/L) or parts per billion (Appendix B). Chloride concentrations in Shallow zone wells range from 30 to 530 milligrams per liter (mg/L) or parts per million. The New Mexico maximum allowable concentration for chloride is 250 mg/L. Figures 5 and 6 are isoconcentration maps of benzene and chloride in Shallow zone groundwater. Shallow zone downgradient receptors monitored include the Lyman well, Upper Indian Hills Spring West, and the Biebelle well. Concentrations of benzene, toluene, ethylbenzene, total xylene, and chloride in groundwater and surface water from these receptors have not exceeded New Mexico or Environmental Protection Agency groundwater quality standards.

Lower Queen dissolved benzene concentrations in the five downgradient wells range from less than 0.5 to 10 micrograms per liter (ug/L) or parts per billion. Chloride concentrations in Lower Queen wells range from 7.4 to 44 and are below New Mexico maximum allowable concentration of 250 milligrams per liter (mg/L) or parts per million. Figures 7 and 8 are isoconcentration maps of benzene and chloride in Lower Queen groundwater, respectively.

Vapor Extraction System

The vapor extraction system was not operated during the Second Quarter.

Figure 1
 Shallow zone Water Table Elevation Map
 April 1996
 Contour Interval = 10 ft
 Elevation Units = Feet Above Mean Sea Level

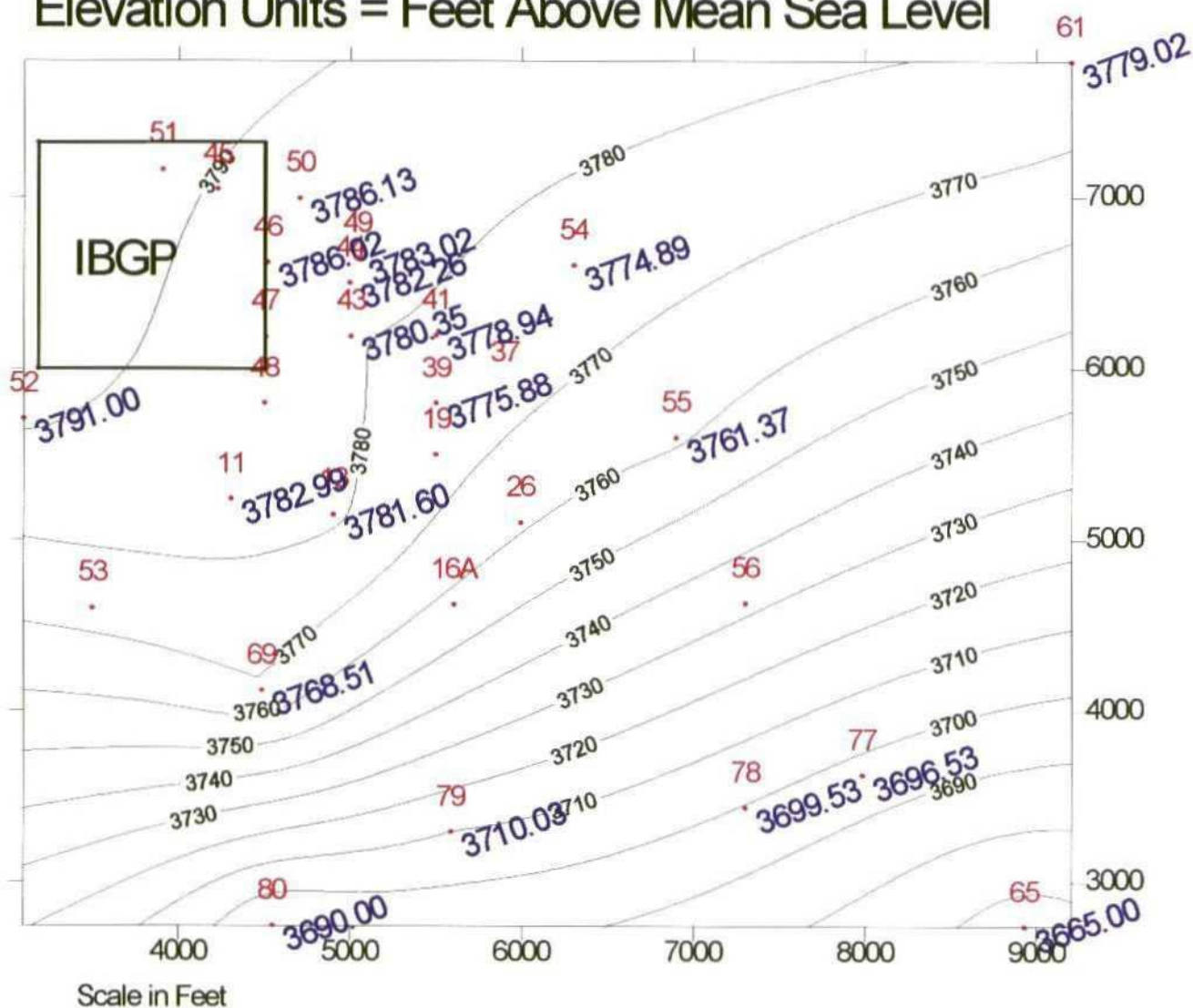


Figure 2
 Lower Queen Water Table Elevation Map
 April 1996
 Contour Interval = 2 ft
 Elevation Units = Feet Above Mean Sea Level

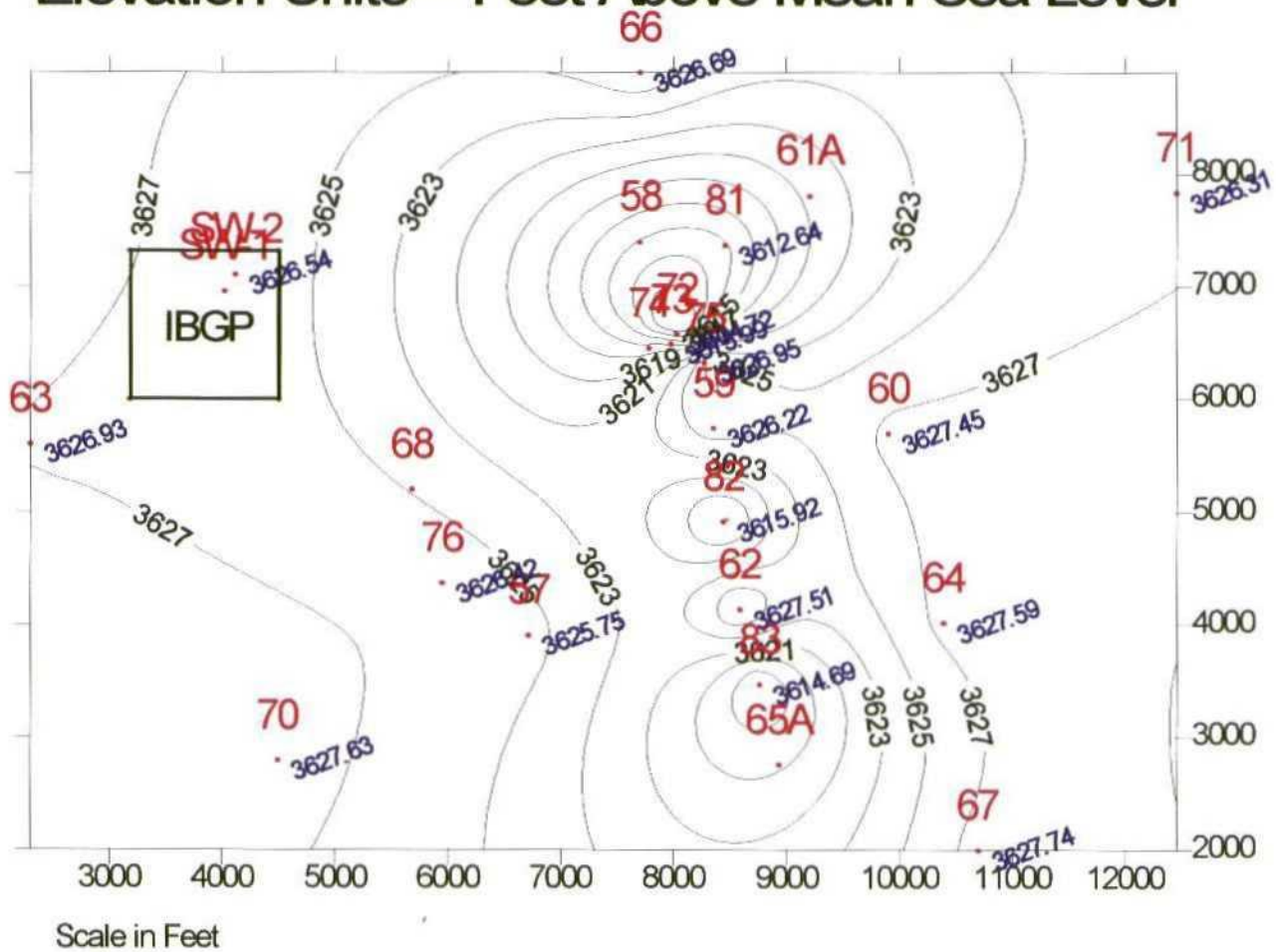


Figure 3
 Shallow zone Free-Phase Product Thickness Map
 April 1996
 Contour Interval = 0.01 feet

