

GW - 21

REPORTS

YEAR(S):

1997

**COMPREHENSIVE
SITE CHARACTERIZATION REPORT
INDIAN BASIN REMEDIATION PROJECT
NEW MEXICO
1991 - 1997**

RECEIVED

AUG 28 1997

Environmental Bureau
Oil Conservation Division

VOLUME II OF II

July 31, 1997

Prepared for:

**Marathon Oil Company
P.O. Box 552
Midland, Texas 79702**

Prepared by:

**Fluor Daniel GTI, Inc.
2501 Yale Boulevard S.E., Suite 204
Albuquerque, New Mexico 87106
(505) 242-3113**

FLUOR DANIEL GTI



APPENDIX A

**Lithologic and Well Completion Logs
for Wells Completed from
1994 through June 1997**

dg/moc-05/cscr.wpd



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-73**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350052
 Surface Elev. _____ Total Hole Depth 220 ft. Diameter 7.875 in.
 Top of Casing _____ Water Level Initial 205 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size _____
 Casing: Dia 8.625 in. Length 10 ft. Type Steel
 Fill Material _____ Rig/Core Falling 1500
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Dave Gann Log By Bob Davis Date 11/29-30/94 Permit # _____
 Checked By Julie Marmorek License No. _____

See Site Map
For Boring Location

COMMENTS:

Well located 100 feet S of MW-72. Set 10 feet 8 5/8" surface CSG to 7 feet below grade after reaming hole to 12 1/4" to a depth of 7 feet. From 7 feet to 220 feet is open borehole.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							SPUD 0800 11/29/94 About 1 ft. alluvium before encountering bedrock. Rate of penetration about 30 ft/hr.
0							0-10 ft: DOLOMITE, medium light gray (N8), hard, interbedded with calcareous, SANDSTONE, pale olive (5 yr 5/2), soft, friable. Rate of penetration about 30 ft/hr (0'-20')
2							
4							
6							
8							
10		0					10-20 ft: Dolomitic SANDSTONE, light gray (N7), moderately soft, moderate friable, dry, slightly calcareous interbedded with DOLOMITE, gray (10 yr 6/1), very hard, conchoidal fractures. Rate of penetration = 30 ft/hr.
12							
14							
16							
18							
20		0					20-30 ft: Dolomitic SANDSTONE, fine grained, light gray (N7), moderately soft, friable, dry, slightly calcareous interbedded with occasional DOLOMITE, medium light gray (N5), hard, conchoidal fractures. Rate of penetration = 30 ft/hr.
22							
24							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-73**

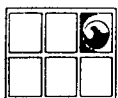
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350052

Depth (ft.)	Well Completion	PTD (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24							
26							
28							
30		0					0905-0930 = 25 minutes to change Subs, bit & connect next 30' stand. Continue drilling at 0930, depth 30 feet.
32							
34							
36							
38							
40		0					30-40 ft: SANDSTONE , fine grained, very light gray (N8), soft, friable, slightly calcareous, dry, interbedded with minor DOLOMITE, yellowish gray (5 yr 7/2), hard, conchoidal fractures.
42							
44							
46							
48							
50		0					40-50 ft: Sandy DOLOMITE , very light gray (N8), moderately hard, dry, non-calcareous.
52							
54							
56							50-60 ft: SANDSTONE , light gray (N7), fine grained, moderately soft, friable, non-calcareous interbedded with sandy DOLOMITE, very light gray (N8), moderately hard, dry, non-calcareous.



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-73**

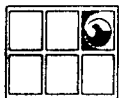
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58						
60		0				60-70 ft: Dolomitic SANDSTONE, light gray (N7), fine grained, moderately hard, dry noncalcareous interbedded with sandy DOLOMITE, medium light gray (N5), hard, crystalline.
62						
64						
66						Rate of penetration about 38 ft/hr.
68						
70		0				70-80 ft: Sandy DOLOMITE as above interbedded with dolomite, light gray, (N7), hard, brittle, conchoidal fractures, dry.
72						
74						
76						Rate of penetration about 30 ft/hr.
78						
80		0				80-90 ft: DOLOMITE, light brownish gray (5 yr 6/1) very hard, crystalline, conchoidal fractures.
82						
84						Rate of penetration about 18 ft/hr.
86						
88						



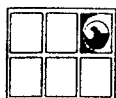
GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-73**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88						
90		0				90-100 ft: Sandy DOLOMITE, light gray (N7), moderately hard, crystalline, minor fine grained sand, conchoidal fractures, dry. Note: Cuttings are predominately powder (98%).
92						
94						Drilled 45 minutes with only 8 feet penetration.
96						
98						
100		0				100-110 ft: DOLOMITE, light brownish gray (5 yr 6/1) very hard, conchoidal fractures, interbedded sandy dolomite, light gray (N7), moderately hard, moderately hydrocarbon odor (PID = 0.0 ppm).
102						
104						1345-1430 Rig down - replaced JAWS gripping KB worn out. Downtime of 45 minutes. 1430 resumed drilling.
106						
108						Rate of penetration about 13 ft/hr.
110		0				110-120 ft: Sandy DOLOMITE, as above.
112						
114						Rate of penetration about 20 ft/hr.
116						
118						
120		0				



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-73**

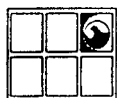
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0				120-130 ft: Sandy DOLOMITE, as above, interbedded with light brownish gray (5 yr 6/1), very hard, conchoidal fractures, moderate hydrocarbon odor, cuttings predominately "rock flour." Rate of penetration about 15 ft/hr.
122						
124						
126						
128						
130		16.4				130-140 ft: Sandy DOLOMITE, interbedded with dolomite, as above. Rate of penetration 15 ft/hr.
132						
134						
136						
138						
140		0				140-150 ft: DOLOMITE, as above. Rate of penetration 40 ft/hr. Rig shutdown for the day at 1700 hours. 11/30/94 Began setting up at 0645 hours, drilling at 0655. Found water in the hole. 0710 - Water in fuel filter - trying to fix problem - shutdown - had to go to town for new filters. <u>Rig down for 2 hours 5 minutes.</u> 0915 - Resume drilling. Rate of penetration 40 ft/hr.
142						
144						
146						
148						
150		0				150-180 ft: Dolomitic SANDSTONE, very light gray (N8), fine grained, moderately hard, non-calcareous, no hydrocarbon odor.
152						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-73**

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152						
154						Rate of penetration 17 ft/hr.
156						
158						
160		0				160-170 ft: Dolomitic SANDSTONE as above, with occasional sandy DOLOMITE, light gray (N7) moderately hard, non-calcareous, no hydrocarbon odor.
162						
164						Rate of penetration about 9 ft/hr.
166						
168						
170		0				170-180 ft: Lithology, as above, with minor dolomite, light brownish gray (5 yr 6/1), hard, brittle, conchoidal fractures, no hydrocarbon odor.
172						
174						
176						
178						
180		0				180-190 ft: DOLOMITE, light brownish gray (5 yr 6/1), very hard, microcrystalline, conchoidal fractures, no hydrocarbon odor, slightly calcareous (effervescent with 10% HCL).
182						
184						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-73**

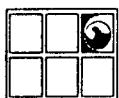
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184						Rate of penetration about 11 ft/hr.
186						
188						
190		0				190-200 ft: DOLOMITE, as above, moderate-strong hydrocarbon odor.
192						
194						
196		354 0				Rate of penetration about 40 ft/hr.
198						
200		6				200-210 ft: DOLOMITE, as above, moderate-strong hydrocarbon odor, saturated, interbedded with dolomitic LIMESTONE, light gray (N7) chalky.
202						
204						Water at 205 feet.
206						
208						Rate of penetration about 27 ft/hr.
210		0				210-220 ft: Dolomitic LIMESTONE, light gray (N7), chalky, saturated moderate hydrocarbon odor.
212						
214						
216						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-73**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350052

Depth (ft)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-216							
-218							
-220		0					Reached TD (220 ft) at 1415 hours. Reamed hole to 7' with 12 1/2" bit. Set 8 5/8" CSG to 7 feet with 3 feet above surface. Set CSG with 1 sack bentonite and 4 sacks ready mix cement. Moved Rig to MW-74 location at 1550 hours.
-222							
-224							
-226							
-228							
-230							
-232							
-234							
-236							
-238							
-240							
-242							
-244							
-246							
-248							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-74**

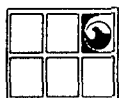
Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052
Surface Elev. _____ Total Hole Depth 220 ft. Diameter 7.875 in.
Top of Casing _____ Water Level Initial 115 ft. Static _____
Screen: Dia _____ Length _____ Type/Size _____
Casing: Dia 8.625 in. Length 9.5 ft. Type Steel
Fill Material _____ Rig/Core Failing 1500
Drill Co. WT Water Well Service Method Air Rotary
Driller Dave Gann Log By Bob Davis Date 11/30-12/06/94 Permit # _____
Checked By Julie Harns License No. _____

See Site Map
For Boring Location

COMMENTS:

MW-74 located approximately 200 ft SW of MW-73. 8 5/8" surface casing set to 7 ft below ground. From 7 feet to 220 feet is open borehole.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							SPUD 1600 hours 11/30/94 Rate of penetration about 40 ft/hr.
0							0-0.5 ft: Approximately 4-6 " alluvium before bedrock.
2							0.5-10 ft: LIMESTONE, pinkish gray (5 yr 8/1), very hard, high effervescence with 10% HCL, dry, interbedded with DOLOMITE, light brown (5 yr 6/4), hard, brittle, conchoidal fractures, no hydrocarbon odor and SANDSTONE, pale yellowish brown (10 yr 6/2), fine grained, soft, friable, noncalcareous, dry.
4							Rate of penetration about 40 ft/hr.
6							
8							
10		0					10-20 ft: SANDSTONE/LIMESTONE/DOLOMITE, as above.
12							
14							
16							
18							Shutdown Rig at 1700 hours 11/30/94. Resume drilling at 0645 12/01/94. 0715-0830 Rig shutdown - change out jaws - downtime 1.25 hours.
20		0					20-30 ft: Dolomitic SANDSTONE, yellowish gray (5 yr 8/1), fine grained, hard, non-calcareous.
22							
24							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-74**

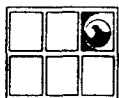
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28						Change bit at 30 feet, resume drilling at 0935. Repack Kelley swivel, change filters and pull down. 0.75 hours down. Rate of penetration 60 ft/hr.
30		0				30-40 ft: Dolomitic SANDSTONE, as above, interbedded with sandstone, yellowish gray (5 yr 8/1), fine grained, moderately hard, non-calcareous, dry.
32						
34						Rate of penetration about 24 ft/hr.
36						
38						
40		0				40-50 ft: SANDSTONE, yellowish gray (5 yr 8/1), very fine grained, moderately soft, moderately friable, dry interbedded with sandy sandy dolomite, very light gray (N8), moderately hard, microcrystalline, conchoidal fractures.
42						
44						Rate of penetration 20 ft/hr.
46						
48						
50		0				50-60 ft: SANDSTONE, as above.
52						Rate of penetration about 30 ft/hr.
54						
56						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-74**

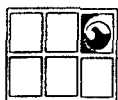
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58						
60		0				
62						80-70 ft: Sandy DOLOMITE, very light gray (N8), moderately hard to hard, microcrystalline, interbedded with minor SANDSTONE, yellowish gray (5 yr 8/1), moderately soft, moderately friable, dry, non-calcareous, no hydrocarbon odor.
64						
66						Rate of penetration about 24 ft/hr.
68						
70		0				70-80 ft: Sandy DOLOMITE, very light gray (N8), hard, brittle, microcrystalline, dry, no hydrocarbon odor.
72						
74						Rate of penetration about 17 ft/hr.
76						
78						
80		0				80-80 ft: DOLOMITE, light brownish gray (5 yr 6/1), hard, brittle microcrystalline, conchoidal fractures, dry, no hydrocarbon odor.
82						
84						Rate of penetration about 17 ft/hr.
86						
88						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-74**

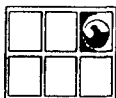
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88						
90		0				90-100 ft: DOLOMITE interbedded with sandy dolomite, very light gray (N8), hard, brittle, dry, no hydrocarbon odor.
92						
94						
96						
98						
100		0				100-110 ft: DOLOMITE, light brownish gray (5 yr 6/1) to very light gray (N8), hard, microcrystalline, conchoidal fractures, dry, faint hydrocarbon odor.
102						
104						Rate of penetration about 30 ft/hr.
106						
108						
110		0				110-120 ft: DOLOMITE, as above, with minor sandy dolomite, light gray (N7), moderately hard, microcrystalline, saturated, no hydrocarbon odor.
112						
114						
116		0				Water at 115 feet with moderate-strong hydrocarbon odor; PID=0.0 ppm.
118						Rate of penetration about 12 ft/hr.
120		0				



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-74**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0				120-130 ft: DOLOMITE and sandy dolomite, as above.
122						
124						
126						Rate of penetration about 30 ft/hr.
128						
130		0				130-140 ft: DOLOMITE, light brownish gray (5 yr 6/1) to very light gray (N8), hard, microcrystalline, conchoidal fractures, no hydrocarbon odor.
132						At 132 feet driller had to add water to system to remove cuttings. Abundant sand, fine grained, quartz, non-calcareous.
134						
136						Rate of penetration about 15 ft/hr.
138						
140		0				140-150 ft: DOLOMITE/SAND, as above, no hydrocarbon odor.
142						
144						Rate of penetration about 30 ft/hr.
146						
148						
150		0				150-160 ft: Abundant SAND with minor DOLOMITE.
152						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-74**

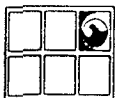
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152							
154							
156							
158							
160		0					
162							160-170 ft: SANDSTONE, yellowish gray (5 yr 7/2), fine grained, quartz grains, noncalcareous, interbedded with DOLOMITE, pale yellowish brown (10 yr 6/2), hard, cherty, conchoidal fractures, no hydrocarbon odor.
164							
166							
168							At 1605 hours pulled out of hole to run surface CSG, ream top hole to 7 feet with 12.25" bit. Set 10 feet of 8 5/8" CSG to 7 feet below grade. Resume drilling 12/05/94 at 1215 hours.
170		0					
172							170-180 ft: DOLOMITE, pale yellowish brown (10 yr 6/2) hard, cherty, microcrystalline, conchoidal fractures, no hydrocarbon odor.
174							
176							Rate of penetration about 15 ft/hr.
178							
180		0					
182							180-190 ft: DOLOMITE, as above.
184							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-74**

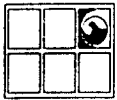
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184						Rate of penetration 15 ft/hr.
186						
188						
190		0				190-200 ft: DOLOMITE, as above.
192						1400 hours at 192 feet, hydraulic pump failed. Rig down until pump can be replaced. Resumed drilling at 1615 hours on 12/06/94.
194						
196						Rate of penetration about 20 ft/hr.
198						
200		0				200-210 ft: DOLOMITE, as above, interbedded with LIMESTONE, light gray (N7), hard, crystalline, high effervescence with 10% HCL, no hydrocarbon odor.
202						
204						Rate of penetration about 30 ft/hr.
206						
208						
210		0				210-220 ft: SANDSTONE, yellowish gray (5 yr 7/2), fine grained, moderately hard, brittle, calcareous, quartz grains, no hydrocarbon odor, interbedded with DOLOMITE, as above.
212						
214						Rate of penetration about 40 ft/hr.
216						



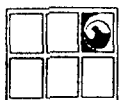
GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-74**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
216						
218						
220		0				Total depth at 1800 hours on 12/06/94. TD = 220 feet.
222						
224						
226						
228						
230						
232						
234						
236						
238						
240						
242						
244						
246						
248						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-75**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052
 Surface Elev. _____ Total Hole Depth 220 ft. Diameter 7.875 in.
 Top of Casing _____ Water Level Initial 85 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size _____
 Casing: Dia 8.625 in. Length 10 ft. Type Steel
 Fill Material _____ Rig/Core Falling 1500
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Ronny Keith Log By Bob Davis Date 12/02-08/94 Permit # _____
 Checked By Mike Mammone License No. _____

See Site Map
For Boring Location

COMMENTS:

400 ft Southwest of MW-73. 8 5/8" surface CSG set to 10 feet below grade. Surface CSG is 27" above grade. From 10 feet to 220 feet is open borehole.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.25							SPUD 12/02/94 0935 hours
0							0-4 ft: Alluvium, silty SAND, pale yellowish brown, (10 yr 6/2), fine grained, soft, friable, dry.
2							Rate of penetration about 40 ft/hr.
4							4-10 ft: Silty SAND, pale yellowish brown (10 yr 6/2), fine grained, soft, friable, dry. LIMESTONE, very pale orange (10 yr 8/2) hard, (high effervescence with 10% HCL) dry. DOLOMITE, light brownish gray (5 yr 6/1), very hard, crystalline, conchoidal fractures, dry.
6							
8							
10		0					10-20 ft: Sandy DOLOMITE, light gray (N7), fine to medium quartz grains, hard, conchoidal fractures, dry.
12							
14							
16							Rate of penetration about 30 ft/hr.
18							
20		0					20-30 ft: SANDSTONE, yellowish gray (5 yr 8/1) to light brownish gray (5 yr 6/1), fine grained quartz sand, moderately hard to hard, non-calcerous, dry with minor sandy DOLOMITE, light gray (N7), fine grained quartz sand, hard, brittle, conchoidal fractures, dry, no hydrocarbon odor.
22							
24							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-75**

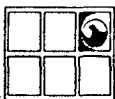
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						Rate of penetration about 24 ft/hr.
26						
28						
30		0				30-40 ft: SANDSTONE , light gray (N7) to light brownish gray (5 yr 6/1), fine grained, moderately hard to soft, friable, dry, noncalcareous, with minor sandy DOLOMITE, as above.
32						
34						
36						Rate of penetration about 30 ft/hr.
38						
40		0				40-50 ft: SANDSTONE/sandy DOLOMITE , as above.
42						Change jaws on kelly. Down 55 minutes (1130-1225).
44						
46						
48						
50		0				50-60 ft: SANDSTONE , pale yellowish brown (10 yr 6/2) to light gray (N7), very fine grained, soft, friable, dry, noncalcareous, no hydrocarbon odor.
52						
54						Rate of penetration about 30 ft/hr.
56						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-75**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58						
60		0				60-70 ft: With sandy DOLOMITE, light gray (N7) fine grained quartz, very hard, conchoidal fractures, dry, no hydrocarbon odor.
62						
64						Rate of penetration about 30 ft/hr.
66						
68						
70		0				70-80 ft: SANDSTONE, as above.
72						
74						Rate of penetration about 24 ft/hr.
76						
78						
80		0				80-90 ft: SANDSTONE interbedded with DOLOMITE, light brownish gray (5 yr 6/1), very hard, microcrystalline, conchoidal fractures, and sandy DOLOMITE, light gray (N7) fine grained quartz, very hard conchoidal fractures, saturated, no hydrocarbon odor.
82						
84						
86						Water at 85 feet, no hydrocarbon odor. Add water to air system to bring up cuttings. Distint "oily" sheen on water from the borehole.
88						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-75**

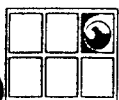
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88						
90		0				90-100 ft: DOLOMITE/sandy dolomite (as above) with minor SANDSTONE.
92						
94						
96						Rate of penetration about 30 ft/hr.
98						
100						100-110 ft: DOLOMITE, grayish orange (10 yr 7/4), hard, crystalline (many rhombohedral crystals visible with hand lens), conchoidal fractures, saturated, no hydrocarbon odor.
102						
104						
106						
108						Pulled out of hole to set surface CSG - 8 5/8" CSG to 10 feet BG. Grout with 1 sack bentonite, 7 sacks reedy mix cement. Rig down at 1630 hours 12/06/94. Resume drilling at 1320 hours 12/07/94.
110		0				110-120 ft: DOLOMITE, grayish orange (10 yr 7/4) to pale yellowish brown (10 yr 6/2), very hard, microcrystalline, occasionally cherty, conchoidal fractures, saturated, no hydrocarbon odor.
112						
114						
116		0				Rate of penetration about 12 ft/hr.
118						
120		0				



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-75**

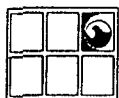
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0				
122						120-130 ft: DOLOMITE, as above, interbedded with SANDSTONE, pale yellowish brown (10 yr 6/2), very fine grained quartz, occasionally silty, soft, friable, saturated, non-calcareous.
124						
126						Black liquid (hydrocarbons ?) observed mixed with water, hydrocarbon odor but no PID readings.
128						Rate of penetration about 15 ft/hr.
130		0				130-140 ft: DOLOMITE as above.
132						
134						
136						
138						
140		0				Black sheen on water, moderate hydrocarbon odor, PID = 0.0 ppm.
142						140-150 ft: DOLOMITE, light brownish gray (5 yr 6/1), hard, microcrystalline, occasionally cherty, conchoidal fractures, saturated, no hydrocarbon odor.
144						
146						Rate of penetration about 15 ft/hr.
148						
150		0				150-160 ft: DOLOMITE, as above, interbedded with SANDSTONE, pale yellowish brown (10 yr 6/2), moderately hard, moderately friable, very fine grained, non-calcareous, saturated, no hydrocarbon odor.
152						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-75**

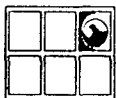
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152						
154						
156						
158						
160		0				
162						
164						
166						
168						
170		0				
172						
174						
176						
178						
180		0				
182						
184						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-75**

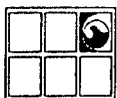
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184						Rate of penetration about 11 ft/hr.
186						
188						
190		0				190-200 ft: DOLOMITE, as above, moderately strong hydrocarbon odor.
192						
194						Rate of penetration about 11 ft/hr.
196						
198						
200		75.1				200-210 ft: DOLOMITE, as above, strong hydrocarbon odor.
202						
204						
206						
208						Rate of penetration about 30 ft/hr.
210		709				210-220 ft: SANDSTONE, pale yellowish brown, (10 yr 6/2), fine quartz grains, moderately soft, moderately friable, occasional vugs of secondary euhedral quartz crystals, calcareous cement, saturated, moderate hydrocarbon odor, minor DOLOMITE, as above, LIMESTONE, light gray (N7), hard, microcrystalline, massive.
212						Drill break at 211 feet and approximately 8 inches, possible small sandstone stringer.
214						
216						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-75**

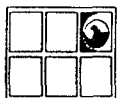
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
216						
218						
220		3.2				Well TD at 220 ft. at 1100 hours 12/08/94.
222						
224						
226						
228						
230						
232						
234						
236						
238						
240						
242						
244						
246						
248						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-76**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052
Surface Elev. _____ Total Hole Depth 220 ft. Diameter 7.875 in.
Top of Casing _____ Water Level Initial 35 ft. Static _____
Screen: Dia NA in. Length _____ Type/Size _____
Casing: Dia 8.625 in. Length 9 ft. Type Steel
Fill Material _____ Rig/Core Falling 1500
Drill Co. WT Water Well Service Method Air Rotary
Driller Ronny Keith Log By Bob Davis Date 12/07-12/94 Permit # _____
Checked By Willie M. M. M. License No. _____

See Site Map
For Boring Location

COMMENTS:

Replacement well for MW-68 set 8 5/8" surface CSG to 6 ft. below grade on 12/7/94. From 6 feet to 220 feet is open borehole.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							SPUD well for surface CSG at 0700 hours 12/07/94.
0							0-6 ft: Encountered bedrock about 0.5 ft below grade, DOLOMITE, light brownish gray (5 yr 6/1), hard, microcrystalline, cherty, conchoidal fractures, dry.
2							
4							Drilled to 6 feet. Resume drilling at 0625 hours on 12/09/94.
6							6-10 ft: DOLOMITE, pale yellowish brown (10 yr 6/2), to light gray (N7), hard, microcrystalline, occasionally cherty, conchoidal fractures, dry, no hydrocarbon odor.
8							
10		0					10-20 ft: DOLOMITE, as above.
12							
14							Rate of penetration about 7.5 ft/hr.
16							
18							
20		0					20-30 ft: DOLOMITE, light gray (N7) to medium light gray (N6), very hard, microcrystalline, dry, no hydrocarbon odor.
22							
24							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-76**

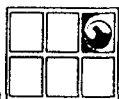
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24							Rate of penetration about 6 ft/hr.
26							
28							
30		0					30-40 ft: DOLOMITE, as above, with thin stringers of silty SANDSTONE/SILTSTONE, medium dark gray (N4). Fine grained, moderate- hard, noncalcareous, dry, moderate hydrocarbon odor.
32							
34							35 ft: Strong hydrocarbon odor at 35 feet with some moisture possible. Top of shallow zone aquifer.
36							
38							Rate of penetration about 24 ft/hr.
40		0					40-50 ft: SANDSTONE, light brownish gray (5 yr 6/1), silty, fine grained, moderate hard, noncalcareous, damp, interbedded with DOLOMITE (as above) and LIMESTONE, light gray (N7), hard, crystalline, effervescence with 10% HCL. No hydrocarbon odor.
42							
44							
46							Rate of penetration about 15 ft/hr.
48							
50							50-60 ft: SANDSTONE, DOLOMITE, LIMESTONE, as above, with moderate hydrocarbon odor, moist.
52							
54							
56							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-76**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58						
60		0				Water noted at 60 foot connection (probably from 35 ft.). 61-64 ft: Drilling break - SANDSTONE, pale yellowish orange (10 yr 8/6), fine grained, hard, calcareous cement, damp. Faint hydrocarbon odor.
62						Rate of penetration about 30 ft/hr (60-70 interval).
64						64-70 ft: GYPSUM, pale olive, (10 yr 6/2) very soft, friable, platy, moist, interbedded with minor SANDSTONE and DOLOMITE, as above. No hydrocarbon odor.
66						
68						Rate of penetration about 20 ft/hr.
70		0				70-80 ft: LIMESTONE, very light gray (N8), moderately soft to hard, chalky, interbedded with DOLOMITE, as above. Moist, fair hydrocarbon odor.
72						
74						
76						
78						
80		0				80-90 ft: SANDSTONE, pale yellowish brown (10 yr 6/2), fine grained, moderately hard, moderately brittle, noncalcareous, saturated, interbedded with minor DOLOMITE and LIMESTONE, as above. No hydrocarbon odor.
82						
84						
86						
88						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-76**

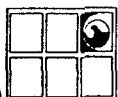
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88						
90		0				90-100 ft: Interbedded SANDSTONE and DOLOMITE, as above, no hydrocarbon odor. Occasional hematite stain and sandstone cuttings.
92						
94						Rate of penetration about 15 ft/hr.
96						
98						
100		0				100-110 ft: DOLOMITE, pale yellowish brown (10 yr 6/2) to brownish gray (5 yr 6/1), hard, microcrystalline, cherty, conchoidal fractures, no hydrocarbon odor, interbedded with SANDSTONE, as above (see 90 ft.).
102						
104						
106						
108						
110		0				110-120 ft: LIMESTONE, grayish orange (10 yr 7/4), to grayish orange pink (5 yr 7/2), moderately soft, crystalline, chalky, powdery in cutting. Minor DOLOMITE, no hydrocarbon odor.
112						
114						
116						
118						
120		0				



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-76**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0				120-130 ft: LIMESTONE/DOLOMITE, as above. Down for routine maintenance (tighten clutch, etc.).
122						
124						
126						
128						130-140 ft: LIMESTONE/DOLOMITE, as above, no hydrocarbon odor. Rate of penetration about 40 ft/hr.
130		0				
132						
134						
136						140-150 ft: SANDSTONE, grayish orange (10 yr 7/4), very fine grained, moderately hard, noncalcareous. Limey SANDSTONE, very pale orange (10 yr 8/2), very fine grained, well rounded, moderately hard, strong effervescence w/10% HCL, no hydrocarbon odor. Minor DOLOMITE. Rate of penetration 60 ft/hr.
138						
140		0				
142						
144						150-160 ft: SANDSTONE, Limey SANDSTONE, minor DOLOMITE, as above, no hydrocarbon odor.
146						
148						
150		0				
152						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-76**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152						
154						
156						
158						
160		0				Rate of penetration about 40 ft/hr.
162						
164						
166						
168						
170		0				180-170 ft: SANDSTONE, grayish orange (10 yr 7/4), very fine quartz grains, moderately hard, well cemented, non-calcareous, no hydrocarbon odor.
172						
174						
176						
178						
180		0				170-180 ft: Dolomitic SANDSTONE, grayish orange (10 yr 7/4), fine grained, 95% loose grains in cuttings, calcareous cement, minor LIMESTONE.
182						
184						
						Rate of penetration about 80 ft/hr.
						180-190 ft: DOLOMITE, paly yellowish brown (10 yr 6/2) very hard, microcrystalline, interbedded with LIMESTONE, pale yellowish brown (10 yr 6/2), moderately hard, microcrystalline. Effervescence with 10% HCL, no hydrocarbon odor.



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-76**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184							Rate of penetration about 80 ft/hr.
186							
188							
190		0					
192							190-200 ft: LIMESTONE, as above, with DOLOMITE, fractures in dolomite filled with calcareous cement, no hydrocarbon odor. Soap added to water to bring up cuttings.
194							
196							
198							
200		0					200-210 ft: SANDSTONE, pale yellowish brown (10 yr 6/2), fine grained, moderately hard, calcareous, no hydrocarbon odor.
202							
204							
206							
208							210-212 ft: SANDSTONE, grayish red (5yr 4/2), very fine grained, moderately hard, noncalcareous, no hydrocarbon odor.
210		0					
212							
214							
216							213-220 ft: SANDSTONE, pale yellowish brown (10 yr 6/2), fine grained, moderately hard, very calcareous, no hydrocarbon odor.



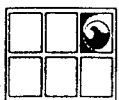
GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-76**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-216-						
-218-						
-220-		0				Well TD at 1335 hrs. 12/12/94.
-222-						
-224-						
-226-						
-228-						
-230-						
-232-						
-234-						
-236-						
-238-						
-240-						
-242-						
-244-						
-246-						
-248-						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-77**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052
 Surface Elev. _____ Total Hole Depth 80 ft. Diameter 7.875 in.
 Top of Casing _____ Water Level Initial _____ Static _____
 Screen: Dia NA in. Length _____ Type/Size _____
 Casing: Dia 8.625 in. Length 17.5 ft. Type Steel
 Fill Material _____ Rig/Core Failing 1500
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Ronny Keith Log By Bob Davis Date 12/07-13/94 Permit # _____
 Checked By Dixie Maudslayi License No. _____

See Site Map
For Boring Location

COMMENTS:

8.625 inches surface casing set to 15 feet on 12/07/94. Well completed on 12/13/94. Located 400 feet SE of MW-73. From 15 feet to 80 feet is open borehole.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5							Spud for surface casing at 0815 on 12/07/94.
0							Well spud in silty alluvium. Alluvium to a depth of 10 feet.
2							0-10 ft: SILTSTONE, moderate yellowish brown (10 yr 4/2), very soft, friable, dry.
4							
6							
8							
10		0					10-11 ft: LIMESTONE, light gray (N7), hard, crystalline, dry with subangular dolomitic gravel (1/2 inch to 3 inches), occasional SANDSTONE, light gray (N7), fine grained quartz, moderately soft, moderately friable, dry.
12							
14							15-20 ft: DOLOMITE, pale yellowish brown (10 yr 6/2) to dark yellowish brown (10 yr 4/2), hard, cherty, microcrystalline, conchoidal fractures, dry, with minor LIMESTONE, light gray (N7), hard crystalline, dry.
16							
18							
20		2.2					20-25 ft: DOLOMITE, as above, no hydrocarbon odor, minor LIMESTONE.
22							Rate of penetration about 15 ft/hr.
24							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-77**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26		0				25-30 ft: DOLOMITE and minor LIMESTONE with minor SILTSTONE, sandy, pale yellowish brown (10 yr 6/2), moderately hard, dry.
28						**Change filters in air system - downtime 20 minutes**
30		0				Rate of penetration 15 ft/hr.
32						30-35 ft: DOLOMITE, as above, with occasional SILTSTONE, dark yellowish orange (10 yr 6/6), (hematite stained), sandy, slightly calcareous, dry, no hydrocarbon odor.
34						Rate of penetration 20 ft/hr.
36		0				35-40 ft: DOLOMITE, dry, moderate hydrocarbon odor.
38						Rate of penetration about 15 ft/hr.
40		14.8				40-45 ft: DOLOMITE, as above, interbedded with sandstone, medium dark gray (N4), fine-medium quartz grains-round to subrounded, poorly sorted, very hard, non-calcareous, dry, no hydrocarbon odor.
42						
44		0				45-50 ft: Dolomite, interbedded with minor SANDSTONE, dry, no hydrocarbon odor.
46						Rate of penetration about 15 ft/hr.
48						
50		4.6				50-55 ft: As above, dry, no hydrocarbon odor.
52						
54						
56		23.0				55-80 ft: DOLOMITE, as above, with minor SILTSTONE, dark yellowish orange (10 yr 6/6), hematite stained,



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-77**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58						moderately soft, non-calcareous, dry, faint hydrocarbon odor.
60		8.1				Rate of penetration about 15 ft/hr.
62						80-85 ft: DOLOMITE, as above, with SANDSTONE, dark yellowish orange (10 yr 6/6), very fine quartz grains, well rounded, hard, noncalcareous, well cemented, dry, no hydrocarbon odor.
64						Rate of penetration about 12 ft/hr.
66		0				85-70 ft: DOLOMITE and SANDSTONE, as above, dry, no hydrocarbon odor.
68						Rate of penetration about 30 ft/hr.
70		0				70-75 ft: DOLOMITE and SANDSTONE, as above, dry, no hydrocarbon odor.
72						Rate of penetration about 20 ft/hr.
74		1.2				75-80 ft: DOLOMITE and SANDSTONE, as above, with minor LIMESTONE, light gray (N7), hard, microcrystalline, dry, faint hydrocarbon odor.
76						
78						
80		13.1				Well Total Depth = 80 feet at 1115 hours on (12/13/94)
82						
84						
86						
88						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-78**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052
 Surface Elev. _____ Total Hole Depth 85 ft. Diameter 7.875 in.
 Top of Casing _____ Water Level Initial _____ Static _____
 Screen: Dia _____ Length _____ Type/Size _____
 Casing: Dia 8.625 in. Length 13.08 ft. Type Steel
 Fill Material _____ Rig/Core Falling 1500
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Roy Spruill Log By Bob Davis Date 12/12-13/94 Permit # _____
 Checked By Vicki Newman License No. _____

See Site Map
For Boring Location

COMMENTS:

Located on North side of arroyo approximately 800 feet east of MW-57. 8 5/8" surface casing was set 11 feet below grade. Surface casing sticks up 25 inches above grade. Total length of surface casing is 13 feet 1 inch. From 11 feet to 80 feet is open borehole.

