

## MONITORING REPORTS



### INDIAN BASIN GAS PLANT TREATMENT PROJECT QUARTERLY REPORT

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### FIRST QUARTER 1993

#### **MAY 1993**

### INDIAN BASIN TREATMENT PROJECT QUARTERLY REPORT

#### **FIRST QUARTER 1993**

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

#### May 11, 1993

#### INDIAN BASIN GAS PLANT TREATMENT PROJECT QUARTERLY REPORT

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#### MARATHON OIL COMPANY INDIAN BASIN TREATMENT PROJECT QUARTERLY REPORT - MAY 1993

#### **INTRODUCTION**

This report summarizes treatment activities which have taken place during the first quarter of 1993 related to environmental problems resulting from a produced liquid gathering line leak discovered in April 1991 near the Indian Basin Gas Plant. Preparation of this report is in accordance with the April 2, 1992 New Mexico Oil Conservation Division (OCD) directive for quarterly reporting on Indian Basin Treatment Project activities.

#### QUARTERLY REPORT SUMMARY

The overall Treatment Project is fully operational and functioning as designed per Marathon's March 1992 technical submittal to OCD. Water withdrawal from the Lower Queen horizon is on-going with an air stripper used to remove volatile hydrocarbons. Shallow water withdrawal has been re-initiated with withdrawal volumes commingled with Lower Queen withdrawals. Water discharged from the air stripper continues to be utilized by the plant for process water. Soil venting operations continue to remove volatile hydrocarbons from soil and shallow bedrock horizons. Water analyses from rancher wells and nearby surface springs have not exceeded any State or Federal drinking water standards for hydrocarbons or chlorides. Local ranchers are kept informed of treatment project activities via a quarterly update letter.

#### QUARTERLY POINT-IN-TIME SAMPLING AND RESULTS

A point-in-time sampling of the Indian Basin treatment project monitor wells was conducted January 19 - 21, 1993. Fifty-six wells were sampled by Southwestern Laboratories using EPA sampling protocol. The attached field log in <u>Appendix A</u> was prepared by Southwestern Laboratories from field notes taken during sample acquisition and identifies the fluid levels, purge volumes and other field analysis data of all wells evaluated.

Marathon's Petroleum Technology Center (PTC) in Littleton, Colorado, performed BTEX and chloride analyses for the quarterly point-in-time samples. High performance liquid chromatography (HPLC) was used to analyze water samples for BTEX concentrations and a titration method was used for chloride analysis. The results from the point-in-time analyses are contained in <u>Appendix B</u>.

Core Laboratories, Aurora, Colorado, performed four BTEX analyses using EPA method 8020 purge and trap gas chromatography as a quality assurance comparison of PTC's HPLC analytical techniques. Core Labs also conducted four chlorides analyses using EPA method 325.2. The following four wells (3 shallow and 1 Lower Queen) were analyzed for BTEX concentrations using both HPLC and purge and trap analytical techniques: B-62, B-67, B-81 and B-90. A chart comparing the BTEX analytical results for the two analysis

techniques is attached in Appendix C.

Appendix D (Tables 1 and 2) compares the results of the September 1991, December 1991, April 1992, July 1992, October 1992 and January 1993 point-in-time benzene concentration data for the Lower Queen and shallow wells. Graphs depicting benzene concentrations over time for each routinely sampled borehole/monitoring well are also included in Appendix D.

#### MONTHLY SAMPLING

Monthly water samples of nearby rancher water wells and springs were taken on January 18, February 12, and March 4. Analytical results from the monthly water samples indicate the water to be within standards for hydrocarbons and chlorides as established by EPA for drinking water. The attached table in Appendix E provides a summary of the monthly analyses performed on the Lyman water well, the closest down gradient water well to the leak site, and a surface water spring in Rocky Arroyo. The quarterly analysis for the Biebelle water well, the second closest down gradient well, is also reported. All rancher water well and arroyo spring samples were obtained using EPA sampling and handling Core Labs performed the BTEX and chloride analyses procedures. using EPA approved methods. Analytical data from rancher water well samples and surface water springs is provided to the local ranchers each month with letters of explanation. Copies of these letters are also provided to the New Mexico Oil Conservation Division (Santa Fe) and the Bureau of Land Management (Roswell)

upon distribution to the ranchers.

The plant water supply well and backup well are also sampled and analyzed on a monthly basis. Analytical reports for all the rancher wells, springs and plant wells are included in Appendix E.

#### WATER AND CONDENSATE RECOVERY

Water withdrawals from the Lower Queen and shallow water wells are individually metered and reported to the State Engineer's Office (SEO) on a monthly basis, per SEO directive. The reports filed with the SEO for the first quarter of 1993 are attached in <u>Appendix F</u>. Appendix F also contains stacked bar graphs depicting weekly water withdrawals from Lower Queen and shallow soil water wells. A third graph shows the combined weekly water withdrawals from the Lower Queen and shallow zone.

Six Lower Queen wells (B-84, B-85, B-87A, B-88, B-91A, and B-94) were routinely pumped for water withdrawal during the quarter. Monthly water withdrawals for each well are listed in the following table.

#### LOWER QUEEN MONTHLY WATER WITHDRAWALS

WELL NUMBER	JAN	FEB	MAR	QTR.	TOTAL
B-84	5,238	3,320	7,873	16,431	BBL.
B-85	1,205	0	2,340	3,545	BBL.
B-87A	5,399	4,634	5,560	15,593	BBL.
B-88	3,417	2,133	3,698	9,248	BBL.
B-91A	7,442	5,647	9,118	22,207	BBL.
B-94	<u>5,518</u>	4,344	4,291	<u>14,153</u>	BBL.
LQ TOTAL	28,219	20,078	32,880	81,177	BBL.

Two shallow water wells, B-36 and B-37, were pumped during the first quarter. Shallow withdrawal wells were previously shut-in due to cold weather freezing the pneumatic pumps. Shallow withdrawal resumed at B-37 in February and B-36 in March.

In addition, Sump All was routinely pumped and/or bailed during the first quarter of 1993. Free product was identified in the sump during the January Point-in-Time sampling. Monthly shallow water withdrawals for each well are listed in the following table.

#### SHALLOW SOIL WATER MONTHLY WITHDRAWALS

WELL NUMBER	JAN	FEB	MAR	QTR.	TOTAL
B-36	0	0	35	35	BBL.
B-37	0	387	1,218	1,605	BBL
Sump A-11	<u>0.3</u>	<u>3</u>	<u>2</u>	<u>6</u>	BBL
SHALLOW TOTAL	0.3	390	1,255	1,646	BBL.

Fluids from the Lower Queen and shallow withdrawal wells are piped to an air stripper facility for hydrocarbon separation and eventual plant usage. An oil/water separator is used to remove free product prior to soluble hydrocarbon removal. The free product is transferred to a holding tank which is gauged on a weekly basis. The measured volume of free condensate recovered during the first quarter of 1993 is 9 barrels. This volume also reflects free product recovered from Sump All. The cumulative free product recovery for the second quarter of 1992 through the first quarter of 1993 is 47 barrels. This brings the cumulative free product recovered to date (not including volumes volatilized by the air stripper and soil vent) to 3,334 barrels.

#### POTENTIOMETRIC MAPPING

Lower Queen fluid levels were measured once a month for all non-pumping wells. The table in <u>Appendix G</u> lists the Lower Queen fluid levels (elevations) obtained during the first quarter of 1993. Cumulative monthly rainfall as measured at the gas plant is also recorded. The cumulative rainfall for the quarter was 2.24 inches. Monthly Lower Queen potentiometric maps, based on these monthly fluid level readings are also attached in Appendix G. The Lower Queen potentiometric maps reflect continued lower fluid levels throughout the quarter.

A shallow water potentiometric map based on data accumulated during the January point-in-time sampling round is attached in <u>Appendix H</u>.

#### SOIL VENTING ACTIVITIES

The Phase I soil venting program, which included wells B-39, B-40 and B-44, is complete. Venting during the first quarter was continuous during January and February. Shallow water withdrawal wells, selectively located in the vicinity of the soil vent wells, helped promote soil venting by lowering the water table and exposing more soil to hydrocarbon vapor extraction.

The soil vent has been relocated to BH-82, a shallow bedrock well approximately 2000 feet east of the Phase I venting wells. Prior to installation of the Phase I soil venting program a pilot soil venting test was conducted at B-82. The well indicated it has excellent air permeability to allow for soil venting remediation techniques.

#### **OTHER ACTIVITIES**

An interference test utilizing four observation wells was conducted at BH-87A in February, 1993.

**APPENDIX A** 

### JANUARY POINT-IN-TIME FIELD NOTES



1703 West Industrial P.O. Box 2150 Midland, Texas 79702 Phone: (915) 683-3349 Fax: (915) 686-0492

January 29, 1992

Mr. Jeffrey S. Lynn Marathon Oil Company P.O. Box 552 Midland, TX 79702

**RE:** INDIAN BASIN REMEDIATION PROJECT

Dear Mr. Lynn:

The quarterly monitoring was started at 8:00 am on January 19, 1993. During a three day period, a total of fifty six wells were checked. The monitoring project was completed at 1:00 pm on January 21, 1993.

Several of the sample vials that were stored in the cooler at the plant were frozen, which caused them to break. The broken vials are as follows: 1 BTEX vial from BH-92 MW-66, 1 chloride vial from SW-1, 1 chloride vial from BH-95 MW-69, and 1 BTEX vial from sample No. 1 which was sent to Core Laboratories.

If you have any questions, please do not hesitate to call.

Sincerely,

Lorre L' Church

Lorri L. Church Project Manager, Midland EAS

LLC:abj

FEB 1 1 1993

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Environmental & Safety

SOUTHWESTERN LABORATORIES, INC.

A member of the  ${\bf HIH}$  group of companies

FIELD LOG

## **QUEENS WELLS**

## Indian Basin Gas Plant

## Artesia, N.M.

		T			Т	—-1			T	<u></u>				·				]
	Hemarks																	
Conductivity	umhos/cm @ 25° C		824	1538	0001	1027	1002	1030	1507	575	296	818	1024	647	691	570	8	812
	Hd		6.44	6 18 6	2	6.45	6.14	6.48	6 50	6.75	6.84	6.58	6.21	6.52	6.46	6.51		6.52
Temperature	LL. 0		69			3	70.5	8		8	68.5		68	68.5	6	68		8
Purge	Volume (aal.)	1	40.2	Pump		Present	75.1	Pump Present	Pump Present	50.2	67.3	Pump Present	70.6	60.1	Pump Present	65.9	Pump Present	None
Free	Product (Y/N)		z	Z	2	z	z	>	2	z	z	z	z	z	Z	z	Z	
Sample	Date		01-20-93	01 10 03	20-20	01-19-93	01-19-93	01-19-93	01-10-03	01-19-93	01-19-93	01-19-93	01-19-93	01-19-93	01-19-93	01-20-93	01-20-93	01-20-93
Water	Column (ft.)		20.52			1	38.33	1		25.64	34.08	1	36.08	30.67	5	33.68	1	113.12
FTC Water	(ft.)	<b>A</b>	156.68			1	184.75	1		195.55	167.99		199.10	135.10		191.52	1	178.88
Reported	I otal Depth (ft.)		177.20	240 74	1 1 .0.1 7	211.29	223.08	216.37	225 QU	221.19	202.37	168.56	235.18	165.77	203.43	225.20	255.00	292.00
Well	d		MW-57	MMM ED		MW-59	MW-60	MW-61A	C3_WMA	MW-63	MW-64	MW-65A	MW-66	MW-67	MW-68	MW-70	Plant Well	Backup Well
5			BH~83			BH-85	BH-86	RH-87A		BH-89	BH-90	BH-91A	BH-92	BH-93	BH-94	BH-97	SW-1	SW-2

Note: BH-83, BH-86, BH-89, BH-90, BH-92, BH-93 and BH-97 were wells that SwL Field Services pumped.

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## FIELD LOG

## SHALLOW WELLS

## Indian Basin Gas Plant

## Artesia, N.M.

Level         Outline         Frotoct         Volume         F         PH         Anthoscin $0.25^{\circ}$ C           1.1.         Dry         01-20-33          40.2           Sa           1.1.         Dry         01-20-33          40.2           Sa           1.1.         Dry         01-20-33          40.2           Sa           1.1.         Dry         01-20-33          0.1           Sa            Dry         01-19-33             Sa            Dry         01-19-33             Sa           13.44         0.49         01-19-33             Sa           17.29         0.01         01-19-33             Sa           17.29         0.01         01-20-33              Sa            Dry         01-20-33 <th>5</th> <th>Well</th> <th>Reported</th> <th>FTC Water</th> <th>Water</th> <th>Sample</th> <th>Free</th> <th>Purge</th> <th>Temperature</th> <th></th> <th>Conductivity</th> <th></th>	5	Well	Reported	FTC Water	Water	Sample	Free	Purge	Temperature		Conductivity	
MW-3         1740          Dy         01-20-33          40.2              MW-4         18.66         18.57         0.11         01-20-33         N         0.1                MW-5         13.10          Dry         01-20-33                 MW-5         13.10          Dry         01-20-33                 MW-5         13.36          Dry         01-20-33         N <t< th=""><th></th><th>D.</th><th>t otal Depth (ft.)</th><th>(ft.)</th><th>Column (ft.)</th><th>Date</th><th>Product (Y/N)</th><th>Volume (gal.)</th><th>٩</th><th>Н</th><th>umhos/cm @ 25° C</th><th>Hemarks</th></t<>		D.	t otal Depth (ft.)	(ft.)	Column (ft.)	Date	Product (Y/N)	Volume (gal.)	٩	Н	umhos/cm @ 25° C	Hemarks
MW-4         18.66         18.57         0.11         01-20-33         N         0.1  <	BH-24	MW-3	17.40	1	Dry	01-20-93	1	40.2			8	
MW-5         13.10          Dry         01-20-93	BH-26	MW-4	18.68	18.57	0.11	01-20-93	z	0.1	1	1	1	Insufficient Sample to bail
MW-6         1336          Dry         01-19-33         N	BH-28	MW-5	13.10	1	Dry	01-20-93	1	1	1	1	1	
MW-31         1933         1944         0.49         01-21-93         N         0.96  <	BH-29	MW-6	13.98	-	Dry	01-19-93	1		-			
MW-7         17.31          Dry         01-19-93 <th< td=""><td>BH-55</td><td>MW-31</td><td>19.93</td><td>19.44</td><td>0.49</td><td>01-21-93</td><td>Z</td><td>0.96</td><td>-</td><td></td><td>1</td><td>(a)</td></th<>	BH-55	MW-31	19.93	19.44	0.49	01-21-93	Z	0.96	-		1	(a)
MW-22         17.30         17.29         0.01         01-20-93         N	BH-30	MW-7	17.31	2	Dry	01-19-93	1	1	1	1		
MW-B         17.74          Dry         01-20-93  M  -	BH-45	MW-22	17.30	17.29	0.01	01-20-93	z					Insufficient Sample to bail
MW-9         13.65          Dry         01-20-93  M  -	BH-31	MW-8	17.74	1	Dry	01-20-93	1	1	1	1		
MW-10         19.08         17.74         1.34         01-21-93         N         2.6              MW-11         24.85         24.03         0.82         01-21-93         Y         1.6          6.65         2420           MW-11         24.85         24.03         0.82         01-21-93         Y         1.6          6.65         2420           MW-13         22.07            6.65         2420           MW-13         22.07            6.65         2420           MW-13         22.07            6.65         2420           MW-13         22.07             6.65         2420           MW-13         19.11         18.85         0.26         01-21-93         N         0.5              MW-24         14.09          Dry         01-20-93	BH-32	6-WW	13.65		Dry	01-20-93		1	1	*	1	
MW-11         24.85         24.03         0.82         01-21-93         Y         1.6          6.65         2420           MW-13         22.07            Pump          6.65         2420           MW-13         22.07            Pump             MW-13         19.11         18.85         0.26         01-21-93         N         0.5              MW-24         14.09          Dry         01-20-93	BH-33	MW-10	19.08	17.74	1.34	01-21-93	z	2.6		-		(a)
MW-13         22.07           Pump         Pump           MW-19         19.11         18.85         0.26         01-21-93         N         0.5              MW-24         14.09          Dry         01-20-93	BH-34	MW-11	24.85	24.03	0.82	01-21-93	>	1.6	1	6.65	2420	3.0" Free Product
MW-19         19.11         18.85         0.26         01-21-93         N         0.5              MW-24         14.09          Dry         01-20-93	BH-36	MW-13	22.07	1	8	5	1	Pump Present	3	1	I I	Inaccesible
MW-24 14.09 Dry 01-20-93	BH-42	MW-19	19.11	18.85	0.26	01-21-93	z	0.5	!	1		(a)
	BH-47	MW-24	14.09	1	Dry	01-20-93	1	3	1			

(a) bailed dry, no recovery in two nours.

Note: BH-55, BH-33, BH-34 and BH-42 were purged with a bailer.

## FIELD LOG

## SHALLOW WELLS

## Indian Basin Gas Plant

## Artesia, N.M.

3	Well	Reported	FTC Water	Water	Sample	Free	Purge	Temperature		Conductivity	
		Total Depth	Level	Column		Product	Volume		Hq		Remarks
	I.D.	(ft.)	(ft.)	(tt.)	Date	(V/V)	(gal.)	ц.		umhos/cm @ 25° C	
BH-41	MW-18	17.42	17.05	0.37	01-21-93	z	0.7	1	1		(a)
BH-53	MW-29	14.76	1	Dry	01-20-93	1	1		1	1	
BH-49	MW-26	21.51	20.41	1.10	01-21-93	Y	2.2		6.69	1903	0.125" Free Product
BH-56	MW-32	16.77	3	Dry	01-20-93	1	1	1	3		
BH-44	MW-21	23.31	8	1	01-20-93		Pump Inaccesible		3	-	
BH-61	MW-38	20.62	20.24	0.38	01-21-93	z	0.7	1	) 1 1	-	(a)
BH-67	MW-44	25.34	21.20	4.14	01-21-93	Z	8.1	4	6.45	2530	
BH-71	MW-48	19.98	19.58	.40	01-21-93	z	0.2	1	1	1	Insufficient Sample to bail
BH-73	MW-50	37.15	25.52	11.63	01-21-93	z	5.7	1	6.42	5700	
BH-75	MW-52	21.44	1	Dry	01-19-93	9 9 9	5	1	1	1	
BH-77	MW-53	16.02	1	Dry	01-20-93	1					
BH-80	MW-54	78.15	45.54	32.61	01-20-93	z	63.9	69	6.30	3190	(q)
BH-81	MW-55	66.80	26.57	40.23	01-20-93	z	78.8	69	6.69	2690	
BH-82	MW-56	43.76	40.40	3.36	01-21-93	~	6.6	1	6.76	2100	1.50" Free Product
BH-95	69-WM	59.41	33.61	25.81	01-20-93	~	50.5	68	6.37	1173	1.00" Free Product
Sump A-11	1	17.20	16.62	0.58	01-21-93	۲	13.9	1	1		(c)
Note: BH-80,	BH-80, BH-81 and BH-95 are wells that were pumped. BH-49, BH-67, BH-73, and BH-82 are wells that were bailed	-95 are wells th	lat were pumpe	d. BH-49, BH	-67, BH-73, an	d BH-82 are w	ells that were b	ailed.			

Note: BH-60, BH-61 and BH-93 are wells that were puriped. BH-49, BH-67, BH-73, and BH-62 are wells that were balled. (a) Bailed dry, no recovery in 2 hours. (b) Pumped dry after approx. 31 gallons. (c) 22 gallons of free product was bailed. No incoming water was ever present.

1

FIELD LOG

## SHALLOW WELLS

## Indian Basin Gas Plant

## Artesia, N.M.

Nell	lle	Reported	FTC Water	Water	Sample	Free	Purge	Temperature		Conductivity	
I.D.	č	Total Depth (ft.)	Level (ft.)	Column (ft.)	Date	Product (Y/N)	Volume (gal.)	ų.	Н	<b>µm</b> hos/cm @ 25° C	Remarks
Sump 16-A	A	15.46	13.00	2.46	01-21-93	z	59.0	70	6.83	1593	(a)
BH-62	MW-39	20.54	17.15	3.39	01-20-93	z	6.6	1 1 1	7.10	2060	:
MW-25		1 1 1	8	Dry	8	8	1	-	ł	8	
BH-54	MW-30	1		Dry			1.	1	1	8	
BH-23	MW-2	1	1	Dry	1	1	1	1	5	8	
BH-50	MW-27	1	1	Dry	3	t 1	1		1		
BH-64	MW-41	l B B	19.18		-	1	i i i		1	1	Not Sampled
BH-46	MW-23	8	1   	Dry	1	-	1	i J I	1	. 1	
BH-52	MW-28	1	3 3 3	Dry	L T T	1	1	1	1		
MW-33		6	19.91		3	l l t	L I I	L	[ 	1	
(a) This well was pumped.	s pumped.							X			

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## **APPENDIX B**

### JANUARY POINT-IN-TIME ANALYTICAL RESULTS

Sample	(ppb) Benzene	(ppb) Toluene	(ppb) o-Xylene	(ppb) Ethyłbenzene	(ppb) m,p-Xylene	(ppb) Total Xylenes	(ppb) Total BTEX	(mg/L) Chloride
BH-34 MW-11	2746	1821	662	475	3618	4280	9322	544
BH-49 MW-26	1708	82	10	399	1073	1083	3272	177
BH-62 MW-39	66	26	19	9	23	42	140	231
BH-67 MW-44	21	11	QN	59	ო	e	94	321
BH-73 MW-50	8	5	5	QN	QN	5	18	337
BH-80 MW-54	14	4	16	15	. 97	113	146	134
BH-81 MW-55	518	23	11	78	43	54	673	304
BH-82 MW-56	1128	40	4	10	800	804	1982	269
BH-83 MW-57	21	40	19	165	QN	19	245	131
BH-84 MW-58	192	30	18	23	21	39	284	175
BH-85 MW-59	26	QN	10	55	QN	10	91	46
BH-86 MW-60	138	4	6	260	QN	9	408	9
BH-87A MW-61A	585	82	19	397	2349	2368	3432	12
BH-88 MW-62	78	18	4	74	203	207	377	202
BH-89 MW-63	12	4	9	QN	7	13	29	ო
BH-90 MW-64	15	QN	с,	QN	7	10	25	6
BH-91A MW-65A	С	QN	6	QN	5	11	14	35
BH-92 MW-66	ო	9	9	ი	14	20	32	12
BH-93 MW-67	8	e	с	QN	6	12	23	4
BH-94 MW-68	376	944	253	246	2123	2376	3942	27
BH-95 MW-69	1284	49	209	309	1722	1931	3573	NS
BH-97 MW-70	QN	QN	5	8	DN	£	13	8
Equip Blank No. 1	16	12	ND	QN	DN	QN	28	NS
Equip Blank No. 1	ო	QN	4	S	ND	4	12	NS
Equip Blank No. 2	6	12	21	10	11	32	63	NS
Equip Blank No. 2	13	14	8	62	QN	8	114	NS
Lab Blank	ND	8	Э	QN	QN	e	11	NS
Sump 16A	741	40	91	96	1264	1355	2232	229
SW-1	9	QN	ND	QN	DN	QN	9	NS
SW-2	47	9	ю	7	6	6	69	344
Trip Blank	16	4	QN	QN	ND	QN	20	NS
Trip Blank	13	4	QN	QN	QN	QN	17	NS

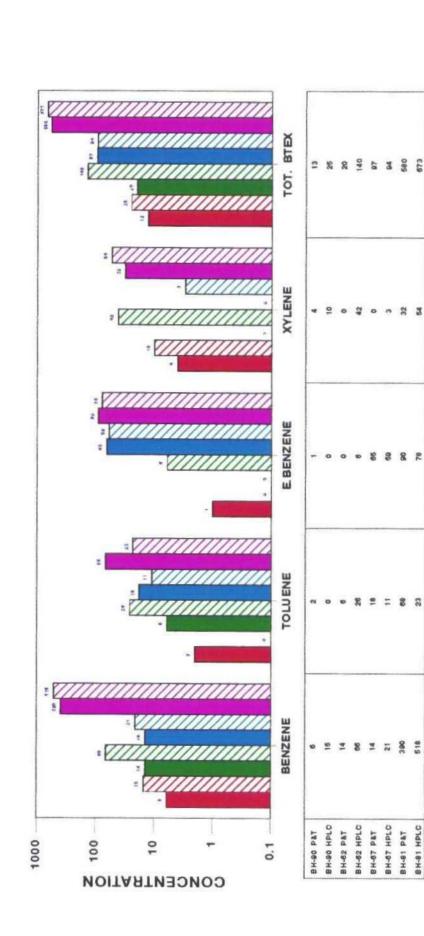
Page 1 of 1

## APPENDIX C

### JANUARY POINT-IN-TIME ANALYSIS TECHNIQUE COMPARISON

# CORE LABS P & T VERSUS MARATHON HPLC ANALYSIS COMPARISON JANUARY 1993 QUARTERLY POINT IN TIME SAMPLING RESULTS INDIAN BASIN TREATMENT PROJECT





## **BTEX COMPONENTS**

HPLC - HIGH PERFORMANCE LIQUID CHROMOTOGRAPHY ANALYSIS P & T - STANDARD PURGE AND TRAP ANALYSIS ALL CONCENTRATIONS GIVEN IN PPB

### APPENDIX D

### ANALYTICAL RESULTS COMPARISON OVER TIME

#### APPENDIX D TABLE 1 LOWER QUEEN BENZENE ANALYSES POINT-IN-TIME SAMPLINGS

(Data in PPB)

Well Number	September 1991^	December 1991^	April 1992#	July 1992 <b>#</b>	October 1992#	January 1993#
BH-83	1600	350	1992	 948*	15.1	21
						·
BH-83		290	125.4*			
BH-83			150.^			
BH-84+	40	90	202.*	178*	190	192
BH-85+	540	420	40.4*	268*	98.8	26
BH-86	33	<1	2.7*@	19*	31.7	138
BH-86			3.5	16.6-		
BH-87A+	190	10	5.0*	359*	470.1	585
BH-87A+				59.8~		
BH-88+	2200	1400	257.5*	357*	212.3	78
BH-89	<1	<1	4.1*	12*	4.3	12
BH-90	150	130	233.*@	115*	37.1	15
BH-90			68.3*		14.^	
BH-91A+	680	150	25.3*	413*	10.6	3
BH-92	<1	<1	2.9*@	8*	12.1	3
BH-92			3.3*			
BH-93	280	320	4.3#	103*	2.6	8
BH-93				69.1~		
BH-94+	240	1900	1865.*	160*	2208.2*	376
BH-97	<1	<1	1.7*	15*	10.7	<3
BH-97				<1^		

+ Withdrawal Well

Analysis by Core Labs

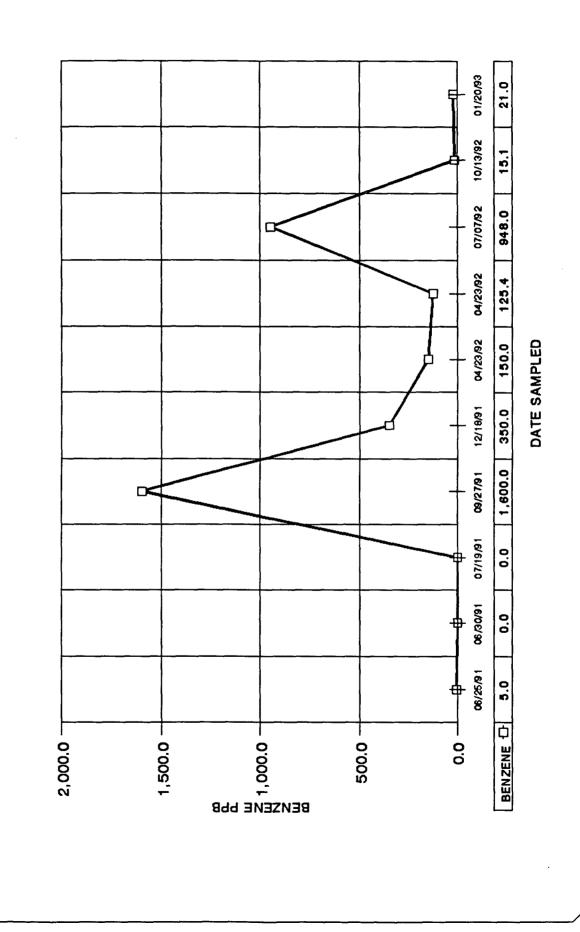
# Analysis by PTC HPLC method except as noted

\* Average of more than one analysis

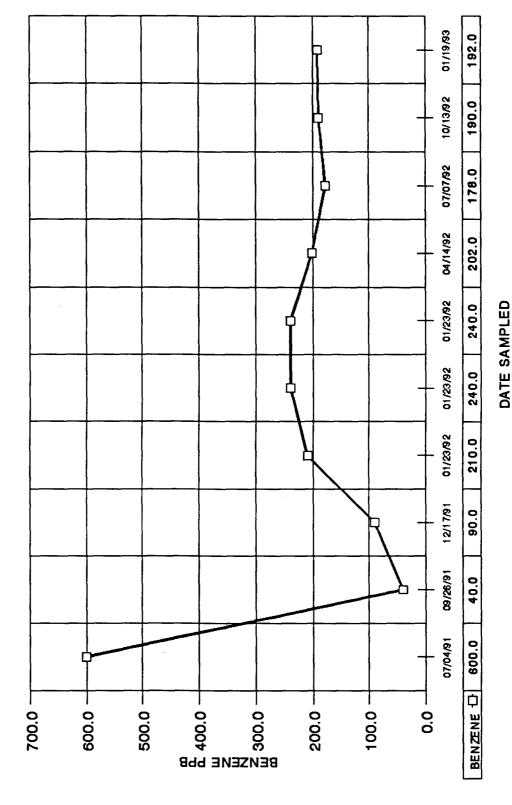
e Bailed sample; all others collected by pump

- Analysis by State Dept. of Health

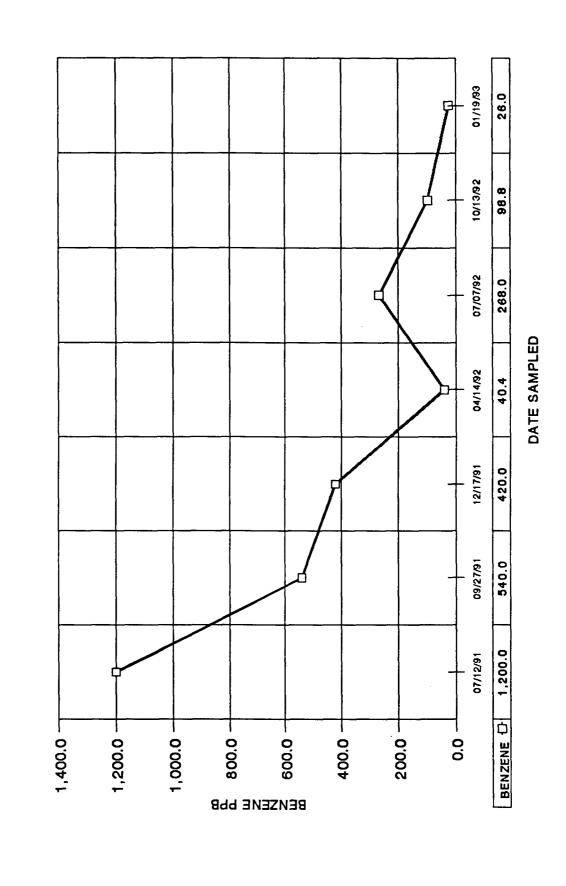
INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA MW#57 BH-83



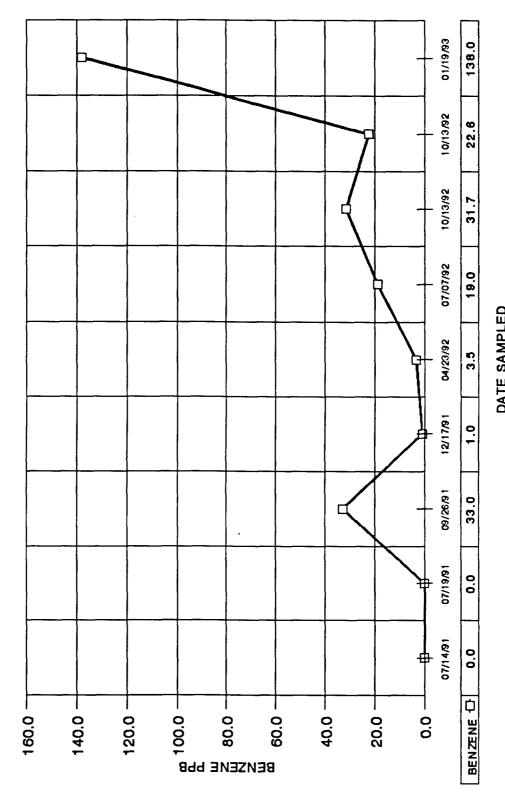
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INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA MW#59 BH-85

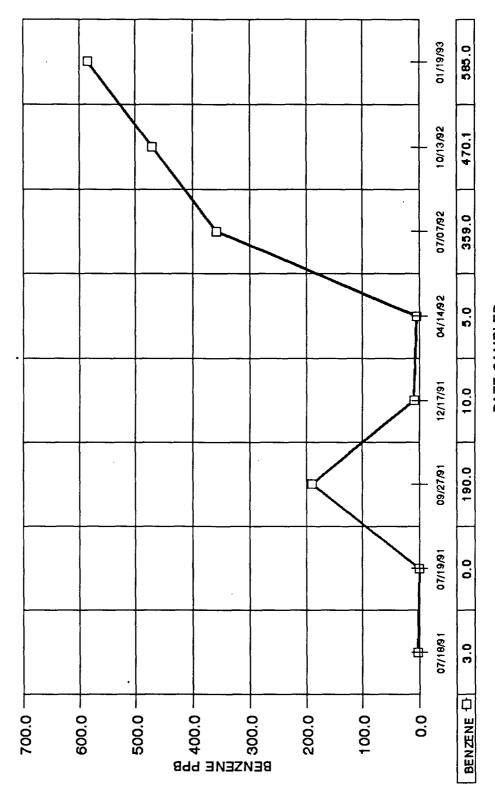


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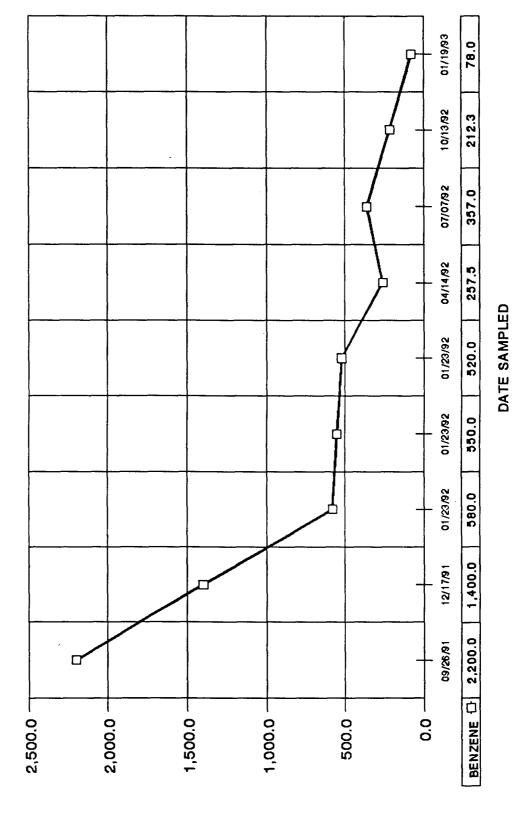
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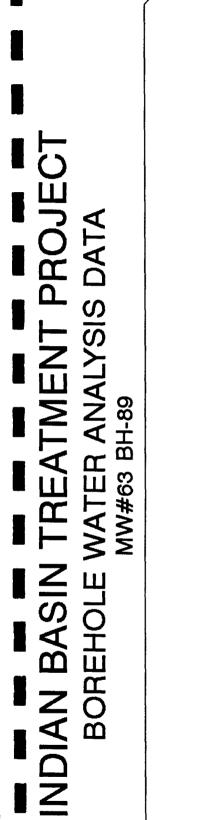
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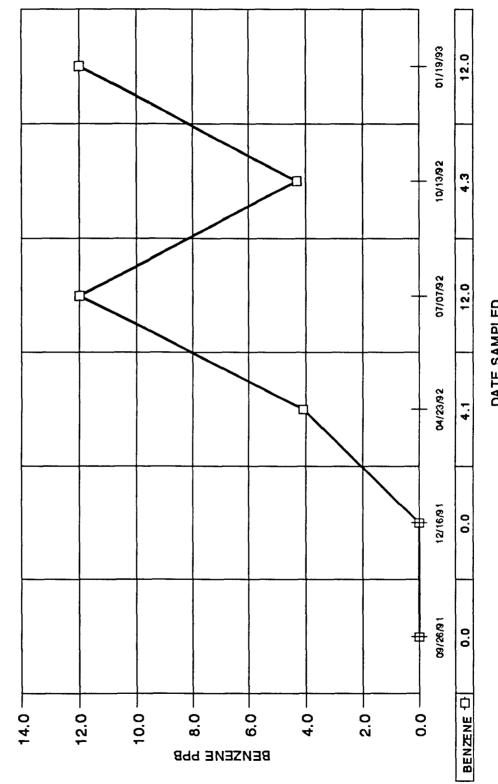


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INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA MW#62 BH-88

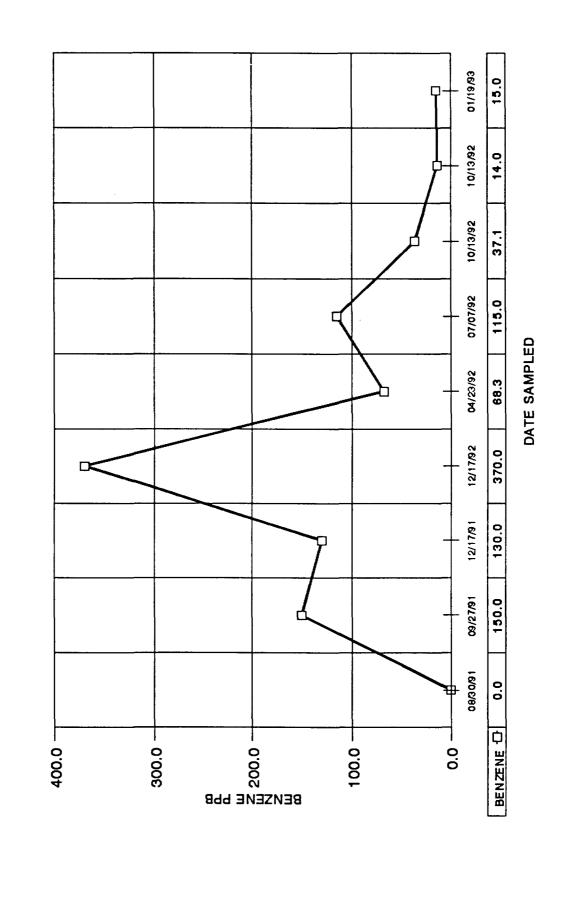




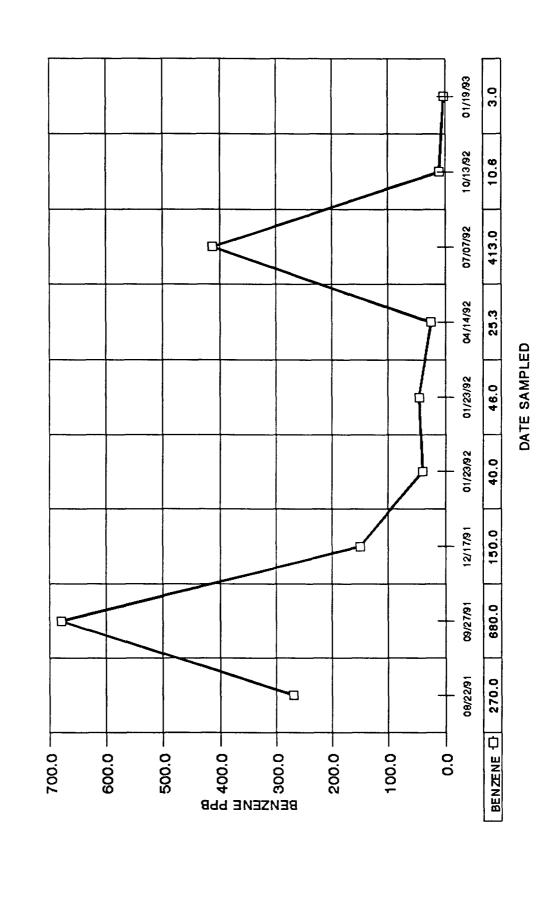


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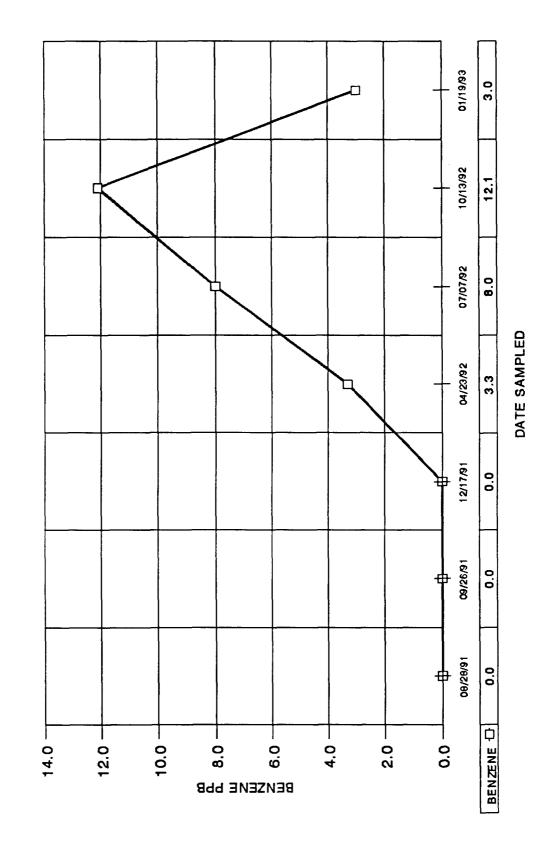
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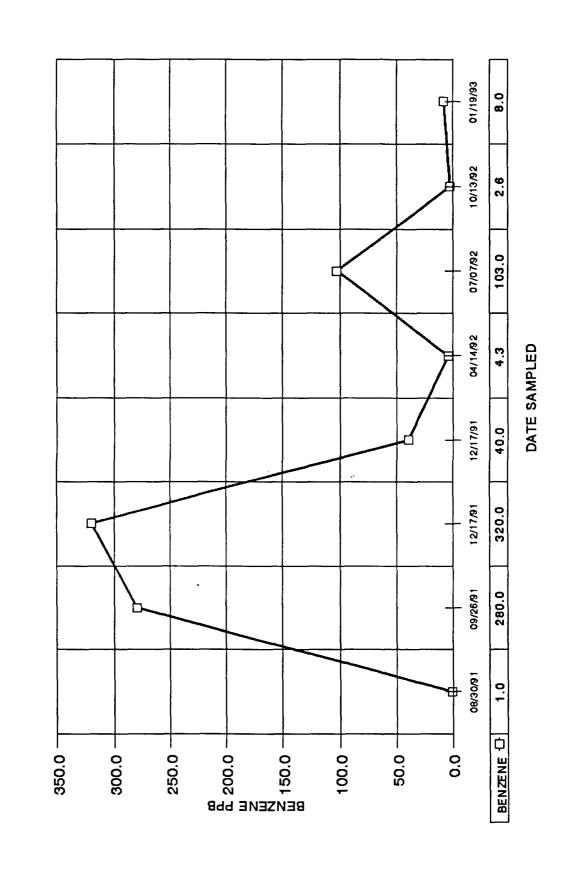
INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA MW#65A BH-91A



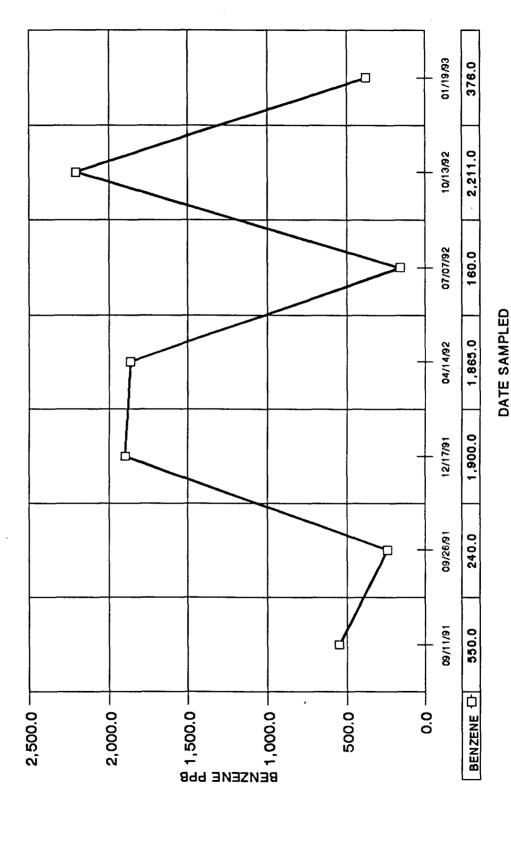
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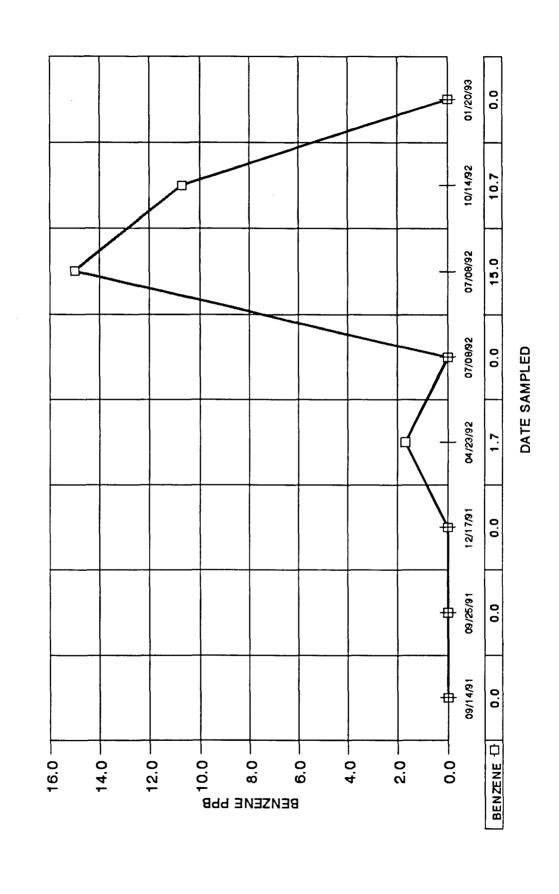
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INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA MW#68 BH-94



INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA MW#70 BH-97



#### APPENDIX D TABLE 2 SHALLOW WELL BENZENE ANALYSES POINT-IN-TIME SAMPLINGS

(Data in PPB)

Well Number	September 1991^	December 1991^	April 1992 <b>#</b>	July 1992#	October 1992 <b>#</b>	Januar 1993#
BH-14	250	200	NS	NS	NS	NS
BH-33	2300	2300	1780.*@	1842.*0	1668.0	QNS
BH-33					2100.0^	
BH-34	3000	3800	3087.*@	2199.*0	2942.@	27460
BH-35	3800	Dry	NS	NS	NS	NS
BH-36	3100	3000	3492.*@	2708.*	NS	NS
BH-38	5100	Dry	NS	NS	NS	NS
BH-39	1700	Dry	NS	NS	NS	NS
BH-41	4300	NS	2639.*	3105.*	3923.0	QNS
BH-41				2700.^	3300.0^	~~
BH-42	4700	Dry	3195.*0	2742.*	3032.	QNS
BH-42				3000.^		
BH-44	1000	1100	NS	NS	NS	NS
BH-45	4	NS	Dry	NS	Dry	Dry
BH-47	3400			4353.*	Dry	Dry
BH-49	3100	3000	NS	1939.*@	1992.0	1708@
BH-49				2000.^		
BH-55	<1	NS	Dry	332.*	9.0	QNS
BH-61	15	15	36.*	37.*	166.0	QNS
BH-61			101.*@			
BH-62						66
BH-62						14^
BH-64	200	170	NS	NS	NS	NS
BH-65	<1	<1	NS	NS	NS	NS
BH-67	59	NS	13.*	97.*@	41.0	21@
BH-67			16.*@		12.@^	14@^
BH-68	<1	<1	NS	NS	NS	NS
BH-70	2600	2000	NS	NS	NS	NS
BH-71	<1	<1	Dry	47.*@	Dry	QNS

Well Number	September 1991~	December 1991^	April 1992#	July 1992 <b>#</b>	October 1992#	January 1993#
BH-73	<1	<1	4.*	4.*0	8.0	8.0
BH-73			4.*0			
BH-74	800	<1	NS	NS	NS	NS
BH-75	<1			5.*@	Dry	Dry
BH-80	<1	<1	9.*	8.*	62.	14
BH-81	940	400	296.*	483.*	215.	518
BH-81						390^
BH-82	2200	1000	NS	1114.*	1026.	1128
BH-90						6^
BH-95	2400	2100		568.	1598.	1284
Sump All	1400	2900	3033.*	1258.*	2815.	Free Product
Sump 16A	240	2000	1233.*	1495.*	632.	741
Sump 16A			1137.*@			

Note: See footnotes

^ Analysis by Core Labs

# Analysis by PTC HPLC method except as noted

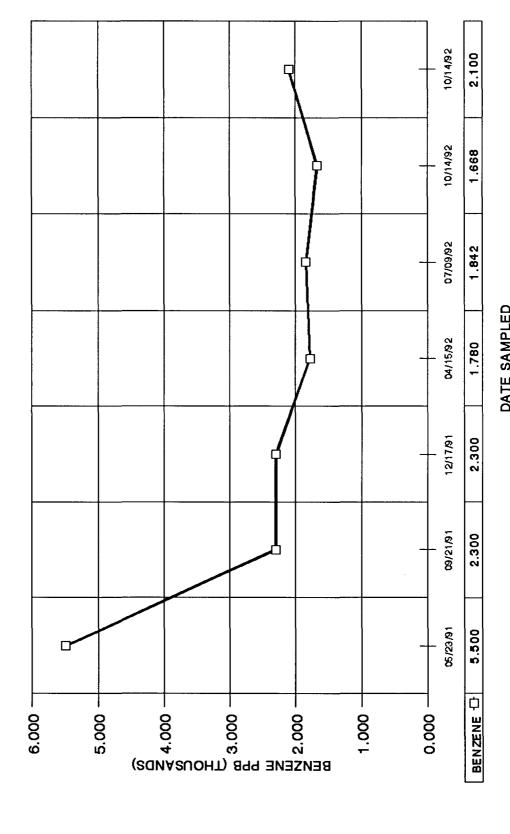
\* Average of more than one analysis

@ Bailed sample; all others collected by pump

NS Not sampled

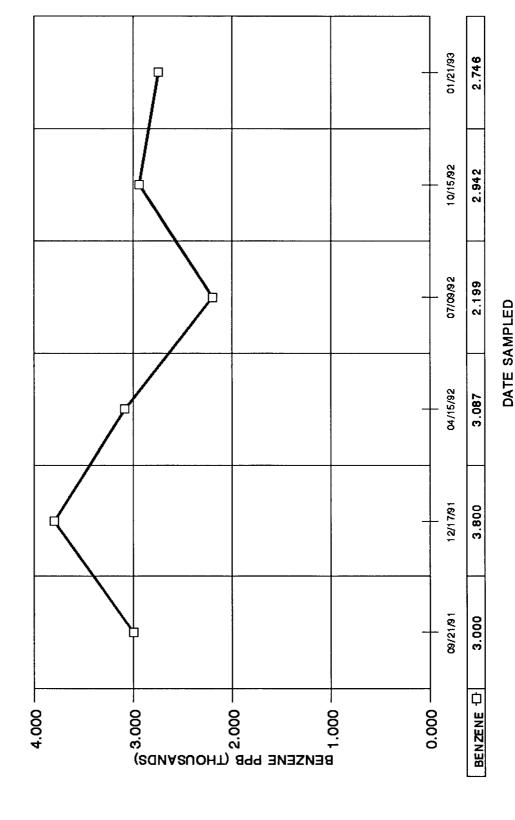
QNS Water quantity not sufficient to sample

INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA MW#10 BH-33

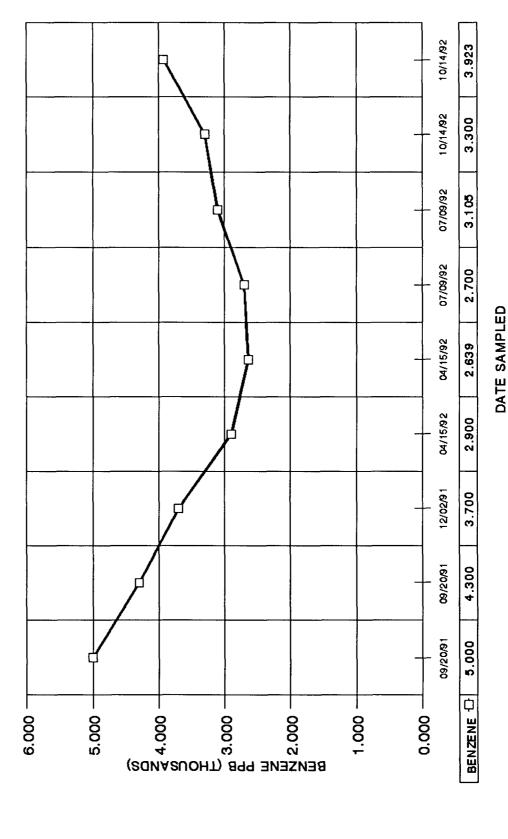


DATE SAMPLED

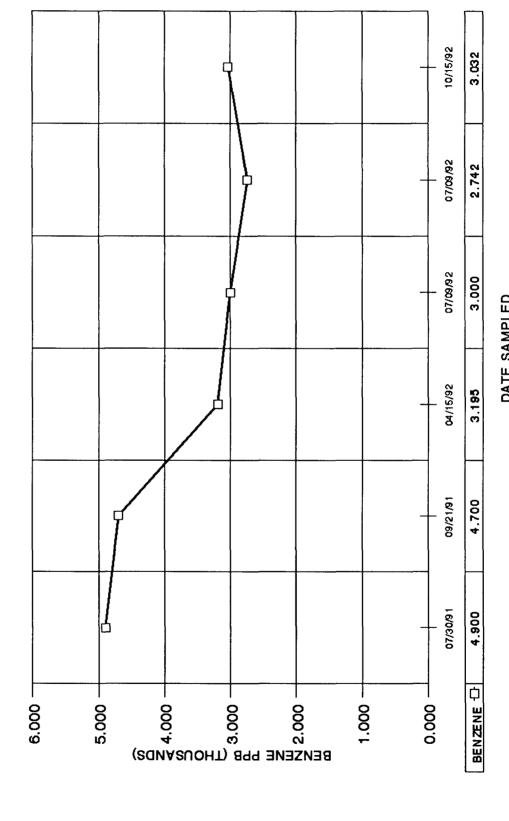
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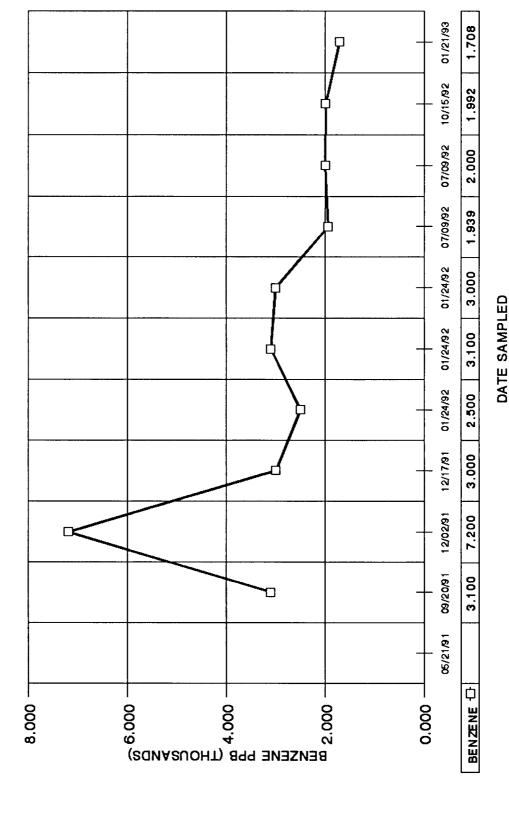