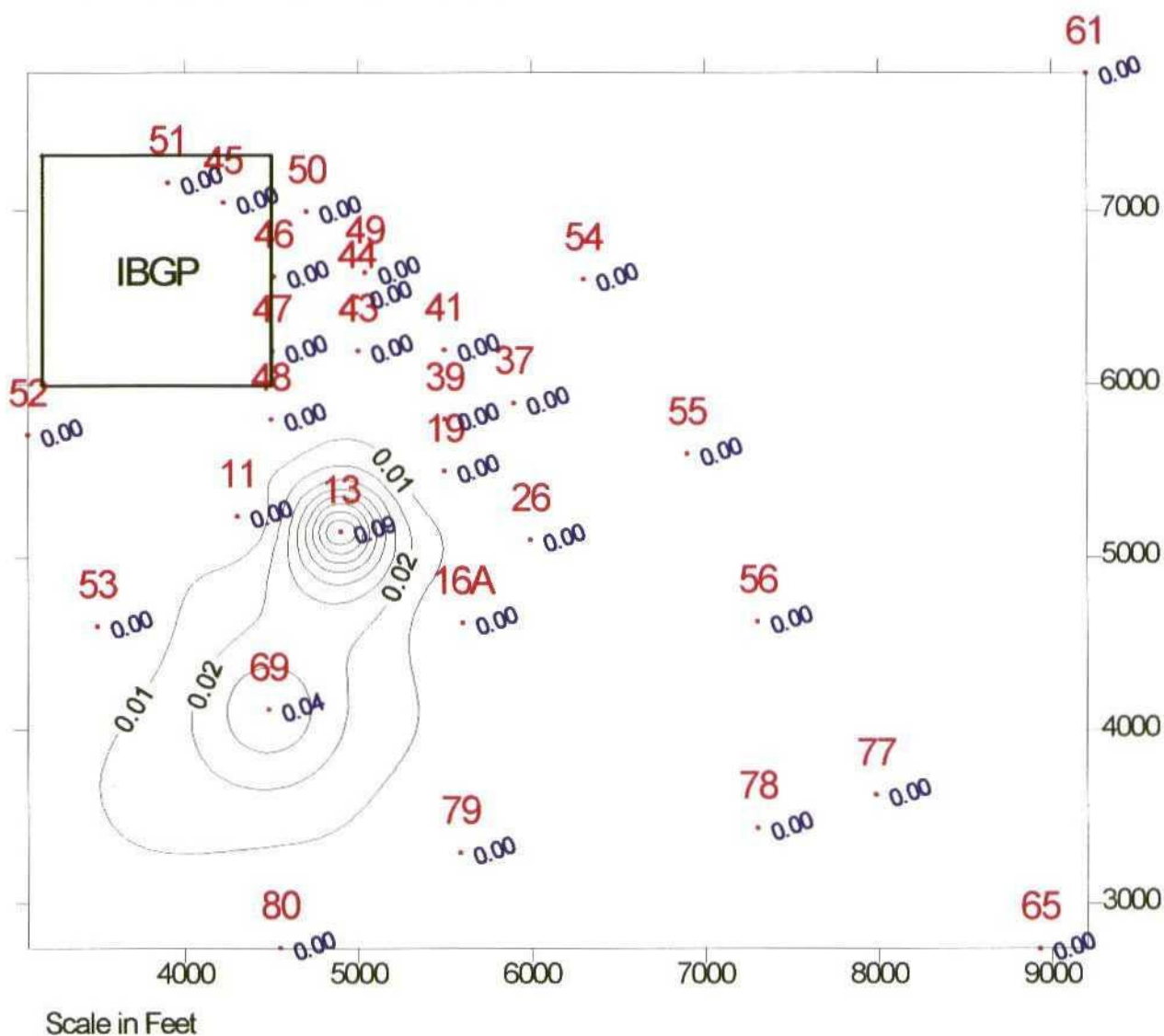


Figure 4
Lower Queen Free-Phase Product Thickness Map
April 1996

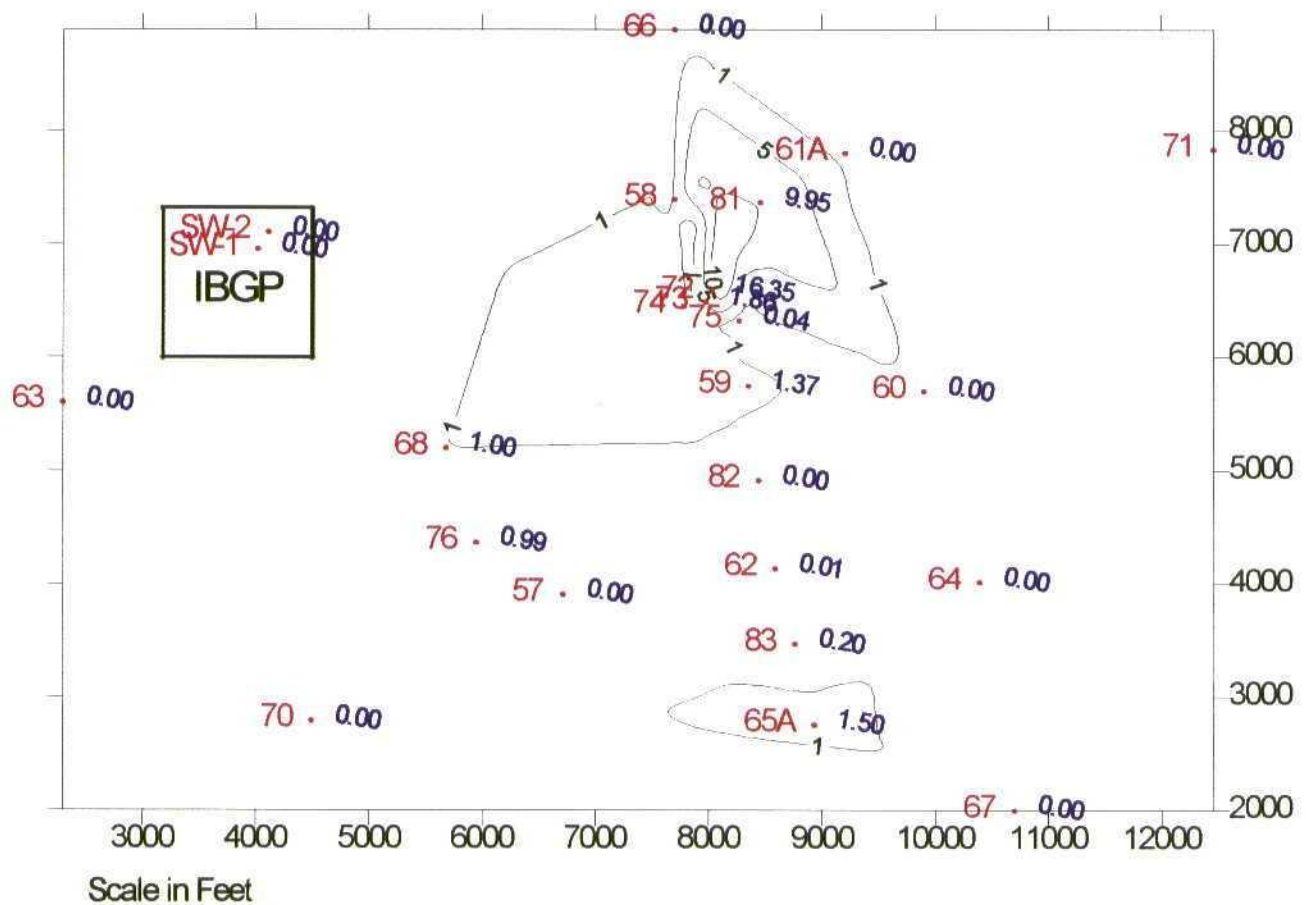
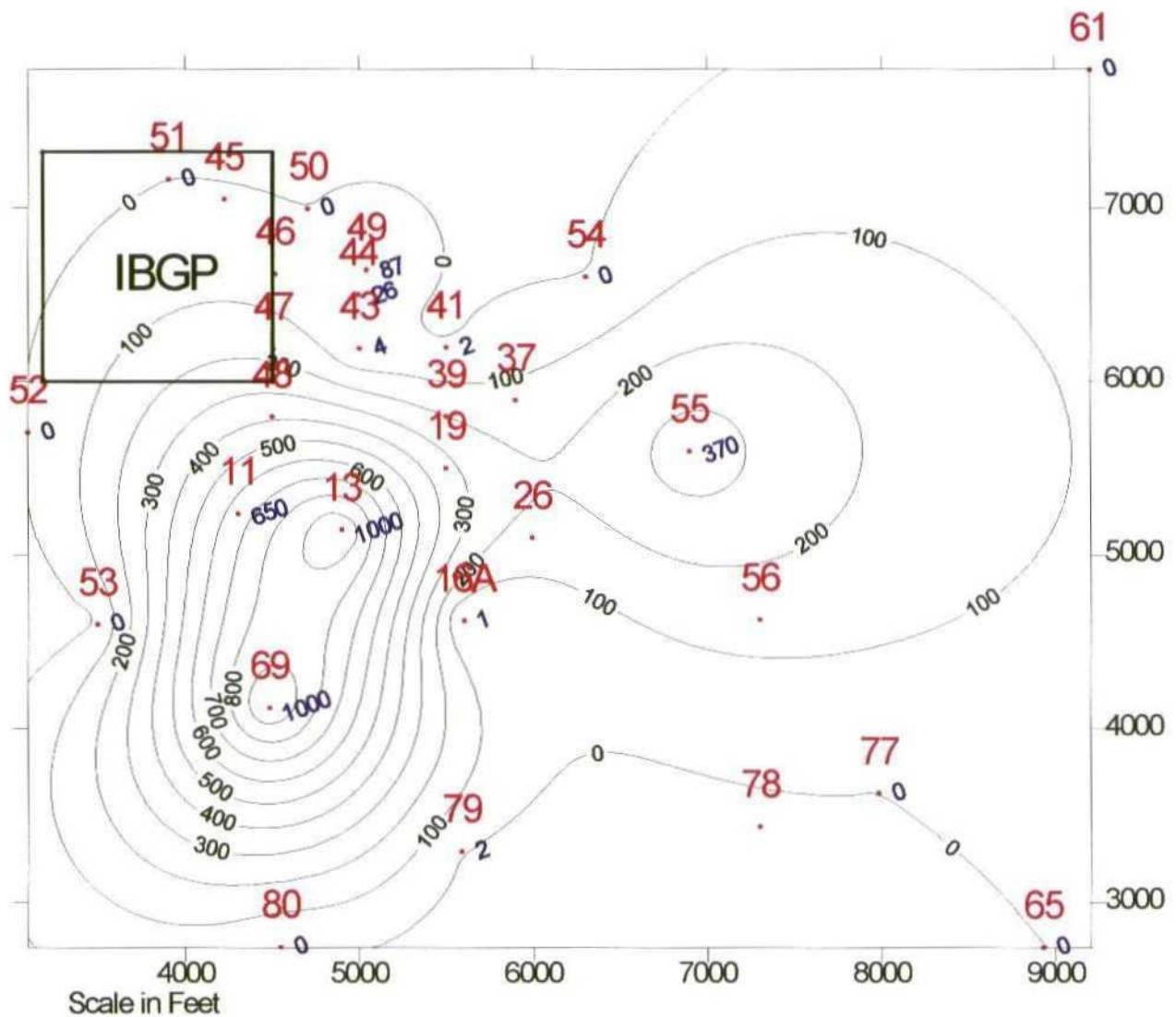
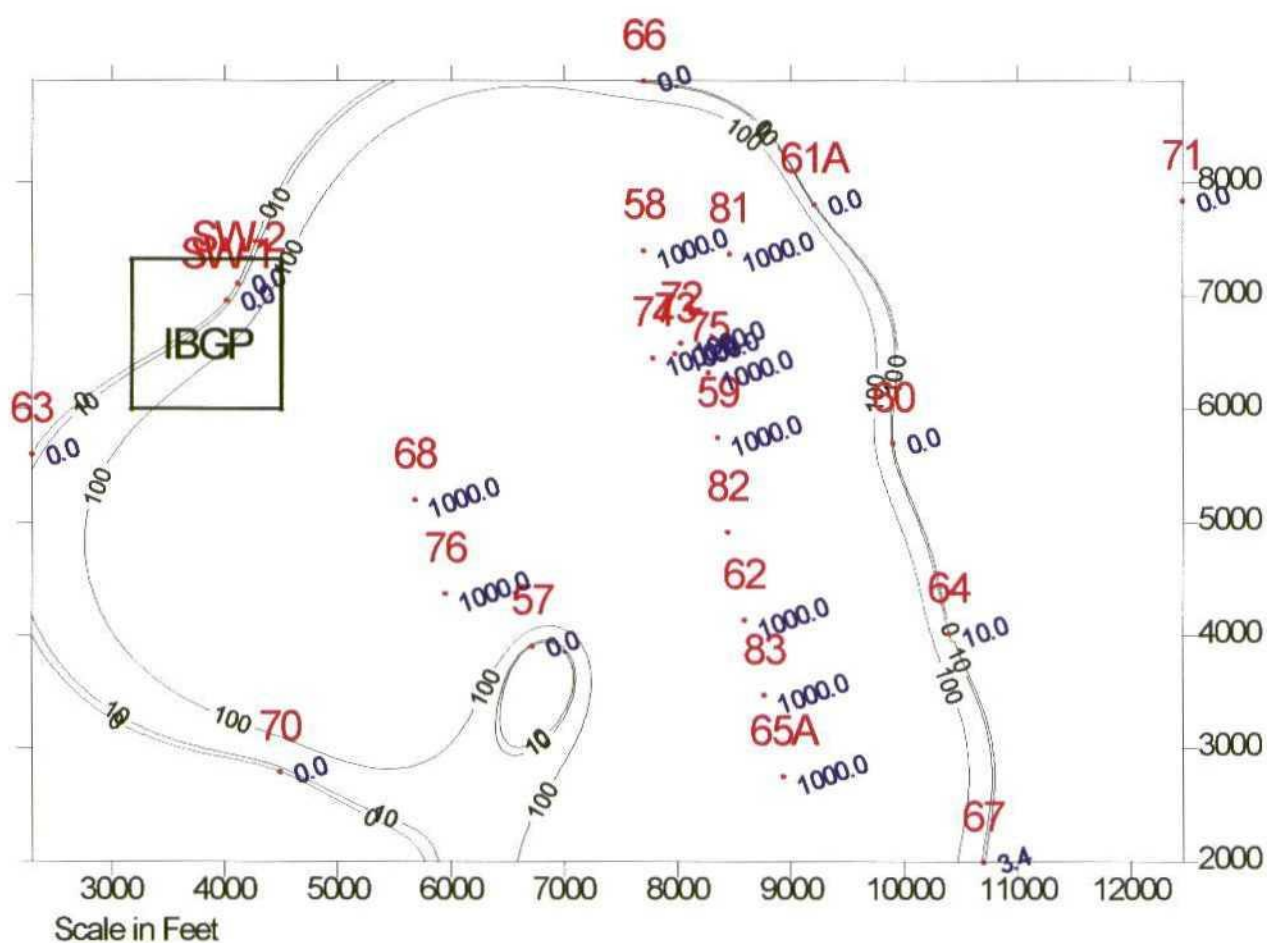