Depth (ft.)	Well Completion	PTD (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2.1 Not to scale						Well spud for surface casing at 1505 12/12/94.
0						0-6 ft: Alluvium, SILTSTONE, moderate yellowish brown (10 yr 4/2) loose, dry.
2						
4						
6						
8						7-10 ft: SANDSTONE, yellowish gray (5 yr 8/1), silty, very fine grained, moderately hard, noncalcareous, dry, no hydrocarbon odor.
10		0				10-15 ft: SANDSTONE, as above, interbedded with minor DOLOMITE, pale yellowish brown (10 yr 6/2), hard, microcrystalline, fractures, dry, occasional hematite staining.
12						
14						Rate of penetration about 20 ft/hr.
16		0				15-20 ft: DOLOMITE, dark yellowish orange (10 yr 6/6), very hard, microcrystalline, cherty, conchoidal fractures, dry, no hydrocarbon odor.
18						Rate of penetration 20 ft/hr.
20		0				
22						20-25 ft: DOLOMITE, as above, dry, no hydrocarbon odor, pale yellowish brown (10 yr 6/2) to dark yellowish orange (10 yr 6/6).
24						



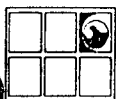
GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-78**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0				
26						25-30 ft: DOLOMITE, as above.
28						Rate of penetration about 12 ft/hr.
30		0				
32						30-35 ft: Dolomitic SANDSTONE, grayish black (N2), fine quartz grains, very hard, noncalcareous, with minor DOLOMITE, pale yellowish brown (10 yr 6/2), hard, microcrystalline, cherty, conchoidal fractures, dry. No hydrocarbon odors.
34						Rate of penetration about 15 ft/hr.
36		9.9				35-40 ft: Dolomitic SANDSTONE, pale yellowish orange (10 yr 8/6) to pale yellowish brown (10 yr 6/2), as above.
38						Rate of penetration about 30 ft/hr.
40		9.9				
42						40-45 ft: DOLOMITE, brownish gray (5 yr 4/1), hard, microcrystalline, cherty, conchoidal fractures, dry, no hydrocarbon odors.
44						Rate of penetration about 15 ft/hr.
46		12.9				45-50 ft: Sandy DOLOMITE, grayish black (N2) and DOLOMITE, as above.
48						Rate of penetration about 15 ft/hr.
50		0				
52						50-55 ft: Sandy DOLOMITE and dolomite, as above, with SILTSTONE, dark yellowish brown (10 yr 6/6), moderately soft, dry, no hydrocarbon odor.
54						Rate of penetration about 30 ft/hr.
56		0				55-80 ft: SANDSTONE, grayish orange (10 yr 7/4) to dark yellowish brown (10 yr 4/2), very fine grained, hard, well



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-78**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58						
60		3.2				cemented, calcareous, in fractures, dry, no hydrocarbon odor, interbedded with DOLOMITE, pale yellowish brown (10 yr 6/2), hard, microcrystalline, cherty, conchoidal fractures. Rate of penetration about 15 ft/hr.
62						60-85 ft: DOLOMITE, pale yellowish brown (10 yr 6/2) to dark yellowish brown (10 yr 6/6), hard, microcrystalline, cherty, conchoidal fractures, dry, no hydrocarbon odor, interbedded with minor SANDSTONE, as above.
64		0				
66						65-70 ft: SANDSTONE, as above, with interbedded DOLOMITE.
68						Rate of penetration about 30 ft/hr.
70		0				
72						70-75 ft: Sandy DOLOMITE, light gray (N7), medium gray (N5) to grayish orange (10 yr 7/4), very hard, fine grained quartz inclusions, dolomite is microcrystalline, dry, fair hydrocarbon odor.
74						Rate of penetration about 15 ft/hr.
76		40				75-80 ft: Sandy DOLOMITE, as above. Dry, no hydrocarbon odor.
78						Rate of penetration about 10 ft/hr.
80		0				
82						80-85 ft: DOLOMITE, grayish orange (10 yr 7/4) to pale yellowish brown (10 yr 6/2), hard microcrystalline, cherty, conchoidal fractures. Dry, no hydrocarbon odor.
84						
86		0				TD @ 85 ft. 1610 hrs. 12/13/94.
88						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-79**

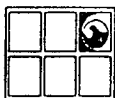
Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052
 Surface Elev. _____ Total Hole Depth 80 ft. Diameter 7.875 in.
 Top of Casing _____ Water Level Initial _____ Static _____
 Screen: Dia _____ Length _____ Type/Size _____
 Casing: Dia 8.625 in. Length 8 ft. Type Steel
 Fill Material _____ Rig/Core Failing 1500
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Roy Spruill Log By Bob Davis Date 12/14/94 Permit # _____
 Checked By Julie Maramba License No. _____

See Site Map
For Boring Location

COMMENTS:

Located approximately 150 ft SSW of
BH-30 (MW-7). Set 8.625" surface
casing to 5.5 ft. below ground with 2.5
ft. above ground. From 5.5 feet to 80
feet is open borehole.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale							Spud at 1345 hrs, 12/14/94.
0							0-1 ft: Alluvium, SILT, moderate yellowish brown (10 yr 5/4), loose, unconsolidated.
2							1-5 ft: DOLOMITE, grayish orange (10 yr 7/4), hard, microcrystalline, cherty, conchoidal fractures, dry.
4							Rate of penetration about 20 ft/hr.
6		0					5-10 ft: DOLOMITE, grayish orange (10 yr 7/4) to pale yellowish brown (10 yr 6/2), as above.
8							Rate of penetration about 12 ft/hr.
10		0					10-15 ft: DOLOMITE, as above.
12							Rate of penetration about 15 ft/hr.
14		0					15-20 ft: DOLOMITE, as above, interbedded with dolomitic SANDSTONE, pale yellowish brown (10 yr 6/2), fine grained, moderately hard, well cemented.
16							Rate of penetration 15 ft/hr.
18							20-25 ft: DOLOMITE, pale yellowish brown (10 yr 6/2), hard, microcrystalline, cherty, conchoidal fractures, dry, no hydrocarbon odor.
20		0					
22							
24							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-79**

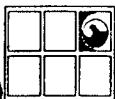
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24							Rate of penetration about 10 ft/hr.
26		0					25-30 ft: DOLOMITE, as above, with minor dolomitic SANDSTONE, medium dark gray (N4), fine grained, moderately hard, well cemented, noncalcareous, dry, no hydrocarbon odor. * Set temporary surface casing to 2.5 feet to control caving. Rate of penetration 20 ft/hr.
28							
30		0					30-35 ft: DOLOMITE, pale yellowish brown (10 yr 6/2) to dark yellowish brown (10 yr 4/2), as above, interbedded with SANDSTONE, light olive gray (5 yr 6/1) to dark yellowish orange (10 yr 6/6), fine grained, occasionally silty, moderately soft, minor hematite staining, dry, no hydrocarbon odor. Rate of penetration about 15 ft/hr.
32							
34		0					35-40 ft: DOLOMITE, as above, dry, no hydrocarbon odor. Rate of penetration about 15 ft/hr.
36							
38							
40		0					40-45 ft: SANDSTONE, pale yellow brown (10 yr 6/2) to medium dark gray (N4), silty, fine grained, soft to moderately hard, occasional hematite staining, with minor DOLOMITE, as above. Dry, no hydrocarbon odor. Rate of penetration about 15 ft/hr.
42							
44		0					45-50 ft: SANDSTONE, as above, interbedded with dolomitic sandstone, medium dark gray (N4), moderately hard, fine grained, well cemented, non-calcareous and DOLOMITE, dark yellowish brown (10 yr 6/2), hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor. Rate of penetration about 15 ft/hr.
46							
48							
50		0					50-55 ft: DOLOMITE and SANDSTONE, as above, dry, faint hydrocarbon odor. Rate of penetration about 12 ft/hr (with connection).
52							
54							
56		20.4					



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-79**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						55-80 ft: DOLOMITE, pale yellow brown (10 yr 6/2), hard, microcrystalline, cherty, conchoidal fractures, interbedded with dolomitic SANDSTONE, yellowish orange (10 yr 6/6), hard, fine grained, well cemented, fractures, non-calcareous, dry, no hydrocarbon odor. Rate of penetration about 12 ft/hr.
58						
60		17.2				60-65 ft: DOLOMITE and dolomitic SANDSTONE, as above, dry, moderate hydrocarbon odor. Rate of penetration about 12 ft/hr.
62						
64						65-70 ft: DOLOMITE/dolomitic SANDSTONE, as above, cuttings are 90% powder, fine grains (after washing) are highly effervescent with 10% HCL., possibly limey sand, dry, moderate hydrocarbon odor.
66		53.1				
68						70-75 ft: Lithology, as above, dry, no hydrocarbon odor.
70		7.1				
72						75-80 ft: Lithology, as above, dry, moderate hydrocarbon odor.
74		0				
76						Well TD @ 80 ft., 1955 hrs. 12/14/94.
78						
80		34.4				
82						
84						
86						
88						

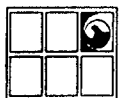
Monitoring Well **MW-80**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052
Surface Elev. _____ Total Hole Depth 90 ft. Diameter 7.875 in.
Top of Casing _____ Water Level Initial _____ Static _____
Screen: Dia _____ Length _____ Type/Size _____
Casing: Dia 8.625 in. Length 18.92 ft. Type Steel
Fill Material _____ Rig/Core Failing 1500
Drill Co. WT Water Well Service Method Air Rotary
Driller Roy Spruill Log By Bob Davis Date 12/14-15/94 Permit # _____
Checked By Debbie Messersmith License No. _____

COMMENTS:

Located approximately 80 feet East of MW-70. Set 8 5/8" surface casing to 16.8 feet below ground with 2.3 feet above ground. From 16.8 feet to 90 feet is open borehole.

Depth (ft.)	Well Completion	O (ppm)	Sample ID	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.25						Spud well 1005 hours, 12/14/94.
0						Alluvium - dolomite/limestone coarse gravel and cobbles.
2						0-5 ft: Alluvium continues.
4						
6		0				5-10 ft: Dolomite gravels/DOLOMITE, pale yellowish brown (10 yr 6/2), hard, microcrystalline, cherty, conchoidal fractures, dry, no hydrocarbon odor.
8						
10		0				10-15 ft: DOLOMITE, as above, with minor cherty, dark yellowish orange (10 yr 6/6).
12						
14		0				15-20 ft: DOLOMITE, pale yellowish brown (10 yr 6/2) to grayish orange (10 yr 7/4), microcrystalline, hard, conchoidal fractures interbedded with thin beds of SILTSTONE, dark yellowish brown (10 yr 6/6), soft, friable, dry, no hydrocarbon odor.
16						
18						Rate of penetration about 20 ft/hr.
20		0				20-25 ft: SANDSTONE, dark yellowish orange (10 yr 6/6), fine grained, silty, moderately hard, non-calcareous. Sandy DOLOMITE, dark yellowish brown (10 yr 4/2), hard, fine quartz grains. Minor DOLOMITE, pale yellowish brown (10 yr 6/2), microcrystalline, cherty, conchoidal fractures. Dry, no hydrocarbon odor.
22						
24						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-80**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	O (ppm)	Sample ID	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						Rate of penetration about 10 ft/hr.
26		0				25-30 ft: Predominately DOLOMITE, as above, with minor SANDSTONE and sandy dolomite.
28						Rate of penetration about 8 ft/hr (with connection).
30		0				30-35 ft: DOLOMITE, grayish orange (10 yr 7/4) to pale yellowish brown (10 yr 6/2), microcrystalline, hard, cherty, conchoidal fractures, minor hematite staining, dry, no hydrocarbon odor.
32						Rate of penetration about 15 ft/hr.
34		0				35-40 ft: DOLOMITE, as above, interbedded with SANDSTONE, dark yellowish brown (10 yr 4/2), fine grained, well cemented, dolomitic, dry, no hydrocarbon odor.
36						Rate of penetration about 20 ft/hr.
38		0				40-45 ft: DOLOMITE, as above, interbedded with minor thin beds of SANDSTONE, brownish gray (5 yr 4/1), moderate soft, fine grained, dry, no hydrocarbon odor.
40						45-50 ft: DOLOMITE and SANDSTONE, as above, with sandy DOLOMITE, light gray (N7), hard, fine quartz grains, microcrystalline, non-calcareous, dry, no hydrocarbon odor.
42		0				50-55 ft: Lithology, as above, dry, no hydrocarbon odor.
44						Rate of penetration about 15 ft/hr.
46		0				
48						
50		0				
52						
54		0				
56						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-80**

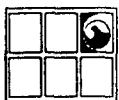
Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	O (ppm)	Sample ID	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						55-60 ft: SANDSTONE, pale yellowish brown (10 yr 6/2), very fine grained, hard, well cemented, dolomitic, non-calcareous, with interbedded DOLOMITE, dark yellowish orange (10 yr 6/6), microcrystalline, hard, cherty, conchoidal fractures. Dry, moderate hydrocarbon odor. Rate of penetration about 15 ft/hr.
58						
60		89.0				
62						60-65 ft: DOLOMITE, pale yellowish brown (10 yr 6/2) to dark yellowish orange (10 yr 6/6), as above, dry, no hydrocarbon odor. Rate of penetration about 12 ft/hr.
64						
66		19.6				
68						65-70 ft: DOLOMITE, pale yellowish brown (10 yr 6/2), as above, dry, moderate hydrocarbon odor. Rate of penetration about 15 ft/hr.
70						
72		68.8				
74						70-75 ft: DOLOMITE, as above. Rate of penetration about 15 ft/hr.
76						
78		4.5				
80						75-80 ft: DOLOMITE, as above, interbedded with minor SANDSTONE, dark yellowish orange (10 yr 6/6), fine to medium grained, poorly sorted, round to subrounded, calcareous, well cemented. Rate of penetration about 12 ft/hr.
82		0				
84						
86						80-85 ft: DOLOMITE and SANDSTONE, as above. Rate of penetration about 15 ft/hr.
88						
						85-90 ft: DOLOMITE and SANDSTONE, as above.



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **MW-80**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052

Depth (ft.)	Well Completion	O (ppm)	Sample ID	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88						
90		0				Well TD @ 90 ft. below grade.
92						
94						
96						
98						
100						
102						
104						
106						
108						
110						
112						
114						
116						
118						
120						



JEI
Jones Environmental, Inc.
700 William Street, Suite 100, Shreveport, Louisiana 71101
(214) 836-8444

WELL LOG

PROJECT NAME/# RATHON/509859		BORING/MWH MW-81		DATE DRILLED 9/19 - 9/20 9/22 - 9/23		DRILLING START TIME 14:00 - 9/19/95		DRILLING FINISH TIME 12:30 - 9/23/95	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD AIR ROTARY		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
GEOLOGIST A. WILSON		DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE) Drilled 7 7/8" pilot hole to 71' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. Surface casing to 71'bgl. Drilled 7 7/8" borehole from 71' to 225'bgl and Completed well with open borehole									
BOREHOLE DIAMETER 12 1/4" - 71', 7 7/8" - 225'				TOTAL DEPTH OF BORING 225'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION		USGS CLASS.	DESCRIPTION OF STRATA	
	D		5	50	CASING CEMENT CEMENT		ML	Brown silty sandy loam 5YR 3/4	
	D		5	43				Very pale orange 10YR 8/2 weathered LS. Effervesces easily	
	D		6	27				Same as above 10 YR 8/2 with some chert nodules.	
	D		30	18				Light olive gray 5Y 6/1 micro-crystalline DD with trace chert and conchoidal fractures.	
	D		20	21				Same as above interbedded with fine grained quartz sand.	
	D		42	20				Light olive gray 5Y 6/1 DD as above to medium light gray N6 interbedded with fine grain quartz sand. Pale yellow brown 10 YR 6/2 moderately well cemented fine grain quartz SS from 24'-26'.	
	D		15	33				Light gray sandy LS N7 with trace DD with conchoidal fractures.	
	D		22	30				Light gray sandy LS N7 with trace DD with conchoidal fractures.	
	D							Light olive gray 5Y 6/1 fine grained poorly cemented SS interbedded with light gray N7 sandy LS. Slight HC odor at 32'.	
	D							Dark yellow brown 10YR 5/6 moderate well cemented. limy SS from 35'-37'. Pale yellow brown 10YR 6/2 very hard silica cemented DD from 37'-39'. Dark yellow brown 10YR 5/6 moderate to weakly cemented limy SS from 39'-40'. Slight HC odor.	
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DD - DOLOMITE SS - SANDSTONE SAMPLE METHOD ☒ SPLIT SPOON ☒ DRILL CUTTINGS ☒ SHELBY TUBE ☒ DEPTH AT WHICH FIRST WATER ENCOUNTERED ☒ STAYING DEPTH OF FIRST WATER AFTER _ HOURS									



JEI

Jones Environmental, Inc.
700 Milam Street, Suite 100, Shreveport, Louisiana 71101
(504) 836-8166

WELL LOG

PROJECT NAME/# MARATHON/509859		BORING#/MWH MW-81		DATE DRILLED 9/19 - 9/20 9/22 - 9/23		DRILLING START TIME 14:00 - 9/19/95		DRILLING FINISH TIME 12:30 - 9/23/95	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD AIR ROTORY		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
GEOLOGIST A. WILSON		DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE) Drilled 7 7/8" pilot hole to 71' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. Surface casing to 71'bgl. Drilled 7 7/8" borehole from 71' to 225'bgl and Completed well with open borehole									
BOREHOLE DIAMETER 7 7/8"				TOTAL DEPTH OF BORING 225'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION		USGS CLASS.	DESCRIPTION OF STRATA	
	D		26	25	CASING CEMENT CEMENT			Same as above to 43'. Light gray N7 fine grained sandy LS from 43'-45'. Slight HC odor.	
50'	D		17	21				Light brownish gray 5YR 6/1 weakly to poorly cemented fine grained cemented limy. Sand from 45'-47'. Light olive gray Sy 6/1. Sandy LS from 47'-50'. Slight HC odor.	
	D		23	33				Same as above to 52'. Pale yellow brown 10YR 6/2 poorly to weakly cemented limy SS. Moist at 54'. Moderate HC odor.	
60'	D		18	37.5				Same as above interbedded with olive gray 5Y 4/1 thinly bedded sandy LS. Wet at 59'. NOTE: Driller switched from air to fresh water.	
	D		9	23				Same as above with trace thin beds of light olive gray 5Y 6/1 very well cemented sandy DD	
70'	D		10	50				Same as above. Hard dry cherty DD at 70'	
	D		12	15				Pale yellowish brown 10YR 6/2 hard cherty DD interbedded with grayish orange 10YR 7/4 very fine grain well cemented DD cemented SS. NOTE: Small sample recovery due to casing cement	
80'	D		20	23				Dark yellowish brown 10YR 4/2 very fine grained weakly cemented dolomitic SS. Moderate HC odor.	
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DD - DOLOMITE SS SANDSTONE SAMPLE METHOD ☒ SPLIT SPOON ☒ DRILL CUTTINGS ☒ SHELBY TUBE DEPTH AT WHICH FIRST WATER ENCOUNTERED STAYING DEPTH OF FIRST WATER AFTER - HOURS									



JEI

Jones Environmental, Inc.
708 Wilson Street, Suite 100, Shreveport, Louisiana 71101
(318) 226-6444

WELL LOG

PROJECT NAME/# LATHON/509859		BORING#/HW# MW-81		DATE DRILLED 9/19 - 9/20 9/22 - 9/23		DRILLING START TIME 14:00 - 9/19/95		DRILLING FINISH TIME 12:30 - 9/23/95	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD AIR ROTORY		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
GEOLOGIST A. WILSON		DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE) Drilled 7 7/8" pilot hole to 71' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. Surface casing to 71'bgl. Drilled 7 7/8" borehole from 71' to 225'bgl and Completed well with open borehole									
BOREHOLE DIAMETER 7 7/8"				TOTAL DEPTH OF BORING 225'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION		USGS CLASS.	DESCRIPTION OF STRATA	
90'	D		75	60	OPEN BOREHOLE			Dark yellowish brown 10YR 4/2 to brownish gray 5YR 4/1 very fine grained, weakly cemented SS with trace Light brown gray 5YR 6/1 cherty DO at 85'. Slight HC order	
	D		25	11				Light brownish gray 5YR 6/1 hard cherty DO with trace very fine grained sand.	
	D		15	25				Light brownish gray 5YR 6/1 hard cherty DO to grayish orange 10YR 7/4 hard micro-crystalline DO with concoidal fractures.	
100'	D		15	21				Same as above to light brownish gray 5YR 6/1 micro-crystalline DO with concoidal fractures.	
	D		15	23				Pale yellowish brown 10YR 6/2 and light brownish gray 5YR 6/1 micro-crystalline DO interbedded with pinkish gray 5YR 8/1 to light gray N7 very fine grain sandy DO. Very pale orange 10YR 8/2 very fine grain well cemented limey SS at 102' - 103'.	
110'	D		11	38				Very pale orange 10YR 8/2 very fine grained weakly cemented limey SS.	
	D		12	43				Same as above to 114'. Light brownish gray 5YR 6/1 cherty DO. NOTE: low sample recovery due to casing cement sluffing.	
120'	D		10	19				Same as above. NOTE: low sample recovery due to casing cement sluffing.	
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DO - DOLOMITE SS - SANDSTONE SAMPLE METHOD ☒ SPLIT SPOON ☐ DRILL CUTTINGS ☒ SHELBY TUBE ☐ DEPTH AT WHICH FIRST WATER ENCOUNTERED ☐ STAYING DEPTH OF FIRST WATER AFTER _ HOURS									

WELL LOG

PROJECT NAME/## MARATHON/509859		BORING/MW# MW-81		DATE DRILLED 9/19 - 9/20 9/22 - 9/23		DRILLING START TIME 14:00 - 9/19/95		DRILLING FINISH TIME 12:30 - 9/23/95	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD AIR ROTORY		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
GEOLOGIST A. WILSON		DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE) Drilled 7 7/8" pilot hole to 71' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. Surface casing to 71'bgl. Drilled 7 7/8" borehole from 71' to 225'bgl and Completed well with open borehole									
BOREHOLE DIAMETER 7 7/8"				TOTAL DEPTH OF BORING 225'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION	USGS CLASS.	DESCRIPTION OF STRATA		
130'	D		10	19	OPEN BOREHOLE		Same as above to 125' with trace light brown SYR 5/6 very fine grain moderate well cemented limey SS. NOTE: Low sample recovery due to casing cement stuffing.		
	D		9	25			Lt brownish gray SYR 6/1 cherty DD with trace pale yellowish brown 10YR 6/2 micro-crystalline DD. NOTE: low sample recovery.		
	D		9	17			Same as above. NOTE: low sample recovery due to casing cement stuffing.		
140'	D		12	23			Light gray N7 to light medium gray N6 very fine grained well cemented DD cemented SS from 136'-139'. Light brownish gray SYR 6/1 cherty DD from 139'. NOTE: Low sample recovery		
	D		9	23			Light brownish gray SYR 6/1 to light olive gray SY 6/1 cherty DD. NOTE: low sample recovery due to casing cement stuffing.		
150'	D		8	21			Same as above. Low sample recovery.		
	D		7	19			Same as above.		
160'	D		8	21			Same as above.		
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DO - DOLOMITE SS - SANDSTONE SAMPLE METHOD SPLIT SPOON DRILL CUTTINGS SHELBY TUBE DEPTH AT WHICH FIRST WATER ENCOUNTERED STAYING DEPTH OF FIRST WATER AFTER 24 HOURS									



JEI

Jones Environmental, Inc.
708 Wilson Street, Suite 100, Shreveport, Louisiana 71101
(504) 225-8444

WELL LOG

PROJECT NAME/# RATHON/509859		BORING/MW# MW-81		DATE DRILLED 9/19 - 9/20 9/22 - 9/23		DRILLING START TIME 14:00 - 9/19/95		DRILLING FINISH TIME 13:00 - 9/23/95	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD AIR ROTARY		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
GEOLOGIST A. WILSON		DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE) Drilled 7 7/8" pilot hole to 71' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. Surface casing to 71'bgl. Drilled 7 7/8" borehole from 71' to 225'bgl and Completed well with open borehole									
BOREHOLE DIAMETER 7 7/8"				TOTAL DEPTH OF BORING 225'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION		USGS CLASS.	DESCRIPTION OF STRATA	
	D		8	23	OPEN BOREHOLE			Pinkish gray 5YR 8/1 to light brownish gray 5YR 6/1 cherty DO.	
170'	D		9	23				Light brownish gray 5YR 6/1 cherty DO with some very thin pinkish gray 5YR 8/1 very fine grained well cemented limey SS stringers.	
	D		8	25				Same as above.	
180'	D		19	25				Same as above.	
	D		8	19				Pinkish gray 5YR 8/1 cherty DO with some very fine grained limey sand stringers	
190'	D		9	20				Same as above. Slight HC odor.	
	D		8	21				Same as above. Slight HC odor.	
200'	D		65	43				Encountered water at 195' while drilling yellowish gray 5Y 8/1 very fine grain moderate well cemented limey SS. Moderate HC odor.	
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DO - DOLOMITE SS - SANDSTONE SAMPLE METHOD ☒ SPLIT SPOON ☒ DRILL CUTTINGS ☒ SHELBY TUBE ☒ DEPTH AT WHICH FIRST WATER ENCOUNTERED ☒ STAYING DEPTH OF FIRST WATER AFTER _ HOURS									

WELL LOG

PROJECT NAME/## MARATHON/509859		BORING#/MW# MW-81		DATE DRILLED 9/19 - 9/20 9/22 - 9/23		DRILLING START TIME 14:00 - 9/19/95		DRILLING FINISH TIME 13:00 - 9/23/95	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD AIR ROTORY		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
GEOLOGIST A. WILSON		DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE) Drilled 7 7/8" pilot hole to 71' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. Surface casing to 71'bgl. Drilled 7 7/8" borehole from 71' to 225'bgl and Completed well with open borehole									
BOREHOLE DIAMETER 7 7/8"				TOTAL DEPTH OF BORING 225'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION	USGS CLASS.	DESCRIPTION OF STRATA		
210'	D		12	20	OPEN BOREHOLE		Same as above. No HC odor.		
	D		11	20			Medium gray N5 very fine grained well cemented dolomitic SS.		
	D		11	20			Grayish orange 10YR 7/4 fine to medium grained moderately well cemented Dolomitic SS. Strong HC odor.		
220'	D		6	27			Grayish orange 10YR 7/4 very fine grained to fine grained moderate to weakly cemented SS. Slight HC odor.		
	D		5	75			Same as above.		
230'									
240'									
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DO - DOLOMITE SS - SANDSTONE SAMPLE METHOD ☒ SPLIT SPOON ☒ DRILL CUTTINGS ☒ SHELBY TUBE ☒ DEPTH AT WHICH FIRST WATER ENCOUNTERED ☒ STAYING DEPTH OF FIRST WATER AFTER _ HOURS									

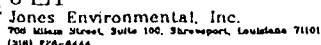


JEL

Jones Environmental, Inc.
700 Milam Street, Suite 100, Shreveport, Louisiana 71101
(318) 226-8444

WELL LOG

PROJECT NAME/# MARATHON/509859		BORING#/MW# MW-82		DATE DRILLED 9/20, 9/21, & 9/25/95		DRILLING START TIME 14:00 - 9/20/95		DRILLING FINISH TIME 17:15 - 9/25/95	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD AIR ROTARY		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
GEOLOGIST A. WILSON		DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE) Drilled 7 7/8" pilot hole to 66.75' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. surface casing to 66.75' bgl. Drilled 7 7/8" borehole from 66.75' to 227' bgl. Completed well open hole from 66.75' to 227' bgl.									
BOREHOLE DIAMETER 12 1/4"-66.75', 7 7/8"-227'				TOTAL DEPTH OF BORING 227'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION		USGS CLASS.	DESCRIPTION OF STRATA	
10'	D		3	60	CASING CEMENT CEMENT			Very pale orange 10YR 8/2 to pinkish gray 5YR 8/1 weathered Limestone (LS).	
	D		5	23				Light brownish gray 5 YR 6/1 hard DD with concoidal fractures from 5'-7'. Pinkish gray 5YR 8/1 weathered LS from 7'-10' with trace very fine grained limey sand.	
	D		3	12				Pale yellowish brown 10YR 6/2 hard DD interbedded with light olive gray 5Y 6/1 sandy LS with trace very fine grained limey sand.	
20'	D		4	14				Grayish orange 10YR 7/4 to light brownish gray 5YR 6/1 moderately well cemented limey SS interbedded with pale yellowish brown 10YR 6/2 hard DD.	
	D		15	16				Grayish orange 10YR 7/4 very fine grained well cemented. SS interbedded with light brownish gray 5YR 6/1 very fine grained, well cemented limey SS with trace biotite to 23'. Grayish orange 10YR 7/4 very fine grained moderate well cemented limey SS.	
30'	D		12	25				Grayish orange 10YR 7/4 very fine grained, moderately well cemented limey SS to 29'. Pale yellowish brown 10YR 6/2 very fine grained, well cemented limey SS.	
	D		11	25				Pale yellowish brown 10YR 6/2 well cemented, very fine grained limey SS interbedded with dark yellowish orange 10YR 6/6 very fine grained, moderate to poorly cemented SS.	
40'	D		30	23				Moist, moderate yellowish brown 10YR 5/4 to brownish gray 5YR 4/1 moderate to well cemented, very fine grained, SS to 38'. Light brown gray 5YR 6/1 well cemented, very fine grained limey SS interbedded with light gray N7 cherty DD. Slight HC odor.	
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DD - DOLOMITE SS - SANDSTONE SAMPLE METHOD ☒ SPLIT SPOON ☒ DRILL CUTTINGS ☒ SHELBY TUBE ☐ DEPTH AT WHICH FIRST WATER ENCOUNTERED ☐ STAYING DEPTH OF FIRST WATER AFTER _ HOURS									



PROJECT NAME/##		BORING#/MWH		DATE DRILLED		DRILLING START TIME		DRILLING FINISH TIME	
MARATHON/509859		MW-82		9/20, 9/21, & 9/25/95		14:00		18:30	
SITE ADDRESS						SKETCH MAP			
INDIAN BASIN GAS PLANT - EDDY CO., NM						SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
AIR ROTORY									
GEOLOGIST		DRILLER		DRILLING SUPERVISOR					
A. WILSON		WEST TEXAS WATER WELL SERVICE		RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE)									
Drilled 7 7/8" pilot hole to 66.75' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. surface casing to 66.75' bgl. Drilled 7 7/8" borehole from 66.75' to 227' bgl. Completed well open hole from 66.75' to 227' bgl.									
BOREHOLE DIAMETER				TOTAL DEPTH OF BORING					
12 1/4"-66.75', 7 7/8"-227'				227'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION		USGS CLASS.	DESCRIPTION OF STRATA	
	D		25	14	CEMENT CASING CEMENT			Light brownish gray 5YR 6/1 very fine grained, well cemented limey SS interbedded with light olive gray 5Y 6/1 sandy LS. Moderate HC odor.	
50'	D		22	7.5			Olive gray 5Y 4/1 sandy LS interbedded with brownish gray very fine grained, well cemented limey SS. Light gray N7 cherty DO at 49'. Moderate HC odor.		
	D		55	25			Light gray N7 to medium light gray N8 very fine grained DO cemented SS. Moderate HC odor.		
60'	D		60	27			Brownish gray 5YR 4/1 poorly to weakly cemented very fine grained DO cemented SS. Strong HC odor.		
	D		55	27			Light olive gray 5Y 6/1 very well cemented, Dolomitic SS interbedded with light gray sandy DO. Moderate HC odor.		
70'	D		15	38			Light gray N7 very fine grained, very well cemented dolomitic SS. Slight HC odor.		
	D		12	15			Light gray N7 to light olive gray 5Y 6/1 very fine grained, very well cemented dolomitic SS to 72'. Light olive gray sandy DO to brownish gray 5YR 4/1 cherty DO.		
80'	D		10	19			Light brownish gray 5YR 6/1 to light gray N7 cherty DO to 77'. Dark yellowish brown 10YR 4/2 very fine grained, moderate well cemented limey SS.		
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DO - DOLOMITE SS - SANDSTONE SAMPLE METHOD SPLIT SPOON DRILL CUTTINGS SHELBY TUBE DEPTH AT WHICH FIRST WATER ENCOUNTERED STAYING DEPTH OF FIRST WATER AFTER . HOURS									

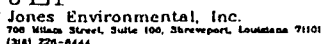


JEI

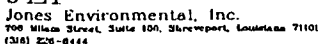
Jones Environmental, Inc.
700 Kilham Street, Suite 100, Shreveport, Louisiana 71101
(318) 224-6444

WELL LOG

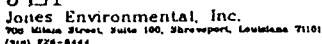
PROJECT NAME/ID MARATHON/509859		BORING#/MWH MW-82		DATE DRILLED		DRILLING START TIME		DRILLING FINISH TIME	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD AIR ROTORY		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
GEOLOGIST A. WILSON		DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE) Drilled 7 7/8" pilot hole to 66.75' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. surface casing to 66.75' bgl. Drilled 7 7/8" borehole from 66.75' to 227' bgl. Completed well open hole from 66.75' to 227' bgl.									
BOREHOLE DIAMETER 7 7/8"				TOTAL DEPTH OF BORING 227'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION		USGS CLASS.	DESCRIPTION OF STRATA	
90'	D		12	50	OPEN BOREHOLE		Moist	Moist light brownish gray 5YR 6/1 to light gray N7 sandy DO to 82'. Grayish brown 5YR 3/2 very fine grained, moderate to weakly cemented, DOLMICTIC cemented, SS to 85'.	
	D		8	38				Light olive gray 5Y 6/1 very fine grained, well cemented dolomitic SS from 85' - 87'. Grayish brown 5YR 3/2 very fine grained, moderate to weakly cemented DOLMICTIC cemented SS from 87' - 89'. Light gray N7 very fine grained sandy DO from 89' - 90'.	
	D		9	25				Light gray N7 to pale yellowish brown 10YR 6/2 very fine grained very well cemented sandy DO.	
100'	D		6	20				Pale yellowish brown 10YR 6/2 to light brownish gray 5YR 6/1 cherty DO.	
	D		8	17				Light brownish gray 5YR 6/1 cherty DO interbedded with very pale orange 10YR 8/2 cherty LS.	
	D		5	18				Light brownish gray 5YR 6/1 to grayish orange pink 5YR 7/2 cherty DO, interbedded with medium gray N5 very fine grained sandy DO.	
110'	D		12	20				Medium light gray N6 cherty DO interbedded with light brownish gray 5YR 6/1 very fine grained sand DO and yellowish gray 5YR 7/2 micro-crystalline DO.	
120'	D		6	20				Light brownish gray 5YR 6/1 to pinkish gray 5YR 8/1 cherty DO interbedded with light olive gray 5Y 6/1 very fine grained, well cemented limey SS from 117'-119'. Olive gray sandy DO to brownish gray 5YR 4/1 cherty DO from 119' - 120'.	
LEGEND PPM - PART PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DO - DOLOMITE SS - SANDSTONE									
SAMPLE METHOD ☒ SPLIT SPOON ☒ DRILL CUTTINGS ☒ SHELBY TUBE									
V DEPTH AT WHICH FIRST WATER ENCOUNTERED V STAYING DEPTH OF FIRST WATER AFTER _ HOURS									