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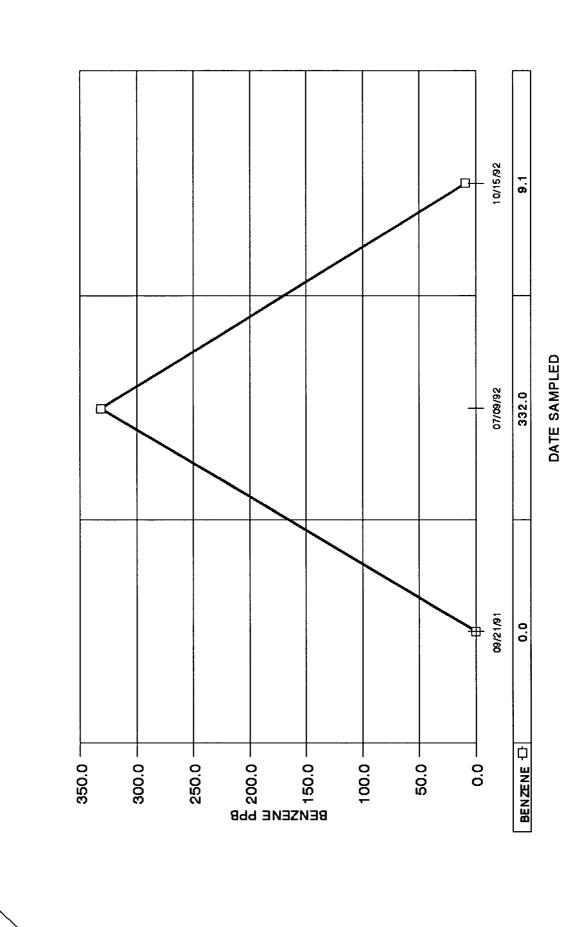


DATE SAMPLED

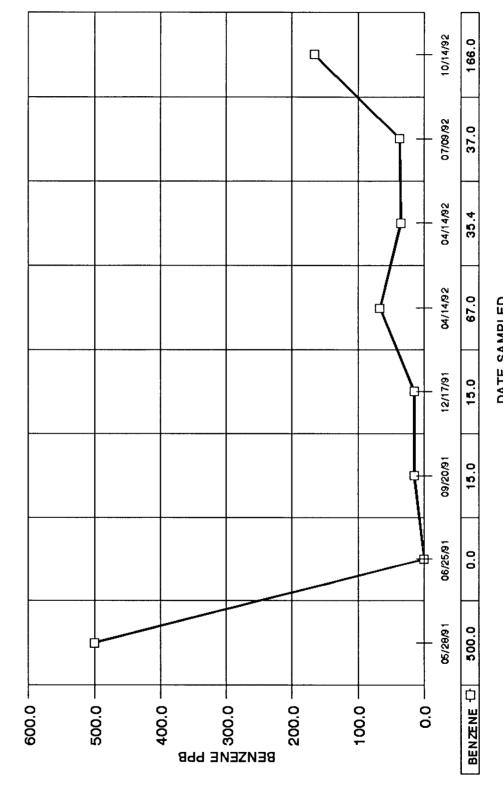
R.M. GRAY μ INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA MW#26 BH-49



INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA MW#31 BH-55

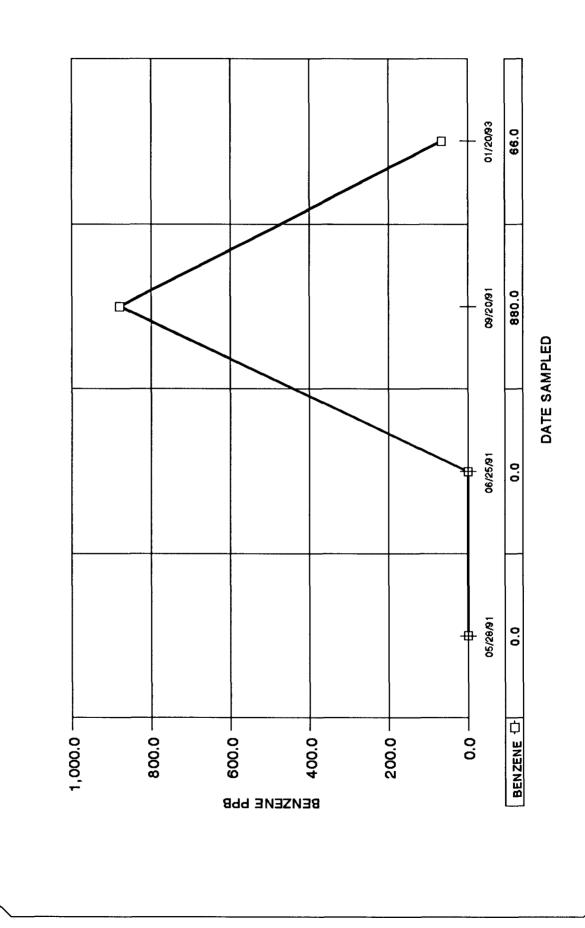


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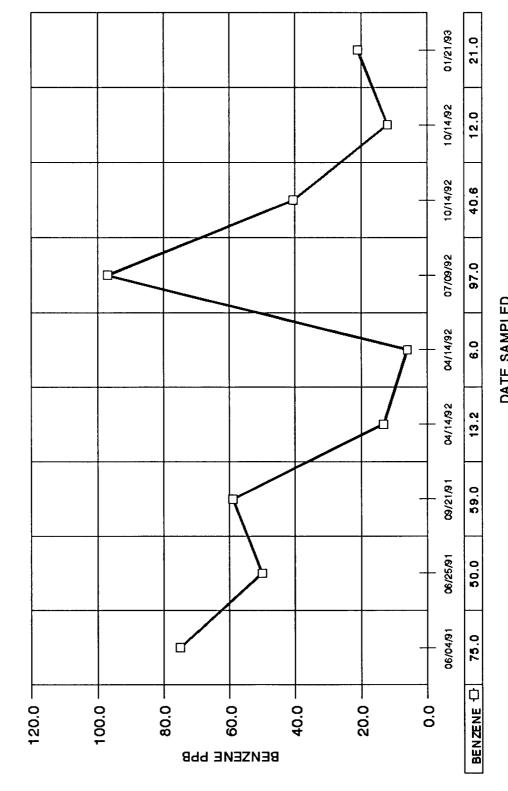


DATE SAMPLED

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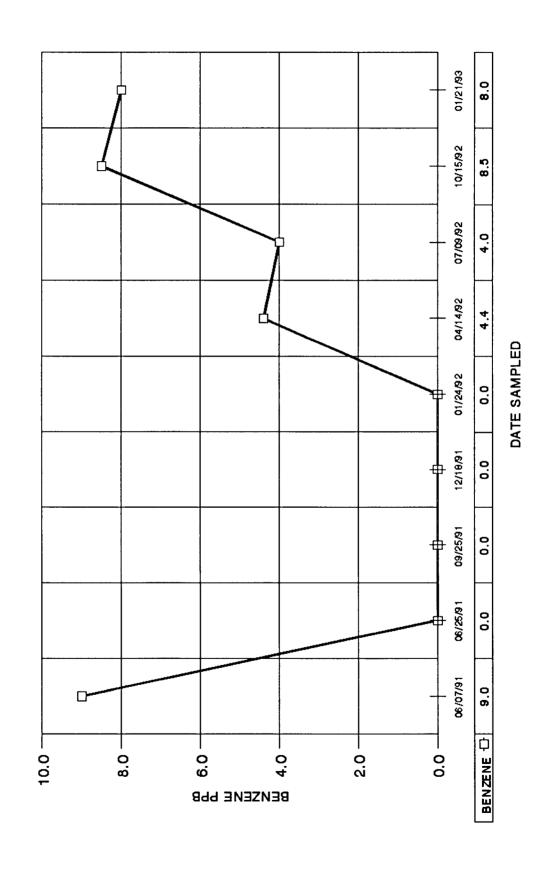


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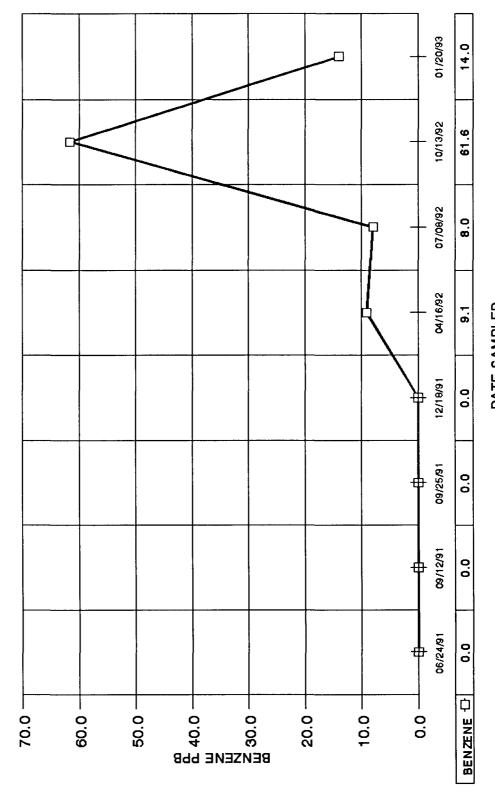


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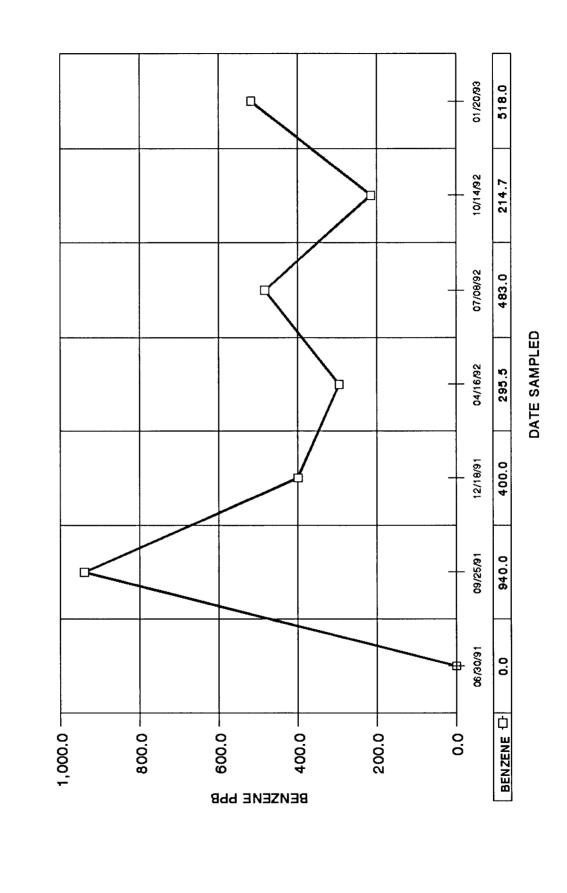


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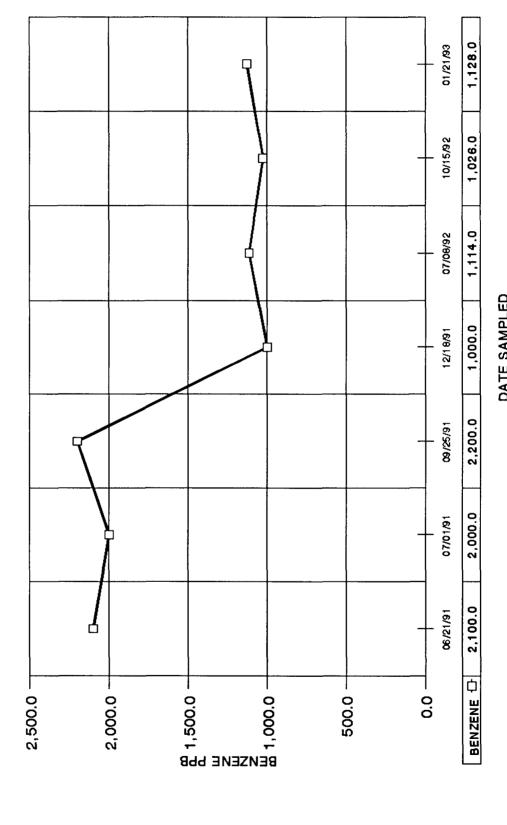


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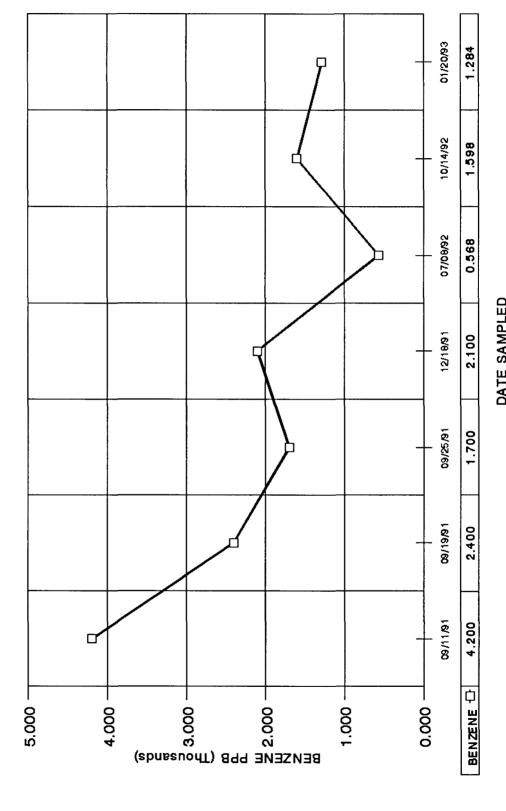


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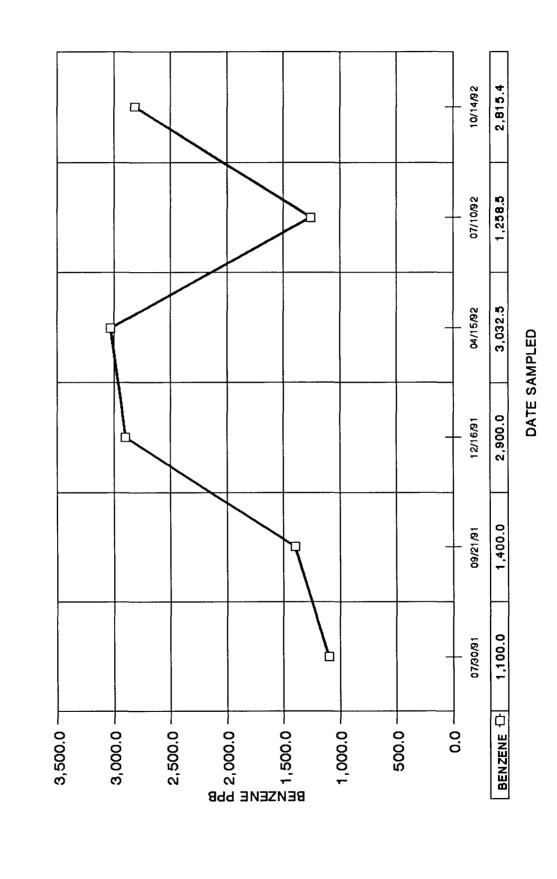
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R.M. GRAY ¥ INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA MW#69 BH-95

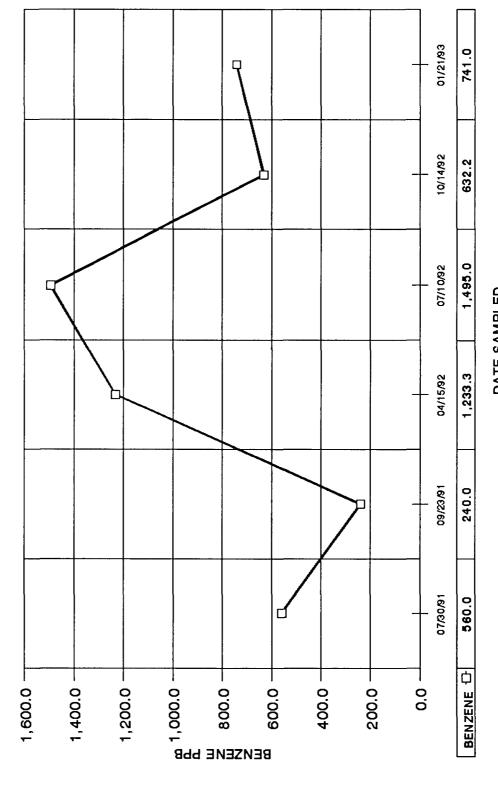


DATE SAMPLED

INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA SUMP 11A



INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA SUMP 16A



DATE SAMPLED



### RANCHER WATER WELLS, PLANT WATER WELLS AND SPRINGS ANALYSES

### **INDIAN BASIN TREATMENT PROJECT**

#### RANCHER WATER WELL SAMPLE RESULTS FIRST QUARTER 1993

LOCATION	JANUARY	FEBRUARY	MARCH	MARCH RESAMPLE
LYMAN WATER WELL				
BENZENE	ND	ND	ND	ND
TOLUENE	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND
XYLENE	ND	ND	ND	ND
CHLORIDE	13.2	13.1	12.5	12.7
UPPER INDIAN HILLS SPRING WEST				
BENZENE	ND	ND	ND	ND
TOLUENE	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND
XYLENE	ND	ND	ND	ND
CHLORIDE	11.4	10.8	11.7	10.7
<b>BIEBELLE WATER WELL</b>				
BENZENE	ND		-	•
TOLUENE	ND	-	-	•
ETHYLBENZENE	ND	-	-	
XYLENE	ND	-	-	•
CHLORIDE	10.6	-	-	•

#### BTEX GIVEN IN PPB CHLORIDE GIVEN IN PPM ND - BELOW DETECTION LIMIT



#### LABORATORY TESTS RESULTS 02/08/93 ATTN: JEFFREY S. LYNN JOB NUMBER: 930097 CUSTOMER: MARATHON OIL COMPANY LABORATORY I.D...: 930097-0001 CLIENT I.D..... MARATHON OIL CO DATE SAMPLED.....: 01/18/93 TIME SAMPLED.....: 14:05 WORK DESCRIPTION...: #1 Lyman Water Well DATE RECEIVED....: 01/26/93 TIME RECEIVED....: 10:00 REMARKS.....: TECHN TEST DESCRIPTION FINAL RESULT LIMITS/\*DILUTION UNITS OF MEASURE TEST METHOD DATE 02/01/93 KJA 0.5 325.2 (1) Chloride (Unfilt.) 13.2 mg/L 8020 - AROMATIC VOLATILE ORGANICS \*1 8020 (2) 01/29/93 MAD Benzene ND ug/L 1 Toluene ND ug/L 1 Ethyl Benzene ug/L ND 1 Xylenes ND 1 ug/L 10703 East Bethany Drive Aurora, CO 80014 (303) 751-1780

PAGE:1

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	LABORATO	RY TESTS 02/08/93	RESULTS			
JOB NUMBER: 930097 CUSTOMER:	MARATHON OIL CO	MPANY	ATTN: JI	EFFREY S. LYNN		
CLIENT I.D: MARATHON OIL CO DATE SAMPLED: 01/18/93 TIME SAMPLED: 14:28 WORK DESCRIPTION: #2 Opper Ind	han Hills Spring	) West	DATE RECEIV	I.D: 930097-0002 ED: 01/26/93 ED: 10:00		
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Chloride (Unfilt.)	11.4	0.5	mg/L	325.2 (1)	02/01/93	KJA
3020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	01/29/93	MAD
Benzene Toluene Ethyl Benzene Xylenes	ND ND ND ND	1 1 1 1	ug/L ug/L ug/L ug/L			
			Auro	3 East Bethany Drive ra, CO 80014 ) 751-1780		<u>.</u>

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	LABORATO	0 RY TESTS 02/08/93	RESULTS			
IOB NUMBER: 930097 CUSTOMER:	MARATHON OIL CO	MPANY	ATTN:	JEFFREY S. LYNN		
CLIENT I.D: MARATHON OIL CO DATE SAMPLED: 01/18/93 FIME SAMPLED: 14:50 WORK DESCRIPTION: #4 Bichelle W	Dater Well		DATE RECE	/ I.D: 930097-0003 IVED: 01/26/93 IVED: 10:00		
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Chloride (Unfilt.)	10.6	0.5	mg/L	325.2 (1)	02/01/93	KJA
3020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	01/29/93	MAD
Benzene Toluene Ethyl Benzene Xylenes	ND ND ND ND	1 1 1 1	ug/L ug/L ug/L ug/L			
			10	703 East Bethany Drive		
		,	Au	rora, CO 80014 03) 751-1780		

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#### LABORATORY TESTS RESULTS 03/16/93

JOB NUMBER: 930250 CUSTOMER: MARATHON OIL COMPANY

CLIENT I.D...... MARATHON OIL DATE SAMPLED...... 02/12/93 TIME SAMPLED...... 11:44 WORK DESCRIPTION...: LYMAN #1

#### LABORATORY I.D...: 930250-0003 DATE RECEIVED...: 02/17/93 TIME RECEIVED...: 13:00 REMARKS.....

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	TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
	Chloride (Unfilt.)	13.1	0.5	mg/L	325.2 (1)	03/05/93	PJM
	8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	02/19/93	MAD
	8020 - AROMATIC VOLATILE ORGANICS Benzene Toluene Ethyl Benzene Xylenes	ND ND ND	*1	ug/L ug/L ug/L ug/L	8020 (2)	02/19/93	MAD
				1070 Auro (303	3 East Bethany Drive ra, CO 80014 ) 751-1780		
			PAGE:3				
-	-						

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#### CORE LABORATORIES

	LABORAT	ORY TESTS 03/16/93	RESULTS			
UOB NUMBER: 930250 CUSTOM	ER: MARATHON OIL (	COMPANY	ATTN:	JEFFREY S. LYNN		
CLIENT I.D: MARATHON OIL DATE SAMPLED: 02/12/93 TIME SAMPLED: 11:22 WORK DESCRIPTION: ARROYO #2 UP	per Indian H	ill Spring Wes	DATE RECE	Y I.D: 930250-00 IVED: 02/17/93 IVED: 13:00	04	
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Chloride (Unfilt.)	10.8	0.5	mg/L	325.2 (1)	03/05/93	PJM
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	02/19/93	MAD
Benzene Toluene Ethyl Benzene Xylenes	ND ND ND		ug/L ug/L ug/L ug/L			
			A	0703 East Bethany Dr urora, CO 80014 303) 751-1780	ive	

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	LABORAT	ORY TESTS 03/16/93	RESULTS					
JOB NUMBER: 930250 CUSTOMER	: MARATHON OIL (	COMPANY	ATTN:	JEFFREY S. LYNN				
cLIENT I.D: MARATHON OIL DATE SAMPLED: 02/12/93 TIME SAMPLED: 10:48 WORK DESCRIPTION: SW-1 Plant Supply Well REMARKS								
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN		
Chloride (Unfilt.)	21	1	mg/L	325.2 (1)	03/05/93	PJM		
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	02/19/93	MAD		
Benzene Toluene Ethyl Benzene Xylenes	ND ND ND		ug/L ug/L ug/L					
			Au	703 East Bethany D rora, CO 80014 03) 751-1780	rive			
		PAGE:2		· · · · · · · · · · · · · · · · · · ·				

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#### LABORATORY TESTS RESULTS 03/16/93 JOB NUMBER: 930250 CUSTOMER: MARATHON OIL COMPANY ATTN: JEFFREY S. LYNN CLIENT I.D.....: MARATHON OIL LABORATORY I.D...: 930250-0001 DATE SAMPLED.....: 02/12/93 DATE RECEIVED....: 02/17/93 TIME SAMPLED.....: 09:56 TIME RECEIVED....: 13:00 Plant Backup Well WORK DESCRIPTION...: SW-2 REMARKS.....: FINAL RESULT TEST DESCRIPTION LIMITS/\*DILUTION UNITS OF MEASURE TECHN TEST METHOD DATE Chloride (Unfilt.) 300 03/05/93 325.2 (1) PJM 4 mg/L 8020 - AROMATIC VOLATILE ORGANICS \*1 8020 (2) 02/19/93 MAD Benzene 9 ug/L 1 Toluene ND ug/L 1 Ethyl Benzene ND 1 ug/L Xylenes ND ug/L 1 10703 East Bethany Drive Aurora, CO 80014 (303) 751-1780 PAGE:1

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	LABORATORY TESTS RESULTS 04/20/93							
JOB NUMBER: 930389 CUSTOMER:	MARATHON OIL CO	DMPANY	ATTN:	JEFFREY S. LYNN				
CLIENT I.D: MARATHON OIL DATE SAMPLED: 03/04/93 TIME SAMPLED: 11:03 WORK DESCRIPTION: #1 Lyman	LABORATORY I.D: 930389-0001 DATE RECEIVED: 03/12/93 TIME RECEIVED: 13:30 REMARKS							
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH		
Chloride (Unfilt.)	12.5	0.5	mg/L	325.2 (1)	03/30/93	KJA		
8020 - AROMATIC VOLATILE ORGANICS		<b>*</b> 1		8020 (2)	03/17/93	MLD		
Benzene Toluene	ND	1	ug/L					
Ethyl Benzene Xylenes	ND ND	1	ug/L ug/L					
	ND	1	ug/L					
	AM	ENDED R	EPORT					

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories, however, assumes no responsibility and makes no warranty or representations, express or implied, as to the productivity proper operations, or profitableness of any oil, gas, coal or other mineral, property well or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced except in its entirety, without the writen approval of Core Laboratories.



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#### **CORE LABORATORIES**

	LABORAT	ORY TESTS 04/20/93	RESULTS			
JOB NUMBER: 930389 CUSTOMER:	MARATHON OIL C	OMPANY	ATTN:	JEFFREY S. LYNN		
CLIENT I.D: MARATHON OIL DATE SAMPLED: 03/04/93 TIME SAMPLED: 10:30 WORK DESCRIPTION: #2 Arroy	o - upper I	ndian Hills S	DATE PECE	/ I.D: 930389-000 VED: 03/12/93 VED: 13:30	02	
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECI
Chloride (Unfilt.)	11.7	0.5	mg/L	325.2 (1)	03/30/93	КJ
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	03/17/93	ML
Benzene Toluene Ethyl Benzene Xylenes	ND ND ND ND	1 1 1 1	ug/L ug/L ug/L ug/L			
	AN	IENDED R	EPORT			
			10 Au	703 East Bethany Dr rora, CO 80014	ive	

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the cirent for whose exclusive and contidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories, however, assumes no responsibility and makes no warranty or representations, express or implied, as to the productivity, proper operations, or promableness of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced except in its entirety, without the written approval of Core Laboratories.

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	LABORATORY TESTS RESULTS							
JOB NUMBER: 930389 CUSTOMER:	MARATHON OIL CO	04/20/93 MPANY	ATTN:	JEFFREY S. LYNN				
ICLIENT I.D: MARATHON OIL DATE SAMPLED: 03/04/93 TIME SAMPLED: 08:45 WORK DESCRIPTION: #7 Plant	LABORATORY I.D: 930389-0003 DATE RECEIVED: 03/12/93 TIME RECEIVED: 13:30 Supply Well SW-1 REMARKS							
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH		
<sup>i</sup> Chloride (Unfilt.)	18.9	0.5	mg/L	325.2 (1)	03/30/93	KJA		
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	03/17/93	MLC		
Benzene Toluene Ethyl Benzene Xylenes	ND ND ND ND	1 1 1 1	ug/L ug/L ug/L ug/L					
	AMEND	ED REPO	RT					
N								
				703 East Bethany Driv	e			
		PAGE:3	Ац (3	rora, CO 80014 03) 751-1780	•			

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories, however, assumes no responsibility and makes no warranty or representations, express or implied, as to the productivity, proper operations, or profitableness of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced except in its entirely without the written approval of Core Laboratories.

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	LABORAT	ORY TESTS 04/20/93	RESULTS			
JOB NUMBER: 930389 CUSTOMER:	MARATHON OIL (	COMPANY	ATTN:	JEFFREY S. LYNN		
CLIENT I.D: MARATHON OIL DATE SAMPLED: 03/04/93 TIME SAMPLED: 08:00 WORK DESCRIPTION: #8 Plant	- Bauleys n	Jeil SW-2	DATE RECE	Y I.D: 930389-0004 IVED: 03/12/93 IVED: 13:30		
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Chloride (Unfilt.)	364	4	mg/L	325.2 (1)	03/23/93	₽JM
2020 - ARDMATIC VOLATILE ORGANICS		*1		8020 (2)	03/17/93	MLC
Senzene Toluene Ethyl Senzene Xylenes	17 ND ND ND	1 1 1 1	ug/L ug/L ug/L ug/L			
	AIVIL	ENDED RE	FURI			
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#### CORE LABORATORIES

#### LABORATORY TESTS RESULTS 04/30/93

JOB NUMBER: 930580

CUSTOMER: MARATHON OIL COMPANY

ATTN: JEFFREY S. LYNN

CLIENT I.D......: MARATHON OIL -- INDIAN BASIN DATE SAMPLED......: 04/13/93 TIME SAMPLED.....: 07:55 WORK DESCRIPTION...: #1 Lyman Water Well LABORATORY I.D...: 930580-0001 DATE RECEIVED...: 04/14/93 TIME RECEIVED...: 09:30 REMARKS...... SAMPLES RECEIVED @ 10C

Chloride (Unfilt.)  12.7  0.5  mg/L  325.2 (1)  04/28/93 VKN  8020 - AROMATIC VOLATILE ORGANICS  1  9020 (2)  04/14/93 MLD  9020 (2)  04/14/93 MLD  9021 9021 9021 9021 9021 9021 9021 902	TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Benzene ND 1 Ug/L Toluene HD 1 Ug/L thyl Benzene ND 1 Ug/L xylenes ND 1 Ug/L i ug/	Chloride (Unfilt.)	12.7	0.5	mg/L	325.2 (1)	04/28/93	VKN
Toluene N0 1 Ug/L Ethyl Benzene N0 1 Ug/L Xylenes N0 1 Ug/L 	8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	04/14/93	MLD
Aurora, CO 80014 (303) 751-1780	Toluene Ethyl Benzene	ND ND	1	ug/L ug/L			
Aurora, CO 80014 (303) 751-1780							
Aurora, CO 80014 (303) 751-1780							
Aurora, CO 80014 (303) 751-1780							
Aurora, CO 80014 (303) 751-1780							
Aurora, CO 80014 (303) 751-1780							
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#### LABORATORY TESTS RESULTS 04/30/93

JOB NUMBER: 930580 CUSTOMER: MARATHON OIL COMPANY

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ATTN: JEFFREY S. LYNN

CLIENT I.D.....: MARATHON OIL -- INDIAN BASIN DATE SAMPLED.....: 04/13/93 TIME SAMPLED.....: 08:38 WORK DESCRIPTION...: #2 Upper Indian Hills Spring West LABORATORY I.D...: 930580-0002 DATE RECEIVED...: 04/14/93 TIME RECEIVED...: 09:30 REMARKS...... SAMPLES RECEIVED @ 10C

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Chloride (Unfilt.)	10.7	0.5	mg/L	325.2 (1)	04/28/93	VKN
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	04/14/93	MLC
Buzene Toluene Ethyl Benzene Xylenes	ND ND ND		ug/L ug/L ug/L	8020 (2)	04/14/93	MLD
	1	1	10 Au (3	703 East Bethany Dr rora, CO 80014 03) 751-1780	rive	

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# APPENDIX F

## STATE ENGINEER'S WATER PRODUCTION REPORTS



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

February 5, 1993

Roswell Basin Watermaster State Engineer Office 1900 West Second Street Roswell, New Mexico 88201

Attention: Robert R. Marr

Re: Indian Basin Treatment Project

Dear Mr. Marr:

The below list of monitor wells (NW)/boreholes (BH) indicates the meter readings for fluid removed from the Lower Queen as of February 4, 1993.

LOCATION	SERIAL NUMBER	DATE READ	METER READING	WATER REMOVED	
MW-58/BH-84	10239118	02/1/93	2332281.0	2332281.0 Gals	
MW-59/BH-85	10259114	02/1/93	63278.8	63278.8 Bbls	
MW-61A/BH-87A	10239116	02/1/93	2249780.0	2249780.0 Gals	
*MW-62/BH-88	10239115	02/1/93	1604342.0	1798272.7 Gals	
MW-65A/BH-91A	10239117	02/1/93	3535918.0	3535918.0 Gals	
MW-68/BH-94	10239114	02/1/93	2118198.0	2118198.0 Gals	
LOWER QUEEN TOTAL 14,692,159.3 Gals					

\* The volume of water removed from BH-88 reflects an additional 193,930.7 gallons which was metered prior to the installation of an automatic sampling device on 1/25/92.

Cumulative Lower Queeen fluid removal as of 02/1/93 is <u>15,013,627.3 Gals</u>. This number reflects the 321,468 gallons removed prior to installation of the present meters in December, 1991.

Indian Basin Treatment Project February 5, 1993 Page 2

The below list of monitor wells (MW)/boreholes (BH) indicates the meter readings for fluid removed from shallow wells under permit RA-8015 as of December 11, 1992 when meters and pumps were removed from these wells due to pump freeze potential. The meters and pumps will be reinstalled upon the arrival of warmer weather.

LOCATION	SERIAL NUMBER	DATE READ	METER READING	WATER REMOVED
** MW-13/BH-36	02209213	12/11/92	122623.9	115911.4 Gals.
*** MW-14/BH-37	02209214	12/11/92	323788.1	323977.1 Gals.
****MW-35/BH-59	02209212	12/11/92	98236.2	98303.5 Gals.
	SHALLOW TOTAL			

\*\* The meter reading on MW-13/BH-36 reflects 6712.5 gallons attributed to MW-1/BH-14 prior to removal and reinstallation on MW-13/BH-36.

- \*\*\* The meter on MW-14/BH-37 has been repaired. As indicated in the December 1992 monthly statement the December meter reading of 323788.1 was below the November reading of 323965.0. The difference between the two readings is 176.9 gallons while the actual withdrawal was 12.1 gallons. The 12.1 gallons has been added to the total water removed volume.
- \*\*\*\* The meter on MW-35/BH-59 has been repaired. As indicated in the August 1992 monthly statement the August meter reading of 37760.9 was below the July reading of 38017.0. The difference between the two readings is 256.1 gallons. This amount has been added to the total water withdrawal volume. The meter reading on MW-35/BH-59 also reflects 188.8 gallons attributed to MW-21/BH-44 prior to meter removal and reinstallation on MW-35/BH-59.

The cumulative shallow fluid removal as of December 11, 1992 is 545,093.3 gals. This number reflects the 6901.3 gallons removed from MW-1/BH-14 and MW-21/BH-44 prior to meter removal.

Indian Basin Treatment Project February 5, 1993 Page 3

If more information is required, please feel free to contact me at (915) 687-8312.

Very truly yours, Reffrey S. Ly

Jeffrey S. Lynn Advanced Environmental Representative

JSL039/nrt

- xc: T.
- T. C. Lowry Midland
  - D. E. Kenyon PTC, Littleton
  - R. F. Unger Midland
  - R. A. Biernbaum Midland
  - C. M. Schweser- IBGP, Artesia



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

March 2, 1993

Roswell Basin Watermaster State Engineer Office 1900 West Second Street Roswell, New Mexico 88201

Attention: Robert R. Marr

Re: Indian Basin Treatment Project

Dear Mr. Marr:

The below list of monitor wells (NW)/boreholes (BH) indicates the meter readings for fluid removed from the Lower Queen as of March 1, 1993.

LOCATION	SERIAL NUMBER	DATE READ	METER READING	WATER REMOVED
MW-58/BH-84	10239118	03/1/93	2477036.0	2477036.0 Gals
MW-59/BH-85	10259114	03/1/93	63278.8	63278.8 Bbls
<b>*MW-61A/BH-87A</b>	10239116	03/1/93	2360111.3	2444383.3 Gals
**MW-62/BH-88	10239115	03/1/93	1693654.0	1887584.7 Gals
MW-65A/BH-91A	10239117	03/1/93	3773108.0	3773108.0 Gals
MW-68/BH-94	10239114	03/1/93	2300625.0	2300625.0 Gals
	LC	WER QUEEN TO	)TAL	15,540,446.6 Gals

\* The volume of water removed from BH-87A reflects an additioinal 84,272.0 gallons which was metered during an interference test of the aquifer conducted on February 19-24, 1993.

\*\* The volume of water removed from BH-88 reflects an additional 193,930.7 gallons which was metered prior to the installation of an automatic sampling device on 1/25/92.

Cumulative Lower Queeen fluid removal as of 03/1/93 is <u>15.861,914.6 Gals</u>. This number reflects the 321,468 gallons removed prior to installation of the present meters in December, 1991.

Indian Basin Treatment Project March 2 Page 2

The below list of monitor wells (MW)/boreholes (BH) indicates the meter readings for fluid removed from shallow wells under permit RA-8015 as of March 1, 1993. The meters and pumps for BH-36 amd BH-59 have not been reinstalled to date.

LOCATION	SERIAL NUMBER	DATE READ	METER READING	WATER REMOVED
*** MW-13/BH-36	02209213	12/11/92	122623.9	115911.4 Gals.
****MW-14/BH-37	02209214	03/1/93	342081.1	342270.1 Gals.
****MW-35/BH-59	02209212	12/11/92	98236.2	98303.5 Gals.
	SHALL	OW TOTAL	556,4	85.0 Gals

\*\*\* The meter reading on MW-13/BH-36 reflects 6712.5 gallons attributed to MW-1/BH-14 prior to removal and reinstallation on MW-13/BH-36.

- \*\*\*\* The meter on MW-14/BH-37 has been repaired. As indicated in the December 1992 monthly statement the December meter reading of 323788.1 was below the November reading of 323965.0. The difference between the two readings is 176.9 gallons while the actual withdrawal was 12.1 gallons. The 12.1 gallons has been added to the total water removed volume.
- \*\*\*\* The meter on MW-35/BH-59 has been repaired. As indicated in the August 1992 monthly statement the August meter reading of 37760.9 was below the July reading of 38017.0. The difference between the two readings is 256.1 gallons. This amount has been added to the total water withdrawal volume. The meter reading on MW-35/BH-59 also reflects 188.8 gallons attributed to MW-21/BH-44 prior to meter removal and reinstallation on MW-35/BH-59.

The cumulative shallow fluid removal as of March 1, 1993 is <u>563,386.3 Gals</u>. This number reflects the 6901.3 gallons removed from MW-1/BH-14 and MW-21/BH-44 prior to meter removal.

Indian Basin Treatment Project March 2 Page 3

If more information is required, please feel free to contact me at (915) 687-8312.

Very truly yours,

-/offin / they \_\_\_\_ Jeffrey S'. Lynn

Advanced Environmental Representative

JSL039/nrt

- xc:
- T. C. Lowry Midland
- D. E. Kenyon PTC, Littleton

R. F. Unger - Midland

- R. A. Biernbaum Midland
- C. M. Schweser- IBGP, Artesia



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

April 9, 1993

Roswell Basin Watermaster State Engineer Office 1900 West Second Street Roswell, New Mexico 88201

Attention: Robert R. Marr

Re: Indian Basin Treatment Project

Dear Mr. Marr:

The below list of monitor wells (MW)/boreholes (BH) indicates the meter readings for fluid removed from the Lower Queen as of April 5, 1993.

LOCATION	SERIAL NUMBER	DATE READ	METER READING	WATER REMOVED
MW-58/BH-84	10239118	04/05/93	2807712	2,807,712 Gals
MW-59/BH-85	10259114	04/05/93	65618.9	65,618.9 Bbls
*MW-61A/BH-87A	10239116	04/05/93	2593678	2,677,950 Gals
**MW-62/BH-88	10239115	04/05/93	1848971	2,042,902 Gals
MW-65A/BH-91A	10239117	04/05/93	4156070	4,156,070 Gals
***MW-68/BH-94	10239114 02209213	03/24/93 04/05/93	2421888 181568	2,480,838 Gals
		LOWER QUEEN	TOTAL	16,921,466 Gals

\* The volume of water removed from BH-87A reflects an additional 84,272 gallons which was metered during an interference test of the aquifer conducted on February 19-24, 1993.

\*\* The volume of water removed from BH-88 reflects an additional 193,931 gallons which was metered prior to the installation of an automatic sampling device on 1/25/92.

Indian Basin Treatment Project Page 2

\*\*\* On March 24, 1993 the meter on MW-68/BH-94, was replaced. The final reading on meter serial no. 10239114 was 2,421,888 gallons. The 3/24/93 initial reading of 122,618 gallons on replacement meter serial no. 02209213 reflects 6,713 gallons attributed to MW-1/BH-14 and 115,905 gallons attributed to MW-13/BH-36.

Cumulative Lower Queeen fluid removal as of 04/5/93 is 17,183,984 Gals. This number reflects the 321,468 gallons removed prior to installation of the present meters in December, 1991.

The below list of monitor wells (MW)/boreholes (BH) indicates the meter readings for fluid removed from shallow wells under permit RA-8015 as of April 5, 1993. Meter 02209213, previously installed on MW-13/BH-36, was reinstalled on MW-68/BH-94. Meter 02209212, previously installed on MW-35/BH-59, was reinstalled on MW-13/BH-36.

LOCATION	SERIAL NUMBER	DATE READ	METER READING	WATER REMOVED
**** MW-13/BH-36	02209212	04/05/93	99722.5	117397.7 Gals.
**** MW-14/BH-37	02209214	04/05/93	393202.1	393391.1 Gals.
***** MW-35/BH-59				98303.5 Gals
	SHALL	OW TOTAL		609,092.3 <b>Gals</b>

\*\*\* Meter 02209212 on MW-13/BH-36 reflects 98,236
gallons pumped from other locations prior to
reinstallation on BH-36, including 189 gallons
attributed to MW-21/BH-44. Refer to the March 1993
statement for further discussion.

- \*\*\*\* The volume of water removed from MW-14/BH-37 reflects an additional 189 gallons not included on the meter reading as discussed in the December 1992 monthly statement.
- \*\*\*\*\* The meter and pump are not installed in MW-35/BH-59 at this time. The previous meter, serial no. 02209212, has been moved to MW-13/BH-36.

The cumulative shallow fluid removal as of April 5, 1993 is 615,994.3 Gals. This number reflects the 6,902 gallons removed from MW-1/BH-14 and MW-21/BH-44 prior to meter removal.

Indian Basin Treatment Project Page 3

If more information is required, please feel free to contact me at (915) 687-8312.

Very truly yours,

al Leaned Al Learned

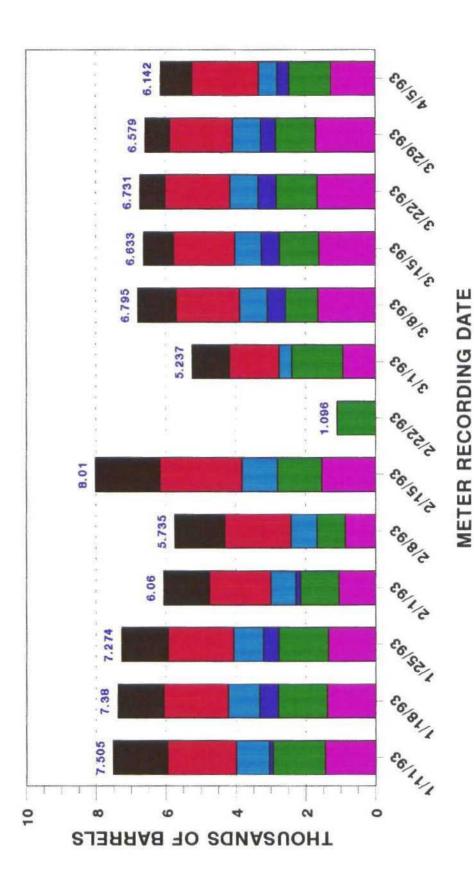
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- xc:
- T. C. Lowry Midland
- D. E. Kenyon PTC, Littleton R. F. Unger Midland
- R. A. Biernbaum Midland
- C. M. Schweser- IBGP, Artesia

## LQPROWA2

# INDIAN BASIN TREATMENT PROJECT WEEKLY LOWER QUEEN WATER WITHDRAWALS FIRST QUARTER 1993

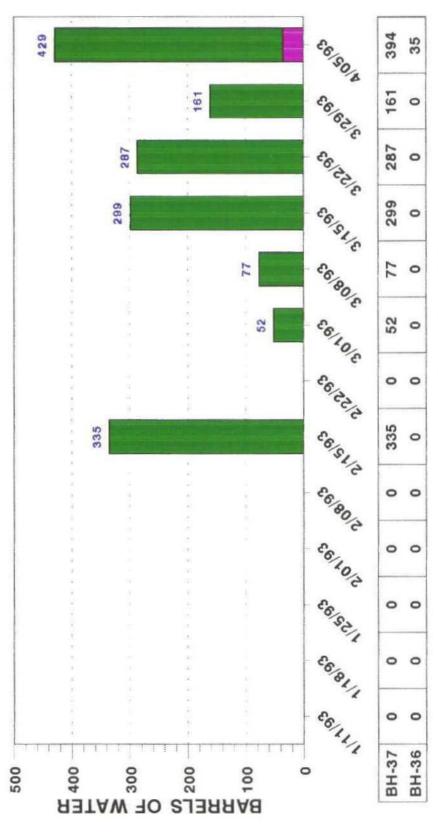




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# INDIAN BASIN TREATMENT PROJECT WEEKLY SHALLOW WATER WITHDRAWALS **FIRST QUARTER 1993** l

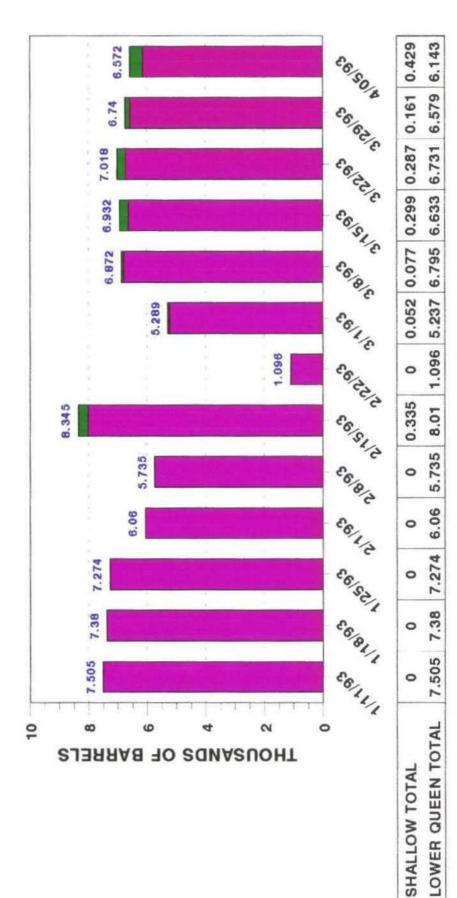




METER RECORDING DATE

INDIAN BASIN TREATMENT PROJECT WEEKLY TOTAL WATER WITHDRAWALS FIRST QUARTER 1993 





METER RECORDING DATE

## APPENDIX G

## LOWER QUEEN FLUID LEVEL DATA AND POTENTIOMETRIC MAPS

INDIAN BASIN TREATMENT PROJECT

LOWER QUEEN MONTHLY FLUID LEVELS FIRST QUARTER 1993

MEIL NUNBER	CSG. ELEVATION	DATE	DEPTH TO WATER	FLIED ELEVATION	DATE	DEPTH TO WATEH	DEPTH TO WATER FLUID ELEVATION		DEPTH TO WATER FLUID ELEVATION	FLUID ELEVATIO
	DATUM	JAN.			FEB.			MAR		
BH63	3787.7	3787.7 1-18-93	156.68	3631.02	2-12-83	156.79	3630.91	3-4-93	157	3630.7
BH84*	3824.31				2-18-53	193.94	3630.37			
BH-a5*	3819.59	3819.59 1-5-93	188.9	3630.69	2-12-83	189.18	3630.41	3-1-83	189.2	3630.39
BH-96	3815.28	3815.28 1-18-83	184.75	3630.53	2-12-83	184.86	3630.42	3-4-93	185.08	3630.2
BH87A*	3815.97				2-4-93	187	3628.97			
8H-86*	3819.9									
BH-69	3826.16	3826.16 1-18-93	195.55	3630.61	2-12-93	195.84	3630.32	3-4-93	196.14	3630.02
BH-90	3798.57	3798.57 1-18-93	167.99	3630.58	3630.58 2-12-93	168.08	67'0296	3-4-93	168.26	3630.31
BH-91A*	3763.26									
BH92	3828.98	3828.98 1-18-33	199.1	3629.88	3629.88 2-12-93	199.23	3629.75	3-4-93	199.49	3629.49
BH83	3765.87	3765.87 1-18-93	135.1	3630.77	3630.77 2-12-93	135.19	3630.68	3630.68 3-4-93	135.39	3630.48
BH94*	3797.83									
BH97	3822.7	3822.7 1-18-93	191.52	3631.18	3631.18 2-12-93	191.67	3631.03	3631.03 3-4-93	191.9	3630.8
SW-1*	3808.19									
SW-2	3808.79	3808.79 1-20-93	178.88	3629.91	3629.91 2-12-93	179.08	3629.71	3629.71 3-4-93	179.31	3629.48
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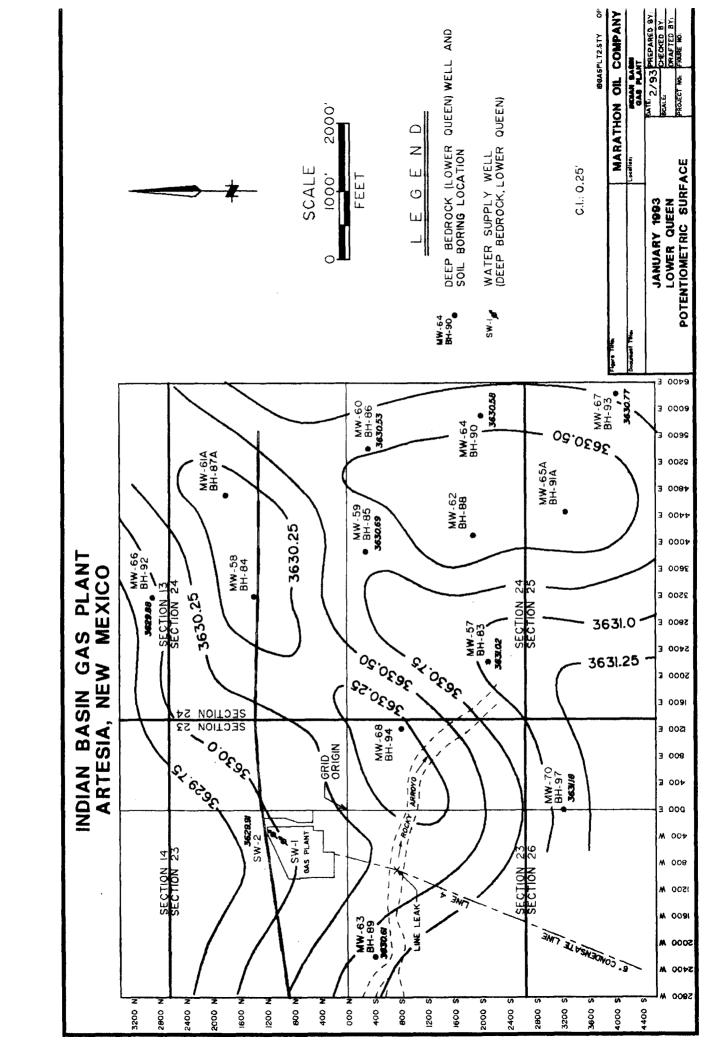
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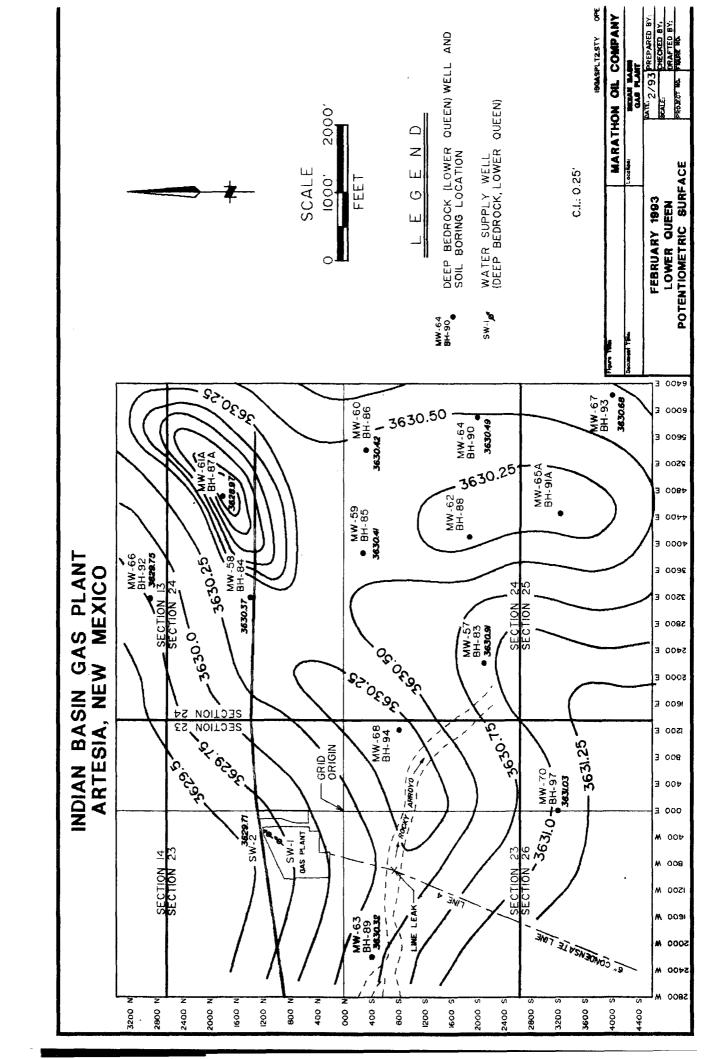
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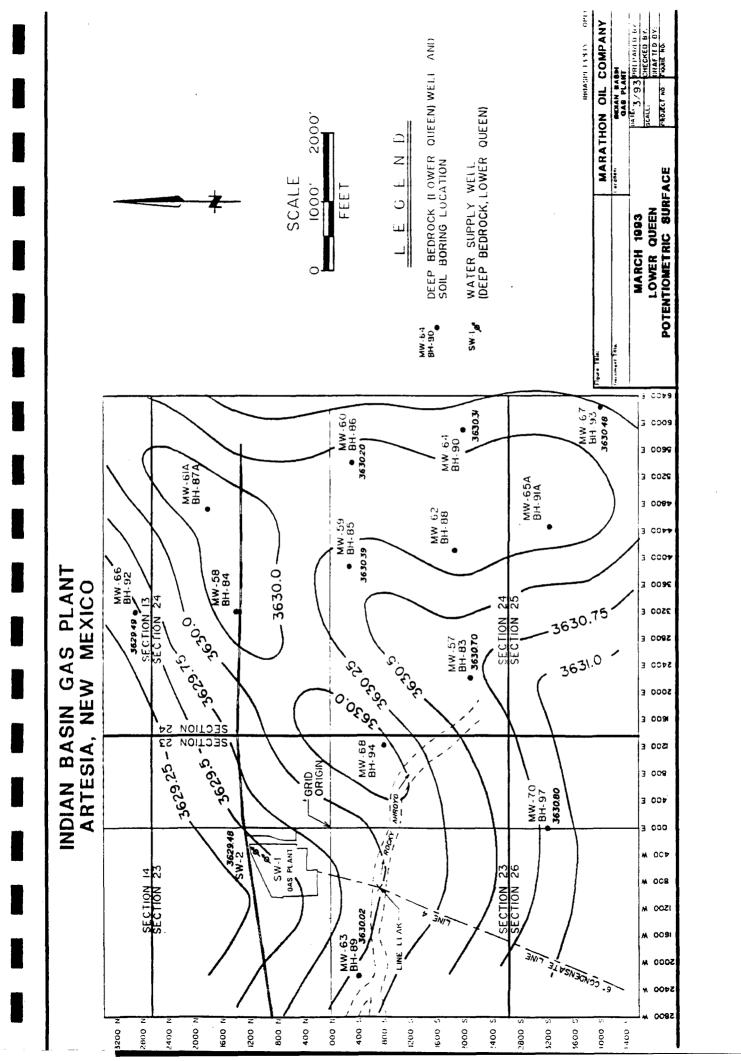


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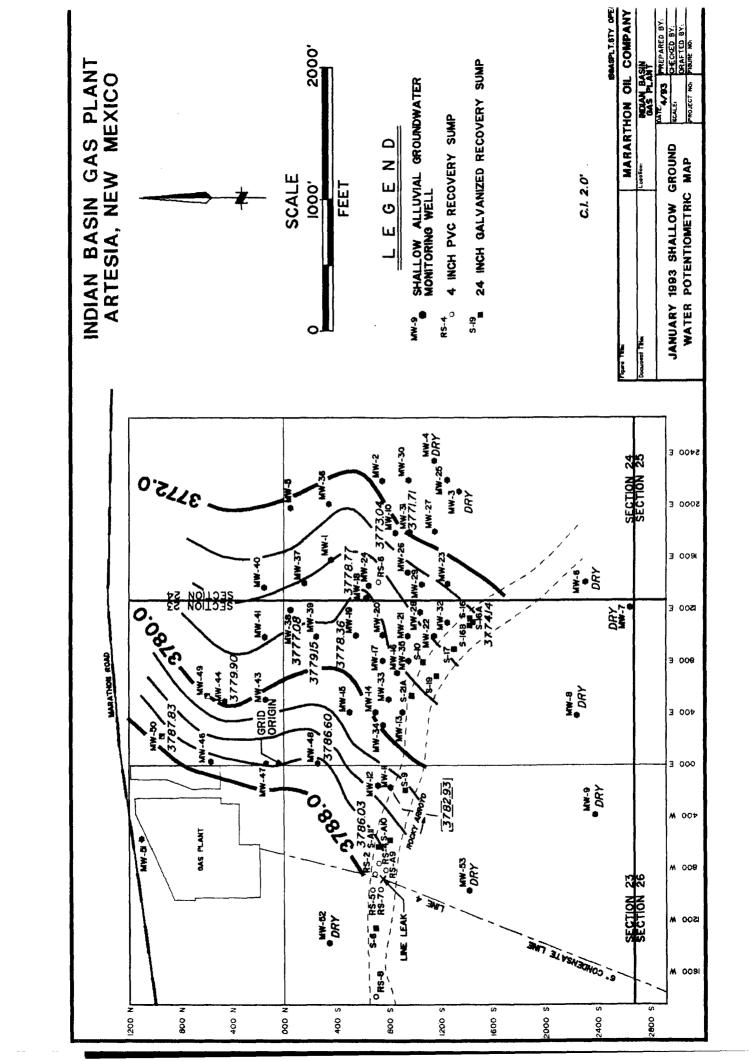
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APPENDIX H

## SHALLOW SOIL WATER POTENTIOMETRIC MAP



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### INDIAN BASIN GAS PLAN RECEIVED TREATMENT PROJECT QUARTERLY REPORT OIL CONSERVATION DIV.