Figure 5
Shallow zone Benzene Isoconcentration Map
April 1996
Contour Interval = 100 ug/L or ppb



NOTE: 1000 ppb is default concentration for free-phase product.

Figure 6
Lower Queen Benzene Isoconcentration Map
April 1996



NOTE: 1000 ppb is default benzene concentration for free-phase product.

Figure 7
Shallow zone Chloride Isoconcentration Map
April 1996
Contour Interval = 100 mg/L or ppm

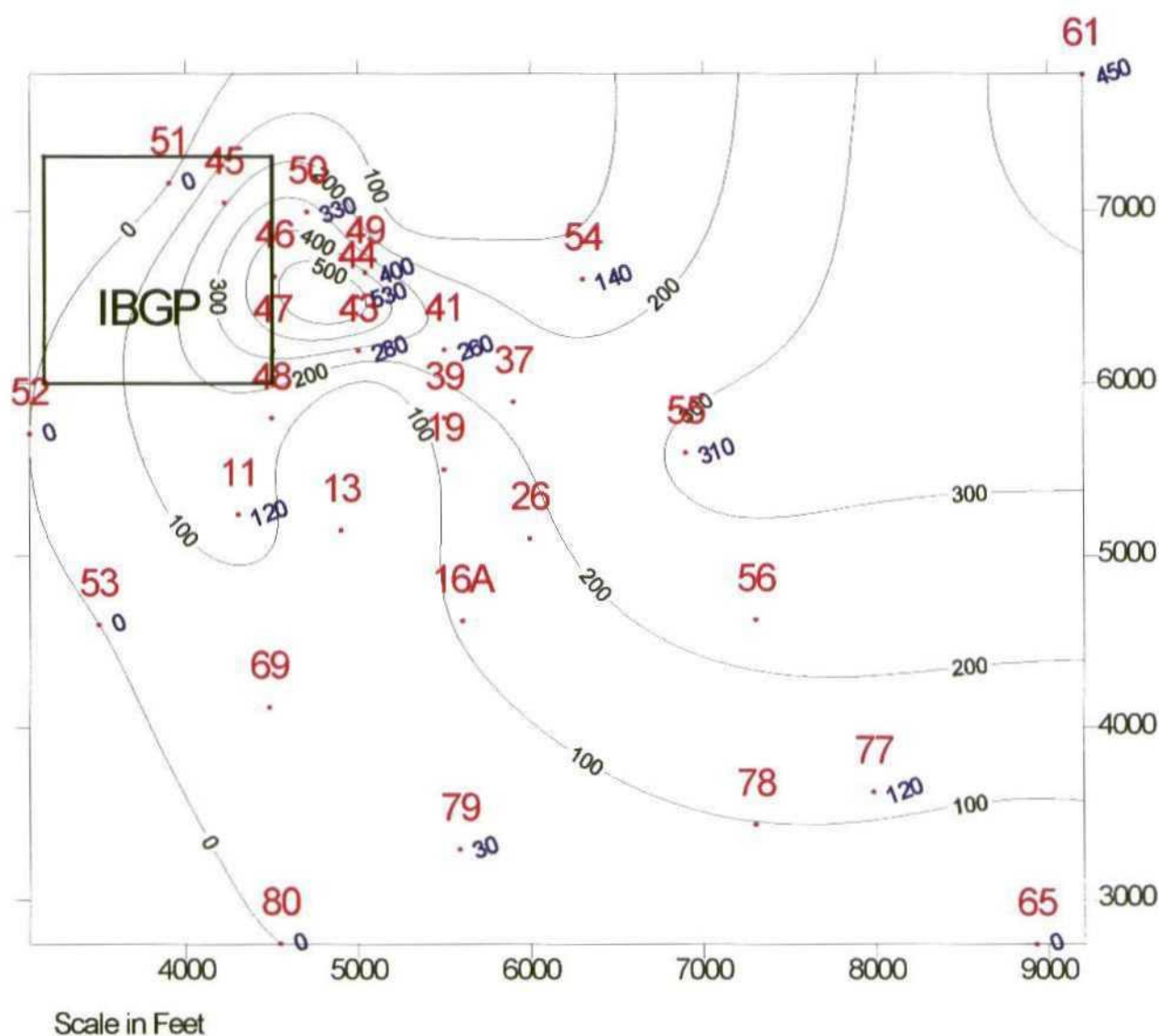
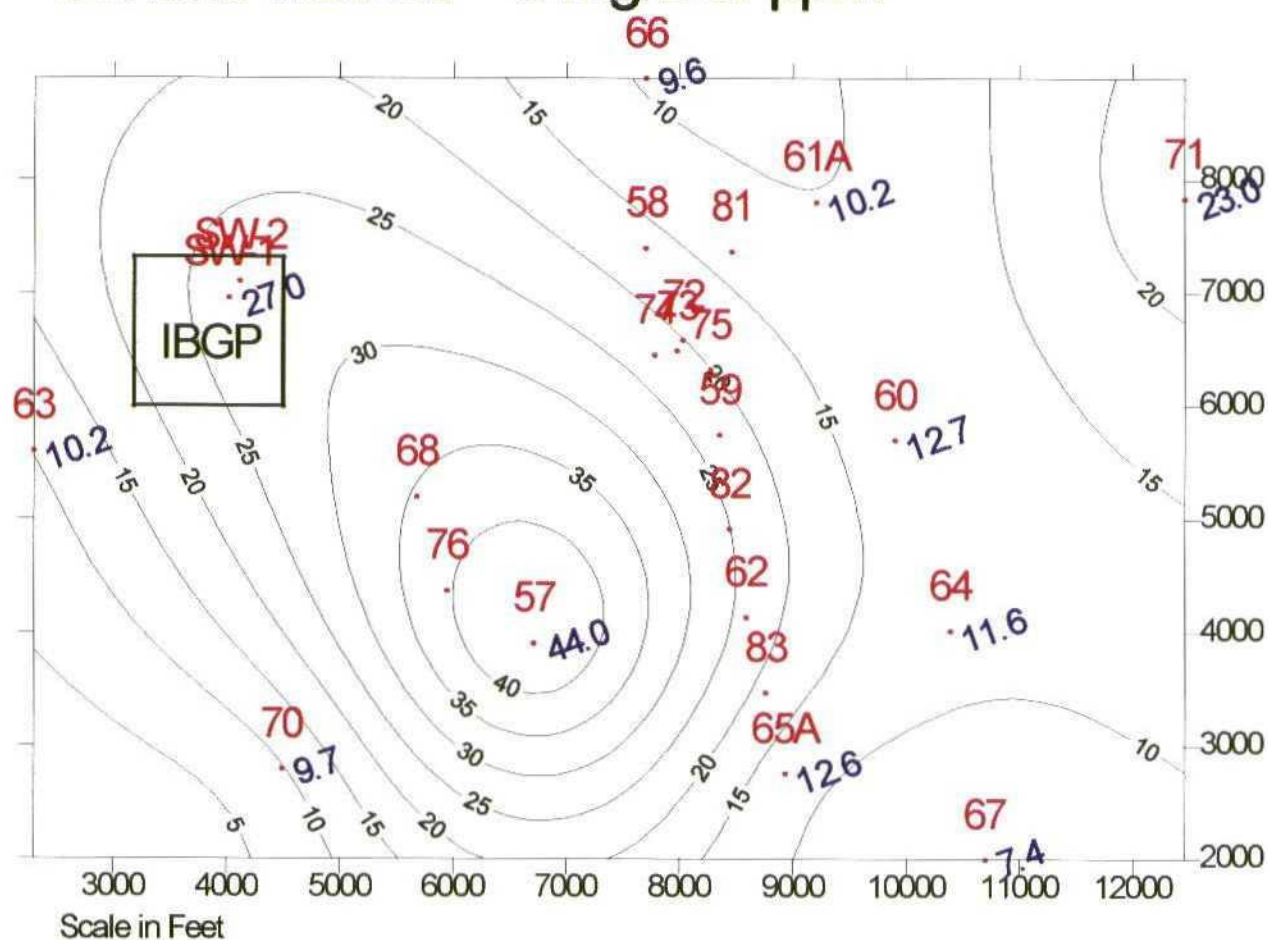