PROJECT NAME/##		BORING#/MW#		DATE DRILLED		DRILLING START TIME		DRILLING FINISH TIME	
MARATHON/509859		MW-82							
SITE ADDRESS						SKETCH MAP			
INDIAN BASIN GAS PLANT - EDDY CO., NM						SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
AIR ROTORY									
GEOLOGIST		DRILLER		DRILLING SUPERVISOR					
A. WILSON		WEST TEXAS WATER WELL SERVICE		RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE)									
Drilled 7 7/8' pilot hole to 66.75' below ground level (bgl). Reamed out pilot hole to 12 1/4' and set 8 5/8' steel. surface casing to 66.75' bgl. Drilled 7 7/8' borehole from 66.75' to 227' bgl. Completed well open hole from 66.75' to 227' bgl.									
BOREHOLE DIAMETER				TOTAL DEPTH OF BORING					
7 7/8"				227'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION	USGS CLASS.	DESCRIPTION OF STRATA		
	D		11	18	OPEN BOREHOLE		Light brownish gray 5YR 6/1 cherty DO.		
130'	D		9	23			Light gray N7 to light brownish gray 5YR 6/1 cherty DO to 128'. Pinkish gray 5YR 8/1 cherty LS from 128' - 130'.		
	D		6	27			Light gray N7 to light brownish gray 5YR 6/1 cherty DO interbedded with thin beds of medium dark gray N4 very fine grained, moderate well cemented, dolomitic SS.		
140'	D		6	21			Medium gray N5 to light brownish gray 5YR 6/2 cherty DO interbedded with very fine grained very well cemented sandy DO.		
	D		12	38			Light gray N7 very fine grained sandy DO to 141'. Yellowish gray 5Y 8/1 very fine grained, weakly cemented limey SS 141' - 144'. Light gray N7 very fine grained sandy DO from 144' - 145'.		
150'	D		15	43			Light gray N7 very fine grained, well cemented limey SS.		
	D		13	30			Light brownish gray 5YR 6/1 cherty DO interbedded with yellowish gray, very fine grained, well cemented limey SS.		
160'	D		10	18			Light brownish gray 5YR 6/1 cherty DO interbedded with light gray N7, very fine grained sandy DO.		
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DO - DOLOMITE SS - SANDSTONE SAMPLE METHOD ☒ SPLIT SPOON ☒ DRILL CUTTINGS ☒ SHELBY TUBE ☒ DEPTH AT WHICH FIRST WATER ENCOUNTERED ☒ STAYING DEPTH OF FIRST WATER AFTER - HOURS									



PROJECT NAME/## MARATHON/509859		BORING#/MW# MW-82		DATE DRILLED		DRILLING START TIME		DRILLING FINISH TIME	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD AIR ROTORY		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
GEOLOGIST A. WILSON		DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE) Drilled 7 7/8" pilot hole to 66.75' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. surface casing to 66.75' bgl. Drilled 7 7/8" borehole from 66.75' to 227' bgl. Completed well open hole from 66.75' to 227' bgl.									
BOREHOLE DIAMETER 7 7/8"				TOTAL DEPTH OF BORING 227'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION	USGS CLASS.	DESCRIPTION OF STRATA		
	D		4	30	OPEN BOREHOLE		Brownish gray SYR 4/1 to light olive gray SY 6/1 very fine grained, moderate to well cemented limey SS to 164'. Light brownish gray SYR 6/1 cherty DD from 164' - 165'.		
170'	D		4	20			Light brownish gray SYR 6/1 cherty DD and sandy DD.		
	D		9	20			Same as above with some pale yellow brown 10YR 6/2 very fine grained liny sand.		
180'	D		6	21			Pinkish gray SYR 8/1 cherty DD.		
	D		7	14			Pinkish gray SYR 8/1 to light brownish gray SYR 6/1 cherty DD.		
190'	D		5	19			Same as above.		
	D		4	16			Same as above.		
200'	D		4	38			Same as above to 197'. Very pale orange 10YR 8/2 moist to wet very fine grained, well cemented limey SS from 197' - 200'. Slight HC odor.		
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DD - DOLOMITE HC - HYDROCARBON SAMPLE METHOD SPLIT SPOON DRILL CUTTINGS SHCLBY TUBE DEPTH AT WHICH FIRST WATER ENCOUNTERED STAYING DEPTH OF FIRST WATER AFTER _ HOURS									



PROJECT NAME/# MARATHON/509859		BORING/MWH MW-82		DATE DRILLED		DRILLING START TIME		DRILLING FINISH TIME	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD AIR ROTORY		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
GEOLOGIST A. WILSON		DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE) Drilled 7 7/8" pilot hole to 66.75' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. surface casing to 66.75' bgl. Drilled 7 7/8" borehole from 66.75' to 227' bgl. Completed well open hole from 66.75' to 227' bgl.									
BOREHOLE DIAMETER 7 7/8"				TOTAL DEPTH OF BORING 227'					
DEPTH (FT)		SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION		USGS CLASS.	DESCRIPTION OF STRATA
210'		D		6	33	OPEN BOREHOLE			Very pale orange 10YR 8/2 very fine grained, well cemented limey SS.
		D		8	60				Very pale orange 10YR 8/2 very fine grained, well cemented limey SS to brownish gray 5YR 4/1 very fine grained, well to moderate well cemented dolomitic SS.
		D		6	30				Brownish gray 5YR 4/1 very fine grained, well to moderate well cemented dolomitic SS interbedded with grayish orange 10YR 7/4 vuggy LS with quartz crystal replacement in vuggs.
220'		D		4	33				Grayish orange 10YR 7/4 LS interbedded with light olive gray 5Y 6/1 very fine grained, moderate well cemented dolomitic SS.
		D		4	30				Moderate yellowish brown 10YR 5/4 very fine grained, moderate well cemented dolomitic SS interbedded with very pale orange 10YR 8/2 very fine grained sandy LS.
230'					24				Same as above except dolomitic SS is well to very well cemented.
LEGEND									
PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON					LS - LIMESTONE DO - DOLOMITE SS - SANDSTONE				
					SAMPLE METHOD SPLIT SPOON DRILL CUTTINGS SHELBY TUBE				
					DEPTH AT WHICH FIRST WATER ENCOUNTERED STAYING DEPTH OF FIRST WATER AFTER 2 HOURS				



Drilling Log

Recovery Well MW-82

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350154.63
 Surface Elev. _____ Total Hole Depth 250 ft. Diameter 7.875 in.
 Top of Casing _____ Water Level Initial 196.1 ft. Static 191.6 ft.
 Screen: Dia _____ Length _____ Type/Size Open Borehole in.
 Casing: Dia 8 in. Length 67.5 ft. Type Steel
 Fill Material Portland Cement Rig/Core Gardner Denver 1500
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Ronnie Kieth Log By Scott Underwood Date 9/30/96 Permit # _____
 Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Initial boring installed to 227 ft. by Jones Environmental, Inc. (JEI) and deepened to 250 ft. by Fluor Daniel GTI on 9/30/96.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						12.25-inch borehole with 8-inch surface casing from 0 to 67.5 ft.
0						0-5 Ft: V. pale orange (10yr 8/2) to pinkish gray (5yr 8/1) weathered LIMESTONE .
2		3	600			
4						5-7 Ft: L. brownish gray (5yr 6/1) DOLOMITE , hard, conchoidal fractures.
6						
8		5	23			7-10 Ft: Pinkish gray (5yr 8/1), weathered LIMESTONE , with trace v. fine-grained limey sand.
10						
12						10-15 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE , hard, with interbedded l. olive gray (5y 6/1) sandy LIMESTONE , with trace v. fine-grained limey sand.
14		3	12			
16						15-20 Ft: Grayish orange (10yr 7/4) to l. brownish gray (5yr 6/1) limey SANDSTONE , mod. to well cemented, interbedded with pale yellowish brown (10yr 6/2) DOLOMITE , hard.
18		4	14			
20						20-23 Ft: Grayish orange (10yr 7/4) SANDSTONE , v. fine-grained, well cemented, interbedded with l. brownish gray (5yr 6/1) limey SANDSTONE , v. fine-grained, well cemented, trace biotite.
22						23-25 Ft: Grayish orange (10yr 7/4) limey SANDSTONE , v. fine-grained, mod. to well cemented.
24		15	16			

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad, New Mexico

Owner Marathon Oil Company
Proj. No. 023350154.63

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		15	16			
26						
28						
30		12	25			25-29 Ft: Grayish orange (10yr 7/4) limey, SANDSTONE , v. fine-grained, mod. to well cemented.
32						28-30 Ft: Pale yellowish brown (10yr 6/2) limey SANDSTONE , v. fine-grained, well cemented.
34		11	25			30-35 Ft: Pale yellowish brown (10yr 6/2) limey SANDSTONE , v. fine-grained, well cemented, interbedded with d. yellowish orange (10yr 6/6) SANDSTONE , v. fine-grained, mod. to poorly cemented.
36						35-38 Ft: Mod. yellowish brown (10yr 5/4) to brownish gray (5yr 4/1) SANDSTONE , mod. to well cemented, v. fine-grained, moist.
38		30	23			38-40 Ft: L. brown gray (5yr 6/1) limey SANDSTONE , well cemented, v. fine-grained, interbedded with l. gray (N7) cherty DOLOMITE . Slight hydrocarbon odor.
40						40-45 Ft: L. brownish gray (5yr 6/1) limey SANDSTONE , v. fine-grained, well cemented, interbedded with l. olive gray (5y 6/1) sandy LIMESTONE , mod. hydrocarbon odor.
42		25	14			
44						
46						45-49 Ft: Olive gray (5y 4/1) sandy LIMESTONE interbedded with brownish gray limey SANDSTONE , v. fine-grained, well cemented.
48		22	7.5			
50						49-50 Ft: L. gray (N7) cherty DOLOMITE , mod. hydrocarbon odor.
52						50-55 Ft: Light gray (N7) to med. light gray (N8) dolomitic cemented SANDSTONE , v. fine-grained, mod. hydrocarbon odor.
54		55	25			
56						55-60 Ft: Brownish gray (5yr 4/1) dolomitic cemented SANDSTONE , weakly cemented, v. fine-grained, strong hydrocarbon odor. Moist.



Drilling Log

Recovery Well MW-82

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Indian Basin, Carlsbad, New MexicoProj. No. 023350154.63

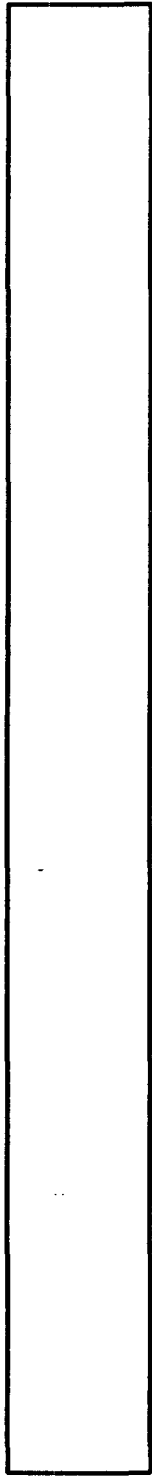
Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58		60	27			
60						60-65 Ft: L. olive gray (5y 6/1) dolomitic SANDSTONE , interbedded with l. gray sandy DOLOMITE , v. well cemented, mod. hydrocarbon odor.
62						
64		55	27			
66						65-70 Ft: L. gray (N7) dolomitic SANDSTONE , v. fine-grained, v. well cemented, slight hydrocarbon odor.
68		15	38			Open borehole from 67.5 to 250 ft.
70						70-72 Ft: L. gray (N7) to l. olive gray (5y 6/1), dolomitic SANDSTONE , v. well cemented, v. fine-grained.
72						
74		12	15			72-75 Ft: L. olive gray (sandy) to l. brownish gray (5yr 4/1 cherty) DOLOMITE .
76						75-77 Ft: L. brownish gray (5yr 6/1) to l. gray (N7) cherty DOLOMITE .
78		10	19			77-80 Ft: D. yellowish brown (10yr 4/2) limey SANDSTONE , v. fine-grained, mod. to well cemented.
80						
82		12	50			80-82 Ft: L. brownish gray (5yr 6/1) to l. gray (N7) sandy DOLOMITE .
84						82-85 Ft: Grayish brown (5yr 3/2) dolomitic SANDSTONE , v. fine-grained, mod. to weakly cemented.
86						85-87 Ft: L. olive gray (5yr 6/1) dolomitic SANDSTONE , v. fine-grained, well cemented.
88		8	38			87-89 Ft: Grayish brown (5yr 3/2) dolomitic SANDSTONE , v. fine-grained, mod. to weakly cemented.

Project MOC/Indian Basin Gas Plant

 Owner Marathon Oil Company

 Location Indian Basin, Carlsbad, New Mexico

 Proj. No. 023350154.63

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		8	38			
89-90 Ft:						L. gray (N7) sandy DOLOMITE , v. fine-grained.
90-95 Ft:						L. gray (N7) to pale yellowish brown (10yr 6/2) sandy DOLOMITE , v. fine-grained, v. well cemented.
95-100 Ft:						Pale yellowish brown (10yr 6/2) to l. brownish gray (5yr 6/1) cherty DOLOMITE .
100-105 Ft:						L. brownish gray (5 yr 6/1) cherty DOLOMITE interbedded with v. pale orange (10yr 8/2) cherty LIMESTONE .
105-110 Ft:						L. brownish gray (5yr 6/1) to grayish orange pink (5yr 7/2) cherty DOLOMITE interbedded with med. gray (N5) sandy DOLOMITE , v. fine-grained.
110-117 Ft:						Med. l. gray (N6) cherty DOLOMITE , interbedded with l. brownish gray (5yr 6/1) sandy DOLOMITE , v. fine-grained, and yellowish gray (5yr 7/2) DOLOMITE , m.crystalline.
117-119 Ft:						L. brownish gray (5yr 6/1) to pinkish gray (5yr 8/1) cherty DOLOMITE , interbedded with l. olive gray (5y 6/1) limey SANDSTONE , v. fine-grained, well cemented.
119-120 Ft:						Olive gray sandy DOLOMITE to brownish gray (5yr 4/1) cherty DOLOMITE .



Drilling Log

Recovery Well MW-82

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Indian Basin, Carlsbad, New MexicoProj. No. 023350154.63

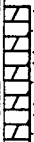
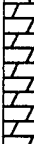
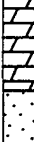
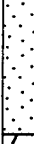
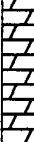
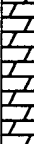
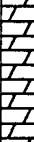
Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		11	18			120-125 Ft: L. brownish gray, cherty DOLOMITE .
122						
124		9	23			125-130 Ft: L. gray (N7) to l. brownish gray (5yr 6/1), cherty DOLOMITE .
126						
128		6	27			128-130 Ft: Pinkish gray (5yr 8/1) cherty LIMESTONE .
130						
132		6	21			130-135 Ft: L. gray (N7) to l. brownish gray (5yr 6/2) cherty DOLOMITE interbedded with thin beds of med. d. gray (N4) dolomitic SANDSTONE , v. fine-grained, mod. to well cemented.
134						
136		12	38			135-140 Ft: Med. gray (N5) to l. brownish gray (5yr 6/2) cherty DOLOMITE interbedded with sandy DOLOMITE , v. fine-grained, v. well cemented.
138						
140		15	43			140-141 Ft: L. gray (N7) sandy DOLOMITE , v. fine-grained.
142						141-144 Ft: Yellowish gray (5y 8/1) limey SANDSTONE , v. fine-grained, weakly cemented.
144		12	38			144-145 Ft: L. gray (N7) sandy DOLOMITE , v. fine grained.
146						145-150 Ft: L. gray (N7) limey SANDSTONE , v. fine-grained, well cemented.
148		15	43			
150						150-155 Ft: L. brownish gray (5yr 6/1) cherty DOLOMITE interbedded with yellowish gray limey SANDSTONE , v. fine-grained, well cemented.
152						

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350154.63

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152		13	30			
154						
156		10	18			155-180 Ft: L. brownish gray (5yr 6/1) cherty DOLOMITE interbedded with l. gray (N7) sandy DOLOMITE, v. fine-grained.
158						
160		4	30			180-184 Ft: Brownish gray (5yr 4/1) to l. olive gray (5y 6/1) limey SANDSTONE, v. fine-grained, mod. to well cemented.
162						
164		4	20			184-185 Ft: L. brownish gray (5yr 6/1) cherty DOLOMITE.
166						185-170 Ft: L. brownish gray (5yr 6/1) cherty and sandy DOLOMITE.
168		9	20			
170						170-175 Ft: Same as above (some pale yellow brown (10yr 6/2) limey sand, v. fine-grained).
172		6	21			
174						175-180 Ft: Pinkish gray (5yr 8/1) cherty DOLOMITE.
176		7	14			
178						
180						180-185 Ft: Pinkish gray (5yr 8/1) to l. brownish gray (5yr 6/1) cherty DOLOMITE.
182						
184						



Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350154.63

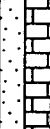
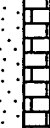
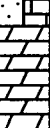
Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184		5	19			185-190 Ft: Same as above
186						
188						
190		4	16			190-195 Ft: Same as above.
192						Depth to water on 9/30/96.
194						
196		4	38			195-197 Ft: Same as above.
198						Depth to water (initial) as encountered during drilling (9/20-25/95).
200						197-200 Ft: V. pale orange (10yr 8/2) limey SANDSTONE, v. fine-grained, well cemented, moist to wet, slight hydrocarbon odor.
202		6	33			200-205 Ft: V. pale orange (10yr 8/2) limey SANDSTONE, v. fine-grained, well cemented.
204						
206						205-210 Ft: V. pale orange (10yr 8/2) limey SANDSTONE, v. fine-grained, well cemented, to brownish gray (5yr 4/1) dolomitic SANDSTONE, v. fine-grained, mod. to well cemented.
208		8	60			
210						
212						210-215 Ft: Brownish gray (5yr 4/1) dolomitic SANDSTONE, v. fine-grained, well to mod. well cemented, interbedded with grayish orange (10yr 7/4) vuggy LIMESTONE (quartz crystal replacement in vugs).
214		6	30			
216						215-220 Ft: Grayish orange (10yr 7/4) LIMESTONE, interbedded with l. olive gray (5y 6/1) dolomitic SANDSTONE, v. fine-grained, mod. to well cemented.

Project MOC/Indian Basin Gas Plant

 Owner Marathon Oil Company

 Location Indian Basin, Carlsbad, New Mexico

 Proj. No. 023350154.63

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
216		4	33			
218						
220		4	30			220-225 Ft: Mod. yellowish brown (10yr 5/4) dolomitic SANDSTONE , v. fine-grained, mod. to well cemented, interbedded with v. pale orange (10yr 8/2) sandy LIMESTONE , v. fine-grained.
222						
224						
226						
228		47	60			225-230 Ft: Same as above (dolomitic SANDSTONE well to v. well cemented). Well deepened on 9/30/96 to 250 ft. by Fluor Daniel GTI.
230						
232						
234						
236		19.6	50			230-235 Ft: V. pale brown (10yr 8/4) sandy DOLOMITE , hard, little hydrocarbon staining, some v. thin beds of sandstone, hydrocarbon odor.
238						
240		14.8	38			235-240 Ft: Same as above (becomes sandier).
242						
244		9.2	50			240-245 Ft: Pale yellow (2.5 7/4) silty SANDSTONE , fine to v. fine-grained, subrounded to rounded, mod. sorted, trace d. mineral, hydrocarbon odor.
246						
248						
248						

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350154.63

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
248						
250						
252						
254						
256						
258						
260						
262						
264						
266						
268						
270						
272						
274						
276						
278						
280						

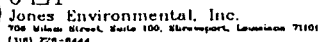


JEI

Jones Environmental, Inc.
708 Main Street, Suite 100, Shreveport, Louisiana 71101
(504) 226-8444

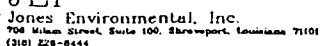
WELL LOG

PROJECT NAME/# INDIAN BASIN/509859		BORING#/MW# MW-83		DATE DRILLED 9/20, 9/22, & 9/26		DRILLING START TIME 15:00 - 9/21/95		DRILLING FINISH TIME 17:00	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
DRILLING METHOD AIR ROTARY		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
GEOLOGIST A. WILSON		DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE) Drilled 7 7/8" pilot hole to 40' below ground level (bgl). Reamed out pilot hole to 12 1/4" and set 8 5/8" steel. surface casing to 39'bgl. Drilled 7 7/8" borehole from 39' to 202' bgl. Complete well open hole from 39' to 202' bgl.									
BOREHOLE DIAMETER 12 1/4" - 39', 7 7/8" - 202'				TOTAL DEPTH OF BORING 202'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION		USGS CLASS.	DESCRIPTION OF STRATA	
	D		7	60	CASING CEMENT CEMENT		ML	Dark yellowish brown 10YR 4/2 sandy loam from 0' - 6'. Grayish orange 10YR 7/4 cherty DO interbedded w/very pale orange 10YR 8/2 to pale yellow orange 10YR 8/6 very fine grained moderate well cemented SS.	
10'	D		7	30				Same as above	
	D		6	20				Very pale orange 10YR 8/2 cherty DO interbedded w/grayish orange 10YR 7/4 to grayish orange pink 5YR 7/2 very fine grained, very well cemented DOLOMITIC Sandstone (SS) with Mn & Fe oxide staining	
20'	D		8	14				Very light gray N7 cherty DO interbedded with pinkish gray 5YR 8/1, light brownish gray 5YR 6/1, and yellowish gray 5YR 8/1 very fine grained, very well cemented DOLOMITIC SS with Mn & Fe oxide staining.	
	D		9	10				Light gray N7 to medium light gray N6 sandy DO interbedded w/dark yellowish orange 10YR 6/6 and very light gray N8 very fine grained, well cemented DOLOMITIC SS and pinkish gray 5YR 8/1 very fine grain very well cemented DOLOMITIC SS w/Fe oxide staining.	
30'	D		12	12				Light brownish gray 5YR 6/1 very fine grained, very well cemented DO cement SS to 29'. Grayish orange 10YR 7/4 to dark yellowish orange 10YR 6/6 very fine grained, well cemented limey SS with Fe oxide staining.	
	D		10	7.5				Same as above interbedded w/grayish orange 10YR 7/4 to pale yellowish brown 10YR 6/2 very hard cherty DO.	
40'	D		18	27				Light brown yellow 5YR 6/1 to medium light gray N6 cherty DO interbedded w/brownish gray 5YR 4/1 very fine grained, very well cemented DOLOMITIC SS.	
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DO - DOLOMITE SS - SANDSTONE SAMPLE METHOD ☒ SPLIT SPOON ☒ DRILL CUTTINGS ☒ SHELBY TUBE ☒ DEPTH AT WHICH FIRST WATER ENCOUNTERED ☒ STAYING DEPTH OF FIRST WATER AFTER 1 HOURS									

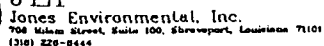


WELL LOG

PROJECT NAME#		BORING#/MW#	DATE DRILLED		DRILLING START TIME		DRILLING FINISH TIME	
MARATHON/509859		MW-83	9/26/95		08:30		17:00	
SITE ADDRESS					SKETCH MAP SEE MONITOR WELL LOCATION MAP			
INDIAN BASIN GAS PLANT - EDDY CO., NM								
DRILLING METHOD		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)				
AIR ROTARY								
GEOLOGIST		DRILLER		DRILLING SUPERVISOR				
A. WILSON		WEST TEXAS WATER WELL SERVICE		RONNY KEITH				
LATITUDE		LONGITUDE		SEC/TWP/RGE				
REMARKS (DRILLING SEQUENCE)								
BOREHOLE DIAMETER					TOTAL DEPTH OF BORING			
7 7/8"					202'			
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION		USGS CLASS.	DESCRIPTION OF STRATA
50'	D		23	20	OPEN BOREHOLE			Very light gray N8 to yellowish gray 5YR 8/1 very fine grain ED, sandy DO interbedded with light brownish gray 5YR 6/1 to brownish gray 5YR 4/1 very fine grain ED, moderate to well cemented DOLOMITIC SS.
	D		25	16				Same as above.
60'	D		10	17				Very pale orange 10YR 8/2 very fine grained, sandy DO interbedded with pinkish gray 5YR 8/1 cherty DO.
	D		8	12				Pale yellowish brown 10YR 6/2 cherty DO interbedded with dark yellowish orange cherty LS
	D		7	43				Light brownish gray cherty DO to 62' very pale orange 10YR 8/2 very fine grained, very well cemented limy SS at 62' - 65'.
70'	D		60	19				Light brownish gray 5YR 6/1 cherty DO and sandy DO interbedded with grayish orange 10YR 7/4 cherty LS and light olive gray 5YR 6/1 very fine grained, sandy LS.
	D		90	12				Light brownish gray 5YR 6/1 cherty DO and sandy DO interbedded.
80'	D		12	17				Light gray N7 very fine grained, moderately well cemented limy SS with Fe oxide staining 75' - 77'. Brownish gray 5YR 4/1 very fine grained, sandy DO to light brownish gray 5YR 6/1 cherty DO from 77' - 80'.
LEGEND								
PPM - PARTS PER MILLION			LS - LIMESTONE			SAMPLE METHOD		
FID - FLAME IONIZATION DETECTOR			DO - DOLOMITE			☒ SPLIT SPOON		
HC - HYDROCARBON			SS - SANDSTONE			☐ DRILL CUTTINGS		
						☒ SHELBY TUBE		
						☐ DEPTH AT WHICH FIRST WATER ENCOUNTERED		
						☐ STAYING DEPTH OF FIRST WATER AFTER _ HOURS		



PROJECT NAME/#		BORING#/MW#		DATE DRILLED		DRILLING START TIME		DRILLING FINISH TIME	
MARATHON/509859		MW-83		9/26/95		08:30		17:00	
SITE ADDRESS						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
INDIAN BASIN GAS PLANT - EDDY CO., NM									
DRILLING METHOD		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
AIR ROTORY									
GEOLOGIST		DRILLER		DRILLING SUPERVISOR					
A. WILSON		WEST TEXAS WATER WELL SERVICE		RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE)									
BOREHOLE DIAMETER				TOTAL DEPTH OF BORING					
7 7/8"				202'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION	USGS CLASS.	DESCRIPTION OF STRATA		
	D		18	18	OPEN BOREHOLE		Light brownish gray 5YR 6/1 cherty DO to 83'. Very pale orange 10YR 8/2 very fine grained sandy LS 83' - 85'		
90'	D		85	19			Light brownish gray 5YR 6/1 to medium Light gray N6 cherty DO interbedded with brownish gray 5YR 4/1 very fine grained, sandy DO and very thin beds of yellowish gray 5YR 7/2 very fine grained, sandy LS.		
	D		8	43			Light brownish gray 5YR 6/1 very fine grained sandy DO interbedded with very thin bedded yellowish gray 5Y 8/1 dolomitic SS.		
100'	D		10	38			Pale yellowish brown 10YR 6/2 cherty DO and very fine grained sandy DO interbedded with very pale orange 10YR 8/2, grayish orange 10R 7/4 and yellowish gray 5Y 8/1 very fine grained, well cemented limy SS.		
	D		7	25			Same as above		
110'	D		18	25			Pale yellowish brown 10YR 6/2 to grayish orange 10YR 7/4 very fine grained sandy DO interbedded w/ thin beds of grayish orange 10YR 7/4 to very pale orange 10YR 8/2 very fine grained, moderate to well cemented limy SS.		
	D		25	38			Pale yellow brown 10YR 6/2 cherty DO interbedded with light brownish gray 5YR 6/1 to pink gray 5YR 8/1 very fine grained sandy DO to 113'. Moderate to weakly cemented pale yellowish orange 10YR 8/6 limy SS from 113' - 115'.		
120'	D		11	19			Pale yellowish brown 10YR 6/2 cherty DO interbedded with grayish orange 10YR 7/4 very fine grained moderately well cemented limy SS.		
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DO - DOLOMITE SS - SANDSTONE SAMPLE METHOD ☒ SPLIT SPOON ☒ DRILL CUTTINGS ☒ SHELBY TUBE ☒ DEPTH AT WHICH FIRST WATER ENCOUNTERED ☒ STAYING DEPTH OF FIRST WATER AFTER _ HOURS									



PROJECT NAME/##		BORING#/HWH		DATE DRILLED		DRILLING START TIME		DRILLING FINISH TIME	
MARATHON/509859		MW-83		9/26/95					
SITE ADDRESS						SKETCH MAP SEE MONITOR WELL LOCATION MAP			
INDIAN BASIN GAS PLANT - EDDY CO., NM									
DRILLING METHOD		SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)					
AIR ROTORY									
GEOLOGIST		DRILLER		DRILLING SUPERVISOR					
A. WILSON		WEST TEXAS WATER WELL SERVICE		RONNY KEITH					
LATITUDE		LONGITUDE		SEC/TWMP/RGE					
REMARKS (DRILLING SEQUENCE)									
BOREHOLE DIAMETER				TOTAL DEPTH OF BORING					
7 7/8"				202'					
DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION	USGS CLASS.	DESCRIPTION OF STRATA		
130'	D		12	27		OPEN BOREHOLE	Medium gray N5 cherty DO interbedded with pale yellowish brown 10YR 6/2 to yellowish gray 5Y 8/1 very fine grained, sandy LS.		
	D		11	20			Light brownish gray 5YR 6/1 cherty and sandy DO interbedded with pinkish gray 5YR 8/1 very fine grained sandy LS.		
	D		17	19			Same as above		
140'	D		14	17			Light brownish gray 5YR 6/1 cherty DO interbedded with very thin beds of very pale orange 10YR 8/2 very fine grained, very well cemented limy SS.		
	D		14	19			Same as above		
	D		9	21			Light brownish gray 5YR 6/1 to pinkish gray 5YR 8/1 cherty DO		
150'	D		8	20			Light brownish gray 5YR 6/1 cherty DO interbedded with very pale orange 10YR 8/2 very fine grained sandy LS.		
	D		5	27			Light brownish gray 5YR 6/1 cherty DO interbedded with yellowish gray 5Y 8/1 and very pale orange 10YR 8/2 very fine grained limy SS.		
160'									
LEGEND PPM - PARTS PER MILLION FID - FLAME IONIZATION DETECTOR HC - HYDROCARBON LS - LIMESTONE DO - DOLOMITE SS - SANDSTONE SAMPLE METHOD SPLIT SPOON DRILL CUTTINGS SHELBY TUBE DEPTH AT WHICH FIRST WATER ENCOUNTERED STAYING DEPTH OF FIRST WATER AFTER _ HOURS									



JEI

Jones Environmental, Inc.
708 Wilson Street, Suite 100, Shreveport, Louisiana 71101
(318) 226-6444

WELL LOG

PROJECT NAME/# MARATHON/509859		BORING#/MW# MW-83	DATE DRILLED 9/26/95	DRILLING START TIME	DRILLING FINISH TIME	
SITE ADDRESS INDIAN BASIN GAS PLANT - EDDY CO., NM				SKETCH MAP SEE MONITOR WELL LOCATION MAP		
DRILLING METHOD AIR ROTARY	SURFACE ELEVATION (MGVD)		TOP OF CASING ELEV. (MGVD)			
GEOLOGIST A. WILSON	DRILLER WEST TEXAS WATER WELL SERVICE		DRILLING SUPERVISOR RONNY KEITH			
LATITUDE	LONGITUDE		SEC/TWMP/RGE			
REMARKS (DRILLING SEQUENCE)						
BOREHOLE DIAMETER 7 7/8"			TOTAL DEPTH OF BORING 202'			

DEPTH (FT)	SAMPLE METHOD	GRAPHIC LOG	FID (PPM)	DRILL RATE	WELL COMPLETION	USGS CLASS.	DESCRIPTION OF STRATA
170'	D		21	38	OPEN BOREHOLE		Light brownish gray 5YR 6/1 cherty DD interbedded with very pale orange 10YR 8/2 very fine grained limy SS. Slight HC odor.
	D		5	27			Same as above
180'	D		6	27			Pinkish gray 5YR 8/1 cherty DD to 172'. Grayish orange 10YR 7/4 very fine grain limy SS from 172' - 175'. NOTE: Lost circulation at 172'.
	D		7	21			Very pale orange 10YR 8/2 to grayish orange 10YR 7/4 very fine grained sandy DD interbedded with yellowish gray 5Y 8/1 very fine grained, moderately well cemented limy SS.
	D		4	27			Same as above. Very little recovery due to lost circulation.
190'	D		4	43			Grayish orange 10YR 7/4 very fine grained, moderately well cemented dolomitic SS.
	D		3	43			Same as above.
200'	D		3	43			Very pale orange 10YR 8/2 to dark yellowish orange 10YR 6/6 very fine grained, moderately well cemented dolomitic SS.

LEGEND

 PPM - PARTS PER MILLION
 FID - FLAME IONIZATION DETECTOR
 HC - HYDROCARBON

 LS - LIMESTONE
 DD - DOLOMITE
 SS - SANDSTONE

SAMPLE METHOD

- ☒ SPLIT SPOON
☒ DRILL CUTTINGS
☒ SHELBY TUBE



DEPTH AT WHICH FIRST WATER ENCOUNTERED



STAYING DEPTH OF FIRST WATER AFTER _ HOURS

JEI

Jones Environmental, Inc.
708 Milam Street, Suite 100, Shreveport, Louisiana 71101
(318) 226-8444

WELL LOG

[illegible]



Drilling Log

Monitoring Well **MW-84**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105
Surface Elev. _____ Total Hole Depth 170 ft. Diameter 17/11 in.
Top of Casing _____ Water Level Initial _____ Static _____
Screen: Dia Open Hole in. Length _____ Type/Size _____
Casing: Dia 12 in./8 in. Length 48 ft./65 ft. Type Steel
Fill Material Portland Cement Rig/Core Gardner Denver 1500
Drill Co. WT Water Well Service Method Mud/Air Rotary
Driller Ronnie Kieth Log By Kevin Spencer Date 6/25/96 Permit # RA-5131-S-22
Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Start 8/4/96 Finish 8/9/96 Found
groundwater at 30' bgs. Zone produced
about 5-15 gpm.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						
2		0	150			17-inch borehole with 12-inch casing 0 to 48 Ft. 0-5 Ft: SAND and GRAVEL (color not distinguishable by Munsel chart). Sands are brown, fine grained. Gravels are 1/2 to 3/4" diameter.
4						
6						5-10 Ft: Same as above (gravels are 3/4 to 2" diameter).
8		0	38			
10					SP GW	10-15 Ft: Same as above
12		0	7			
14						
16						15-20 Ft: Same as above (with a trace of cobbles).
18		0	5			
20						
22		0	5			20-25 Ft: Gray (10yr 5/1) DOLOMITE , hard, microcrystalline, conchoidal fractures, minor limestone, argillaceous, (moderately hard).
24						

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28		0	6			25-30 Ft: Gray (10 yr 5/1), DOLOMITE , hard, micro-crystalline, conchoidal fractures, and very pale brown (10 yr 7/3) sandy DOLOMITE , hard, fine grained sand, well cemented.
30						
32		0.	6			30-35 Ft: Same as above (minor light brownish gray (10 yr 6/2) LIMESTONE , hard, microcrystalline, slight reation with HCl).
34						
36						
38		7.8	18			35-40 Ft: Yellow (10 yr 7/6) to very pale brown (10 yr 7/3) and gray (10 yr 5/1) sandy DOLOMITE , very hard, fine grained sand, well cemented, and minor gray (10 yr 5/1) DOLOMITE , micro crystalline, conchoidal fractures.
40						40-45 Ft: Same as above (softer at 42 Ft.).
42						
44		8.7	27			45-50 Ft: Same as above
46						
48		5.7	25			11-inch borehole with 8-inch casing 48 to 65 Ft.
50						50-55 Ft: Same as above
52						
54		0	25			
56						55-60 Ft: Same as above (harder, well cemented).