#### **SECOND QUARTER 1993**

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

August 11, 1993

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#### INTRODUCTION

This report summarizes groundwater and unsaturated zone treatment activities conducted during the Second Quarter of 1993 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 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 and brine spill from a production pipeline discovered in April 1991 near the Indian Basin Gas Plant.

#### QUARTERLY REPORT SUMMARY

The overall remediation system is fully operational and functioning as set forth in the Treatment Project Plan document. Fluid recovery from the Lower Queen aquifer is continuing with volatile hydrocarbon compounds being removed by air stripping. Shallow zone fluid recovery continues with recovery volumes commingled with pumped Lower Queen fluids. Water discharged from the air stripper continues to be utilized by the plant for process water. The vapor extraction operation continues and is currently removing volatile hydrocarbons from the shallow alluvium. Water analyses from rancher wells and nearby surface springs have not exceeded any State or Federal drinking water standards for benzene, toluene, ethylbenzene, total xylene or chloride. Local ranchers are kept informed of treatment project activities via a quarterly letter.

#### **GROUNDWATER ELEVATION**

#### Lower Queen

Depth-to-water measurements were acquired from nonpumping, Lower Queen aquifer monitoring wells in April, May, and June 1993. Table 1 in part presents groundwater elevations calculated from casing elevation data and depth-to-water measurements obtained from eight (May and June 1993) or nine (April 1993) Lower Queen wells. Figures 1, 2, and 3 are potentiometric maps of the Lower Queen aquifer based on gauging conducted in April, May, and June, respectively. The Lower Queen data indicate decreasing groundwater elevations in monitoring wells during the quarter.

#### Shallow Zone

A potentiometric map was constructed using depth-to-water measurements collected from shallow monitoring wells in April 1993 during the quarterly sampling event (Figure 4). Table 1 shows the depth-to-water measurements and calculated groundwater elevations for shallow zone wells. Groundwater Recharge Daily rainfall is gauged at the gas plant. Monthly rainfall for April, May, and June was 0.52, 0.60, and 0.67 inches, respectively (Table 1). Cumulative rainfall for the Second Quarter was 1.79 inches.

#### QUARTERLY SAMPLING LABORATORY RESULTS

Gauging, purging, and sampling of 24 monitoring wells were conducted on April 13 through 15, 1993. All 15 Lower Queen wells including the plant water supply well (SW-1) and backup well (SW-2) were sampled. Seven of these Lower Queen wells have downhole pumps installed and were sampled through the pump. Ten of the fifty-nine Shallow zone wells and one of several sumps completed in the shallow fluvial deposits were sampled in April. Of these, five of the original twenty-three shallow zone monitoring wells and one (Sump 16A) of the two sumps designated for quarterly sampling in the Treatment Project Plan were sampled. The remaining 18 wells were either dry (14), contain free product (MW-11, MW-56, MW-69, Sump A10), or inaccesible (MW-13; pumping well). Five Shallow zone wells other than those designated in the Treatment Project Plan were sampled (MW-16, MW-17, MW-21, MW-26, and Samples were collected by Southwestern Laboratories in Midland, Texas using MW-39). Environmental Protection Agency (EPA) sampling protocol. A table was prepared by Southwestern Laboratories of field observations from notes recorded during gauging, purging, and sampling activities. This table documents the depth-to-water measurement, purge volume, temperature, pH, conductivity, and whether free phase product was observed in the well (Appendix A).

Marathon Oil Company's Petroleum Technology Center (PTC) in Littleton, Colorado performed chloride and benzene, toluene, ethylbenzene, and total xylene (BTEX) analyses on the samples collected during the quarterly monitoring episode. High performance liquid chromatography (HPLC) was used to analyze groundwater samples for BTEX concentrations and a titration method was used for chloride analysis. These results are contained in Appendix B. Core Laboratories in Aurora, Colorado performed duplicate BTEX analysis using EPA Method 8020 purge and trap gas chromatography of four select samples. This practice will enable a quality assurance comparison of the HPLC analytical technique. Core Laboratories also conducted four duplicate chloride analyses using EPA Method 325.2. Three shallow wells (MW-17, MW-50, MW-68) and one Lower Queen well (MW-63) were analyzed for BTEX concentrations using both the HPLC and EPA 8020 methods. Figure 5 compares BTEX analytical results for the two analytical techniques. Duplicate laboratory results performed by Core Laboratories using EPA Method 8020 and 325.2 are included in Appendix B.

Tables 2 and 3 are historical summaries of quarterly benzene concentration data since September 1991 for the Lower Queen wells and shallow zone wells, respectively. Benzene concentration (in ug/L) versus time graphs for each routinely sampled monitoring well are provided in Appendix C.

#### RANCHER WELLS, SPRING, AND PLANT WELL LABORATORY RESULTS

Monthly groundwater samples of one nearby rancher well (Lyman) and surface water from one natural spring in Rocky Arroyo (Upper Indian Hills Spring West; Hendrickson and Jones, 1952) were collected on April 15, May 12, and June 28, 1993. In addition, another rancher well which is sampled quarterly (Biebelle), was sampled on April 15, 1993. Analytical results from these samples show that groundwater and spring water do not exceed the EPA drinking water standards for chloride, benzene, toluene, ethylbenzene, and total xylenes.

Table 4 provides a summary of the monthly analyses performed on the natural spring in Rocky Arroyo and the Lyman well which is the closest downgradient well to the remediation site. The quarterly analysis for the Biebelle well, the second closest downgradient well, is also reported. The rancher well and the natural spring samples were obtained using EPA sampling and handling procedures. Core Laboratories performed the BTEX and chloride analyses using EPA approved methods. Laboratory results of groundwater from the rancher wells and the natural spring are transmitted to the local ranchers each month with letters of explanation. Copies of these letters are also provided to the OCD and the Bureau of Land Management (BLM) in Santa Fe and Roswell, New Mexico, respectively.

The plant water supply well and backup well are also sampled and analyzed monthly. Laboratory reports for all the rancher wells, natural spring, and plant wells are included in Appendix D.

#### **GROUNDWATER PUMPING**

#### Lower Queen

Fluid recovery from the Lower Queen aquifer and shallow saturated zone is metered and reported to the State Engineer's Office (SEO) on a monthly basis, per SEO directive. The reports filed with the SEO for the Second Quarter of 1993 are attached in Appendix E. Figures 6, 7 and 8 are stacked bar graphs depicting weekly fluid recovery from the Lower Queen, weekly fluid recovery from the shallow zone recovery wells, and combined weekly fluid recovery from the Lower Queen aquifer and shallow zone, respectively.

Six Lower Queen wells (MW-58 (BH-84), MW-59 (BH-85), MW-61A (BH-87A), MW-62 (BH-88), MW-65A (BH-91A), and MW-68 (BH-94) were intermittently pumped for plume control during the quarter. Monthly fluid recovery for each well is listed in the following table.

		QUELL'I		
Well Number	April	May	June	Quarter Total (Bbls)
MW-58 (BH-84)	6,042	5,112	4,401	15,555
MW-59 (BH-85)	1,990	3,677	3,653	9,320
MW-61A (BH-87A)	5,735	4,027	4,977	14,739
MW-62 (BH-88)	1,967	3,114	2,806	7,887
MW-65A (BH-91A)	7,414	8,497	6,634	22,545
MW-68 (BH-94)	4,843	5,010	4,920	14,773
TOTAL	27,991	29,437	27,391	84,819

#### LOWER QUEEN FLUID RECOVERY

#### Shallow Zone

Shallow zone fluid recovery during the second quarter was from two intermittent pumping wells (MW-13 and MW-14) and two shallow zone sumps completed in the fluvial gravels of Rocky Arroyo (sumps 11A and 16A). Sump A11 was periodically pumped between April 12 and May 4 before pumping was discontinued there and the diesel-fueled, portable pump moved to Sump 16A (Figure 4). Shallow zone fluid recovery from Sump 16A commenced on May 7. Monthly shallow zone fluid recovery volumes for each well and sump are listed in the following table.

Free product recovery from sumps A11 and 16A during the second quarter totaled 4.4 barrels.

Well Number	APRIL Cond./Water	MAY Cond./Water	JUNE Cond./Water	Quarter Total (Bbls) Cond./Water
MW-13 (BH-36)	228*	116.2*	56.6*	400.8*
MW-14 (BH-37)	121*	NP	NP	121*
Sump A11	0.6/0.7	0.1/0.2	NP	0.7/0.9
Sump 16A	NA	3.4/2.8	0.3/0	3.7/2.8
TOTAL (Bbls)	0.6/349.7	3.5/119.2	0.3/56.6	4.4/525.5

#### SHALLOW ZONE FLUID RECOVERY

\* Total fluid volume because condensate and produced groundwater are not separated at the well. NP = Not Pumped during this period.

#### **GROUNDWATER TREATMENT**

Commingled fluids pumped from the six Lower Queen and two shallow zone recovery wells were pumped through piping to a treatment compound that includes an oil/water separator, air stripper, and three aboveground tanks. The oil/water separator is used to remove free product from the produced groundwater. The free product is transferred to a condensate holding tank which is gauged on a weekly basis. The measured volume of free condensate recovered from the commingled groundwater during the second quarter was 2.1 barrels. Cumulative condensate separated from the recovered groundwater since product separation began in April 1992 is 45.2 barrels.

Groundwater from the separator is pumped through the air stripper to remove dissolvedphase hydrocarbon compounds. Stripped hydrocarbon compounds are vented to the atmosphere through a stack. Treated groundwater is used as make-up water for the gas plant.

Total free product recovery from the Lower Queen and shallow zone for the second quarter was 6.5 barrels. Cumulative free product recovered to date excluding the volume volatilized by the air stripper and vapor extraction system is 3,340.5 barrels.

#### VAPOR EXTRACTION SYSTEM

Phase I of the unsaturated zone remediation using vapor extraction technology was completed in March 1993. The Phase I program vented from shallow zone wells MW-16 (BH-39), MW-17 (BH-40), and MW-21 (BH-44).

The mobile soil vapor extraction system was relocated in March 1993 to prepare for venting of shallow zone monitoring well MW-56 (BH-82). Vent well MW-56 is completed within the shallow bedrock (Upper Queen) approximately 2000 feet east of the Phase I extraction wells (Figure 4). Necessary generator repairs delayed initiation of venting until April 8, 1993. Venting was continuous from this start date to the end of the quarter. Organic vapor concentrations of the extracted air effluent measured with a Foxboro Model 108 flame ionization detector (FID) on May 20 and 26, 1993 from MW-56 indicated a concentration greater than 10,000 ppm calibrated to methane.

#### **OTHER ACTIVITIES**

A right-of-way amendment application was submitted to the BLM on June 17, 1993 for the proposed downgradient Lower Queen monitoring well MW-71. In addition, the amendment includes the right-of-way for an additional Lower Queen recovery well (MW-72) that may be drilled between MW-58 (BH-84) and MW-59 (BH-85) (Figure 3). Right-of-way amendment approval was gained on July 9, 1993.

#### **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.



Table 1 Indian Basin Remediation Project Monthly Groundwater Elevations Second Quarter 1993

3629.73 3630.11 3629.39 3630.29 WATER ELEV. 3629.40 GROUND 3630.05 3630.39 3630.57 Jun-93 0.6 Not Gauged Not Gauged Vot Gauged **Not Gauged** WATER (FT) Vot Gauged Vot Gauged Vot Gauged Vot Gauged Vot Gauged Not Gauged Vot Gauged Vot Gauged Vot Gauged Vot Gauged Vot Gauged Not Gauged Vot Gauged Vot Gauged Vot Gaugec 96.43 68.46 199.59 135.58 185.23 DEPTH 192.18 179.39 157.13 0 3629.35 3630.24 3629.82 3630.05 WATER ELEV. GROUND 3629.99 3630.48 3630.47 3629.57 May-93 WATER (FT) Vot Gauged Not Gauged Vot Gauged Vot Gauged Not Gauged Gauged Not Gauged Not Gauged Not Gauged Not Gauged Gauged Vot Gauged Not Gauged Vot Gauged Not Gauged Not Gauged Not Gauged Gauged Not Gauged 199.63 135.63 96.34 68.52 85.29 92.09 DEPTH 157.23 179.22 5 Not Not Not 3787.19 3777.75 3765.70 3782.58 3778.72 3780.87 3778.28 3775.58 3781.91 3629.60 3630.50 3772.29 3771.51 GROUND WATER ELEV. 3630.75 3630.26 3630.35 3629.75 3773.88 3782.66 3765.53 3630.17 3630.77 3772.47 3778.69 3776.90 3784.44 3630.21 3767.31 Apr-93 0.52 WATER (FT) 189.38 185.02 199.38 135.37 195.99 168.22 191.80 18.68 17.13 18.93 22.63 17.29 20.72 DEPTH 56.95 79.04 24.38 19.64 20.42 18.68 21.48 26.16 28.70 39.58 22.32 22.32 46.11 18.57 18.31 5 3828.98 3765.87 3797.83 3822.57 3813.35 3823.86 3794.40 3824.31 3819.59 3799.55 3795.82 3791.15 3797.32 3787.70 CASING 3815.28 3815.97 3819.90 3826.16 3798.57 3763.26 3808.19 3808.79 3790.78 3806.96 3801.04 3796.20 3803.12 3804.14 3785.88 3799.20 FT AMSI 3793.01 OP OF 3797.21 ELEV. 3798.21 3805.11 MW-61A (BH-87A)\* MW-65A (BH-91A)\*| MW-62 (BH-88)\* MW-58 (BH-84)\* MW-59 (BH-85)\* MW-68 (BH-94)\* **MONTHLY RAINFALL (INCHES** SW-1\* (SUPPLY) MW-66 (BH-92) SW-2 (BACKUP) MW-60 (BH-86) MW-63 (BH-89) MW-64 (BH-90) MW-67 (BH-93) MW-70 (BH-97) MW-11 (BH-34) MW-16 (BH-39) WELL NUMBER (BH-83) MW-10 (BH-33) MW-17 (BH-40) MW-19 (BH-42) (BH-44) (BH-55) (BH-61) MW-39 (BH-62) (BH-63) MW-50 (BH-73) MW-54 (BH-80) MW-55 (BH-81) MW-69 (BH-95) MW-18 (BH-41) (BH-45) MW-26 (BH-49) MW-44 (BH-67) MW-4 (BH-26) **MW-40 MW-22 MW-38 MW-31** <u>WW-57</u> **MW-21** QUEEN WELLS ZONE SHALLOW WELLS <u>. OWER</u>

**GWELEV20.XLS** 

\*Pump present in well

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## TABLE 2 INDIAN BASIN REMEDIATION PROJECT HISTORICAL SUMMARY LOWER QUEEN BENZENE CONCENTRATIONS VS TIME SECOND QUARTER 1993

	Ber	rzene (ug/L)	using EPA N	Aethod 8020	Benzene (ug/L) using EPA Method 8020 unless indicated otherwise	ated otherw	ise
	SEP	DEC	APR	JUL	OCT	NAL	APR
WELL	1991	1991	1992	1992	1992	1993	1993
MW-57 (BH-83)	1600	350	150	948**	15.1*	21*	* ©
MW-58 (BH-84)	40	90	202**	178**	190*	192*	55*
MW-59 (BH-85)	540	420	40.4**	268**	98.8*	26*	10*
MW-60 (BH-86)	33	v	3.5**	19**	31.7*	138*	17*
MW-61A (BH-87A)	190	10	5.0**	359**	470.1*	585*	2821*
MW-62 (BH-88)	2200	1400	257.5**	357**	212.3*	78*	33*
MW-63 (BH-89)	- -	, V	4.1**	12**	4.3*	12*	7*
MW-64 (BH-90)	150	130	233**	115**	14	15*	5 •
MW-65A (BH-91A)	680	150	25.3**	413**	10.6*	* ෆ	*
MW-66 (BH-92)		v 1	3.3**	**0	12.1*	* ෆ	<ul> <li>3</li> <li>3</li> </ul>
MW-67 (BH-93)	280	320	4.3*	103**	2.6*	* ∞	7*
MW-68 (BH-94)	240	1900	1865**	160**	2208.2**	376*	1890*
MW-70 (BH-97)		۲ ۲	1.7**	v	10.7*	* ℃ ∨	• ດ
SW-1 (SUPPLY)	- -	v 1	ۍ ۴	17.5*	15.7*	<b>*</b> 9	v
SW-2 (BACKUP)	<1	<1	7.9*	7*	69.4*	47*	4

\* High Performance Liquid Chromatography (HPLC)

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

TABLE2.XLS

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#### TABLE 3 INDIAN BASIN REMEDIATION PROJECT HISTORICAL SUMMARY SHALLOW ZONE BENZENE CONCENTRATIONS VS TIME SECOND QUARTER 1993

	Ben	zene (ug/L)	using EPA N	lethod 8020	unless indi	cated otherw	vise
	SEP	DEC	APR	JUL	ост	JAN	APR
WELL	1991	1991	1992	1992	1992	1993	1993
MW-1 (BH-14)	250	200	NS	NS	NS	NS	NS
MW-2 (BH-23)	NS	NS	NS	NS	NS	NS	NS
MW-3 (BH-24)	NS	NS	NS	NS	NS	NS	NS
MW-4 (BH-26)	NS	NS	NS	NS	NS	NS	NS
MW-5 (BH-28)	NS	NS	NS	NS	NS	NS	NS
MW-6 (BH-29)	NS	NS	NS	NS	NS	NS	NS
MW-7 (8H-30)	NS	NS	NS	NS	NS	NS	NS
MW-8 (BH-31)	NS	NS	NS	NS	NS	NS	NS
MW-9 (BH-32)	NS	NS	NS	NS	NS	NS	NS
MW-10 (BH-33)	2300	2300	1780**	1842**	2100	NS	NS
MW-11 (8H-34)	3000	3800	3087**	2195**	2942*	2746*	NS
MW-12 (BH35)	3800	NS	NS	NS	NS	NS	NS
MW-13 (BH-36)	3100	3000	3492**	2708**	NS	NS	NS
MW-14 (BH-37)	5100**	NS	NS	NS	NS	NS	NS
MW-15 (BH-38)	5100	NS	NS	NS	NS	NS	NS
	1700	NS	NS	NS	NS	NS	514*
MW-16 (BH-39)	2000	NS	NS	NS	NS	NS	1500
MW-17 (BH-40)	4300	NS	2639**	2700	3300	NS	NS
MW-18 (BH-41) MW-19 (BH-42)	4300	NS	3195**	3000	3032*	NS	3926*
	110	NS	· · · · · · · · · · · · · · · · · · ·	NS	NS	NS	NS
MW-20 (BH-43)	1000	1100	NS NS	NS		NS	114*
MW-21 (BH-44)	4	NS	NS	NS	NS NS	NS	NS
MW-22 (BH-45)				•			······································
MW-23 (BH-46)	NS	NS NG	NS	NS	NS	NS	NS
MW-24 (BH-47)	3400	NS	NS	4353**	NS	NS	NS NC
MW-25 (BH-48)	NS	NS	NS NG	NS	NS	NS	NS
MW-26 (BH-49)	3100	3000	NS	2000	1992*	1708*	861*
MW-27 (BH-50)	NS	NS	NS	NS	NS	NS	NS
MW-28 (BH-52)	2200	NS_	NS	NS	NS	NS	NS
MW-29 (BH-53)	NS	NS	NS	NS	NS	NS	NS
MW-30 (BH-54)	NS	NS	NS	NS	NS	NS	NS
MW-31 (BH-55)	<1	NS	NS	332**	9*	NS	NS
MW-32 (BH-56)	200	NS	NS	NS	NS	NS	NS
MW-33 (BH-57)	6300	NS	NS	NS	NS	NS	NS
MW-34 (BH-58)	2500	NS	NS	NS	NS	NS	NS
MW-35 (BH-59)	5700	NS_	NS	NS	NS	NS	NS
MW-36 (BH-21)	NS	NS	NS	NS	NS	NS	NS
MW-37 (BH-60)	150	NS	NS	NS	NS	NS	NS
MW-38 (BH-61)	15	15	51**	37*	166**	NS	NS
MW-39 (BH-62)	880	NS	NS	NS	NS_	14	29*
MW-40 (BH-63)	NS	NS	NS	NS	NS	NS	NS
MW-41 (BH-64)	200	170	NS	NS	NS	NS	NS
MW-42 (BH-65)	<1		NS	NS	NS	NS	NS
MW-43 (BH-66)	320	NS	NS	NS	NS	NS	NS
MW-44 (BH-67)	59	NS	10**	97**	12 ·	14	7*
MW-45 (BH-68)	<1	<1	NS	NS	NS	NS	NS
MW-46 (BH-69)	140	25	NS	NS	NS	NS	NS
MW-47 (BH-70)	2600	2200	NS	NS	NS	NS	NS
MW-48 (BH-71)	<1	<1	NS	47**	NS	NS	NS
MW-49 (BH-72)	35	NS	NS	NS	NS	NS	NS
MW-50 (BH-73)	<1	<1	4	4	8*	8*	<1
MW-51 (BH-74)	800	<1	NS	NS	NS	NS	NS
MW-52 (BH-75)	<1	NS	NS	5**	NS	NS	NS
MW-53 (BH-77)	<1	NS	NS	NS	NS	NS	NS
MW-54 (BH-80)	<1	<1	9++	8**	62*	14*	10*
MW-55 (BH-81)	940	400	296**	483**	215*	390	412*
						1128*	
MW-56 (BH-82)	2200	1000	NS	1114**	1026*		NS
MW-61 (BH-87)	<1	NS NS	NS	NS NG	NS NS	NS	NS
MW-65 (BH-91)	<1	NS 0100	NS	NS Foot	NS	NS	NS
MW-69 (BH-95)	2400	2100	NS	568*	1598*	1284*	NS
SUMP A-11	1400	2900	3033**	1258**	2815*	NS	NS 707*
SUMP A-16	240	2000	1233**		632*	741**	

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\* High Performance Liquid Chromatography (HPLC)

\*\* Average of more than one sample result using HPLC. NS = Not Sampled.

FP = Free Product

RANCHER WELL AND SPRING WATER SAMPLE RESULTS INDIAN BASIN REMEDIATION PROJECT TABLE 4

# 1993 SECOND QUARTER 1993

								2221							
			APRIL					MAY					JUNE		
WELL/ SPRING	Benzene	Toluene	Benzene Toluene Ethylbenzene Xylenes	Xylenes	Chloride	Benzene	Toluene	Chloride Benzene Tolvene Ethylbenzene Xylenes Chloride Benzene Tolvene Ethylbenzene Xylenes Chloride	Xylenes	Chloride	Benzene	Toluene	Ethylbenzene	Xylenes	Chloride
Lyman (#1)	QN	QN	QN	QN	13.0	QN	QN	QN	QN	13.0	Q	QN	QN	QN	12.5
Upper Indian Hills Spring West (#2) ND	QN	Q	QN	QN	13.5	Q	QN	QN	QN	11.0	QN	QN	QN	QN	11.4
Biebelle (#3)	QN	QN	DN	DN	11.4			NOT SAMPLED					NOT SAMPLED		

BENZENE, TOLUENE, ETHYLBENZENE, & XYLENE CONCENTRATION IN Ug/L

CHLORIDE CONCENTRATION IN mg/L ND = NOT DETECTED AT METHOD DETECTION LIMIT

**TABLE4.XLS** 

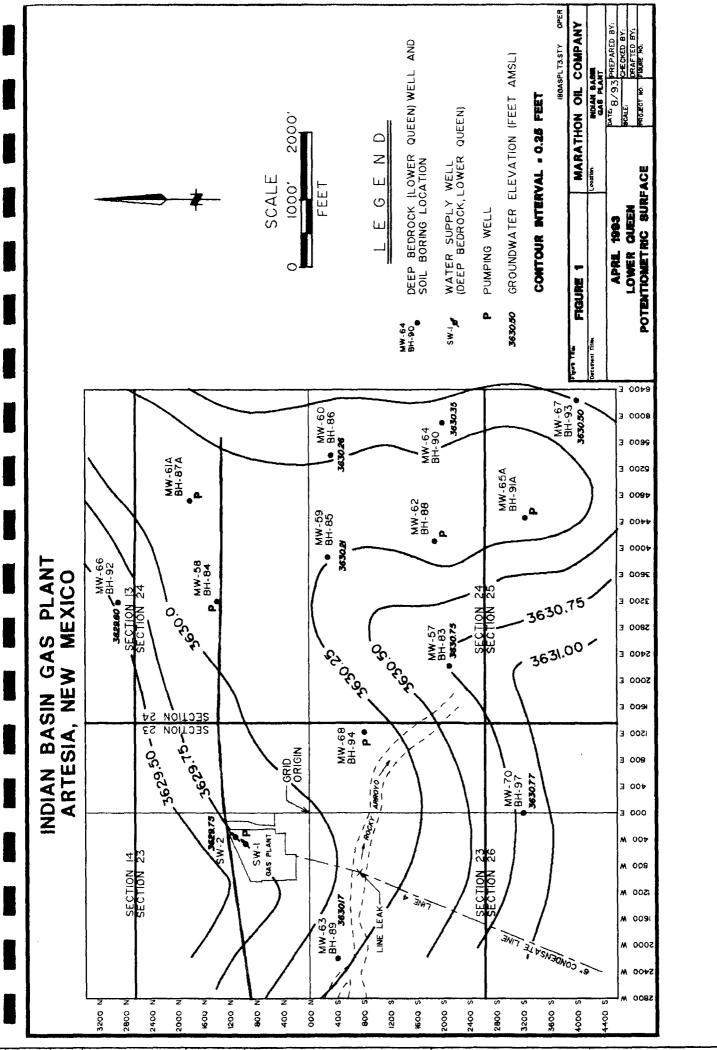
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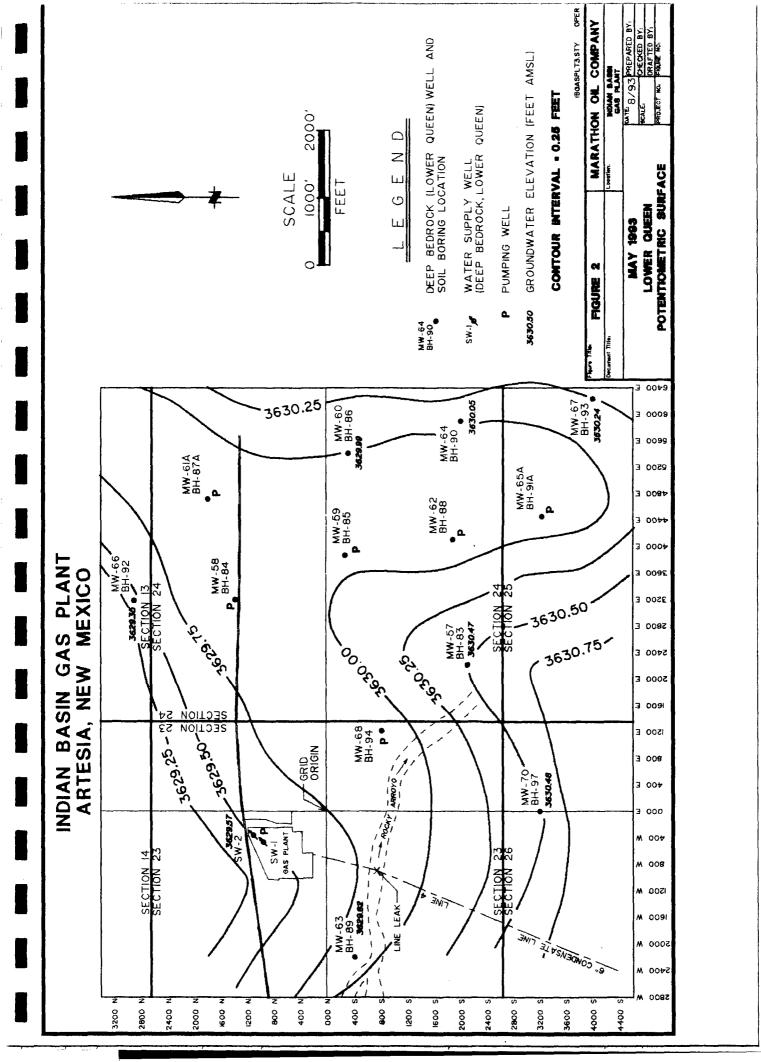
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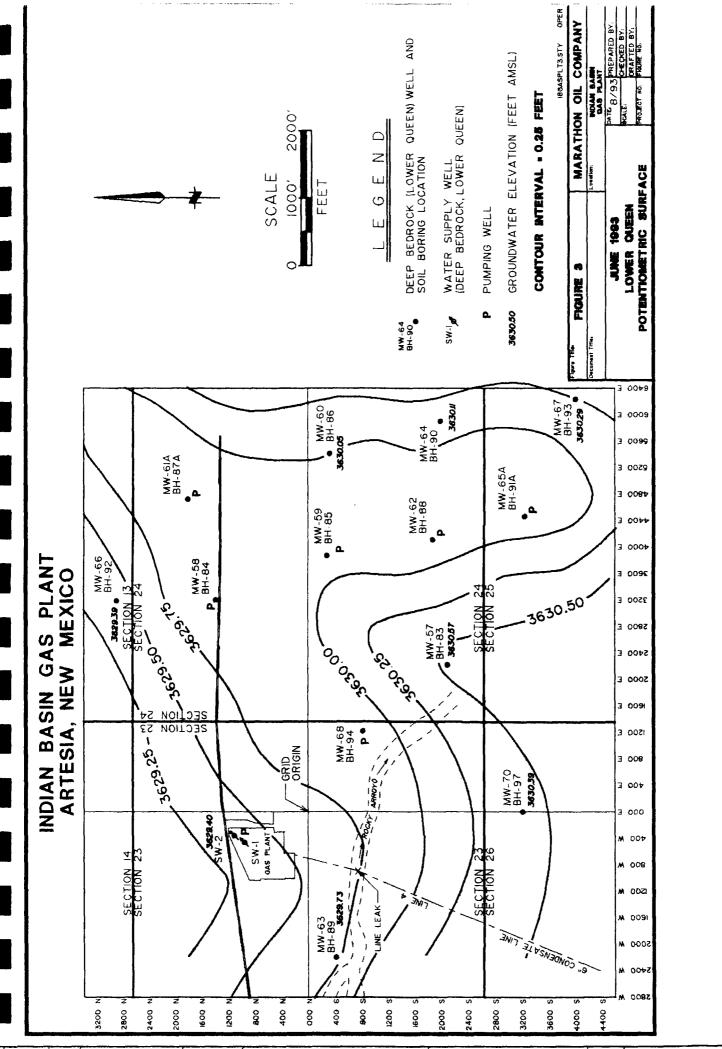
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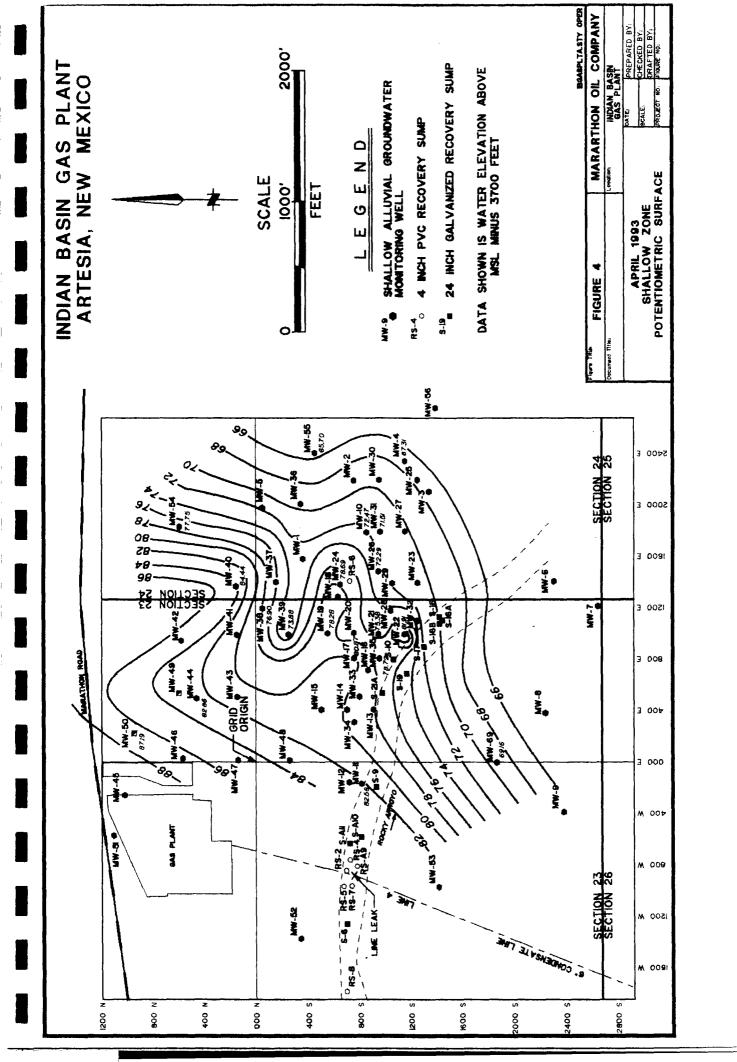
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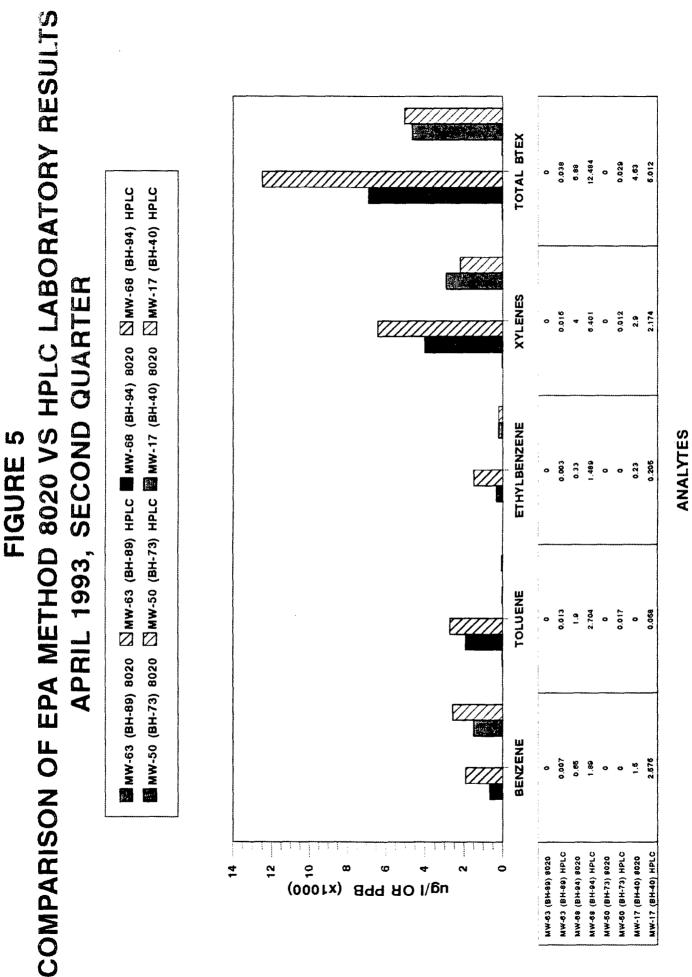
#### FIGURES







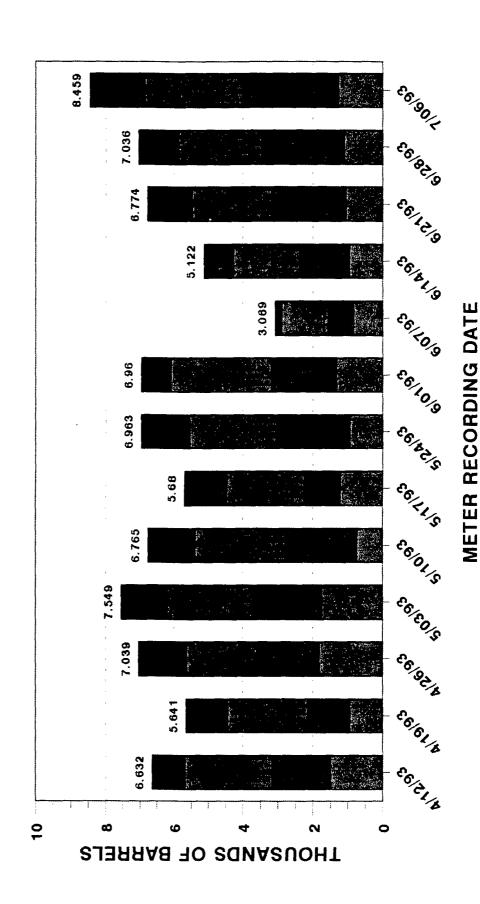




HPLC = HIGH PERFORMANCE LIQUID CHROMOTOGRAPHY

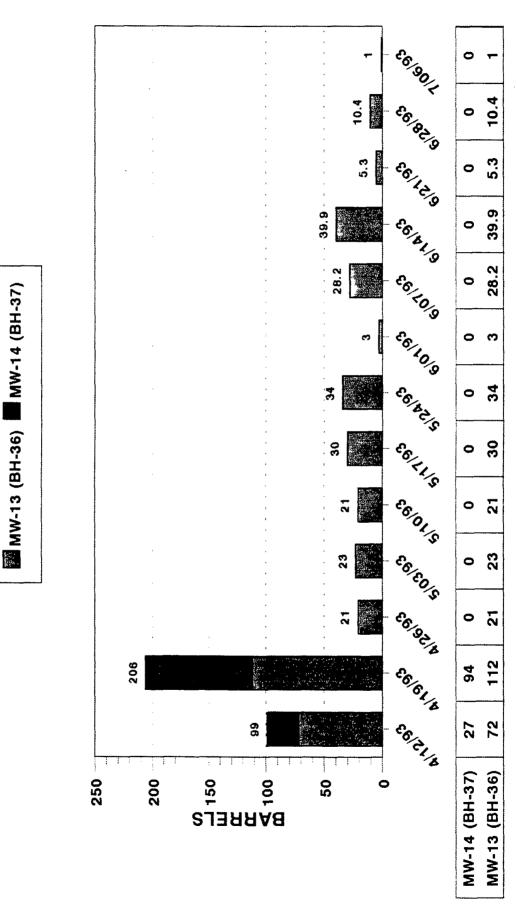






WKLQREC2Q

WKSHREC2Q



WEEKLY SHALLOW FLUID RECOVERY

FIGURE 7

1993

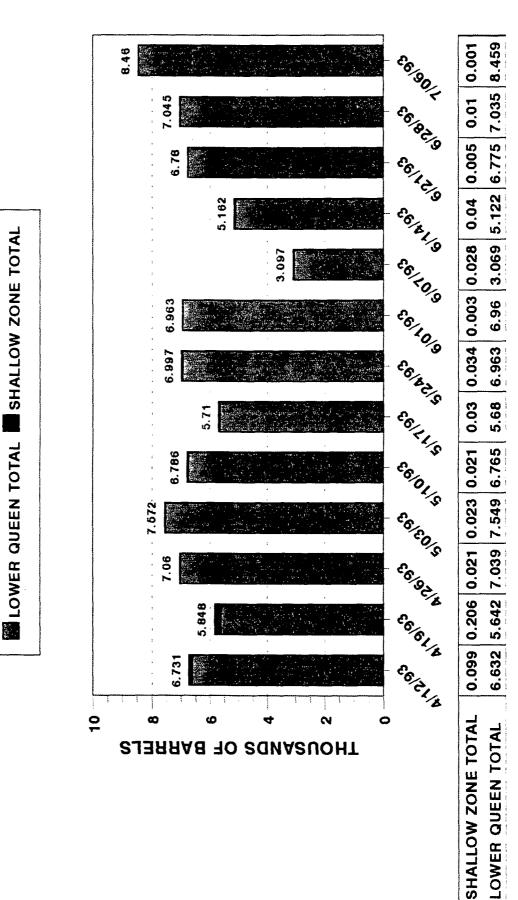
SECOND QUARTER

# METER RECORDING DATE

WKREC2Q

RECOVERY SECOND QUARTER 1993 WEEKLY TOTAL FLUID **FIGURE 8** 

SHALLOW ZONE TOTAL



METER RECORDING DATE

### APPENDIX A

### APRIL 1993 GAUGING, PURGING, AND SAMPLING FIELD SUMMARY



1703 West Industrial P O Box 2150 Midland, Texas 79702 Phone: i9151 683-3349 Fax: i9151 686-0492

April 28, 1993

Mr. Al Learned Marathon Oil Company P. O. Box 552 Midland, Texas 79702

Re: Marathon Indian Basin Remediation Project

Gentlemen:

The quarterly monitoring project was started at 7:00 a.m. on April 13, 1993. During a three (3) day period, a total of fifty (50) wells was checked. The monitoring project was completed at 11:00 a.m. on April 15, 1993.

Sampling of the wells which were pumped are listed below in the order in which they were pumped.

#### <u>April 13, 1993</u>

Trip Blank Equipment Blank No. 1 BH-85 MW-59 Equipment Blank No. 2 BH-90 MW-64 BH-93 MW-67 Equipment Blank No. 3 Water out of Fresh Water tank Equipment Blank No. 4 (w/water out of tank) BH-89 MW-63 BH-92 MW-66 Equipment Blank No. 5 <u>April 14, 1993</u>

Trip Blank Equipment Blank No. 6 BH-97 MW-70 BH-86 MW-60 Equipment Blank No. 7 Changed water in Decon Barrels BH-83 MW-57 BH-81 MW-55 Equipment Blank No. 8 BH-80 MW-54 Sump 16A

When samples were prepared to be shipped to Core and PTC Laboratories on Monday, April 19, 1993, the Corrossive label on the side of the PTC cooler was not removed, and Federal Express brought the PTC cooler back to SwL on Tuesday, April 20, 1993. At that time an office employee knew what was in the box, so she removed the sticker and sent Federal Express back on their way with the package. Later this same day, I received a phone call from Charlie Kerley acknowledging that PTC had not yet received their samples. He also had concern over whether or not we had repacked the samples on ice. After this, I called Federal Express to see if they could bring my package back to me to insure us that our samples were still cold. Upon

APR 3 0 1993

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Environmental & Safety

SOUTHWESTERN LABORATORIES, INC.

arrival, we took a temperature inside the cooler which was 43°F. Before shipping samples on Tuesday, April 20 1993, we re-packed them with frozen cold packs.

If you have any further questions, please do not hesitate to call.

Thank you.

Sincerely,

You & Church

Lorri L. Church Project Manager Midland EAS

LLC:jjc

SOUTHWESTERN LABORATORIES, INC.

FIELD LOG

## **QUEENS WELLS**

# Indian Basin Gas Plant

### Artesia, N.M.

				1	<u> </u>	I	<u> </u>				T				[]	<u> </u>
Remarks									1							
Conductivity	/mhos/cm @ 25° C	768	1354	1417	866	941	1433	591	985	819	1031	651	736	563	8	
H	5	6.72	6.47	6.50	7.07	6.49	6.65	6.56	6.42	6.62	6.73	6.29	6.51	7.25		-
Temperature	٩.	69		02	ő	1		70	11		69	71	1	69	1	-
Purge Volume	(gal.)	39.6	Pump Present	42.9	74.5	Pump Present	Pump Present	49.3	6.9	Pump Present	70.1	59.5	Pump Present	65.4	Pump Present	None
Free Product	(V/N)	z	z	z	z	7	z	Z	z	z	z	z	z	z	z	
Sample	Date	04-14-93	04-13-93	04-13-93	04-14-93	04-13-93	04-13-93	04-13-93	04-13-93	04-13-93	04-13-93	04-13-93	04-13-93	04-14-93	04-15-93	04-15-93
Column	(tt.)	20.25	1	21.91	38.06	5 2 1		25.20	34.15		35.80	30.40	1	33.40		112.96
FTC Water I avel	(H.)	156.95		189.38	185.02	1	L L	195.99	168.22		199.38	135.37	1	191.80	1	179.04
Reported Total Denth	(ft.)	177.20	218.71	211.29	223.08	216.37	225.90	221.19	202.37	168.56	235.18	165.77	203.43	225.20	255.00	292.00
Well	I.D.	MW-57	MW-58	MW-59	MW-60	MW-61A	MW-62	MW-63	MW-64	MW-65A	MW-66	MW-67	MW-68	MW-70	Plant Well	Backup Well
5	Γ	BH-83	BH-84	BH-85	BH-86	BH-87A	BH-88	BH-89	BH-90	BH-91A	BH-92	BH-93	BH-94	BH-97	SW-1	SW-2

Note: BH-83, BH-86, BH-89, BH-90, BH-92, BH-93 and BH-97 were wells that SwL Field Services pumped.

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FIELD LOG

## SHALLOW WELLS

# Indian Basin Gas Plant

## Artesia, N.M.

3	Weil	Reported	FTC Water	Water	Sample	Free	Purge	Temperature		Conductivity	
		Total Depth	Level	Column		Product	Volume		Hq		Remarks
-	i.D.	(ft.)	( <del>I</del> I.)	(tt.)	Date	(N/X)	(gal.)	ц.		umhos/cm @ 25° C	
BH-24	MW-3	17.40	1	Dry	04-14-93	1	-		-	1	
											Insufficient
BH-26	MW-4	18.68	18.57	0.11	04-14-93	1	QNS	1 4	1	1	Sample to bail
BH-28	MW-5	13.10		Dry	04-14-93	1			1 1 1		
BH-29	MW-6	13.98		Dry	04-14-93	8		1	1		
BH-55	MW-31	19.93	19.64	0.29	04-14-93	1	QNS		;		Insufficient Sample to bail
BH-30	7-WM	17.31	-	Dry	04-14-93		6	8			
BH-45	MW-22	17.30	17.29	0.01	04-14-93		8				Insufficient Sample to bail
BH-31	MW-8	17.74	-	Dry	04-14-93	1	8		1		
BH-32	9-WM	13.65	8	Dry	04-14-93	8	1	1	1		
BH-33	MW10	19.08	18.31	0.77	04-15-93	ŧ 1 1	1.5	1	-	8	Insufficient Sample to bail
BH-34	MW-11	24.85	24.38	0.47	04-15-93	Y3" -5"	0.9				(q)
BH-36	MW-13	22.07	1	1	04-14-93	1	Pump Present	-	1		Inaccesible
BH-42	MW-19	19.11	18.93	0.18	04-15-93	z	0.4	-	2 8		(a)
BH-47	MW-24	14.09	1	Dry	04-14-93	8		8			
(a) Bailed dry t	(a) Bailed dry but did recover enough to fill one VOA vial for BTEX. (b) Bailed dry of water but did recover enough for one VOA vial half full	enough to fill on recover enough	e VOA vial for I	BTEX. vial half full.							

VUA VIAI NAIT TUII. enougn tor one (b) Bailed dry of water, but did recover SOUTHWESTERN LABORATORIES, INC. FIELD LOG

## SHALLOW WELLS

# Indian Basin Gas Plant

### Artesia, N.M.

					]		ail											Π
Remarks		(a)		0.125" (b)		(c)	Insufficient Sample to bail						(d)			Not Sampled		
Conductivity	umhos/cm @ 25° C			5	I I I	1910	1	2730		5230	4	1	3180	2500	1			
На			9 8 1	6.69	1	7.56		7.03	1	6.84	:	1	6.94	7.02				
Temperature	ų,	8		1	1		1	1			<b>1</b>		20	70	1	1	1	
Purge Volume	(gal.)	0.6	L 1 1	1.5	1	0.33	0.4	7.6		5.4	1	1	62.7	74.6		38.8	Pump present	
Free Product	(N/X)	z	1	Y 0.6"	1	1		z	Z	z	1	l ł l	z	z	Inaccesible/ Soil vent well	3'7" FP	1	Bailed dry after 0.1 gallons.
Sample	Date	04-15-93	04-14-93	04-15-93	04-14-93	04-15-93	04-15-93	04-15-93	04-14-93	04-15-93	04-13-93	04-14-93	04-14-93	04-14-83	04-14-93	04-14-93	04-14-93	11
Water Column	(#.)	0.29	Dry	0.79	Dry	0.68	0.20	3.86	Dry	10.99	Dry	Dry	32.04	38.10		19.83	0.71	to fill one vial.
FTC Water Level	(tt.)	17.13	1	20.72	5	22.63	20.42	21.48	1	26.16	1		46.11	28.70	1	39.58	16.49	iough recovery
Reported Total Depth	(tt.)	17.42	14.76	21.51	16.77	23.31	20.62	25.34	19.98	37.15	21.44	16.02	78.15	66.80	43.76	59.41	17.20	Hours. (b) En
lle		MW-18	MW-29	MW-26	MW-32	MW-21	MW-38	MW-44	MW-48	MW-50	MW-52	MW-53	MW-54	MW-55	MW-56	MW-69	-	no recovery in 2
Well	I.D.	BH-41	BH-53	BH-49	BH-56	BH-44	BH-61	BH-67	BH-71	BH-73	BH-75	BH-77	BH-80	BH-81	BH-82	BH-95	Sump A-11	(a) Bailed dry, no recovery in 2 Hours. (b) Enough recovery to fill one vial. (c)

(d) Pumped dry after 40 gallons then sample caught with bailer.

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i i SOUTHWESTERN LABORATORIES, INC.

### FIELD LOG

## SHALLOW WELLS

# Indian Basin Gas Plant

### Artesia, N.M.

		<del></del>		<u></u>		T				 	 	
	Hemarks	In Report	(a)	<b>QNS to Bail</b>								
Conductivity	umhos/cm @ 25° C		1	1	1840	1990						
	Н	1	1		7.84	7.17						
Temperature	Ŀ.		2	1		-						
Purge	Volume (gal.)	31.4	6.6	1.7	0.25	0.51						
Free	Product (Y/N)	1.5″	z	z	z	Z						
Sample	Date	04-14-93	04-15-93	04-15-93	04-15-93	04-15-93						
Water	Column (ft.)	1.31	3.37	0.85	0.13	1.05						als.
FTC Water	Level (ft.)	14.15	17.13	19.96	22.32	18.68						enough to fill via
Reported	Total Depth (ft.)	15.46	20.54	20.81	22.45	19.73						ut did recover e
lle		A	MW-39	MW-37	MW-16	MW-17						(a) Bailed dry after 4 gallons, but did recover enough to fill vials.
Well	I.D.	Sump 16-A	BH-62	BH-62	BH-39	BH-40						(a) Bailed dry a

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### APPENDIX B

### **APRIL 1993 LABORATORY REPORTS**

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(4/93)
НРСС
þу
Results
Analysis
BTEX
Basin
Indian

	(ddd)	(qdd)	(ddd)	(qdd)	(qdd)	(qdd)	(qdd)	(mg/L)
Sample	Benzene	evenioi	o-Xylene	Ethylbenzene	m,p-Xylene	I otal Xylenes	I otal BIEX	Chloride
BH-39/MW-16	514	ß	19	39	2115	2134	2740	246
BH-40/MW-17	2575	58	121	205	2053	2174	5012	294
BH-42/MW-19	3926	130	23	16	59	82	4154	NS
BH-44/MW-21	114	19	ŋ	38	29	38	209	283
BH-49/MW-26	861	62	16	600	1998	2014	3537	NS
BH-62/MW-39	28	15	4	4	7	11	58	83
BH-67/MW-44	7	15	14	18	QN	14	54	365
BH-73/MW-50	QN	17	7	QN	Ω.	12	29	347
BH-80/MW-54	10	QN	QN	QN	8	8	18	145
BH-81/MW-55	412	20	10	89	80	18	539	301
BH-83/MW-57	00	21	7	15	თ	16	60	80
BH-84/MW-56'58	55	16	5	31	4	6	111	133
BH-85/MW-59	10	14	S	12	QN	S	41	29
BH-86/MW-60	17	16	12	QN	QN	12	45	6
BH-88/MW-62	33	15	e	16	21	24	88	207
BH-89/MW-63	7	13	ო	ო	12	15	38	5
BH-90/MW-64	5	11	ო	5	9	6	30	10
BH-91A/MW-65A	4	0	e	ო	5	8	24	26
BH-92/MW-66	QN	5	QN	5	QN	QN	10	8
BH-93/MW-67	7	18	5	7	14	19	51	8
BH-97/MW-20 7/0	o	20	QN	QN	4	4	33	8
Equip Blank No. 1	17	9	QN	QN	8	8	31	NS
Equip Blank No. 2	n	8	QN	n	QN	QN	14	NS
Equip Blank No. 3	QN	ŋ	QN	QN	5	5	8	NS
Equip Blank No. 4	4	QN	QN	QN	8	89	12	NS
Equip Blank No. 5	5	5	QN	QN	ო	С	13	NS
Equip Blank No. 6	11	თ	ო	QN	4	4	27	NS
Equip Blank No. 7	10	30	QN	4	QN	QN	44	NS
Equip Blank No. 8	16	16	QN	9	4	4	42	NS
H2O Out of Tank	17	36	QN	QN	QN	QN	53	NS
Sump 16A	707	881	810	298	3416	4226	6112	218
Trip Blank	ŝ	=	QN	ę	n	e	22	NS

Page 1 of 2

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	(mg/L) Chloride		NS
-	(ppb) Total BTEX	42	2
PLC (4/93)	(ppb) Total Xvlenes	4	QN
sults by H	(dqd) m.p-Xvlene	4	QN
Analysis Re	(ppb) (ppb) Ethvibenzene m.p-Xviene	QN	7
Basin BTEX Analysis Results by HPLC (4/93)	(ppb) e-Xvlene	Q	QN
Indian I	(ppb) Toluene	=	Q
	(ppb) Benzene	27	QN
	Sample	Trip Blank	Lab Blank

ND=No detection at or below detection limit of 3 ppb.

\* Notes:

NS=No sample available.