Figure 8
 Lower Queen Chloride Isoconcentration Map
 April 1996
 Contour Interval = 5 mg/L or ppm



APPENDIX A

APRIL 1996 GAUGING AND SAMPLING FIELD SUMMARY



FLUOR DANIEL GTI

May 16, 1996

Project No.: 053350107.62

Mr. Robert J. Menzie, Jr.
Marathon Oil Company
P.O. Box 552
Midland, TX 79702-5233

RE: Transmittal of Groundwater Monitoring and Sampling Reports, Quarter 2 Data

Dear Bob:

Enclosed for your use are summary tables of groundwater monitoring and sampling data collected in April 1996 during the 2nd quarter groundwater sampling event. These tables have been reformatted somewhat for clarity in accordance with our recent conversation.

If you have any questions regarding these data, or require any additional information or services, please do not hesitate to contact me at (505) 242-3113.

Sincerely,

Fluor Daniel GTI, Inc.

Susan Fields, P.E.
Operations Manager

c: Project File

dg/marathon-01/2ndqtr.ltr

MCR

MAY 20 1996

Enclosure

Well Gauging Data Form

Client: Marathon Oil Company
 Site: Indian Basin Remediation Project
 Project #: 053350107.62
 Date: 4/16-19/96

Recorded By: C. Briscoe K. Cook
 Interface Probe (IP) #: ORS 300' IP Marathons
 IP Corrector: NA
 Weather: Sunny/Windy

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	LEL READING %	PID READING (ppm)	COMMENTS
MW-03	2		16.90	DRY					0	NA	4/19/96
MW-05	2		12.77	DRY					0	NA	4/19/96
MW-06	2		14.18	-					-	-	4/17/96, CANNOT FIND
MW-07	2	12:38	17.33	DRY					0	0	4/17/96
MW-08	2	12:32	17.24	DRY					0	0	4/17/96
MW-09	2	12:22	13.65	DRY					0	0	4/17/96
MW-10	4		18.21	DRY					0	NA	4/19/96
MW-11	4		24.85	23.97					0	NA	4/19/96
MW-13	2		22.07	19.98	19.89	0.09	0.066	19.91	0	NA	N/S PSH 4/18/96
MW-19	4		19.11	19.06					0	NA	N/S INSUF H2O 4/19/96
MW-24	2		13.18	DRY					0	NA	4/19/96
MW-29	2		14.76	DRY					0	NA	4/19/96
MW-32	2		15.70	DRY					0	NA	4/19/96
MW-38	4		20.57	DRY					0	NA	4/19/96 N/S DRY
MW-39	4		20.54	20.32					0	NA	4/17/96 N/S INSUF H2O
MW-41	4		24.04	20.10					0	NA	4/19/96
MW-43	4		24.55	21.70					0	NA	4/19/96
MW-44	4		25.24	21.88					0	NA	4/19/96



Well Gauging Data Form

Client: Marathon Oil Company
 Site: Indian Basin Remediation Project
 Project #: 053350107.62
 Date: 4/16/96

Recorded By: Briscoe
 Interface Probe (P) #: MOCs 300' IP
 IP Corrector: NA
 Weather: Cloudy

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (H:M:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	LEL READING %	PID READING (ppm)	COMMENTS
MW-45	2		26.62	-					-	-	Piping in well, no access
MW-46	4		19.80	19.52					0	NA	4/19/96 N/S INSUFF H2O
MW-47	2		21.79	DRY					0	NA	4/19/96 N/S DRY
MW-48	2		19.98	DRY					0	0	4/19/96 N/S DRY
MW-49	2		25.91	22.59					0	0	4/19/96
MW-50	2		37.15	27.22					0	0	4/19/96
MW-52	2		21.19	DRY					0	0	4/19/96
MW-53	2	12:15	15.20	DRY					0	0	4/17/96
MW-54	4	16:43	78.15	48.97					0	NA	4/17/96
MW-55	4	16:32	66.32	33.03					0	NA	4/17/96
MW-56	4		43.76	DRY					0	NA	4/19/96 N/S DRY
MW-57	4	16:18	179.30	161.95					0	0	4/17/96
MW-58		13:43	173.4	DRY					0	0	4/17/96 Mud on probe
MW-59		15:00		193.37	192.00	1.37	1.00	192.37	0	0	4/17/96 N/S PSH
MW-60	4	14:15	226.08	187.83					0	0	4/17/96
MW-61	4	13:14	57.97	37.18					0	0	4/17/96
MW-61A	4	-	215.67	-					-	-	Pump in well, no access
MW-62		14:51		192.39	192.38	0.01	0.007	192.38	0	0	4/17/96 N/S PSH
MW-63	4	17:50	221.88	199.23					0	0	



Well Gauging Data Form

Client:	Marathon Oil Company	Recorded By:	Cook
Site:	Indian Basin Remediation Project	Interface Probe (IP) #:	MOCs 300' IP
Project #:	053350107.62	IP Correcton:	NA
Date:	4/16-19/96	Weather:	Sunny/Windy

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	LEL READING %	PID READING (ppm)	COMMENTS
MW-64	4	14:22	204.38	170.98					0	305	4/17/96
MW-65	4	14:34	57.69	57.35					0	0	4/17/96 N/S INSUF H2O
MW-65A		--		--					--	--	Cannot gauge, pump in well
MW-66	4	13:21	237.66	202.29					0	0	4/17/96
MW-67	4	14:28	168.54	138.13					0	2	4/17/96
MW-69	4	12:10	51.27	36.60	36.64	0.04	0.19	36.41	4	564	4/17/96
MW-70	4	17:10	228.14	194.94					0	0	
MW-71	4	11:36	235.41	151.74					0	0	4/17/96
MW-72		15:34		214.60	198.25	16.35	11.94	202.66	0	NA	4/17/96
MW-73		15:46		204.10	202.24	1.86	1.36	202.74	25+	NA	4/17/1996, N/S PSH
MW-74	8	16:05	220.00	187.30					100+	NA	4/17/96 Heavy condensate on probe
MW-75	8	15:07	220.00	189.17	189.13	0.04	0.03	189.14	0	20.4	4/17/96
MW-76	8	16:24	220.00	169.59	168.60	0.99	0.72	168.87	48	NA	4/17/96
MW-77	8	16:12	82.20	78.95					0	NA	4/17/96
MW-78	8		86.62	86.29					0	0	4/19/96 N/S Insuf H2O
MW-79	8	12:55	82.90	78.36					0	0	4/17/96
MW-80	8	17:10	91.80	DRY							
MW-81		13:34		204.35	194.40	9.95	7.26	197.09	0	3.8	4/17/96



Well Gauging Data Form

Client: Marathon Oil Company
 Site: Indian Basin Remediation Project
 Project #: 053350107.62
 Date: 4/16-19/96

Recorded By: Cook
 Interface Probe (IP) #: MOCs 300' IP
 IP Correcton: NA
 Weather: Sunny/Windy

WELL NUMBER	WELL DIA. (inch)	TIME OF READING (HH:MM)	TOTAL DEPTH (feet)	DTW (feet)	DTP (feet)	PT (feet)	PTx0.73 (feet)	ADJ DTW (feet)	LEL READING %	PID READING (ppm)	COMMENTS
MW-82		15:26		209.12					0	142	4/17/96
MW-83		14:45		179.40	179.20	0.20	0.15	179.25	0	361	4/17/96
MW-84											
MW-85											
MW-86											Not yet installed
MW-87											Not yet installed
MW-88											Not yet installed
MW-89											Not yet installed
MW-90	8										Not yet installed
MW-91	8										Not yet installed
MW-92	8										Not yet installed
MW-93	8										Not yet installed
SUMP-16A	24		17.45								4/19/96
SUMP-A10	24		13.42	DRY					0	0	4/19/96 N/S DRY
*SW-02	10	18:15	292.00	182.25	--	--	--	--	17.8 (O2)	2280	
*Heavy positive pressure in this well. Both doors should be opened and building monitored before entry.											

LOWER QUEEN MONITORING WELL GAUGING, PURGING, AND SAMPLING FORM

Project Name/Location: MOC/IBRP Carlsbad, New Mexico Date: 4/16/96
 Project Number: 053350107 Technician: Briscoe

Well Number	Well Dia. (in)	Well Depth (ft)	DTW from TOC (ft)	Purge volume (gal)	Purge Method (pump/bail)	Actual volume purged (gal)	Depth of pump (ft)	Pumping rate (gpm)	Final pH	Final Spec. Cond. (mohms/cm)	Final Temp. (F)	Final DO (mg/l)	Date, time sample/comments
MW-57	4	179.30	161.95	40	Pump	40	170	5	6.27	330	70.1		4/18/96 14:40
MW-58	4	218.03	DRY	NA									N/S
MW-59	4	211.29											N/S PSH
MW-60	4	226.08	187.83	100	Pump	100	220	5	7.01	1530	69.7		4/18/96 8:20
MW-62	4	224.69	192.39	NA									N/S PSH
MW-63	4	221.88	199.23	44	Pump	45	218	3	8.09	570	69.2		4/17/96 12:20
MW-64	4	204.38	170.98	70	Pump	70	200	6	7.16	770	68.2		4/18/96 9:35
MW-65A	4	168.56		NA	Pump in well								4/18/96 10:45
MW-66	4	237.66	202.29	70	Pump	70	235	3	7.18	900	67.5		4/17/96 18:25
MW-67	4	168.54	138.13	60	Pump	60	160	8	7.45	740	69.7		4/18/96 10:32
MW-70	4	228.14	194.94	66	Pump	80	220	4	7.96	550	64.1	NA	4/17/96 8:27
MW-71	4	235.41	151.74	170	Pump	170	230	.5-2	7.28	1230	74.0		4/17/96 16:05

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic).
- 2 - Purge amounts are 3 well casing volumes
- 3 - N/S: Not sampled due to insufficient recharge, NA: Not Applicable