Drilling Log

Monitoring Well **MW-84**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		0	15			
58						
60						60-65 Ft: Same as above
62		0	14			
64						
66						7.875-inch open borehole 65 to 170 Ft. 65-70 Ft: Brown (10 yr 5/3) DOLOMITE , hard microcrystalline matrix, conchoidal fractures, slightly sandy.
68		2.9	15			
70						70-75 Ft: Light brownish gray (10 yr 6/2) DOLOMITE , hard, microcrystalline, conchoidal fractures, and yellowish brown (10 yr 5/6) sandy DOLOMITE , hard, fine-grained sand in dolomite matrix.
72		2.9	11			
74						
76						75-80 Ft: Light brownish gray (10 yr 6/2) DOLOMITE , hard, microcrystalline, conchoidal fractures.
78		2.9	12			
80						80-85 Ft: Same as above
82						
84		5.9	15			
86						85-90 Ft: Yellow (10 yr 7/6) and light reddish brown (5 yr 6/4) DOLOMITE , hard, microcrystalline, conchoidal fractures, and minor limestone, very pale brown (10 yr 7/4), microcrystalline.
88		2.9	13			



Drilling Log

Monitoring Well **MW-84**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		2.9	13			
90						90-93 Ft: Light gray (10 yr 7/2) SANDSTONE , very fine- to fine-grained, moderately sorted, poorly cemented.
92		2.9	21			
94						93-95 Ft: Light brownish gray (10 yr 6/2), hard, DOLOMITE microcrystalline, conchoidal fractures.
96						95-100 Ft: Brownish yellow (10 yr 6/6), slightly sandy DOLOMITE .
98		0	20			
100						100-105 Ft: Light brownish gray (10 yr 6/2) sandy DOLOMITE , hard, microcrystalline, conchoidal fractures.
102		0	20			
104						105-110 Ft: Same as above (less sandy).
106						
108		0	17			
110						110-115 Ft: Brownish yellow (10 yr 6/6) DOLOMITE , hard, slightly sandy to microcrystalline, conchoidal fractures.
112		0	21			
114						115-120 Ft: Same as above (trace green, possibly glauconite sandy).
116						
118		0	20			
120						



Drilling Log

Monitoring Well **MW-84**

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0	27			120-125 Ft: Light yellowish brown (10 yr 6/3) sandy DOLOMITE mod. hard, very fine- to fine-grained sand in dolomite matrix, very slight moisture.
122						
124		0	43			125-130 Ft: Yellow (10 yr 7/6) SANDSTONE and sandy DOLOMITE (same as above), very fine-grained, well sorted, poorly cemented, subrounded, slightly moist. Hydrocarbon odor.
126						
128		5.7	43			130-135 Ft: Same as above (Start mist pump at 135 Ft.).
130						
132		0	50			135-140 Ft: Same as above
134						
136		0	50			140-145 Ft: Same as above
138						
140		0	60			145-150 Ft: Yellow (10yr 7/6) SANDSTONE fine- to med-grain, moderately sorted, poorly cemented, subangular, wet, and light yellowish brown (10 yr 6/3) sandy DOLOMITE , fine-grained sand in dolomitic matrix.
142						
144		0				
146						
148		0				
150						150-155 Ft: Same as above
152						



Drilling Log

Monitoring Well MW-84

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152						
154		0	60			155-160 Ft: Same as above
156						
158		0	75			
160						160-165 Ft: Light brownish gray (10 yr 6/2) sandy DOLOMITE and yellow (10 yr 7/8) fine -grained SAND in dolomitic matrix, moderately hard to soft, moderately to poorly cemented. (Lost circulation at 162').
162		0	38			
164						65-170 Ft: Same as above
166						
168		0	60			
170						TD at 170 Ft. at 1225 hrs. on 6/25/96.
172						
174						
176						
178						
180						
182						
184						

Drilling Log

Monitoring Well **MW-85**

FLUOR DANIEL GTI

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105
 Surface Elev. _____ Total Hole Depth 235 ft. Diameter 12.25/7.875 in.
 Top of Casing _____ Water Level Initial 56 ft. Static _____
 Screen: Dia Open Borehole Length _____ Type/Size Open Borehole in.
 Casing: Dia 8 in. Length 75 ft. Type Steel
 Fill Material Portland Cement Rig/Core Gardner Denver 1500
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Ronnie Kieth Log By Kevin Spencer Date 6/4/96 Permit # RA-5131-S-23
 Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						12.25-inch borehole with 8-inch casing 0 to 75 Ft.
2		0	100			0-5 Ft: Pale yellow (2.5y 8/3) and light gray (2.5y 7/2) LIMESTONE , argillaceous, extremely fractured, extremely weathered along fractures, dry.
4						
6						5-10 Ft: Olive gray (5y 4/2) dolomitic SAND , fine-grained sand, moderate to poorly cemented, well rounded, poorly sorted, dry.
8		2.5	50			
10						10-15 Ft: Pale brown (10yr 6/3)sandy DOLOMITE and dolomitic sand (same as above), fine-grained sand in dolomitic matrix, hard, dry, and very pale brown (10 yr 7/2) sandy LIMESTONE , well cemented, very fine- to fine-grained sand in calcite matrix, hard, dry.
12		5.0	25			
14						
16						15-20 Ft: Dark grayish brown (2.5y 4/2) dolomitic SAND , very fine- to fine-grained, poorly cemented, well rounded, well sorted, dry.
18		7.7	50			
20						20-25 Ft: Graysih brown (2.5y 5/2)sandy DOLOMITE , very fine- to fine-grained sand, very well cemented, well rounded, well sorted, dry.
22						
24		5.0	4			

Drilling Log

Monitoring Well **MW-85**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28		5.0	13			27-30 Ft: Very pale brown (10 yr 7/2) DOLOMITE , hard, microcrystalline, conchoidal fractures. Dark gray (10 yr 4/1) silty sand, very fine-grained, well rounded, well sorted, moderately cemented. Very minor white (10 yr 8/2) limestone, slightly sandy, hard, dry.
30						
32		22	14			30-35 Ft: Gray (10 yr 6/1) dolomitic silty SAND , very fine-grained, well rounded, moderately cemented, high silt content, dry.
34						
36						
38		7.0	75			
40						
42		22	50			42-48 Ft: Gray (10 yr 5/2) dolomitic SANDSTONE very fine to fine-grained, mod. sorted, well rounded, poorly cemented, dry.
44						
46		5.0	43			48-52 Ft: Light gray (10 yr 7/2) silty SANDSTONE , v. fine-grained, well to moderately rounded, moderately sorted, very silty, reacts with HCl, soft, friable, slightly moist.
48						
50						
52		5.0	27			52-55 Ft: Gray (10 yr 5/2) dolomitic SANDSTONE , v. fine-to fine-grained, moderately sorted, moderately to well rounded, poorly cemented, slightly moist.
54						
56						Groundwater encountered at 56 ft.



Drilling Log

Monitoring Well **MW-85**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						55-60 Ft: Same as above (Dark gray (10 yr 4/1), black (10 yr 2/1), and gray (7.5 yr N61) cemented and friable sand in alternating layers).
58		5.0	33			
60						60-65 Ft: Same as above
62		2.5	30			
64						
66						65-70 Ft: Same as above
68		5.0	50			
70						70-75 Ft: Same as above
72		5.0	75			
74						
76						7.875-inch open borehole 75 to 235 Ft. 75-80 Ft: Gray (10 yr 6/1) SANDSTONE , v. fine- to fine-grained sand, moderately sorted, subrounded, moderately to poorly cemented. Layered with gray (10 yr 6/2) DOLOMITE , microcrystalline, hard, conchoidal fractures, slightly sand, slightly moist.
78		1.2	50			
80						80-85 Ft: Gray (5y 6/1) DOLOMITE , microcrystalline, hard, conchoidal fractures, interbedded with thin beds of dark gray (5y 4/1) silty SAND , slightly moist.
82		1.2	9			
84						
86						85-90 Ft: Grayish brown (10 yr 5/2) SANDSTONE , very fine- to fine-grained, moderately sorted, subrounded, poorly cemented, moist (at 87').
88		1.2	30			



Drilling Log

Monitoring Well **MW-85**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		1.2	30			90-95 Ft: Same as above (fine-grained, well sorted, moist).
90						
92		3.7	50			
94						95-100 Ft: Grayish brown (10 yr 5/2) DOLOMITE , micro-crystalline, hard conchoidal fractures. Interbedded with gray (10 yr 5/1) SANDSTONE , very fine-grained, well sorted, subrounded, moderately cemented.
96						
98		1.2	14			
100						100-105 Ft: Same as above
102		1.2	21			
104						
106						105-110 Ft: Grayish brown (10 yr 5/2) DOLOMITE , micro-crystalline, hard, conchoidal fractures.
108		1.2	20			
110						
112		0	14			110-115 Ft: Light gray (10 yr 7/2) SANDSTONE , very fine-to fine-grained, moderately sorted, subrounded to subangular, very slight reaction with HCl.
114						
116						115-120 Ft: Same as above
118		0	27			
120						

Drilling Log

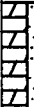
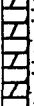
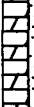
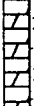
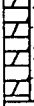
Monitoring Well **MW-85**



Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		1.2	38			120-125 Ft: Same as above
122						
124						
126		1.2	20			125-130 Ft: Gray (10 yr 5/1) SANDSTONE , fine- to medium-grained, moderately sorted, subrounded to subangular, moderately cemented. Interbedded with grayish brown (10 yr 5/2) DOLOMITE , microcrystalline, hard, conchoidal fractures.
128						
130						130-135 Ft: Gray (10 yr 5/1) SANDSTONE , very fine- to fine-grained, well sorted, subrounded, poorly cemented.
132		1.2	17			
134						135-140 Ft: Same as above
136						
138		1.2	30			
140						140-145 Ft: Grayish brown (10 yr 5/2) DOLOMITE and SANDSTONE (as above), hard microcrystalline, conchoidal fractures.
142						
144		6.3	21			
146						145-150 Ft: Light gray (10 yr 7/1) SANDSTONE , very fine-grained, well sorted, well to subrounded, moderately cemented, trace white mica.
148						
150						150-155 Ft: Same as above (no white mica).
152		1.2	21			

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152		1.2	18			
154						
156		1.2	20			155-160 Ft: Same as above
158						
160		1.2	14			160-165 Ft: Same as above
162						
164		1.2	17			165-170 Ft: Light brownish gray (10 yr 6/2) DOLOMITE and SANDSTONE (as above), hard, m. crystalline, conchoidal fractures.
166						
168		1.2	14			170-175 Ft: Same as above (more dolomite than sand).
170						
172		1.2	13			175-180 Ft: Same as above
174						
176		1.2	14			180-185 Ft: Same as above
178						
180		1.2	14			
182						
184						



Drilling Log

Monitoring Well MW-85

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184						185-190 Ft: Same as above
186						
188		1.2	17			
190						190-195 Ft: Same as above
192		1.2	16			
194						195-200 Ft: Same as above (more sandy)
196						
198		1.2	20			
200						200-205 Ft: Light grayish brown (10 yr 6/2) DOLOMITE , hard, conchoidal fractures, microcrystalline, and light gray SANDSTONE , fine-grained, subrounded.
202		1.2	23			
204						205-210 Ft: Same as above
206						
208		6.3	75			
210						210-215 Ft: Light grayish brown (10 yr 6/2) DOLOMITE , conchoidal fractures, microcrystalline, soft.
212		3.7	75			
214						215-220 Ft: Very pale brown (10 yr 7/3) DOLOMITE , micro-crystalline, moderately hard, conchoidal fractures; and very pale (10 yr 7/3) SANDSTONE , fine- to medium-grained, subrounded to subangular, moderately sorted.
216						



Drilling Log

Monitoring Well **MW-85**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
216		3.7	43	NNNNNN		brown (10 yr 7/3) SANDSTONE , fine- to medium-grained, subrounded to subangular, moderately sorted.
218						
220		1.2	43	NNNNNN		220-225 Ft: Pale yellow (2.5y 7/4) SANDSTONE , very fine- to fine-grained, moderately sorted, subangular, poorly cemented, with minor dolomite, strong reaction with HCl.
222						
224						
226		1.2	38	NNNNNN		225-230 Ft: Same as above
228						
230						
232		1.2	27	NNNNNN		230-235 Ft: Same as above (friable sand)
234						
236						
238						TD = 235 Ft.
240						
242						
244						
246						
248						



Drilling Log

Recovery Well MW-86

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350154.63
 Surface Elev. _____ Total Hole Depth 225 ft. Diameter 7.875 in.
 Top of Casing _____ Water Level Initial _____ Static _____
 Screen: Dia _____ Length _____ Type/Size Open Borehole in.
 Casing: Dia 8 in. Length 75 ft. Type Steel
 Fill Material Portland Cement Rig/Core Gardner Denver 1500
 Drill Co. WT Water Well Service Method Air/Mud Rotary
 Driller Ronnie Kieth Log By Eric Matzner Date 6/11/96 Permit # _____
 Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Start on 6/11/96. Open borehole from 75 to 120 ft.. Borehole deepened to 225 ft. on 10/01/96 by Fluor Daniel GTI.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						8-inch surface casing 0 to 5 ft. Open Borehole from 75 to 225 ft.
0		0	100			0-0.5 Ft: Top soil. Pale brown (10yr 6/3).
2						0.5-5 Ft: White (2.5y N8) chalky LIMESTONE , mod. hard, slightly weathered.
4						
6		0	14			5-10 Ft: Very pale brown (10yr 7/3) chalky LIMESTONE , and grayish brown (2.5y 5/2) dolomitic sand. Sand is very fine- to fine- grained, mod. sorted, mod. cemented, subrounded.
8						
10						10-15 Ft: Pale yellow (2.5y 8/3) silty SANDSTONE , silt is v. fine-grained, calcareous cement, subrounded, mod. sorted, reacts with HCL, dry, hard.
12		0	100			
14						15-20 Ft: Same as above.
16		0	25			
18						20-25 Ft: L. brownish gray (10yr 6.2), SANDSTONE and dolomitic SANDSTONE , v. fine-grained, well cemented, mod. sorted, well rounded.
20						
22		2.5	108			
24		2.5	38			

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

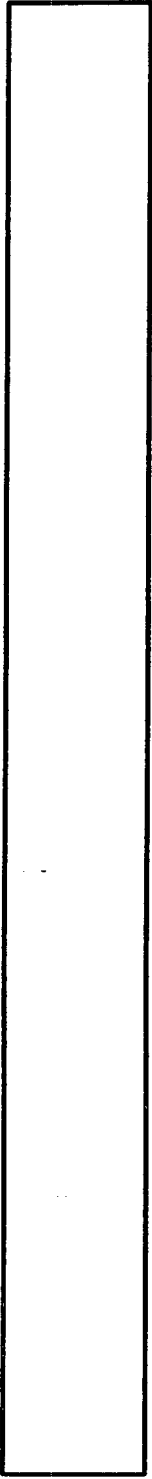
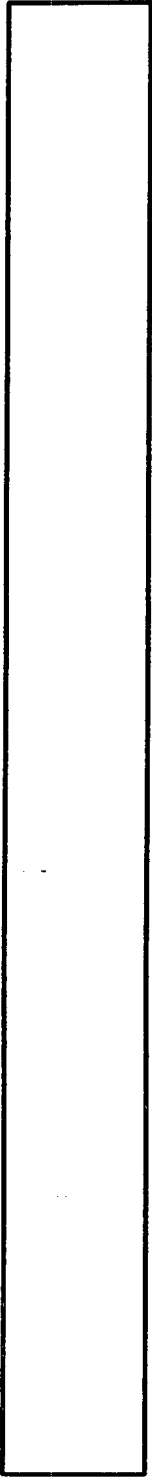
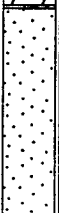
Proj. No. 023350154.63

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		2.5	38			
26						
28						
30						25-30 Ft: Same as above (SANDSTONE/dolomitic SANDSTONE, dry).
32		2.5	132			
34						
36						
38		0	60			30-35 Ft: Same as above (with pale yellow (2.5y 7/4) dolomitic sandstone bed from 32'-34', v. fine-grained, mod. sorted, subrounded, dry, with mod. calcareous cement).
40						
42						35-40 Ft: Same as above (dry to slight moisture).
44		2.5	84			
46						
48		2.5	108			40-45 Ft: Grayish brown (2.5y 5/2) dolomitic SANDSTONE, v. fine sand, well cemented, mod. sorted, subrounded, occ. mica flakes, some intervals of limestone, very slight moisture.
50						
52		0	72			45-50 Ft: Same as above (harder at 47', less limestone beds, dry to slight moisture).
54						
56						50-55 Ft: Same as above (very slight moisture).
						55-60 Ft: L. brownish gray (2.5y 6/2) dolomitic SANDSTONE, v. fine-grained sand, mod. sorted, mod. cemented, subrounded, slight moisture.

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350154.63

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		0	84			
58						
60						60-65 Ft: Same as above (slightly darker color, grayish brown (2.5y 5/2), slight moisture).
62		0	84			
64						
66						Switched over to mist pump.
68		2.5	72			65-70 Ft: D. gray (2.5y N41) dolomitic SANDSTONE , v. fine-grained sand, mod. to well cemented, sub to well rounded, mod. sorted.
70						70-74 Ft: Same as above
72		2.5	132			Annulus filled with bentonite 72 to 75 ft.
74						74-75 Ft: L. grayish brown (10yr 6/2) dolomitic LIMESTONE
76						7.875-inch open borehole 75 to 120 ft.
78		0				75-80 Ft: Gray (10yr 5.5/1) DOLOMITE , slightly sandy matrix becoming more sandy with depth, m. crystalline, trace pyrite, dry.
80						
82		2.5				80-85 Ft: L. brownish gray (10yr 6.2) SANDSTONE , med. hard, silt to v. fine-grained quartz, mod. sorted, sub- to well rounded, v. slight moisture, v. slight reaction with HCl (poss. dolomite cement).
84						Switched over to mist pump.
86		0				85-90 Ft: Gray (10yr 6/1) DOLOMITE , v. hard, m. crystalline, conchoidal fractures, slightly sandy matrix, interval of softer sandy dolomite, and occ. chalk.
88						

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350154.63

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		2.5				90-95 Ft: Same as above (less chalk, little (15%) sand).
90						
92						
94						
96		0				95-100 Ft: L. gray (10yr 7/2) sandy DOLOMITE , m. crystalline, some (20%) sand, v. fine-grained, mod. sorted, subrounded, well cemented.
98						
100						
102						
104		2.5				100-105 Ft: Same as above.
106						
108						
110						
112		2.5				105-110 Ft: L. gray (10yr 7/1) dolomitic SANDSTONE , v. fine grained sand, dolomitic/calcareous cement, mod. sorted, well rounded, mod. cemented. Cuttings are friable sand.
114						
116						
118						
120		0				110-115 Ft: Same as above.
122						
124						
126						

Seperate-phase hydrocarbons at 120 ft.
 Hole re-entered and deepened to 225 ft. on 10/1/96.



Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350154.63

Depth (ft)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		32.5	18			120-125 Ft: L. brownish gray (10yr 6/2) sandy DOLOMITE , hard, m.crystalline, occ. v. thin beds of silty sandstone, dolomite has conchoidal fractures, trace dark minerals, hydrocarbon odor.
122						
124		14.4	25			125-130 Ft: L. gray (10yr 7/1) silty SANDSTONE , mod. hard, fine- to v.fine-grained, rounded to subrounded, mod. sorted, slight hydrocarbon odor.
126						
128		15.8	20			130-135 Ft: Same as above.
130						
132		9.2	30			135-140 Ft: Same as above.
134						
136		4.7	18			140-145 Ft: Same as above.
138						
140		8.8	17			145-150 Ft: L. gray (2.5y 7/2) and l. brownish gray (10yr 6/2) sandy DOLOMITE , hard, fine-grained, subrounded, Cuttings are med. to coarse sand size, conchoidal fractured dolomite, occ. thin beds of gray and brown sandstone, slight hydrocarbon odor, trace glauconite.
142						
144						
146						150-155 Ft: Same as above (dolomite is m.crystalline).
148						
150						
152						
154						



Drilling Log

Recovery Well MW-86

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350154.63

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152		24.4	19			155-160 Ft: Same as above.
154						
156		7.6	17			160-165 Ft: Same as above.
158						
160		8.1	18			165-170 Ft: Same as above.
162						
164		4.2	18			170-175 Ft: Same as above.
166						
168		8.1	14			175-180 Ft: Same as above.
170						
172		10.2	18			180-185 Ft: Same as above.
174						
176		23.4	20			
178						
180						
182						
184						



Drilling Log

Recovery Well MW-86

Project MOC/Indian Basin Gas Plant

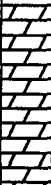
Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350154.63

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184		10.2	43			
186						185-190 Ft: White (2.5y 8/2) dolomitic SANDSTONE , poorly cemented, subrounded to subangular, mod. sorted, med. to fine-grained, hydrocarbon odor.
188		12.6	100			190-195 Ft: Same as above.
190						
192						
194		22.7	43			195-200 Ft: L. brownish gray (10yr 6/2) sandy DOLOMITE , mod. hard, conchoidal fractures, occ. thin beds of dolomitic sandstone, hydrocarbon odor.
196						
198		56.8	50			200-205 Ft: L. brownish gray (10yr 6/2) sandy DOLOMITE , interbedded with d. brown (7.5yr 4/3) dolomitic SANDSTONE . Sandy dolomite is hard, m.crystalline, with conchoidal fractures. Dolomitic sandstone is hard, blocky, v.fine-grained, fractures with trace calcite filled fractures. Hydrocarbon odor.
202						205-210 Ft: Same as above (predominately d. brown (7.5yr 4/3) dolomitic sandstone).
204						
206		74.0	50			
208						
210		166.2	100			210-215 Ft: L. brownish gray (10yr 6/2) and l. reddish brown sandy DOLOMITE , mod. hard, m.crystalline, with conchoidal fractures, trace coarse to med. sand sized pores, some filled with pyrite or stained red, hydrocarbon odor.
212						
214						215-220 Ft: Same as above.
216						

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350154.63

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-216		174.0	60			
-218						
-220						
-222		96.5	75			220-225 Ft: L. brownish gray (10yr6/2) dolomitic SANDSTONE , mod. cement, hard, rounded to subrounded, mod. sorted, occ. v. thin beds of sandy dolomite, hydrocarbon odor.
-224						
-226						
-228						
-230						
-232						
-234						
-236						
-238						
-240						
-242						
-244						
-246						
-248						

Drilling Log

Monitoring Well **MW-86**



Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105
 Surface Elev. _____ Total Hole Depth 120 ft. Diameter 7.875 in.
 Top of Casing _____ Water Level Initial _____ Static _____
 Screen: Dia Open Borehole Length _____ Type/Size _____
 Casing: Dia 8 in. Length 75 ft. Type Steel
 Fill Material Portland Cement Rig/Core Gardner Denver 1500
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Ronnie Kieth Log By Eric Matzner Date 6/11/96 Permit # RA-5131-S-24
 Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Start on 6/11/96 Open borehole from 75' to 120'.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						8-inch surface casing 0 to 75 Ft.
2		0	100			0-0.5 Ft: Top soil. Pale brown (10 yr 6/3). 0.5-5 Ft: white (2.5y N8/) chalky LIMESTONE , moderately hard, slightly weathered.
4						
6						5-10 Ft: Very pale brown (10 yr 7/3) chalky LIMESTONE and grayish brown (2.5y 5/2) dolomitic SAND . Sand is very fine to fine grained, moderately sorted, moderately cemented, subrounded.
8		0	14			
10						10-15 Ft: Pale yellow (2.5y 8/3) silty SANDSTONE , silt is very fine grained, calcareous cement, subrounded, moderately sorted, reacts with HCl, dry, hard.
12		0	100			
14						15-20 Ft: Same as above
16						
18		0	25			
20						20-25 Ft: SANDSTONE and dolomitic sandstone light brownish gray (10yr 6/2), very fine-grained, well cemented, moderately sorted, well rounded.
22		2.5	108			
24		2.5	38			



Drilling Log

Monitoring Well MW-86

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Indian Basin, Carlsbad NMProj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		2.5	38			25-30 Ft: Same as above (SANDSTONE and dolomitic sandstone, dry).
26						
28						
30						30-35 Ft: Same as above (with pale yellow (2.5y 7/4) dolomitic sandstone bed from 32'-34', very fine-grained, moderately sorted, subrounded, dry, with moderate calcareous cement.
32		2.5	132			
34						35-40 Ft: Same as above (dry to slightly moist).
36						
38		0	60			
40						40-45 Ft: Grayish brown (2.5y 5/2) dolomitic SANDSTONE , very fine sand, well cemented, moderately sorted, subrounded, occasional mica flakes, some intervals of limestone, very slight moisture.
42		2.5	84			
44						45-50 Ft: Same as above (harder at 47', less limestone beds, dry to slight moisture).
46						
48		2.5	108			
50						50-55 Ft: Same as above (very slight moisture).
52		0	72			
54						
56						55-60 Ft: Light brownish gray (2.5y 6/2) dolomitic SANDSTONE very fine grained sand, moderately sorted, moderately cemented, subrounded, slight moisture.

Drilling Log

Monitoring Well **MW-86**



Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		0	84			
58						
60						80-85 Ft: Same as above (slightly darker color, grayish brown (2.5y 5/2), slight moisture).
62		0	84			
64						
66						Switched over to mist pump.
68		2.5	72			65-70 Ft: Dark gray (2.5y N41) dolomitic SANDSTONE , very fine grained sand, moderately to well cemented, sub to well rounded, moderately sorted.
70						70-74 Ft: Same as above
72		2.5	132			Annulus filled with bentonite 72 to 75 Ft.
74						74-75 Ft: Light grayish brown (10 yr 6/2) dolomitic LIMESTONE , micrite, conchoidal fracturing, very hard, slight reaction with HCl, microcrystalline, trace of black specks.
76		0				7.875-inch open borehole 75 to 120 Ft. 75-80 Ft: Gray (10 yr 5.5/1) DOLOMITE , slightly sandy matrix, becoming more sandy with depth, microcrystalline, trace pyrite, dry.
78						
80						80-85 Ft: L. brownish gray (10 yr 6/2) SANDSTONE , med. hard, silt to very fine grained quartz, moderately sorted, sub- to well rounded, very slight moisture, very slight reaction with HCl (possible dolomite cement).
82		2.5				
84						Switch over to mist pump.
86						85-90 Ft: Gray (10 yr 6/1) DOLOMITE , very hard, microcrystalline, conchoidal fracturing, slightly sandy matrix, intervals of softer sandy dolomite, and occasional chalk.
88		0				

Project MOC/Indian Basin Gas Plant
 Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
 Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88						
90						90-95 Ft: Same as above (less chalk, little (15%) sand).
92		2.5				
94						
96						95-100 Ft: L. gray (10yr7/2)sandy DOLOMITE , m. crystalline, some (20%) sand, very fine-grained, moderately sorted, subrounded, well cemented.
98		0				
100						100-105 Ft: Same as above
102		2.5				
104						
106						105-110 Ft: Light gray (10 yr 7/1) dolomitic SANDSTONE , very fine grained sand, dolomitic/calcareous cement, moderatley sorted well rounded, moderatley cemented. Cuttings are friable sand.
108		2.5				
110						110-115 Ft: Same as above (gray (10 yr 6/1)).
112		0				
114						
116						
118		0				
120						115-120 Ft: Dolomitic SANDSTONE , light gray (10 yr 7/1), thin beds of dolomite/limestone. Separate phase hydrocarbons at 120 Ft. TD at 120 Ft.



Drilling Log

Monitoring Well **MW-87**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105
Surface Elev. _____ Total Hole Depth 170 ft. Diameter 7.875 in.
Top of Casing _____ Water Level Initial 154 ft. Static 110.1 ft.
Screen: Dia 4 in. Length 20 ft. Type/Size 0.04" SCH 40 PVC
Casing: Dia 4 in. Length 145 ft. Type SCH 40 PVC, Flush Thread
Fill Material 6/9 Silica Sand/Bentonite Rig/Core Gardner Denver 1500
Drill Co. WT Water Well Service Method Air Rotary
Driller Ronnie Kieth Log By S. Underwood Date 8/5/96 Permit # _____
Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Start 8/5/96 Finish 8/9/96 Portland cement from 0'to 15'; Volclay from 15'to 130'. Bentonite chips from 130'-140.8'; sand from 140.8' to 170'. Stainless steel centralizers at 146' and 164'.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
3.1 Not to scale						
0						
2		0.7	100		SP	0-5 Ft: Topsoll , brown (10 yr 4/3), soft, dry, fine-grained SAND , silty, trace organics (roots).
4						5-7 Ft: Same as above
6						
8		0	100			7-10 Ft: Pale yellow (2.5y 7/4), sandy DOLOMITE , hard, dry, well cemented.
10						
12		0.7	38			10-15 Ft: Light brownish gray (10 yr 6/2) and light yellowish brown (2.5y 6/4), silty dolomitic SANDSTONE , very fine- to fine- grained, moderately sorted, subrounded, dry, weakly cemented, friable, trace silt, occasional thin beds of light gray sandy dolomite, matrix reacts with HCl.
14						15-20 Ft: Same as above
16		0.7	20			
18						
20						20-25 Ft: Same as above
22		0	23			
24						



Drilling Log

Monitoring Well MW-87

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Indian Basin, Carlsbad NMProj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0	20			25-30 Ft: Dark grayish brown (2.5y 5/2) and light gray (2.5 N/7) silty SANDSTONE , very hard, well cemented, very fine- to fine-grained, subrounded to rounded, moderately sorted.
26						
28						
30						30-35 Ft: Pale brown (10 yr 6/3) DOLOMITE , very hard, dry, microcrystalline, possible siliceous cement. Cuttings are flat and blocky with conchoidal fractures.
32						
34						
36						35-40 Ft: Light brownish gray (10 yr 6/2) and dark grayish brown silty dolomitic SANDSTONE , dry, hard, well cemented, very fine- to fine-grained, subrounded to rounded, moderately sorted, occasional thin beds of sandy dolomite.
38						
40						40-45 Ft: Same as above
42						
44		0	17			45-50 Ft: Same as above
46						
48						
50						50-55 Ft: Same as above
52						
54						
56						55-60 Ft: Same as above



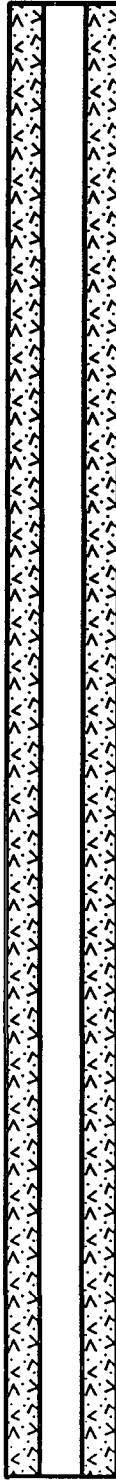
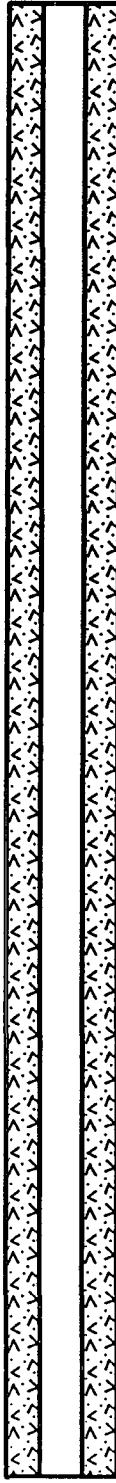
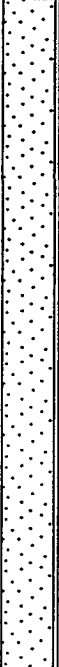
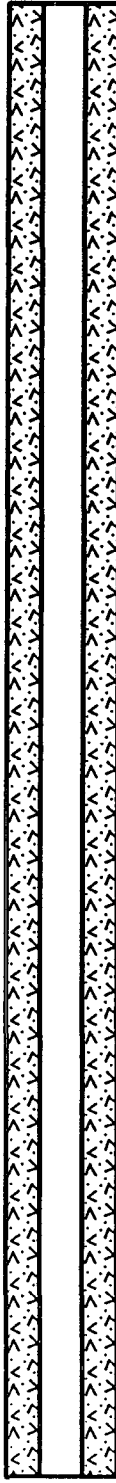
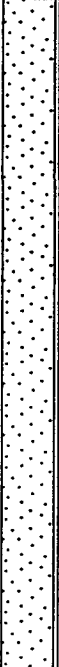
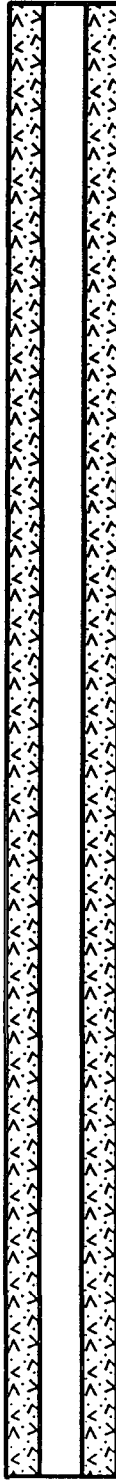
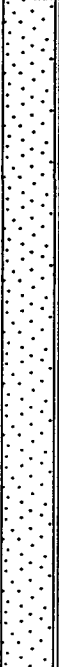
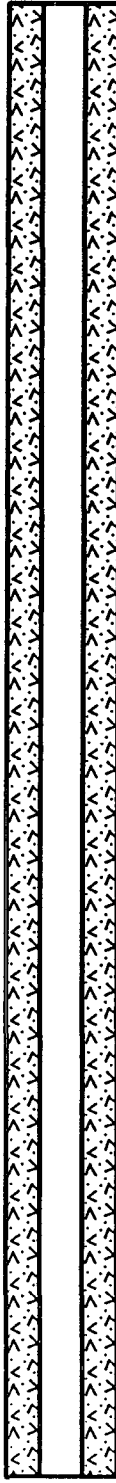
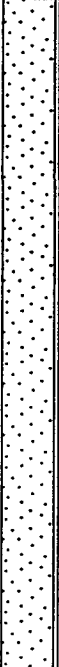
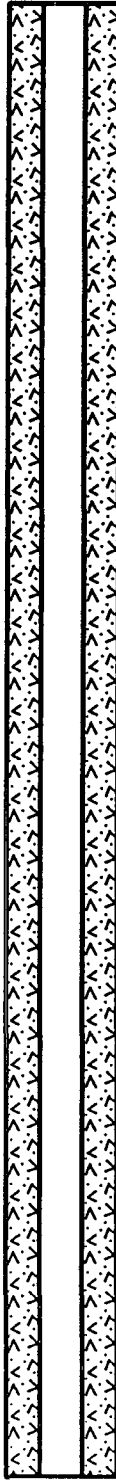
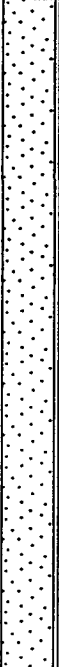
Drilling Log

Monitoring Well MW-87

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Indian Basin, Carlsbad NMProj. No. 023350105

Depth (ft.)	Well Completion	PIG (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58		0	14			
60						
62		0	10			60-65 Ft: Light gray (10 yr 6/1) and light brownish gray (10 yr 6/2) DOLOMITE , very hard, microcrystalline, possible siliceous cement. Cuttings break flat and blocky with conchoidal fractures.
64						
66		0	14			65-70 Ft: Same as above.
68						
70						
72		0	13			70-75 Ft: Light brownish gray (10 yr 6/1) and light yellowish brown (10 yr 6/4) DOLOMITE , very hard, microcrystalline, dry. Cuttings break flat and blocky, with conchoidal fractures. Dolomite interbedded with very thin beds of dark gray dolomitic sandstone.
74						
76		0	25			75-80 Ft: Dark grayish brown (2.5 yr 4/2) dolomitic, silty SANDSTONE , hard, slightly moist, very fine- to fine-grained, moderately sorted, subrounded, well cemented, occasional thin beds of pale brown, microcrystalline, dolomite, trace of d. green shale poss. glauconite. (Driller notes HC odor at this interval)
78						
80						80-85 Ft: Same as above
82		0	18			
84						
86		0	12			85-90 Ft: Pale brown (10 yr 6/3) sandy DOLOMITE , very hard, dry, microcrystalline, occasional thin beds of dolomitic sand. Cuttings break into coarse sand size, flat blocky plates with conchoidal fractures.
88						

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		0	14			90-95 Ft: Same as above
90						
92						
94						
96		0	21			95-100 Ft Very dark grayish brown (10 yr 3/2) silty dolomitic SANDSTONE , very hard, very fine- to fine-grained, mod. sorted, rounded, well cemented, occasional thin beds of light brownish gray (10 yr 6/2) dolomite, microcrystalline, matrix reacts with HCl.
98						
100						
102						
104		0.5	20			100-105 Ft: Same as above
106						
108						
110						
112		0	19			105-110 Ft: Same as above
114						
116						
118						
120		0	33			110-115 Ft: Same as above
		0	60			115-120 Ft: Light gray (2.5y 7/2) and light olive brown (2.5y 5/2) silty dolomitic SANDSTONE , slightly moist, moderately hard, poorly cemented beds, very fine- to fine-grained, rounded to sub rounded, moderately sorted, occasional thin beds of pale brown dolomite, Cuttings are coarse sand to silt size. Matrix reacts with HCl. Faint hydrocarbon odor.