Benzene         Toluene         o-Xylene         Ethylbenzene         m,p-Xylene         Total Xylenes         Total BT           BH-87AMW-61A         2821         173         113         817         3880         3993         7804           BH-94MW-68         1890         2704         1416         1489         4985         6401         12484	Benzene         Toluene         o-Xylene         Ethylbenzene         m.p-Xylene         Total Xylenes           2821         173         113         817         3880         3993           1890         2704         1416         1489         4985         6401           samples with free condensate in the sample vial are of dubious value because it is impossible to approducible sampling for analysis.         993	Samples from Well 87A, and from Well 94 had visible free condensate in the sample vial. For this reason, BTEX results are reported separately for these samples, and are shown below.*	il 87A, and fror ITEX results ar	n Well 94 had e reported se	d visible free parately for t	condensate in t these samples, a	he sample vi and are show	al. n below.*		
BH-87AMW-61A 2821 173 113 817 3880 3993 7804 BH-94MW-68 1890 2704 1416 1489 4985 6401 12484	BH-87A/MW-61A       2821       173       113       817       3880       3993       7804         BH-94/MW-68       1890       2704       1416       1489       4985       6401       12484         • BTEX results for samples with free condensate in the sample vial are of dubious value because it is impossible to assure representative, reproducible sampling for analysis.		Benzene	Toluene	o-Xylene	Ethylbenzene	m,p-Xylene	Total Xylenes	Total BTEX	Chloride
BH-94/MW-68 1890 2704 1416 1489 4985 6401 12484	BH-94/MW-68       1890       2704       1416       1489       4985       6401       12484         * BTEX results for samples with free condensate in the sample vial are of dubious value because it is impossible to assure representative, reproducible sampling for analysis.       12484	BH-87A/MW-61A	2821	173	113	817	3880	3993	7804	15
	BTEX results for samples with free condensate in the sample vial are of dubious value because it is impossible to assure representative, reproducible sampling for analysis.	BH-94/MW-68	1890	2704	1416	1489	4985	6401	12484	27
I' ATFX results for complete with tree condensate in the completions of dubions value hereige it is impossible to secure	representative, reproducible sampling for analysis.	* RTFY results for s	amniae with frac	) condensate ir	n the sample v	rial are of dubione	t value hecaus	e it is imnoselhie t	n seeline	

Page 2 of 2

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			Analysis 1	Request/Chain of Custody Form	<b>Custody Form</b>	
From: Marathon Oil Company 329 Marathon Road Lakewood, New Mexico 88254 CONTACT: PTC Project: <u>32-03-144</u>	Company t Road ew Mexico 81 32-03-144	8254				Packing Information: Packed by: <u>L.C.h.w.e.</u> Date: <u>4.19.9</u> S VOA vials: <u>V</u> es No Coolant: Ice <u>C</u> old Pack Comments:
Laboratory Address: Marathon Oil Company % R. G. Thompson 7400 South Broadway Littleton, Co. 80122	eas: Company Iompson roadway 80122					As Received Sample Status: Seal Intact: Yes No Sample Temp: Thawed or warm Cool Box/Shiping: OK Damaged
Sample Date	Sample Time	Sampler (Person)	Sample Label	Sample Type	No. of bottles	Analysis Required
4-13-93	8,00	L, Churl	L Trieblank	Water	2	& TEX
4-13-93	8:15	11	Ean & BIK No	0, 1 11	62	BIEX
11	8: SO	11	BH-85 MW	.54 .1	Ķ	BTEX
11	11	11	1	11		CI
11	9:39	11	Equip BIK N	٥٥. ٦ ١٠	ス	BTEX
5	0 h:01		BH-FO AW	· 64 ···	3	BTEX
11	11	וו	11	11	/	<i>21</i> -
11	12:02	11	BH-93 MU	MW-67	2	& TEX
-1	1	11	11		/	<li>21<sup>-</sup></li>
١٢	11	11	11	Dupl	6	BrEX
11	1:30	N	EDULE Blank	k 106,3	3	B TEX
1	1:35	11	+ 0	3	2	BTEX
SHIPPING IN Delivered To Shipper By: Method of Shipment: Airbill No. 151855	SHIPPING INFORMA Delivered To Shipper By: <u>Federa</u> Method of Shipment: Airbill No. <u>5185</u>	TIO	≈			SHIPMENT Time:
Shipment Date/Time:	te/Time: 4 - /	19-93 / 1600	0			Rev: 4/8/92

:

s Request/Chain of Custody Form	Packing Information: $\int c_i v_i e$ Packed by: Date: VOA vials: Yes No Coolant: Ice Cold Pack Comments:	As-Received Sample Status: Seal Intact: Yes No Sample Temp: Thawed or warm Cool Box/Shiping: OK Damaged	No. of Analysis bottles Required	ter 2	" 2 BTEX		" 2 RTEX	× 1 C1	in 2 BIEX	" 2 BIEX	" 2 BTEX		2 & TEX		LABORATORY RECEIT OF SHIPMENT	Name: Date:
Analysis Request/Cl			Sample Sample Label Type	Epice BIK Do. 4 wate	0-63		BH-93 MW 66	11	loud "	Eduin Blank No.5	96	11	BH-87 A MW61A	11		
	8254		Sampler (Person)	L.Church	11	11	11	11	١٢	11	R.M Gray	1 11	11	11	SHIPPING INFORMATION	JHME
	From: Marathon Oil Company 329 Marathon Road Lakewood, New Mexico 88254 CONTACT: PTC Project: <u>32-03-144</u>	il Company hompson 3roadway 80122	Sample Time	00:0	2:45	11	4:20	11	1	5:35	10:38	11	13.20	,,	SHIPPING IN Delivered To Shipper By:	hipment:
	From: Marathon Oil Company 329 Marathon Road Lakewood, New Mexico CONTACT: PTC Project: <u>32-03-144</u>	Laboratory Address: Marathon Oil Company % R. G. Thompson 7400 South Broadway Littleton, Co. 80122	Sample Date	4-13-93	1-	11	11	L)	11	1	1	11	11	11	SH Delivered To	Method of Shipment: Airbill No.

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	SHIPPING INFORMATION LABORATORY RECEIT OF SHIPMENT		racked by:       Yes         VOA vials:       Yes         Coolant:       Ice         Comments:       Astriction of the state	No. of bottles bottles	ample Type Uvater Luater	Sample Label Label Label Jr.p Blank No. BH-97 AW-62 BH-97 AW-20 Uy	MATION	Company Road aw Mexico 32-03-144 32-03-144 Company Company B0122 80122 1305 14 11 11 11 11 11 11 11 11 11 11 11 11
FORMATION			ト	-6	1	in Dupl	11	11
FORMATION	" " BT	" Cuol " & & & &	- 1 - 2		11		-1	11
FORMATION	1 1 1 1 1 8 1 8 1	i i Dupt ii 2 & 87	7:9	52	х. Т	MW CB.	11	
11 24.97 AW 70 11 2 11 11 11 2 11 2 FORMATION	54 " 8H.97 AW.70 " 2 87	54 " 8H.97 AW.20" " 2 87	C 7 I	دز	11	p Blank No	11	\$50
···         Едигр Вlank No 6         ··         ·	50 " Equip Blank No 6 " 2 875 54 " & AH-97 ANU-70 " 1 2 875× " " " " [ ] (1 - (1 - )	50 " Equip Blank No 6 " 2 875 54 " & 84.97 AW-70" " 2 875× " " " " 1 0401 " 2 875×	ĸ	5	1		L. Church	823
L.Church Trip Blank " " 2 " Equip Blank No 6 " 2 " Equip Blank No 6 " 2 " 2 " 2 " 2 PORMATION [ 2 PORMATION ] 2 PORMAT	123 L.Church Trip Blank " 2 875 50 " Equip Blank No 6 " 2 875 54 " 84.97 Aw 70 " 7 8 875× " " " " 0401 " 2 875×	123 L.Church Trip Blank " 2 875 50 " Equip Blank No 6 " 2 875 54 " 84.97 AW-70" 1 2 875× " " " 1 040 1 2 875×	12		Ţ	1.	) ]	11
L.Church Trip Blank No 6 11 22 1. Equip Blank No 6 11 22 1. Equip Blank No 6 11 22 1. En 11 11 20 1. In 0401 11 22 1. In 2007 11 22	11 11 11 11 11 11 11 11 11 11 11 11 11		7.12	7	ŗ,	MW-6		0191
1.     84-83 Mw.62     1.     1.       1.     84-83 Mw.62     1.     1.       1.     7     81ank     1.     2.       1.     241-97 Mw.70     1.     2.       1.     84-97 Mw.70     1.     2.       1.     1.     1.     2.       1.     1.     1.     2.       1.     20     1.     2.       1.     1.     1.     2.       1.     1.     1.     2.       1.     1.     1.     2.       1.     1.     1.     2.       1.     1.     1.     2.	1610 1. 84-88 MW-62 1. 2 875× 1. 1. 1. 1. 1. 1. 1. 1. 1. 2.1. 1. 2. 2. 1. 2. 875× 5.0 1. 24.92 MW-20 1. 2. 875× 5.4 1. 84.92 MW-20 1. 2. 875× 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	1610 1. 84-85 MW-62 1. 2 875X 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 2. 875 2. 2. Church 7r. p Blank No 6 1. 2. 875 5. 1. Equip Blank No 6 1. 2. 875X 5. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	Ci-	`	11	11	÷	11
1.     1.     1.     1.     1.     1.     1.       1.     84-83 Mw.62     1.     1.     2.       1.     1.     1.     1.     1.       1.     2     7.     81a A K     1.     1.       1.     2     1.     1.     1.     2.       1.     2     2     1.     1.     2.       1.     2     3     1.     1.     2.       1.     2     3     1.     1.     2.       1.     2     1.     1.     2.     2.       1.     2     1.     1.     2.     3.       1.     1.     1.     1.     2.       1.     1.     1.     2.     3.       1.     1.     1.     1.     3.       1.     1.     1.     1.     3.       1.     1.     1.     1.     3.       1.     1.     1.     1.     3.       1.     1.     1.     1.     3.	11 г	11 11 11 11 11 11 11 11 11 11 11 11 11	62 TEX	८१	loat er	A w 6	1	1455
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11     11     11     11     11     11       11     8H-94 Aw 68 water 3       11     11     11     11       11     11     11     11       11     11     11     11       11     11     11     11       11     11     11     11       11     11     11     11       11     2     11     11       11     2     11     11       11     2     11     11       11     2     11     20       11     11     11     2       11     11     11     2       11     11     11     2       11     11     11     2	u $u$ $u$ $u$ $u$ $U$	и и и и и и и и и и и и и и и и и и и	BTEX	3	Water		R.M. Gray	1305
R.M. Gray       BH-84 Mw.58 Water       2         11       11       11         11       11       11         11       11       11         11       11       11         11       11       11         11       11       11         11       11       11         11       11       11         11       11       11         11       11       11         11       2       11       2         11       2       11       11       2         11       11       11       11       2         11       11       11       11       2         11       11       11       11       2         11       11       11       11       2         11       11       11       11       2         11       11       11       11       2         11       11       11       11       2         11       11       11       11       2         11       11       11       11       2         11       11 <th>305     R.M. Gray     BH-84     Mw-58     Water     2     B7EX       """"""""""""""""""""""""""""""""""""</th> <th>305     R.M. 6ray     BH-84 Mw-58     Water     2     B7EX       "     "     "     "     "     1     C1       "     "     "     "     "     C1       "     "     "     "     "     C1       "     "     "     "     C1     C1       "     "     "     "     "     C1       50     "     "     "     "     C1       "     "     "     "     "     <td< th=""><th>Analysis Required</th><th>No. of bottles</th><th>ample Type</th><th></th><th>Sampler (Person)</th><th>Sample Sample Date Time</th></td<></th>	305     R.M. Gray     BH-84     Mw-58     Water     2     B7EX       """"""""""""""""""""""""""""""""""""	305     R.M. 6ray     BH-84 Mw-58     Water     2     B7EX       "     "     "     "     "     1     C1       "     "     "     "     "     C1       "     "     "     "     "     C1       "     "     "     "     C1     C1       "     "     "     "     "     C1       50     "     "     "     "     C1       "     "     "     "     " <td< th=""><th>Analysis Required</th><th>No. of bottles</th><th>ample Type</th><th></th><th>Sampler (Person)</th><th>Sample Sample Date Time</th></td<>	Analysis Required	No. of bottles	ample Type		Sampler (Person)	Sample Sample Date Time
SamplerSampleSampleSampleNo. of TypeR.M. GrayBH-84 $hw$ -58 $water$ 2111 $w-58$ $water$ 21 $w-68$ $water$ 21 $w-68$ $water$ 21 $w-68$ $water$ 21 $w-68$ $water$ 21 $w-62$ 21 $w-62$ 21 $w-62$ 21 $w-62$ 21 $w-62$ 21 $w-62$ 21 $w-62$ 21 $w-62$ 21 $w-62$ 21 $w-62$ 21 $w-72$ 21 $w-70$ 1 $w-70$ 1 $w-70$ 1 $w-70$ 1 $w-70$ 111111	Sample Time (Person)Sample (Person)Sample LabelSample TypeSample No. of TypeNo. of Required RequiredAnalysis Required $305$ $R.M. 6ray$ $BH.84$ $M6ray$ $BH.84$ $M58$ $M652$ $M. 6ray$ $BH.84$ $M58$ $M67$ $M. 0.01$ $M67$ $AnalysisRequiredM67305R.M. 6rayBH.84M67M67M67AnalysisM67B.76XM67455M6rayBH94M62M67M62B.76XM67450M67M62M67M62B.76XM62MM67M62M67M62B.76XM62MM62M62M67M62B.75M67MM62M60M62M62B.75M61MM60MM62MB.75MMM$	SampleSampleSampleSampleSampleNo. ofAnalysisTime(Person)LabelTypeNo. ofAnalysis $305$ $R/h. Gray$ $BH-84$ $m = 58$ $water$ $2$ $B7EX$ $10$ $1.$ $1.$ $1.$ $1.$ $1.$ $C1^{-1}$ $1.$ $1.$ $1.$ $1.$ $1.$ $C1^{-1}$ $1.$ $1.$ $1.$ $1.$ $1.$ $C1^{-1}$ $1.$ $1.$ $1.$ $1.$ $1.$ $C1^{-1}$ $1.$ $1.$ $1.$ $1.$ $1.$ $C1^{-1}$ $1.$ $1.$ $1.$ $1.$ $1.$ $C1^{-1}$ $1.$ $1.$ $1.$ $1.$ $1.$ $C1^{-1}$ $1.$ $1.$ $1.$ $1.$ $2.$ $8.7EX$ $1.$ $1.$ $1.$ $1.$ $1.$ $C1^{-1}$ $2.$ $2.$ $2.$ $2.$ $2.$ $8.7EX$ $5.$ $1.$ $1.$ $1.$ $1.$ $0.$ $1.$ $1.$ $1.$ $1.$ $2.$ $8.7EX$ $1.$ $1.$ $1.$ $1.$ $1.$ $C1^{-1}$ $1.$ $1.$ $1.$ $1.$ $1.$ $C1^{-1}$ $1.$ $1.$ $1.$ $1.$ $1.$ $0.$ $1.$ $1.$ $1.$ $1.$ $1.$ $0.$ $2.$ $1.$ $1.$ $1.$ $2.$ $8.7EX$ $1.$ $1.$ $1.$ $1.$ $1.$ $0.$ $1.$ $1.$ $1.$ $1.$ $1.$	mple S Te p: (					eas: I Company hompson iroadway 80122
SamplerSampleSampleSampleSampleNo. ofSamplerSampleSampleSampleNo. ofPersonLabelTypebottlesN. Gray $BH-34$ Mw-58Water2N.NNNNN.NNNNN.NNNNN.NNNNN.NNNNN.NNNNN.NNNNN.NNNNN.NNNNN.NNNNN.NNNNN.NNNNN.NNNNN.NNNNN.NNN <td< th=""><th>Reserved Sample Same Sample Sample Sample Sample Sample Sample Sample Sampl</th><th>Reserved Sample Statut     Astreactived Sample Statut       Sampler     Sample       Sampler     Sampler       Sampler     Sample       Sampler     Sample       Sampler     Sample       Sampler     Sampler       I     I       I     I       I     I       I     I       I</th><td></td><td></td><td></td><td></td><td>88254</td><td>Lakewood, New Mexico CONTACT: PTC Project: <u>32-03-144</u></td></td<>	Reserved Sample Same Sample Sample Sample Sample Sample Sample Sample Sampl	Reserved Sample Statut     Astreactived Sample Statut       Sampler     Sample       Sampler     Sampler       Sampler     Sample       Sampler     Sample       Sampler     Sample       Sampler     Sampler       I     I       I     I       I     I       I     I       I					88254	Lakewood, New Mexico CONTACT: PTC Project: <u>32-03-144</u>
3 8624     Coolatt: Lee     Coll Pack       0 Millinger     Comments:     Conments:       1 Millinger     Sample     Sample     No. of       Sample     Sample     Sample     No. of       Sample     Sample     Sample     No. of       Sample     Sample     No. of     Analysis       Comments:     Conments:     OK     Damaged       Sample     Sample     No. of     Analysis       (reson)     Label     Type     bottes     Required       (reson)     Label     Type     Sample     Sample       (reson)     Label     Tape     Sample     No. of       (reson)     Label     Type     Sample     Sample       (reson)     Label     Type     Sample     Sample       (reson)     RA-88     W $\omega drec     2     Sample       (reson)     N     N     C     C       (r       C     C       (reson)     R     Required     C     C       (reson)       C     C       (r       C     C       (r       C     C       (r     $	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	R $C$ </th <td>ין ן צּגא</td> <td></td> <td></td> <td></td> <td></td> <td>Marathon Oil Company 329 Marathon Road</td>	ין ן צּגא					Marathon Oil Company 329 Marathon Road
Time:	OF SHIPMENT			VOA vials: Yes VOA vials: Yes Coolant: Ice Comments: As Received Sample Stat Seal Intact: Yes Sample Temp: T Box/Shiping: OK Box/Shiping: OK Box/Shiping: OK Box/Shiping: OK C/ C/ C/ C/ C/ C/ C/ C/ Date: C/ Date: Date: Date: Date: Date: C/ Date: Date: Date: Date: Date: C/ Date: Date: Date: Date: C/ Date: Date: Date: Date: C/ Date: Date: Date: Date: C/ Date: Date: Date: C/ Date: C/ C/ C/ C/ C/ C/ C/ C/ C/ C/ C/ C/ C/ C	32 - 22 )2 82 - 22 - 22 - 20 bottles	Name:	Sample Sample No. of Label Type No. of Label Sample Sample No. of Label Type bottles No. of Label No. of Carles No. of No. of Carles No. of No	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$

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	A ≮ Date: 	No kd or warm Cool Damaged														IIPMENT	<b>G:</b> 
	Packing Information: Sá M Packed by: VOA vials: Yes Coolant: Ice Co Comments:	As-Received Sample Status: Seal Intact: Yes No Sample Temp: Thawed or warm Box/Shiping: OK Dama	Analysis Required	& 77 X	<i>21-</i>	B TE-X	- 1 -2	& TE X	-12	BTEX	C1-	はてきょ	BTEX	- 12	BTEX	LABORATORY RECEIT OF SHIPMENT	Date:
Analysis Request/Chain of Custody Form			No. of bottles	c٤	/	2	/	C V		2	/	/	Č		3	LABOR	
equest/Chain o			Sample Type	Water	11	11	11	()	11	11	),	, , ,	11	11	11 10		Name:
Analysis R			Sample Label	Sump 16A	 D	84-23 MW 50	11	BH-67 AW-44	11	84-62 AW-39	( )	8H-42 MW -19	8H-44 NW 21	11	11 Da		
	88254		Sampler (Person)	2 Church S	רו	B. Ryhman 6	B. Ruthmann	L. Church	11	B. Ruhman	11	L.Church	11	11	11	SHIPPING INFORMATION	SAME
	From: Marathon Oil Company 329 Marathon Road Lakewood, New Mexico 88254 CONTACT: PTC Project: <u>32-03-144</u>	Laboratory Address: Marathon Oil Company % R. G. Thompson 7400 South Broadway Littleton, Co. 80122	ple Sample e Time	3 1707	И	3 750	750	839	11	9:40	11	10:36	1008	11	11	SHIPPING IN	Method of Shipment: Airbill No. Shipment Date/Time:
	From: Marathon Oi 329 Maratho Lakewood, N CONTACT: PTC Project:	Laboratory Marathon % R. G 7400 Sout Littleton,	Sample Date	4-14-93	P.	4-15.93	11	11	11	.,	11	11	1	11	1		Method of Airbill No.

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	Packing Information: 54 M C Packed by: Date: VOA vials: Yes No Coolant: Ice Cold Pack Comments:	As-Received Sample Status: Seal Intact: Yes No Sample Temp: Thawed or warm Cool Box/Shiping: OK Damaged	Analysis Requiréd	BTEX	-1-	8 TEX		BTEX		LABORATORY RECEIT OF SHIPMENT Date: Time:
Custody For			No. of bottles	٢٢	/	3	/	/		
sis Request/Chain of Custody Form			Sample Type	Water	-	~ -		( )		Name -
Analysis Re			Sample Label	84-39 Aw -16	11	BH-40 MW-17	11	BH-49 AW-26		
	8254		Sampler (Person)	2. Chunch	11	11	11	11		SHIPPING INFORMATION I To Shipper By: of Shipment:
	Company Road ew Mexico 8 32-03-144	company Company ompson oadway 80122	Sample Time	1030	١٢	922	11	1145		IPPING IN Shipper By: ipment: e/Time:
	From: Marathon Oil Company 329 Marathon Road Lakewood, New Mexico 88254 CONTACT: PTC Project: <u>32-03-144</u>	Laboratory Address: Marathon Oil Company % R. G. Thompson 7400 South Broadway Littleton, Co. 80122	Sample Date	4-15-43	11	1	ł	И		SHIPPING IN Delivered To Shipper By: Method of Shipment: Airbill No. Shipment Date/Time:

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### CORE LABORATORIES

#### LABORATORY. ΤΕSTS RESULTS 05/11/93 JOB NUMBER: 930603 CUSTOMER: MARATHON OIL COMPANY ATTN: JEFFREY S. LYNN CLIENT I.D..... MARATHON OIL LABORATORY 1.D...: 930603-0007 DATE SAMPLED.....: 04/13/93 DATE RECEIVED....: 04/20/93 TIME SAMPLED.....: 14:45 TIME RECEIVED....: 10:15 WORK DESCRIPTION ...: BH-89 MW-63 REMARKS.....: TEST DESCRIPTION FINAL RESULT LIMITS/\*DILUTION UNITS OF MEASURE TEST METHOD DATE TECHN Chloride (Unfilt.) 5.6 0.5 mg/L 325.2 (1) 05/05/93 KDS 8020 - AROMATIC VOLATILE ORGANICS \*1 04/25/93 8020 (2) MLD ND Benzene 1 ug/L Toluene ND ug/L Ethyl Benzene ND ug/L 1 Xylenes ND 1 ug/L 10703 East Bethany Drive Aurora, CO 80014 (303) 751-1780 PAGE:7

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### CORE LABORATORIES

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JOB NUMBER: 930603 CUSTOMER	: MARATHON OIL C	OMPANY	ATTN:	JEFFREY S. LYNN		
LIENT I.D MARATHON OIL ATE SAMPLED: 04/13/93 TIME SAMPLED: 15:00 WORK DESCRIPTION: BH-94 MW-68			DATE RECE	Y I.D: 930603-00 IVED: 04/20/93 IVED: 10:15 :	08	
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUT	ION UNITS OF MEASURE	TEST METHOD	DATE	TECHN
hloride (Unfilt.)	27	1	mg/L	325.2 (1)	05/06/93	KDS
■ 3020 - AROMATIC VOLATILE ORGANICS		*10		8020 (2)	04/25/93	MLD
Benzene Toluene Ethyl Benzene Xylenes	650 1900 330 4000	10 100 10 100	ug/L ug/L ug/L ug/L			
1						
1						
			Au	703 East Bethany Dr rora, CO 80014 03) 751-1780	ive	



### CORE LABORATORIES

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JOB NUMBER: 930603 CUSTOME	R: MARATHON OIL C	OMPANY	ATTN:	JEFFREY S. LYNN		
CLIENT I.D MARATHON OIL DATE SAMPLED: 04/15/93 TIME SAMPLED: 07:50 WORK DESCRIPTION: BH-73 MW-50			DATE RECE	Y I.D: 930603-00 IVED: 04/20/93 IVED: 10:15 :	09	
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Chloride (Unfilt.)	955	5	mg/L	325.2 (1)	05/05/93	KDS
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	04/27/93	MLD
Benzene Toluene Ethyl Benzene Xylenes	ND ND ND		ug/L ug/L ug/L ug/L			
	•		Au	703 East Bethany Dr rora, CO 80014 03) 751-1780	ive	

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### CORE LABORATORIES

IOR NUMBER, 030607 CHOTONE		CHDANK	A T T + I			
JOB NUMBER: 930603 CUSTOMER	R: MARATHON OIL C	UMPANT	ATTN:	JEFFREY S. LYNN		· · · · · · · · · · · · · · · · · · ·
CLIENT I.D MARATHON OIL DATE SAMPLED 04/15/93 TIME SAMPLED 09:22 WORK DESCRIPTION: BH-40 MW-17			DATE RECE	Y I.D: 930603-00 IVED: 04/20/93 IVED: 10:15 	10	
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Chloride (Unfilt.)	306	3	mg/L	325.2 (1)	05/05/93	KDS
8020 - AROMATIC VOLATILE ORGANICS		*100		8020 (2)	04/27/93	MLD
Benzene Toluene Ethyl Benzene Xylenes	1500 ND 230 2900	100 100 100	ug/L ug/L ug/L			
			Au	703 East Bethany Dr rora, CO 80014 03) 751-1780	ive	

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CUSTO	CUSTOMER INFORMATION		PROJEC		T INFORMATION			0		
COMPANY: MA	avathon Oil	PROJECT N	PROJECT NAME/NUMBER:					OHI		
SEND REPORT TO:	-		BILI	BILLING INFORMATION	MATION	NER		153		
	Pux 557	BIFT TO:				IATN	SIS			
Priv	0	ADDRESS:					74747			AB JOB NO.
						0 8	10			
PHONE: (915)	687-9312	PHONE:								
FAX (915)	647-6337	FAX:		PO NO.:		אר		// <		
SAMPLE NO.	SAMPLE ID	SAMPLE	SAMPLE	SAMPLE MATRIX	CONTAINER TYPE	PRES.				(S / PRECAUTIONS
# 1#	11 Lyman	4-15-93	1308:25	water	HON 1 MOH		2 7			
H 7 7 7	L L	4/15/43		watry	) 1 11		5			
<b># C</b>	#4 Bir Bble	64/51/h			11		7			
r	47 SW-1	4/15/53	5 07:38	in tot			ر د			
# 8 #	#8 5w-2	12	307:45	watr	27 . 1		7			
				1			, č.			
<u>े</u> र्ट	r 51 116 6 3	4 6311	3 1. 1 3	-			L. L-			
	1 70 1 1 10 6 5	1. 1. S. 1. S.			7		-7 -7			
194	4-73 A. 50	$X_{i} \in V_{i} Y_{i}$	250	1 2 3	-		2			
æ	6.1 and C 1. H	$C_{2,2} = c_{2,2}$	872	1. 21.19			2-2-2			
SAMPLER: R M	Gray , Al Learned	1 84 ve.	SHIPMENT METHOD:	IETHOD: 2000	( - (	1		AIRBILL NO .:	21, 1, 2, 2, 2, 2	L
REQUIRED TURNAROUND:*	· SAME DAY 24 HOURS	48 HOURS	T2 HOURS	AS 🗌 5 DAYS	VS 🗌 10 DAYS	S 🗌 ROUTINE	JE OTHER			91 XXC
1. RELINQUISHED BY:			2. RELINQUISHED BY:	BY:			DATE	3. RELINQUISHED BY:	3Y:	DATE
SIGNATURE:	Gurth	State	SIGNATURE:					SIGNATURE:		
PRINTED NAME/COMPANY			PRINTED NAME/COMPANY:	OMPANY:			TIME	PRINTED NAME/COMPANY:	MPANY:	TIME
1. RECEIVED BY: SIGNATURE:		DATE 2	2. RECEIVED BY: SIGNATURE:				DATE	3. RECEIVED BY: SIGNATURE:		DATE
PRINTED NAME/COMPANY:		TIME	PRINTED NAME/COMPANY:	OMPANY:			TIME	PRINTED NAME/COMPANY:	MPANY:	TIME
* RUSH TURNAROUND MAY RE Anahelin, California 1250 E. Gene Auty Way Anahelin, California 20905	JUIRE SURCHARGE	Deriver (Aurora), Colorado 1300 S. Potomaco, S. 1. Suite 130 Aurora Colorado 2013		Cesper, Wyoming 420 West 1st Street Castor Wormino 82601		Houston, Texes 10201 Westheimer, Bidg. 1-A Houston Towas 77042		I Houston, Texas 8210 Mosely Road Houston Texas 77075	Corpus Christi, Texas 1733 Nonth Pade Island Dr. Commis Christi Tevas 2400	Set Africa Stream Stream Set African Stream Subhrir Louisiana 2063
(714) 937-1094	(310) 595-8401	(303) 751-1780		(307) 235-5741		3) 972-6700		13) 943-9776	(512) 289-2673	Jupriur, Louisiana 7000 (318) 583-4926

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SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services 1703 West Industrial Avenue • P.O. Box 2150 • Midland, Texas 79702

Report of tests on Client Delivered by Water Marathon Oil Company Lorri Church 
 File No.
 6546001

 Report No.
 80653

 Report Date
 04-29-93

 Date Received
 04-15-93

Identification Indian Basin

#### REPORT OF ORGANICS ANALYSIS

Date of BTEX Analysis04-19-93BTEX AnalystL. Duty

Method SW846 5030/8020A MDL 0.004 mg/L

Report	Sample		Resu	ılts, mg/L	
<u>Number</u>	Identification	<u>Benzene</u>	<u>Toluene</u>	<u>Ethylbenzene</u>	<u>Xylenes</u>
80653-1	Equipment Blank #1, 4-13-93	*0.004	*0.004	*0.004	0.004
80653-2	Equipment Blank #2, 4-13-93	*0.004	*0.004	*0.004	0.004
80653-3	Equipment Blank #3, 4-13-93	*0.004	*0.004	*0.004	0.007
80653-4	Equipment Blank #4, 4-13-93	*0.004	*0.004	*0.004	0.004
80653-5	Equipment Blank #5, 4-13-93	*0.004	*0.004	*0.004	*0.004
80653-6	Out of Tank @ Plant	*0.004	*0.004	*0.004	*0.004
80653-7	Out of Hose @ Station	*0.004	*0.004	*0.004	*0.004
80653-8	Trip Blank, 4-13-93	*0.004	*0.004	*0.004	*0.004
80653-9	BH-93 MW 67	*0.004	*0.004	*0.004	*0.004

#### NOTE: Just wanted you to see these.

Copies: Marathon Oil Company Attn: Al Learned

Reviewed by

SOUTHWESTERNLABORATORIES

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Page       Page       Box 2150. Midland. Texas 79702 • 915/683-3349       Box 2502 • 915/683-3349       Midland. Texas 79702 • 915/683-9849       Distribution to the texas 79702 • 915/683-9849       Distribution to the texas 777	0	ustody Record	3-43	LAB I.D. NO.										COC Seal No.		ふむ Intact: 5.5	Laboratory No.		
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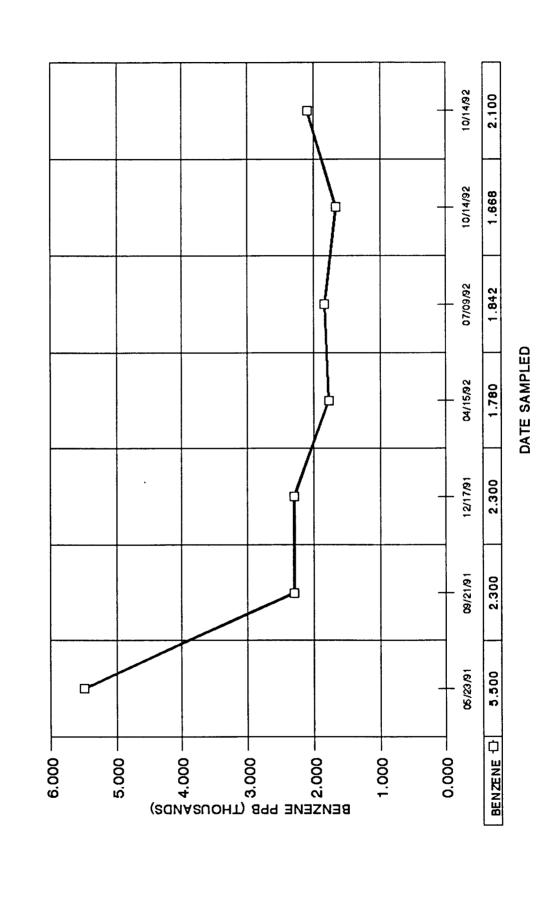
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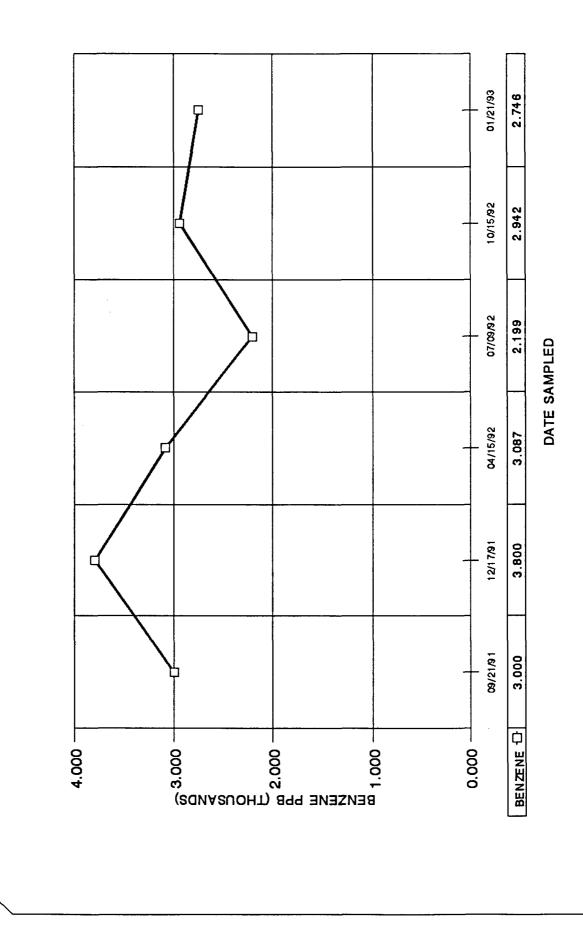
APPENDIX C

### **BENZENE CONCENTRATION VS TIME GRAPHS**

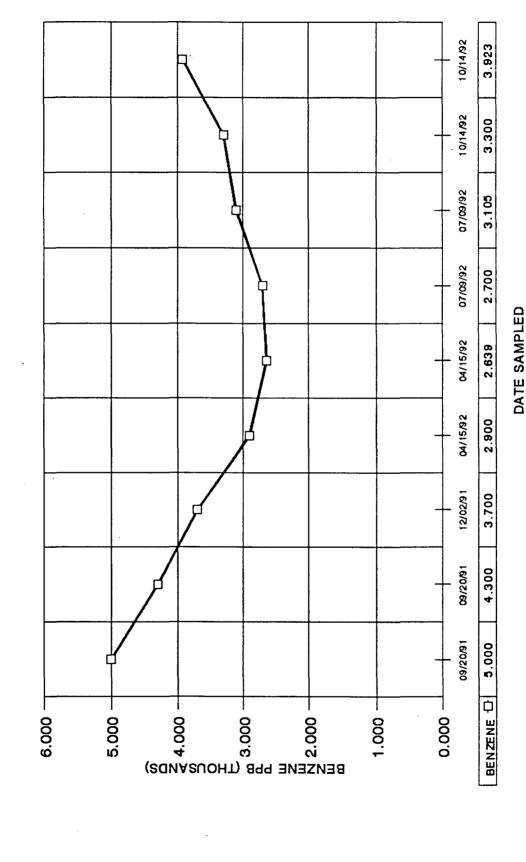
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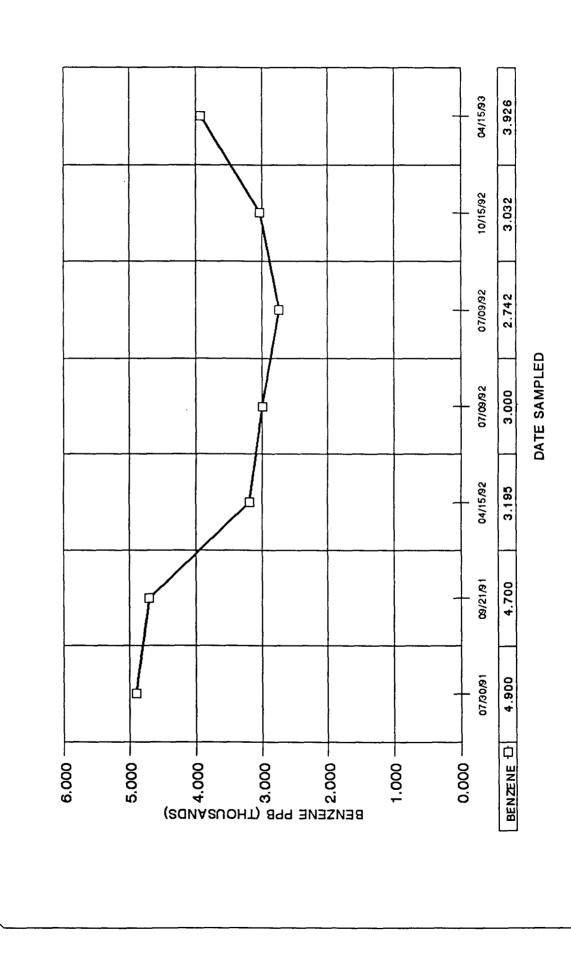
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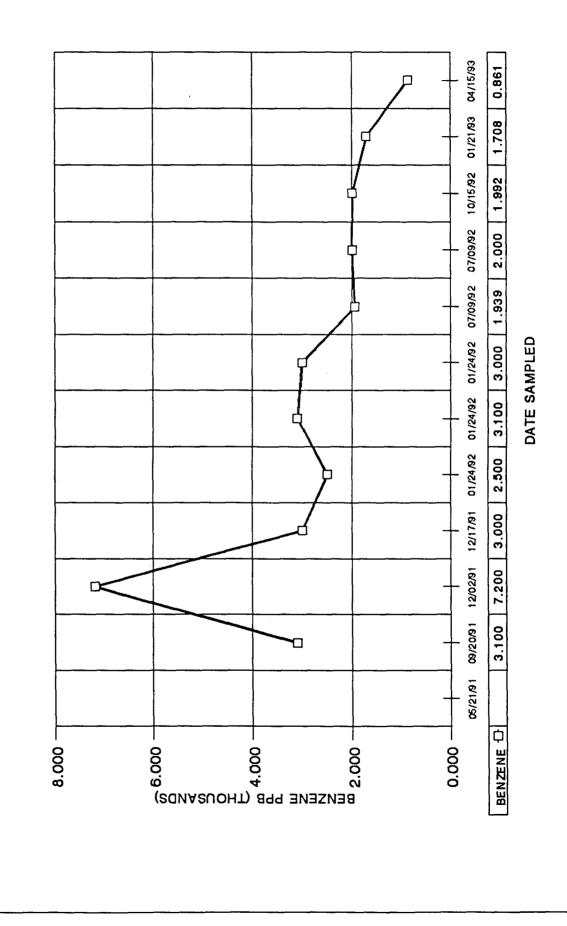
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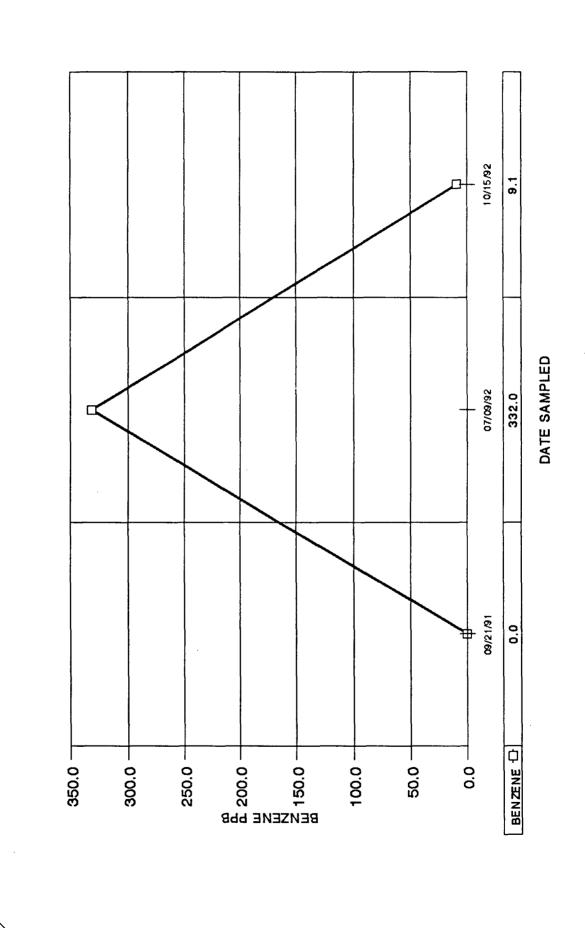
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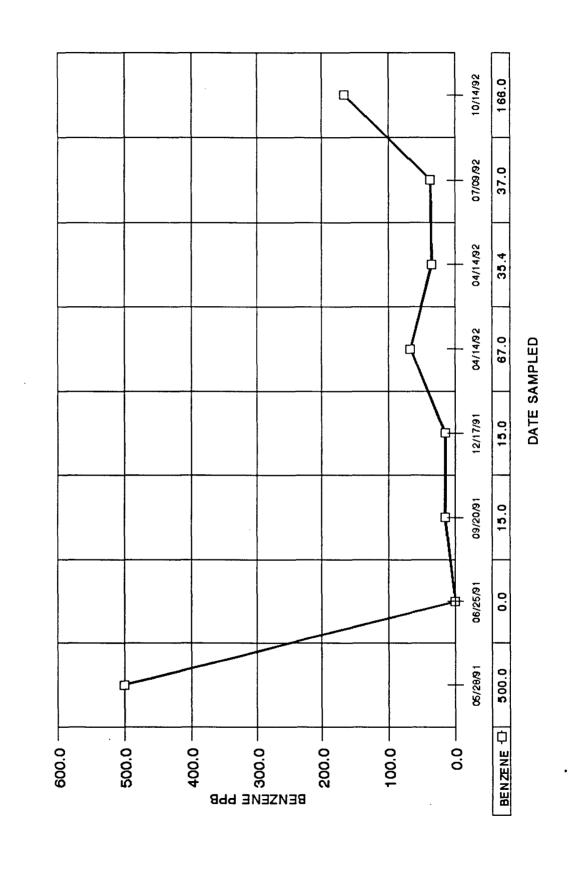
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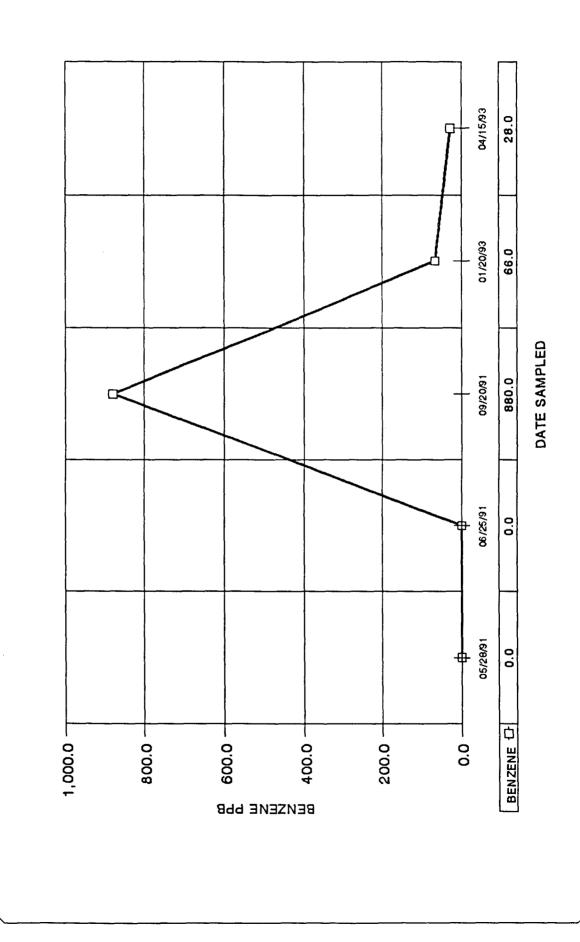
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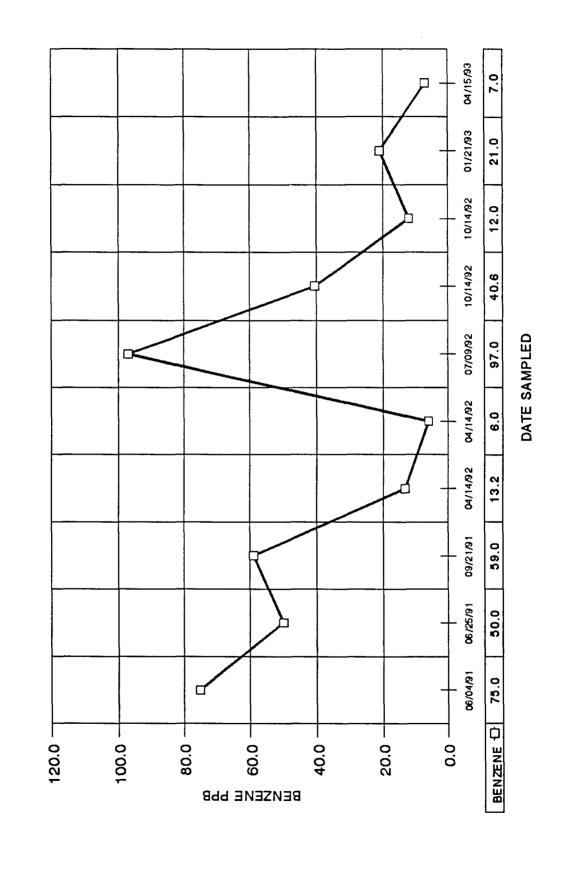
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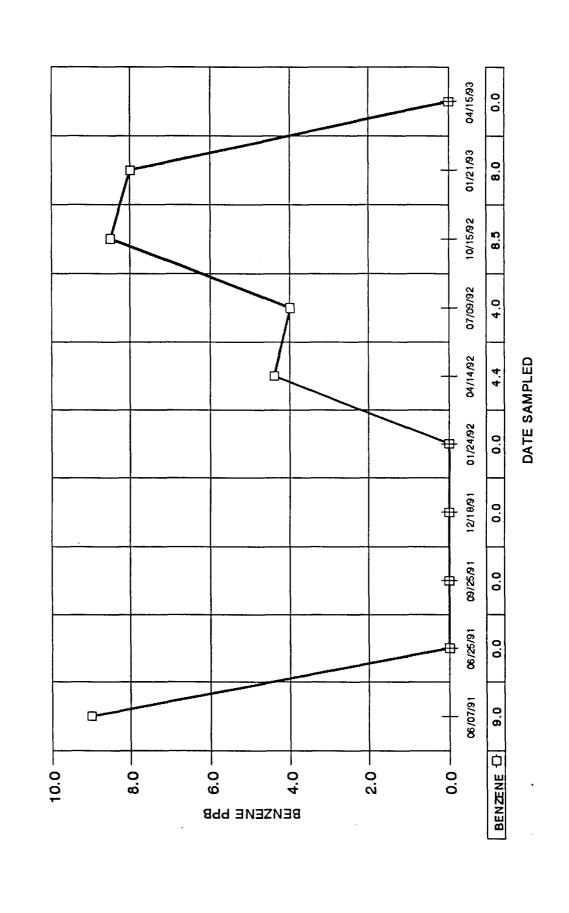
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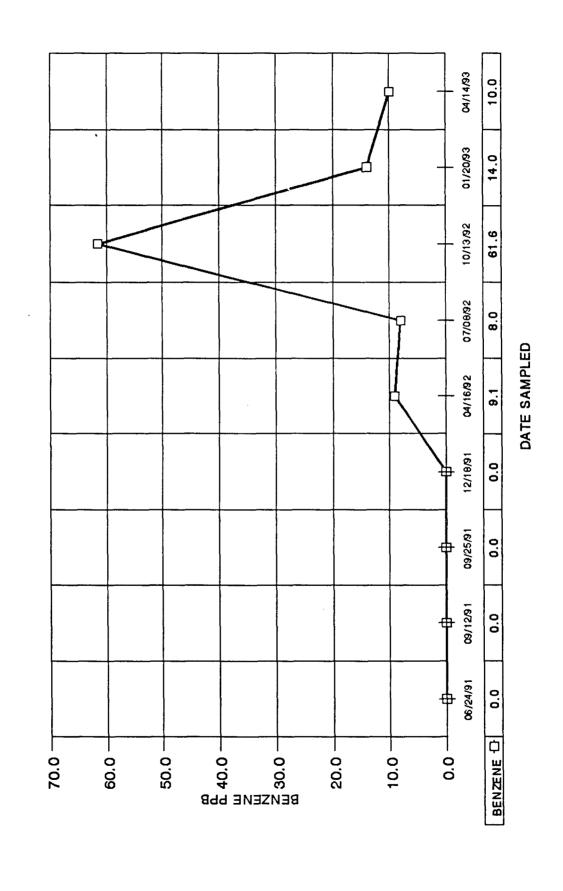
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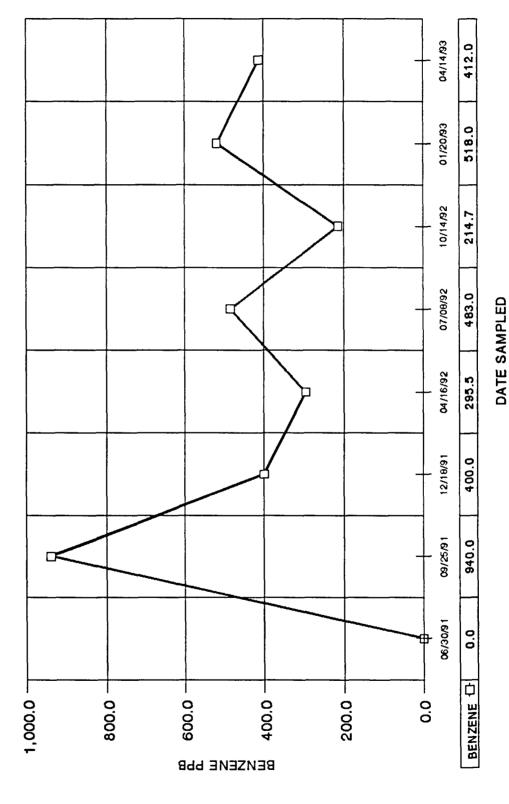
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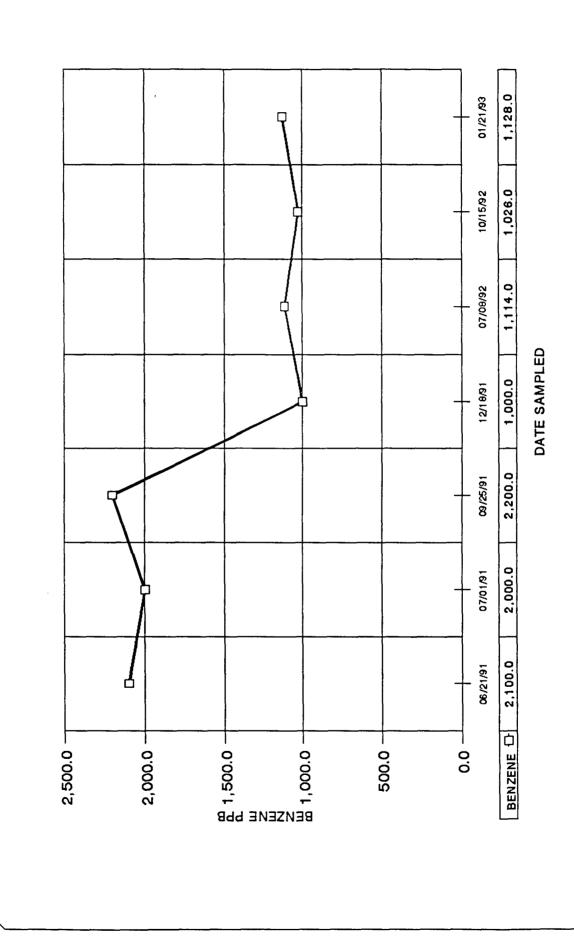
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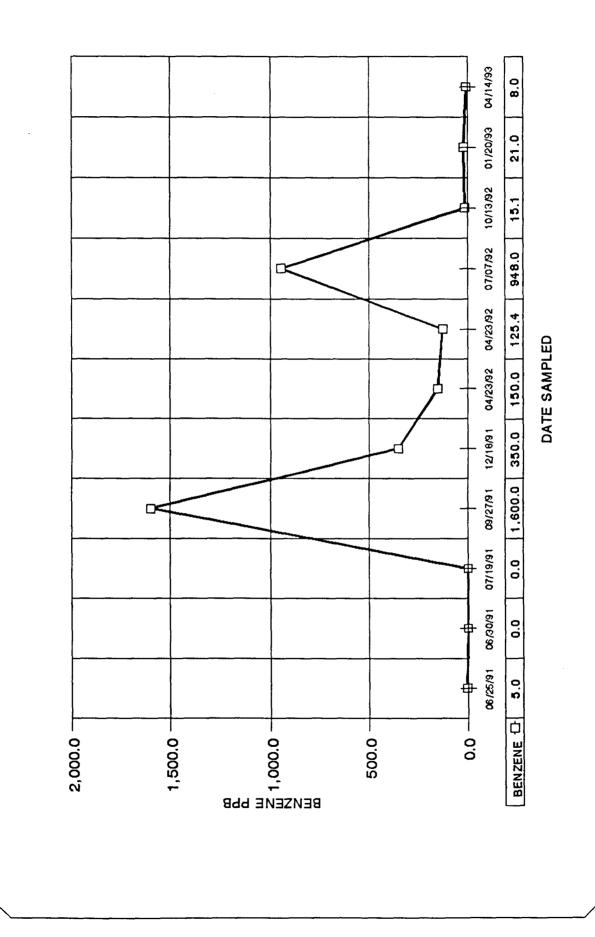
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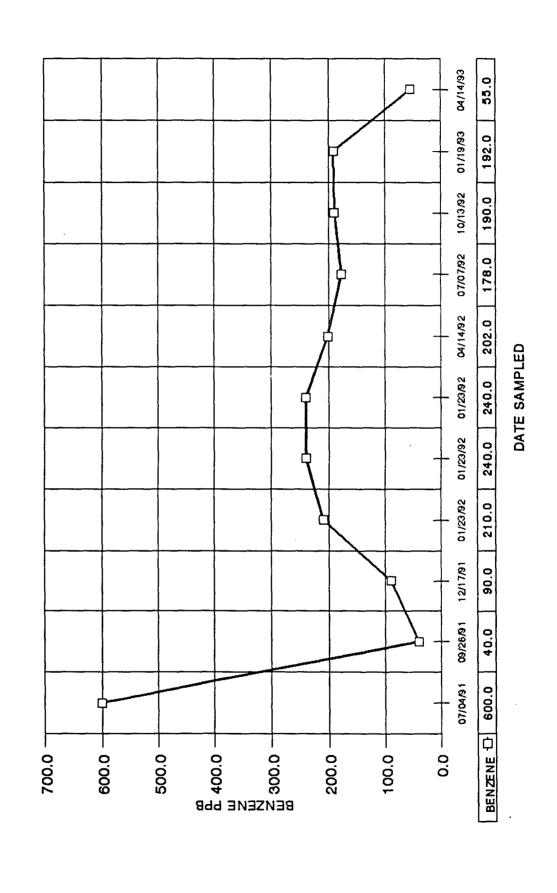
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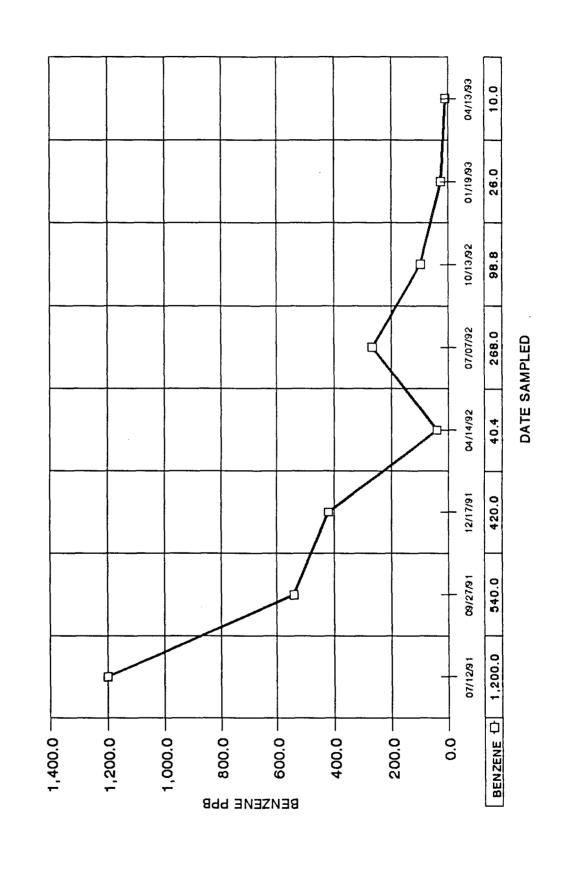
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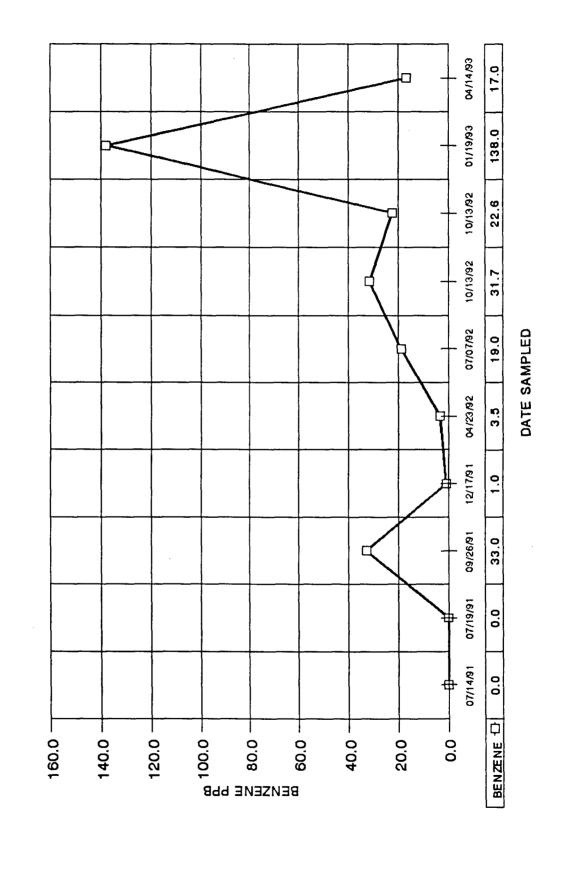
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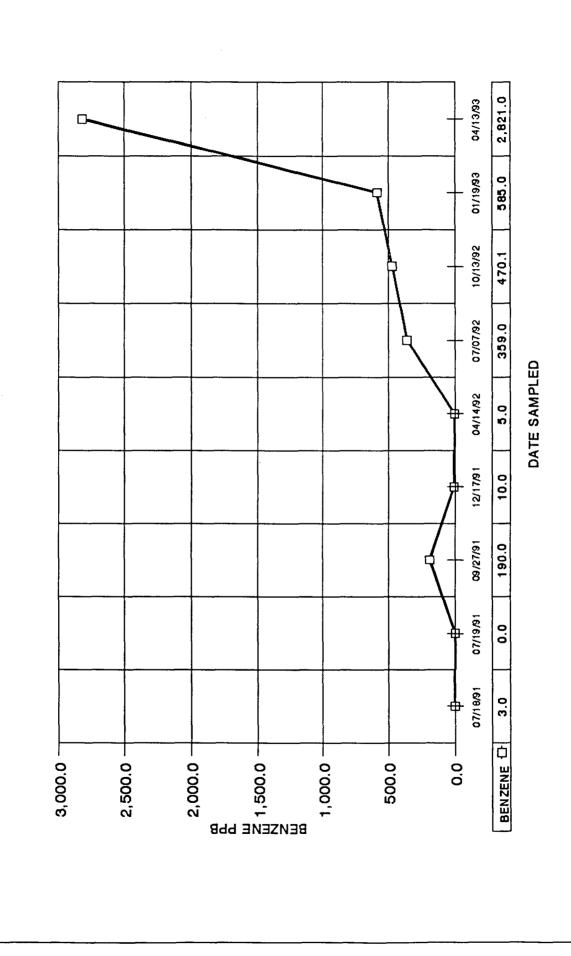