SHALLOW ZONE MONITORING WELL GAUGING, PURGING, AND SAMPLING FORM

Project Name/Location: MOC/IBRP Carlsbad, New Mexico Date: 4/16-19/96
 Project Number: 053350107 Technician: Briscoe/Cook

Well Number	Well Dia. (in)	Well Depth (ft)	DTW from TOC (ft)	Purge volume (gal)	Purge Method (pump/bail)	Actual volume purged (gal)	Depth of pump (ft)	Pumping rate (gpm)	Final pH	Final Spec. Cond. (mohms/cm)	Final Temp. (F)	Final DO (mg/l)	Date, time sampled/comments
MW-11	4	24.85	23.97		Hand	1			7.17	1490	76.7		4/19/96 19:20
MW-13	2	22.07											N/S PSH
MW-19	4	19.11	19.06										N/S Insuf. H2O
MW-38	4	20.57											N/S Dry
MW-39	4	20.54	20.32										N/S Insuf. H2O
MW-41	4	24.04	20.10		Hand	4.5			7.21	2140	74.8		4/19/96 18:35
MW-43	4	24.55	21.70		Hand	6			7.52	2180	75.0		4/19/96 18:20
MW-44	4	25.24	21.88		Hand	7			7.04	3330	74.3		4/19/96 18:00
MW-46	4	19.80	19.52										N/S Insuf. H2O
MW-47	2	21.79											N/S Dry
MW-48	2	19.98											N/S Dry
MW-49	2	25.91	22.52		Hand	1.5			7.29	2990	74.4		4/19/96 17:45
MW-50	2	37.15	27.22		Hand	5			7.12	3200	72.5		4/19/96 17:15

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic).
- 2 - Purge amounts are 3 well casing volumes
- 3 - N/S: Not sampled due to insufficient recharge, NA: Not Applicable



FLUOR DANIEL GTI

SHALLOW ZONE MONITORING WELL GAUGING, PURGING, AND SAMPLING FORM

Project Name/Location: MOC/IBRP Carlsbad, New Mexico Date: 4/16-19/96

Project Number: 053350107 Technician: Briscoe/Cook

Well Number	Well Dia. (in)	Well Depth (ft)	DTW from TOC (ft)	Purge volume (gal)	Purge Method (pump/bail)	Actual volume purged (gal)	Depth of pump (ft)	Pumping rate (gpm)	Final pH	Final Spec. Cond. (mohms/cm)	Final Temp. (F)	Final DO (mg/l)	Date, time sampled/comments
MW-54	4	78.15	48.97	60	Pump	30	75	1	6.40	2790	76.4		4/18/96 14:40
MW-55	4	66.32	33.03	66	Pump	66	60	5	6.41	115	72.2		4/18/96 12:40
MW-56	4	43.76	DRY										N/S
MW-61	4	57.97	37.18	40	Pump	40	55	1					4/18/96
MW-65	4	57.69	57.35										N/S Insuf. H2O
MW-77	7.875	82.20	78.95		Not purged	NA			NA	NA	NA		4/19/96 19:40
MW-78	7.875	86.62	86.29										N/S Insuf. H2O
MW-79	7.875	82.90	78.36		Hand	6			7.82	670	75.1		4/19/96 16:29
Sump 16A				NA									4/19/96 18:55

Comments:

- 1 - All wells sampled with Teflon bailers for BTEX by EPA Method 8020 (2 x 40 ml VOA's) and Chloride (1 x 250 ml plastic).
- 2 - Purge amounts are 3 well casing volumes
- 3 - N/S: Not sampled due to insufficient recharge, NA: Not Applicable



APPENDIX B
APRIL 1996 LABORATORY RESULTS

American Environmental Network, Inc.

AEN I.D. 604388

May 7, 1996

Marathon Oil Company
P.O. Box 552
Midland, TX 79702

Project Name/Number: IB REMEDIATION

Attention: Bob Menzie

On 04/22/96, American Environmental Network (NM), Inc., (ADHS License No. AZ0015) 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.

Chloride analyses were performed by American Environmental Network (AZ), Inc., 9830 S. 51st Street, Suite B-113, Phoenix, AZ.

All other analyses were performed by American Environmental Network (NM), Inc., Albuquerque, NM.

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



Kimberly D. McNeill
Project Manager



H. Mitchell Rubenstein, Ph.D.
General Manager

MR:jt

Enclosure

American Environmental Network, Inc.

CLIENT : MARATHON OIL COMPANY DATE RECEIVED : 04/22/96
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION REPORT DATE : 05/07/96
AEN ID: 604388

AEN #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	INT-RB	AQUEOUS	04/17/96
02	MW-70 RB	AQUEOUS	04/17/96
03	MW-70	AQUEOUS	04/17/96
04	MW-63	AQUEOUS	04/17/96
05	MW-63 RB	AQUEOUS	04/17/96
06	MW-71 RB	AQUEOUS	04/17/96
07	MW-71	AQUEOUS	04/17/96
08	MW-66 RB	AQUEOUS	04/17/96
09	MW-66	AQUEOUS	04/17/96
10	MW-60	AQUEOUS	04/18/96
11	MW-60 RB	AQUEOUS	04/18/96
12	MW-64	AQUEOUS	04/18/96
13	MW-64 RB	AQUEOUS	04/18/96
14	MW-67	AQUEOUS	04/18/96
15	MW-67 RB	AQUEOUS	04/18/96
16	MW-65A	AQUEOUS	04/18/96
17	MW-57	AQUEOUS	04/18/96
18	MW-57 RB	AQUEOUS	04/18/96
19	MW-55 RB	AQUEOUS	04/18/96
20	MW-55	AQUEOUS	04/18/96
21	MW-54 RB	AQUEOUS	04/18/96
22	MW-54	AQUEOUS	04/18/96
23	MW-61	AQUEOUS	04/18/96
24	MW-61 RB	AQUEOUS	04/18/96
25	MW-79	AQUEOUS	04/19/96
26	MW-50	AQUEOUS	04/19/96
27	MW-49	AQUEOUS	04/19/96
28	MW-44	AQUEOUS	04/19/96
29	MW-43	AQUEOUS	04/19/96
30	MW-41	AQUEOUS	04/19/96
31	SUMP 16A	AQUEOUS	04/19/96
32	MW-11	AQUEOUS	04/19/96
33	MW-77	AQUEOUS	04/19/96
34	ARROYO	AQUEOUS	04/17/96
35	BIEBBLE	AQUEOUS	04/17/96

American Environmental Network, Inc.

CLIENT : MARATHON OIL COMPANY DATE RECEIVED : 04/22/96
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION REPORT DATE : 05/07/96

AEN ID: 604388

AEN #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
36	LYMAN	AQUEOUS	04/18/96
37	STRIPPER INLET	AQUEOUS	04/18/96
38	STRIPPER OUTLET	AQUEOUS	04/18/96
39	SW-1	AQUEOUS	04/18/96
40	MW-61A	AQUEOUS	04/19/96
41	TRIP BLANK	AQUEOUS	04/08/96

---TOTALS---

<u>MATRIX</u>	<u>#SAMPLES</u>
AQUEOUS	41

AEN STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

American Environmental Network, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 604832

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 604388
PROJECT NAME : IB REMEDIATION

DATE RECEIVED : 04/23/96

REPORT DATE : 05/07/96

PARAMETER	UNITS	03	04	07	09	10
CHLORIDE (EPA 325.2)	MG/L	9.7	10.2	23	9.6	12.7

American Environmental Network, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 604832

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.

DATE RECEIVED : 04/23/96

PROJECT # : 604388

PROJECT NAME : IB REMEDIATION

REPORT DATE : 05/07/96

PARAMETER	UNITS	12	14	16	17	20
CHLORIDE (EPA 325.2)	MG/L	11.6	7.4	12.6	44	310

American Environmental Network, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 604832

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.

DATE RECEIVED : 04/23/96

PROJECT # : 604388

PROJECT NAME : IB REMEDIATION

REPORT DATE : 05/07/96

PARAMETER	UNITS	22	23	25	26	27
CHLORIDE (EPA 325.2)	MG/L	140	450	30	330	400

American Environmental Network, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 604832

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.

DATE RECEIVED : 04/23/96

PROJECT # : 604388

PROJECT NAME : IB REMEDIATION

REPORT DATE : 05/07/96

PARAMETER	UNITS	28	29	30	32	33
CHLORIDE (EPA 325.2)	MG/L	530	280	260	120	120

American Environmental Network, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 604832

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.

DATE RECEIVED : 04/23/96

PROJECT # : 604388

PROJECT NAME : IB REMEDIATION

REPORT DATE : 05/07/96

PARAMETER	UNITS	34	35	36	39	40
CHLORIDE (EPA 325.2)	MG/L	10.9	10.5	11.1	27	10.2

American Environmental Network, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.

PROJECT # : 604388

PROJECT NAME : IB REMEDIATION

ATI I.D. : 604832

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CHLORIDE	MG/L	60481102	75	75	0	176	100	101
CHLORIDE	MG/L	60483204	9.6	9.6	0	19.8	10.0	102
CHLORIDE	MG/L	60483213	30	30	0	81	50	102
CHLORIDE	MG/L	60483223	11.1	11.1	0	21.6	10.0	105

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

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

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	INT-RB	AQUEOUS	04/17/96	NA	04/22/96	1
02	MW-70-RB	AQUEOUS	04/17/96	NA	04/22/96	1
03	MW-70	AQUEOUS	04/17/96	NA	04/22/96	1

PARAMETER	UNITS	01	02	03
BENZENE	UG/L	<0.5	<0.5	<0.5
TOLUENE	UG/L	<0.5	<0.5	<0.5
ETHYLBENZENE	UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES	UG/L	<0.5	<0.5	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5	<2.5	<2.5

SURROGATE:

BROMOFLUOROBENZENE (%)	101	101	101
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GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	MW-63	AQUEOUS	04/17/96	NA	04/22/96	1
05	MW-63 RB	AQUEOUS	04/17/96	NA	04/22/96	1
06	MW-71 RB	AQUEOUS	04/17/96	NA	04/22/96	1

PARAMETER	UNITS	04	05	06
BENZENE	UG/L	<0.5	<0.5	<0.5
TOLUENE	UG/L	<0.5	<0.5	<0.5
ETHYLBENZENE	UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES	UG/L	<0.5	<0.5	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5	<2.5	<2.5

SURROGATE:

BROMOFLUOROBENZENE (%)	99	100	100
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GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
07	MW-71	AQUEOUS	04/17/96	NA	04/23/96	1
08	MW-66 RB	AQUEOUS	04/17/96	NA	04/22/96	1
09	MW-66	AQUEOUS	04/17/96	NA	04/23/96	1