Drilling Log

Monitoring Well **MW-87**

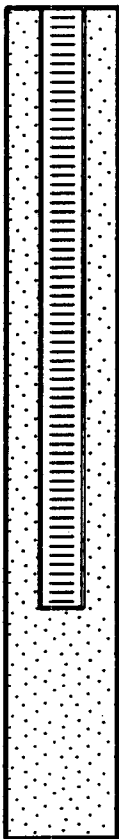
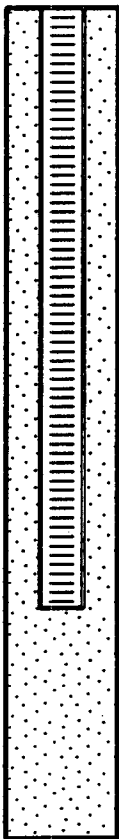
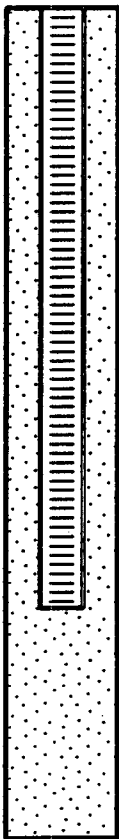
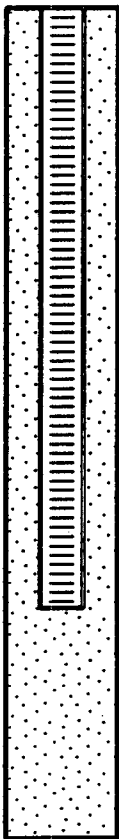
Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120						(Kelly bar rattles near top of run, hard zone). 120-125 Ft: Same as above
122						
124		0	43			
126						125-130 Ft: Same as above (no HC odor).
128		0.5	30			
130						130-135 Ft: Light brownish gray (10 yr 6/2) silty dolomitic SANDSTONE , dry, moderately hard, very fine- to fine-grained, rounded, moderately sorted, moderately cemented. Cuttings are coarse sand to silt sized. Occasional very thin beds of microcrystalline dolomite. Bentonite chips in annulus 130 to 140.8 Ft.
132		0	33			
134						135-140 Ft: Same as above
136		0.5	18			
138						
140						140-145 Ft: Light brownish gray (10 yr 6/2) silty DOLOMITE , moderately hard, dry, microcrystalline, conchoidal fractures. Cuttings are coarse sand to silt sized. Occasional thin beds of dolomitic sand.
142		0	17			
144						145-150 Ft: Same as above Stainless steel centralizer at 146 Ft.
146						
148		0	16			
150						150-155 Ft: Same as above (with sandy dolomite)
152		0	14			

Drilling Log

Monitoring Well **MW-87**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152		0	14			Groundwater encountered at 154'.
154						
156		0	17			155-160 Ft: Light brownish gray (10 yr 6/2) and brownish yellow (10 yr 6/6) sandy DOLOMITE , hard, occasional thin beds of dolomitic silty sand.
158						
160						
162		0.7	10			160-165 Ft: Brownish yellow (10 yr 6/6) and very dark brown (10 yr 7/3) silty dolomitic SANDSTONE , hard, very fine- to fine- grained, poorly sorted, common very thin beds of sandy dolomite, secondary cementation is friable. Stainless steel centralizer at 164 Ft.
164						165-170 Ft: Same as above
166		0	15			
168						TD at 170 Ft.
170						
172						
174						
176						
178						
180						
182						
184						



Drilling Log

Monitoring Well **MW-87A**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105
Surface Elev. _____ Total Hole Depth 130 ft. Diameter 12.25/7.875 in.
Top of Casing _____ Water Level Initial Dry Static _____
Screen: Dia Open Hole Length _____ Type/Size _____
Casing: Dia 8 in. Length 10 ft. Type Steel
Fill Material Portland Cement Rig/Core Gardner Denver 1500
Drill Co. WT Water Well Service Method Air Rotary
Driller Ronnie Kieth Log By Scott Underwood Date 8/6/96 Permit # _____
Checked By Underwood/Fields License No. _____

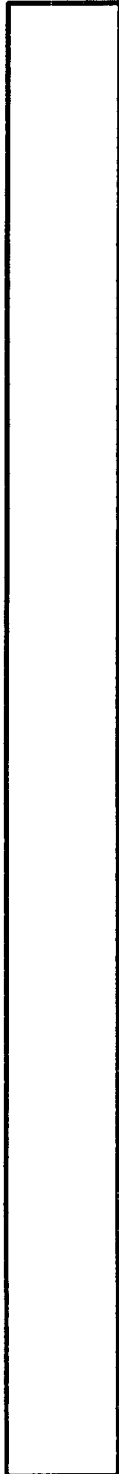
See Site Map
For Boring Location

COMMENTS:

Start 8/6/96 Finish 8/7/96 Moved
approximately 55' east of MW-87. Set
steel surface casing from 0'-10', then
cleaned out borehole from 70'-130'.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						12.25-inch borehole with 8-inch casing 0 to 10 Ft. 0-5 Ft: Brown sandy loam, hard, dry, fine grained SAND , (10yr 4/3).
2		0	150			
4						
6						5-10 Ft: Light brownish gray (10 yr 6/2) and light yellowish brown (2.5y 6/4) silty dolomitic SANDSTONE , very fine to fine-grained, moderately sorted, rounded to subrounded, slightly moist, weakly cemented, moderately hard, friable, occasional beds of light gray sandy dolomite.
8		0	100			
10						10-15 Ft: Same as above 7.875-inch open borehole 10 to 130 Ft.
12						
14		0.7	43			15-20 Ft: Same as above
16						
18		0	20			
20						20-25 Ft: Same as above
22		0	38			
24						

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						25-30 Ft: Dark grayish brown (2.5y 5/2) and light gray (2.5y N/7) silty SANDSTONE , dry, hard, very fine to fine grained, rounded to subrounded, moderately sorted. Rate of penetration about 23 ft/hr (25'-30').
26						
28		0	23			
30						
32		0.7	33			30-35 Ft: Same as above
34						
36						35-40 Ft: Pale brown (10 yr 6/3) sandy DOLOMITE , very hard, dry, microcrystalline, possibly siliceous cement. Cuttings are flat and blocky with conchoidal fractures, trace pyrite, occasional thin beds of dark grayish brown silty sandstone.
38		0	27			
40						40-45 Ft: Light brownish gray (10 yr 6/2) and dark grayish brown (10 yr 3/2) silty dolomitic SANDSTONE , dry, hard, well cemented, very fine to fine grained, subrounded to rounded, moderately sorted, occasional thin beds of sandy dolomite.
42		0	18			
44						
46						
48		0	17			45-50 Ft: Same as above
50						
52						50-55 Ft: Same as above
54		0	25			
56						55-60 Ft: Same as above



Drilling Log

Monitoring Well **MW-87A**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		0	20			
58						
60						60-65 Ft: Light gray (10 yr 6/1) and light brownish gray sandy DOLOMITE , very hard, microcrystalline, possible siliceous cement, breaks into flat, blocky cuttings with conchoidal fractures, trace pyrite, occasional very thin beds of sandstone.
62		0	20			
64						65-70 Ft: Same as above
66						
68		0	17			70-75 Ft: Same as above
70						
72		0	16			75-80 Ft: Dark grayish brown (2.5y 4/2) dolomitic silty SANDSTONE , slight moisture, very fine-to fine-grained, subrounded to rounded, well cemented, occasional very thin beds of crystalline dolomite, trace yellow sandstone (HC odor).
74						
76		7.5	30			80-85 Ft: Same as above
78						
80		0	20			
82						
84						
86						85-90 Ft: Pale brown (10yr 6/3) sandy Dolomite , very hard, dry, microcrystalline, occasional thin beds of dolomitic sand. Cuttings are coarse sand to silt size, trace of yellow dolomite, trace of pyrite.
88		0	15			



Drilling Log

Monitoring Well MW-87A

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		0	15			90-95 Ft: Same as above
90						
92		0	15			
94						
96						
98		0	15			
100						
102		0	20			
104						
106						
108		0	15			95-100 Ft: Very dark grayish brown (10 yr 3/2) and light brownish gray (10 yr 6/2) silty dolomitic SANDSTONE , dry, hard, very fine to fine grained, moderately sorted, rounded. Cuttings are fine gravel to silt sized, occasional thin beds microcrystalline dolomite. 100-105 Ft: Same as above 105-110 Ft: Same as above 110-115 Ft: Same as above
110						
112		0	38			
114						
116						
118		0	27			
120						



Drilling Log

Monitoring Well **MW-87A**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120						120-125 Ft: Same as above
122		0	45			
124						
126		0	50			125-130 Ft: Same as above
128						
130						Dry during drilling and upon completion. TD at 130 Ft.
132						
134						
136						
138						
140						
142						
144						
146						
148						
150						
152						



Drilling Log

Monitoring Well **MW-88**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105
 Surface Elev. _____ Total Hole Depth 175 ft. Diameter 12.25/7.875 in.
 Top of Casing _____ Water Level Initial 30/69/161 Static 161 ft.
 Screen: Dia 4 in. Length 35 ft. Type/Size SCH 40 PVC/0.04 in.
 Casing: Dia 8 in./4 in. Length 60/142.5 ft. Type SCH 40 PVC
 Fill Material 6/9 Silica Sand/Bent./P. Cement Rig/Core Gardner Denver 1500
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Ronnie Kieth Log By Scott Underwood Date 8/4/96 Permit # _____
 Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Start 8/4/96. Finish 8/9/96. Found groundwater at 30' bgs. Zone produced about 5-15 gpm. Installed 8" surface casing from 0-60'. Found additional zone of perched groundwater at 69'. Portland cement from 0'-15' followed by Volclay from 15'-129'. SCH 40 PVC well installed from +2.5' to 140' and screened with 0.04" PVC from 140'-175'. Est. flow rate during drilling: 60-80 gpm.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						12.25-inch borehole with 8-inch surface casing 0 to 60 Ft. and 4-inch well casing + 2.5 to 140 Ft.
2						0-5 Ft.: Brown sandy loam, hard, dry, fine grained SAND , silty, trace organics (10yr4/3). Rate of Penetration about 75ft/hr (0'-5').
4		0.7	75			
6					SM	5-10 Ft: Same as above
8		1.4	30			
10						10-15 Ft: Pale brown (10 yr 6/3) and dark grayish brown (2.5y 4/2) silty dolomitic SANDSTONE , dry, hard, very fine to to fine-grained, moderately sorted, subrounded, well cemented, with occasional thin beds of crystalline dolomite and light olive brown sandy silt (2.5y 5/4).
12		0.7	43			
14						15-20 Ft: Same as above
16						
18		0	21			
20						20-25 Ft: Same as above, with common thin beds of olive brown sandy silt, soft, with little clay).
22						
24			21			



Drilling Log

Monitoring Well MW-88

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company

Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28		0	18			25-30 Ft: Pale brown (10 yr 6/3) and dark grayish brown (2.5y 4/2) dolomitic SANDSTONE , moist, moderately hard, very fine to fine grained, moderately sorted, subrounded, well cemented, thin beds of crystalline dolomite sandstone interbedded with olive brown sandy silt.
30						Driller reports water at approximately 29 Ft. Returns are wet. No mist pump. Air and formation water returns. Estimated flow rate 8 gpm (very rough estimate).
32		0	9			30-35 Ft: Same as above
34						
36						
38		0	38			35-40 Ft: Olive gray (5y 5/2) and brown (10 yr 5/2) SANDSTONE moderately hard, very fine to fine grained, moderately sorted, subrounded, well cemented.
40						
42		0	50			40-45 Ft: Same as above (poorly cemented).
44						
46						
48		0	75			45-50 Ft: Same as above
50						
52		0	33			50-55 Ft: Same as above
54						
56						55-60 Ft: Same as above (well cemented beds interbedded with poorly cemented beds).



Drilling Log

Monitoring Well MW-88

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58		0	13			
60						End 8-inch surface casing at 60 Ft.
62		0.7	33			60-65 Ft: Brown (10 yr 5/3) and grayish brown (2.5y 5/2) silty dolomitic SANDSTONE , very hard to moderately hard, interbedded well and weak beds, moist, very fine-to fine-grained, rounded, mod. sorted.
64						
66						65-70 Ft: Same as above (becomes wet 69', driller note 6" free fall drop (69.0'-69.5' then quick drilling from 69.5'-70.0'. Water rises to approx. 38' bgs in borehole, borehole wet below 69').
68		1.5	100			
70						70-75 Ft: Dark gray (10 yr 44/1) and gray (5y 5/1) silty dolomitic SANDSTONE , hard, very fine-to fine-grained, subrounded to rounded, well-cemented, moderately sorted.
72		0	60			
74						75-80 Ft: Same as above
76		0	50			
78						
80						80-85 Ft: Same as above (faint HC odor).
82		1.7	38			
84						
86						85-88 Ft: Gray sandy (5y 5/1) DOLOMITE , very hard, conchoidal fractures, microcrystalline, occasional thin beds of sandstone.
88						



Drilling Log

Monitoring Well MW-88

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88						
90						90-95 Ft: Dark gray (10 yr 4/1) and gray (5y 5/1) silty dolomitic SANDSTONE , hard, well cemented, v.fine-to fine-grained, subrounded to rounded, moderately sorted (faint hydrocarbon odor).
92		0	21			
94						
96						95-100 Ft: Same as above
98		0	25			
100						100-105 Ft: Same as above
102		0	33			
104						
106						105-110 Ft: L. gray (10 yr 7/1) silty dolomitic SANDSTONE , hard, very fine-to fine-grained, moderately sorted, with occasional very thin beds of dolomite.
108		0	30			
110						110-115 Ft: Light gray (10 yr 7/1) sandy DOLOMITE , very hard, microcrystalline (cuttings are coarse sand size, occasional thin beds of dolomitic sand).
112						
114		0	18			115-120 Ft: Same as above
116						
118		0	19			
120						



Drilling Log

Monitoring Well MW-88

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120						120-125 Ft: Dark gray (10 yr 4/1) and gray (5y 5/1) silty dolomitic SANDSTONE , hard, well cemented, very fine-to fine-grained rounded to subrounded, moderately sorted (faint hydrocarbon odor). 125-130 Ft: Same as above
122		0.7	20			
124						
126						
128		0.7	30			130-135 Ft: Pale brown (10 yr 6/3) DOLOMITE , micro-crystalline, conchoidal fractures. Cuttings are coarse to medium sand-sized, trace sand. 135-140 ft: Same as above 140-145 Ft: Same as above 145-150 Ft: Same as above
130						
132		0	19			
134						
136						150-155 Ft: Pale brown (10 yr 6/3) silty dolomitic SANDSTONE , moderately hard to soft, weak cement, very fine to medium grained, poorly sorted, rounded to angular, trace fossils (possible forams and radiolaria), trace pyrite.
138		0	16			
140						
142		0	20			
144						
146						
148		0	17			
150						
152						



Drilling Log

Monitoring Well MW-88

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152		0	23			155-160 Ft: Same as above
154						
156						
158		0.7	38			
160						
162		0	50			
164						
166		0	27			
168						
170						
172		0	43			170-175 Ft: Same as above
174						
176						
178						
180						
182						
184						
						TD = 175 Ft.



Drilling Log

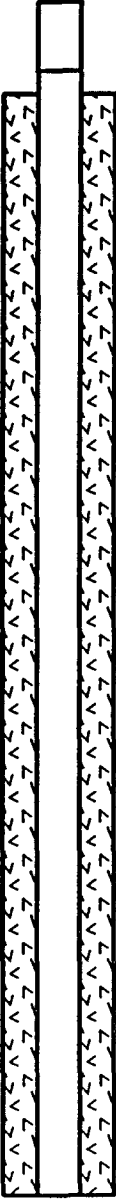
Monitoring Well **MW-89**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105
Surface Elev. _____ Total Hole Depth 232 ft. Diameter 7.875 in.
Top of Casing _____ Water Level Initial 212 ft. Static 212 ft.
Screen: Dia 4 in. Length 40 ft. Type/Size 0.04 in.
Casing: Dia 4 in. Length 188.5 ft. Type SCH 40 PVC
Fill Material 6/9 Silica sand Rig/Core Gardner Denver 1500
Drill Co. WT Water Well Service Method Air/Mist Rotary
Driller Ronnie Kieth Log By Scott Underwood Date 8/2/96 Permit # _____
Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

SPUD hole at 1300 hrs. on 8/3/96 Finish
8/3/96. Stainless steel centralizers at
186', 206', 226'.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale 0 2 4 6 8 10 12 14 16 18 20 22 24						
0-4 Ft:		0	90			Yellowish-brown (10 yr 5/4)sandy LOAM with some dolomite gravel
4-5 Ft:						Very pale brown (10 yr 8/3) dolomitic silty SAND , very fine to medium grained, poorly sorted, dry, soft, with occasional thin beds of dolomite. Sand is poorly cemented and friable.
5-10 Ft:						Same as above
10-15 Ft:		0.7	50			Same as above
15-20 Ft:		0.7	50			Same as above
15-20 Ft:		1.5	27			Grayish brown (10 yr 5/2) dolomitic LIMESTONE , tracv. fine sand, becomes hard at 18'. Limestone is hard with interbedded thin soft beds (2-3").
20-25 Ft:		0	27			Same as above



Drilling Log

Monitoring Well MW-89

 Project MOC/Indian Basin Gas Plant
 Location Indian Basin, Carlsbad NM

 Owner Marathon Oil Company
 Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0	38			25-30 Ft: Pale brown (10 yr 6/3), and light gray (10 yr 7/2) DOLOMITE , hard, dry, occasional thin dolomitic sand beds (<2/3"), sand is very fine to fine grained.
26						
28						
30		0	27			30-35 Ft: Pale brown (10 yr 6/3) and light gray (10 yr 7/2) silty dolomitic SANDSTONE , dry, soft, poorly sorted, very fine to fine grained, subrounded, occasional thin beds of harder sandy dolomite. Sandstone is weakly cemented.
32						
34						
36		0	100			35-40 Ft: Same as above (cuttings are damp at 36' and 39').
38						
40						
42		3.7	75			40-45 Ft: Same as above (moist cuttings).
44						
46						
48		1.5	60			45-50 Ft: Same as above
50						
52						
54		0	75			50-55 Ft: Pale brown (10 yr 6/3) and light gray (10 yr 7/2) silty dolomitic SANDSTONE , soft, subrounded, very fine-to fine-grained, moderately sorted, weakly cemented, becomes dry at about 50'.
56						
58						
60		0	75			55-60 Ft: Grayish brown (10 yr 5/2) silty SANDSTONE , very fine to fine grained, moderately sorted, subrounded, friable, very
62						



Drilling Log

Monitoring Well **MW-89**

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		0	75			weakly cemented, very moist, soft, occasional very thin beds (<2") of dolomitic SANDSTONE , matrix reacts with HCl.
58						
60						60-65 Ft: Same as above
62		0	60			
64						
66						65-70 Ft: Same as above
68		0	75			
70						70-75 Ft: Grayish brown (10 yr 5/2) and very dark grayish brown (10 yr 3/2) silty SANDSTONE , very fine-to fine-grained, moderately sorted, subrounded, weakly cemented, occasional very thin beds of dolomitic SANDSTONE , matrix reacts with HCl.
72		0	60			
74						75-80 Ft: Same as above (becomes harder at 79').
76		0	60			
78						
80						80-85 Ft: Same as above (becomes harder at 83'. Sandstone is cemented with calcium carbonate).
82		11.1	51			
84						
86		17.3	27			85-90 Ft: White (10 yr 8/2) DOLOMITE , microcrystalline, very hard, conchoidal fractures, dry, possibly siliceous dolomite.
88						



Drilling Log

Monitoring Well MW-89

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88						
90						
92		0	38			90-95 Ft: Grayish brown (2.5 y 5/2) silty dolomitic SANSTONE , very fine- to fine- grained, moderately sorted, subrounded, soft, weakly cemented, slight moisture, occasional thin hard beds of dolomitic SANDSTONE , matrix reacts with HCl. (Slight HC odor).
94						
96		0.7	21			95-100 Ft: DOLOMITE (10 yr 7/1), microcrystalline, very hard, conchoidal fractures, dry, possibly siliceous dolomite. Cuttings are fine to coarse sand size.
98						
100						100-105 Ft: Same as above
102		0	20			
104						105-110 Ft: Same as above
106		0	18			
108						
110						110-115 Ft: Same as above
112		0	17			
114						
116						115-120 Ft: Same as above
118		0	23			
120						



Drilling Log

Monitoring Well **MW-89**

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

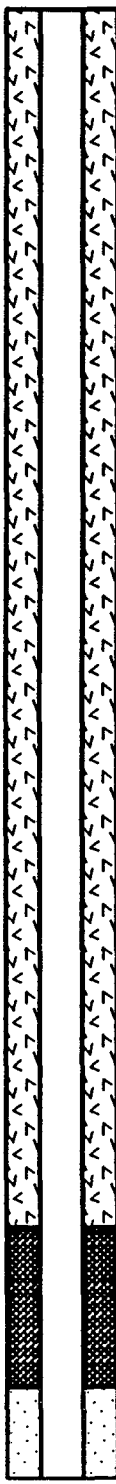
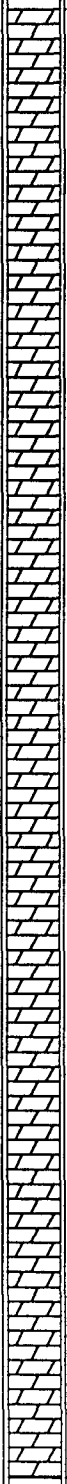
Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0	18			120-125 Ft: Pale brown (10 yr 6/3) DOLOMITE , microcrystalline, very hard, conchoidal fractures, dry, possibly siliceous dolomite. Cuttings are coarse sand sized. Trace sand.
122						
124		0	27			125-130 Ft: same as above
126						
128						
130						
132		0	35			130-135 Ft: Light gray (7.5 yr N7/) silty dolomitic SANDSTONE , very fine to fine grained, moderately sorted, subrounded, dry, hard, occasional thin beds of dolomite, well cemented.
134						
136		0	25			135-140 Ft: Gray (7.5 yr N6/) sandy DOLOMITE , microcrystalline, hard, conchoidal fractures, becomes wet at 137'. Possible siliceous cement. Very thin beds of dolomitic sand. (Switched to mist pump)
138						
140		0	33			140-145 Ft: Same as above
142						
144		0	30			145-150 Ft: Same as above
146						
148						
150						
152						150-155 Ft: Light gray (10 yr 7/1) sandy DOLOMITE , and light brownish gray dolomitic silty sand (interbedded). Dolomite is hard, microcrystalline, possibly siliceous cement, common thin beds of dolomitic silty sand, sand is fine grained, subrounded, moderately sorted.

Drilling Log

Monitoring Well MW-89

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152		0	21			
154						
156						
158		0	25			
160						
162		0	23			
164						
166						
168		0	25			
170						
172		0	20			
174						
176		0	18			
178						Bentonite in annulus 178.5 to 182 Ft.
180						
182		0	25			
184						



Drilling Log

Monitoring Well **MW-89**

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

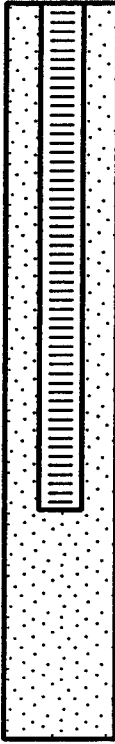
Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184						
186						185-190 Ft: Very pale brown (10 yr 7/3) DOLOMITE , microcrystalline, very hard, possible siliceous cement, conchoidal fractures. Cuttings are flat, coarse sand to fine gravel size, blocky Stainless steel centralizer at 186 Ft.
188		0	23			
190						190-195 Ft: Same as above
192		0	25			
194						195-200 Ft: Same as above
196						
198		0	23			
200						200-205 Ft: Same as above
202		0	38			
204						
206		0	43			205-210 Ft: Very pale brown (10 yr 7/3) sandy DOLOMITE , microcrystalline, hard siliceous cement. Cuttings are coarse gravel size, occasional very thin beds of dolomitic sand. Return water increases, estimated depth to water during drilling is 212 Ft. Stainless steel centralizer at 206 Ft.
208						
210						210-215 Ft: Brown (10 yr 4/3) and light gray dolomitic silty SANDSTONE , very fine to fine grained, moderately sorted, subrounded, moderately hard, friable, moderate cement, occasional thin beds of dolomite, trace shale.
212		0	43			
214		0	43			215-220 Ft: Same as above
216						



Drilling Log

Monitoring Well MW-89

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
216						
218						
220						
222		0	48			220-225 Ft: White (5 yr 8/1) and very pale brown DOLOMITE (sandy), hard, microcrystalline, interbedded with very thin beds of sandstone.
224						
226						225-232 Ft: Same as above Stainless steel centralizer at 226 Ft.
228		0	48			
230		0	24			
232						TD at 232 Ft.
234						
236						
238						
240						
242						
244						
246						
248						



Drilling Log

Shallow Zone Monitor Well 90

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61
Surface Elev. _____ Total Hole Depth 60 ft. Diameter 7 5/8 in/7 in.
Top of Casing 2.5 ft. Water Level Initial 49 ft. Static _____
Screen: Dia 4 in. Length 50 ft. Type/Size PVC/0.040" in.
Casing: Dia 4 in. Length 12.5 ft. Type PVC
Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
Drill Co. PC Exploration Method Air Rotary
Driller S. Mott Log By Bob Davis Date 1/13/96 Permit # _____
Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Bedrock at surface. Groundwater encountered during drilling at 49 Ft.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						7 5/8-inch hole drilled to 5 Ft. Temp. set 7 11/3-inch odex csg. Drill 7-inch hole to 60 Ft.
0						0-5 Ft: Dark yellowish orange (10yr 6/6) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, with minor light brown (5yr 5/6) SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well sorted, poorly cemented, calcareous, no hydrocarbon odor.
2			50			5-10 Ft: DOLOMITE and SANDSTONE , as above.
4		.3				
6			50			
8						10-15 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor, with minor SANDSTONE , as above.
10		1.5				
12			46			
14		12.4				15-20 Ft: Brownish black (5yr 2/1) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, interbedded with pale yellowish brown (10yr 6/2) SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well sorted, moderately well cemented, calcareous, no hydrocarbon odor.
16			46			
18						20-25 Ft: DOLOMITE and SANDSTONE , as above with pale olive (10yr 6/2), CLAY , soft, damp, no hydrocarbon odor.
20		96				
22			38			
24						



Drilling Log

Shallow Zone Monitor Well 90

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%		
24		1.5	41			25-30 Ft: Brownish gray (5yr 4/1) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor, with minor SANDSTONE , as above.		
26								
28		18.2	41			30-35 Ft: DOLOMITE and minor SANDSTONE , as above.		
30								
32		1.5	41			35-40 Ft: DOLOMITE and minor SANDSTONE , as above.		
34								
36		1.2	41			40-45 Ft: Pale yellowish brown (10yr 6/2) to dark yellowish orange (10yr 6/2) DOLOMITE , very hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor, with minor SANDSTONE , as above.		
38								
40		8.6	30			45-50 Ft: DOLOMITE and SANDSTONE , as above (sandstone % increased w/depth).		
42								
44		50	50			50-55 Ft: DOLOMITE and SANDSTONE , as above.		
46								
48		4.2	50			55-80 Ft: DOLOMITE and SANDSTONE , as above.		
50								
52		4.3	50					
54								
56		4.3	50					
58								



Drilling Log

Shallow Zone Monitor Well 90

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		9.3	36			
58						
60						Total depth at 60 Ft.
62						
64						
66						
68						
70						
72						
74						
76						
78						
80						
82						
84						
86						
88						



Drilling Log

Shallow Zone Monitor Well 91

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61
Surface Elev. _____ Total Hole Depth 70 ft. Diameter 7 5/8 in./7 in.
Top of Casing 2.5 ft. Water Level Initial _____ Static _____
Screen: Dia 4 in. Length 60 ft. Type/Size PVC/0.040" in.
Casing: Dia 4 in. Length 12.5 ft. Type PVC
Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
Drill Co. PC Exploration Method Air Rotary
Driller S. Mott Log By Bob Davis Date 1/14/97 Permit # _____
Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Bedrock at 14 Ft. No water encountered during drilling.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						
0						7 5/8-inch hole drilled to 20 Ft. Temp. set 7 11/3-inch odex csg. at 20 Ft. Drilled 7-inch hole to 70 Ft. total depth.
2			30			0-5 Ft: ARROYO ALLUVIUM, dolomite fragments from cobbles and boulders, no hydrocarbon odor.
4		0				5-10 Ft: ARROYO ALLUVIUM, as above.
6			25			
8						10-14 Ft: ARROYO ALLUVIUM, as above.
10		0	25			
12						
14		0	38			14-20 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
16						
18			43			20-25 Ft: DOLOMITE, as above.
20						
22						
24						



Drilling Log

Shallow Zone Monitor Well 91

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0	60			25-30 Ft: DOLOMITE, as above with minor grayish orange (10yr 7/4) SANDSTONE, dense, dry, very fine-grained, subrounded, well sorted, well cemented, calcareous, no hydrocarbon odor.
26						
28		1.5	40			30-35 Ft: DOLOMITE and minor SANDSTONE, as above.
30						
32		9.4	40			35-40 Ft: Pale brown (5yr 5/2) to light brown (5yr 5/6) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, moderate hydrocarbon odor, w/minor SANDSTONE, as above.
34						
36		10.1	50			40-45 Ft: SANDSTONE, as above with strong hydrocarbon odor. Occasional minor pale yellowish brown (10yr 6/2) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures.
38						
40		27.9	40			45-50 Ft: DOLOMITE, as above. Minor SANDSTONE, as above, faint hydrocarbon odor.
42						
44		11.1	27			50-55 Ft: DOLOMITE and minor SANDSTONE, as above with moderate hydrocarbon odor.
46						
48		80.8				
50						
52						
54						
56						55-60 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, faint hydrocarbon odor.