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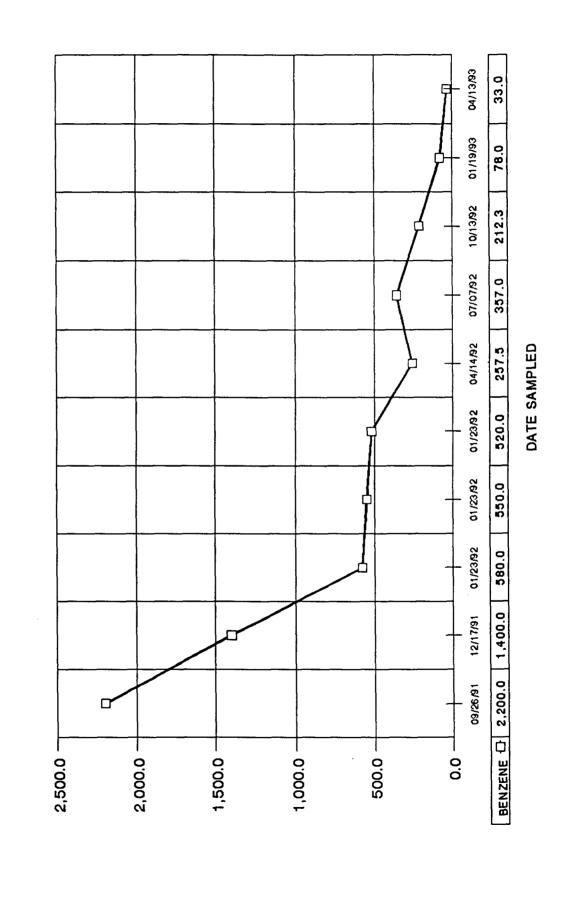


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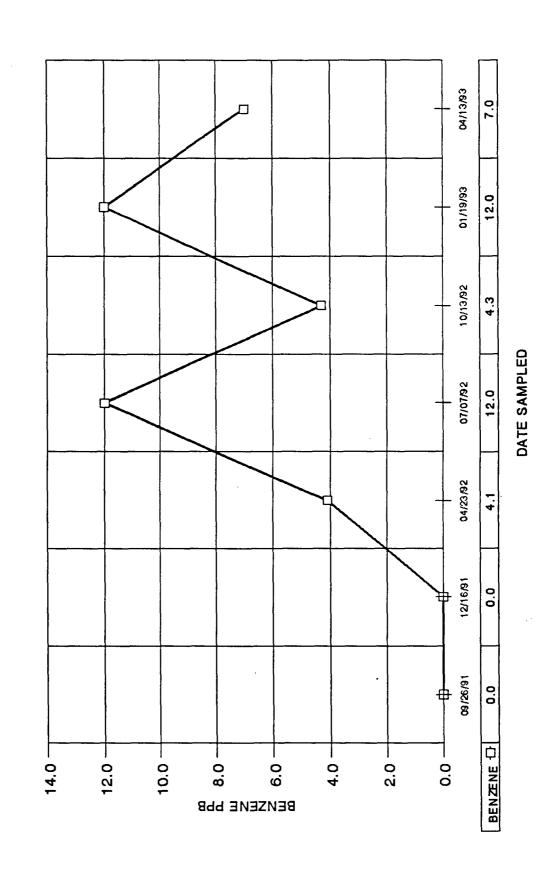
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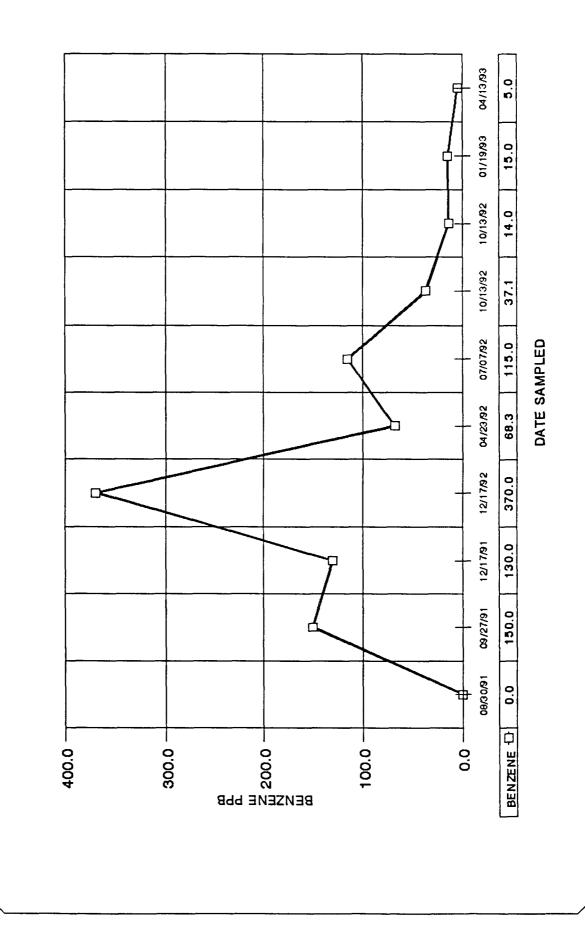
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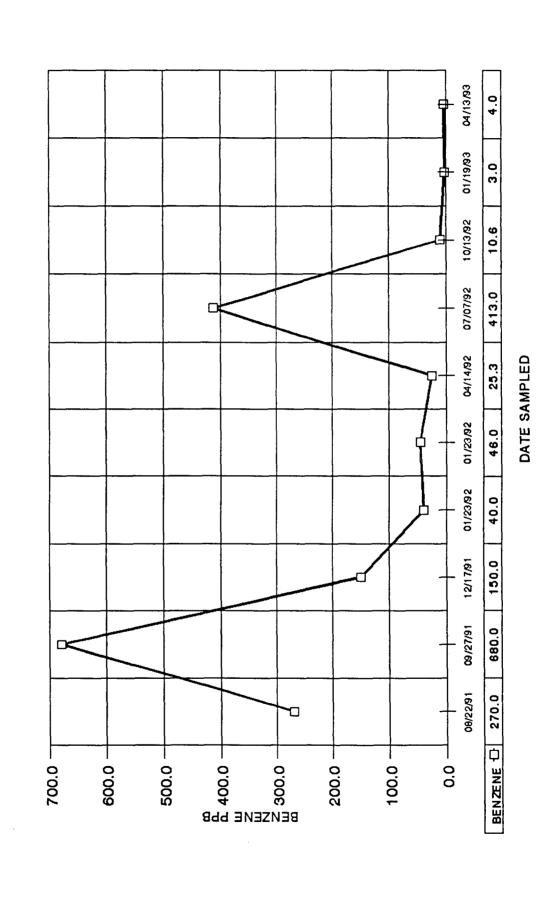
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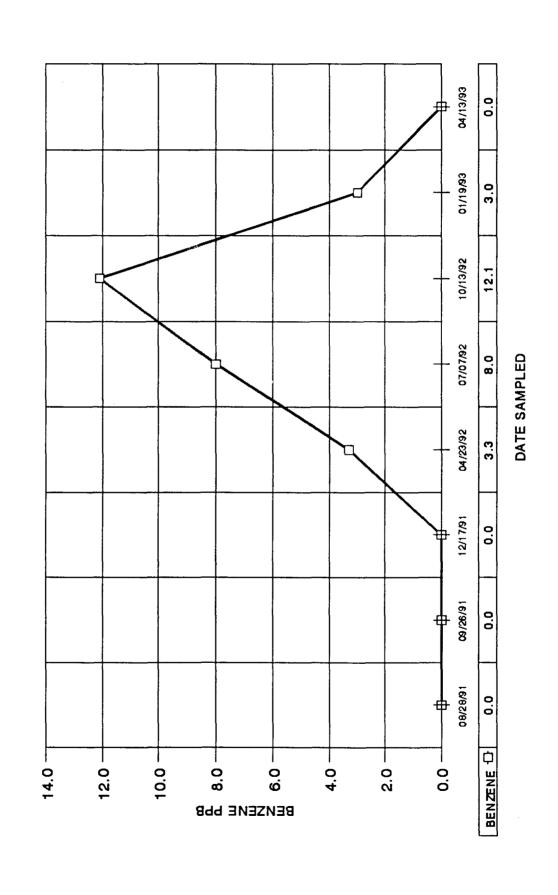
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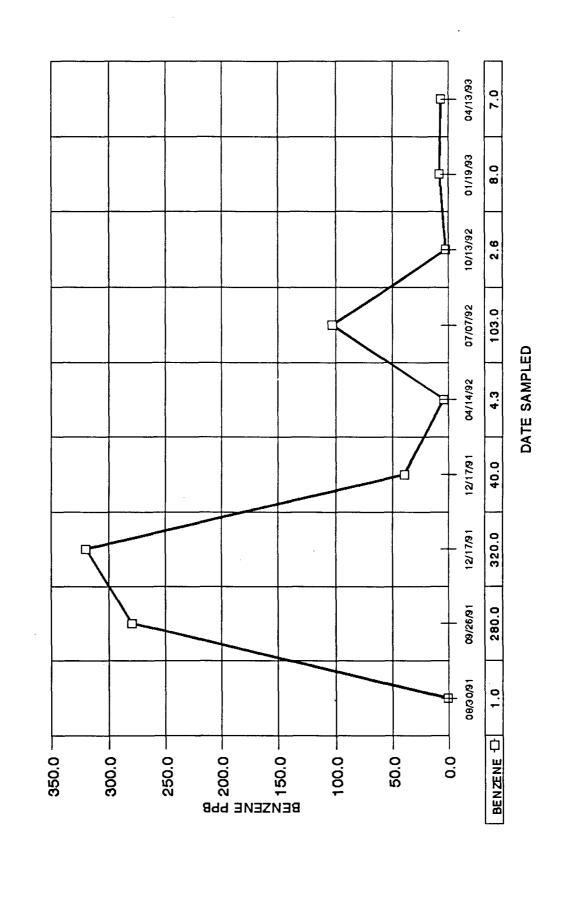
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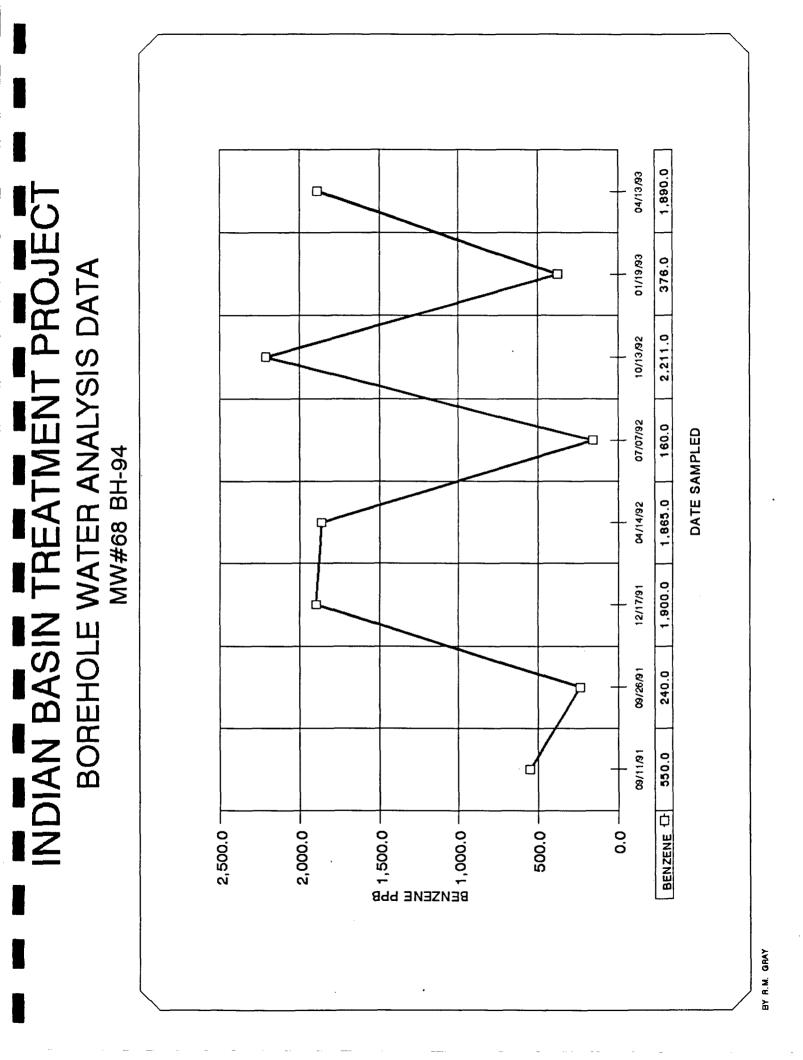


BY R.M. GRAY

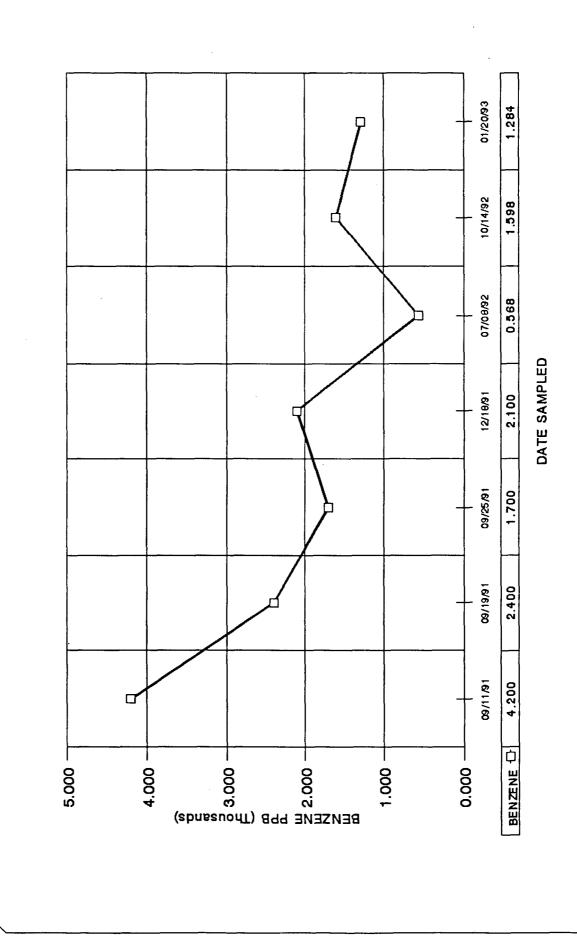
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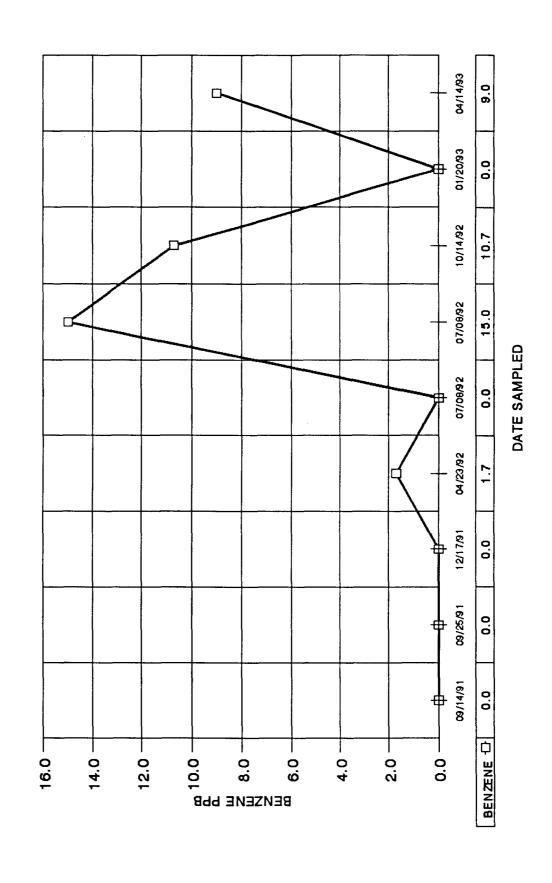




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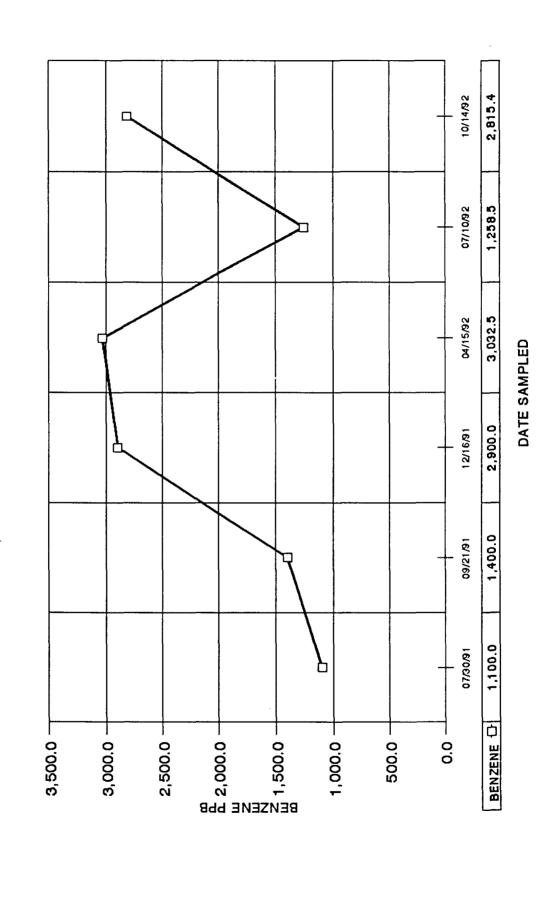


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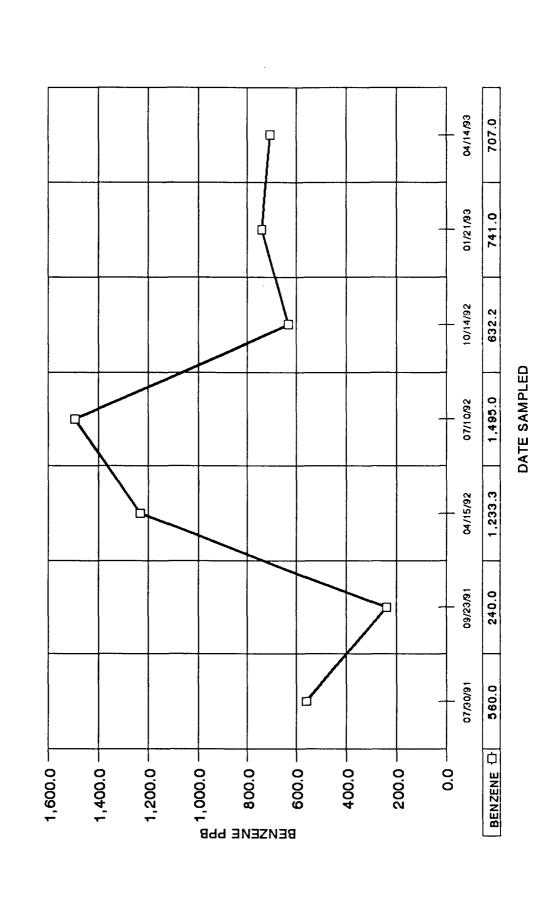


BY R.M. GRAY

INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA SUMP 11A



INDIAN BASIN TREATMENT PROJECT BOREHOLE WATER ANALYSIS DATA SUMP 16A



#### **APPENDIX D**

# RANCHER WELL, PLANT WELL, AND SPRING LABORATORY REPORTS



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#### CORE LABCRATORIES

#### LABORATORY TESTS RESULTS 05/11/93 JOB NUMBER: 930603 CUSTOMER: MARATHON OIL COMPANY ATTN: JEFFREY S. LYNN CLIENT I.D..... MARATHON OIL DATE SAMPLED...... 04/15/93 LABORATORY 1.D...: 930603-0002 DATE RECEIVED....: 04/20/93 TIME SAMPLED.....: 08:45 TIME RECEIVED....: 10:15 WORK DESCRIPTION...: #2 ARROYO REMARKS....: TEST DESCRIPTION FINAL RESULT LIMITS/\*DILUTION UNITS OF MEASURE TEST METHOD DATE TECHN Chloride (Unfilt.) 13.5 0.5 mg/L 325.2 (1) 05/06/93 KDS 8020 - AROMATIC VOLATILE ORGANICS 04/24/93 \*1 8020 (2) MLD Benzene ND 1 ug/L Toluene ND 1 ug/L Ethyl Benzene ND ug/L 1 Xylenes ND 1 ug/L 10703 East Bethany Drive Aurora, CO 80014 (303) 751-1780 PAGE:2

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#### LABORATORY TESTS RESULTS 05/11/93 JOB NUMBER: 930603 CUSTOMER: MARATHON OIL COMPANY ATTN: JEFFREY S. LYNN CLIENT I.D..... MARATHON OIL LABORATORY 1.D...: 930603-0003 DATE SAMPLED..... 04/15/93 DATE RECEIVED....: 04/20/93 TIME SAMPLED..... 09:07 TIME RECEIVED....: 10:15 WORK DESCRIPTION...: #4 BIEBBLE REMARKS.....: TEST DESCRIPTION FINAL RESULT LIMITS/\*DILUTION UNITS OF MEASURE TEST METHOD DATE TECHN Chloride (Unfilt.) 11.4 0.5 05/06/93 KDS 325.2 (1) mg/L 8020 - AROMATIC VOLATILE ORGANICS \*1 8020 (2) 04/24/93 MLD Benzene ND 1 ug/L Toluene ND ug/L 1 Ethyl Benzene ND 1 ug/L Xylenes ND ug/L 1 10703 East Bethany Drive Aurora, CO 80014 (303) 751-1780 PAGE:3

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		05/11/93				
JOB NUMBER: 930603 CUSTOMER	R: MARATHON OIL C	OMPANY	ATTN:	JEFFREY S. LYNN		
CLIENT I.D: MARATHON OIL DATE SAMPLED: 04/15/93 TIME SAMPLED: 08:25 WORK DESCRIPTION: #1 LYMAN			DATE RECE	Y I.D: 930603-00 IVED: 04/20/93 IVED: 10:15 :	101	
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	тесні
Chloride (Unfilt.)	13.0	0.5	mg/L	325.2 (1)	05/06/93	KDS
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	04/24/93	MLD
Benzene Toluene Ethyl Benzene Xylenes	ND ND ND		ug/L ug/L ug/L ug/L			
			10	703 East Bethany D	rive	
			AL	irora, CO 80014 0 <b>3</b> ) 751-1780		

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	LABORAT	ORY TESTS 05/11/93	RESULTS			
JOB NUMBER: 930603 CUSTOMER	: MARATHON OIL C	COMPANY	ATTN:	JEFFREY S. LYNN		
CLIENT I.D: MARATHON OIL DATE SAMPLED: 04/15/93 TIME SAMPLED: 07:38 WORK DESCRIPTION: #7 SW-1			DATE RECE	Y I.D: 930603-00 IVED: 04/20/93 IVED: 10:15 :	04	
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Chloride (Unfilt.)	20	1	mg/L	325.2 (1)	05/05/93	KDS
3020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	04/24/93	MLD
Benzene Toluene Ethyl Benzene Xylenes	NC ND ND ND		ug/L ug/L ug/L ug/L			
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	LABORAT	05/11	STS RESULT 1/93	-		
JOB NUMBER: 930603 CUSTOME	R: MARATHON OIL C	OMPANY	AT	TN: JEFFREY S. LYNN		
CLIENT I.D: MARATHON OIL DATE SAMPLED: 04/15/93 TIME SAMPLED: 07:45 WORK DESCRIPTION: #8 SW-2			DATE TIME	ATORY I.D: 930603-00 RECEIVED: 04/20/93 RECEIVED: 10:15 KS	005	
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DII	UTION UNITS OF MEASL	IRE TEST METHOD	DATE	TECH
Chloride (Unfilt.)	363	3	mg/L	325.2 (1)	05/05/93	KDS
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	04/24/93	MLD
Benzene Toluene Ethyl Benzene Xylenes	4 ND ND NO	1 1 7 1	ug/L ug/L ug/L ug/L			
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				10703 East Bethany D Aurora, CO 80014 (303) 751-1780	l	
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									DE PRES.									Ł	1,	× 2025	] 10 DAYS [.] RO				
CT INFORMATION		MATION						-	CONTAINER TYPE	40ml UOH	11 1(	11		11 11	3	יר נו	÷	11		Federal E	لے				
PROJECT INFOI		RILLING INCODMATION						PO NO.	SAMPLE MATRIX	water	watr		water	water	water	water	Water	water	1044 PC			D BY:	COMPANY:		COMPANY:
PR(	NE/NUMBER:	ā	ā						SAMPLE	08:25	03;45		07:38	24:60	11:15	1445	1500	750	922	SHIPMENT METHOD:	I 72 HOURS	2. RELINQUISHED BY SIGNATURE:	PRINTED NAME/COMPANY:	2. RECEIVED BY	PRINTED NAME/COMF
	PROJECT NAME/NUMBER:	-		BILL TU.	ADDRESS		PHONE:	FAX:	SAMPLE DATE	4-15-13-08:25	4/12/63	4/15/43	4/15/43	4/15/43	1/15/43	4/13/93	4/13/93	4/15/43	4115193	J.L. Church		DATE 2.1 4//a/a2			4.20.93
NO	); (		z d		< 79702			37							Buttled Pricking Water	~ `~	68	50 0	(7	Learned	] 24 HOURS	7	1112	2	
CUSTOMER INFORMATION	Non C		Parne	< 551			- 93/2	-633	SAMPLE ID	yman	Areyo	Bictble	56-1	5W-2	$\sim$	MW 6	NW C	3 4.	AW -	H. 2	SAME DAY		L L	V V	Chisim
CUSTOMER	lavatl			0 1302	Midland		5) (27			#1 T	オレゼ	) + +	- '	H.S.	Equip	BH-84	BH-94	BH-73	BH-40	MGra	$\Box$	0 e )			£(
	COMPANY: N	SEND REPORT TO:	oree 🔿		2		PHONE (915	FAX (915	SAMPLE NO.	#1	74	ナ 井	#2	8 #						SAMPLER: R	REQUIRED TURNAROUND	1. RELINQUISHED BY: FIGNATURE:	PRINTED NAME/COMPANY	L V P P · C 1. RECEIVED BY: SICHATURE:	

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LABO DATE TIME	TTN: JEFFREY S. LYNN RATORY I.D: 930780-00 RECEIVED: 05/13/93 RECEIVED: 09:45 RKS URE TEST METHOD 325.2 (1) 8020 (2)	DO1 DATE 05/19/93 05/14/93	TECHN
DATE TIME REMAI	RECEIVED: 05/13/93 RECEIVED: 09:45 RKS URE TEST METHOD 325.2 (1)	DATE 05/19/93	KDS
5 mg/L ug/L ug/L ug/L	325.2 (1)	05/19/93	KDS
ug/L ug/L ug/L			
ug/L ug/L	8020 (2)	05/14/93	14.14
ug/L ug/L			KJA
	1 10703 East Bethany Du Aurora, CO 80014 (303) 751-1780	rive	
	PAGE : 1	10703 East Bethany Dr Aurora, CO 80014 (303) 751-1780	10703 East Bethany Drive Aurora, CO 80014 (303) 751-1780

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DB NUMBER: 930780 CUSTOMER:	MARATHON OIL	COMPANY	ATTN:	JEFFREY S. LYNN		
IENT I.D MARATHON OIL ITE SAMPLED 05/12/93 IME SAMPLED 08:40 PRK DESCRIPTION: #2 ARROYO			DATE RECE	Y I.D: 930780-00 IVED: 05/13/93 IVED: 09:45 :	02	
ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
lloride (Unfilt.)	11.0	0.5	mg/L	325.2 (1)	05/19/93	KDS
D20 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	05/14/93	КJА
Benzene Toluene Ethyl Benzene Xylenes	ND ND ND ND	1 1 1 1	ug/L ug/L ug/L ug/L		1	
	·		Au	703 East Bethany Dr irora, CO 80014 03) 751-1780	ive	

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	LABORATORY TESTS RESULTS 06/04/93												
OB NUMBER: 930780 CUSTOMER	: MARATHON OIL	COMPANY	ATTN:	ATTN: JEFFREY S. LYNN									
IENT I.D: MARATHON OIL TE SAMPLED: 05/12/93 IME SAMPLED: 09:51 ORK DESCRIPTION: #7 SW-1			DATE RECE	Y I.D: 930780-00 IVED: 05/13/93 IVED: 09:45	003								
EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH							
loride (Unfilt.)	19.5	0.5	mg/L	325.2 (1)	05/19/93	KDS							
■ 020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	05/14/93	KJA							
Benzene Toluene Ethyl Benzene Xylenes	ND ND ND		ug/L ug/L ug/L ug/L										
			Au	703 East Bethany Di rora, CO 80014 03) 751-1780	ive								
	A	PAGE:3			· · · · · · · · · · · · · · · · · · ·								

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	LABORAT	ORY TESTS 06/04/93	RESULTS			
OB NUMBER: 930780 CUSTOME	R: MARATHON OIL	COMPANY	ATTN:	JEFFREY S. LYNN		
IENT I.D: MARATHON OIL TE SAMPLED: 05/12/93 IME SAMPLED: 09:18 ORK DESCRIPTION: #8 SW-2			DATE REC TIME REC	RY I.D: 930780-00 EIVED: 05/13/93 EIVED: 09:45	004	
EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
loride (Unfilt.)	522	3	mg/L	325.2 (1)	05/18/93	VKN
D20 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	05/19/93	KJA
Toluene Ethyl Benzene Xylenes	ND ND ND		ug/L ug/L ug/L			
	<u></u>	<u>, , , , , , , , , , , , , , , , , , , </u>	A	0703 East Bethany D Murora, CO 80014 303) 751-1780	rive	<u>.                                    </u>
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CHAIN OF CUSTODY RECORD																	1373362692		•	ANY:		ANY:	Corpus Christi, Texes 1733 North Padre Island Dr. Corpus Christi, Texas 78408 (512) 289-2673
CHAIN OF	00				A LAND	///////////////////////////////////////	/ / / / /		9911	2	2	2	7		 		 AIRBILL NO.: ${\cal P}$	OTHER	3. RELINQUISHED BY: SIGNATURE:	PRINTED NAME/COMPANY	3. RECEIVED BY: SIGNATURE:	PRINTED NAME/COMPANY:	Houston, Texas 8210 Mosely Road Houston, Texas 77075 (713) 943-9776
	 				OF CC	<b>7</b>				7	7	7	-7 1		 				DATE	TIME	DATE	TIME	1-A
	Z						311		ER TYPE PRES.	m/	11	1					 Express	10 DAYS					Houston, Texas 10201 Westheimer, Bldg. 1-A Houston, Texas 77042 (713) 972-6700
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TORIE	PROJE	PROJECT NAME/NUMBER:	BIL	TO: SCI ME	ADDRESS:		RE		SAMPLE SAMPLE Date time	1,2/93 08:15	12/43 0440	12:43 09:51	243 09.18		 -		SHIPMENT METHOD:	JURS 72 HOURS	2. RELINQUISHED BY:	PRINTED NAME/COMP	2. RECEIVED BY: SIGNATURE:	PRINTED NAME/COMP	Denver (Aurora), Colorado 1300 S. Potomac St Suite 130 Aurora, Colorado 80012 (303) 751-1780
		PRO		BILL TO:	ADD		PHONE	FAX	SA	5	15	15	5/1		 	+		48 HOURS	DATE 5/17/	5	DATE	い い い い い い い い	Denver (Au 1300 S. Pot Aurora, Colo (303) 751-11
CORE LABORATORIES	CUSTOMER INFORMATION	Marathen O: 1 Company	rned	) Box 552	Midland JX 76904		(683312)		SAMPLE ID	#1 Lyman	#2 Arread		#8 SW-2				M Gray	DUND: 🗌 SAMEDAY 🔲 24 HOURS	M Y Sol	Marza		Cine La La	Y REQUIRE SURCHARGE Long Beach, California Nay 3700 Cheny Avenue Long Beach, California 90807 (310) 595-8401
		COMPANY:	SEND REPORT TO:	address: $ ho_C$	W		PHONE: $(9/5)$	FAX:	SAMPLE NO.	<i>#</i> /	#7	# 7	#9				SAMPLER: R	REQUIRED TURNAROUND:		PRINTED NAME/COMPANY:	1 RECEIVED BY: SIGNATURE:	PRINTED NAME/COMPANY:	<ul> <li>RUSH TURNAROUND MAY REC</li> <li>Anaheim, California</li> <li>1250 E. Gene Auty Way</li> <li>Anaheim, California 92805</li> <li>(714) 937-1094</li> </ul>

George Marth



# LABORATORY TESTS RESULTS 07/27/93

10	B NUMBER: 931230 CUSTOMER:	MARATHON DIL COMPANY	ATTN: BOB MENZIE, JR.

CLIENT I.D...... MARATHON OIL CO. DATE SAMPLED...... 06/28/93 TIME SAMPLED...... 11:39 WORK DESCRIPTION...: SW-1

#### LABORATORY I.D...: 931230-0001 DATE RECEIVED....: 06/29/93 TIME RECEIVED....: 10:18 REMARKS......

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TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Chloride (Unfilt.)	20.2	1.0	mg/L	325.2 (1)	07/19/93	SLS
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	07/12/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND 108	0.5 0.5 0.5 0.5 1	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
	1	1	Auro	3 East Bethany Drive ra, CO 80014 ) 751-1780	 	
		PAGE:1	<u></u>		<u> </u>	

The analyses, opinions or interpretations contained in this record are based upon observations and material supplied by the client for whose exclusive and contidential use this report has been made. The interpretations or opinions expressed recresent the best judgment of Core Laboratories. Core Laboratories nowever, assumes no responsibility and makes no warranty or representations, excress or implied, as to the productivity, proper operations, or protitableness of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be recroduced except in its entirety, without the written approval of Core Laboratories.



#### LABORATORY TESTS RESULTS 07/27/93 JOB NUMBER: 931230 CUSTOMER: MARATHON OIL COMPANY ATTN: BOB MENZIE, JR. CLIENT I.D..... MARATHON OIL CO. LABORATORY I.D...: 931230-0002 DATE SAMPLED.....: 06/28/93 DATE RECEIVED....: 06/29/93 TIME SAMPLED..... 12:12 TIME RECEIVED....: 10:18 WORK DESCRIPTION .... #1 REMARKS.....: LIMITS/\*DILUTION UNITS OF MEASURE TECHN TEST DESCRIPTION FINAL RESULT TEST METHOD DATE 07/19/93 Chloride (Unfilt.) 12.5 0.5 mg/L 325.2 (1) SLS 8020 - AROMATIC VOLATILE ORGANICS \*1 8020 (2) 07/13/93 CLT Benzene ND 0.5 ug/L Toluene ND 0.5 ug/L Ethyl Benzene ND 0.5 ug/L ug/L Xylenes ND 0.5 4-Bromofluorobenzene (surrogate) 103 Limits (85-115) 1 % Recovery

10703 East Bethany Drive Aurora, CO 80014 (303) 751-1780

PAGE:2

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### CORE LABORATORIES

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LABORATORY TESTS RESULTS 07/27/93							
<u></u>	MARATHON OIL C	OMPANY	ATTNE	OB MENZIE, JR.			
LIENT I.D MARATHON OIL CO. ATE SAMPLED 06/28/93 IME SAMPLED 12:30 ORK DESCRIPTION: #2			DATE RECEIV	I.D: 931230-000 /ED: 06/29/93 /ED: 10:18	3		
EST DESCRIPTION	FINAL RESULT	LINITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC	
hloríde (Unfilt.)	11.4	0.5	mg/L	325.2 (1)	07/19/93	SL	
D20 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	07/12/93	CL	
Benzene Toluene Ethyl Benzene	ND ND ND	0.5 0.5 0.5	ug/L ug/L ug/L				
Xylenes 4-Bromofluorobenzene (surrogate)	ND 102	0.5 1	ug/L % Recovery	Limits (85-115)			
			Auro	03 East Bethany Dri ora, CO 80014 3) 751-1780	ve		

The analyses composed in the report and based upon observations and material subplied by the client for whose exclusive and confidential use this report has been made. The report and based upon observations and material subplied by the client for whose exclusive and confidential use this report has been made. The report and based or political expressed represent the best ludgment of Core Laboratories. Core Laboratories, however, assumes no responsibility and makes no warranty or representations, express or implied, as to the productivity proper overations, in profitableness of any oil, gas, coal or other mineral property were or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shail not be reproduced except in its entirety, without the written approval of Core Laboratories.

XOOTSU	1. Packed By: Am Grain Date: 6-28-93         2. VOA Vials7       Version Date: 6-28-93         2. VOA Vials7       Version Date: 6-28-93         3. Caps scaled whape?       VES       NO         3. Caps scaled whape?       VES       NO         4. Coolant?       ICE       OILD PAN         5. SEAL. Date/Time: 6-28-93       14:45         6. Notes/Comments: Please return our cooler       and also as many blue ice packs as possyble.         And XTICAL LABORATORY RECEITL-OBSERVATIONS:       1. SEAL Intact?         1. SEAL Intact?       VES       NO         3. Condition:       Col       Col         6. Secont Condition:       Col       Col	NO. CONTAINERS ANALYSIS PARAMETERS	4 BTEX & Cl- 4 BTEX & Cl- 4 BTEX & Cl-	SHIPPING DETAILS	Delivered to Shipper by. R.M. Graey Method of Shipment: U.P.S. Next Dasy Airbill #: 1763 1755 808 Rec'd for Lab: U.D.F. Rui, Date: 6/21/3 Time: 10:16 Assigned Laboratory Number: 731230 Assigned Laboratory Number: 731230
CHAIN OF CUSTODY	Jr. 3/2 MEN: 80014-2695	SAMPLE TYPE	Water Water	( TRANSFEES	Signature Date Time 2 and 6 28-53 14:45 19. A.a., 6/29/53 2026 19. A.a., 6/29/53 2026 Copy: Senter Retains
	<ul> <li>Jarathon Oil Company</li> <li>S9 Markhon Road</li> <li>Jewood, New Mexico 88254</li> <li>S05) 457-2621 / Fax (505) 457-2544</li> <li>S05) 457-2621 / Fax (505) 457-2544</li> <li>S05) 457-2621 / Fax (505) 682-83/2</li> <li>(9/5) 682-83/2</li> <li>(9/5) 682-83/2</li> <li>MALYTICAL LABORATORY ADDRESS</li> <li>MALYTICAL LABORATORY</li> <li>MALY DIVENTINA</li> </ul>	DATE TIME SAMPLEID	6-29-93 11:39 5W-1 6-28-93 12:12 # 1 2-28-93 12:30 # 2	INITIAL CUSTODY TRANSFEES	Signation (clinquished by: (signed): ANA- coceived hy: (signed): ALA- clinquished by: (signed): cccived by: (signed): cccived by: (signed): ginal: To Laboratory Cop

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### APPENDIX E

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### STATE ENGINEER'S FLUID RECOVERY REPORTS



P.O. Box 552 Midland. Texas 79702 Telephone 915/682-1626

May 10, 1993

Roswell Basin Watermaster State Engineer Office 1900 West Second Street Roswell, New Mexico 88201

Attention: Robert R. Marr

Re: Indian Basin Treatment Project

Dear Mr. Marr:

The below list of monitor wells (NW)/boreholes (BH) indicates the meter readings for fluid removed from the Lower Queen as of May 3, 1993.

	t soudd try e See State	LOWER QUEE	N	
LOCATION	SERIAL NUMBER	DATE READ	METER READING	WATER REMOVED
MW-58/BH-84	10239118	05/03/93	3061493	3,061,493 Gals
MW-59/BH-85	10259114	05/03/93	67609.7	67,609.7 Bbls
*MW-61A/BH-87A	10239116	05/03/93	2787144	2,871,416 Gals
**MW-62/BH-88	10239115	05/03/93	1931575	2,125,506 Gals
MW-65A/BH-91A	10239117	05/03/93	4467419	4,467,419 Gals
***MW-68/BH-94	02209213	05/03/93	384992	2,684,262 Gals
	I	OWER QUEEN 1	TOTAL	18,049,703 Gals

\* The volume of water removed from BH-87A reflects an additional 84,272.0 gallons which was metered during an interference test of the aquifer conducted on February 19-24, 1993.

\*\* The volume of water removed from BH-88 reflects an additional 193,931 gallons which was metered prior to the installation of an automatic sampling device on 1/25/92.

\*\*\* Meter 00209213 on MW-68/BH-94 reflects 122,618 gallons previously attributed to other locations (6,713 gallons to MW-1/BH-14 and 115,905 gallons to MW-13/BH-36.

i

### Indian Basin Treatment Project Page 2

Cumulative Lower Queeen fluid removal as of May 3,1993 is <u>18,371,171 Gals</u>. This number reflects the 321,468 gallons removed prior to installation of the present meters in December, 1991.

The below list of monitor wells (MW)/boreholes (BH) indicates the meter readings for fluid removed from shallow wells under permit RA-8015 as of May 3, 1993.

	SHA	ALLOW WELLS		
LOCATION	SERIAL NUMBER	DATE READ	METER READING	WATER REMOVED
**** NW-13/BH-36	02209212	05/03/93	109305.9	126.981.1 gals.
***** NW-14/BH-37	02209214	05/03/93	398213.3	398,402.3 gals
******MW-35/BH-59				98303.5 gals.
	<u> </u>	SHALLOW T	DTAL 62	3,686.9 gals.

- \*\*\*\* Meter 02209212 on MW-13/BH-36 reflects 98,236.2 gallons
  previously attributed to other locations (188.8 gallons
  to MW-21/BH-44, 98,047.4 gallons to MW-35/BH-59).
- \*\*\*\* The volume of water removed from MW-14/BH-37 reflects an additional 189 gallons not included on the meter reading as discussed in the December 1992 monthly statement.
- \*\*\*\*\* A meter and pump are not installed in MW-35/BH-59 at this time. The previous meter, serial No. 02209212, has been moved to MW-13/BH-36.

The cumulative shallow fluid removal as of May 3, 1993 is  $\underline{630,588.9}$  <u>Gals</u>. This number reflects the 6,902 gallons removed from MW-1/BH-14 and MW-21/BH-44 prior to meter removal.

If more information is required, please feel free to contact me at (915) 687-8312.

Very truly yours,

al feared

Al Learned

AL93510/nrt

Indian Basin Treatment Project Page 3

- xc: T. C. Lowry Midland
  - D. E. Kenyon PTC, Littleton
  - R. F. Unger Midland
  - R. A. Biernbaum Midland
  - C. M. Schweser- IBGP, Artesia

Mid-Continent Region Production United States Æ.



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

June 14, 1993

Robert R. Marr Rosweil Basin Watermaster State Engineer Office 1900 West Second Street Roswell, New Mexico 88201

Re: Indian Basin Treatment Project

Dear Mr. Marr:

The following list of monitoring wells (MW) and their corresponding borehole (BH) designations indicates the recorded meter readings for fluid removed from the Lower Queen as of Tuesday, June 1, 1993. Cumulative Lower Queen fluid removal as of June 1, 1993 is <u>19,478,506 Gal</u>.

WELL/ BOREHOLE	SERIAL NUMBER	INIT'L METER START	6/01/93 METER READING	WATER REMOVED (Gal)	PER-WELL WATER REMOVED (Gal)
MW-58/ BH-84	10239118 36285324	0	3240692	3,240,692 26,922	3,267,614
M <b>W-</b> 59/ BH-85	10259114 45120581	0	71108.2	71,108.2* 83,454	3 <b>,069,998</b>
MW-61A/ BH-87A	10239116 36285325	0	2933008.0	2,933,008 84,272' 46,578	3, <b>063,858</b>
MW-62/ BH-88	10239115 45473975	0	20 <b>57529.9</b>	2,057,529.9 193,931 <sup>2</sup> 62,622	2,314,083
MW-65A/ BH-91A	10239117 45473977	0	4773486.0	4,773,486 39,774	4,813,260
M <b>W-68</b> / B <b>H-9</b> 4	02209213 10239114 45473979 45473978	122618 0	588234.6	465,616.6 2,421,888 57,862 4,326	2,949,693
* Pormia				LOWER QUEEN TOTAL	19,478,506

\* Barreis.

<sup>1</sup> Water recovered during interference test conducted 2/19-24/93.

<sup>2</sup> Total prior to automatic sampling device installation on 1/25/92.

### Indian Basin Treatment Project Page 2

The following list of SHALLOW ZONE monitoring wells (MW) and their corresponding borehole (BH) designations indicates the meter readings for fluid removed under permit RA-8015 as of Tuesday, June 1, 1993. The cumulative shallow fluid removal as of Tuesday June 1, 1993 is <u>634,270.8 Gal</u>.

WELL/ BOREHOLE	SERIAL NUMBER	INIT'L METER START	06/01/93 METER READING	WATER REMOVED (Gal)	PER-WELL WATER REMOVED (Gal)
MW-1/BH-14 <sup>3</sup>	02209213	0		6,712.5	6,712.5
MW-13/BH-36	02209212 02209213	98236.2 6712.5	113000.6	14,764.4 115,911.4	130,675.8
MW-14/BH-37	02209214	0	398203.7 	39 <b>8.203.7</b> 9.6 <sup>4</sup> 176.9 <sup>5</sup>	39 <b>8,3</b> 90.2
MW-21/BH-44 <sup>3</sup>	02209212	0		188.8	188.8
MW-35/BH-59³	02209212	18 <b>8</b> .8		98.047.4 2 <b>56</b> .1 <sup>6</sup>	98,303.5
SHALLOW TOTAL 634,270.8 Gal					

<sup>3</sup> Pump and meter not installed currently.

<sup>4</sup> Meter reading indicated reverse flow equaling this volume (5/93 report).

<sup>5</sup> Meter reading indicated reverse flow equaling this volume (12/92 report).

<sup>6</sup> Meter reading indicated reverse flow equaling this volume (8/92 report).

If more information is required, please contact me at (915) 687-8312.

Very truly yours,

Robert J. May Robert J. Menzie, Jr.

### RJM93614/nrt

- xc: T. C. Lowry Midland
  - D. E. Kenyon PTC, Littleton
  - R. F. Unger Midland
  - R. A. Biernbaum Midland
  - C. M. Schweser- IBGP, Artesia



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

July 12, 1993

Robert R. Marr Roswell Basin Watermaster State Engineer Office 1900 West Second Street Roswell, New Mexico 88201

Re: Indian Basin Treatment Project

Dear Mr. Marr:

The following table indicates the recorded meter readings for fluid removed from the Lower Queen monitoring wells as of Tuesday, July 6, 1993. Cumulative Lower Queen fluid removal through that date is 20,757,729 gallons.

MONITORING WELL	METER SERIAL NUMBER	INIT'L METER START	7/06/93 METER READING	WATER REMOVED (Gal)	PER-WELL WATER REMOVED (Gal)	
MW-58	10239118	0	3461016	3,451,016 26,922 <sup>1</sup>	3,487,938	
MW-59	10259114	0	74936.8*	3,147,346 83,454 <sup>1</sup>	3,230,800	
MW-61A	10239116	0	3165326	3,165,326 46,578 <sup>1</sup> 84,272 <sup>2</sup>	3,296,176	
MW-62	10239115	0	2180148	2,180,148 193,931 <sup>3</sup> 62,622 <sup>1</sup>	2,436,701	
MW-65A	10239117	0	5102850	5,102,850 39,774 <sup>1</sup>	5,142,624	
MW-68	02209213	122618	802032	679,414 2,484,076 <sup>1</sup>	3,163,490	
LOWER QUEEN TOTAL 20,757,729 gallons						

Metered units are barrels.

<sup>1</sup> Previously metered recovered volumes.

<sup>2</sup> Water recovered during interference test conducted 2/19-24/93.

<sup>3</sup> Total prior to automatic sampling device installation on 1/25/92.

Indian Basin Treatment Project Page 2

The following table indicates the meter readings for fluid removed from Shallow zone monitoring wells under permit RA-8015 as of Tuesday, July 6, 1993. The cumulative shallow fluid removal through that date is 637,835 gallons.

MONITORING WELL	METER SERIAL NUMBER	INIT'L METER START	07/06/93 METER READING	WATER REMOVED (Gal)	PER-WELL WATER REMOVED (Gal)
MW-1				6,713 <sup>1</sup>	6,713
MW-13	02209212	98236.2	116564.2	18,328 115,911 <sup>1</sup>	134,239
MW-14	02209214	0	398203.7	398,204 187 <sup>1</sup>	3 <b>98,391</b>
MW-21				189 <sup>1</sup>	189
MW-35				98,303 <sup>1</sup>	98,303
		S	SHALLOW TOTAL	637,835	gallons

Previously metered recovered volumes.

Please note the above tables have been revised to show only the meter serial numbers and readings for the meters currently installed on each well. Earlier readings from meters that have been replaced or switched to other wells have been summarized as "previously metered recovered volumes" to simplify the tables and associated footnotes.

If more information is required, please contact me at (915) 687-8312.

Very truly yours,

Robert J. Menzie Sr. In Test

RJM93714/nrt

- xc: T. C. Lowry Midland
  - D. E. Kenyon PTC, Littleton
  - R. F. Unger Midland
  - R. A. Biernbaum Midland
  - C. M. Schweser- IBGP, Artesia

### RECEIVED

NOV 1 2 1993

OIL CONSERVATION DIV. SANTA FE

### INDIAN BASIN GAS PLANT TREATMENT PROJECT QUARTERLY REPORT

### THIRD QUARTER 1993 JULY, AUGUST, AND SEPTEMBER

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

November 11, 1993

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RANCHER WELLS, SPRING, AND PLANT WELL LABORATORY RESULTS	3
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TABLE 2	HISTORICAL SUMMARY OF BENZENE IN LOWER QUEEN
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	GROUNDWATER
TABLE 4	RANCHER WELL GROUNDWATER AND SPRING WATER
	SAMPLE RESULTS

### FIGURES

FIGURE 1	JULY 1993 LOWER QUEEN POTENTIOMETRIC SURFACE
FIGURE 2	LOWER QUEEN GROUNDWATER ELEVATION VS. TIME
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FIGURE 5	WEEKLY LOWER QUEEN FLUID RECOVERY
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APPENDIX E STATE ENGINEER'S FLUID RECOVERY REPORTS

### INTRODUCTION

This report summarizes groundwater and unsaturated zone treatment activities conducted during the Third Quarter of 1993 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 spill from a production pipeline discovered in April 1991 near the Indian Basin Gas Plant.

### QUARTERLY REPORT SUMMARY

The groundwater remediation system is fully operational and functioning as set forth in the Treatment Project Plan document. Fluid recovery from the Lower Queen aquifer is continuing with volatile hydrocarbon compounds being removed by air stripping. Shallow zone pumping continues from two wells. Water discharged from the air stripper continues to be utilized by the plant for process water and excess treated groundwater not used by the plant is disposed of in the Class II injection well. The vapor extraction system was not operated during the Third Quarter. Concentrations of benzene, toluene, ethylbenzene, total xylene, and chloride in groundwater collected from rancher wells and nearby surface springs have not exceeded State or Federal drinking water standards. Local ranchers are informed of treatment project activities via a quarterly letter.

### **GROUNDWATER ELEVATION**

### Lower Queen

Depth-to-water measurements were acquired from nonpumping, Lower Queen aquifer monitoring wells in July, August, and September 1993. Table 1 in part presents groundwater elevations calculated from casing elevation data and depth-to-water measurements obtained from nine Lower Queen wells. Figure 1 is a potentiometric map of the Lower Queen aquifer based on gauging conducted in July. These Lower Queen data indicate decreasing groundwater elevations in monitoring wells during the quarter (Figure 2).

### Shallow Zone

A potentiometric map was constructed using depth-to-water measurements collected from shallow monitoring wells during the quarterly sampling event in July 1993 (Figure 3). Table 1 shows the depth-to-water measurements and calculated groundwater elevations for shallow zone wells. These Shallow zone data also indicate decreasing groundwater elevations in monitoring wells during the quarter.

1

Groundwater Recharge (Rainfall)

Daily rainfall is gauged at the gas plant. Monthly rainfall for July, August, and September was 0.55, 0.63, and 0.62 inches, respectively (Table 1). Cumulative rainfall for the Third Quarter was 1.80 inches.

### QUARTERLY SAMPLING LABORATORY RESULTS

Gauging, purging, and sampling of 23 monitoring wells were conducted on July 12 through 15, 1993 and new downgradient monitoring well MW-71 was sampled on September 1, 1993. Fifteen Lower Queen wells including the plant water supply well (SW-1) were sampled. The backup well (SW-2) was gauged but not not sampled because the purge time (three casing volumes) for this well is 5.7 hours. Seven of these Lower Queen wells have downhole pumps installed and were sampled through the pump. Two of the Lower Queen pumping wells contained free product (condensate) and were not submitted for laboratory analysis (MW-59 and MW-61A).

Eleven of the fifty-nine Shallow zone wells were sampled in July. Three of the original twenty-three shallow zone monitoring wells designated for quarterly sampling in the Treatment Project Plan were sampled (see bolded well designations in Table 3). The remaining 20 wells were either dry (17), contain free product (MW-11, MW-69), or inaccesible (MW-13; pumping well). Seven Shallow zone wells other than those designated in the Treatment Project Plan were sampled (MW-37, MW-39, MW-41, MW-43, MW-45, MW-49, and MW-65). None of the sumps completed in the shallow fluvial deposits were sampled because the current Shallow zone groundwater elevation is below these wells. Samples were collected by Southwestern Laboratories, Inc. (SWL) in Midland, Texas using Environmental Protection Agency (EPA) sampling protocol. A table was prepared by SWL of field observations from notes recorded during gauging, purging, and sampling activities. This table documents the depth-to-water measurement, purge volume, temperature, pH, conductivity, and whether free-phase product was observed in the well (Appendix A).

Marathon Oil Company's Petroleum Technology Center (PTC) in Littleton, Colorado performed chloride and benzene, toluene, ethylbenzene, and total xylene (BTEX) analyses on the samples collected during the quarterly monitoring episode. High performance liquid chromatography (HPLC) was used to analyze groundwater samples for BTEX concentrations and a titration method was used for chloride analysis. These results are contained in Appendix B.

Core Laboratories in Aurora, Colorado performed five duplicate BTEX analysis using EPA Method 8020 (purge and trap gas chromatography). This practice is required to verify the HPLC results since the HPLC analytical technique is not an EPA-approved method for determining BTEX concentations. Core Laboratories also conducted five duplicate chloride analyses using EPA Method 325.2. One Shallow zone well (MW-41) and four Lower Queen

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wells (SW-1, MW-60, MW-64, and MW-68) were analyzed for BTEX using both the HPLC and EPA 8020 methods. Figure 4 compares BTEX analytical results for the two analytical techniques. Duplicate laboratory results performed by Core Laboratories using EPA Method 8020 and 325.2 are included in Appendix B.