PARAMETER	UNITS	07	08	09
BENZENE	UG/L	<0.5	<0.5	<0.5
TOLUENE	UG/L	<0.5	<0.5	0.8
ETHYLBENZENE	UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES	UG/L	<0.5	<0.5	1.0
METHYL-t-BUTYL ETHER	UG/L	<2.5	<2.5	<2.5

SURROGATE:

BROMOFLUOROBENZENE (%)	99	102	99
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GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	MW-60	AQUEOUS	04/18/96	NA	04/22/96	1
11	MW-60 RB	AQUEOUS	04/18/96	NA	04/22/96	1
12	MW-64	AQUEOUS	04/18/96	NA	04/22/96	1
PARAMETER			UNITS	10	11	12
BENZENE			UG/L	<0.5	<0.5	10
TOLUENE			UG/L	<0.5	<0.5	2.0
ETHYLBENZENE			UG/L	<0.5	<0.5	4.3
TOTAL XYLENES			UG/L	<0.5	<0.5	7.9
METHYL-t-BUTYL ETHER			UG/L	<2.5	<2.5	<2.5

SURROGATE:

BROMOFLUOROBENZENE (%)	103	88	107
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GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
13	MW-64 RB	AQUEOUS	04/18/96	NA	04/22/96	1
14	MW-67	AQUEOUS	04/18/96	NA	04/22/96	1
15	MW-67 RB	AQUEOUS	04/18/96	NA	04/23/96	1

PARAMETER	UNITS	13	14	15
BENZENE	UG/L	<0.5	3.4	<0.5
TOLUENE	UG/L	<0.5	0.9	<0.5
ETHYLBENZENE	UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES	UG/L	<0.5	2.5	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5	<2.5	<2.5

SURROGATE:

BROMOFLUOROBENZENE (%)	105	102	104
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GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
16	MW-65A	AQUEOUS	04/18/96	NA	04/23/96	1
17	MW-57	AQUEOUS	04/18/96	NA	04/23/96	1
18	MW-57 RB	AQUEOUS	04/18/96	NA	04/23/96	1

PARAMETER	UNITS	16	17	18
BENZENE	UG/L	0.5	<0.5	<0.5
TOLUENE	UG/L	0.5	0.9	<0.5
ETHYLBENZENE	UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES	UG/L	2.0	<0.5	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5	<2.5	<2.5

SURROGATE:

BROMOFLUOROBENZENE (%)	102	99	106
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GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
19	MW-55 RB	AQUEOUS	04/18/96	NA	04/23/96	1
20	MW-55	AQUEOUS	04/18/96	NA	04/23/96	5
21	MW-54 RB	AQUEOUS	04/18/96	NA	04/23/96	1

PARAMETER	UNITS	19	20	21
BENZENE	UG/L	1.6	370	<0.5
TOLUENE	UG/L	<0.5	13	<0.5
ETHYLBENZENE	UG/L	2.9	310	<0.5
TOTAL XYLENES	UG/L	<0.5	22	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5	<13	<2.5

SURROGATE:

BROMOFLUOROBENZENE (%)	101	107	102
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GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
22	MW-54	AQUEOUS	04/18/96	NA	04/23/96	1
23	MW-61	AQUEOUS	04/18/96	NA	04/23/96	1
24	MW-61 RB	AQUEOUS	04/18/96	NA	04/23/96	1

PARAMETER	UNITS	22	23	24
BENZENE	UG/L	<0.5	<0.5	<0.5
TOLUENE	UG/L	<0.5	<0.5	<0.5
ETHYLBENZENE	UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES	UG/L	<0.5	<0.5	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5	<2.5	<2.5

SURROGATE:

BROMOFLUOROBENZENE (%)	102	97	101
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GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
25	MW-79	AQUEOUS	04/19/96	NA	04/23/96	1
26	MW-50	AQUEOUS	04/19/96	NA	04/23/96	1
27	MW-49	AQUEOUS	04/19/96	NA	04/23/96	5

PARAMETER	UNITS	25	26	27
BENZENE	UG/L	2.4	<0.5	87
TOLUENE	UG/L	7.3	<0.5	23
ETHYLBENZENE	UG/L	1.0	<0.5	18
TOTAL XYLENES	UG/L	2.7	<0.5	32
METHYL-t-BUTYL ETHER	UG/L	6.2	<2.5	<13

SURROGATE:

BROMOFLUOROBENZENE (%)	84	103	104
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GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
28	MW-44	AQUEOUS	04/19/96	NA	04/23/96	5
29	MW-43	AQUEOUS	04/19/96	NA	04/23/96	1
30	MW-41	AQUEOUS	04/19/96	NA	04/24/96	1

PARAMETER	UNITS	28	29	30
BENZENE	UG/L	26	4.4	1.7
TOLUENE	UG/L	11	4.3	9.8
ETHYLBENZENE	UG/L	74	1.3	5.5
TOTAL XYLENES	UG/L	6.3	5.3	6.7
METHYL-t-BUTYL ETHER	UG/L	<13	<2.5	<2.5

SURROGATE:

BROMOFLUOROBENZENE (%)	83	110	97
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GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
31	SUMP 16A	AQUEOUS	04/19/96	NA	04/23/96	1
32	MW-11	AQUEOUS	04/19/96	NA	04/24/96	10
33	MW-77	AQUEOUS	04/19/96	NA	04/24/96	1

PARAMETER	UNITS	31	32	33
BENZENE	UG/L	0.8	650	<0.5
TOLUENE	UG/L	1.5	38	3.8
ETHYLBENZENE	UG/L	3.8	84	0.8
TOTAL XYLENES	UG/L	27	2800	2.5
METHYL-t-BUTYL ETHER	UG/L	<2.5	<25	<2.5

SURROGATE:

BROMOFLUOROBENZENE (%)	100	98	95
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GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : MARATHON OIL COMPANY AEN I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
41	TRIP BLANK	AQUEOUS	04/08/96	NA	04/24/96	1

PARAMETER	UNITS	41
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 (%) 103

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX, MTBE (EPA 8020)	AEN I.D.	: 604388
BLANK I.D.	: 042296	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: (NONE)	DATE ANALYZED	: 04/22/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

PARAMETER	UNITS	
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 (%)	98
------------------------	----

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX, MTBE (EPA 8020)	AEN I.D.	: 604388
BLANK I.D.	: 042296B	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: (NONE)	DATE ANALYZED	: 04/22/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

PARAMETER	UNITS	
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 (%)	101
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GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX, MTBE (EPA 8020)	AEN I.D.	: 604388
BLANK I.D.	: 042396	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: (NONE)	DATE ANALYZED	: 04/23/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

PARAMETER	UNITS	
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 (%)	99
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GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX, MTBE (EPA 8020)	AEN I.D.	: 604388
BLANK I.D.	: 042396B	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: (NONE)	DATE ANALYZED	: 04/23/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

PARAMETER	UNITS	
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 (%)	101
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GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX, MTBE (EPA 8020)	AEN I.D.	: 604388
BLANK I.D.	: 042496	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: (NONE)	DATE ANALYZED	: 04/24/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

PARAMETER	UNITS	
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 (%)	100
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GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : BTEX, MTBE (EPA 8020)
MSMSD # : 60438803 AEN I.D. : 604388
CLIENT : MARATHON OIL COMPANY DATE EXTRACTED : NA
PROJECT # : (NONE) DATE ANALYZED : 04/22/96
PROJECT NAME : IB REMEDIATION SAMPLE MATRIX : AQUEOUS
REF. I.D. : 60438803 UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10.0	9.4	94	10.1	101	7
TOLUENE	<0.5	10.0	9.6	96	10.3	103	7
ETHYLBENZENE	<0.5	10.0	9.4	94	10.1	101	7
TOTAL XYLENES	<0.5	30.0	28.6	95	30.8	103	7
METHYL-t-BUTYL ETHER	<2.5	20.0	20.5	103	22.1	111	8

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

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

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : BTEX, MTBE (EPA 8020)
MSMSD # : 60438822 AEN I.D. : 604388
CLIENT : MARATHON OIL COMPANY DATE EXTRACTED : NA
PROJECT # : (NONE) DATE ANALYZED : 04/23/96
PROJECT NAME : IB REMEDIATION SAMPLE MATRIX : AQUEOUS
REF. I.D. : 60438822 UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10.0	10.0	100	9.6	96	4
TOLUENE	<0.5	10.0	9.9	99	9.6	96	3
ETHYLBENZENE	<0.5	10.0	10.2	102	9.9	99	3
TOTAL XYLENES	<0.5	30.0	30.3	101	29.4	98	3
METHYL-t-BUTYL ETHER	<2.5	20.0	22.5	113	20.8	104	8

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

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

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
34	ARROYO	AQUEOUS	04/17/96	NA	04/24/96	1
35	BIEBBLE	AQUEOUS	04/17/96	NA	04/24/96	1
36	LYMAN	AQUEOUS	04/18/96	NA	04/24/96	1
PARAMETER			UNITS	34	35	36
BENZENE			UG/L	<0.5	<0.5	<0.5
TOLUENE			UG/L	<0.5	<0.5	<0.5
ETHYLBENZENE			UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES			UG/L	<0.5	<0.5	<0.5

SURROGATE:

BROMOFLUOROBENZENE (%) 101 104 104

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
37	STRIPPER INLET	AQUEOUS	04/18/96	NA	04/24/96	10
38	STRIPPER OUTLET	AQUEOUS	04/18/96	NA	04/24/96	1
39	SW-1	AQUEOUS	04/18/96	NA	04/24/96	1
PARAMETER			UNITS	37	38	39
BENZENE			UG/L	<5.0	24	<0.5
TOLUENE			UG/L	79	3.4	<0.5
ETHYLBENZENE			UG/L	61	21	<0.5
TOTAL XYLENES			UG/L	490	130	<0.5

SURROGATE:

BROMOFLUOROBENZENE (%)	156*	110	99
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*OUTSIDE AEN QUALITY CONTROL LIMITS DUE TO MATRIX INTERFERENCE

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY ATI I.D.: 604388
PROJECT # : (NONE)
PROJECT NAME : IB REMEDIATION

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
40	MW-61A	AQUEOUS	04/19/96	NA	04/24/96	1
41	TRIP BLANK	AQUEOUS	04/08/96	NA	04/24/96	1
PARAMETER			UNITS	40	41	
BENZENE			UG/L	<0.5	<0.5	
TOLUENE			UG/L	<0.5	<0.5	
ETHYLBENZENE			UG/L	<0.5	<0.5	
TOTAL XYLENES			UG/L	<0.5	<0.5	