Drilling Log

Shallow Zone Monitor Well 91

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		23.1	27			80-85 Ft: DOLOMITE, as above with no hydrocarbon odor.
58						
60						
62						
64						
66		18.4	40			85-70 Ft: DOLOMITE, as above.
68						
70						
72						
74						
76		2.5	27			Total depth at 70 Ft.
78						
80						
82						
84						
86						
88						



Drilling Log

Shallow Zone Monitor Well 92

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61
Surface Elev. _____ Total Hole Depth 70 ft. Diameter 7 5/8 in./7 in.
Top of Casing 2.5 ft. Water Level Initial _____ Static _____
Screen: Dia 4 in. Length 60 ft. Type/Size PVC/0.040" in.
Casing: Dia 4 in. Length 12.5 ft. Type PVC
Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
Drill Co. PC Exploration Method Air Rotary
Driller S. Mott Log By Bob Davis Date 1/14/97 Permit # _____
Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Bedrock at 21 Ft. No water encountered during drilling.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5						7 5/8-inch hole drilled to 25 Ft. Temp. set 7 11/32-inch odex csg. at 25 Ft. Drilled 7-inch hole to 70 Ft. total depth.
0						0-5 Ft: ARROYO ALLUVIUM, silt, very loose, dry, dolomite, fragments from cobbles and boulders, minor sandstone fragments.
2			30			
4						5-10 Ft: ARROYO ALLUVIUM, as above.
6		6.5				
8			38			
10		0.7				10-15 Ft: ARROYO ALLUVIUM, predominantly dolomite fragments.
12			13			
14						15-21 Ft: ARROYO ALLUVIUM, as above.
16		0.8				
18			21			
20		132				
22						21-25 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
24			23			



Drilling Log

Shallow Zone Monitor Well 92

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		68.4	43			25-30 Ft: DOLOMITE, as above.
26						
28		41.1	46			30-35 Ft: DOLOMITE, as above.
30						
32		10.8	38			35-40 Ft: DOLOMITE, as above.
34						
36		16.1	40			40-45 Ft: DOLOMITE, as above w/interbedded grayish orange SANDSTONE, moderately dense, dry, very fine-grained, subrounded, well sorted, well cemented, calcareous, faint hydrocarbon odor.
38						
40		4.9	36			45-50 Ft: DOLOMITE w/minor SANDSTONE, as above.
42						
44		3.1	36			50-55 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor with interbedded brownish gray (5yr 4/1) SANDSTONE, moderately dense, very fine-grained, subrounded, well sorted, well cemented, calcareous, no hydrocarbon odor.
46						
48		2.5				
50						
52						
54						
56						



Drilling Log

Shallow Zone Monitor Well 92

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		2.8	40			80-85 Ft: DOLOMITE and SANDSTONE, as above.
58						
60						
62						
64						
66		3.2	38			85-70 Ft: DOLOMITE and minor SANDSTONE, as above
68						
70						
72						
74						
76		6.1	33			Total depth at 70 Ft.
78						
80						
82						
84						
86						
88						



Drilling Log

Shallow Zone Monitor Well 93

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61
Surface Elev. _____ Total Hole Depth 70 ft. Diameter 7 5/8 in./7 in.
Top of Casing 2.5 ft. Water Level Initial _____ Static _____
Screen: Dia 4 in. Length 60 ft. Type/Size PVC/0.040" in.
Casing: Dia 4 in. Length 12.5 ft. Type PVC
Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
Drill Co. PC Exploration Method Air Rotary
Driller S. Mott Log By Bob Davis Date 1/13/97 Permit # _____
Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

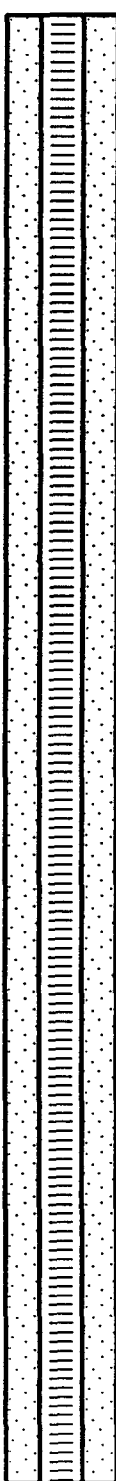
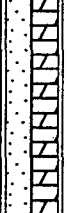
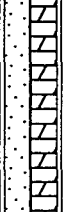
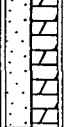
Bedrock at 17 Ft. No water encountered during drilling. Drilled 0-40 Ft on 1/13/97 and 45-70 Ft on 1/14/97.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						7 5/8-inch hole drilled to 20 Ft. Temp. set 7 11/32-inch odex csg. at 20 Ft. Drilled 7-inch hole to 70 Ft. total depth.
0						0-5 Ft: ARROYO ALLUVIUM, silt and dolomite fragments from cobbles and boulders.
2			43			
4						5-10 Ft: ARROYO ALLUVIUM, as above.
6		0				
8			25			
10		0				10-17 Ft: ARROYO ALLUVIUM, as above.
12			25			
14		0				
16			25			17-20 Ft: Pale yellowish brown (10yr 6/2), DOLOMITE, hard, dry, microcrystalline, conchoidal fracture, no hydrocarbon odor.
18						
20		0.5				20-25 Ft: DOLOMITE, as above.
22			38			
24						

Drilling Log

Shallow Zone Monitor Well 93

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0.7	36			25-30 Ft: DOLOMITE, as above.
26						
28		12.2	46			30-35 Ft: DOLOMITE, as above with minor SANDSTONE.
30						
32		3.8	38			35-40 Ft: DOLOMITE and minor SANDSTONE, as above.
34						
36		0.5	43			40-45 Ft: DOLOMITE and SANDSTONE, as above.
38						
40		0	40			45-50 Ft: Pale yellowish brown (10yr 6/2) to dark yellowish orange (10yr 6/6) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor w/minor SANDSTONE.
42						
44		0.3	36			50-55 Ft: DOLOMITE, w/minor SANDSTONE, as above.
46						
48		1.2				55-60 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE, moderately dense, dry, very fine-grained, subrounded, well sorted, well cemented, calcareous, no hydrocarbon odor, with interbedded DOLOMITE, as above.
50						
52						
54						
56						



Drilling Log

Shallow Zone Monitor Well 93

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		1.4	50			80-85 Ft: Interbedded SANDSTONE and DOLOMITE, as above.
58						
60		15.9	38			85-70 Ft: Interbedded SANDSTONE and DOLOMITE, as above.
62						
64						
66		24.1	33			Total depth at 70 Ft.
68						
70						
72						
74						
76						
78						
80						
82						
84						
86						
88						



Drilling Log

Monitoring Well **MW-94**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105
Surface Elev. _____ Total Hole Depth 230 ft. Diameter 12.25/7.875 in.
Top of Casing _____ Water Level Initial 50 ft. Static _____
Screen: Dia Open Hole in. Length _____ Type/Size _____
Casing: Dia 8" in. Length 65 ft. Type Steel
Fill Material _____ Rig/Core Gardner Denver 1500
Drill Co. WT Water Well Service Method Air Rotary
Driller Ronnie Kieth Log By Eric Matzner Date 6/10/96 Permit # RA-5131-S-25
Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Start at 0945 hrs. on 6/10/96. Borehole
relocated NNE initial caved hole. (-N35
E, approximately 100-150 yds.) Estimated
flow rate at 50 - 54 ft., 4 gpm.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						12.25-inch borehole with 8-inch casing 0 to 65 Ft.
2						0-5 Ft: Light brownish gray (10 yr 6/2) DOLOMITE , conchoidal fracturing, slightly sandy matrix.
4		0	30			
6						5-10 Ft: Graysih brown (10 yr 5.5/2) DOLOMITE , conchoidal fracturing, slightly sandy matrix, dry, occassional calcium carbonate fragments.
8		0	25			
10						10-15 Ft: Olive gray (5y 5/2) DOLOMITE and gray (7.5 yr N 6/) SANDSTONE , moderately cemented, well sorted, well rounded, dry. Matrix does not react with HCl.
12		2.4	21			
14						
16						15-20 Ft : Pale yellow (2.5 y 7/4) dolomitic SANDSTONE , very fine-grained, moderately cemented, well sorted, well rounded.
18		0	43			
20						20-25 Ft: Light brownish gray (2.5y*6/2) dolomitic SANDSTONE , moderately cemented, moderately sorted, well rounded, dry. (interbedded interval of dolomitic sandstone and sandstone).
22		2.4	30			
24						



Drilling Log

Monitoring Well MW-94

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28		7.6	43			25-30 Ft: Same as above
30						
32		2.4	30			30-35 Ft: Light olive brown (2.5y 5/3) dolomitic SANDSTONE , very fine-grained, moderately sorted, well rounded, moderate to poorly cemented, dry to slightly moist.
34						
36		2.4	43			35-40 Ft: Very dark greenish brown (10 yr 3/2) SANDSTONE , very fine-grained, moderately sorted, well rounded, moist to wet, moderately cemented, hard. Moist, no odor. Begin misting hole.
38						
40						
42		2.4	25			40-45 Ft: Dark gray (7.5y N4/) and gray (7.5 yr N6/) SANDSTONE , moderately sorted, moderately cemented, well rounded.
44						
46		2.4	43			45-50 Ft: Same as above (water at 50'-54' - 4 gpm).
48						
50						50-55 Ft: Same as above (dark gray).
52		2.4	43			
54						
56						55-60 Ft: Same as above



Drilling Log

Monitoring Well **MW-94**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

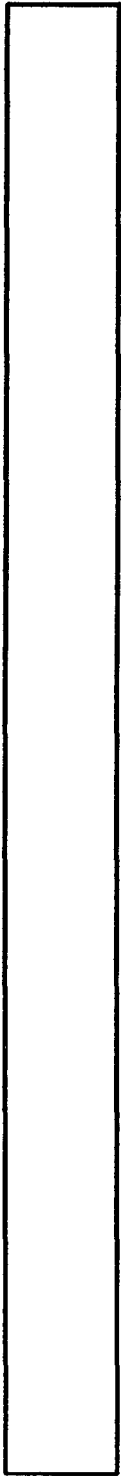
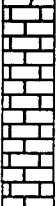
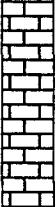
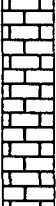
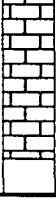
Location Indian Basin, Carlsbad NM

Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58		2.4	50			
60						
62		0	11			80-85 Ft: Gray (10 yr 6/1) DOLOMITE , conchoidal fractures, microcrystalline, small light green clasts, slight reaction with HCl.
64						
66		11.9	20			7.875-inch open borehole 65 to 230 Ft. 65-70 Ft: Dark gray (10 yr 4/1) dolomitic SANDSTONE , very fine-grained, moderately sorted, well rounded, well cemented, hard.
68						
70						70-75 Ft: Gray (2.5y N6/) dolomitic SANDSTONE , very fine-grained, moderately sorted, well rounded, well cemented.
72		7.4	50			
74						
76		1.2	10			75-80 Ft: Gray (10 yr 6/1) DOLOMITE and LIMESTONE , microcrystalline, very hard, conchoidal fractures, dry, moderate reaction with HCL.
78						
80						80-85 Ft: Gray (10 yr 6/1) DOLOMITE , microcrystalline, very hard, conchoidal fractures, dry.
82		0	10			
84						
86						85-90 Ft: Same as above
88		0	10			

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		1.2	11			90-95 Ft: Same as above
90						
92						
94						
96		3.7	14			95-100 Ft: Same as above
98						
100						
102						
104		2.4	15			100-105 Ft: Gray (5 yr 6/1) dolomitic LIMESTONE , micro-crystalline, conchoidal fractures, hard, reacts slightly with HCl.
106						
108						
110						
112		0	13			105-110 Ft: Same as above
114						
116						
118						
120		0	23			110-115 Ft: Same as above (slightly sandy matrix).
		0	23			115-120 Ft: Gray (10 yr 6/1) dolomitic LIMESTONE , slightly sandy, microcrystalline, trace pyrite crystals, hard.



Drilling Log

Monitoring Well **MW-94**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120						120-125 Ft: Gray (10 yr 6/1) dolomitic LIMESTONE , sandy, conchoidal fractures.
122		0	27			
124						
126		0	60			125-130 Ft: Gray (10 yr 6/1) sandy dolomitic LIMESTONE , little pyrite, cross stratification, powdery, dry.
128						
130						130-135 Ft: Same as above (less sandy, less pyrite, hard, dry).
132		0	23			
134						
136		0	16			135-140 Ft: Gray (2.5 y N5/) and light brownish gray (2.5y 6/2) sandy DOLOMITE , trace black grains (possibly magnesium).
138						
140						140-145 Ft: Gray (5y 5/1) dolomitic SHALE/SILTSTONE , moderately hard, very thinly laminated, platy cuttings.
142		0	27			
144						
146		0	18			145-150 Ft: Light gray (10 yr 7/2) LIMESTONE , interbedded hard and soft limestone, chalky, moderately sandy, very fine-grained, occasional calcite crystals, hard.
148						
150						150-155 Ft: Same as above (white (10 yr 8/1), hard).
152		5.0	19			



Drilling Log

Monitoring Well **MW-94**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152		5.0	19			155-180 Ft: Same as above
154						
156						
158		0	18			
160						
162		2.4	15			
164						
166						
168		2.4	17			
170						
172		5.0	21			170-175 Ft: Same as above
174						
176						
178		5.0	150			
180						
182		5.0	100			
184						175-180 Ft: White (10 yr 8/2) CHALK, silt sized, with occasional sand sized grains, moist, strong reaction w/HCL, soft. 180-185 Ft: Same as above (more sandy).



Drilling Log

Monitoring Well **MW-94**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184		5.0	100	x x x x		185-190 Ft: Same as above
186				x x x x		
188				x x x x		
190				x x x x		
192		5.0	60	x x x x		190-195 Ft: Same as above (more sand).
194				x x x x		
196				x x x x		
198				x x x x		
200		5.0	50	x x x x		195-200 Ft: Same as above (15% sand/calcium carbonate grains). Groundwater encountered at 200 ft.
202				x x x x		
204				x x x x		
206				x x x x		
208		5.0	75	x x x x		200-205 Ft: White (10 yr 8/2) CHALK and SANDSTONE , some sand/calcium carbonate grains, poorly sorted, subangular. Interbedded with thin beds of dolomite, very fine- to fine-grained. 205-210 Ft: Same as above
210				x x x x		
212				x x x x		
214				x x x x		
216		5.0	75	x x x x		210-215 Ft: Light gray (10 yr 7/2) sandy LIMESTONE , very fine-grained. Limestone and dark gray (10 yr 4/1) shale interbeds. 215-220 Ft: Same as above (common secondary porosity, intervals of hard and soft sediments).



Drilling Log

Monitoring Well MW-94

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
216		2.4	75			220-225 Ft: Light brownish gray (10 yr 6/2) sandy LIMESTONE , secondary porosity (abundant), hard but crumbles, slightly dolomitic limestone, slight reaction with HCl.
218						
220						
222		5.0	50			225-230 Ft: Gray (10 yr 5/1) sandy LIMESTONE and DOLOMITE , poorly sorted, subangular, ferrous and magnesium carbonate grains.
224						
226	2.4	43	TD at 230 ft. on 6/11/96			
228						
230						
232						
234						
236						
238						
240						
242						
244						
246						
248						



Drilling Log

Monitoring Well 95

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228
 Surface Elev. _____ Total Hole Depth 145 ft. Diameter 7 7/8 in.
 Top of Casing _____ Water Level Initial 123.5 ft. Static _____
 Screen: Dia 4 in. Length 30 ft. Type/Size 0.040 in.
 Casing: Dia 4 in. Length 111 ft. Type Sch. 40 PVC
 Fill Material Gravel/Grout Rig/Core Gardner Denver 15W
 Drill Co. West Texas Method Mud/Air Rotary
 Driller V. Parker Log By Bob Davis Date 03/31/97 Permit # _____
 Checked By Davis, Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Bedrock at 29 ft. Used mud system to drill top hole. Switched to air rotary system out of 8 5/8-inch steel surface casing at 31 ft.

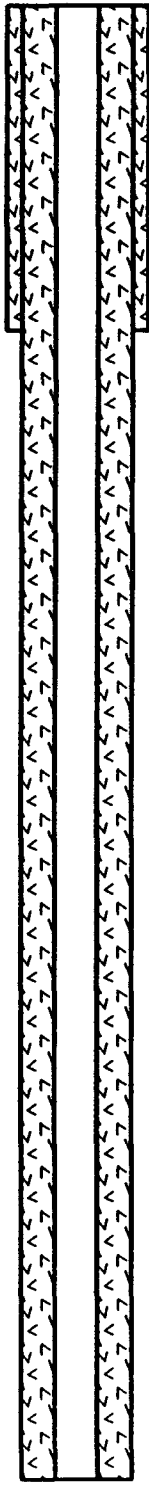
Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						12 1/4-inch hole drilled to 31 ft. Set 8 5/8-inch steel casing to 31 ft. Drilled 7 7/8-inch hole to 145 ft. (below grade) total depth.
0		No PID rdngs due to mud system to 31 ft.	Not able to calculate drill rates from 0-31 ft. due to caving of borehole in arroyo alluvium.			0-5 ft.: ARROYO ALLUVIUM, pale yellowish brown (10YR 6/2) silt, loose, dry, interbedded with dolomite fragments from dolomitic gravels, cobbles, and boulders.
2						5-10 ft.: ARROYO ALLUVIUM, as above.
4						10-15 ft.: ARROYO ALLUVIUM, as above.
6						15-20 ft.: ARROYO ALLUVIUM, as above.
8						20-25 ft.: ARROYO ALLUVIUM, as above.
10						
12						
14						
16						
18						
20						
22						
24						



Drilling Log

Monitoring Well 95

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%		
24						25-29 ft.: ARROYO ALLUVIUM, as above.		
26								
28								
30						29	29-30 ft.: Grayish orange (10YR 7/4) to pale yellowish brown (10YR 6/2) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.	
32						10		
34								
36						3.8	30	35-40 ft.: Pale yellowish brown (10YR 6/2) SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well-sorted, well-cemented, calcareous, no hydrocarbon odor.
38								
40						4.1		40-45 ft.: Pale yellowish brown (10YR 6/2) sandy DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, sand grain inclusions range in color from pale yellowish brown (10YR 6/2) to black (N1).
42								
44							27	
46						74.9		45-50 ft.: Pale yellowish brown (10YR 6/2) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, interbedded with pale yellowish brown (10YR 6/2) DOLOMITE/SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well-sorted, well-cemented, calcareous, no hydrocarbon odor.
48							25	
50						41.4		50-55 ft.: Pale yellowish brown (10YR 6/2), SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well-sorted, well-cemented, calcareous, moderately to strong hydrocarbon odor.
52							30	
54								
56						32.4		55-60 ft.: SANDSTONE , as above.



Drilling Log

Monitoring Well 95

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			27			
60		196				
62						60-65 ft.: Pale yellowish brown (10YR 6/2) DOLOMITIC SANDSTONE , dense, dry, very fine- to fine-grained, subrounded to rounded, well-sorted, well-cemented, calcareous interbedded with grayish brown (5YR 3/2) SANDSTONE , moderate dense, dry, very fine-grained, subrounded, well-sorted, well-cemented, calcareous, strong hydrocarbon odor.
64			23			
66		153.7				65-70 ft.: SANDSTONE , as above, interbedded with pale brown (5YR 5/2) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, moderate to strong hydrocarbon odor.
68			14			
70		146.3				70-75 ft.: SANDSTONE and DOLOMITE , as above, with moderate hydrocarbon odor.
72						
74			30			
76		28.4				75-80 ft.: Dark yellowish orange (10YR 6/6) SANDSTONE , loose, damp, very fine-grained, subrounded, well-sorted, poorly-cemented, calcareous, interbedded with minor pale brown (5YR 5/2) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
78			33			
80		10.4				80-85 ft.: Pale brown (5YR 5/2) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor, with minor SANDSTONE .
82			20			
84						
86		20.6				85-90 ft.: DOLOMITE and SANDSTONE , as above.
88			20			

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

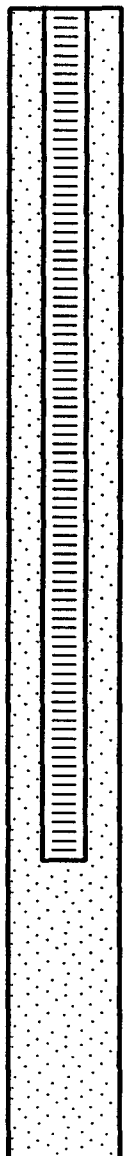
Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88			20			
90		40.0				90-95 ft.: DOLOMITE and SANDSTONE, as above.
92			21			
94		5.1				95-100 ft.: Pale yellowish brown (10YR 6/2) DOLOMITIC SANDSTONE, hard, dry, fine- to medium-grained, subrounded to angular, well-sorted, poorly-cemented, calcareous, no hydrocarbon odor (sand-sized cuttings are dolomite).
96						
98		30				
100		3.5				100-105 ft.: DOLOMITIC SANDSTONE, as above, slightly moist.
102						
104		19				
106		0.0				105-110 ft.: DOLOMITIC SANDSTONE, as above.
108		30				
110		2.5				110-115 ft.: DOLOMITIC SANDSTONE, as above.
112						
114		27				
116		3.5				115-120 ft.: DOLOMITIC SANDSTONE, as above.
118		27				
120		3.5				



Drilling Log

Monitoring Well 95

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		3.5				
122			21			120-125 ft.: Pale yellowish brown (10YR 6/2) SANDSTONE , moderate dense, damp, very fine-grained, subrounded, well-sorted, well-cemented, calcareous, no hydrocarbon odor. Well making water immediately below 123 ft. Interface probe indicates top of water at 123.5 ft. below grade (1415 hrs. 4/2/97).
124						
126		2.5	16			125-130 ft. Pale yellowish brown (10YR 6/2) DOLOMITE , hard, saturated, microcrystalline, conchoidal fractures, no hydrocarbon odor.
128						
130		2.2				130-135 ft.: DOLOMITE , as above, interbedded with pale yellowish brown (10YR 6/2) SANDSTONE , loose, saturated, very fine-grained, rounded to subrounded, well-sorted, poorly-cemented, calcareous, no hydrocarbon odor.
132			33			
134		0.0				135-140 ft.: DOLOMITE and SANDSTONE , as above.
136						
138			25			
140						140-145 ft.: SANDSTONE , as above.
142			38			
144						
146						Total depth at 145 ft. below grade.
148						
150						
152						



Drilling Log

Monitoring Well 96

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228
 Surface Elev. _____ Total Hole Depth 135 ft. Diameter 7 7/8 in.
 Top of Casing _____ Water Level Initial 110 ft. Static _____
 Screen: Dia 4 in. Length 30 ft. Type/Size 0.040 in.
 Casing: Dia 4 in. Length 97.5 ft. Type Sch. 40 PVC
 Fill Material Gravel/Grout Rig/Core Gardner Denver 15W
 Drill Co. West Texas Method Air Rotary
 Driller R. Keith Log By Bob Davis Date 03/25/97 Permit # _____
 Checked By Davis, Fields License No. _____

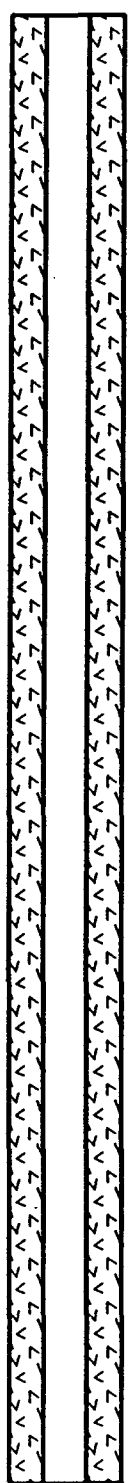
See Site Map
For Boring Location

COMMENTS:

Bedrock at 6 ft.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						12 1/4-inch hole drilled to 10 ft. Set 8 5/8-inch steel casing to 10 ft. Drilled 7 7/8-inch hole to 135 ft., total depth.
0						0-6 ft.: ARROYO ALLUVIUM, pale yellowish brown (10YR 6/2) to dark yellowish orange (10YR 6/4) SANDSTONE, moderately dense, dry, very fine-grained, subrounded to subangular, well-sorted, calcareous, no hydrocarbon odor.
2		75				
4		0				
6						8-10 ft.: Pale yellowish brown (10YR 6/2) SANDSTONE, as above. Interbedded with dark yellowish orange (10YR 6/4) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
8		38				
10		0				10-15 ft.: Pale yellowish brown (10YR 6/2) SANDSTONE, dense, dry, very fine-grained, subrounded, well-sorted, well-cemented, calcareous, interbedded with grayish orange (10YR 7/4) to pale yellowish brown (10YR 6/2) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
12		25				
14		5.1				15-20 ft.: DOLOMITE, as above.
16						
18		21				
20		6.5				20-25 ft.: Pale yellowish brown (10YR 6/2) SANDSTONE, moderate dense, dry, very fine-grained, rounded to subrounded, well-sorted, well-cemented, calcareous, no hydrocarbon odor, with minor DOLOMITE, as above.
22						
24		15				

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		4.7				
26						25-30 ft.: SANDSTONE, as above.
28			38			
30		1.5				30-35 ft.: SANDSTONE, as above.
32			33			
34						
36		3.3				35-40 ft.: SANDSTONE, as above.
38			50			
40		31.2				40-45 ft.: SANDSTONE, as above, with minor grayish orange (10YR 7/4) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
42			43			
44		13.3				45-50 ft.: SANDSTONE and DOLOMITE, as above.
46			43			
48						
50		2.9				50-55 ft.: DOLOMITE, as above, with minor sandstone, as above.
52			20			
54						
56		6.0				55-80 ft.: Pale yellowish brown (10YR 6/2) to medium yellowish brown (10YR 5/4) SANDSTONE, moderately dense, damp, very fine-grained, rounded to subrounded,



Drilling Log

Monitoring Well 96

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		6.6	20			well-sorted, well-cemented, calcareous, with interbedded grayish orange (10YR 7/4) to pale yellowish brown (10YR 6/2) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor. 60-85 ft.: SANDSTONE , as above.
58						
60						
62						
64						
66						
68						
70						
72						
74						
76		5.7	20			85-70 ft.: Grayish orange (10YR 7/4) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor. 70-75 ft.: Pale yellowish brown (10YR 6/2) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor. 75-80 ft.: Pale yellowish brown (10YR 6/2) to dusky yellowish brown (10YR 2/2) SANDSTONE , moderate dense, damp, very fine-grained, subrounded, well-sorted, well-cemented, calcareous, no hydrocarbon odor, interbedded with DOLOMITE , as above. 80-85 ft.: SANDSTONE and DOLOMITE , as above.
78						
80						
82						
84						
86						
88						
		2.2	25			85-90 ft.: SANDSTONE and DOLOMITE , as above.
		18.8	21			
		20	20			

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88			20			
90		2.3				80-95 ft.: SANDSTONE and DOLOMITE, as above.
92			27			
94		3.8				95-100 ft.: Pale yellowish orange (10YR 8/6) SANDSTONE, loose, moist, very fine-grained, rounded to subrounded, well-sorted, poorly-cemented, calcareous, no hydrocarbon odor.
96			60			
98						100-105 ft.: SANDSTONE, as above.
100		2.7				
102			60			
104		4.7				105-110 ft.: Pale yellowish brown (10YR 6/2) SANDSTONE, loose, moist, very fine-grained, rounded to subrounded, well-sorted, poorly-cemented, calcareous, no hydrocarbon odor.
106			30			
108						110-115 ft.: SANDSTONE, as above. (Note: Top of water at 110 ft. below grade based on interface probe reading taken immediately after drilling the well).
110		6.0				
112			50			
114		4.7				115-120 ft.: Dark yellowish orange (10YR 6/6) SANDSTONE, loose, saturated, very fine to fine-grained, subrounded, well-sorted, poorly-cemented, calcareous, no hydrocarbon odor. (Note: water encountered at approximately 115 ft during drilling).
116						
118		23				
120		5.9				



Drilling Log

Monitoring Well 96

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		5.9				120-125 ft.: SANDSTONE, as above.
122			21			
124		3.9				125-130 ft.: Dark yellowish orange (10YR 6/6) DOLOMITIC SANDSTONE , loose, saturated, very fine to fine-grained, subrounded to angular, well-sorted, poorly-cemented, no hydrocarbon odor.
126			23			
128		4.7				130-135 ft.: Pale yellowish brown (10YR 6/2) SANDSTONE and DOLOMITIC SANDSTONE , loose, saturated, fine-grained, rounded to subangular, well-sorted, poorly-cemented, no hydrocarbon odor.
130			43			
132						
134						
136						Total depth at 135 ft. below grade.
138						
140						
142						
144						
146						
148						
150						
152						



Drilling Log

Monitoring Well 97

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228
 Surface Elev. _____ Total Hole Depth 148 ft. Diameter 7 7/8 in.
 Top of Casing _____ Water Level Initial 120 ft. Static _____
 Screen: Dia 4 in. Length 30 ft. Type/Size 0.040 in.
 Casing: Dia 4 in. Length 107.5 ft. Type Sch. 40 PVC
 Fill Material Gravel/Grout Rig/Core Gardner Denver 15W
 Drill Co. West Texas Method Air Rotary
 Driller V. Parker Log By Bob Davis Date 03/21/97 Permit # _____
 Checked By Davis, Fields License No. _____

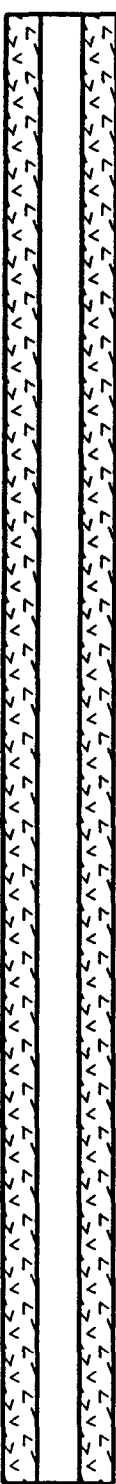
See Site Map
For Boring Location

COMMENTS:

Bedrock at 8 ft below grade.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						12 1/4-inch hole drilled to 10 ft. Set 8 5/8-inch steel casing to 10 ft. Drilled 7 7/8-inch hole to 148 ft total depth (below grade).
0						
2		38				0-5 ft.: ARROYO ALLUVIUM , grayish orange (10YR 7/4), silt, loose, dry, calcareous and dolomite fragments, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
4		0				5-8 ft.: ARROYO ALLUVIUM , grayish orange (10YR 7/4) silt, loose, dry, calcareous, no hydrocarbon odor.
6						
8		19				8-10 ft.: Grayish orange (10YR 7/4) SANDSTONE , very loose, dry, very fine to medium grained, subrounded, well-sorted, calcareous, no hydrocarbon odor.
10		0				10-15 ft.: Grayish orange (10YR 7/4) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
12		19				
14		0.7				15-20 ft.: DOLOMITE , as above.
16						
18		23				
20		1.1				20-25 ft.: Pale yellowish brown (10YR 6/2) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
22		17				
24		0.8				

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

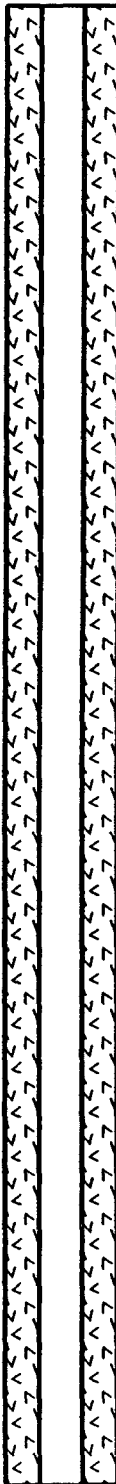
Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0.8				25-30 ft.: Grayish orange (10YR 7/4) to dark yellowish orange (10YR 6/6) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
26						
28		16				
30		1.4				30-35 ft.: Pale yellowish brown (10YR 6/2) DOLOMITE , as above.
32		9				
34						
36		8.8				35-40 ft.: DOLOMITE , as above, with minor interbedded pale yellowish brown (10YR 6/2) SANDSTONE , moderately dense, dry, very fine-grained, rounded to subrounded, well-sorted, well-cemented, calcareous, no hydrocarbon odor.
38		25				
40		1.1				40-45 ft.: Dark yellowish brown (10YR 4/2) SANDSTONE , moderately dense, dry, very fine-grained, rounded to subrounded, well-sorted, well-cemented, slightly calcareous, no hydrocarbon odor.
42		38				
44						
46		6.7				45-50 ft.: Pale yellowish brown (10YR 6/2) sandy DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, interbedded with pale yellowish brown (10YR 6/2) SANDSTONE , dense, dry, very fine-grained, rounded, well-sorted, well-cemented, no hydrocarbon odor.
48		17				
50		2.9				50-55 ft.: SANDSTONE , as above.
52		27				
54						55-60 ft.: Pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) SANDSTONE , moderate dense, dry, very fine-grained, rounded, well-sorted, well-cemented, calcareous, no hydrocarbon odor.
56		1.2				



Drilling Log

Monitoring Well 97

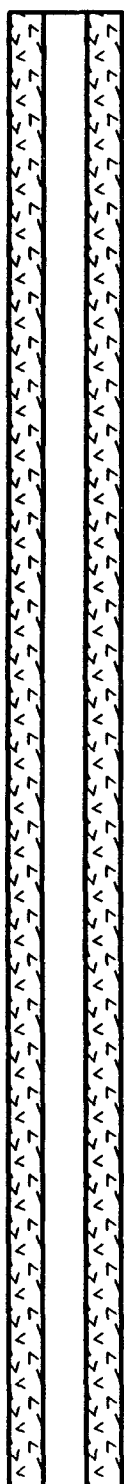
Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			38			
60		17.3				60-85 ft.: SANDSTONE, as above.
62						
64			50			
66		1.0				65-70 ft.: SANDSTONE, as above.
68			20			
70		8.4				70-78 ft.: SANDSTONE, as above.
72			30			
74		2.0				
76						75-80 ft.: Pale yellowish brown (10YR 6/2) DOLOMITIC SANDSTONE, dense, dry, very fine to fine-grained, rounded to subrounded, well-sorted, poorly- to medium-cemented, calcareous, no hydrocarbon odor.
78			30			
80		39.6				80-85 ft.: DOLOMITIC SANDSTONE, as above.
82			20			
84						
86		24.6				85-90 ft.: DOLOMITIC SANDSTONE, as above.
88			27			

Drilling Log

Monitoring Well 97

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88			27			
90		13.7				90-95 ft.: DOLOMITIC SANDSTONE, as above. Interbedded with pale yellowish brown (10YR 6/2) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
92			21			
94		8.1				95-100 ft.: DOLOMITE, as above, with minor SANDSTONE, as above.
96						
98			21			
100		20.3				100-105 ft.: Pale yellowish brown (10YR 6/2) DOLOMITIC SANDSTONE, dense, dry, very fine-grained, subrounded, well-sorted, well-cemented, calcareous interbedded with pale yellowish brown (10YR 2/2) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
102			21			
104		9.5				105-110 ft.: DOLOMITE, as above.
106						
108			21			
110		8.8				110-115 ft.: DOLOMITE, as above.
112						
114			25			
116		5.8				115-120 ft.: Pale yellowish brown (10YR 6/2) DOLOMITIC SANDSTONE, dense, dry, very fine-grained, subrounded to subangular, well-sorted, poorly to medium-cemented, calcareous with DOLOMITE, as above.
118			25			
120		5.3				



Drilling Log

Monitoring Well 97

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		5.3				120-125 ft.: DOLOMITIC SANDSTONE, as above. Water below grade based on interface probe reading taken immediately after drilling the well.
122			25			
124						
126		6.6				125-130 ft.: DOLOMITIC SANDSTONE, as above. Cutting saturated @ 128 ft.
128			23			
130		6.2				130-135 ft.: DOLOMITIC SANDSTONE, as above. Interbedded with pale yellowish brown (10YR 6/2) SANDSTONE, loose to moderately dense, saturated, very fine-grained, rounded to subrounded, well-sorted, poorly-cemented, no hydrocarbon odor.
132			21			
134						
136		6.9				135-140 ft.: DOLOMITIC SANDSTONE, and SANDSTONE, as above.
138			25			
140		7.1				140-145 ft.: DOLOMITIC SANDSTONE and SANDSTONE, as above.
142			25			
144						
146		7.1				145-148 ft.: DOLOMITIC SANDSTONE and SANDSTONE, as above.
148		6.3	25			Total depth at 148 ft.
150						
152						



Drilling Log

Monitoring Well 98

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228
 Surface Elev. _____ Total Hole Depth 165 ft. Diameter 7 7/8 in.
 Top of Casing 2 ft. Water Level Initial 140.5 ft. Static _____
 Screen: Dia 4 in. Length 30 ft. Type/Size 0.040 in.
 Casing: Dia 4 in. Length 127.5 ft. Type Sch. 40 PVC
 Fill Material Gravel/Grout Rig/Core Gardner Denver 15W
 Drill Co. West Texas Method Air Rotary
 Driller R. Keith Log By Bob Davis Date 03/25/97 Permit # _____
 Checked By Davis, Fields License No. _____

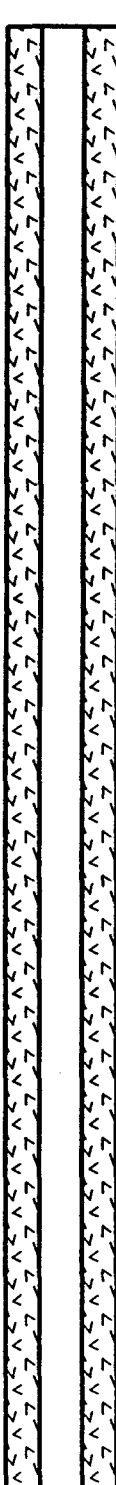
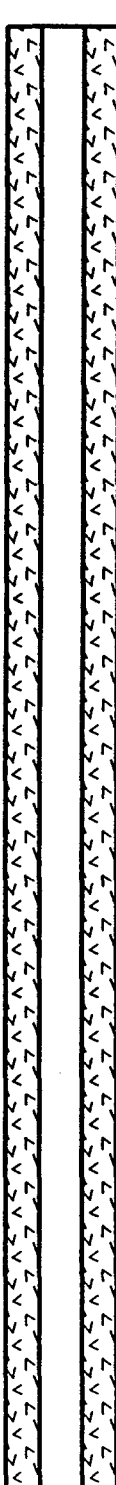
See Site Map
For Boring Location

COMMENTS:

Bedrock at surface.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						12 1/4-inch hole drilled to 10 ft. Set 8 5/8-inch steel casing 10 ft. Drilled 7 7/8-inch hole to 165 ft. total depth below grade
0						0-8 ft.: Grayish orange (10YR 7/4) DOLOMITE , hard, dry, microcrystalline, conchoial fractures interbedded with grayish orange (10YR 7/4) SANDSTONE , loose to moderately dense, dry, fine-grained, subrounded, well-sorted, no hydrocarbon odor.
2			60			
4		0				
6						
8		12				8-10 ft.: Pale yellowish brown (10YR 6/6) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
10		0				10-15 ft.: DOLOMITE , as above.
12			15			
14		0				
16						15-20 ft.: DOLOMITE , as above, with minor (6-inch: 18.5-19 ft.) dark yellowish orange (10YR 6/6) silty SANDSTONE , very loose, damp, very fine-grained, subrounded, well-sorted, calcareous, no hydrocarbon odor.
18			18			
20		1.3				20-25 ft.: Pale yellowish brown (10YR 6/6) DOLOMITE , very hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
22			14			
24						

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		3.4				
26						
28		27				25-30 ft.: Grayish orange (10YR 7/4) SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well-sorted, calcareous, interbedded with pale yellowish brown (10YR 6/6), DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
30						
32		1.3				30-35 ft.: Pale brown (5YR 5/2) SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well-sorted, calcareous, no hydrocarbon odor.
34						
36		5.3				35-40 ft.: SANDSTONE , as above, with interbedded pale yellowish brown (10YR 6/6) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
38						
40		11				40-45 ft.: SANDSTONE , as above.
42						
44		5.3				45-50 ft.: SANDSTONE , as above, with faint hydrocarbon odor.
46						
48		30				
50						50-58 ft.: SANDSTONE , as above, no hydrocarbon odor.
52		60.5				
54						
56		43				
		17.6				



Drilling Log

Monitoring Well 98

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

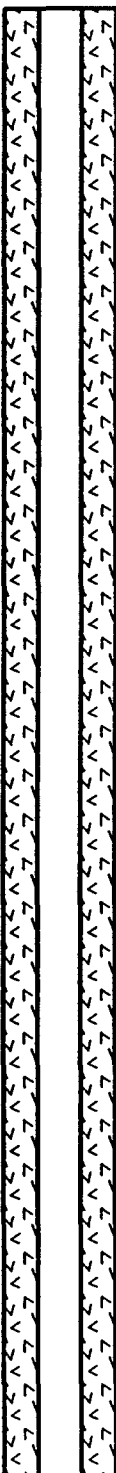
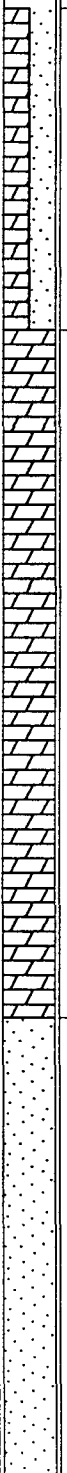
Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			14			58-60 ft.: Pale yellowish brown (10YR 6/6) DOLOMITE , very hard, dry microcrystalline, conchoidal fractures, no hydrocarbon odor.
60		2.0				60-65 ft.: DOLOMITE , as above. Interbedded with pale brown (5YR 5/2) SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well-sorted, calcareous, no hydrocarbon odor.
62			14			
64		12.3				65-70 ft.: DOLOMITE and SANDSTONE , as above.
66						
68			19			
70		7.4				70-75 ft.: DOLOMITE and SANDSTONE , as above.
72		25				
74		12.9				
76						75-80 ft.: DOLOMITE , as above.
78			18			
80		6.9				80-85 ft.: DOLOMITE , as above, with pale yellowish orange (10YR 7/4) SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well-rounded, calcareous, no hydrocarbon odor.
82			83			
84		1.1				85-90 ft.: DOLOMITE and SANDSTONE , as above.
86						
88			21			



Drilling Log

Monitoring Well 98

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88			21			
90		0.8				90-95 ft.: DOLOMITE, as above, with minor SANDSTONE, as above.
92			20			
94		0.2				
96			21			95-100 ft.: Pale yellowish brown (10YR 6/2), DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
98			21			
100		0.2				100-105 ft.: DOLOMITE, as above.
102			30			
104		0				105-110 ft.: DOLOMITE, as above, interbedded with minor, dark yellowish brown (10YR 6/6), moderately dense, dry, very fine-grained, subrounded, well-sorted, slightly calcareous, no hydrocarbon odor.
106			27			
108		0.2				110-115 ft.: SANDSTONE, as above.
110			30			
112						
114		0				115-120 ft.: Very pale orange (10YR 5/2) SANDSTONE, loose, damp, very fine-grained, subrounded, well-sorted, calcareous, no hydrocarbon odor.
116						
118			33			
120		0.4				



Drilling Log

Monitoring Well 98

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

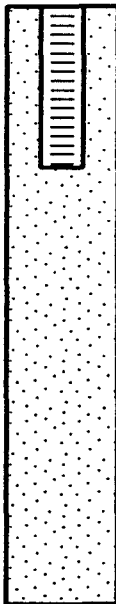
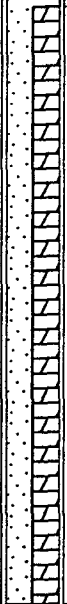
Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0.4				120-125 ft.: SANDSTONE, as above.
122			33			
124		2.5				124-130 ft.: SANDSTONE, as above.
126						
128			38			
130		0.8				130-135 ft.: SANDSTONE, as above, moist.
132			60			
134		0				135-140 ft.: SANDSTONE, as above.
136						
138			43			
140		0			▽	140-145 ft.: Grayish orange (10YR 7/4) SANDSTONE, loose, moist, very fine-grained, subrounded, well-sorted, calcareous, moderate hydrocarbon odor. Water at 140 ft below grade based on interface probe reading taken immediately after drilling the well.
142			50			
144		5.0				145-150 ft.: SANDSTONE, as above, saturated. (Note: water is being added to drilling sytem).
146						
148			50			
150		0				150-155 ft.: Pale yellowish brown (10YR 6/2) SANDSTONE, loose, saturated, fine to medium-grained, subrounded, well-sorted, no hydrocarbon odor.
152						



Drilling Log

Monitoring Well 98

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152						with minor, pale yellowish brown (10YR 6/2) DOLOMITE , hard, saturated, microcrystalline, conchoidal fractures, no hydrocarbon odor.
154			60			
156		0.2				155-160 ft.: SANDSTONE with minor DOLOMITE , as above.
158			60			
160		0				160-165 ft.: SANDSTONE and DOLOMITE , with increasing percentage of dolomite with depth.
162						
164			27			
166		0.4				Total depth at 165 ft.
168						
170						
172						
174						
176						
178						
180						
182						
184						



Drilling Log

Shallow Zone Monitor Well 99

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61
Surface Elev. _____ Total Hole Depth 70 ft. Diameter 7 5/8 in./7 in.
Top of Casing 2.5 ft. Water Level Initial _____ Static _____
Screen: Dia 4 in. Length 60 ft. Type/Size PVC/0.040" in.
Casing: Dia 4 in. Length 12.5 ft. Type PVC
Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
Drill Co. PC Exploration Method Air Rotary
Driller S. Mott Log By Bob Davis Date 1/13/97 Permit # _____
Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Bedrock at 12 Ft. No water encountered during drilling.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						7 5/8-inch hole drilled to 20 Ft. Temp. set 7 11/32-inch odex csg. to 20 Ft. drilled 7-inch hole to 70 Ft. total depth.
0						
2			43			0-5 Ft: ARROYO ALLUVIUM , light brown (5yr 8/4) silt, loose, dry with dolomite and sandstone fragments, from cobbles and boulders, no hydrocarbon odor.
4		3.7				
6			30			5-12 Ft: ARROYO ALLUVIUM , predominantly dolomite fragments with minor silt and sandstone fragments.
8						
10		0				
12			17			12-15 Ft: Dark yellowish orange (10yr 6/6) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, with minor grayish orange (10yr 7/4) SANDSTONE , mod. dense, dry, very fine-grained, subrounded, well sorted, moderately well cemented, calcareous, no hydrocarbon odor.
14						
16			13			15-20 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE , very hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
18						
20		70				
22			43			20-25 Ft: DOLOMITE , as above interbedded with grayish orange (10yr 7/4) SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well sorted, moderately well cemented, calcareous, faint hydrocarbon odor.
24						



Drilling Log

Shallow Zone Monitor Well 99

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%		
24		39.5	38			25-30 Ft: DOLOMITE and SANDSTONE, as above.		
26								
28		44.2	43			30-35 Ft: DOLOMITE and SANDSTONE, as above.		
30								
32		51.9	46			35-40 Ft: Pale yellowish orange (10yr 7/4) SANDSTONE, moderately dense, dry, very fine-grained, subrounded to subangular, well sorted, moderately well cemented, calcareous, faint hydrocarbon odor, with minor DOLOMITE.		
34								
36		2.4	40			40-45 Ft: SANDSTONE, as above, interbedded with pale yellowish brown (10yr 6/2) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, faint hydrocarbon odor.		
38								
40		69.9	40			45-50 Ft: SANDSTONE and DOLOMITE, as above.		
42								
44		1.5	43			50-55 Ft: SANDSTONE and DOLOMITE, as above, no hydrocarbon odor.		
46								
48		16.2				55-60 Ft: SANDSTONE and DOLOMITE, as above.		
50								
52								
54								
56								



Drilling Log

Shallow Zone Monitor Well 99

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		49.8	46			60-85 Ft: DOLOMITE as above interbedded with minor SANDSTONE .
58						
60						
62						
64						
66		20.6	46			85-70 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
68						
70						
72						
74						
76		19.1	36			Total depth at 70 Ft.
78						
80						
82						
84						
86						
88						



Drilling Log

Shallow Zone Monitor Well 100

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61
Surface Elev. _____ Total Hole Depth 70 ft. Diameter 7 5/8 in./7 in.
Top of Casing 2.5 ft. Water Level Initial _____ Static _____
Screen: Dia 4 in. Length 60 ft. Type/Size PVC/0.040" in.
Casing: Dia 4 in. Length 12.5 ft. Type PVC
Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
Drill Co. PC Exploration Method Air Rotary
Driller S. Mott Log By Bob Davis Date 1/11/97 Permit # _____
Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Bedrock at surface. No water
encountered during drilling.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						7 5/8-inch hole drilled to 5 Ft. Temp. set 7 11/32-inch odex csg. to 5 Ft, drilled 7-inch hole to 70 Ft. total depth.
0						0-5 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
2			30			
4						5-10 Ft: DOLOMITE , as above.
6		0				
8			43			
10		1.4				10-15 Ft: DOLOMITE , as above.
12			43			
14						
16		37.9				15-20 Ft: DOLOMITE , as above interbedded with dark yellowish orange (10yr 6/6) SANDSTONE , moderately dense, dry, very fine- to fine-grained, subrounded to angular, well sorted, well cemented, calcareous, no hydrocarbon odor.
18			68			
20		2.6				20-25 Ft: DOLOMITE , as above interbedded with pale yellowish brown (10yr 2/2) SANDSTONE , as above.
22						
24			38			

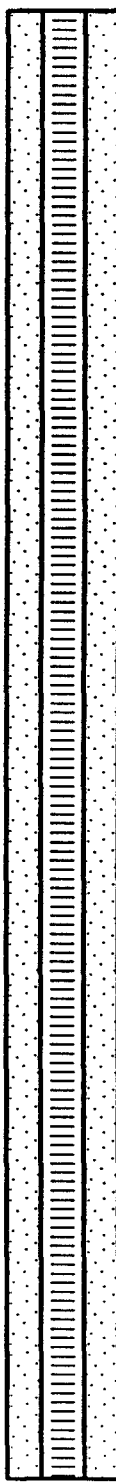
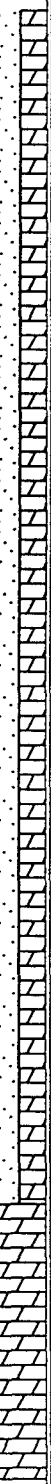
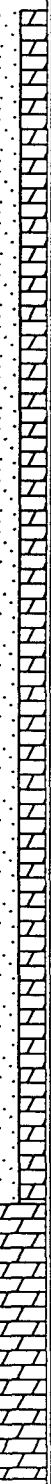
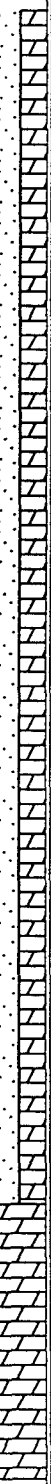
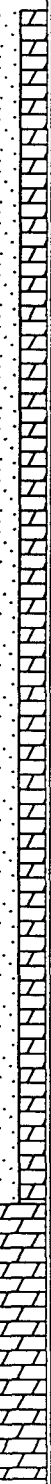
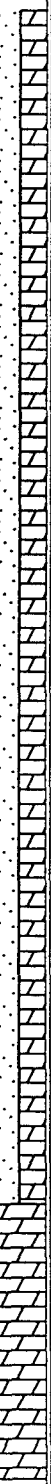
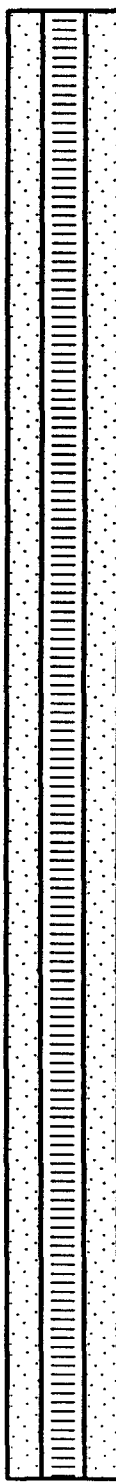
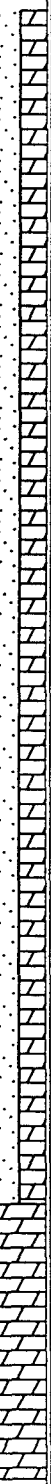
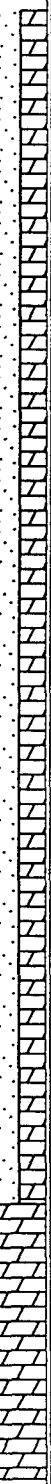
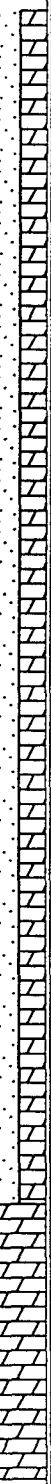


Drilling Log

Shallow Zone Monitor Well 100

 Project Indian Basin Remediation
 Location Eddy County, New Mexico

 Owner Marathon Oil Company
 Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		14.3	43			25-30 Ft: DOLOMITE and SANDSTONE, as above.
26						
28		19.0	43			30-35 Ft: DOLOMITE and SANDSTONE, as above.
30						
32		0.8	43			35-40 Ft: Grayish orange (10yr 7/4) to pale yellowish brown (10yr 6/2) SANDSTONE, moderately dense, dry, very fine-grained, subrounded, well sorted, moderately well cemented, calcareous, no hydrocarbon odor, with minor DOLOMITE.
34						
36		2.4	60			40-45 Ft: Pale brown (5yr 5/2) SANDSTONE, moderately dense to dense, dry, very fine-grained, subrounded, well sorted, well cemented, calcareous, no hydrocarbon odor, interbedded with grayish orange (10yr 7/4) DOLOMITE, hard, microcrystalline, conchoidal fractures.
38						
40		58.9	33			45-50 Ft: SANDSTONE and DOLOMITE, as above.
42						
44		43	43			
46						
48		11.4	30			50-55 Ft: Light grayish brown (5yr 6/1) to brownish gray (5yr 4/1) DOLOMITE, hard, microcrystalline, conchoidal fractures, no hydrocarbon odor.
50						
52		28.2				55-60 Ft: DOLOMITE, as above.
54						
56						



Drilling Log

Shallow Zone Monitor Well 100

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		11.1	33			60-85 Ft: DOLOMITE, as above.
58						
60						
62						
64						
66		19.9	29			85-70 Ft: DOLOMITE, as above interbedded with minor pale yellowish brown (10yr 6/2) SANDSTONE, dense, dry, very fine-grained, subrounded, well sorted, poorly cemented, calcareous, no hydrocarbon odor.
68						
70						
72						
74						
76		6.8	30			Total depth at 70 Ft.
78						
80						
82						
84						
86						
88						



Drilling Log

Shallow Zone Monitor Well 101

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61
 Surface Elev. _____ Total Hole Depth 70 ft. Diameter 7 5/8 in./7 in.
 Top of Casing 2.5 ft. Water Level Initial _____ Static _____
 Screen: Dia 4 in. Length 60 ft. Type/Size PVC/0.040" in.
 Casing: Dia 4 in. Length 12.5 ft. Type PVC
 Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
 Drill Co. PC Exploration Method Air Rotary
 Driller S. Mott Log By Bob Davis Date 1/11/97 Permit # _____
 Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Bedrock at 3 Ft. below grade. No water encountered during drilling.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						7 5/8-inch hole drilled to 20 Ft. Temp. set 7 11/32-inch odex csg. to 20 Ft. drilled 7-inch hole to 70 Ft. total depth.
0						0-3 Ft: ARROYO ALLUVIUM, dolomite fragments from cobbles and boulders.
2			10			
4		0				3-5 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE, very hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
6						5-10 Ft: DOLOMITE, as above.
8			30			
10		0.9				10-15 Ft: DOLOMITE, as above with minor very pale orange (10yr 8/2) SANDSTONE, moderately dense, dry, very fine-grained, subrounded, well sorted, moderately well cemented, calcareous.
12			43			
14		2.0				15-20 Ft: Brownish gray (5yr 4/1) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor with minor interbedded SANDSTONE, as above.
16			46			
18						
20		3.0				20-25 Ft: DOLOMITE with minor SANDSTONE, as above.
22			30			
24						



Drilling Log

Shallow Zone Monitor Well 101

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%		
24		15.2	46			25-30 Ft: DOLOMITE with interbedded minor SANDSTONE, as above.		
26								
28		8.2	36			30-35 Ft: DOLOMITE and interbedded minor SANDSTONE, as above.		
30								
32		44.2	50			35-40 Ft: Very pale orange (10yr 8/2) SANDSTONE, moderately dense, dry, very fine-grained, subrounded to subangular, well sorted, moderately well cemented, calcareous, no hydrocarbon odor, interbedded with brownish gray (5yr 4/1) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures.		
34								
36		16.2	30			40-45 Ft: SANDSTONE and DOLOMITE, as above.		
38								
40		21.4	43			45-50 Ft: SANDSTONE and DOLOMITE, as above.		
42								
44		46.8	38			50-55 Ft: Brownish gray (5yr 4/1) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor, with minor, interbedded SANDSTONE, as above.		
46								
48		6.0				55-60 Ft: DOLOMITE and minor SANDSTONE, as above.		
50								
52								
54								
56								



Drilling Log

Shallow Zone Monitor Well 101

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		16.2	38			60-65 Ft: DOLOMITE and minor SANDSTONE, as above.
58						
60						
62						
64						
66						
68						
70						
72						Total depth at 70 Ft.
74						
76						
78						
80						
82						
84						
86						
88						



Drilling Log

Shallow Zone Monitor Well 102

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61
 Surface Elev. _____ Total Hole Depth 80 ft. Diameter 7 5/8 in./7 in.
 Top of Casing 2.5 ft. Water Level Initial _____ Static _____
 Screen: Dia 4 in. Length 70 ft. Type/Size PVC/0.040" in.
 Casing: Dia 4 in. Length 12.5 ft. Type PVC
 Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
 Drill Co. PC Exploration Method Air Rotary
 Driller S. Mott Log By Bob Davis Date 1/9/97 Permit # _____
 Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

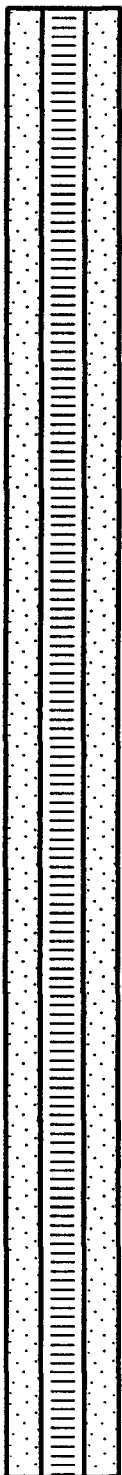
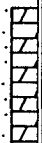
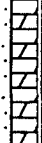
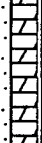
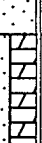
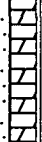
Bedrock at surface. Original location moved ~25' north (on edge of arroyo). No water encountered.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						7 5/8-inch hole drilled to 5 Ft. Temp. set 7 11/32-inch odex csg. to 5 Ft. drilled 7-inch hole to 80 Ft. total depth.
0						0-5 Ft: Grayish orange (10yr 7/4) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor. Bedrock at surface.
2			23			
4						
6		5.0				5-10 Ft: DOLOMITE , as above with minor SANDSTONE , moderately dense, dry, fine-grained, subrounded, well sorted, poorly cemented, calcareous, no hydrocarbon odor.
8			38			
10		3.7				10-15 Ft: DOLOMITE with minor SANDSTONE , as above.
12			38			
14						
16		9.0				15-20 Ft: DOLOMITE and SANDSTONE , as above, sandstone percentage increasing with depth.
18			50			
20		8.1				20-25 Ft: Pale brown (5yr 5/2) SANDSTONE , dense, dry, very fine-grained, subrounded, well sorted, well cemented, calcareous, with minor light brownish gray (5yr 6/1) DOLOMITE , hard, microcrystalline, fractured, no hydrocarbon odor.
22			38			
24						

Drilling Log

Shallow Zone Monitor Well 102

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 0233502II.6I

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		41.7	43			25-30 Ft: SANDSTONE and DOLOMITE, as above.
26						
28		13.6	43			30-35 Ft: SANDSTONE and DOLOMITE, as above.
30						
32		2.3	43			35-40 Ft: Grayish orange (10yr 7/4) SANDSTONE, moderately dense, dry, very fine-grained, subrounded, well sorted, well cemented, calcareous, no hydrocarbon odor.
34						
36		1.8	38			40-45 Ft: SANDSTONE, as above with minor interbedded DOLOMITE.
38						
40		1.0	42			45-50 Ft: SANDSTONE with minor interbedded DOLOMITE, as above.
42						
44		11.8	48			50-55 Ft: SANDSTONE with minor interbedded DOLOMITE, as above.
46						
48		3.7	43			55-60 Ft: DOLOMITE, as above with minor SANDSTONE, as above.
50						
52						
54						
56						



Drilling Log

Shallow Zone Monitor Well 102

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		3.7	36			60-65 Ft: DOLOMITE and minor SANDSTONE, as above.
58						
60						
62						
64		4.1	36			65-70 Ft: SANDSTONE and DOLOMITE, as above, SANDSTONE predominates.
66						
68		0.4	38			70-75 Ft: Light brownish gray (5yr 6/1) DOLOMITE, hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
70						
72		0	43			75-80 Ft: DOLOMITE and SANDSTONE, as above. SANDSTONE increases with depth.
74						
76						
78						
80						Total depth at 80 Ft.
82						
84						
86						
88						



Drilling Log

Shallow Zone Monitor Well 103

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61
 Surface Elev. _____ Total Hole Depth 70 ft. Diameter 7 5/8 in./7 in.
 Top of Casing 2.5 ft. Water Level Initial _____ Static _____
 Screen: Dia 4 in. Length 60 ft. Type/Size PVC/0.040" in.
 Casing: Dia 4 in. Length 12.5 ft. Type PVC
 Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
 Drill Co. PC Exploration Method Air Rotary
 Driller S. Mott Log By Bob Davis Date 1/10/97 Permit # _____
 Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Bedrock at 20.5 Ft. No water encountered during drilling.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						7 5/8-inch hole drilled to 25 Ft. Temp. set 7 11/32-inch odex csg. to 25 Ft. drilled 7-inch hole to 70 Ft. total depth.
0						0-5 Ft: ARROYO ALLUVIUM, dolomite fragments from cobbles and boulders.
2			30			
4		0				5-10 Ft: ARROYO ALLUVIUM, as above.
6			33			
8						10-15 Ft: ARROYO ALLUVIUM, as above.
10		0				
12			18			
14		9.8				15-20.5 Ft: ARROYO ALLUVIUM, as above.
16			25			
18						
20		0.5				
22			25			20.5-25 Ft: Grayish orange (10yr 7/4) SANDSTONE, moderately dense, dry, very fine-grained, subrounded, well sorted, well cemented, calcareous, no hydrocarbon odor.
24						



Drilling Log

Shallow Zone Monitor Well 103

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

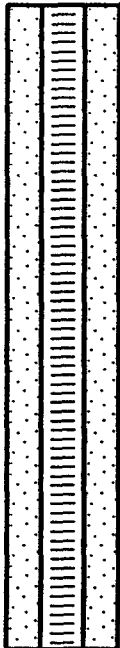
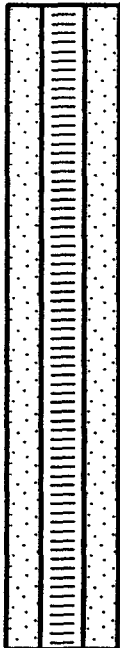
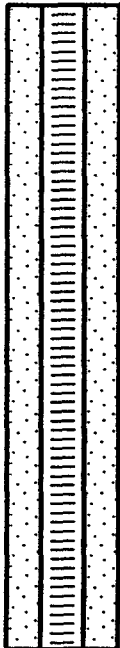
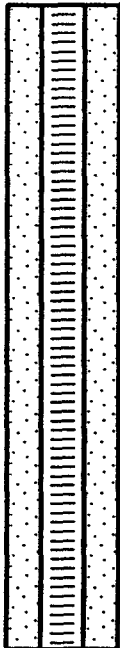
Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		1.2	38			25-30 Ft: Brownish gray (5yr 4/1) DOLOMITE , very hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
26						
28		13.5	40			30-35 Ft: DOLOMITE , as above interbedded with grayish orange (10yr 7/4) SANDSTONE , moderately dense, very fine-grained, subrounded, well sorted, well cemented, calcareous, no hydrocarbon odor.
30						
32		0.5	40			35-40 Ft: SANDSTONE , as above.
34						
36		5.9	33			40-45 Ft: SANDSTONE , as above.
38						
40		9.0	33			45-50 Ft: Brownish gray (5yr 4/1) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor, with minor SANDSTONE , as above.
42						
44		12.7	32			50-55 Ft: DOLOMITE and minor SANDSTONE , as above.
46						
48		3.3				55-60 Ft: DOLOMITE and SANDSTONE , as above with sandstone increasing to 50%.
50						
52						
54						
56						



Drilling Log

Shallow Zone Monitor Well 103

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		1.1	50			60-85 Ft: DOLOMITE and minor SANDSTONE, as above.
58						
60						
62						
64						
66		8.1	33			65-70 Ft: DOLOMITE with minor SANDSTONE, as above.
68						
70						
72						
74						
76		4.8	33			Total depth at 70 Ft.
78						
80						
82						
84						
86						
88						



Drilling Log

Shallow Zone Monitor Well 104

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228.60
 Surface Elev. _____ Total Hole Depth 220 ft. Diameter 12 1/4" / 7 7/8" in in.
 Top of Casing 2.5 ft. Water Level Initial 171 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size _____
 Casing: Dia 8 5/8" in. Length 37.5 ft. Type Steel
 Fill Material _____ Rig/Core Gardner Denver 15W
 Drill Co. West Texas Water Serv Method Air Rotary
 Driller R. Ketih Log By Bob Davis Date 5/13/97 Permit # _____
 Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

12 1/4" borehole drilled to 35 ft. 8 5/8" steel casing run to 35 ft. 7 7/8" borehole drilled to 220 feet. total depth.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						
0						
2			150			0-5 Ft: ARROYO ALLUVIUM, dark yellowish brown (10yr 4/2) SILT; pale yellowish brown (10yr 6/2); sand, loose, fine- to medium-grained, well graded, poorly cemented, dry, no odor.
4						
6		7.5				5-10 Ft: Very pale orange (10yr 8/2) to grayish orange (10yr 7/4) SANDSTONE, loose to moderate dense, fine-grained, subrounded to subangular, well sorted, mod. cemented, calcareous, dry, no odor.
8			100			
10		30.3				10-15 Ft: Grayish orange (10yr 9/4) SANDSTONE, as above
12			75			
14						
16		2.7				15-20 Ft: Pale yellowish brown (10yr 6/2) to mod. yellowish brown (10yr 5/4) DOLOMITE, very hard, microcrystalline, conchoidal fractures, dry, no odor.
18			23			
20		4.9				20-25 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE, as above interbedded with pale yellowish brown (10yr 6/2) SANDSTONE, very dense, fine-grained, well sorted, well cemented, calcareous, dry, no odor.
22						
24			21			

Drilling Log

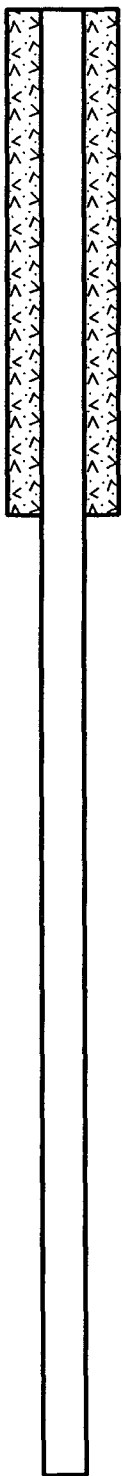
Shallow Zone Monitor Well 104

Project Indian Basin Remediation

Owner Marathon Oil Company

Location Eddy County, New Mexico

Proj. No. 023350228.60

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26			50			25-30 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE , med. dense, fine-grained, well sorted, well cemented, calcareous, dry, no odor.
28						
30		0				30-35 Ft: SANDSTONE , as above.
32			33			
34						
36		14.2				35-40 Ft: SANDSTONE , as above
38			38			
40		23.4				40-45 Ft: Moderate yellowish brown (10yr 5/4) to dark yellowish brown (10yr 4/2) SANDSTONE , moderate dense to hard, fine-grained, subrounded to subangular, well sorted, well cemented, calcareous, dry, no odor.
42			27			
44						
46		42.3				45-50 Ft: SANDSTONE , as above
48			25			
50		4.2				50-55 Ft: Light brown (5yr 6/4) DOLOMITE , very hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor.
52			14			
54						
56		0				55-60 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE , dense fine-grained, subrounded to subangular, well sorted, well cemented, dry, no hydrocarbon odor.



Drilling Log

Shallow Zone Monitor Well 104

Project Indian Basin Remediation
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350228.60

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56			18			
58						
60		0				60-65 Ft: Dark yellowish brown (10yr 4/2) SANDSTONE , as above.
62			25			
64						
66		0				65-70 Ft: SANDSTONE , as above.
68			33			
70		37.1				70-75 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE , very hard, microcrystalline, conchoidal fractures, dry, no odor.
72			19			
74						
76		120.1				75-80 Ft: DOLOMITE , as above.
78			20			
80		0				80-85 Ft: DOLOMITE , as above.
82			21			
84						
86		16.8				85-90 Ft: DOLOMITE , as above.
88			19			

Drilling Log

Shallow Zone Monitor Well 104

Project Indian Basin Remediation

Owner Marathon Oil Company

Location Eddy County, New Mexico

Proj. No. 023350228.60

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88						
90		49.3				90-95 Ft: DOLOMITE, as above.
92			20			
94						
96		0				95-100 Ft: DOLOMITE, as above.
98			23			
100		1.3				100-105 Ft: DOLOMITE as above, interbedded with grayish orange (10yr 7/4) SANDSTONE, moderately dense, very fine-grained, subrounded, well sorted, moderately well cemented, calcareous, dry.
102			30			
104		0				105-110 Ft: Grayish orange (10yr 7/4) DOLOMITIC SANDSTONE, hard, fine- to coarse-grained, subrounded to angular, well sorted, poorly cemented, calcareous, dry, no hydrocarbon odor (Dolomite is sand sized particles).
106			19			
108						
110		0				110-115 Ft: DOLOMITIC SANDSTONE, as above, with grayish orange (10yr 7/4) DOLOMITE, hard, microcrystalline, conchoidal fractures, dry, no odor.
112			19			
114		0				115-120 Ft: DOLOMITIC SANDSTONE and DOLOMITE, as above.
116			19			
118						
120		74.1				



Drilling Log

Shallow Zone Monitor Well 104

Project Indian Basin Remediation
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350228.60

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		74.1				120-125 Ft: Pale yellowish orange (10yr 8/6) SANDSTONE , dense to hard, fine- to coarse-grained, subrounded to angular, well sorted, poorly cemented, calcareous, damp, no hydrocarbon odor.
122			21			
124						
126		0				125-130 Ft: Pale yellowish brown (10 yr 6/2) SANDSTONE , moderate dense, very fine-grained, subrounded, well sorted, poorly cemented, damp, no hydrocarbon odor.
128			43			
130		0				130-135 Ft: SANDSTONE , as above.
132			43			
134		0				
136			16			135-140 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE , hard, microcrystalline, conchoidal fractures, damp, no hydrocarbon odor, interbedded with SANSTONE as above.
138						
140		0				140-145 Ft: SANDSTONE with minor DOLOMITE , as above.
142			23			
144						
146		70.3				145-150 Ft: SANDSTONE , as above.
148			25			
150		0				150-155 Ft: Pale yellowish brown (10yr 6/2) DOLOMITIC SANDSTONE , hard, fine- to coarse-grained, subrounded to angular, well-sorted poorly cemented, calcareous, damp, no hydrocarbon odor.
152			17			

Drilling Log

Shallow Zone Monitor Well 104

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228.60

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152			17			
154						
156		9.1				155-180 Ft: DOLOMITIC SANDSTONE, as above.
158			20			
160		50.8				160-165 Ft: Grayish orange (10yr 7/4) SANDSTONE, hard, fine- to medium-grained, subrounded, well-sorted, poorly cemented, calcareous, damp, strong hydrocarbon odor with minor dolomite grains.
162			21			
164		1999				165-170 Ft: SANDSTONE, as above. Dolomite grains increasing to approximately 50%, weak odor.
166			21			
168						
170		433				170-175 Ft: SANDSTONE, as above with very minor, pale yellowish brown (10yr 6/2) DOLOMITE, hard, microcrystalline, conchoidal fractures, saturated, weak hydrocarbon odor.
172			19			
174						
176		186				175-180 Ft: SANDSTONE, and very minor DOLOMITE as above
178			21			
180		1999				180-185 Ft: SANDSTONE AND DOLOMITE, as above. Dolomite increases to 40%, moderate hydrocarbon odor.
182			23			
184						



Drilling Log

Shallow Zone Monitor Well 104

Project Indian Basin Remediation
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350228.60

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184						
186		620	18			185-190 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE , dense, very fine- to fine-grained, subrounded, well-sorted, moderately- to poorly cemented, calcareous, saturated, no hydrocarbon odor.
190		186				190-195 Ft: SANDSTONE , as above.
192			25			
194						
196		127	30			195-200 Ft: Pale yellowish orange (10yr 8/6) SANDSTONE , as above.
200		481				200-205 Ft: SANDSTONE , as above.
202			60			
204						
206		1783	27			205-210 Ft: SANDSTONE , as above.
210						210-215 Ft: Moderate yellowish brown (10yr 5/4) SANDSTONE , as above.
214						
216						215-220 Ft: SANDSTONE , as above.