Tables 2 and 3 are historical summaries of quarterly benzene concentration data since September 1991 for the Lower Queen wells and Shallow zone wells, respectively. Benzene concentration (in ug/L) versus time graphs for each routinely sampled monitoring well are provided in Appendix C.

### RANCHER WELLS, SPRING, AND PLANT WELL LABORATORY RESULTS

Monthly groundwater samples of one nearby rancher well (Lyman) and surface water from one natural spring in Rocky Arroyo (Upper Indian Hills Spring West; Hendrickson and Jones, 1952) were collected on July 15, August 3, and September 21, 1993. In addition, another rancher well which is sampled quarterly (Biebelle), was sampled on July 15, 1993. Analytical results indicate that groundwater and spring water do not exceed the EPA drinking water standards for chloride, benzene, toluene, ethylbenzene, and total xylenes.

Table 4 provides a summary of the monthly analyses performed on Upper Indian Hills Spring West and the Lyman well which is the closest downgradient well to the remediation site. The quarterly analysis for the Biebelle well, the second closest downgradient well, is also reported. The rancher well and natural spring samples were obtained using EPA sampling and handling procedures. Core Laboratories performed the BTEX and chloride analyses using EPA approved methods. Laboratory results of groundwater from the rancher wells and the natural spring are transmitted to the local ranchers each month with letters of explanation. Copies of these letters are also provided to the OCD and the Bureau of Land Management (BLM) in Santa Fe and Roswell, New Mexico, respectively.

The plant water supply well (SW-1) is also sampled and analyzed monthly. Laboratory reports for all the rancher wells, natural spring, and plant supply well are included in Appendix D.

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### **GROUNDWATER PUMPING**

### Lower Queen

Fluid recovery from the Lower Queen aquifer and Shallow zone is metered and reported to the State Engineer's Office (SEO) on a monthly basis, per SEO directive. The reports filed with the SEO for the Third Quarter of 1993 are attached in Appendix E. Figures 5, 6, and 7 are stacked bar graphs depicting weekly fluid recovery from the Lower Queen, weekly fluid recovery from the Shallow zone recovery wells, and combined weekly fluid recovery from the Lower Queen aquifer and Shallow zone, respectively.

Six Lower Queen wells (MW-58, MW-59, MW-61A, MW-62, MW-65A, and MW-68) were intermittently pumped for plume control during the quarter. Monthly fluid recovery for each well and the plant supply well SW-1 is listed in the following table.

Well Number	July	August	September	Quarter Total (Bbls)
MW-58 (BH-84)	3,300	6,859	4,643	14,802
MW-59 (BH-85)	3,125	3,914	2,275	9,314
MW-61A (BH-87A)	4,929	6,747	4,824	16,500
MW-62 (BH-88)	3,355	4,712	3,263	11,330
MW-65A (BH-91A)	6,486	8,890	6,025	21,401
MW-68 (BH-94)	5,377	5,119	3,658	14,154
Plant Supply SW-1	14,460*	25,752	20,542	60,754
TOTAL	41,032	61,993	45,230	148,255

### LOWER QUEEN FLUID RECOVERY

\* A verage recovery determined by dividing the quarterly recovered volume for May, June, and July of 14,460 by three.

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### Shallow Zone

Shallow zone fluid recovery during the Third Quarter was from two intermittent pumping wells (MW-13 and MW-69). Shallow zone fluid recovery from MW-69 commenced on August 11, 1993. Monthly shallow zone fluid recovery volumes for each well and sump are listed in the following table. Free product recovery from MW-69 during the Third Quarter totaled 6.5 barrels.

Well Number	JULY Cond./Water	AUGUST Cond./Water	SEPTEMBER Cond./Water	Quarter Total (Bbls) Cond./Water
MW-13 (BH-36)	9.6*	10.5*	12.9*	33*
MW-14 (BH-37)	NP (DRY)	NP (DRY)	NP (DRY)	0*
Sump All	NP (DRY)	NP (DRY)	NP (DRY)	0/0
Sump 16A	NP (DRY)	NP (DRY)	NP (DRY)	0/0
MW-69 (BH-95)	NP	1.8/2.5	4.7/4.2	6.5/6.7
TOTAL (Bbls)	9.6*	1.8/13*	4.7/17.1*	6.5/39.7*

### SHALLOW ZONE FLUID RECOVERY

\* Total fluid volume because condensate and produced groundwater are not separated at the well. NP = Not pumped during this period.

### **GROUNDWATER TREATMENT**

Commingled fluids pumped from the six Lower Queen and one Shallow zone recovery wells were pumped through piping to a treatment compound that includes an oil/water separator, air stripper, and two aboveground tanks. The oil/water separator is used to remove free product from the produced groundwater. The free product is transferred to a condensate holding tank which is gauged on a daily basis. The measured volume of free condensate recovered from the commingled groundwater during the Third Quarter was 9.92 barrels. Cumulative condensate separated from the recovered groundwater since product separation began in April 1992 is 55.12 barrels.

Groundwater from the separator is pumped through the air stripper to remove dissolvedphase, volatile hydrocarbon compounds. Stripped hydrocarbon compounds are vented to the atmosphere through a stack. Treated groundwater is used as make-up water for the gas plant.

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Total free product recovery from the Lower Queen and Shallow zone for the Third Quarter was 16.42 barrels. Cumulative free product recovered to date excluding the volume volatilized by the air stripper and vapor extraction system is 3,356.92 barrels.

### VAPOR EXTRACTION SYSTEM

Phase I of the unsaturated zone remediation using vapor extraction was completed in March 1993. The Phase I program vented Shallow zone wells MW-16 (BH-39), MW-17 (BH-40), and MW-21 (BH-44). Shallow venting continued from MW-56 (BH-82) between April 8 and July 20, 1993.

The vapor extraction (VE) equipment was only operated for a few days in early July. The electric generator that was supplying power to the VE unit was moved to operate a submersible pump that was installed to recover free condensate from MW-69 (BH-95).

### **OTHER ACTIVITIES**

Downgradient Lower Queen monitoring well MW-71 was drilled and completed between August 22 and August 25. The well was developed by pumping, purged and sampled on September 1, 1993. The OCD split samples with Marathon for laboratory analysis comparison. Lower Queen recovery well MW-72 was completed on September 10 and is located at the midpoint between monitoring wells MW-58 and MW-59 (Figure 1). Right-of-way amendment approval was gained on July 9, 1993.

### **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.



TABLE 1 DEPTH-TO-WATER, GROUNDWATER ELEVATION, AND RAINFALL DATA THIRD QUARTER 1993

| WATER<br>ELEV.   | 3830.13   | 3629.62   |  | 3629.23  | 3028.74  | 3628.97  | 3629.88  | 3630.04  | 3628.39  | 3629.73  
   | <b>3678 93</b>   | 0000   |  |  |  |  |   
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| 10<br>WATER (FT) | 157.57  | 185.66  |  | 196.93   | 108.83   | 200.01   | 135.99   | 192.53   | 149.66   | 189.59   
   | 179 R.G  | Not Gauged   | Not Gauged   | Not Gauged   
   
  | Not Gauged   
   | Not Gauged   | Not Gauged   | Not Gauged  
   
   | Not Gauged   | Not Gauged   
  | Not Gauged   
   
   | Not Gauged   | Not Gauged   
  | Not Gauged   | Not Gauged   | Not Gauged   
   | Not Gauged   | Not Gauged  | Not Gauged   | Not Gauged   | Not Cauged   | | | | | |
| WAIEH<br>ELEV.   | 3630.20   | 3629.69   |  | 3629.28  | 61.6205  | 3628.96  | 3629.99  | 3630.12  |  |  
   | 3878 79  |  |  |  |  |  |   
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   |  |  |  |
| NATER (FT)       | 157.5   | 185.59  |  | 196.88   | 100.10   | 200.02   | 135.88   | 192.45   | 149.85   | WNC  
   | 180  | Not Gauged   | Not Gauged   | Not Gauged   
   
  | Not Gauged   
   | Not Gauged   | Not Gauged   | Not Gauged  
   
   | Not Gauged   | Not Gauged   
  | Not Gauged   
   
   | Not Gauged   | Not Gauged   
  | Not Gauged   | Not Gauged   | | | | | | | | |
   | Not Gauged   | Not Gauged  | Not Gauged   | Not Gauged   | Not Gauged   |
| WAIEH<br>ELEV.   | 3630.28   | 3629.81   |  | 3629.54  | 10.8205  | 3629.16  | 3630.06  | 3630.25  |  |  
   | 3629.03  |  |  |  | 3778.79  | 3/80.42  |   
  | 3775.33  |   
   
   | 3//2.24  | 3782 57  | 3781.04  | 3774.92  
   
  | 3777.09  | 3778.42   
   
   | 3779 76   
   
  | 3782.10  | 3780.72   
   | 3782.51  | 3/8/.19  | 3783.63  | 3786.92  | 3777.25   
   | 3764.38  | 37/9.54  | 3783 15  |
| VATER (FT)       | 157.42  | 185.47  |  | 196.62   | 07.901   | 199.82   | 135.81   | 192.32   | WNC  | WNC  
   | 179.76   | DRY  | DRY  | DRY  | 22.25  | 19.13<br>DRV   | DRY   
  | 22.88  | DRY   
   
   | 70.7   | 19.91  | 19.77  | 20.11  
   
  | 20.23  | 17.78   
   
   | 19.28   
   
  | 22.63  | 21.33   
   | 21.63  | 21.49  | 21.98  | 26.43  | 46.61   
   | 30.02  | 30.00<br>FA 34   | 41 0.6   |
| ELEV.            | 3787.70<br>3824.31  | 3819.59<br>3815.28<br>2915.28   | 3819.90  | 3826.16  | 3763.26  | 3828.98  | 3765.87<br>3797.83   | 3822.57  | 3778.05  | 3819.32  
   | 3808.79  | 3785.88  | 3790.78  | 3806.96  | 3801.04  | 3795 R2  | 3797.21   
  | 3798.21  | 3799.20   
   
   | 379445   | 3802.48  | 3800.81  | 3795.03  
   
  | 3797.32  | 3796.20   
   
   | 3799.04   
   
  | 3804.73  | 3802.05   
   | 3804.14  | 3808.08  | 3805.61  | 3813.35  | 3823.86   
   | 3794.40  | 3816.20  | 3805 11  |
|                  |   |   | MW-62 (BH-88)p   | MW-63 (BH-89)  | MW-65A (BH-91A)p   | MW-66 (BH-92)  | MW-67 (BH-93)<br>MW-68 (BH-94)p  | MW-70 (BH-97)  | MW-71 (BH-98)  | MW-72 (BH-99)  
   | SW-2 (BACKUP)  | r -  |  |  | MW-16 (BH-39)  | MW-17 (BH-40)<br>MW-18 (BH-41)   | MW-19 (BH-42)   
  |  | MW-22 (BH-46)   
   
   | MVV-20 (BH-49)   | MW-33 (BH-57)  | MW-35 (BH-59)  |  
   
  |  | MW-39 (BH-62)   
   
   | MW-41 (BH-64)   
   
  | MW-42 (BH-65)  |   
   | MW-44 (BH-67)  |  |  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
   | MW-55 (BH-81)  |  |  |
|                  | NUMBER   (FT AMSL)   WATER (FT) ELEV.   WATER (FT) ELEV.   WATER (FT) | NUMBER         (FT AMSL)         WATER (FT)         ELEV.         WATER (FT)         ELEV.           MW-57 (BH-83)         3787.70         157.42         3830.28         157.5         3830.20           MW-58 (BH-84)p         3824.31         157.42         3830.28         157.5         3830.20 | NUMBER         (FT AMSL)         WATER (FT)         ELEV.         ELEV.         MATER (FT)< | NUMBER         (FT AMSL)         WATER (FT)         ELEV.         WATER (FT)         ELEV.< | NUMBER         (FT AMSL)         WATER (FT)         ELEV.         WATER (FT)         ELEV.< | NUMBER         (FT AMSL)         WATER (FT)         ELEC.         WATER (FT)         ELEC.< | NUMBER         (FT AMSL)         WATER (FT)         ELEC.         WATER (FT)         ELEC.< | NUMBER         (FT AMSL)         WATER (FT)         ELEC.         MATER (FT)         ELEC.< | NUMBER         (FT AMSL)         WATER (FT)         ELEC.         MATER (FT)         ELEC.< | NUMBER         (FT AMSL)         WATER (FT)         ELEC.         MATER (FT)         ELEC.< | NUMBER         (FT AMSL)         WATER (FT)         ELEC.         MATER (FT)         ELEC.< | NUMBER         (FT AMSL)         WATER (FT)         ELEC.         MATER (FT)         ELEC.< | NUMBER         (FT AMSL)         WATER (FT)         ELECN         WATER (FT)         ELECN< | NUMBER         (FT AMSL)         WATER (FT)         ELEC.         IB1.165.69         IB1.26 | NUMBER         (FT AMSL)         WATER (FT)         ELEV.         MATER (FT)         ELEV.< | NUMBER         (FT AMSL)         WATER (FT)         ELEV.         WATER (FT)         ELEV.< | NWMER         (FT AMSL)         WATER (FT)         ELEV.<br>ELEV.<br>T57.42         WATER (FT)         ELEV.<br>T57.55         WATER (FT)         WAT | WW-57 (BH-83)         ST87.70         T57.42         3630.28         T57.5         MATER (FT)         ELEV.         WATER (F | NUMBER         FT AMSL         WATEN (FT)         ELEV.         WATEN (FT)         ELEV. <td>NUMBER         (FT AMSL)         WATEN (FT)         ELEV.         WATEN (FT)         ELEV.&lt;</td> <td>NUMBER         (FT AMSL)         WATER (FT)         EEV.<br/>EEV.<br/>To MATER (FT)         WATER (FT)         EEV.<br/>To MATER (FT)         WATER (FT)         EEV.<br/>To MATER (FT)         WATER (FT)         MATER (FT)&lt;</td> <td>NUMBER         (FT AMSL)         WATER (FT)         ELEV.         WATER (FT)         ELEV.&lt;</td> <td>NUMBER         FT AMSL         WATER (FT)         ELEVC         WATER (FT)         ELEVC<td>NUMBER         FT AMSI, MATER (FT)         ELEV.         WATER <td>NUMBER         FT AMS1         WATER (FT)         ELEV.         WATER (FT)         ELEV.<td>NUMBER         FT AMS1         WATER (FT)         ELEV.         WATER (FT)         ELEV.<td>NUMBER         FT AMEL         WATER (FT)         ELV.T         WATER (FT)         WATER (FT)         MATER (FT)</td><td>NUMBER         FT AMEL         WATER (FT)         MATER (FT)         MATER (FT)         WATER (FT)         MATER (FT)<td>NUMBER         FT AMSLI         WATER (FT)         FT         MARC         MARC</td><td>NUMBER         FT AMSL         WATER (FT)         EEV.         WATER (FT)         FT AMSL         JASL         JAS</td><td>NUMER         (FT-MisL)         WATER (FT)         EEUV         WATER (FT)</td><td>NUMER         (FT-Mist)         WATER (FT)         FEAU         WATER (FT)         WATER (FT)</td><td>NUMBER         FT-XMS11         WATEN (FT)         ETCVT         IBS 20.20         IBS 20.2</td><td>NUMBER         FT-XMS11         WATEN (FT)         ELCU         WATEN (FT)         WATEN (FT)</td><td>NUMBER         FT-Mis.1         WATEN (FT)         ETCV         WATEN (FT)         WATEN (FT)         MATEN (FT)</td><td>NUMBER         (FT-Mis.)         MATER (FT)         TEV/T         MATER (FT)         TEV/T&lt;</td></td></td></td></td> | NUMBER         (FT AMSL)         WATEN (FT)         ELEV.         WATEN (FT)         ELEV.< | NUMBER         (FT AMSL)         WATER (FT)         EEV.<br>EEV.<br>To MATER (FT)         WATER (FT)         EEV.<br>To MATER (FT)         WATER (FT)         EEV.<br>To MATER (FT)         WATER (FT)         MATER (FT)< | NUMBER         (FT AMSL)         WATER (FT)         ELEV.         WATER (FT)         ELEV.< | NUMBER         FT AMSL         WATER (FT)         ELEVC         WATER (FT)         ELEVC <td>NUMBER         FT AMSI, MATER (FT)         ELEV.         WATER  <td>NUMBER         FT AMS1         WATER (FT)         ELEV.         WATER (FT)         ELEV.<td>NUMBER         FT AMS1         WATER (FT)         ELEV.         WATER (FT)         ELEV.<td>NUMBER         FT AMEL         WATER (FT)         ELV.T         WATER (FT)         WATER (FT)         MATER (FT)</td><td>NUMBER         FT AMEL         WATER (FT)         MATER (FT)         MATER (FT)         WATER (FT)         MATER (FT)<td>NUMBER         FT AMSLI         WATER (FT)         FT         MARC         MARC</td><td>NUMBER         FT AMSL         WATER (FT)         EEV.         WATER (FT)         FT AMSL         JASL         JAS</td><td>NUMER         (FT-MisL)         WATER (FT)         EEUV         WATER (FT)</td><td>NUMER         (FT-Mist)         WATER (FT)         FEAU         WATER (FT)         WATER (FT)</td><td>NUMBER         FT-XMS11         WATEN (FT)         ETCVT         IBS 20.20         IBS 20.2</td><td>NUMBER         FT-XMS11         WATEN (FT)         ELCU         WATEN (FT)         WATEN (FT)</td><td>NUMBER         FT-Mis.1         WATEN (FT)         ETCV         WATEN (FT)         WATEN (FT)         MATEN (FT)</td><td>NUMBER         (FT-Mis.)         MATER (FT)         TEV/T         MATER (FT)         TEV/T&lt;</td></td></td></td> | NUMBER         FT AMSI, MATER (FT)         ELEV.         WATER MBER         FT AMS1         WATER (FT)         ELEV.         WATER (FT)         ELEV. <td>NUMBER         FT AMS1         WATER (FT)         ELEV.         WATER (FT)         ELEV.<td>NUMBER         FT AMEL         WATER (FT)         ELV.T         WATER (FT)         WATER (FT)         MATER (FT)</td><td>NUMBER         FT AMEL         WATER (FT)         MATER (FT)         MATER (FT)         WATER (FT)         MATER (FT)<td>NUMBER         FT AMSLI         WATER (FT)         FT         MARC         MARC</td><td>NUMBER         FT AMSL         WATER (FT)         EEV.         WATER (FT)         FT AMSL         JASL         JAS</td><td>NUMER         (FT-MisL)         WATER (FT)         EEUV         WATER (FT)</td><td>NUMER         (FT-Mist)         WATER (FT)         FEAU         WATER (FT)         WATER (FT)</td><td>NUMBER         FT-XMS11         WATEN (FT)         ETCVT         IBS 20.20         IBS 20.2</td><td>NUMBER         FT-XMS11         WATEN (FT)         ELCU         WATEN (FT)         WATEN (FT)</td><td>NUMBER         FT-Mis.1         WATEN (FT)         ETCV         WATEN (FT)         WATEN (FT)         MATEN (FT)</td><td>NUMBER         (FT-Mis.)         MATER (FT)         TEV/T         MATER (FT)         TEV/T&lt;</td></td></td> | NUMBER         FT AMS1         WATER (FT)         ELEV.         WATER (FT)         ELEV. <td>NUMBER         FT AMEL         WATER (FT)         ELV.T         WATER (FT)         WATER (FT)         MATER (FT)</td> <td>NUMBER         FT AMEL         WATER (FT)         MATER (FT)         MATER (FT)         WATER (FT)         MATER (FT)<td>NUMBER         FT AMSLI         WATER (FT)         FT         MARC         MARC</td><td>NUMBER         FT AMSL         WATER (FT)         EEV.         WATER (FT)         FT AMSL         JASL         JAS</td><td>NUMER         (FT-MisL)         WATER (FT)         EEUV         WATER (FT)</td><td>NUMER         (FT-Mist)         WATER (FT)         FEAU         WATER (FT)         WATER (FT)</td><td>NUMBER         FT-XMS11         WATEN (FT)         ETCVT         IBS 20.20         IBS 20.2</td><td>NUMBER         FT-XMS11         WATEN (FT)         ELCU         WATEN (FT)         WATEN (FT)</td><td>NUMBER         FT-Mis.1         WATEN (FT)         ETCV         WATEN (FT)         WATEN (FT)         MATEN (FT)</td><td>NUMBER         (FT-Mis.)         MATER (FT)         TEV/T         MATER (FT)         TEV/T&lt;</td></td> | NUMBER         FT AMEL         WATER (FT)         ELV.T         WATER (FT)         WATER (FT)         MATER (FT) | NUMBER         FT AMEL         WATER (FT)         MATER (FT)         MATER (FT)         WATER (FT)         MATER (FT) <td>NUMBER         FT AMSLI         WATER (FT)         FT         MARC         MARC</td> <td>NUMBER         FT AMSL         WATER (FT)         EEV.         WATER (FT)         FT AMSL         JASL         JAS</td> <td>NUMER         (FT-MisL)         WATER (FT)         EEUV         WATER (FT)</td> <td>NUMER         (FT-Mist)         WATER (FT)         FEAU         WATER (FT)         WATER (FT)</td> <td>NUMBER         FT-XMS11         WATEN (FT)         ETCVT         IBS 20.20         IBS 20.2</td> <td>NUMBER         FT-XMS11         WATEN (FT)         ELCU         WATEN (FT)         WATEN (FT)</td> <td>NUMBER         FT-Mis.1         WATEN (FT)         ETCV         WATEN (FT)         WATEN (FT)         MATEN (FT)</td> <td>NUMBER         (FT-Mis.)         MATER (FT)         TEV/T         MATER (FT)         TEV/T&lt;</td> | NUMBER         FT AMSLI         WATER (FT)         FT         MARC         MARC | NUMBER         FT AMSL         WATER (FT)         EEV.         WATER (FT)         FT AMSL         JASL         JAS | NUMER         (FT-MisL)         WATER (FT)         EEUV         WATER (FT) | NUMER         (FT-Mist)         WATER (FT)         FEAU         WATER (FT)         WATER (FT) | NUMBER         FT-XMS11         WATEN (FT)         ETCVT         IBS 20.20         IBS 20.2 | NUMBER         FT-XMS11         WATEN (FT)         ELCU         WATEN (FT)         WATEN (FT) | NUMBER         FT-Mis.1         WATEN (FT)         ETCV         WATEN (FT)         WATEN (FT)         MATEN (FT) | NUMBER         (FT-Mis.)         MATER (FT)         TEV/T         MATER (FT)         TEV/T< |

30TABLE1.XLS

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p=Pump present in well; unable to measure depth-to-water WNC = Well Not Completed

**TABLE 2** 

		Be	Benzene (ug/L)	using EPA	) using EPA Method 8020 unless indicated otherwise	unless indic	cated otherw	ise	
DOWNGRADIENT	SEP	DEC	APR	JUL	OCT	JAN	APR	JUL	SEP
WELLS	1991	1991	1992	1992	1992	1993	1993	1993	1993
MW-60 (BH-86)	33	1>	3.5**	**61	31.7*	138*	17*	3*	NS
MW-64 (BH-90)	150	130	233**	115**	14	15*	ۍ ۴	* ෆ	NS
MW-66 (BH-92)	~ 1	, V	3,3**	**8	12.1*	* ო	*° ≺3	*8	NS
MW-67 (BH-93)	280	320	4.3*	103**	2.6*	* ©	7*	7*	NS
MW-71 (BH-98)	WNC	WNC	WNC	WNC	WNC	WNC	WNC	WNC	~
PUMPING & MIDPLUME WELLS	WELLS								
MW-57 (BH-83)	1600	350	150	948**	15.1*	21*	*8	<b>*</b> 9	NS
MW-58 (BH-84)p	40	06	202**	178**	190*	192*	55*	25*	NS
MW-59 (BH-85)p	540	420	40.4**	268**	98.8*	26*	10*	£	NS
MW-61A (BH-87A)p	190	10	5.0**	359**	470.1*	585*	2821*	Ę	NS
MW-62 (BH-88)p	2200	1400	257.5**	357**	212.3*	78*	33*	98*	NS
MW-65A (BH-91A)p	680	150	25.3**	413**	10.6*	<b>*</b> ო	<b>4</b>	* ~	NS
MW-68 (BH-94)p	240	1900	1865**	160**	2208.2**	376*	1890*	197*	NS
SW-1 (SUPPLY)p	, 1	- -	5 *	17.5*	15.7*	<b>*</b> 9	۲ ۲	* 6	NS
SW-2 (BACKUP)i	<1	, V	7.9*	*4	69.4*	47*	4	NS	NS
UPGRADIENT WELLS									
MW-63 (BH-89)	۰ ۱	۲ ۲	4.1**	12**	4.3*	12*	7*	4*	NS
MW-70 (BH-97)	v	- V	1.7**	۲ ۲	10.7*	* ° <	* თ	* ~	SN

p = pumping well i = idled pumping well

\* High Performance Liquid Chromatography (HPLC)

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

NS = Not Sampled WNC = Well Not Completed FP = Free Product (Condensate)

**3QTABLE2.XLS** 

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### TABLE 3 HISTORICAL SUMMARY OF BENZENE IN SHALLOW ZONE GROUNDWATER THIRD QUARTER 1993

		Benzene	(ug/L) using	EPA Metho	d 8020 unle	ss indicated	othe <b>rwise</b>	
	SEP	DEC	APR	JUL	ост	JAN	APR	JUL
WELL	1991	1991	1992	1992	1992	1993	1993	1993
MW-1 (BH-14)	250	200	NS	NS	NS	NS	NS	DRY
MW-2 (BH-23)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-3 (BH-24)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-4 (8H-26)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-5 (BH-28)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-4 (BH-29)	NS	' NS	NS	NS	NS	NS	NS	DRY
MW-7 (BH-30)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-4 (BH-31)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-9 (BH-32)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-10 (BH-33)	2300	2300	1780**	1842**	2100	NS	NS	DRY
MW-11 (BH-34)	3000	3800	3087**	2199**	2942*	2746*	FP	FP
MW-12 (BH35)	3800	NS	NS	NS	NS	NS	NS	DRY
MW-13 (BH-36)	3100	3000	3492**	2708**	NS	NS	PUMP	PUMP
MW-14 (BH-37)	5100**	NS	NS	NS	NS	NS	PUMP	PUMP
MW-15 (BH-38)	5100	NS	NS	NS	NS	NS	NS	DRY
MW-16 (BH-39)	1700	NS	NS	NS	NS	NS	514*	DRY
MW-17 (BH-40)	2000	NS	NS	NS	NS	NS	1500	DRY
MW-18 (BH-41)	4300	NS	2639**	2700	3300	NS	NS	DRY
MW-19 (BH-42)	4700	NS	3195**	3000	3032*	NS	3926*	DRY
MW-20 (BH-43)	110	NS	NS	NS	NS	NS	NS	DRY
MW-21 (BH-44)	1000	1100	NS	NS	NS	NS	114*	FP
MW-22 (BH-45)	4	NS	NS	NS	NS	NS	NS	DRY
MW-23 (BH-46)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-24 (BH-47)	3400	NS	NS	4353**	NS	NS	NS	DRY
MW-25 (BH-48)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-26 (BH-49)	3100	3000	NS	2000	1992*	1708*	861*	FP
MW-27 (BH-50)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-28 (BH-52)	2200	NS	NS	NS	NS	NS	NS	DRY
MW-29 (BH-53)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-30 (BH-54)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-31 (BH-55)	<1	NS	NS	332**	9+	NS	NS	DRY
MW-32 (BH-56)	200	NS	NS	NS NS	NS	NS	NS	DRY
MW-33 (BH-57)	6300	NS	NS	NS	NS	NS	NS	DRY
MW-33 (BH-58)	2500	NS	NS	NS	NS	NS	NS	DRY
MW-34 (BH-59)	5700	NS	NS	NS	NS	NS	NS	FP
MW-36 (BH-21)	NS	NS	NS	NS	NS	NS	NS	DRY
MW-37 (BH-60)	150	NS	NS	NS	NS	NS	NS	27*
MW-38 (BH-61)	150	15	51**	37*	166**		NS	DRY
MW-39 (BH-62)	880	NS	NS	NS	NS	NS 14	29*	24*
MW-40 (BH-63)	NS 200	NS	NS	NS	NS	NS	NS	DRY
MW-41 (BH-64)	+	170	NS	NS	NS	NS	NS	22*
MW-42 (BH-65)	<1	<1 NC	NS	NS	NS	NS	NS	NS 25.
MW-43 (BH-66)	320	NS	NS	NS	NS	NS	NS	25*
MW-44 (BH-67)	59	NS	10**	97**	12	14	7*	6*
MW-45 (BH-68)	<1	<1	NS	NS	NS	NS	NS	<3*
MW-46 (BH-69)	140	25	NS	NS	NS	NS	NS	NS
MW-47 (BH-70)	2600	2200	NS	NS	NS	NS	NS	DRY
MW-48 (BH-71)	<1	<1	NS	47**	NS	NS	NS	DRY
MW-49 (BH-72)	35	NS	NS	NS	NS	NS	NS	210*
MW-50 (BH-73)	<1	<1	4**	4**	8*	8*	<1	<3*
MW-51 (BH-74)	800	<1	NS	NS	NS	NS	NS	DRY
MW-52 (BH-75)	<1	NS	NS	5**	NS	NS	NS	DRY
MW-53 (BH-77)	<1	NS	NS	NS	NS	NS	NS	DRY
MW-54 (BH-80)	<1	<1	9**	8**	62*	14*	10*	<3*
MW-55 (BH-\$1)	940	400	296**	483**	215*	390	412*	625*
MW-56 (BH-82)	2200	1000	NS	1114**	1026*	1128*	VE	DRY
MW-61 (BH-87)	<1	NS	NS	NS	NS	NS	NS	NS
MW-65 (8H-91)	<1	NS	NS	NS	NS	NS	NS	<3*
MW-69 (BH-95)	2400	2100	NS	568*	1598*	1284*	FP	FP
SUMP A-10	FP	FP	FP	FP	FP	FP	FP	DRY
SUMP A-11	1400	2900	3033**	1258**	2815*	NS	NS	DRY
SUMP A-16	240	2000	1233**	1495**	632*	741**	707*	DRY
	<1	<1	<1	<1	<1	<1	<1	<1

Boided well numbers = Designated wells for quarterly sampling in Marathon Treatment Plan (April 1992)

DRY = Dry well

\* High Performance Liquid Chromatography (HPLC)

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

FP = Free Product (condensate) NS = Not Sampled. VE = Vapor Extraction well 1

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TABLE 4

### RANCHER WELL GROUNDWATER AND SPRING WATER SAMPLE RESULTS THIRD QUARTER 1993

								1993							
			Jul-15					Aug-3					Sep-21		
WELL/ SPRING	Benzene Toluene		Ethylbenzen Xylene Chloride Benzene Toluene Ethylbenzen Xylene Chloride Benzene Toluene Ethylbenzen Xylene Chloride	Xylene	Chloride	Benzene	Toluene E	thylbenzen	Xylene	Chloride	Benzene	Toluene E	thylbenzen	Xylene	Chioride
Lyman (#1)	QN	QN	QN	QN	15.0	QN	QN	QN	QN	13.1	QN	QN	QN	QN	12.4
Upper Indian Hills Spring West (#2) ND	QN	QN	QN	QN	12.9	QN	QN	QN	QN	11.8	QN	Q	Q	QN	11.5
Biebelle (#3)	QN	QN	QN	DN	13.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Benzene, Toluene, Ethylbenzene, and total Xylene concentration in ug/L.

Chloride concentration in mg/L.

. ND = Not Detected at method detection limit of 0.5 ug/L. NS = Not Sampled.

**3QTABLE4.XLS** 

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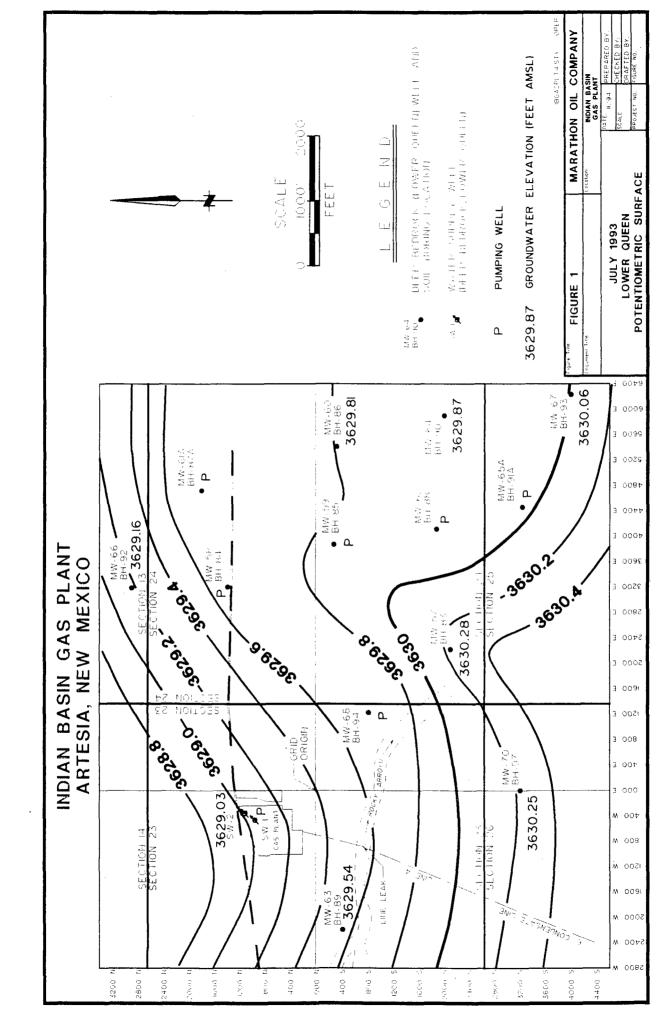
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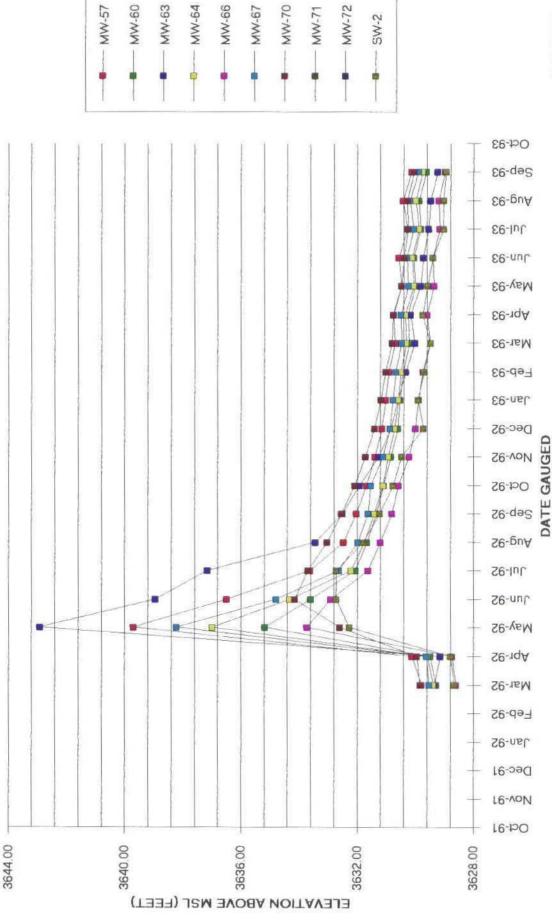
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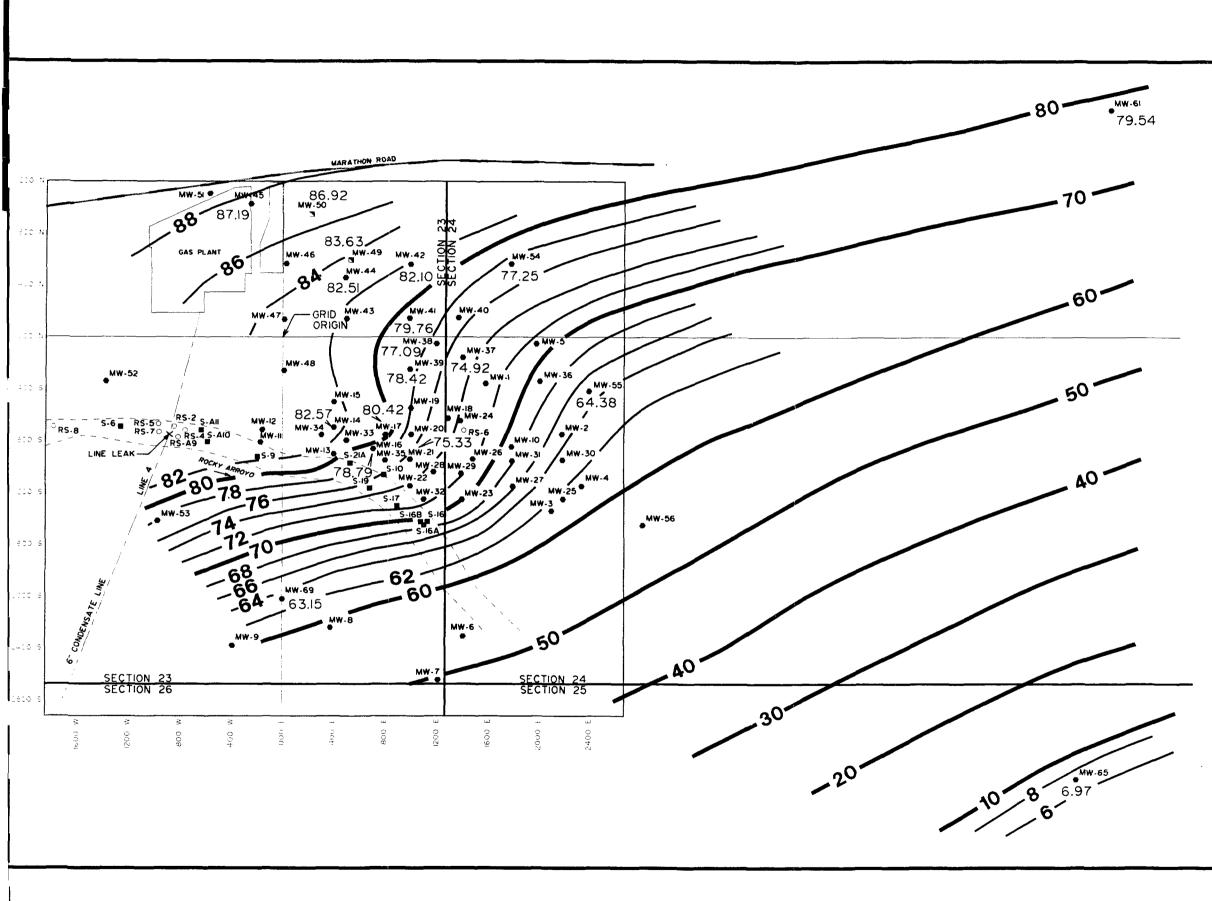
**FIGURES** 

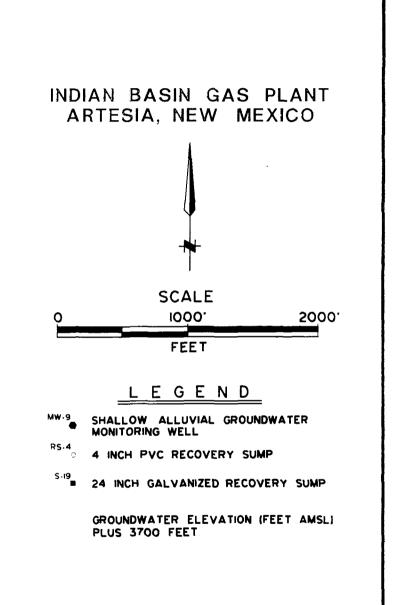


# FIGURE 2. LOWER QUEEN GROUNDWATER **ELEVATION VS. TIME**



GWTIME XLC

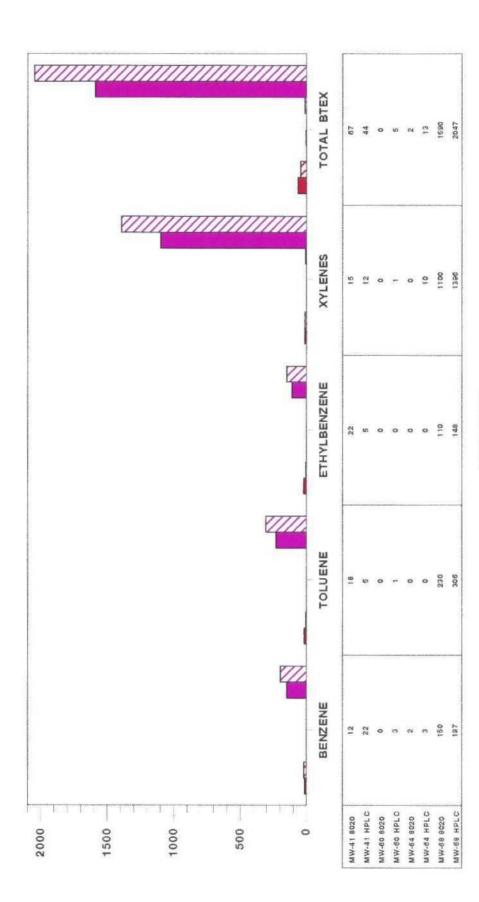




	BGASPLT5 STY OPER
Figure Title FIGURE 3	MARARTHON OIL COMPANY
Document Title	Location: INDIAN BASIN GAS PLANT
JULY 1993	DATE II/93 PREADED BY
SHALLOW ZONE POTENTIOMETRIC SUR	DRAFTED SY:

### VS MARATHON HPLC ANALYSIS COMPARISON QUARTER LABORATORY RESULTS FIGURE 4 **EPA METHOD 8020** JULY 1993, THIRD CORE LAB



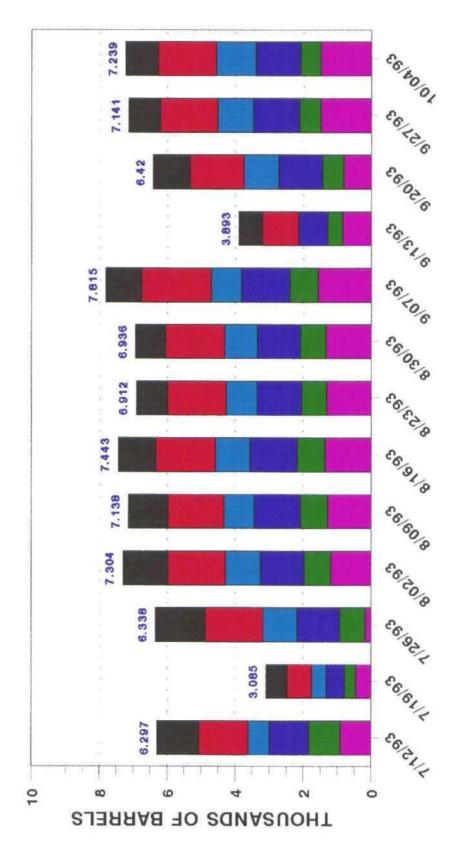


ANALYTES

### **WKLQREC3Q**

### QUEEN FLUID RECOVERY QUARTER 1993 S FIGURE THIRD **WEEKLY LOWER**



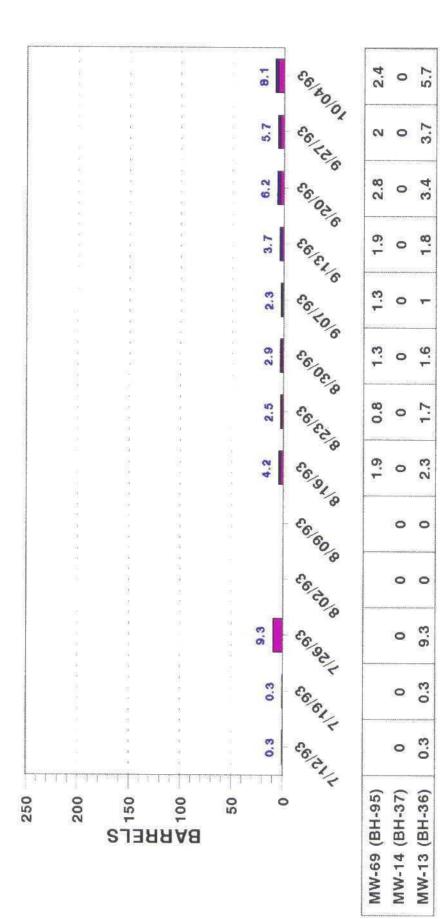


METER RECORDING DATE

**WKSHREC3Q** 

### WEEKLY SHALLOW FLUID RECOVERY **THIRD QUARTER 1993** FIGURE 6



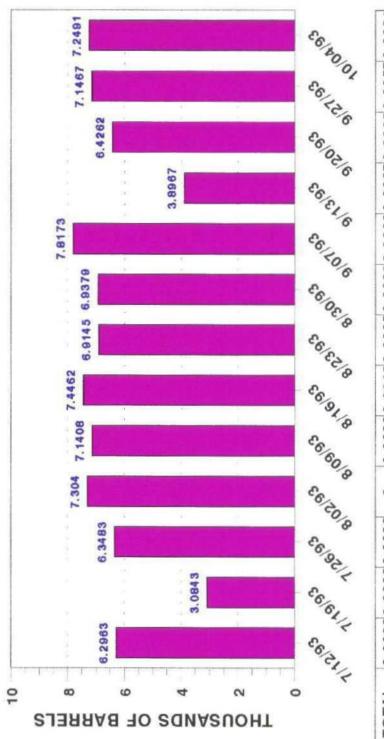


METER RECORDING DATE

WKREC30

# WEEKLY TOTAL FLUID RECOVERY **THIRD QUARTER 1993** FIGURE





METER RECORDING DATE

### APPENDIX A

### JULY 1993 GAUGING, PURGING, AND SAMPLING FIELD SUMMARY

July 21, 1993

Mr. Bob Menzie Marathon Oil Company P. O. Box 552 Midland, Texas 79702

Re: Indian Basin Remediation Project

Dear Mr. Menzie:

On Tuesday, July 12, 1993 at 7:00 a.m., Southwestern Laboratories (SwL) began the quarterly sampling project at the Indian Basin Gas Plant. This sampling project was completed on Thursday, July 15, 1993 at 1:00 p.m. During the 3 day period, 30 wells were examined and 23 wells were sampled. Of these 23 sampled wells, 9 were pumped using the Grundfos pump. The order in which they were sampled was based on the January data and discussion with you. The order is as follows:

Tuesday, July 13, 1993

Wednesday, July 14, 1993

SWL

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MW-70 MW-67 Equipment Blank No. 1 MW-64 MW-66 MW-63 MW-54 MW-60 Equipment Blank No. 2 MW-55 MW-57

On Tuesday, July 20, 1993, the samples were shipped to PTC and Core Laboratories. The samples shipped to PTC are:

MW-37	MW-54	MW-65
MW-39	MW-55	MW-65A
MW-41	MW-57	MW-66
MW-43	MW-58	MW-67
MW-44	MW-60	MW-68
MW-45	MW-62	MW-70
MW-49	MW-63	SW-1
MW-50	MW-64	Equipment Blank No. 1
		Equipment Blank No. 2

The samples shipped to Core Laboratories are:

MW-41	dup.	MW-68 dup.	Sample No. 3
MW-60	dup.	Sample No. 1	SW-1 dup.
MW-64	dup.	Sample No. 2	-

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If you have any questions, please feel free to call me at (915) 683-3340.

Sincerely, 4 LADA

Allan B. Johnston Project Manager Southwestern Laboratories - Midland EAS

ABJ/jjc

SOUTHWESTERN LABORATORIES, INC.

### FIELD LOG

### SHALLOW WELLS

## Indian Basin Gas Plant

### Artesia, N.M.

Total Depth         Level         Column           FTC (ft.)         FTC (ft.)         (ft.)           19.47         19.33         0.14           19.47         19.33         0.14           19.47         19.33         0.14           19.47         19.33         0.14           19.47         19.33         0.14           19.55         19.13         0.62           20.29         19.91         0.38           20.54         17.78         2.76           20.54         17.78         2.76           20.54         17.78         2.76           20.54         19.28         4.76           24.04         19.28         3.61           25.24         21.63         3.61           26.62         21.33         3.23           21.79         21.33         3.93           25.91         21.33         3.93           26.43         10.72         10.72           78.15         26.43         10.72           78.15         26.43         10.72           78.15         26.43         10.72           78.15         26.43         10.72	Wall	Banortad	Water	Mator	Cample	Eron	Duran	Tomocrature		Cardinate in	
Intermediation         Volume         PH         Arrhos/cm @ 25° C           07/15/93         N         0/91         (gal)         •F         Arrhos/cm @ 25° C           07/15/93         N         0.08              07/15/93         N         0.74              07/15/93         N         0.74              07/15/93         N         0.74              07/15/93         N         0.74              07/15/93         N         5.40         7.45             07/15/93         N         5.40         7.45             07/15/93         N         5.70         7.69         2498           07/15/93         N         5.724         2529            07/15/93         N         7.00         7.16         3205           07/15/93         N         7.00         7.16         3205           07/15/93         N         2.32		Total Death			Calible				:	Conductivity	
Date         (YN)         (gal)         °F         rumbosch (0 25° C           07/15/93         N         0.08             07/15/93         N         0.08             07/15/93         N         0.36             07/15/93         N         0.74             07/15/93         N         0.74             07/15/93         N         0.74             07/15/93         N         0.74             07/15/93         N         5.40         74.5            07/15/93         N         5.40         74.5            07/15/93         N         5.40         7.45         259           07/15/93         N         5.30         2570         259           07/15/93         N         5.30         255         259           07/15/93         N         5.30         255         259           07/15/93         N         5.30         255         256           07/15/93         N         0.25	1		revei	Column		Product	Volume		Hd		Remarks
07/15/93         N         0.08          L           0.7/15/93         N         0.08             0.7/15/93         N         0.36             0.7/15/93         N         0.74             0.7/15/93         N         1.40             0.7/15/93         N         5.40         74.5            0.7/15/93         N         5.40         74.5            0.7/15/93         N         5.40         74.5            0.7/15/93         N         5.40         74.5            0.7/15/93         N         5.30         7.24         2529           0.7/15/93         N         7.07         70.0         7.16         3205           0.7/15/93         N         7.07         70.0         7.16         3205           0.7/15/93         N         0.22              0.7/15/93         N         2.32         5570            0.7/15/93         N         2.32         5765	I.D.	FTC (ft.)	FTC (ft.)	(ft.)	Date	(N/X)	(gal.)	÷		umhos/cm @ 25° C	
N         0.08             07/15/93         N         0.36             07/15/93         N         0.36             07/15/93         N         0.74             07/15/93         N         1.40             07/15/93         N         5.40         74.5            07/15/93         N         5.40         74.5            07/15/93         N         5.40         74.5            07/15/93         N         5.40         74.5         2498           07/15/93         N         5.30         7.24         2529           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         7.24         2529            07/15/93         N         7.28         5570            07/15/93         N         2.23             07/15/93         N         2.24         2555            07/15/93         N					07/15/93						
07/15/93         N         0.36             07/14/93         N         0.74             07/14/93         N         0.74             07/14/93         N         1.40             07/15/93         N         5.40         74.5            8           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         2.32         5.70         5.70         5.70           07/15/93         N         2.32         5.74         2.5570         5.70           07/15/93         N         2.32         5.75	MW-15	19.47	19.33	0.14		z	0.08				Note (1)
07/15/93         N         0.74              07/14/93         N         1.40              07/14/93         N         1.40              07/15/93         N         5.40         74.5             07/15/93         N         5.40         74.5             07/15/93         N         6.31         69.5         7.24         2529           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         7.05         7.16         3205           07/15/93         N         7.05         7.16         3205           07/15/93         N         2.32          6.79         5570           07/15/93         N         2.32          6.74         3205           07/15/93         N         2.32          6.74         3563           07/15/93         N         6.32	MW-17	19.75	19.13	0.62	07/15/93	z	0.36	1			Note (1)
N         0.74              07/14/93         N         1.40              07/15/93         N         5.40         74.5             07/15/93         N         9.32         69.5         7.69         2498           07/15/93         N         6.31         69.5         7.69         2498           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         0.25          6.74         3570           07/15/93         N         0.25          6.74         3963           07/15/93         N         6.32          6.74         3963           07/15/93         N         6.32          6.74         3963           07/15/93         N					07/15/93						(1) 2004
07/14/93         N         1.40              10.22         N         5.40         74.5             10.15/93         N         5.40         74.5             07/15/93         N         9.32         69.5         7.69         2498           07/15/93         N         6.31         69.5         7.24         2529           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         3.03          7.16         3205           07/15/93         N         0.25          6.84         4761           07/15/93         N         0.25          6.79         5765           07/15/93         N         6.32          6.79         5765           07/15/93         N         6.32          6.79         5765           07/15/93         N         6.32          6.79         5765           07/15/93         N	MW-33	20.29	19.91	0.38		z	0.74				Note (1)
10:22         N         1:40             07/15/93         N         5.40         74.5            07/15/93         N         5.40         74.5            07/15/93         N         9.32         69.5         7.69         2498           07/15/93         N         6.31         69.5         7.24         2529           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         3.03          7.15         5570           07/15/93         N         0.25          7.16         3205           07/15/93         N         0.25          7.15         5570           07/15/93         N         0.25          2.15         570           07/15/93         N         2.32          6.84         <					07/14/93						Sampled by R.M. Gray
07/15/93         N         5.40         74.5            10:40         N         9.32         69.5         7.69         2498           07/15/93         N         9.32         69.5         7.69         2498           07/15/93         N         6.31         69.5         7.24         2529           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         3.03          7.15         3205           07/15/93         N         3.03          7.15         3205           07/15/93         N         3.03          7.15         5570           07/15/93         N         0.25          7.15         5570           07/15/93         N         0.25          6.84         4761           07/15/93         N         2.32          6.84         4761           07/15/93         N         2.32          6.84         4761           07/15/93         N         6.32          6.84         4761           07/15/93         N         6.32	MW-37	20.83	20.11	0.72	10:22	z	1.40		1		Note (2)
10:40         N         5.40         7.45             07/15/93         N         9.32         69.5         7.69         2498           07/15/93         N         6.31         69.5         7.24         2529           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         3.03          7.15         5570           07/15/93         N         0.232          7.15         5570           07/15/93         N         0.232          7.15         5570           07/15/93         N         2.32             07/15/93         N         2.32         5570           07/15/93         N         2.32             07/15/93         N         6.32             07/15/93         N         6.32          6.74         396.3			0 F T	C T C	07/15/93						
07/15/93         N         9.32         69.5         7.69         2498           10:50         N         6.31         69.5         7.24         2529           11:10         N         7.07         7.00         7.16         3205           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         3.03          7.15         5570           07/15/93         N         3.03          7.15         5570           07/15/93         N         0.25          7.15         5570           07/15/93         N         0.25          7.15         5570           07/15/93         N         2.32          7.15         5570           07/15/93         N         2.32          6.84         4761           07/15/93         N         2.32          6.84         4761           07/15/93         N         2.32          6.84         4761           07/15/93         N         <	- 73G	2U.54	11.78	2./6	10:40	z	5.40	74.5		-	Note (2)
10:50         N         9.32         69.5         7.69         2498           07/15/93         N         6.31         69.5         7.24         2529           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         3.03          7.15         5570           07/15/93         N         3.03          7.15         5570           07/15/93         N         3.03          7.15         5570           07/15/93         N         0.25          7.15         5570           07/15/93         N         2.32          7.15         5570           07/15/93         N         2.32              07/15/93         N         2.32          6.79         5765           10:00         N         6.32          6.79         5765           07/14/93         N         6.32          6.74         3963           07/14/93         N					07/15/93	:					Sample dup.
07/15/93         N         6.31         69.5         7.24         2529           11:10         N         7.07         70.0         7.16         3205           07/15/93         N         7.07         70.0         7.16         3205           07/15/93         N         3.03          7.15         5570           07/15/93         N         3.03          7.15         5570           07/15/93         N         0.25          7.15         5570           07/15/93         N         0.25          6.84         4761           07/15/93         N         2.32          6.79         5765           07/15/93         N         2.32          6.79         5765           07/15/93         N         6.32          6.79         5765           07/15/93         N         6.32          6.79         5765           07/15/93         N         6.32          6.79         5765           07/14/93         N         71.09         7.06         5766            07/14/93         N	MW-41	24.04	19.28	4.76	10:50	z	9.32	69.5	7.69	2498	Taken
11.10         N $6.31$ $69.5$ $7.24$ $2529$ $07/15/93$ N $7.07$ $70.0$ $7.16$ $3205$ $07/15/93$ N $3.03$ $$ $7.15$ $5570$ $07/15/93$ N $3.03$ $$ $7.15$ $5570$ $07/15/93$ N $0.25$ $$ $7.15$ $5570$ $07/15/93$ N $0.25$ $$ $7.15$ $5570$ $07/15/93$ N $0.25$ $$ $6.84$ $4761$ $07/15/93$ N $2.32$ $$ $6.74$ $3963$ $07/14/93$ N $6.32$ $$ $6.74$ $3963$ $07/14/93$ N $6.177$ $70.0$ $6.74$ $3963$ $07/15/93$ N $71.09$ $73.0$ $7.06$ $2816$ $07/14/93$ N $71.09$ $73.0$ $7.06$ $2816$ $07/15/93$ N $2.64$ $$	C F JVIVY	0.4 EE	00 10		07/15/93	2	Ċ	L C	c r		
07/15/93         N         7.07         70.0         7.16         3205           03:05         N         7.07         70.0         7.16         3205           07/15/93         N         3.03          7.15         5570           07/15/93         N         0.25          7.15         5570           07/15/93         N         0.25          7.15         5570           07/15/93         N         0.25          6.84         4761           07/15/93         N         2.32          6.79         5765           07/15/93         N         6.32          6.79         5765           07/14/93         N         6.32          6.79         5765           07/14/93         N         6.1.77         70.0         6.74         3963           07/14/93         N         71.09         73.0         7.06         2816           07/14/93         N         2.64	MIV -43	CC.42	21.33	3.22	01:11	z	6.31	69.5	7.24	2529	
03:05         N         7.07         7.07         7.16         3205           07/15/93         N         3.03          7.15         5570           07/15/93         N         3.03          7.15         5570           07/15/93         N         0.25          7.15         5570           07/15/93         N         0.25          7.15         5570           07/15/93         N         2.32          6.84         4761           07/15/93         N         2.32          6.79         5765           07/14/93         N         6.32          6.79         5765           07/14/93         N         6.1.77         70.0         6.74         3963           07/14/93         N         71.09         73.0         7.06         2816           07/15/93         N         2.64		1			07/15/93						
07/15/93         N         3.03          7.15         5570           10:08         N         3.03          7.15         5570           07/15/93         N         0.25          6.84         4761           07/15/93         N         2.32          6.84         4761           07/15/93         N         2.32          6.84         4761           07/15/93         N         2.32          6.79         5765           07/15/93         N         6.32          6.79         5765           07/14/93         N         6.1.77         70.0         6.74         3963           07/14/93         N         71.09         73.0         7.06         2816           07/14/93         N         2.64	MW-44	25.24	21.63	3.61	09:05	z	7.07	70.0	7.16	3205	
10:08         N         3.03          7.15         5570           07/15/93         N         0.25          6.84         4761           07/15/93         N         2.32          6.84         4761           07/15/93         N         2.32          6.84         4761           07/15/93         N         2.32          6.84         3963           07/15/93         N         6.32          6.79         5765           10:00         N         6.32          6.79         5765           07/14/93         N         6.1.77         70.0         6.74         3963           07/14/93         N         71.09         73.0         7.06         2816           07/15/93         N         2.64					07/15/93						
07/15/93         N         0.25          6.84         4761            07/15/93         N         2.32          6.84         4761           07/15/93         N         2.32          6.84         4761           07/15/93         N         2.32          6.84         4761           07/14/93         N         6.32          6.74         3963           1         003.35         N         61.77         70.0         6.74         3963           0         07/14/93         N         71.09         73.0         7.06         2816           0         13:30         N         2.64	MW-45	26.62	21.49	5.13	10:08	z	3.03	-	7.15	5570	Note (1)
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$					07/15/93						
07/15/93       N       2.32        6.84       4761         09:28       N       2.32        6.84       4761         07/15/93       N       6.32        6.79       5765         10:00       N       6.32        6.79       5765         10:00       N       6.17       70.0       6.74       3963         007/14/93       N       71.09       73.0       7.06       2816         013:30       N       2.64	MW-47	21.79	21.37	0.42	1	z	0.25	3 8 6 1		•	Note (1)
09:28         N         2.32          6.84         4761           07/15/93         07/15/93         N         6.32          6.79         5765           10:00         N         6.32          6.74         3963           10:01         N         61.77         70.0         6.74         3963           07/14/93         N         71.09         73.0         7.06         2816           07/15/93         N         2.64					07/15/93						
07/15/93         N         6.32          6.79         5765           10:00         N         6.32          6.79         5765           07/14/93         N         61.77         70.0         6.74         3963           07/14/93         N         71.09         73.0         7.06         2816           07/15/93         N         2.64	MW-49	25.91	21.98	3.93	09:28	z	2.32		6.84	4761	
2         10:00         N         6.32          6.79         5765           07/14/93         N         61.77         70.0         6.74         3963           07/14/93         N         61.77         70.0         6.74         3963           07/14/93         N         71.09         73.0         7.06         2816           07/15/93         N         2.64					07/15/93						
07/14/93         N         61.77         70.0         6.74         3963           08:35         N         61.77         70.0         6.74         3963           07/14/93         N         71.09         73.0         7.06         2816           07/15/93         N         2.64	MW-50	37.15	26.43	10.72	10:00	z	6.32	1	6.79	5765	
Image: Normal Signature         Image: Normal		1			07/14/93						
07/14/93         N         71.09         73.0         7.06         2816           13:30         N         71.09         73.0         7.06         2816           11:02         N         2.64	MW-54	78.15	46.61	31.54	08:35	z	61.77	70.0	6.74	3963	
0         13:30         N         71.09         73.0         7.06         2816           07/15/93         N         2.64		1			07/14/93						
07/15/93 N 2.64	MW-55	66.32	30.02	36.30	13:30	z	71.09	73.0	7.06	2816	
	MW-65	57.69	56.34	1.35	07/15/93	Z	2.64	3 1 1 1 1	1 5 6 8	4	Sampled by R.M. Gray Note (1)
	Note (1). Well wee heiled drif	These are as									110000

Note (2): Well was bailed dry. Insufficient recovery to collect sample for pH and conductivity.