SURROGATE:

BROMOFLUOROBENZENE (%) 100 103

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEX (EPA 8020)	ATI I.D.	: 604388
BLANK I.D.	: 042496	MATRIX	: AQUEOUS
CLIENT	: MARATHON OIL COMPANY	DATE EXTRACTED	: NA
PROJECT #	: (NONE)	DATE ANALYZED	: 04/24/96
PROJECT NAME	: IB REMEDIATION	DILUTION FACTOR	: 1

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 (%)	100
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GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 60438836 ATI I.D. : 604388
CLIENT : MARATHON OIL COMPANY DATE EXTRACTED : NA
PROJECT # : (NONE) DATE ANALYZED : 04/24/96
PROJECT NAME : IB REMEDIATION SAMPLE MATRIX : AQUEOUS
REF. I.D. : 60438836 UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10.0	9.9	99	9.6	96	3
TOLUENE	<0.5	10.0	10.1	101	9.4	94	7
ETHYLBENZENE	<0.5	10.0	10.1	101	9.6	96	5
TOTAL XYLENES	<0.5	30.0	30.9	103	30.9	103	0

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

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



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CHAIN OF CUSTODY
DATE: 4-17-96 PAGE: 1 OF 5

ATLABID.
604388

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PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bob Menzies		COMPANY: Mather O/C	
ADDRESS: P.O. Box 552		PHONE: (915) 687-8312	
FAX: (915) 687-8337		BILL TO: ABOVE	
COMPANY: SPCO AR		ADDRESS:	
SAMPLE ID		DATE	TIME
INT-RB	08:22	4/1/96	AR
MM-70 RB	0945	4/1/96	-02
MM-70	0950	4/1/96	-03
MM-63	12:30	4/1/96	-04
MM-63 RB	12:20	4/1/96	-05
MM-71 RB	16:10	4/1/96	-06
MM-71	16:05	4/1/96	-07
MM-66 RB	18:15	4/1/96	-08
MM-66	18:25	4/1/96	-09
PROJECT INFORMATION		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS	
PROJ. NO.:	(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK	(NORMAL) ☐ 2 WEEK	
PROJ. NAME:	CERTIFICATION REQUIRED: ☐ NM ☐ OTHER		
P.O. NO.:	METHANOL PRESERVATION ☐		
SHIPPED VIA:	COMMENTS:		
SAMPLE RECEIPT		RELINQUISHED BY: 1.	
NO. CONTAINERS: 23	Signature: [Signature]		Time: 0950
CUSTODY SEALS: YQDNA	Printed Name: Keni Cole		Date: 4-22-96
RECEIVED INTACT: Y	Company: GTE		
BLUE ICE: 10°C	RECEIVED BY: 1.		
Signature: [Signature]		Time: 0950	
Printed Name: [Signature]		Date: 4-22-96	
Company: Analytical Technologies of New Mexico			
RELINQUISHED BY: 2.			
Signature: [Signature]		Time: 0950	
Printed Name: [Signature]		Date: 4-22-96	
Company: Analytical Technologies of New Mexico			
RECEIVED BY: (LAB) 2.			
Signature: [Signature]		Time: 0950	
Printed Name: [Signature]		Date: 4-22-96	
Company: Analytical Technologies of New Mexico			
NUMBER OF CONTAINERS			



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CHAIN OF CUSTODY

DATE: 4/18/96 PAGE: 2 OF 2

ATI LAB I.D.
604388

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PROJECT MANAGER: Bob Menzies				ANALYSIS REQUEST			
COMPANY: <u>Martinez O/C</u>				Petroleum Hydrocarbons (418.1) TRPH			
ADDRESS: <u>PO Box 552</u>				(MOD.8015) Diesel/Direct/Inject			
PHONE: <u>(915) 687-8312</u>				Chloro. 05			
FAX: <u>(915) 687-8337</u>				(M8015) Gas/Purge & Trap			
BILL TO:				Gasoline/BTEX & MTBE (M8015/8020)			
COMPANY:				BTXE/MTBE (8020)			
ADDRESS: <u>State AS PO Box</u>				BTEX & Chlorinated Aromatics (602/8020)			
				BTEX/MTBE/EDC & EDB (8020/8010/Short)			
				Chlorinated Hydrocarbons (601/8010)			
				504 EDB ☐ / DBCP ☐			
				Polynuclear Aromatics (610/8310)			
				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:			
				Priority Pollutant Metals (13)			
				Target Analyte List Metals (23)			
				RCRA Metals (8)			
				RCRA Metals by TCLP (Method 1311)			
				Metals:			
				NUMBER OF CONTAINERS			
SAMPLE ID				DATE	TIME	MATRIX	LAB I.D.
MW-60				4/18/96	08:20		-10
MW-60 RB				4/18/96	08:29		-11
MW-64				4/18/96	09:30		-12
MW-64 RB				4/18/96	09:35		-13
MW-67				4/18/96	10:32		-14
MW-67 RB				4/18/96	10:20		-15
MW-65A				4/18/96	10:45		-16
MW-57				4/18/96	11:35		-17
MW-57-RB				4/18/96	11:30		-18
PROJECT INFORMATION				PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS			
PROJ. NO.:				(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK ☒ (NORMAL) ☒ 2 WEEK			
PROJ. NAME: <u>To Revitalize</u>				CERTIFICATION REQUIRED: ☐ NM ☐ OTHER			
P.O. NO.:				METHANOL PRESERVATION ☐			
SHIPPED VIA:				COMMENTS:			
SAMPLE RECEIPT							
NO. CONTAINERS: <u>23</u>							
CUSTODY SEALS: <u>YEA NA</u>							
RECEIVED INTACT: <u>Y</u>							
BLUE ICE/ICE: <u>NO</u>							
RELINQUISHED BY: 1.				RELINQUISHED BY: 2.			
Signature: <u>[Signature]</u>				Signature:			
Printed Name: <u>KEN GIL</u>				Printed Name:			
Date: <u>4-22-96</u>				Date:			
Company: <u>ATI</u>				Company:			
RECEIVED BY: <u>1.</u>				RECEIVED BY: (LAB) <u>2.</u>			
Signature: <u>[Signature]</u>				Signature: <u>[Signature]</u>			
Printed Name: <u>John C. [Signature]</u>				Printed Name: <u>[Signature]</u>			
Date: <u>4-22-96</u>				Date: <u>0950</u>			
Company: <u>Analytical Technologies of New Mexico</u>				Company: <u>Analytical Technologies of New Mexico</u>			



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CHAIN OF CUSTODY
DATE: 4/18/96 PAGE: 3 OF 5

ATI LAB I.D. 604388

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PROJECT MANAGER: Bob Mezie		COMPANY: Mather O/C			
ADDRESS: PO Box 552		ADDRESS: Mather TX 79702			
PHONE: (915) 687-8312		PHONE: (915) 687-8337			
FAX: (915) 687-8337		FAX: (915) 687-8337			
BILL TO: ABOVE		BILL TO: ABOVE			
COMPANY: Mather		COMPANY: Mather			
ADDRESS: Mather		ADDRESS: Mather			
SAMPLE ID		DATE	TIME	MATRIX	LAB I.D.
MM-55 EB	4/18/96	12:35			-19
MM-55	4/18/96	12:10			-20
MM-54 RB	4/18/96	14:35			-21
MM-54	4/18/96	14:40			-22
MM-61	4/18/96	16:00			-23
MM-61 RB	4/18/96	16:20			-24
MM-79	4/19/96	16:29			-25
MM-50	4/19/96	17:15			-26
MM-49	4/19/96	17:45			-27
PROJECT INFORMATION					
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS					
(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☐ 12 WEEK					
CERTIFICATION REQUIRED: ☐ NM ☐ OTHER					
METHANOL PRESERVATION ☐					
COMMENTS:					
SAMPLE RECEIPT					
NO. CONTAINERS 27					
CUSTODY SEALS CDNA					
RECEIVED INTACT Y					
BLUE ICE ICE 100					
RELINQUISHED BY: 1. Signature: [Signature] Time: 0950					
RELINQUISHED BY: 2. Signature: [Signature] Time: 0950					
RECEIVED BY: 1. Signature: [Signature] Time: 1. RECEIVED BY: (LAB) 2. Signature: [Signature] Time: 0950					
Printed Name: [Name] Date: 4-22-96					
Printed Name: [Name] Date: 4-22-96					
Analytical Technologies of New Mexico					

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CHAIN OF CUSTODY

DATE: 4/19/96 PAGE: 4 OF 5

ATI LAB I.D.

604388

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PROJECT MANAGER: Bob Menzies		COMPANY: Marathon o/c		
ADDRESS: PO Box 552		PHONE: (915) 687-8312		
FAX: (915) 687-8337		BILL TO: State of NM AGOLC		
COMPANY: State of NM AGOLC		ADDRESS:		
SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
MW-44	4/19/96	1800	Water	-28
MW-43		1820		-29
MW-41		1835		-30
Sample 16A		1855		-31
MW-11		1920		-32
MW-77		1940		-33
Prior Authorization is Required for Rush Projects				
RELINQUISHED BY: 1. Signature: <i>He Lind</i> Time: 0930				
RELINQUISHED BY: 2. Signature: _____ Time: _____				
RECEIVED BY: 1. Signature: <i>Kenn Cook</i> Time: 4:22 PM				
RECEIVED BY: 2. Signature: <i>John C. Lee</i> Time: 4/22/96				

PROJECT INFORMATION	PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS
PROJ. NO.: _____	(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒ 2 WEEK
PROJ. NAME: <i>T&E Landfill</i>	CERTIFICATION REQUIRED: ☐ NM ☐ OTHER
P.O. NO.: _____	METHANOL PRESERVATION ☐
SHIPPED VIA: _____	COMMENTS: _____
SAMPLE RECEIPT	
NO. CONTAINERS: <i>28</i>	
CUSTODY SEALS: <i>(N/A)</i>	
RECEIVED INTACT: ☒	
BLUE ICE/ICE: <i>18</i>	

Petroleum Hydrocarbons (418.1) TRPH	
(MOD.8015) Diesel/Direct/Inject	
<i>Chlorine</i>	
(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)	
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:	
Priority Pollutant Metals (13)	
Target Analyte List Metals (23)	
RCRA Metals (8)	
RCRA Metals by TCLP (Method 1311)	
Metals:	
NUMBER OF CONTAINERS	28



Analytical Technologies of New Mexico, Inc., Albuquerque, NM
San Diego • Phoenix • Seattle • Pensacola • Ft. Collins • Portland • Albuquerque • Anchorage

CHAIN OF CUSTODY
DATE: 4/17/96 PAGE: 5 OF 5

AT LAB I.D.
604388

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.