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SOUTHWESTERN LABORATORIES, INC.

FIELD LOG

## **QUEENS WELLS**

# Indian Basin Gas Plant

### Artesia, N.M.

Well	Reported	Water	Water	Sample	Free	Purge	Temperature		Conductivity	
	Total Depth	Level	Column		Product	Volume		Нq		Remarks
I.D.	FTC (ft.)	FTC (ft.)	(ft.)	Date	(N/X)	(gal.)	5		µmhos/cm @ 25° C	
MW-57	177.20	157.42	19.78	07/14/93 15:45	z	38.74	73.0	7.23	881	
				07/13/93		Pump				Sampled by
MW-58	218.03			60:60	Z	Present	1	7.01	1200	R.M. Gray
	1					Pump				No Sample
MW-59	211.29			1	٢	Present		3 5 1 1		Taken
				07/14/93						Sample dup.
MW-60	223.00	185.47	37.53	10:50	z	73.50	73.0	7.25	1071	Taken
						Pump				No Sample
MW-61A	215.67				۲	Present		** ** ** <b>**</b>	8	Taken
				07/14/93		Pump				Sampled by
MW-62	224.69	* = = =	1 1 1 1	15:25	z	Present	3	6.57	824	R.M. Gray
MW-63	220.49	196.62	23.87	07/13/93 17:45	z	46.75	71.5	7.26	580	
				07/13/93					Anna - Angeler Angeler Anna - Angeler Angeler Angeler Angeler Angeler Angeler Angeler Angeler Angeler Angeler A	Sample dup.
MW-64	201.89	168.70	33.19	13:05	z	65.00	71.0	7.24	1028	Taken
				07/13/93		Pump				Sampled by
MW-65A	168.56			12:35	z	Present	1	7.23	935	R.M. Gray
				07/13/93						
MW-66	235.18	199.82	35.36	15:50	Z	69.25	71.5	7.05	1092	
				07/13/93						
MW-67	165.77	135.81	29.96	11:30	z	58.67	72.0	7.17	815	
				07/13/93		Pump				Sample dup taken
MW-68	203.43	<b>I I I I I I I I I I</b>		14:50	Sheen	Present		7.19	755	Sampled by R M Gray
				07/13/93						
MW-70	225.07	192.32	32.75	08:39	z	64.14	70.5	7.27	620	
				07/15/93		Pump				Sample dup taken
SW-1 Plant Well	255.00			07:42	z	Present		7.14	2294	Sampled by R M Gray
CM 2 Backing Mall		32 02 1			X					No Sample
	236.00	1/3/10	112.24		2		1			Такел

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**SWL** 

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CLIENT: Marathon Oil Company LOCATION: Indian Basin Gas Plant

<u>NOTES</u>:

MW-39 - Bailed dry after approximately 3 gals.
MW-41 - Bailed dry after approximately 5 gals.
MW-43 - Bailed dry after approximately 3.5 gals.
MW-65 - Bailed dry after approximately 1 gal.

### APPENDIX B

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### JULY 1993 LABORATORY REPORTS

Indian Basin BTEX Analysis Results by HPLC (7/93)

Sample	(ppb) Benzene	(ppb) Toluene	(ppb) o-Xylene	(ppb) Ethylbenzene	(ppb) m.p-Xylene	(ppb) Total Xylenes	(ppb) Total BTEX	(mg/L) Chloride
BH-60/MW-37	27	2	QN	QN	Q	QN	34	173
BH-62/MW-39	24	ы	QN	QN	QN	QN	27	296
BH-64/MW-41	22	5	QN	S	11	11	43	310
BH-66/MW-43	25	17	QN	QN	ო	e	45	232
BH-67/MW-44	9	16	11	QN	7	18	40	445
BH-68/MW-45	QN	9	QN	7	4	4	17	434
BH-72/MW-49	210	27	4	42	26	30	309	399
BH-73/MW-50	QN	12	4	10	QN	4	26	347
BH-80/MW-54	QN	QN	ო	QN	QN	ო	ო	146
BH-81/MW-55	625	21	QN	8	50	50	704	312
BH-83/MW-57	9	89	QN	QN	QN	QN	14	72
BH-84/MW-58	25	42	9	14	7	13	94	133
BH-86/MW-60	e	QN	QN	QN	QN	QN	ო	10
BH-88/MW-62	96	12	5	70	199	204	384	459
BH-89/MW-63	4	QN	QN	QN	QN	QN	4	ო
BH-90/MW-64	С	QN	6	QN	QN	ი	12	15
BH-91/MW-65	QN	9	ო	QN	QN	ო	თ	4
BH-91A/MW-65A	QN	e	QN	QN	QN	QN	ო	19
BH-92/MW-66	8	4	QN	QN	QN	QN	12	15
BH-93/MW-67	7	QN	QN	QN	QN	QN	7	9
BH-94/MW-68	197	306	141	148	1255	1396	2047	30
07-WM/70-HB	QN	11	QN	ы	QN	QN	14	æ
Equip. Blank No.1	17	8	QN	16	4	4	45	NS
Equip. Blank No.2	QN	QN	QN	9	ო	ო	ັ ດ	NS
SW-1	6	12	QN	QN	QN	QN	21	NS
* Notes:	R.M.G. is R.M.	. Gray		ND=No detectic	n, minimum d	ND=No detection, minimum detection limit = 3 ppb.	3 ppb.	
	B.R. Is B. Ruhr	Imann		NS=No sampie available	available.		:	

Page 1 of 1

SWL is Southwestern Laboratories

A.J. is otherwise unidentified

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### SOUTHWESTERN LABORATORIES

1703 West Industrial Avenue \* P.O. Box 2150, Midland, Texas 79702 \* 915/683-3349

Client No. 6546001

Report No. M3-09-025

Report Date 09/07/93 12:38

Client Marathon Oil Company P.O. Box 552 Midland, Tx. 79702

Attn: Bob Menzie

Project Indian Basin Gas Plant

Date Sampled 09/01/93

Sample Type <u>Water</u>\_\_\_\_\_

P.O. # \_\_\_\_\_

Lab No. M3-09-025-01 M3-09-025-02

Sampled By SwL Field Services

Transported by <u>SwL Field Services</u>

Date Received 09/02/93

Sample Identification Equipment Blank MW-71

SOUTHWESTERN LABORATORIES

ALLAN B. JOHNSTON

Order # M3-09-025 09/07/93 15:00

Client: Marathon Oil Company

TEST RESULTS BY SAMPLE

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Sample: 02A MW-71

Collected: 09/01/93 14:21

				Detectio	<u>n Date</u>	
<u>Test Name</u>	Method	<u>Result</u>	<u>Units</u>	<u>Limit</u>	Started	<u>Analyst</u>
CHLORIDE	SM 4500-CL,B	9	mg/L		09/02/93	MJJ

THMESTERN LABORATORIES								~ -
	M3-09-025							Page 3
	3 12:38		1	ST RESULTS	BY SAMPLE			
Client:	Marathon Oil	Company						
Sample Description: E	quipmont Rlank	,	Lab No:	014				
Test Description: B			Method:		Test fr	de: BTEX_	u	
Collected: 0			He thou.		Test of		-	
	9/01/93							
Date Started	09/02/93	Analyst		LWD				
Detection Limit		Units		mg/L				
Method	EPA 602							
	<u> </u>							
Compound		<u>Results</u>						
BENZENE		< 0.004						
TOLUENE		< 0.004						
ETHYLBENZENE		< 0.004						
XYLENE		< 0.004						
Sample Description: M	w-71		Lab No:	02 <b>A</b>				
Test Description: B	TEX - WATER SA	MPLE	Method:	EPA 602	Test Co	de: BTEX_	<u>w</u>	
Collected: 0	9/01/93 14:21							
Date Started	09/02/93	Analyst		LWD				
Detection Limit	0.004	Units		mg/L				
Method	EPA 602							
Compound		<u>Results</u>						
DENZENE								
BENZENE		< 0.004						
TOLUENE		< 0.004						
		< 0.004						
ETHYLBENZENE								
ETHYLBENZENE XYLENE		< 0.004						

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ot /	ecord		LAB I.D. NO.							COC Seal No.		÷	Laboratory No.	
Page /	Chain of Custody F	Sample Date 09/01/93								Date: COC Time:	Date: Time:	Date:     9/2/93     Intact:       Time:     08:00		
	- Analysis Request and Chain of Custody Record	n ties in Cas Rond	ANALYSIS REQUESTED	BTEX	BTEX, C/O					Received by: (Signature)	Received by: (Signature)	Received by Laboratory (Signature)	Data Results To: 1. Dod Menzie	~
	ORATORIES «. metallurgical and analytical services exas 79702 • 915/683-3349	sibul predme	Type (Liquid Preser- Sludge, Etc.) vative	HZO	Hz O					Date: Time:	/ Date: / Time:	Date: 09/02/93		Ι.
	<b>BOUTHWESTERN LABORATORIES</b> Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services 1703 West. Industrial • P.O. Box 2150, Midland, Texas 79702 • 915/683-3349	Client/Project	୍ରତ୍	2.09:01 Vials	3 40 mL	•				Relinquished by: (Signature)	Relinquished by: (Signature)	(Signature) M Kalus	REMARKS:	
	Swy Materials, envronment 1703 West. Indust	Project no.	Sample No / Identification	Equipment Blank	MW-71, 14:2						KII Kuhnann	Sw L	Results by Res	Yes No

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	LABORAT	ORY ESTS 08/17/93	RESULTS			
DB NUMBER: 931392 CUSTOMER:	MARATHON OIL	COMPANY	ATTN:	BOB MENZIE		
IENT I.D TE SAMPLED 07/15/93 ME SAMPLED 10:50 DRK DESCRIPTION: MW-41			DATE RECE	Y I.D: 931392-0001 IVED: 07/21/93 IVED: 10:25		
ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHI
aloride (Unfilt.)	242	3	mg/L	325.2 (1)	07/28/93	DME
20 - AROMATIC VOLATILE ORGANICS		*10		8020 (2)	08/02/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	12 ND 22 ND 112	5555	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
	:					
			Au	703 East Bethany Drive rora, CO 80014 03) 751-1780	;	
		PAGE:1		n - 15 - 17 - 17 - 17 - 17 - 17 - 17 - 17		

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### CORE LABORATORIES

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1	LABORAT	ORY TESTS 08/17/93	RESULTS			
IOB NUMBER: 931392 CUSTOMER	: MARATHON OIL	COMPANY	ATTN:	BOB MENZIE		
CLIENT I.C: DATE SAMPLED: 07/14/93 TIME SAMPLED: 10:50 WORK DESCRIPTION: MW-60			DATE RECE	Y I.D: 931392-0002 IVED: 07/21/93 IVED: 10:25 :		
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
	10.7	0.5	mg/L	325.2 (1)	08/02/93	DME
3020 - AROMATIC VOLATILE ORGANICS		*1		3020 (2)	07/26/93	CLT
Senzene Toluene Ethyl Benzene Xylenes →-Bromofluorobenzene (surrogate)	ND ND ND ND 107	0.5	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
1			-			
	4					
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			Au	703 East Bethany Driv rora, CO 80014 03) 751-1780	/e	

The analyses, opinions or interpretations contained in this report are based upon observations and material subored by the client for whose exclusive and contident a lise this report has been made. The interpretations or opinions expressed reprecent the best judgment of Core Laboratories. Core Laboratories, however, assumes no responsibility and makes no warranty or representations, express or implied, as to the productivity, proper operations, or prolifableness of any oil, gas, coal or timer mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced except in its entirety, whou't the written approval of Core Laboratories.



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	LABORAT	ORY TESTS 08/17/93	RESULTS			
JOB NUMBER: 931392 CUSTOMER:	MARATHON CIL (	COMPANY	ATTN:	BOB MENZIE		
I CLIENT I.D: 07/13/93 DATE SAMPLED: 07/13/93 TIME SAMPLED: 13:05 WORK DESCRIPTION: MW-64			DATE RECE	Y I.D: 931392-0003 IVED: 07/21/93 IVED: 10:25	·	
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Chloride (Unfilt.)	12.0	0.5	mg/L .	325.2 (1)	08/02/93	DME
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	07/26/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	2 ND ND ND 106	0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
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	2 					
		• •	•			
			Au	703 East Bethany Driv rora, CC 80014 03) 751-1780	e	

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### LABORATORY τεςτς RESULTS 08/17/93 JOB NUMBER: 931392 CUSTOMER: MARATHON OIL COMPANY ATTN: BOB MENZIE CLIENT I.D..... LABORATORY I.D...: 931392-0004 DATE SAMPLED..... 07/13/93 DATE RECEIVED....: 07/21/93 TIME SAMPLED..... 14:50 TIME RECEIVED....: 10:25 WORK DESCRIPTION ...: MW-68 REMARKS..... TEST DESCRIPTION FINAL RESULT LIMITS/\*DILUTION UNITS OF MEASURE TEST METHOD DATE TECHN 07/28/93 Chloride (Unfilt.) 28 1 325.2 (1) DME mg/L 8020 - AROMATIC VOLATILE ORGANICS \*50 08/02/93 8020 (2) CLT Benzene 150 25 ug/L Toluene 230 25 ug/L 25 Ethyl Benzene 110 ug/L 25 Xylenes 1100 ug/L 4-Bromofluorobenzene (surrogate) 113 0 Limits (85-115) % Recovery 10703 East Bethany Drive Aurora, CO 80014 (303) 751-1780 PAGE:4

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·		0 RY TESTS 08/17/93	RESULTS			
JOB NUMBER: 931392 CUSTOMER:	MARATHON OIL CO	MPANY	ATTN:	BOB MENZIE		
CLIENT I.D: DATE SAMPLED: 07/15/93 TIME SAMPLED: 08:50 WORK DESCRIPTION: SAMPLE NO. 2	· .		DATE RECEI	/ I.D: 931392-0005 VED: 07/21/93 VED: 10:25		
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Chloride (Unfilt.)	12.9	0.5	mg/L	325.2 (1)	08/02/93	DME
3020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	07/26/93	CLT
Senzene Toluene Ethyl Benzene Xylenes →-Bromofluorøbenzene (surrogate)	ND ND ND 106	0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
			Aur	703 East Bethany Drive Tora, CO 80014 13) 751-1780	2	
1	5	PAGE:5		<u></u>		

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### APPENDIX C

### BENZENE CONCENTRATION VS TIME GRAPHS

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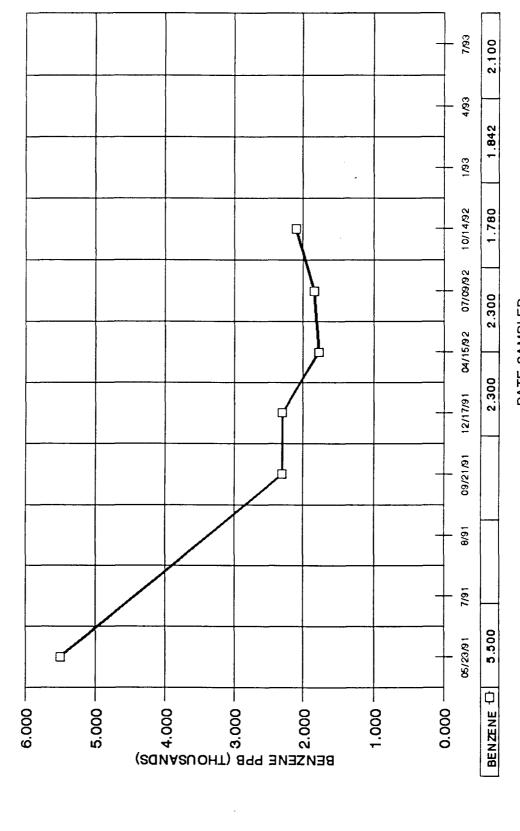
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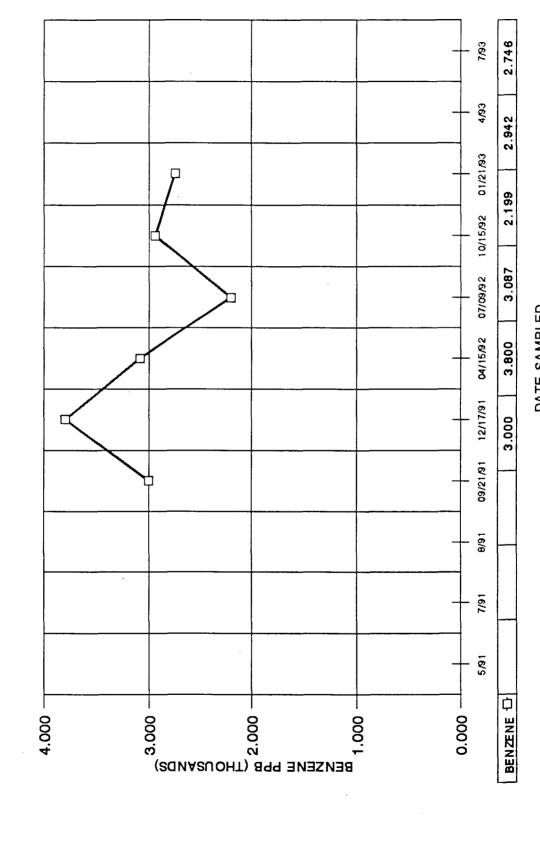
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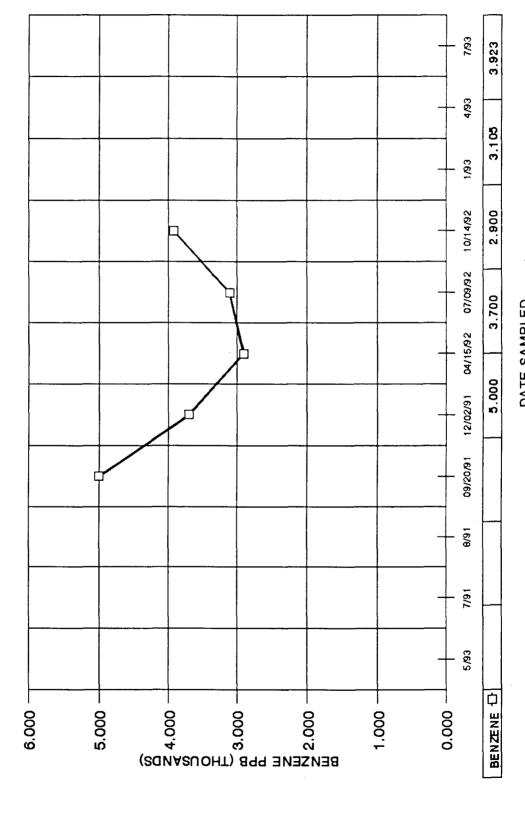
GROUNDWATER ANALYSIS DATA MW#10 BH-33



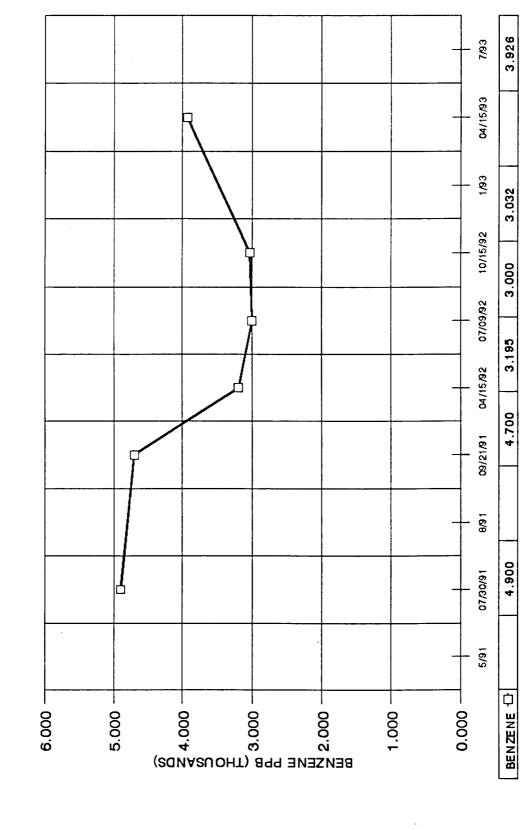
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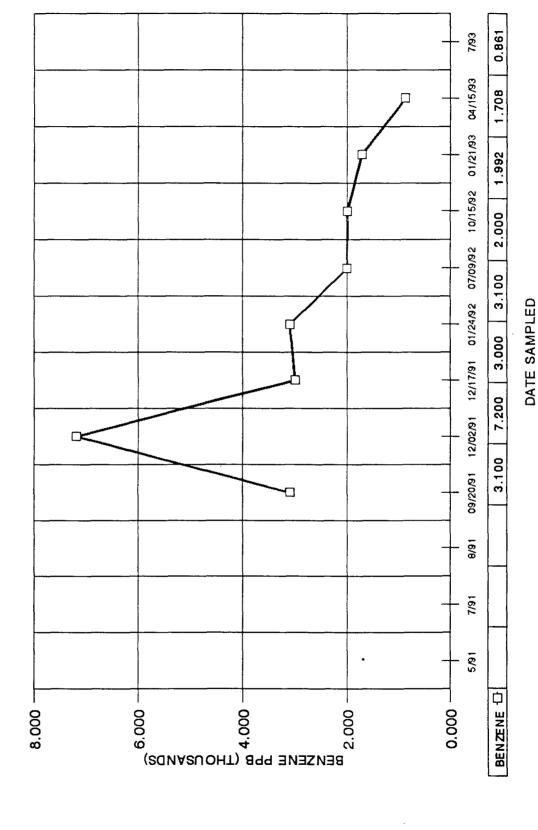
GROUNDWATER ANALYSIS DATA MW#18 BH-41



GROUNDWATER ANALYSIS DATA MW#19 BH-42

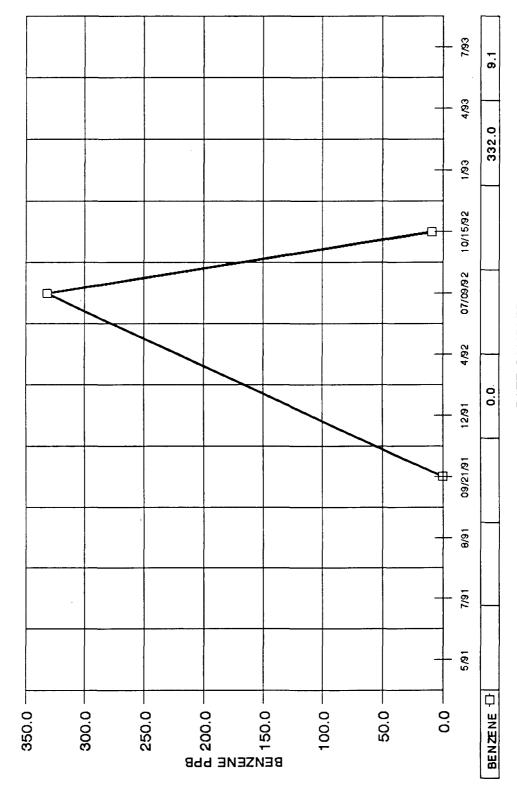


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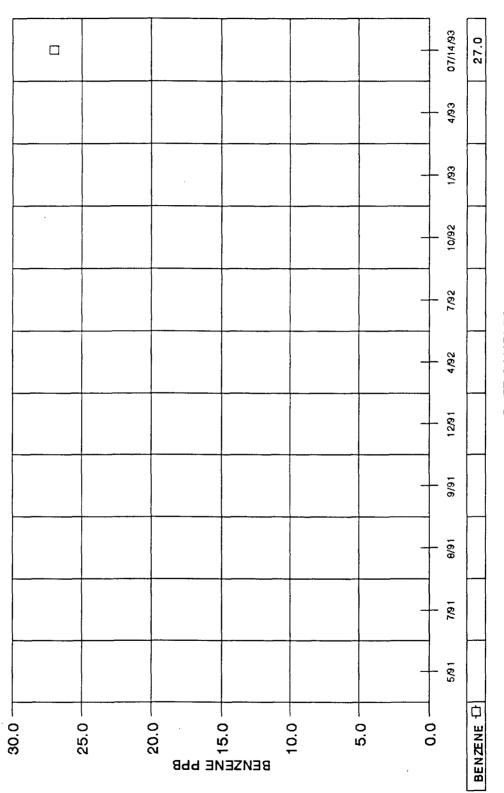
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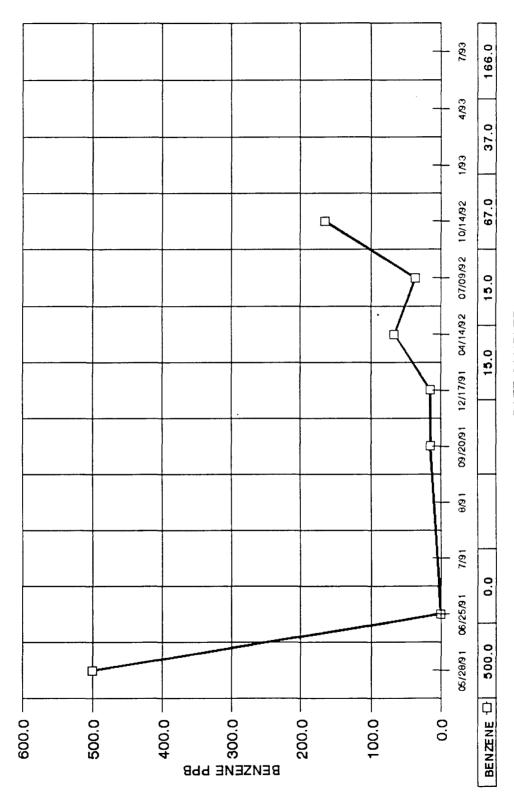
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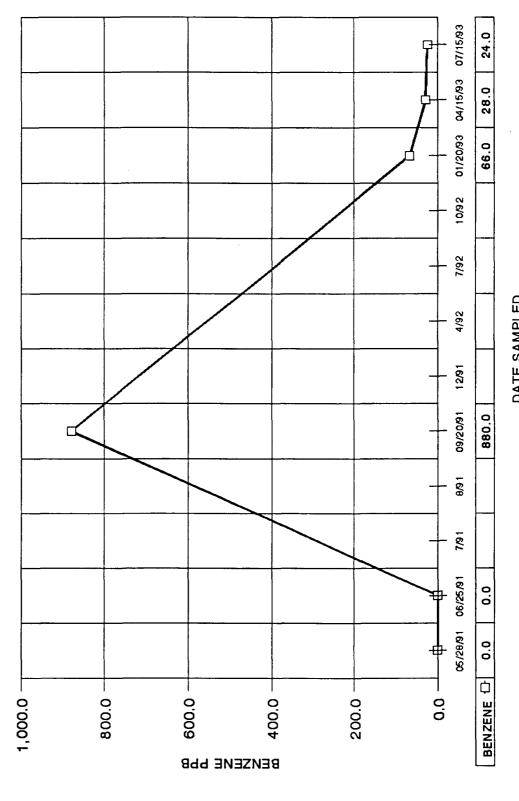
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DATE SAMPLED

SAMPLEU

GROUNDWATER ANALYSIS DATA MW#39 BH-62



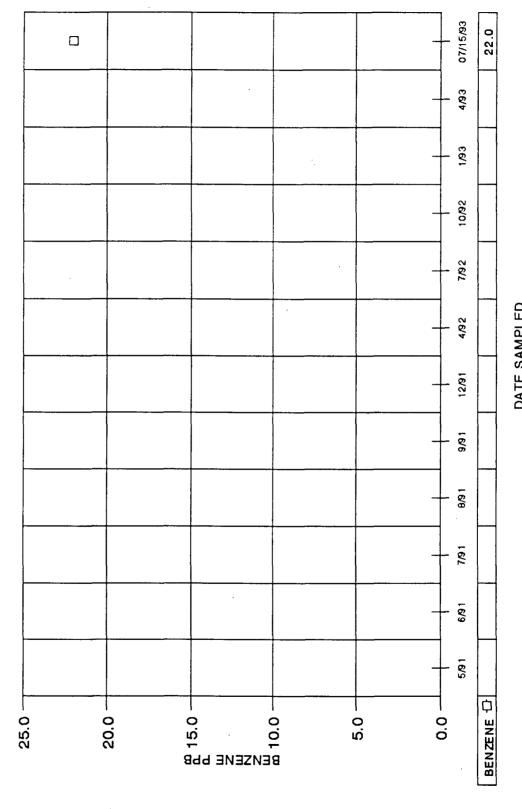
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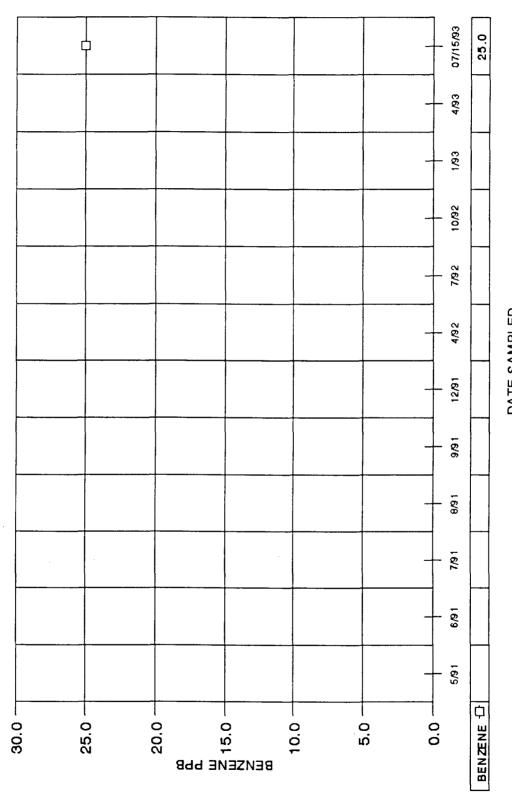
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GROUNDWATER ANALYSIS DATA MW#41 BH-64



GROUNDWATER ANALYSIS DATA MW#43 BH-66



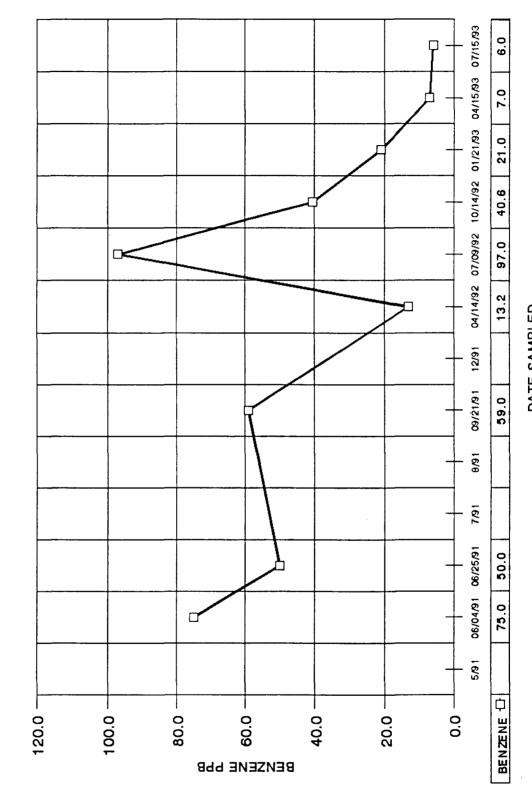
DATE SAMPLED

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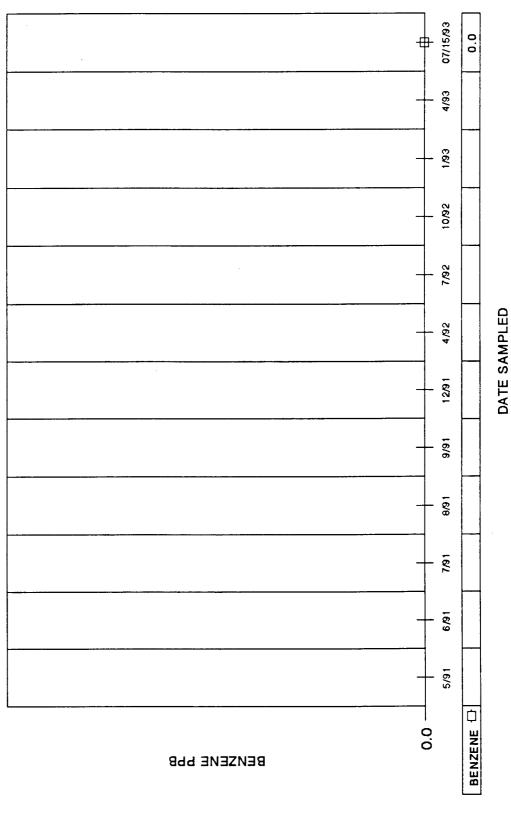
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BOREHOLE WATER ANALYSIS DATA MW#44 BH-67

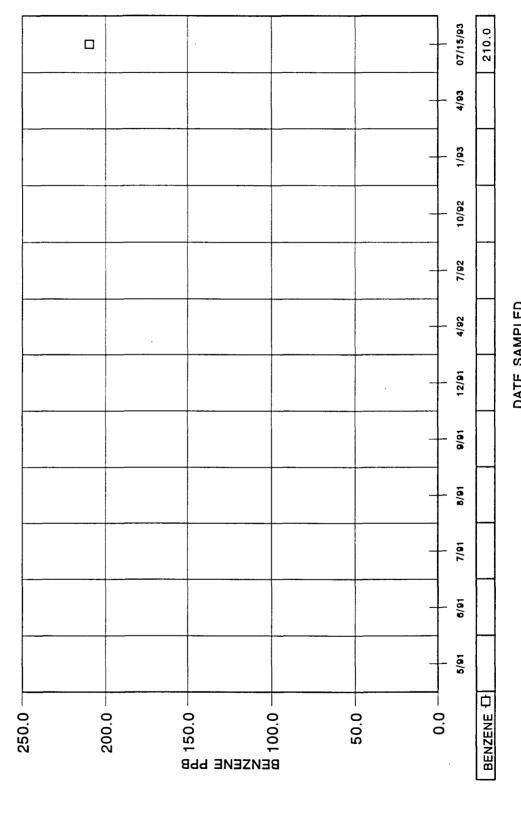


BOREHOLE WATER ANALYSIS DATA MW#45 BH-68



BOREHOLE WATER ANALYSIS DATA MW#49 BH-72

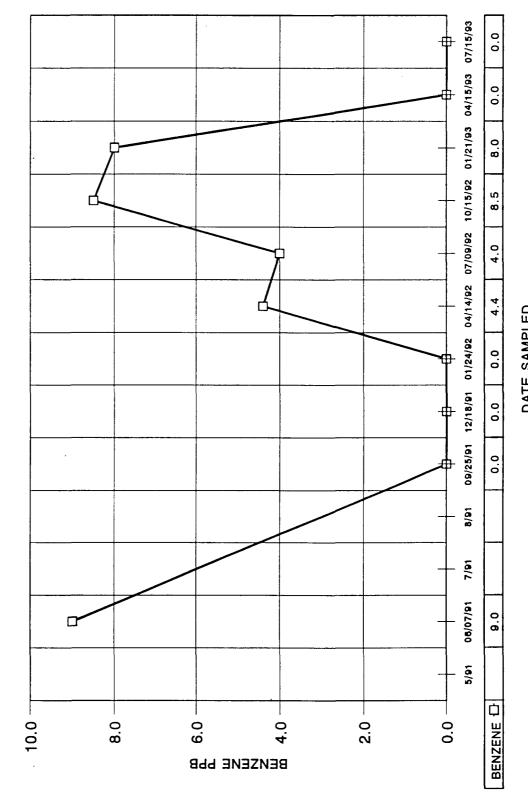
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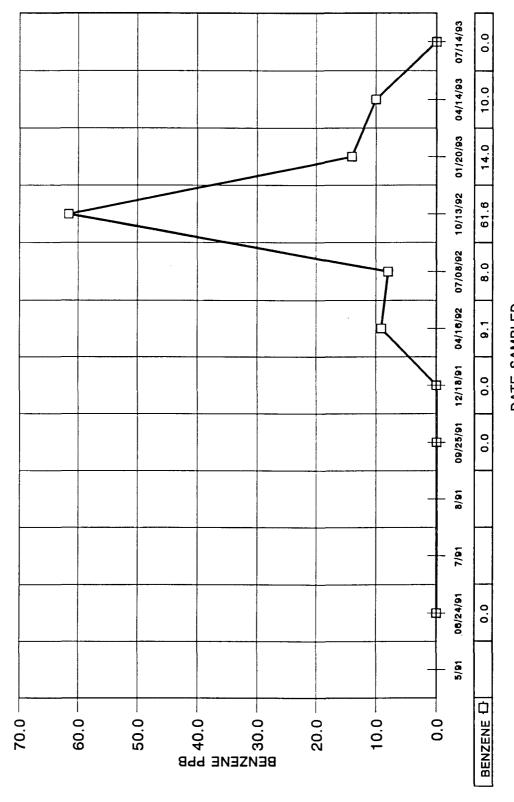
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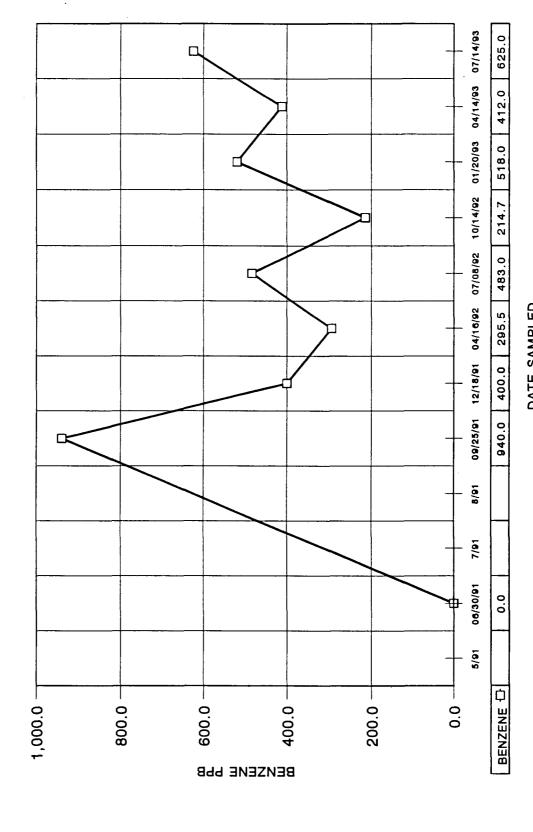
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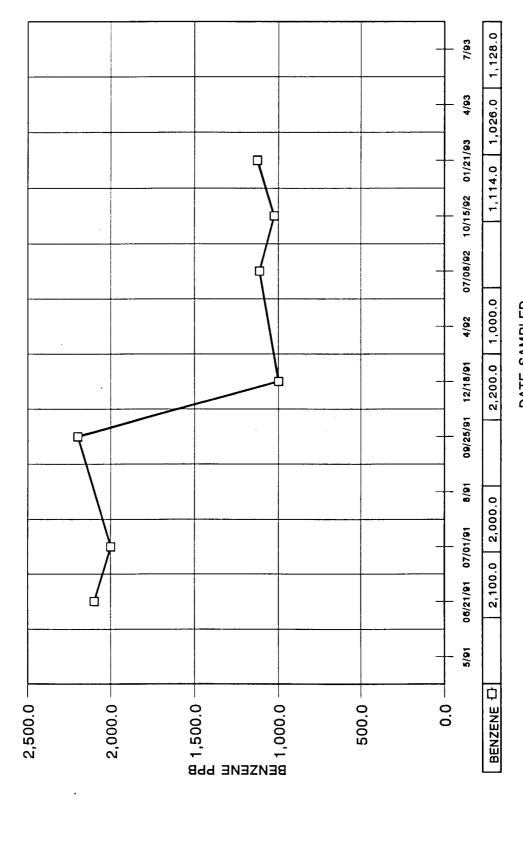
GROUNDWATER ANALYSIS DATA MW#54 BH-80



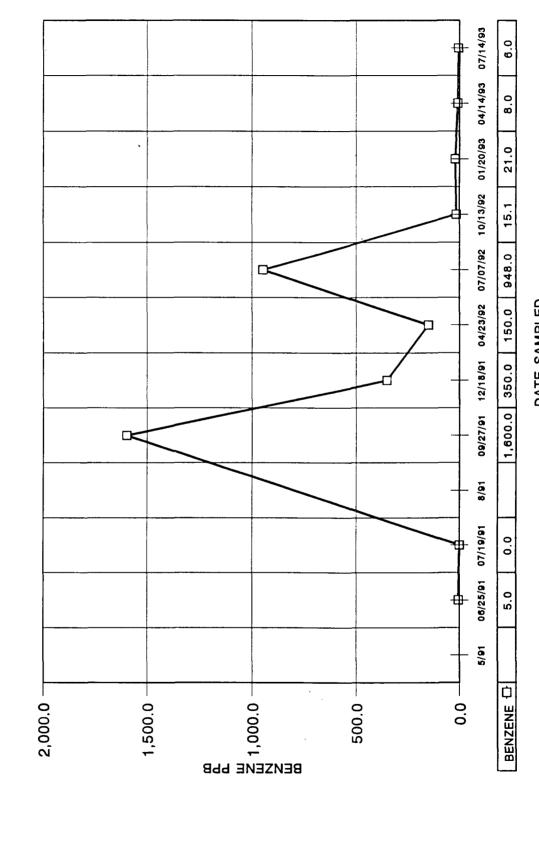
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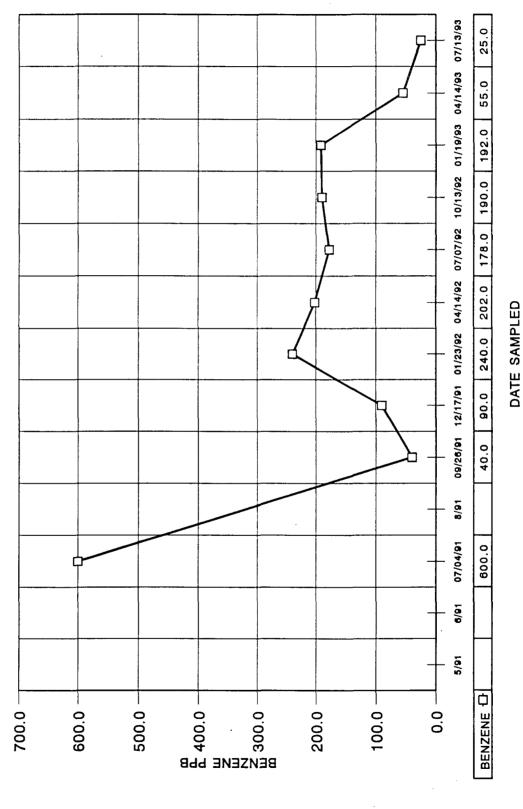
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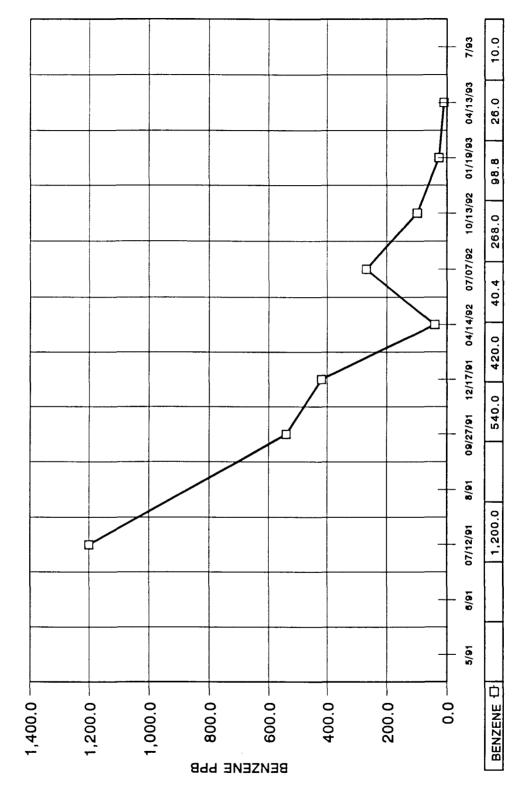
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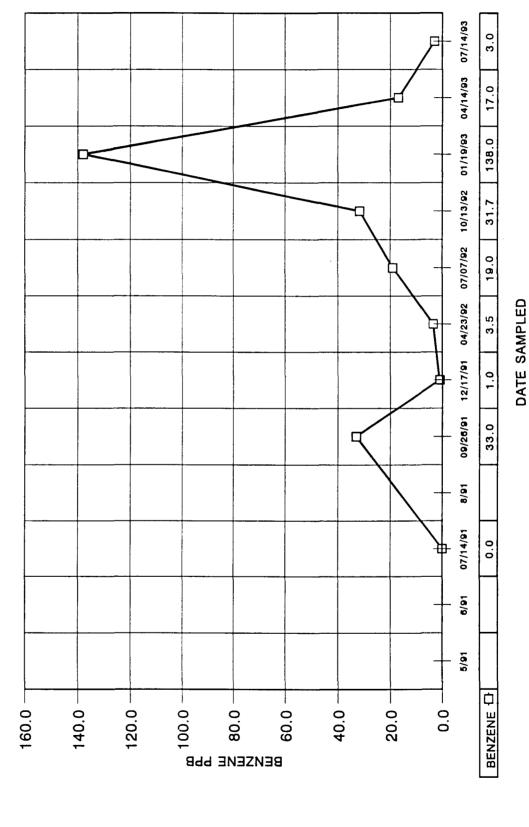
GROUNDWATER ANALYSIS DATA MW#58 BH-84



GROUNDWATER ANALYSIS DATA MW#59 BH-85

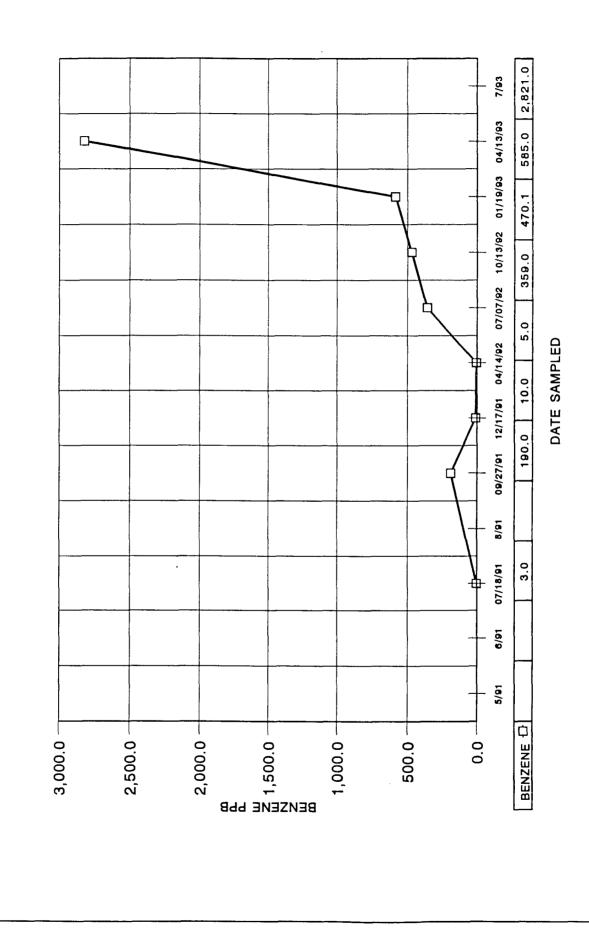


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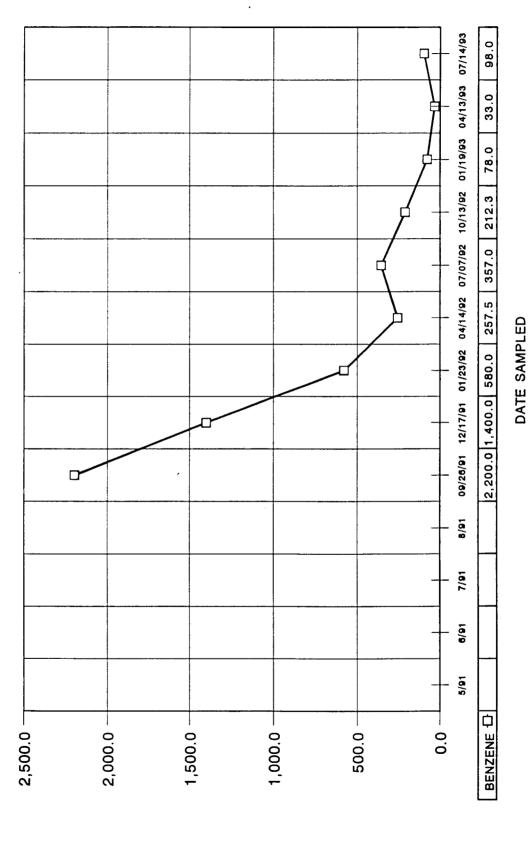
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GROUNDWATER ANALYSIS DATA MW#61A BH-87A



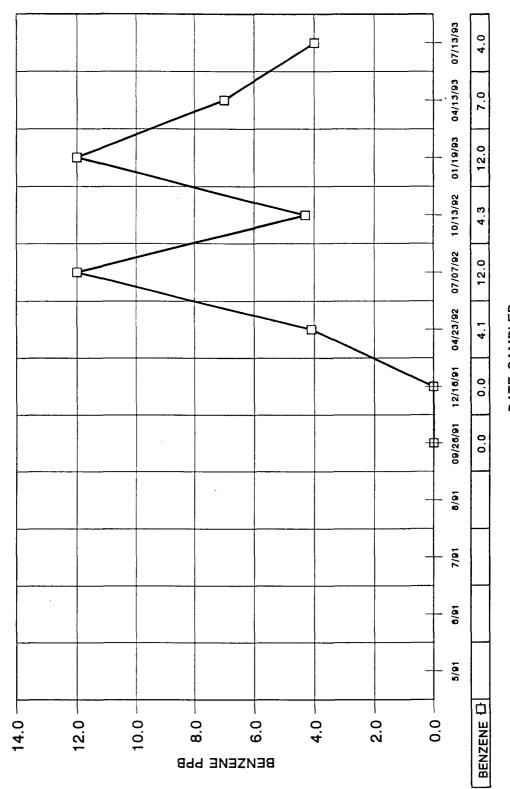
GROUNDWATER ANALYSIS DATA MW#62 BH-88

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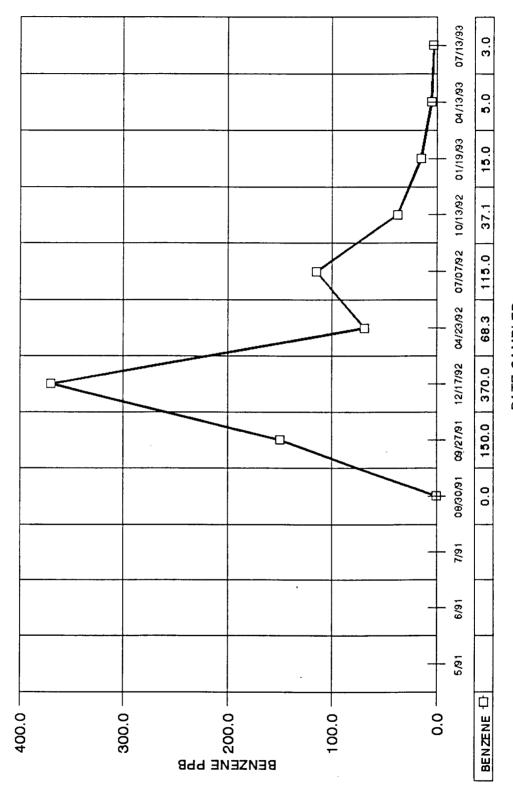


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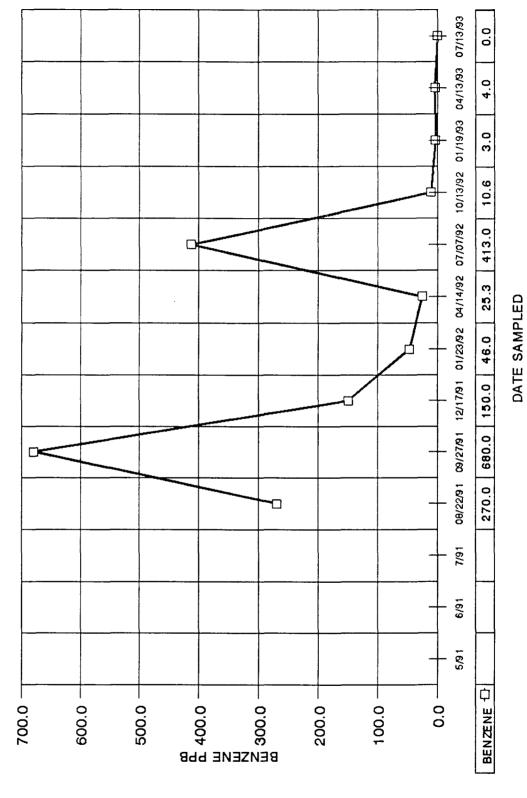
GROUNDWATER ANALYSIS DATA MW#63 BH-89



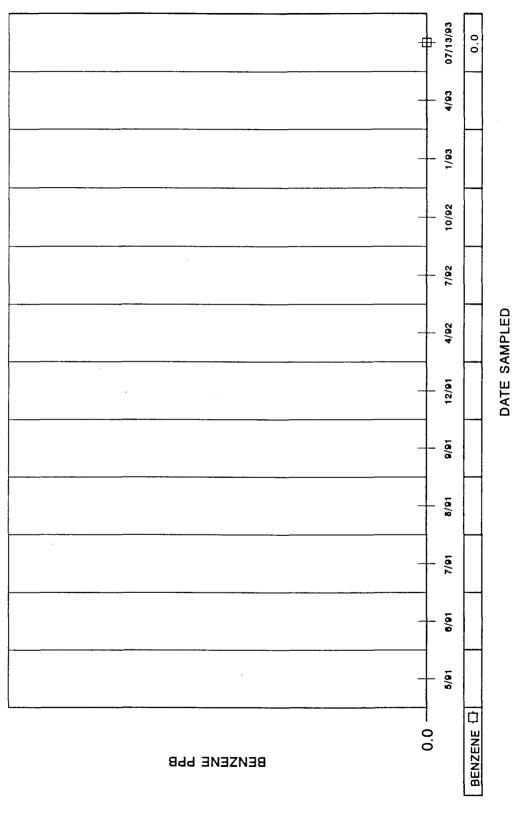
BOREHOLE WATER ANALYSIS DATA MW#64 BH-90



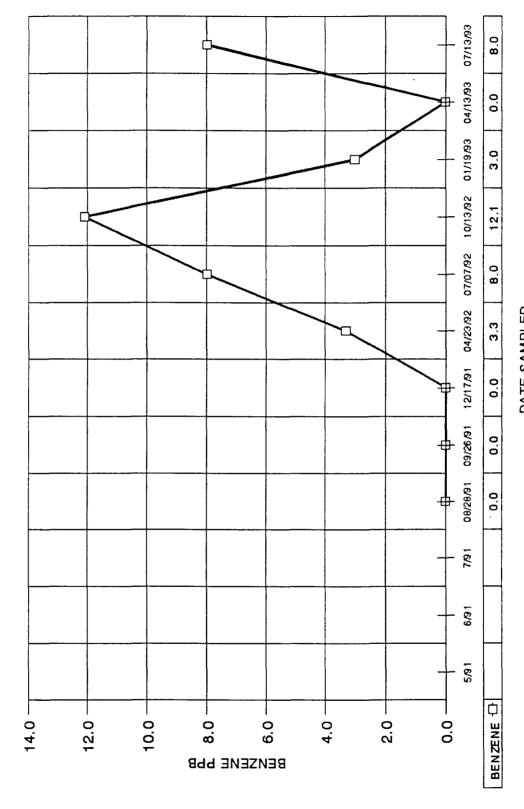
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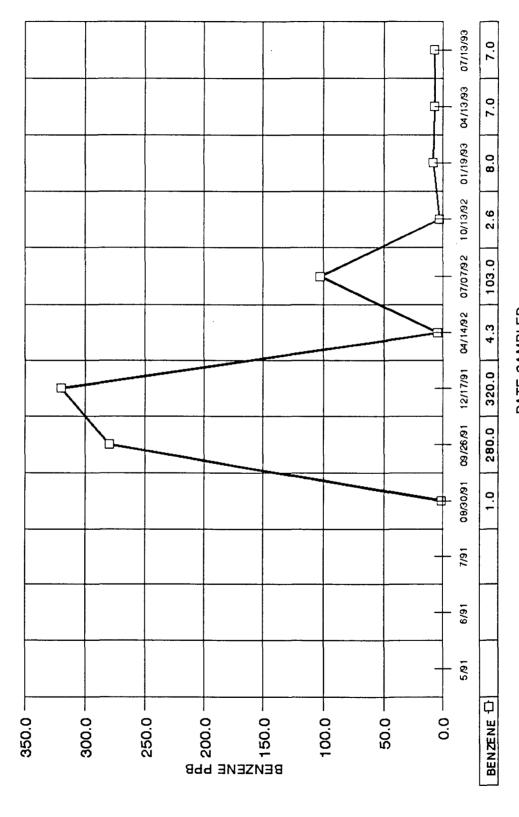
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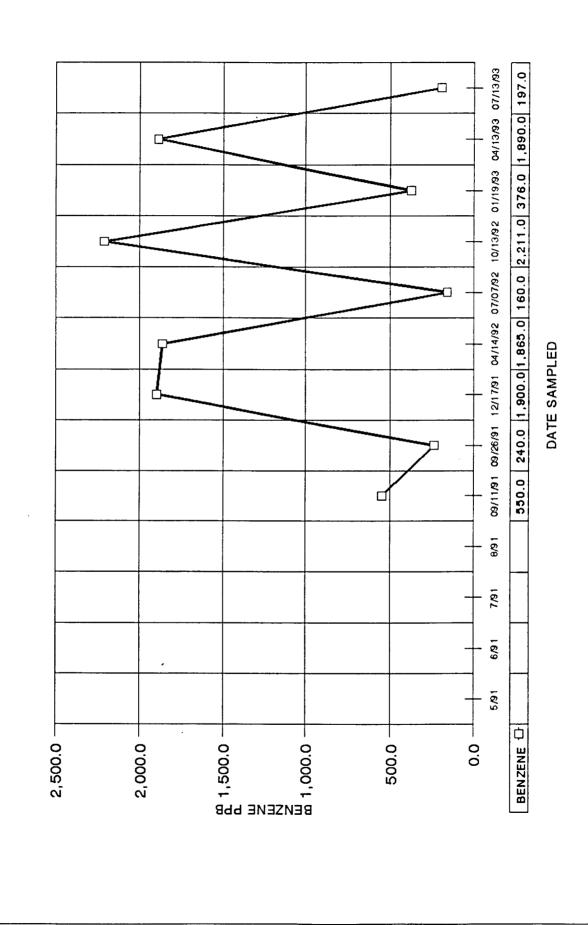
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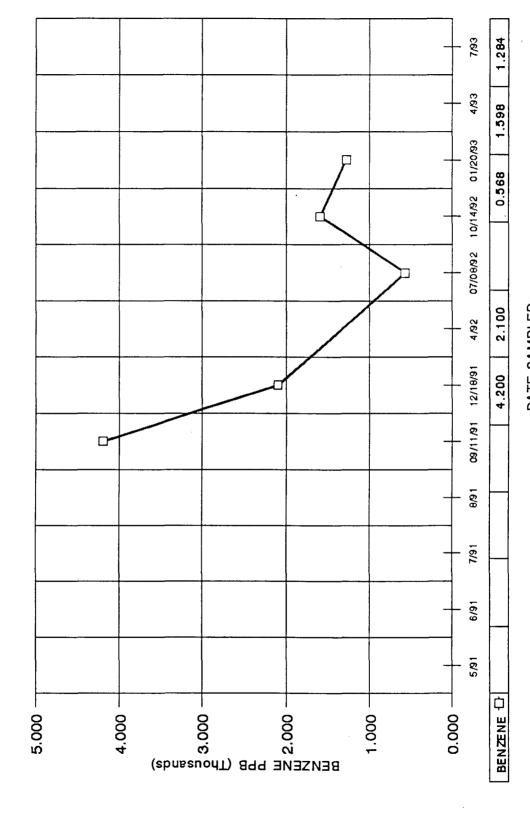
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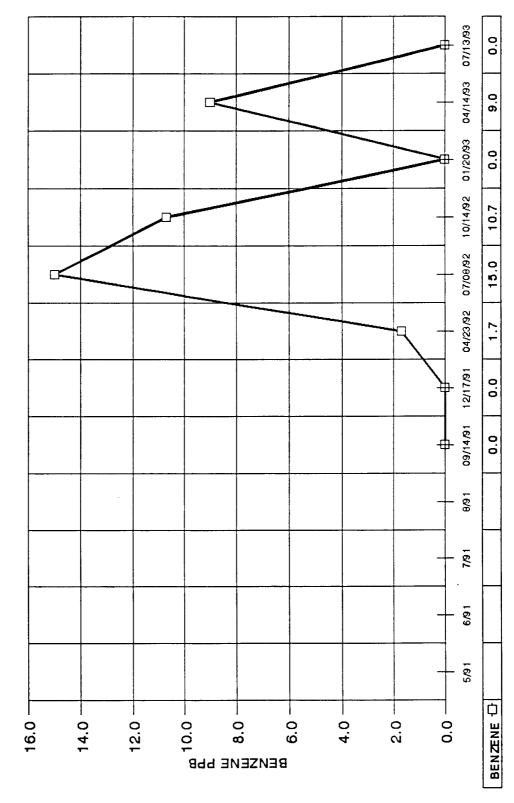
GROUNDWATER ANALYSIS DATA MW#68 BH-94 



GROUNDWATER ANALYSIS DATA MW#69 BH-95



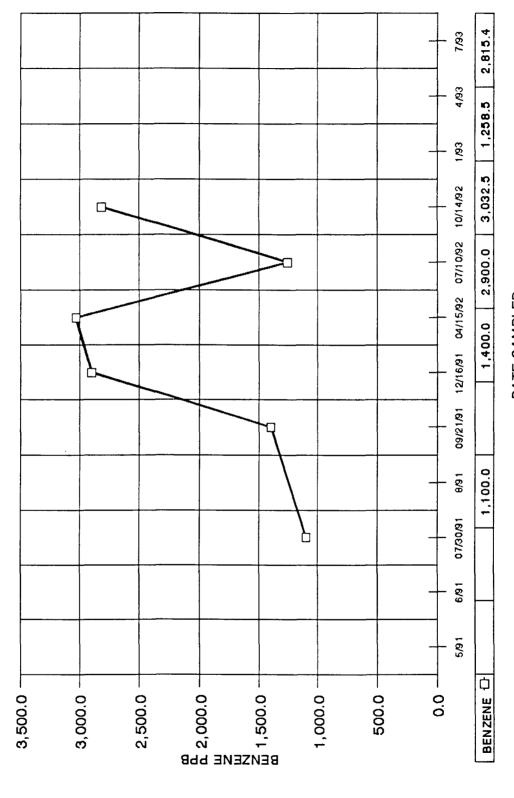
GROUNDWATER ANALYSIS DATA MW#70 BH-97



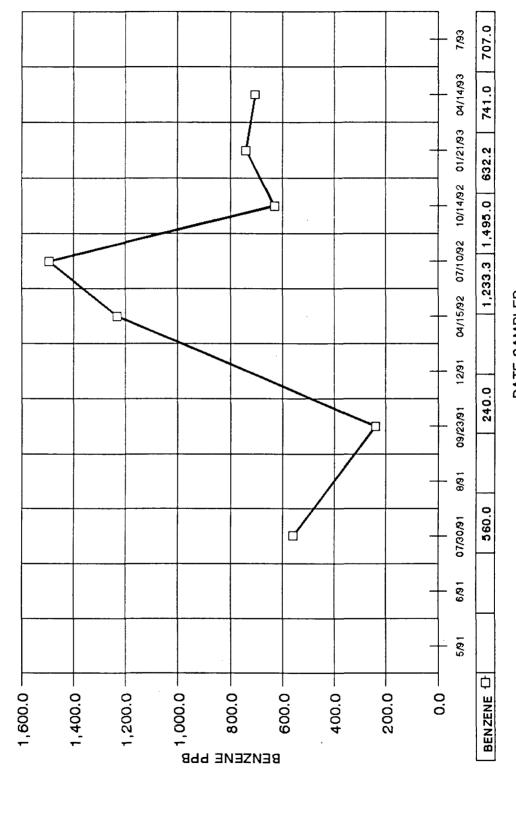
DATE SAMPLED

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GROUNDWATER ANALYSIS DATA SUMP 11A



GROUNDWATER ANALYSIS DATA SUMP 16A



#### APPENDIX D

# RANCHER WELL, PLANT WELL, AND SPRING LABORATORY REPORTS



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	LABORAT	ORY TES 08/17/				
JOB NUMBER: 931392 CUSTOMER	: MARATHON OIL C	OMPANY	ATTN:	BOB MENZIE		
CLIENT I.D			DATE RECE	Y I.D: 931392-0000 IVED: 07/21/93 IVED: 10:25	5	
TEST DESCRIPTION	-INAL RESULT	LIMITS/*DILU	TION UNITS OF MEASURE	TEST METHOD	DATE	TECH
Chloride (Unfilt.)	15.0	0.5	mg/L	325.2 (1)	08/02/93	DME
BO20 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	07/27/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND 104	0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85–115)		
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			Au	703 East Bethany Dri rora, CO 80014 03) 751-1780	/e	

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	LABORAT	ORY TESTS 08/17/93	RESULTS			
IOB NUMBER: 931392 CUSTOMER:	MARATHON OIL (		ATTN:	BOB MENZIE		
CLIENT I.D: DATE SAMPLED: 07/15/93 TIME SAMPLED: 09:44 WORK DESCRIPTION: SAMPLE NO. 3			DATE RECE	Y I.D: 931392-0007 IVED: 07/21/93 IVED: 10:25		
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Chloride (Unfilt.)	13.3	2.5	mg/L	325.2 (1)	08/02/93	DME
3020 - AROMATIC VOLATILE ORGANICS		• •		8020 (2)	07/27/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND ND 109	2.5 3.5 3.5 3.5	ug/L ug/L ug/L % Recovery	Limits (85-115)		
			Au	703 East Bethany Driv rora, CO 80014 03) 751-1780	/ //e	

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	LABORAT	ORY TES 08/17/				
OB NUMBER: 931392 CUSTOMER:	MARATHON OIL C	OMPANY	ATTN:	BOB MENZIE		
LIENT I.D: ATE SAMPLED: 07/15/93 IME SAMPLED: 07:42 ORK DESCRIPTION: SW-1			DATE RECE	Y I.D: 931392-000 IVED: 07/21/93 IVED: 10:25 	8	
EST DESCRIPTION	FINAL RESULT	LIMITS/*DILL	ITION UNITS OF MEASURE	TEST METHOD	DATE	TEC
hloride (Unfilt.)	21		mg/L	325.2 (1)	08/05/93	DM
020 - AROMATIC VOLATILE ORGANICS		• 1		8020 (2)	07/27/ <b>93</b>	CL
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND ND 104	2.5 2.5 2.5 2.5	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
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			Αι	)703 East Bethany Dri µrora, CO 80014 \$03) 751-1780	ve	

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JOB NUMBER: 931392 CUSTOMER	: MARATHON DIL		AllN:	BOB MENZIE		
CLIENT I.D: DATE SAMPLED: 07/13/93 TIME SAMPLED: 13:05 WORK DESCRIPTION: TRIP BLANK			DATE RECE	( I.D: 931392-0009 IVED: 07/21/93 IVED: 10:25	2	. `
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
3020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	07/26/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND ND 109	0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
	:					
	-			4 		
·						
			Au	703 East Bethany Dri rora, CO 80014 03) 751-1780	ve	



JOB NUMBER:	931392	CUSTOME	R: MARATHO	N DIL COMPAN	Y		ATTN: BOB	MENZIE		
		LYSIS		· DUPL	ICATES	REFEREN	ICE STANDARDS		MATRIX SPIK	ES
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	CUPLICATE VALUE (B)	RPD or ( A-B )	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SP I KE ADDED	PERCENT RECOVERY
PARAMETER:CH REPORTING LI		ilt.) UNITS:mg/L			NALYZED:07/2 RENCE :325		<u> </u>			NUMBER:27534 ECHNICIAN:DI
BLANK BLANK STANDARD STANDARD SPIKE DUPLICATE	ICB CCB ICV CCV MS MD	930728 930728 930728 \$160 931381-2 931381-2	<1 <1 49 171 61 10	:0	0	50 160	98 107	10	50	102
PARAMETER:CH					NALYZED:08/0 RENCE :325		,	<u> </u>		NUMBER:2756 ECHNICIAN:D
BLANK BLANK BLANK BLANK STANDARD STANDARD STANDARD SPIKE SPIKE DUPLICATE DUPLICATE DUPLICATE	ICB CCB CCB ICV CCV CCV CCV CCV MS MS MS MD MD MD	930802 930802 930802 930802 6930728C \$16.0 \$16.0 931367-2 931381-28 931381-28 931381-28 931381-38	<0.5 <0.5 <0.5 <0.5 5.0 16.5 16.5 15.2 5.1 12.0 12.0 <0.5 7.4 7.4	<0.5 7.4 7.4	NC 0 0	5.0 16.0 16.0 16.0	100 103 103 95	<0.5 7 7	5.0 5.0 5.0	102 92 92
PARAMETER:CH REPORTING LI		ilt.) UNITS:mg/L			NALYZED:08/0 RENCE :325		)			NUMBER:2758 ECHNICIAN:D
BLANK BLANK SLANK STANDARD STANDARD STANDARD SPIKE DUPLICATE	ICB CCB ICV CCV CCV CCV MS MD	930805 930805 930805 69307288 \$160 \$160 931373-4 931373-4	<1 <1 53 155 159 60 7	7	0	50 160 160	106 97 99	7	50	106
							. Aurora	East Bethany , CO 80014 751-1780		

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#### QUALITY CONTROL FOOTER

#### METHOD REFERENCES

- (1) EPA 600/4-79-020, Methods For Chemical Analysis Of Water And Wastes, March 1983
- (2) EPA SW-846, Test Methods For Evaluating Solid Waste, Third Edition, November 1986
- (3) Standard Methods For The Examination Of Water And Wastewater, 17th Edition, 1989
- (4) EPA 600/4-80-032, Prescribed Procedures For Measurement Of Radioactivity In Drinking Water, August 1980
- (5) EPA 600/8-78-017, Microbiological Methods For Monitoring The Environment, December 1978
- (6) Federal Register, July 1, 1990 (40 CFR Part 136)
- (7) EPA 600/4-88-039, Methods For The Determination Of Organics Compounds In Drinking Water, December 1988
- (8) U.S.G.S. Methods For The Determination Of Inorganic Substances In Water And Fluvial Sediments, Book 5, Chapter A1, 1985
- (9) Federal Register, Friday, June 7, 1991, (40 CFR Parts 141 and 142)
- (10) Standard Methods For The Examination Of Water And Wastewater, 16th Edition, 1985
- (11) ASTM, Section 11 Water And Environmental Technology, Volume 11.01 Water (1), 1991
- (12) Methods Of Soil Analysis, American Society Of Agronomy, Agronomy No. 9, 1965
- (13) EPA SW-846, Test Methods For Evaluating Solid Waste, Third Edition, Revision 1, November 1990
- (14) ASTM, Section 5, Petroleum Products, Lubricants, and Fossil Fuels, Volume 05.05, Gaseous Fuels, Coal and Coke
- (15) EPA 600/2-78-054, Field and Laboratory Methods Applicable To Overburdens and Mine Soils, March 1978
- COMMENTS: Data in QA report may differ from final results due to digestion and/or dilution of sample into analytical ranges. The "Time Analyzed" in the QA report refers to the start time of the analytical batch which may not reflect the actual time of each analysis. The "Date Analyzed" is the actual date of analysis. NC = Not Calculable Due To Value(s) Lower Than The Detection Limit.

Analyses performed by a subcontract laboratory are indicated on the analytical and/or quality control reports under "Technician" using the following codes:

Subcontract Laboratory	<u>Code</u>
Core Laboratories - Anaheim, CA	*AN
Core Laboratories - Casper, WY	*CA
Core Laboratories - Corpus Christi, TX	*cc
Core Laboratories - Houston, TX	*HP
Core Laboratories - Lake Charles, LA	*LC
Core Laboratories - Long Beach, CA	*LB
Other Subcontract Laboratories	*xx

Laboratory ID Provided Upon Request

\* The asterisk in the "Technician" data field signifies that the analysis was performed by a subcontract laboratory.

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	LABORAT	ORY TESTS 08/17/93	RESULTS			
JOB NUMBER: 931392 CUSTOMER:	MARATHON OIL C	OMPANY	ATTN:	BOB MENZIE	<del>_</del>	
CLIENT 1.D: DATE SAMPLED: / / TIME SAMPLED: : WORK DESCRIPTION: METHOD BLANK-1			LABORATOR DATE RECE TIME RECE REMARKS	IVED: :		
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
8020 - AROMATIC VOLATILE ORGANICS		*1	1 1	8020 (2)	07/26/93	CLŤ
Senzene Toluene Ethyl Benzene Xylenes →-Bromofluorobenzene (surrogate)	ND ND ND 100	0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
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<i>,</i>						
	·		Au	703 East Bethany Drive rora, CO 80014 03) 751-1780	2	

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	LABORAT	ORY TESTS 08/17/93	RESULTS			
JOB NUMBER: 931392 CUSTOMER:	MARATHON OIL C		ATTN:	BOB MENZIE		
CLIENT I.D: DATE SAMPLED: / / TIME SAMPLED: : WORK DESCRIPTION: METHOD BLANK-2			LABORATOR DATE RECE TIME RECE REMARKS	IVED: :		
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
8020 - AROMATIC VOLATILE ORGANICS	-	*1		8020 (2)	08/02/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND ND 105	0.5 0.5 0.5	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)	:	
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RECORD					AB JOB NO.				KS / PRECAUTIONS											DATE	TIME	DATE	TIME		Lake Charles, Louisiana 3645 Anzona Siteel Suphur, Louisiana 70663 (318) 583-4926
CHAIN OF CUSTODY RECORD																		NO.:		HED BY: E:	AE/COMPANY:	BY:	AE/COMPANY:		Corpus Christi, Texes 1733 North Padre Island Dr Corpus Christi, Texas 78408 (512) 289-2673
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									TYPE PRES.										] 10 DAYS   ROI						Houston, Texas     10201 Westheimer, Bidg 1-A     Houston, Toxas 77042     (713) 972-6700     ∂ c2 / c e ≤ 5
	PROJECT INFORMATION		G INFORMATION						LE CONTAINER TYPE	٥									] 5 DAYS						Casper, wyoming 420 West 1st Street Casper, Wyoming 82601 (307) 235-5741 Dr
S S S	ROJECT I	Ċ.	<b>BILLING IN</b>					PO NO.	E SAMPLE MATRIX	241 00		10	0	0	3	4	→ N	 SHIPMENT METHOD:	HOURS	HED BY: E:	AE/COMPANY.	BY:	PRINTED NAME/COMPANY:		
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CORE LABORATORIES	<b>CUSTOMER INFORMATION</b>	0,0	ž.		D		1-0212		SAMPLE ID	-41	0%-	42-	00 2 1	202 -10					SAME DAY	N/	and		- 7	RE SURCHARGE	Long Beach, California 3700 Cherry Avenue Long Beach, California 90807 (310) 595-8401
	CUSTOMER	Marather	Sob	ň			7121601			-1712		1		Sample	Sample	$\rightarrow$	SW-			712C	:OMPANY:		200	* BIISH TUBNABOLIND MAY REQUIRE SUBCHABGE	<b>J Anaheim, California</b> 1250 E. Gene Aury Way Anaheim, California 92805 (714) 937-1094
			SEND REPORT TO	ADDRESS. P.O.	N	PHONE:	4	FAX:	SAMPLE NO.									SAMPLER:	REQUIRED TURNAROUND:	1. RELINQUISHED BY SIGNATURE	PRINTED NAME/COMPANY	1. RECEIVED BY: SIGNATURE	PRINTED NAME/COMPANY	* RUSH TURNAR	Anaheim, California 1250 E. Gene Aury V Anaheim, California 9 (714) 937-1094



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	LABORATO	RY TESTS 08/27/93	RESULTS			
JOB NUMBER: 931479 CUSTOMER:	MARATHON OIL CO	MPANY		BOB MENZIE, JR.	·····	·
CLIENT I.D: MONTHLY DATE SAMPLED: 08/03/93 TIME SAMPLED: 11:50 WORK DESCRIPTION: #1			DATE RECE TIME RECE	RY I.D: 931479-0001 IVED: 08/04/93 IVED: 09:40		
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Chloride (Unfilt.)	13.1	0.5	mg/L	325.2 (1)	08/25/93	VKN
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	08/17/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND 106	0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85–115)		
· · · · · · · · · · · · · · · · · · ·			A	0703 East Bethany Driv urora, CO 80014 303) 751-1780	/e	

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	LABORAT	ORY TESTS 08/27/93	RESULTS			
OB NUMBER: 931479 CUSTOMER:	MARATHON OIL C	OMPANY	ATTN:	BOB MENZIE, JR.	······	
CLIENT I.D: MONTHLY DATE SAMPLED: 08/03/93 IME SAMPLED: 12:15 JORK DESCRIPTION: #2			DATE RECE	Y I.D: 931479-0002 IVED: 08/04/93 IVED: 09:40		
EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Chloride (Unfilt.)	11.8	0.5	mg/L	325.2 (1)	08/25/93	VKN
3020 - AROMATIC VOLATILE ORGANICS		*1	:	8020 (2)	08/16/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND 110	0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
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			Au	703 East Bethany Driv rora, CO 80014 03) 751-1780	/e	

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# LABORATORY TESTS RESULTS 08/27/93

#### JOB NUMBER: 931479

CUSTOMER: MARATHON OIL COMPANY

ATTN: BOB MENZIE, JR.

LABORATORY I.D...: 931479-0003 DATE RECEIVED...: 08/04/93 TIME RECEIVED...: 09:40 REMARKS.....

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CLIENT I.D..... MONTHLY DATE SAMPLED..... 08/03/93 TIME SAMPLED..... 13:50 WORK DESCRIPTION...: SW-1

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Chloride (Unfilt.)	21.0	1.0	mg/L	325.2 (1)	08/25/93	VKN
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	08/16/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND ND 105	0.5 0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85–115)		
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	LABORAT	ORY TESTS 08/27/93	RESULTS			
JOB NUMBER: 931479 CUSTOMER:	MARATHON OIL C	OMPANY	ATTN:	BOB MENZIE, JR.		
CLIENT I.D: MONTHLY DATE SAMPLED: 07/20/93 TIME SAMPLED: 14:55 WORK DESCRIPTION: TRIP BLANK			DATE RECE	Y I.D: 931479-0004 IVED: 08/04/93 IVED: 09:40		
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	08/16/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND 107	0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
			Au	703 East Bethany Driv rora, CO 80014 03) 751-1780	ve	

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#### LABORATORY TESTS RESULTS 08/27/93

#### JOB NUMBER: 931479

CUSTOMER: MARATHON OIL COMPANY

ATTN: BOB MENZIE, JR.

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LABORATORY I.D...: 931479-0005 DATE RECEIVED....: / / TIME RECEIVED....: : REMARKS......

CLIENT I.D.....: DATE SAMPLED.....: / / TIME SAMPLED.....: : WORK DESCRIPTION...: METHOD BLANK

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	08/16/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND ND 106	0.5 0.5 0.5 0.5 0.5	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
			10 Au (3	703 East Bethany Dri rora, CO 80014 03) 751-1780	ve	
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	LABORAT	ORY TESTS 08/27/93	RESULTS			
JOB NUMBER: 931479 CUSTOMER:	MARATHON OIL C	OMPANY	ATTN:	BOB MENZIE, JR.		
CLIENT I.D: DATE SAMPLED: / / TIME SAMPLED: : WORK DESCRIPTION: METHOD BLANK						
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
8020 - AROMATIC VOLATILE ORGANICS		*1		8020 (2)	08/17/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND 109	0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
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3 NUMBER: 931479	CUSTOMER: MARAT	HON OIL COMP	ANY		ATTN:	BOB MENZIE, J	R.	
20 - AROMATIC VOLATILE OR	GANICS DATE ANA	LYZED: 08/16	/93 TIME AN	ALYZED: 11:1	9 METHOD:	8020 (2)	QC	UMBER:276607
	<u> </u>	REFERE	NCE S	TANDAR	DS		<u></u>	
ST SCRIPTION	ANALYSIS SUB-TYPE	ANALYSIS 1. D.	DILUTION FACTOR	ANALYZED VALUE	TRUE VALUE	PERCENT RECOVERY	DETECTION LIMITS	UNITS OF MEASURE
nzene	SB	V930816J	1	19.3	20.0	97	0.5	ug/L
luene	SBD SB	V930816J V930816J	1	20.0	20.0 20.0	100 96	0.5	ug/L ug/L
nyl Benzene	SBD SB SBD	V930816J V930816J V930816J	1	19.4 20.6 20.3	20.0 20.0 20.0	97 103 102	0.5 0.5 0.5	ug/L ug/L ug/L
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					Aur	03 East Betha ora, CO 800 3) 751-1780		

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TYPESUB-TYPEI.D.VALUE (A)VALUE (B)( A-B )VALUERECOVERYVALUEADDEDREIPARAMETER:Chloride (Unfilt.) REPORTING LIMIT/DF: 0.5DATE/TIME ANALYZED:08/25/9319:00 METHOD REFERENCEQC BATCH NUMBEL TECHNIN METHOD REFERENCEQC BATCH NUMBEL TECHNIN TECHNINNLANK BLANK CCBICBS0 <0.5<0.5 <0.5<0.5 5.0100 16.0<000 106	RCENT COVER
TYPESUB-TYPEI.D.VALUE (A)VALUE (B)( A-B )VALUERECOVERYVALUEADDEDREIARAMETER:Chloride (Unfilt.) EPORTING LIMIT/DF: 0.5DATE/TIME ANALYZED:08/25/9319:00 METHOD REFERENCE :325.2 (1)QC BATCH NUMBEL TECHNIELANK 	
EPORTING LIMIT/DF: 0.5     UNITS:mg/L     METHOD REFERENCE     :325.2 (1)     TECHNIA       LANK     ICB     S0     <0.5         LANK     CCB     S0     <0.5         TANDARD     ICV/LCS     G930728C     5.0     5.0     100       TANDARD     CCV     S16.0     17.0     16.0     106       PIKE     MS     931479-3     15.8     10.5     5.0     10	
LANK         CCB         S0         <0.5	
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10703 East Bethany Drive Aurora, CO 80014	

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#### QUALITY CONTROL FOOTER

#### METHOD REFERENCES

- (1) EPA 600/4-79-020, Methods For Chemical Analysis Of Water And Wastes, March 1983
- (2) EPA SW-846, Test Methods For Evaluating Solid Waste, Third Edition, November 1986
- (3) Standard Methods For The Examination Of Water And Wastewater, 17th Edition, 1989
- (4) EPA 600/4-80-032, Prescribed Procedures For Measurement Of Radioactivity In Drinking Water, August 1980
- (5) EPA 600/8-78-017, Microbiological Methods For Monitoring The Environment, December 1978
- (6) Federal Register, July 1, 1990 (40 CFR Part 136)
- (7) EPA 600/4-88-039, Methods For The Determination Of Organics Compounds In Drinking Water, December 1988
- (8) U.S.G.S. Methods For The Determination Of Inorganic Substances In Water And Fluvial Sediments, Book 5, Chapter A1, 1985
- (9) Federal Register, Friday, June 7, 1991, (40 CFR Parts 141 and 142)
- (10) Standard Methods For The Examination Of Water And Wastewater, 16th Edition, 1985
- (11) ASTM, Section 11 Water And Environmental Technology, Volume 11.01 Water (1), 1991
- (12) Methods Of Soil Analysis, American Society Of Agronomy, Agronomy No. 9, 1965
- (13) EPA SW-846, Test Methods For Evaluating Solid Waste, Third Edition, Revision 1, November 1990
- (14) ASTM, Section 5, Petroleum Products, Lubricants, and Fossil Fuels, Volume 05.05, Gaseous Fuels, Coal and Coke
- (15) EPA 600/2-78-054, Field and Laboratory Methods Applicable To Overburdens and Mine Soils, March 1978
- COMMENTS: Data in QA report may differ from final results due to digestion and/or dilution of sample into analytical ranges. The "Time Analyzed" in the QA report refers to the start time of the analytical batch which may not reflect the actual time of each analysis. The "Date Analyzed" is the actual date of analysis. NC = Not Calculable Due To Value(s) Lower Than The Detection Limit.

Analyses performed by a subcontract laboratory are indicated on the analytical and/or quality control reports under "Technician" using the following codes:

Subcontract Laboratory	<u>Code</u>
Core Laboratories - Anaheim, CA	*AN
Core Laboratories - Casper, WY	*CA
Core Laboratories - Corpus Christi, TX	*cc
Core Laboratories - Houston, TX	*HP
Core Laboratories - Lake Charles, LA	*LC
Core Laboratories - Long Beach, CA	*LB
Other Subcontract Laboratories	*xx



\* The asterisk in the "Technician" data field signifies that the analysis was performed by a subcontract laboratory.

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CHAIN OF	HAIN OF CUSTODY	
iarathoa Oil Company 29 Marakhon Road Jiewood, New Mexico 88254 05) 457-2621 / Fax (5()5) 457-2544 0NTACT	<ol> <li>Packed By:</li> <li>VOA Vials?</li> <li>Caps scaled w</li> <li>Caps scaled w/tape?</li> <li>Coolant? ICE</li> <li>Coolant? ICE</li> <li>SEAL. Date/Time:</li> <li>S. SEAL. Date/Time:</li> </ol>	d By: Date: Date: Vials? Vials? VES NO Caps scaled w/tape? YES NO scaled w/tape? YES NO unt? ICE COLD PAK Other: Other: Viconincets: Viconincets:
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mpuny: Core Laboratorics eet Address: 30703 East Bethany Drive y/Sue/ZJP: Aurora Colondo 80015-2695 x: (303) 751-1780 x: (303) 751-1784	<ol> <li>SEAL Intact?</li> <li>Coolant Condition:</li> <li>Condition of Contect</li> </ol>	SEAL Intact? YES NO Coolant Condition: 4°C Condition of Concents? 6000 4
DATE TIME SAMPLE ID SAMPLE TYPE	NO. CONTAINEBS	ANALYSIS PARAMETTERS
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ISEESS		SHIPPING DETAILS
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cceived hy: (signed): Mand Acc 7 2 740 linquished by: (signed):	Rec'd for Lab: Mining Scart Assigned Laboratury Number:	$S_{C_{a}} \rightarrow D_{a} = \frac{940}{100}$ Time: $\frac{940}{100}$
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	LABORAT	ORY TESTS 10/14/93	RESULTS			
JOB NUMBER: 931871 CUSTOMER:	MARATHON OIL (		ATTN:	BOB MENZIE, JR.		-
CLIENT I.D: DATE SAMPLED: 09/21/93 TIME SAMPLED: 12:29 WORK DESCRIPTION: SW-1			DATE RECE TIME RECE	Y I.D: 931871-0001 IVED: 09/24/93 IVED: 12:05		
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Chloride (Unfilt.)	19.0	0.5	mg/L	325.2 (1)	10/12/93	DME
8020 - AROMATIC VOLATILE ORGANICS		*1		624 (1)	10/05/93	CLT
βenzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND 1 0.6 94	0.5 0.5 0.5 0	ug/L ug/L ug/L % Recovery	Limits (85-115)		
	1	1	Au	703 East Bethany Driv Jrora, CO 80014 103) 751-1780	' <b>e</b>	

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#### LABORATORY TESTS RESULTS 10/14/93

JOB NUMBER: 931871

CUSTOMER: MARATHON OIL COMPANY

ATTN: BOB MENZIE, JR.

DATE RECEIVED....: 09/24/93

TIME RECEIVED....: 12:05 REMARKS.....

LABORATORY 1.D...: 931871-0002

CLIENT I.D.....: DATE SAMPLED.....: 09/21/93 FIME SAMPLED.....: 12:55 JORK DESCRIPTION...: #1

EST DESCRIPTION FINAL RESULT LIMITS/\*DILUTION UNITS OF MEASURE TEST METHOD DATE TECHN Chloride (Unfilt.) 12.4 0.5 325.2 (1) 10/12/93 DME mg/L 8020 - AROMATIC VOLATILE ORGANICS \*1 624 (1) 10/05/93 CLT Benzene ND 0.5 ug/L Toluene ND 0.5 ug/L Ethyl Benzene ND 0.5 ug/L Xylenes ND 0.5 ug/L 4-Bromofluorobenzene (surrogate) 97 0 % Recovery Limits (85-115) 10703 East Bethany Drive Aurora, CO 80014 (303) 751-1780 PAGE:2

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#### LABORATORY TESTS RESULTS 10/14/93

#### UOB NUMBER: 931871

CUSTOMER: MARATHON OIL COMPANY

ATTN: BOB MENZIE, JR.

REMARKS.....

LABORATORY I.D...: 931871-0003 DATE RECEIVED....: 09/24/93 TIME RECEIVED....: 12:05

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CLIENT I.D...... PATE SAMPLED...... 09/21/93 JIME SAMPLED...... 13:40 WORK DESCRIPTION...: #2

NURK DESCRIPTION: #2			REMARKS			
TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Chloride (Unfilt.)	11.5	0.5	mg/L	325.2 (1)	10/12/93	DME
8020 - AROMATIC VOLATILE ORGANICS		*1		624 (1)	10/05/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND ND 97	0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85–115)		
			Au	703 East Bethany Driv rora, CO 80014 03) 751-1780	/e	
ang and a any ang pala ang p	<u></u>	PAGE:3		and the state of the state of the state of the state of the state of the state of the state of the state of the	· · · · · · · · · · · · · · · · · · ·	

The analyses, opinions or interpretations contained in this report are based upon observations and material subplied by the crient for whose exclusive and confidential use this report has been made. The memoritations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories, however, assumes no responsibility and makes no warranty or representations, express or implied, as to the productivity, proper operations, or prototableness of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced except in its entirety, without the writeh approval of Core Laboratories.



## LABORATORY TESTS RESULTS 10/14/93

### JOB NUMBER: 931871

CUSTOMER: MARATHON OIL COMPANY

ATTN: BOB MENZIE, JR.

DATE RECEIVED....: 09/24/93 TIME RECEIVED....: 12:05

REMARKS.....

LABORATORY I.D...: 931871-0004

i.

CLIENT I.D.....: DATE SAMPLED.....: 08/23/93 TIME SAMPLED.....: 12:29 WORK DESCRIPTION...: TRIP BLANK

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
8020 - AROMATIC VOLATILE ORGANICS		*1		624 (1)	10/05/93	CLT
Benzene Toluene Ethyl Benzene Xylenes 4-Bromofluorobenzene (surrogate)	ND ND ND ND 100	0.5 0.5 0.5 0.5 0	ug/L ug/L ug/L ug/L % Recovery	Limits (85-115)		
	-					
			Au	703 East Bethany Dri Fora, CO 80014 03) 751-1780	ve	

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LIMITS/*DILUTION *1 0.5 0.5 0.5 0.5 0.5 0.5	LABORATOR		DATE 10/05/93	TECHN
*1 0.5 0.5 0.5 0.5	DATE RECE TIME RECE REMARKS UNITS OF MEASURE ug/L ug/L ug/L	IVED: / / IVED: : TEST METHOD 624 (1)	DATE	
*1 0.5 0.5 0.5 0.5	ug/L ug/L ug/L ug/L	624 (1)		
0.5 0.5 0.5 0.5	ug/L ug/L ug/L		10/05/93	CLT
0.5 0.5 0.5	ug/L ug/L ug/L	Limits (85-115)		
	Aur	rora, CO 80014	e	
	PAGE:5	Au (3)	Aurora, CO 80014 (303) 751-1780	(303) 751-1780

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OB NUMBER:	931871	CUSTOM	ER: MARATHO	N OIL COMPAN	Y		ATTN: BOB	MENZIE, JR.			
	ANA	LYSIS		DUPL	ICATES	REFEREN	REFERENCE STANDARDS		MATRIX SPIKES		
NALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or ( A-B )	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SP I KE ADDED	PERCENT RECOVERY	
PARAMETER:Chloride (Unfilt.) REPORTING LIMIT/DF: 0.5 UNITS:mg/L				DATE/TIME ANALYZED:10/12/93 08:32 METHOD REFERENCE :325.2 (1)						NUMBER:2807 ECHNICIAN:D	
LANK LANK LANK TANDARD TANDARD PIKE UPLICATE UPLICATE	ICB CCB ICV/LCS CCV CCV MS MD MD	931012 931012 931012 G921222H \$16.0 \$16.0 931865-4 931865-4 931865-4	<0.5 <0.5 <0.5 5.0 15.8 16.8 6.0 18.4 1.1	18.0 1.1	20.0	5.0 16.0 16.0	100 99 105	1.1	5.0	98	
			1				Aurora,	ast Bethany CO 80014 751-1780			

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### QUALITY CONTROL FOOTER

#### METHOD REFERENCES

- (1) EPA 600/4-79-020, Methods For Chemical Analysis Of Water And Wastes, March 1983
- (2) EPA SW-846, Test Methods For Evaluating Solid Waste, Third Edition, November 1986
- (3) Standard Methods For The Examination Of Water And Wastewater, 17th Edition, 1989
- (4) EPA 600/4-80-032, Prescribed Procedures For Measurement Of Radioactivity In Drinking Water, August 1980
- (5) EPA 600/8-78-017, Microbiological Methods For Monitoring The Environment, December 1978
- (6) Federal Register, July 1, 1990 (40 CFR Part 136)
- (7) EPA 600/4-88-039, Methods For The Determination Of Organics Compounds In Drinking Water, December 1988
- (8) U.S.G.S. Methods For The Determination Of Inorganic Substances In Water And Fluvial Sediments, Book 5, Chapter A1, 1985
- (9) Federal Register, Friday, June 7, 1991, (40 CFR Parts 141 and 142)
- (10) Standard Methods For The Examination Of Water And Wastewater, 16th Edition, 1985
- (11) ASTM, Section 11 Water And Environmental Technology, Volume 11.01 Water (1), 1991
- (12) Methods Of Soil Analysis, American Society Of Agronomy, Agronomy No. 9, 1965
- (13) EPA SW-846, Test Methods For Evaluating Solid Waste, Third Edition, Revision 1, November 1990
- (14) ASTM, Section 5, Petroleum Products, Lubricants, and Fossil Fuels, Volume 05.05, Gaseous Fuels, Coal and Coke
- (15) EPA 600/2-78-054, Field and Laboratory Methods Applicable To Overburdens and Mine Soils, March 1978
- (16) ASTM, Part 19, Soils and Rock; Building Stones, 1981

COMMENTS: Data in QA report may differ from final results due to digestion and/or dilution of sample into analytical ranges. The "Time Analyzed" in the QA report refers to the start time of the analytical batch which may not reflect the actual time of each analysis. The "Date Analyzed" is the actual date of analysis.

NC = Not Calculable Due To Value(s) Lower Than The Detection Limit.

Analyses performed by a subcontract laboratory are indicated on the analytical and/or quality control reports under "Technician" using the following codes:

Subcontract Laboratory	<u>Code</u>	
Core Laboratories - Anaheim, CA	*AN	
Core Laboratories - Casper, WY	*CA	
Core Laboratories - Corpus Christi, TX	*CC	
Core Laboratories - Houston, TX	*HP	
Core Laboratories - Lake Charles, LA	*LC	
Core Laboratories - Long Beach, CA	*LB	
Other Subcontract Laboratories	*XX	Laboratory ID Provided Upon Request

\* The asterisk in the "Technician" data field signifies that the analysis was performed by a subcontract laboratory.

10703 East Bethany Drive
Aurora, CO 80014
(303) 751-1780

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the cirent for whose exclusive and contidental use this report has been made. The interpretations or opinions expressed represent the best judgment or Core Laboratories. Core Laboratories, nowever, assumes no responsibility and makes no warranty or representations, express or implied, as to the productivity, proper operations, or profitableness of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or reled upon for any reason whatsoever. This report shall not be reproduced except in its entirety, without the written approval of Core Laboratories.

RECORD					LAB JOB NO.				REMARKS / PRECAUTIONS					-	8		DATE	TIME	DATE	TIME	Lake Chartes, Louisiana 3845 Arizona Street Suibhur, Louisiana 70663
CHAIN OF CUSTODY RECORD	0		5////////////												AIRBILL NO: 492 721 353		3. Relinouished By: Signature:	PRINTED NAME/COMPANY:	3 RECEIVED BY: Signature:	PRINTED NAME/COMPANY:	Houston, Teras Corpus Christi, Teras 2010 Mosely Road 1733 North Fadre Island Di. Houston, Teras 77075 Corpus Christi, Teras 7408
さ					AL AL	/ <b>&gt;</b>			5 7 7	+ 2 2	+ 1 5				55	nne other _	DATE	TIME	DATE	TIME	
CORE LABORATORIES	PROJECT INFORMATION			BILL TO Marathan CI! (	ADDRESS PC Box 552	ard TX 79702	76	7-8337	SAMP	9-219312:29 Water tom 104 4	9-21-93/2:55 water you von	4-21-93 1:40 Water 4011 004 4			ay SHIPMENT METHOD: ALT PORTO EXPROS	248 HOURS 72 HOURS 75 BAYS 71 10 DAYS X ROUTINE	DATE 2 RELINQUISHED BY: $9 - 23 c_{y}$ signature:	HERINTED NAME COMPANY:	DATE 24-33 2 RECEIVED BY: 7-34-33 SIGNATURE:	TIME PRINTED NAME COMPANY:	Denver (Aurora), Colorado         Casper, Wyoming         Houston, Taxas           1300 S. Potomac St Suite 130         420 West 1st Street         10201 Westheimer, Bkg, 1-A           Aurora. Colorado 80012         Casper, Wyoming 82601         Houston, Taxas
Western Atlan Mestern Atlan	CUSTOMER INFORMATION	COMPANY: Marathon 011	SEND REPORT TO ROLD MENZIC	1)   X	midland, IX 28202		PHONE (915) 687-8312	(215) 687-8337	SAMPLE NO.	$1  5  \omega  J$	2 # 1	1 # C			SAMPLER E. I Hill + R.M. Gra	REQUIRED TURNAROUND. • [1] SAME DAY	SIGNATURED BY:	Martho.	#3	PRINTED NAME/COMPANY:	

## APPENDIX E

# STATE ENGINEER'S FLUID RECOVERY REPORTS

Mid-Continent Region Production United States



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

August 9, 1993

Robert R. Marr Roswell Basin Watermaster State Engineer Office 1900 West Second Street Roswell, New Mexico 88201

Re: Indian Basin Treatment Project

Dear Mr. Marr:

The following table indicates the recorded meter readings for fluid removed from the Lower Queen monitoring wells as of Monday, August 2, 1993. Cumulative Lower Queen fluid removal through that date is <u>21,873,758 gallons</u>.

MONITORING WELL	METER SERIAL NUMBER	INIT'L METER START	8/02/93 METER READING	WATER REMOVED (Gal)	PER-WELL WATER REMOVED (Gal)
MW-58 (BH-84)	10239118	0	3599596	3,599,596 26,922 <sup>1</sup>	3,626,58 <b>8</b>
MW-59 (BH-85)	10259114	0	78061.9*	3,278,600 83,454 <sup>1</sup>	3,362,054
MW-61A (BH-87A)	10239116	0	3372324	3,372,324 46,578 <sup>1</sup> 84,272 <sup>2</sup>	3,503,174
MW-62 (BH-88)	10239115	0	2321046	2,321,046 193,931 <sup>3</sup> 62,622 <sup>1</sup>	2,577,599
MW-65A (BH-91A)	10239117	0	5375263	5,375,263 39,774 <sup>1</sup>	5,415,037
MW-68 (BH-94)	02209213	122618	1027848	905,230 2,484,076 <sup>1</sup>	3,389,306
			LOWER QUEEN	N TOTAL 21,873,	758

\* Metered units are barrels.

<sup>1</sup> Previously metered recovered volumes.

<sup>2</sup> Water recovered during interference test conducted 2/19-24/93.

<sup>3</sup> Total prior to automatic sampling device installation on 1/25/92.

Indian Basin Treatment Project Page 2

The following table indicates the meter readings for fluid removed from Shallow zone monitoring wells under permit RA-8015 as of Monday, August 2, 1993. The cumulative shallow fluid removal through that date is <u>638.238 gallons</u>.

MONITORING WELL	METER SERIAL NUMBER	INIT'L METER START	08/02/93 METER READING	WATER REMOVED (Gal)	PER-WELL WATER REMOVED (Gal)
MW-1				6,713 <sup>1</sup>	6,713
MW-13 (BH-36)	02209212	98236.2	116967.5	18,731 115,911 <sup>1</sup>	134,642
MW-14 (BH-37)	02209214	0	398203.7	398,204 187 <sup>1</sup>	398,391
MW-21				189 <sup>1</sup>	189
MW-35	02209212	188.8		98,303 <sup>1</sup>	98,303
		S	HALLOW TOTAL	. 638,238	gallons

<sup>1</sup> Previously metered recovered volumes.

Please note the above tables have been revised to show only the meter serial numbers and readings for the meters currently installed on each well. Earlier readings from meters that have been replaced or switched to other wells have been summarized as "previously metered recovered volumes" to simplify the tables and associated footnotes.

If more information is required, please contact me at (915) 687-8312.

Very truly yours,

Robert Mening

Robert J. Menzie, Jr.

## RJM93714/nrt

- xc: T. C. Lowry Midland
  - D. E. Kenyon PTC, Littleton
  - R. F. Unger Midland
  - R. A. Biernbaum Midland
  - C. M. Schweser- IBGP, Lakewood



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

September 9, 1993

Robert R. Marr Roswell Basin Watermaster State Engineer Office 1900 West Second Street Roswell, New Mexico 88201

Re: Indian Basin Remediation Project

Dear Mr. Marr:

The following table indicates the recorded meter readings for fluid removed from the Lower Queen monitoring wells as of Tuesday, September 7, 1993. Cumulative Lower Queen fluid removal through that date is <u>23,395,524 gallons</u>.

MONITORING WELL	METER SERIAL NUMBER	INIT'L METER START	9/07/93 METER READING	FLUID REMOVED (Gal)	PER-WELL FLUID REMOVED (Gal)				
MW-58 (BH-84)	10239118	0	3887687	3,887,687 26,922 <sup>1</sup>	3,914,609				
MW-59 (BH-85)	10259114	0	81975.4*	3,442,967 83,454 <sup>1</sup>	3,526,421				
MW-61A (BH-87A)	10239116	0	3655711	3,655,711 46,578 <sup>1</sup> 84,272 <sup>2</sup>	3,786,561				
MW-62 (BH-88)	10239115	0	2518946	2,518,946 193,931 <sup>3</sup> 62,622 <sup>1</sup>	2,775,499				
MW-65A (BH-91A)	10239117	0	5748650	5,748,650 39,774 <sup>1</sup>	5,788,424				
MW-68 (BH-94)	02209213	122618	1242552	1,119,934 2,484,076 <sup>1</sup>	3,604,010				
LOWER QUEEN TOTAL 23,395,524 Gallons									

\* Metered units are barrels.

<sup>1</sup> Previously metered recovered volumes.

<sup>2</sup> Water recovered during interference test conducted 2/19-24/93.

<sup>3</sup> Total prior to automatic sampling device installation on 1/25/92.

# Indian Basin Remediation Project Page 2

The following table indicates the meter readings for fluid removed from Shallow zone monitoring wells under permit RA-8015 as of Tuesday, September 7, 1993. The cumulative shallow fluid removal through that date is <u>638,903 gallons</u>.

MONITORING WELL	METER SERIAL NUMBER	INIT'L METER START	09/07/93 METER READING	FLUID REMOVED (Gal)	PER-WELL FLUID REMOVED (Gal)
MW-1				6,713 <sup>1</sup>	6,713
MW-13 (BH-36)	02209212	98236.2	117408.7	19,173 115,911 <sup>1</sup>	135,084
MW-14 (BH-37)	02209214	0	398204.3	398,204 187 <sup>1</sup>	398,391
MW-21				189 <sup>1</sup>	189
MW-35	02209212	188.8		98,303 <sup>1</sup>	98,303
MW-69				223 <sup>2</sup>	223
	SHALLOV	L	638,903 Gallons		

<sup>1</sup> Previously metered recovered volumes.

<sup>2</sup> Well is pumped off once or twice daily and gauged in portable fiberglass tank.

Please note the above tables have been revised to show only the meter serial numbers and readings for the meters currently installed on each well. Earlier readings from meters that have been replaced or switched to other wells have been summarized as "previously metered recovered volumes" to simplify the tables and associated footnotes.

If more information is required, please contact me at (915) 687-8312.

Sincerely, Robert J. Menzie, Jr.

RJM93909/nrt

- xc: T. C. Lowry Midland
  - D. E. Kenyon PTC, Littleton
  - R. F. Unger Midland
  - R. A. Biernbaum Midland
  - C. M. Schweser- IBGP, Lakewood

Mid-Continent Region Production United States



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

October 6, 1993

Robert R. Marr Roswell Basin Watermaster State Engineer Office 1900 West Second Street Roswell, New Mexico 88201

Re: Indian Basin Remediation Project

Dear Mr. Marr:

The following table indicates the recorded meter readings for fluid removed from the Lower Queen monitoring wells as of Monday, October 4, 1993. Cumulative Lower Queen fluid removal through that date is <u>24,432,430 gallons</u>.

MONITORING WELL	METER SERIAL NUMBER	INIT'L METER START	10/4/93 METER READING	FLUID REMOVED (Gal)	PER-WELL FLUID REMOVED (Gal)
MW-58 (BH-84)	10239118	0	4082687	4,082,687 26,922 <sup>1</sup>	4,109,609
MW-59 (BH-85)	10259114	0	84250*	3, <b>538</b> ,500 83,454 <sup>1</sup>	3,621,954
MW-61A (BH-87A)	10239116	0	3858306	<b>3,858</b> ,306 46,578 <sup>1</sup> 84,272 <sup>2</sup>	3,989,156
MW-62 (BH-88)	10239115	0	2656002	2,656,002 193,931 <sup>3</sup> 62,622 <sup>1</sup>	2,912,555
MW-65A (BH-91A)	10239117	0	6001716	6,001,716 39,774 <sup>1</sup>	6,041,490
MW-68 (BH-94)	02209213	122618	1396208	1,273,590 2,484,076 <sup>1</sup>	3,757,666
		LOWER	UEEN TOTAL	24,432,430 Gallor	ns

Metered units are barrels.

<sup>1</sup> Previously metered recovered volumes.

<sup>2</sup> Water recovered during interference test conducted 2/19-24/93.

<sup>3</sup> Total prior to automatic sampling device installation on 1/25/92.

# Indian Basin Remediation Project Page 2

The following table indicates the meter readings for fluid removed from Shallow zone monitoring wells under permit RA-8015 as of Monday, October 4, 1993. The cumulative shallow fluid removal through that date is <u>640,441 gallons</u>.

MONITORING WELL	METER SERIAL NUMBER	INIT'L METER START	10/04/93 METER READING	FLUID REMOVED (Gal)	PER-WELL FLUID REMOVED (Gal)
MW-1				6,713 <sup>1</sup>	6,713
MW-13	02209212	98236.2	117952.1	19,716 115,911 <sup>1</sup>	135,627
MW-14	02209214	0	398204.3	398,204 <sup>1</sup> 187 <sup>1</sup>	398,391
MW-21				189 <sup>1</sup>	189
MW-35	02209212	188.8		98,303 <sup>1</sup>	98,303
MW-69			••••	1218 <sup>2</sup>	1218
	SHALLOV	I TOTAL		640,441 Gallon	S

Previously metered recovered volumes.

<sup>2</sup> Well is pumped off once or twice daily and gauged in portable fiberglass tank.

Please note the above tables have been revised to show only the meter serial numbers and readings for the meters currently installed on each well. Earlier readings from meters that have been replaced or switched to other wells have been summarized as "previously metered recovered volumes" to simplify the tables and associated footnotes.

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If more information is required, please contact me at (915) 687-8312.

Sincerely, Robert J. Menzie, Jr.

RJM93909/nrt

- xc: T. C. Lowry Midland
  - D. E. Kenyon PTC, Littleton
  - R. F. Unger Midland
  - R. A. Biernbaum Midland
  - C. M. Schweser- IBGP, Lakewood