PROJECT INFORMATION		PRIORITY AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS		RELINQUISHED BY:		RELINQUISHED BY:	
PROJ. NO.	PROJ. NAME	(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK	(NORMAL) ☒ 2 WEEK	Signature:	Time:	Signature:	Time:
PO. NO.:	IB Remediation	CERTIFICATION REQUIRED: ☐ NM ☐ OTHER		Printed Name: Thomas Price	Date: 4-19-96	Printed Name: Kevin Cook	Date: 4-22-96
SHIPPED VIA:		METHANOL PRESERVATION ☐		Company: Marathon Oil Co		Company: AT	
SAMPLE RECEIPT		COMMENTS:		RECEIVED BY: 1.		RECEIVED BY: (LAB) 2.	
NO. CONTAINERS	21			Signature: Kevin Cook	Time: 1507	Signature: Kevin Cook	Time: 0950
CUSTODY SEALS	YCDNA			Printed Name: Kevin Cook	Date: 4-19-96	Printed Name: Kevin Cook	Date: 4-22-96
RECEIVED INTACT	Y			Company: AT		Analytical Technologies of New Mexico	
BLUE ICE	10						

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct/Inject	Chloride	(M8015) Gas/Purge & Trap	Gasoline/BTEX & MTBE (M8015/8020)	BTEX/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)	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	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	NUMBER OF CONTAINERS
AK6040	4-17-96	18:25	LUKAT	-34																						3
Beeble	4-17-96	18:55		-35																						3
LYMAN	4-18-96	06:00		-36																						3
STIPPER INLET	4-18-96	07:25		-37																						2
STIPPER OUTLET	4-18-96	07:30		-38																						2
SU-1	4-18-96	10:00		-39																						3
MU 61A	4-19-96	10:00		-40																						3
7B	4-08-96			-41																						2

Interlab Chain of Custody

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL				ANALYSIS REQUEST																																																																																															
COMPANY: Analytical Technologies of New Mexico, Inc. ADDRESS: 2709-D Pan American Freeway, NE Albuquerque, NM 87107				CLIENT PROJECT MANAGER: K McNeill																																																																																															
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>SAMPLE ID</th> <th>DATE</th> <th>TIME</th> <th>MATRIX</th> <th>LAB ID</th> </tr> </thead> <tbody> <tr> <td>604388-03</td> <td>4/19/96</td> <td>0950</td> <td>AA</td> <td>1</td> </tr> <tr> <td>-04</td> <td></td> <td>1230</td> <td></td> <td>2</td> </tr> <tr> <td>-07</td> <td></td> <td>1605</td> <td></td> <td>3</td> </tr> <tr> <td>-09</td> <td></td> <td>1825</td> <td></td> <td>4</td> </tr> <tr> <td>-10</td> <td>4/18/96</td> <td>0820</td> <td></td> <td>5</td> </tr> <tr> <td>-12</td> <td></td> <td>0930</td> <td></td> <td>6</td> </tr> <tr> <td>-14</td> <td></td> <td>1032</td> <td></td> <td>7</td> </tr> <tr> <td>-16</td> <td></td> <td>1045</td> <td></td> <td>8</td> </tr> <tr> <td>-17</td> <td></td> <td>1135</td> <td></td> <td>9</td> </tr> </tbody> </table>				SAMPLE ID	DATE	TIME	MATRIX	LAB ID	604388-03	4/19/96	0950	AA	1	-04		1230		2	-07		1605		3	-09		1825		4	-10	4/18/96	0820		5	-12		0930		6	-14		1032		7	-16		1045		8	-17		1135		9	<table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>Metals - TAL</td><td></td></tr> <tr><td>Metals - PP List</td><td></td></tr> <tr><td>Metals - RCRA</td><td></td></tr> <tr><td>RCRA Metals by TCLP (1311)</td><td></td></tr> <tr><td>Chloride</td><td>325-2</td></tr> <tr><td>TOX</td><td></td></tr> <tr><td>TOC</td><td></td></tr> <tr><td>Gen Chemistry</td><td></td></tr> <tr><td>Oil and Grease</td><td></td></tr> <tr><td>BOD</td><td></td></tr> <tr><td>COD</td><td></td></tr> <tr><td>Pesticides/PCB (608/8080)</td><td></td></tr> <tr><td>Herbicides (615/8150)</td><td></td></tr> <tr><td>Base/Neutral Acid Compounds GC/MS (625/8270)</td><td></td></tr> <tr><td>Volatile Organics GC/MS (624/8240)</td><td></td></tr> <tr><td>Polynuclear Aromatics (610/8310)</td><td></td></tr> <tr><td>8240 (TCLP 1311) ZHE</td><td></td></tr> <tr><td>8270 (TCLP 1311)</td><td></td></tr> <tr><td>TO-14</td><td></td></tr> <tr><td>Gross Alpha/Beta</td><td></td></tr> <tr><td>NUMBER OF CONTAINERS</td><td></td></tr> </table>				Metals - TAL		Metals - PP List		Metals - RCRA		RCRA Metals by TCLP (1311)		Chloride	325-2	TOX		TOC		Gen Chemistry		Oil and Grease		BOD		COD		Pesticides/PCB (608/8080)		Herbicides (615/8150)		Base/Neutral Acid Compounds GC/MS (625/8270)		Volatile Organics GC/MS (624/8240)		Polynuclear Aromatics (610/8310)		8240 (TCLP 1311) ZHE		8270 (TCLP 1311)		TO-14		Gross Alpha/Beta		NUMBER OF CONTAINERS	
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PROJECT INFORMATION				SAMPLE RECEIPT																																																																																															
PROJECT NUMBER: 604388		TOTAL NUMBER OF CONTAINERS: 9		SAMPLES SENT TO:		RELINQUISHED BY: 1.																																																																																													
PROJECT NAME: IB Remediation		CHAIN OF CUSTODY SEALS: NA		SAN DIEGO		Signature: <u>[Signature]</u> Time: <u>1:00</u>																																																																																													
OC LEVEL: STD IV		INTACT? <u>Y</u>		FT. COLLINS		Printed Name: <u>[Signature]</u> Date: <u>4/22/96</u>																																																																																													
OC REQUIRED: MS MSD BLANK		RECEIVED GOOD COND./COLD: <u>OK</u>		BENTON		Analytical Technologies of New Mexico, Inc.																																																																																													
TAT: STANDARD RUSHI		LAB NUMBER: 604632		PENSACOLA		Albuquerque																																																																																													
				PORTLAND		RECEIVED BY: 1.																																																																																													
				PHOENIX		Signature: <u>[Signature]</u> Time: <u>1:00</u>																																																																																													
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						Company: <u>ATN-Phx</u>																																																																																													
						RECEIVED BY: (LAB) 2.																																																																																													
						Signature: <u>[Signature]</u> Time: <u>9:49</u>																																																																																													
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Interlab Chain of Custody

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

COMPANY: Analytical Technologies of New Mexico, Inc.
ADDRESS: 2709-D Pan American Freeway, NE
Albuquerque, NM 87107

CLIENT PROJECT MANAGER:

K McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals - TAL	Metals - PP List	Metals - RCRA	RCRA Metals by TCLP (1311)	TOX	TOC	Gen Chemistry	Oil and Grease	BOD	COD	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	8240 (TCLP 1311) ZHE	8270 (TCLP 1311)	TO-14	Gross Alpha/Beta	NUMBER OF CONTAINERS
604388-20	4/18	1420	HAZ	10				Chloride 325.2																1
-22		1440		11																				1
-23		400		13																				1
-25	4/18/02	1624		13																				2
-26		1715		14																				2
-27		1745		15																				2
-28		1800		16																				2
-29		1820		17																				2
-30		1835		18																				2

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER:	604388	TOTAL NUMBER OF CONTAINERS:	15
PROJECT NAME:	IA	CHAIN OF CUSTODY SEALS:	NA
QC LEVEL:	STD IV	INTEGRITY:	Y
QC REQUIRED:	MS MSD BLANK	RECEIVED GOOD COND./COLD:	648
TAT:	STANDARD RUSHI	LAB NUMBER:	604832
SAN DIEGO		RECEIVED BY:	1.
FT. COLLINS		Signature:	Kim Caldwell
RENTON		Time:	1:00
PENSACOLA		Printed Name:	Kim Caldwell
PORTLAND		Date:	4-22-02
PHOENIX		Company:	Analytical Technologies of New Mexico, Inc.
		RECEIVED BY:	2.
		Signature:	Deborah Galloway
		Time:	9:49
		Printed Name:	Deborah Galloway
		Date:	4/23/02
		Company:	ATL

DUE DATE:	5/10
RUSH SURCHARGE:	
CLIENT DISCOUNT:	Quote
SPECIAL CERTIFICATION REQUIRED:	☐ YES ☐ NO

Interlab Chain of Custody

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

COMPANY: Analytical Technologies of New Mexico, Inc.
ADDRESS: 2709-D Pan American Freeway, NE
Albuquerque, NM 87107

CLIENT PROJECT MANAGER:

K McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Me	Me	Me	RC	C	TO	TO	Ge		Oil	BO	CO	Pe	He	Bas	Vol	Po	82	82		TO	Gr		NU
604388	4/19/18	1720	HR	19					X																			2
-32	1	1942		20					X																		2	
-33	4/17	1625		21					X																		1	
-34	1	1855		22					X																		1	
-35	4/18	0620		23					X																		1	
-36	1	1820		24					X																		1	
-39	4/19	1000		25					X																		1	
-40																											1	

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER: 604388

TOTAL NUMBER OF CONTAINERS: 9

SAN DIEGO

Signature: [Signature] Time: 11:20

Signature: [Signature] Time: [Time]

PROJECT NAME: I B

CHAIN OF CUSTODY SEALS

FT. COLLINS

Printed Name: John Carver Date: 4/24/18

Printed Name: [Name] Date: [Date]

OC LEVEL: STD IV

INTACT?

RENTON

Analytical Technologies of New Mexico, Inc. Albuquerque

Company: [Company]

OC REQUIRED: MS MSD BLANK

RECEIVED GOOD COND/COLD

PENSACOLA

RECEIVED BY: 1.

RECEIVED BY: (LAB) 2.

TAT: STANDARD RUSH:

LAB NUMBER 604832

PHOENIX

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

DUE DATE: 5/10

RUSH SURCHARGE:

Printed Name: [Name] Date: [Date]

Printed Name: [Name] Date: [Date]

Printed Name: [Name] Date: [Date]

CLIENT DISCOUNT: Quota

SPECIAL CERTIFICATION REQUIRED: YES NO

Company: [Company]

Company: [Company]

Company: [Company]