Drilling Log

Shallow Zone Monitor Well 104

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350228.60

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-216-		24.1	75			Total Depth 220ft
-218-						
-220-						
-222-						
-224-						
-226-						
-228-						
-230-						
-232-						
-234-						
-236-						
-238-						
-240-						
-242-						
-244-						
-246-						
-248-						



Drilling Log

Shallow Zone Monitor Well 105

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61
Surface Elev. _____ Total Hole Depth 80 ft. Diameter 7 5/8 in./7 in.
Top of Casing 2.5 ft. Water Level Initial _____ Static _____
Screen: Dia 4 in. Length 70 ft. Type/Size PVC/0.040" in.
Casing: Dia 4 in. Length 12.5 ft. Type PVC
Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
Drill Co. PC Exploration Method Air Rotary
Driller S. Mott Log By Bob Davis Date 1/9/97 Permit # _____
Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Bedrock at surface. No water encountered.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						7 5/8-inch hole drilled to 5 Ft. Temp. set 7-11/32 inch odex csg. to 5 Ft. below grade drilled 7-inch hole to 80 Ft. total depth.
0						0-5 Ft: Yellowish gray (5yr 8/1) DOLOMITE , hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
2			30			
4						5-10 Ft: DOLOMITE , as above.
6		0				
8			43			
10		1.6				10-15 Ft: DOLOMITE , as above with interbedded grayish orange (10yr 7/4) SANDSTONE (10-11 Ft.), moderately dense, dry, fine-grained, subrounded, well sorted, calcareous, poorly cemented, no hydrocarbon odor.
12			33			
14		3.7				15-19.5 Ft: DOLOMITE , as above.
16			43			
18						19.5-20.5 Ft: SANDSTONE , as above.
20		1.0				
22			38			20.5-25 Ft: Light grayish brown (5yr 6/1) DOLOMITE , very hard, dry, microcrystalline, conchoidal fractures, interbedded with grayish orange (10yr 7/4) SANDSTONE , dense, dry, very fine-grained, subrounded, well sorted, well cemented, calcareous, no hydrocarbon odor.
24						



Drilling Log

Shallow Zone Monitor Well 105

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		4.8	50			60-65 Ft: DOLOMITE with minor SANDSTONE.
58						
60						
62						
64		14.6	38			65-70 Ft: DOLOMITE with minor SANDSTONE.
66						
68						
70						
72		9.2	38			70-75 Ft: Interbedded SANDSTONE and DOLOMITE, as above.
74						
76						
78						
80		3.8	38			75-80 Ft: DOLOMITE, very hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
82						
84						
86						
88						Total depth at 80 Ft.



Drilling Log

Shallow Zone Monitor Well 106

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61
Surface Elev. _____ Total Hole Depth 92 ft. Diameter 7 5/8 in./7 in.
Top of Casing 2.5 ft. Water Level Initial _____ Static _____
Screen: Dia 4 in. Length 80 ft. Type/Size PVC/0.040" in.
Casing: Dia 4 in. Length 12.5 ft. Type PVC
Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
Drill Co. PC Exploration Method Air Rotary
Driller S. Mott Log By Bob Davis Date 1/8/97 Permit # _____
Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Steel well monument 2.5 Ft. above
grade. No water encountered. Bedrock
at 12 Ft.

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						7 5/8-inch hole drilled to 30 Ft. Temp. set 7-11/32 inch odex csg. Drilled 7-inch hole to 92 Ft. Install well through odex csg. and then pull csg.
0						
2			38			0-5 Ft: ARROYO ALLUVIUM, light brownish gray (5yr 6/1) to brownish gray (5yr 4/1) dolomite fragments from arroyo cobbles and boulders. Very hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
4		0				5-10 Ft: ARROYO ALLUVIUM, as above.
6			30			
8						10-12 Ft: ARROYO ALLUVIUM, as above.
10		0				
12			33			12-15 Ft: Light brownish gray (5yr 6/1) to brownish gray (5yr 4/1), DOLOMITE, very hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor.
14		0.3				15-20 Ft: DOLOMITE, as above.
16			30			
18						
20		0				20-25 Ft: DOLOMITE, as above with interbedded very pale orange (10yr 8/2) SANDSTONE, moderately dense, dry, fine-grained, subrounded, very calcareous, no hydrocarbon odor, minor chert.
22			27			
24						



Drilling Log

Shallow Zone Monitor Well 106

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0	43			25-30 Ft: Very pale orange (10yr 8/2) SANDSTONE , moderately dense, dry, fine-grained, subrounded, moderately sorted, calcareous, minor DOLOMITE , no hydrocarbon odor.
26						
28		0	43			30-35 Ft: Calcareous SANDSTONE , as above.
30						
32		0	43			35-40 Ft: Brownish gray (5yr 4/1) SANDSTONE , moderately dense to dense, dry, very fine- to fine-grained, subrounded, well sorted, calcareous, no hydrocarbon odor.
34						
36		0	38			40-45 Ft: Gray orange (10yr 7/4) SANDSTONE , moderately dense dry, very fine-grained, subrounded, well sorted, calcareous, no hydrocarbon odor.
38						
40		0.5	30			45-50 Ft: Brownish gray (5yr 4/1) SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well sorted, well cemented, calcareous, no hydrocarbon odor.
42						
44		4.5	38			50-55 Ft: SANDSTONE , as above.
46						
48		0	27			55-60 Ft: Grayish orange (0yr 7/4) DOLOMITE , very dense, dry, microcrystalline with interbedded brownish gray (5yr 4/1) SANDSTONE , hard, dry, very fine-grained, subrounded, well sorted, well cemented, no hydrocarbon odor.
50						
52		0				
54						
56		0				
58						



Drilling Log

Shallow Zone Monitor Well 106

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 0233502II.6I

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		1.5	27			
58						
60						
62						
64						
66						
68						
70						
72						
74						
76		0	38			60-65 Ft: Pale brown (5yr 5/2) SANDSTONE, moderately dense, damp, very fine-grained, subrounded, well sorted, poorly cemented, calcareous, no hydrocarbon odor. 65-70 Ft: SANDSTONE, as above. 70-75 Ft: SANDSTONE, as above.
78						
80						
82						
84						
86						
88						
		3.7	30			75-80 Ft: SANDSTONE, as above with light brownish gray (5yr 6/1), DOLOMITE, very hard, dry, microcrystalline, conchoidal fractures, no hydrocarbon odor. 80-85 Ft: DOLOMITE, as above with SANDSTONE, as above. Dolomite predominates.
		1.5	20			85-92 Ft: DOLOMITE and SANDSTONE, as above.
		2.0	23			



Drilling Log

Shallow Zone Monitor Well 106

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		.5				
90						
92						
94						
96						Total depth at 92 Ft.
98						
100						
102						
104						
106						
108						
110						
112						
114						
116						
118						
120						



Drilling Log

Shallow Zone Monitor Well 107

Project Indian Basin Remediation Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350211.61
Surface Elev. _____ Total Hole Depth 70 ft. Diameter 7 5/8 in./7 in.
Top of Casing 2.5 ft. Water Level Initial _____ Static _____
Screen: Dia 4 in. Length 60 ft. Type/Size PVC/0.040" in.
Casing: Dia 4 in. Length 12.5 ft. Type PVC
Fill Material 6/12 Sand Pack Rig/Core Ingersoll-Rand TH-60
Drill Co. PC Exploration Method Air Rotary
Driller S. Mott Log By Bob Davis Date 1/10/97 Permit # _____
Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

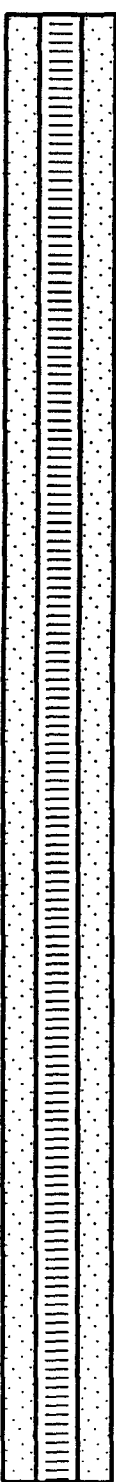
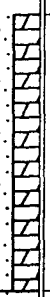
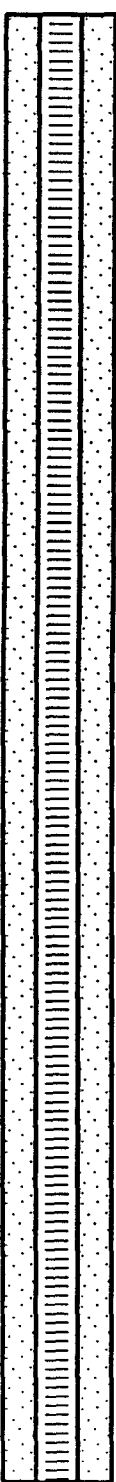
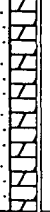
Bedrock at 17.5 Ft. below grade. No water encountered during drilling

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						7 5/8-inch hole drilled to 20 Ft. Temp. set 7 11/32-inch odex csg. to 20 Ft. drilled 7-inch hole to 70 Ft. total depth.
0						0-5 Ft: ARROYO ALLUVIUM, cobbles and boulder fragments, dolomite and sandstone.
2			43			
4						
6		0				5-10 Ft: ARROYO ALLUVIUM, dolomite and sandstone fragments.
8			43			
10		0.6				10-17.5 Ft: ARROYO ALLUVIUM, as above.
12			14			
14		0.7				
16						
18			18			17.5-20 Ft: Grayish orange (10yr 7/4) SANDSTONE, dense, dry, very fine-grained, subrounded, well sorted, well cemented, calcareous, no hydrocarbon odor with minor light brownish gray (5yr 6/1) DOLOMITE, hard, microcrystalline, conchoidal fractures.
20		0.5				20-25 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE, hard, microcrystalline, conchoidal fractures, no hydrocarbon odor with minor SANDSTONE, as above.
22			33			
24						

Drilling Log

Shallow Zone Monitor Well 107

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

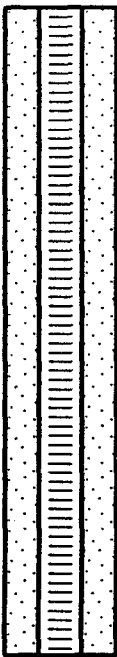
Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		54.5	38			25-30 Ft: DOLOMITE and SANDSTONE , as above. SANDSTONE increases with depth.
26						
28		30.1	40			30-35 Ft: Grayish orange (10yr 7/4) SANDSTONE , moderately dense, dry, very fine-grained, subrounded, well sorted, fairly well cemented, calcareous, non hydrocarbon odor with minor, light brownish gray (5yr 6/1), hard, microcrystalline, conchoidal fractures.
30						
32		1.4	55			35-40 Ft: SANDSTONE , as above.
34						
36		0.5	30			40-45 Ft: SANDSTONE , as above.
38						
40		2.0	50			45-50 Ft: Grayish orange (10yr 7/4) SANDSTONE , moderately dense to soft, damp, very fine- to fine-grained, subrounded, well sorted, poorly cemented, calcareous, no hydrocarbon odor.
42						
44		0.4	36			50-55 Ft: Brownish gray (5yr 4/1) DOLOMITE , hard, damp, microcrystalline, conchoidal fractures, no hydrocarbon odor, minor SANDSTONE , as above.
46						
48		40.1				55-60 Ft: DOLOMITE , as above interbedded with pale yellowish brown (10yr 6/2) SANDSTONE , moderately dense, damp, very fine-grained, subrounded, well sorted, moderately cemented, calcareous.
50						
52						
54						
56						



Drilling Log

Shallow Zone Monitor Well 107

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350211.61

Depth (ft.)	Well Completion	PID/LEL (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
56		2.2	47			80-85 Ft: SANDSTONE, as above, with minor DOLOMITE.	
58							
60							
62							
64							
66		1.0	47				85-70 Ft: DOLOMITE and SANDSTONE, as above.
68							
70							
72							
74							
76					Total depth at 70 Ft. No water encountered.		
78							
80							
82							
84							
86							
88							



Drilling Log

Monitoring Well **MW-108**

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60
 Surface Elev. _____ Total Hole Depth 170 ft. Diameter 12 1/4" & 7 7/8 in.
 Top of Casing 2.5 ft. Water Level Initial 130 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size _____
 Casing: Dia 8 5/8 in. Length 42 ft. Type steel
 Fill Material _____ Rig/Core Gardner Denver 15W
 Drill Co. West Texas Water Serv Method Air Rotary
 Driller Ronny Keith Log By Bob Davis Date 05/16/97 Permit # _____
 Checked By Peter Raftery License No. RG 4018

See Site Map
For Boring Location

COMMENTS:

12 1/4" borehole drilled to 39.5 ft. 8 5/8" steel casing run to 39.5 ft. 7 7/8" borehole drilled to 170 ft total depth. Bedrock @ surface.

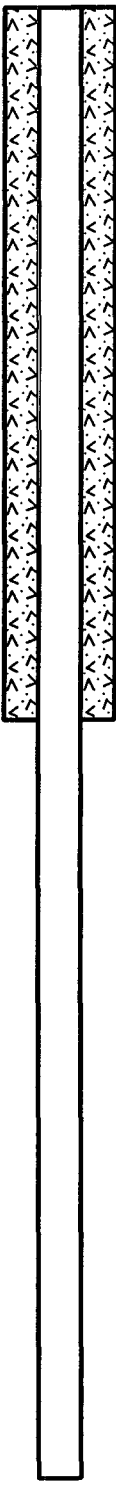
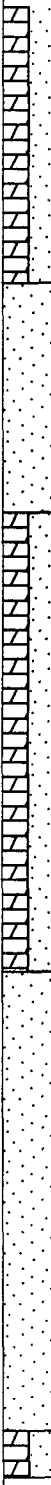
Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5						
0						
2			38			
4		0				
6						
8			27			
10		4.2				
12			27			
14						
16		9.4				
18			30			
20		4.2				
22			18			
24						



Drilling Log

Monitoring Well **MW-108**

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		16.2				
26						25-30 Ft.: DOLOMITE and SANDSTONE , as above. Sandstone colours range from pale yellowish brown (10yr 6/2) to pale yellowish orange (10yr 8/6).
28		38				
30		10.0				30-35 Ft.: Grayish orange (10yr 7/4) SANDSTONE , moderately- dense, fine-grained, subrounded, well-sorted, well cemented, calcareous, dry, no hydrocarbon odor.
32		30				
34		15.8				35-40 Ft.: SANDSTONE , as above, interbedded with pale yellowish brown (10yr 6/2) DOLOMITE , hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor.
36		25				
38						
40		4.3				40-45 Ft.: SANDSTONE and DOLOMITE , as above.
42		30				
44		0				45-50 Ft.: Pale yellowish brown (10yr 6/2) SANDSTONE , moderately-dense to dense, fine-grained, well-sorted, well cemented, calcareous, dry, no hydrocarbon odor.
46		30				
48						
50		0				50-55 Ft.: SANDSTONE , as above.
52		25				
54						
56		48.3				55-60 Ft.: SANDSTONE , as above, interbedded with pale yellowish brown (10yr 6/2) DOLOMITE , very hard, microcrystalline, conchoidal fractures, dry, faint hydrocarbon odor.



Drilling Log

Monitoring Well MW-108

Project Indian Basin Remediation
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			27			
60		8.3				60-85 Ft.: DOLOMITE and SANDSTONE, as above.
62			17			
64						
66		0				65-70 Ft.: DOLOMITE, as above, interbedded with moderate yellowish brown (10yr 5/4) SANDSTONE, dense, fine-grained, subrounded, well-sorted, well to moderately cemented, calcareous, damp, no hydrocarbon odor.
68			33			
70		0				70-75 Ft.: Pale yellowish brown (10yr 6/2) to grayish orange (10yr 7/4) DOLOMITIC SANDSTONE, hard, fine- to coarse-grained, subrounded to angular, well-sorted, poorly-cemented, calcareous, damp, no hydrocarbon odor.
72			27			
74		0				
76						75-80 Ft. Pale yellowish brown (10yr 6/2) DOLOMITE, hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor.
78			20			
80		0				80-85 Ft.: DOLOMITE, as above, interbedded with grayish orange (10yr 7/4) to moderate yellowish orange (10yr 5/4) SANDSTONE, dense, subrounded, fine-grained, subrounded, well-sorted, well-cemented, calcareous, damp, moderate hydrocarbon odor.
82			20			
84						
86		48.1				85-90 Ft.: Pale yellowish brown (10yr 6/2) DOLOMITE, hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor.
88			20			

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88			20			
90		0				90-95 Ft.: DOLOMITE, as above.
92			19			
94						
96		0				95-100 Ft.: DOLOMITE, as above, and pale yellowish brown (10yr 6/2) SANDSTONE, hard, fine- to medium-grained, subrounded to angular, well-sorted, poorly cemented, calcareous, damp, no hydrocarbon odor. Approximately 40% of sand-sized grains are dolomitic.
98			21			
100		19.1				100-105 Ft.: DOLOMITE and SANDSTONE, as above.
102			30			
104						
106		20.9				105-110 Ft.: DOLOMITE and SANDSTONE, as above.
108			25			
110		49.0				110-115 Ft.: DOLOMITE and SANDSTONE, as above.
112			25			
114		0				115-120 Ft.: DOLOMITE and SANDSTONE, as above.
116						
118			18			
120		0				



Drilling Log

Monitoring Well **MW-108**

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0				120-125 Ft.: DOLOMITE and SANDSTONE, as above.
122			17			
124						
126		0				125-130 Ft.: DOLOMITE and SANDSTONE, as above.
128			33			
130		0				Note: Well making water @ 130 ft.
132			30			130-135 Ft.: Very pale orange (10yr 8/2) SANDSTONE, dense, fine-grained, subrounded, well-sorted, poorly cemented, calcareous, saturated, no hydrocarbon odor.
134						
136		17.3				135-140 Ft.: SANDSTONE, as above.
138			50			
140		82.2				140-145 Ft.: Dark yellowish orange (10yr 6/6) SANDSTONE, as above.
142						
144						
146		0				145-150 Ft.: SANDSTONE, as above.
148			60			
150						
152						150-155 Ft.: SANDSTONE, as above, interbedded with grayish brown (5yr 3/2) DOLOMITE, hard, microcrystalline, conchoidal fractures, saturated, no hydrocarbon odor.



Drilling Log

Monitoring Well **MW-108**

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152						
154						
156		15.1				155-160 Ft.: Grayish brown (10yr 7/4) SANDSTONE , moderately dense, fine-grained, subrounded, well-sorted, poorly cemented, calcareous, saturated, no hydrocarbon odor.
158			60			
160		0				160-165 Ft.: SANDSTONE , as above.
162			75			
164		0				165-170 Ft.: SANDSTONE , as above.
166			75			
168						
170		0				Total depth: 170 ft.
172						
174						
176						
178						
180						
182						
184						



Drilling Log

Injection Well **IW-01**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105
Surface Elev. _____ Total Hole Depth 230 ft. Diameter 20/17.5/11 in.
Top of Casing _____ Water Level Initial _____ Static _____
Screen: Dia Open Hole Length _____ Type/Size _____
Casing: Dia 18/12 in. Length 17.5/73 ft. Type Steel
Fill Material Portland Cement Rig/Core Gardner Denver 1500
Drill Co. WT Water Well Service Method Air/Mud Rotary
Driller Ronnie Kieth Log By Kevin Spencer Date 6/4/96 Permit # RA-9140
Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

06/13/96 start well over, drilling with mud.
Estimated flow rate during drilling: 180' - 1
gpm 195' - 4 gpm 210' - 10 gpm 230' - 25
gpm

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						
2		0				20-inch borehole with 18-inch casing from 0 to 17.5 ft. 0-5 Ft.: Grayish brown (2.5y 5/2) and light brownish gray (2.5y 6/2) DOLOMITE , conchoidal fractures, dense, and white (2.5y 8/2) LIMESTONE , hard, COBBLES , cemented with calcite cement, minor amount of chert.
4						
6		0				5-10 Ft: Same as above
8						
10		0				10-15 Ft: Same as above
12						
14						
16						15-17.5 Ft: Same as above
18		0	6			17.5-inch borehole with 12-inch casing from 17.5 to 73 ft 17.5-20 Ft: Light yellowish brown (10 yr 6/4) and yellowish brown (10 yr 5/6) DOLOMITE , very hard, microcrystalline, conchoidal fractures.
20		0	8			20-25 Ft: Same as above (minor dark gray (10 yr 4/1) sandy dolomite, fine-grained, well cemented, hard).
22						
24						



Drilling Log

Injection Well IW-01

 Project MOC/Indian Basin Gas Plant
 Location Indian Basin, Carlsbad NM

 Owner Marathon Oil Company
 Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0	8			25-30 Ft: Same as above
26						
28		0	6			30-35 Ft: Very pale brown (10 yr 7/3) and light brownish gray (10 yr 6/2) DOLOMITE microcrystalline, very hard, conchoidal fractures.
30						
32		8.5	13			35-40 Ft: Same as above
34						
36		2.7	25			40-45 Ft: Grayish brown (10 yr 5/2) and very pale brown (10 yr 7/4) sandy dolomitic LIMESTONE , very fine- to fine-grained, slight reaction with HCl, moderately to well cemented.
38						
40		5.6	23			45-50 Ft: Light brownish gray (10 yr 6/2) light reddish brown (5 yr 6/3) DOLOMITE microcrystalline, hard and brownish yellow (10 yr 6/6) LIMESTONE , argillaceous, medium hard.
42						
44		2.7	25			50-55 Ft: Light brownish gray (10 yr 6/2) and light reddish brown (5 yr 6/3), DOLOMITE microcrystalline, moderately hard.
46						
48						55-60 Ft: Light grayish brown (10 yr 6/2) DOLOMITE , hard, microcrystalline, conchoidal fractures, and grayish brown (2.5y 5/2) and light yellowish brown (2.5y 5/2) sandy DOLOMITE , fine-grained hard.
50						
52						
54						
56						



Drilling Log

Injection Well IW-01

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		0	23			
58						
60						60-65 Ft: Grayish brown (2.5y 5/2) and dark gray (5y 4/1) sandy DOLOMITE , very fine grained, moderately hard to soft.
62		0	18			
64						
66						65-70 Ft: Brown (10 yr 5/3) DOLOMITE , microcrystalline, conchoidal fractures, hard, and gray (10 yr 4/1) sandy DOLOMITE , very fine-grained, moderately cemented, moderately hard.
68		2.7	23			
70						70-73 Ft: Same as above
72		2.7	60			11-inch open borehole from 73 to 230 ft.
74		0	8			73-80 Ft: Very dark gray (10 yr 3/1); grayish brown (10 yr 5/2), and brownish yellow (10 yr 6/6) sandy yellow DOLOMITE hard, very fine- to fine-grained, well cemented.
76						
78		5.9	13			
80						80-88 Ft: Same as above
82						
84		12.1	13			
86						
88		5.9	38			88-90 Ft: Very pale brown (10 yr 7/4) sandy DOLOMITE , and light brownish gray (10 yr 6/2) DOLOMITE , microcrystalline, conchoidal fractures, trace of green sand (possibly glauconite).

Drilling Log

Injection Well **IW-01**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		5.9	38			90-95 Ft: Light brownish gray (10 yr 6/2) sandy DOLOMITE , very fine-grained, trace of green sand (possibly glauconite), minor limestone.
90						
92		0	75			
94						
96						95-100 Ft: Light brownish gray (10 yr 6/2) SANDSTONE , very fine-grained, well sorted, subangular, poorly cemented, soft. Minor amount of sandy dolomite as above.
98						
100		0	75			
102						100-105 Ft: Light brownish gray (10 yr 6/2) sandy DOLOMITE , very fine-grained, trace green sand (possibly glauconite).
104		0	50			
106						105-110 Ft: Same as above
108		0	27			
110						110-115 Ft: Same as above
112						
114		0	38			115-120 Ft: Same as above
116						
118		0	43			
120						



Drilling Log

Injection Well IW-01

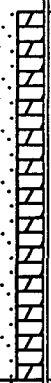
Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120						120-125 Ft: Same as above. Samples are more pulverized.
122		0	50			
124						
126						125-130 Ft: Same as above
128		0	33			
130						130-135 Ft: Same as above. Color changes to pale yellow (2.5y 7/4).
132		0	60			
134						
136		0	60			135-140 Ft: Yellow (10 yr 7/6) SANDSTONE, very fine-grained, well sorted, poorly cemented, subrounded; and pale yellow (2.5y 7/4) sandy DOLOMITE, fine-grained, trace green sand (pos. glauconite).
138						
140						140-145 Ft: Same as above
142		0	50			
144						
146						145-150 Ft: Same as above
148		0	50			
150						
152						150-155 Ft: Same as above

Drilling Log

Injection Well IW-01

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152						
154		0	21			Start mist pump
156						155-160 Ft: Very pale brown (10 yr 7/4) SANDSTONE , v. fine grained, well sorted, moderately cemented; and grayish brown (10 yr 5/2); black (10 yr 2/1), and gray (7.5 yr N5/) sandy DOLOMITE , fine-grained, moderately hard.
158		0	50			
160						160-165 Ft: Very pale brown (10 yr 7/4) SANDSTONE , very fine- to fine-grained, moderately sorted, moderately cemented.
162		0	75			
164						165-170 Ft: Same as above
166						
168		0	38			
170						170-175 Ft: Same as above (slight odor).
172		0	100			
174						175-180 Ft: Same as above
176						
178		0	60			
180						180-185 Ft: Pale brown (10 yr 6/3) sandy DOLOMITE , very fine- to fine-grained, moderately cemented.
182		0	75			
184						

Drilling Log

Injection Well **IW-01**

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184						185-190 Ft: Same as above
186						
188		0	100			
190						190-195 Ft: Same as above (slightly higher sand content).
192		0	75			
194						
196						195-200 Ft: Same as above
198		0	50			
200						200-205 Ft: Same as above
202		0	50			
204						205-210 Ft: Same as above (harder)
206						
208		0	27			
210						210-215 Ft: Light brownish gray (10 yr 6/2) SANDSTONE , very fine- to fine-grained, moderately sorted, poorly cemented, subrounded; and light brownish gray (10 yr 6/2) sandy DOLOMITE , fine-grained.
212		0	60			
214						215-220 Ft: Same as above
216						



Drilling Log

Injection Well IW-01

 Project MOC/Indian Basin Gas Plant
 Location Indian Basin, Carlsbad NM

 Owner Marathon Oil Company
 Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
216		0	60			
218						
220		0	75			220-225 Ft: Pale brown (10 yr 6/3) SANDSTONE , very fine- to fine-grained, moderately sorted, poorly cemented, subrounded.
222						
224		0	75			225-230 Ft: Same as above
226						
228		0	75			
230						TD at 230 ft.
232						
234						
236						
238						
240						
242						
244						
246						
248						



Drilling Log

Injection Well **IW-02**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105
Surface Elev. _____ Total Hole Depth 300 ft. Diameter 17.5/11 in.
Top of Casing _____ Water Level Initial 225 ft. Static _____
Screen: Dia Open Hole Length _____ Type/Size _____
Casing: Dia 12 in. Length 159 ft. Type Steel
Fill Material Portland Cement Rig/Core Gardner Denver 1500
Drill Co. WT Water Well Service Method Air Rotary
Driller Ronnie Kieth Log By Kevin Spencer Date 7/23/96 Permit # RA-9149-S
Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Estimated water level 225-230 Ft.
Estimated flow rate: 75-100 gpm during
drilling.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						17.5-inch borehole with 12-inch casing 0 to 159 Ft.
2						0-5 Ft: Yellowish brown (10 yr 5/6) and light brown (7.5yr 6/4) DOLOMITE , hard, microcrystalline, conchoidal fractures, dry.
4		0	20			5-10 Ft: Light yellowish brown (10 yr 6/4) and l. grayish brown (10 yr 6/2) DOLOMITE , microcrystalline, conchoidal fractures, dry
6						
8		0	20			
10						10-15 Ft: Brownish yellow (10 yr 6/3) SANDSTONE , fine-to very-fine grained, moderately sorted, poorly cemented, slightly moist.
12		0	27			
14						15-20 Ft: Brownish yellow (10 yr 6/8) and gray (10 yr 5/1) SANDSTONE , very fine- to fine-grained, moderately sorted, poorly to moderately cemented, slightly moist.
16						
18		0	23			
20						20-25 Ft: Pale brown (10 yr 7/4), light yellowish brown (10 yr 6/4), and light brown (7.5 yr 6/4)sandy DOLOMITE , fine- grained sand in dolomitic matrix, moderately hard, dry.
22		0	14			
24						



Drilling Log

Injection Well **IW-02**

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26		0	27			25-30 Ft: Brownish yellow (10 yr 6/6) DOLOMITE , micro-crystalline, hard, conchoidal fractures, dry.
28						
30						30-35 Ft: Same as above
32		0	12			
34						35-40 Ft: Brownish yellow (10 yr 6/6) and pale brown (10 yr 6/3) DOLOMITE , microcrystalline, hard, conchoidal fractures, dry. (occasional green, possibly glauconite, sand layers).
36						
38		0	13			40-45 Ft: Same as above
40						
42		0	13			
44						
46		16	16			45-50 Ft: Grayish brown (2.5y 5/2) and light yellowish brown (10 yr 6/4) SANDSTONE , very fine- to fine-grained, moderately sorted, subrounded, moderately cemented. (trace green, glauconite sand).
48						
50						50-55 Ft: SANDSTONE (same as above) Dolomite reddish brown (7.5 yr 6/6), microcrystalline, mod. hard, conchoidal fractures, dry.
52		1	19			
54						
56						55-60 Ft: Light brown (7.5 yr 6/4), reddish yellow (7.5 yr 6/6), and dark brown (7.5 yr 3/2) DOLOMITE , microcrystalline, hard, conchoidal fractures, dry.



Drilling Log

Injection Well IW-02

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58		0	12			
60						60-65 Ft: Light yellowish brown (10 yr 6/4) and pale brown (10 yr 6/3) DOLOMITE , microcrystalline, hard, conchoidal fractures, dry, (minor beds of glauconite sand).
62		0	17			
64						
66						65-70 Ft: Gray (5y 5/1) SANDSTONE , very fine- to fine-grained, moderately sorted, well cemented, hard, subrounded, dry, (trace glauconite).
68		0	13			
70						
72		1	12			70-75 Ft: Pale brown (10 yr 6/3) DOLOMITE , microcrystalline, hard, conchoidal fractures, dry; and yellow (10 yr 7/6) sandy DOLOMITE , hard, very fine-grained, dry.
74						
76						75-80 Ft: Very dark gray (10 yr 3/1) SANDSTONE , very fine- grained, well sorted, moderately cemented, subrounded, dry.
78		2	21			
80						
82		0	7			80-85 Ft: Brown (10 yr 5/3) sandy DOLOMITE , fine-grained, hard, conchoidal fractures, dry.
84						
86						
88		23	12			85-90 Ft: Sandy DOLOMITE (as above) and pale brown (10 yr 6/3) and brownish yellow (10 yr 6/6) SANDSTONE , very fine- to fine- grained, moderately sorted, well cemented, hard, subrounded.



Drilling Log

Injection Well IW-02

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Indian Basin, Carlsbad NMProj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88						
90						
92		5	11			90-95 Ft: Pale brown (10 yr 6/3) and brownish yellow (10 yr 6/6) sandy DOLOMITE , v. fine-grained, hard, conchoidal fractures, dry.
94						
96						95-100 Ft: Same as above
98		1	13			
100						100-105 Ft: Same as above
102		0	13			
104						105-110 Ft: Same as above
106						
108		0	15			
110						110-115 Ft: Very pale brown (10 yr 7/4) silty SAND , very fine- to medium-grained, poorly sorted, subangular to subrounded, poorly cemented, dry.
112		0	30			
114						
116						115-120 Ft: Pale brown (10y 6/3) sandy DOLOMITE , fine-grained, hard, conchoidal fractures, dry.
118		0	12			
120						



Drilling Log

Injection Well **IW-02**

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120						120-125 Ft: Sandy DOLOMITE (as above) and pale brown (10 yr 6/3) DOLOMITE , microcrystalline, hard, conchoidal fractures, dry.
122		0	9			
124						
126						125-130 Ft: Pale brown (10 yr 6/3) sandy DOLOMITE , fine-grained, dry, (trace glauconite).
128		0	14			
130						
132		0	13			130-135 Ft: Pale brown (10 yr 6/3) and yellow (10 yr 8/6) sandy DOLOMITE , fine-grained, hard (fractured encrustations on fracture face).
134						
136						
138		0	13			135-140 Ft: Same as above (trace of glauconite sand).
140						
142		0	17			
144						140-145 Ft: Brownish yellow (10 yr 6/6) SANDSTONE , very fine- to fine-grained, subangular to subrounded, moderately cemented, moderately sorted.
146						
148		0	25			
150						145-150 Ft: Same as above (trace glauconite).
152						
						150-155 Ft: Same as above

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152						
154		0	30			
156						155-180 Ft: SANDSTONE (as above) and brownish yellow (10 yr 6/8) DOLOMITE , microcrystalline, hard, conchoidal fractures, dry.
158		0	19			
160						11-inch open borehole from 159 to 300 Ft. 160-165 Ft: Yellow (10 yr 7/6) SANDSTONE , very fine- to medium-grained, poorly sorted, subangular, moderately cemented, very slightly moist.
162		0	20			
164						165-170 Ft: Yellow (10 yr 7/6) SANDSTONE , very fine- to fine-grained, subrounded, moderately sorted, poorly cemented, very slightly moist.
166						
168		0	23			
170						170-175 Ft: Same as above
172		0	21			
174						175-180 Ft: Same as above (moist)
176						
178		0	43			
180						180-185 Ft: Same as above
182		0	75			
184						



Drilling Log

Injection Well IW-02

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184						185-190 Ft: Same as above
186						
188		0	38			
190						190-195 Ft: Same as above
192						
194		0	38			
196						195-200 Ft: Same as above
198		0	50			
200						200-205 Ft: Same as above
202		0	60			
204						
206						205-210 Ft: Very pale brown (10 yr 7/4) SANDSTONE , very fine- to fine-grained, moderately sorted, subrounded, poorly cemented, moist, (trace glauconite).
208		0	27			
210						210-215 Ft: Same as above
212		0	30			
214						
216						215-220 Ft: Same as above (more moist)



Drilling Log

Injection Well IW-02

 Project MOC/Indian Basin Gas Plant
 Location Indian Basin, Carlsbad NM

 Owner Marathon Oil Company
 Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-216						
-218		0	33			
-220						220-225 Ft: Same as above (start mist pump)
-222		0	43			
-224						Groundwater encountered at 225'-230' (estimate)
-226		0	38			225-230 Ft: Pale brown (10 yr 6/3) clayey SAND, very fine-grained, subrounded, interbedded with pale brown (10 yr 6/3) sandy DOLOMITE, hard, fine-grained, very moist, detect groundwater at this interval.
-228						
-230						230-235 Ft: Same as above
-232		0	75			
-234						
-236						235-240 Ft: Light yellowish brown (2.5y 6/6) SANDSTONE, fine-grained, well sorted, moderately cemented, subrounded, (trace glauconite sand).
-238		0	27			
-240						240-245 Ft: Same as above
-242		0	38			
-244						Lost circulation to 260'
-246						245-280 Ft: SANDSTONE (as above) and light yellowish brown (2.5y 6/4) sandy DOLOMITE, fine-grained.
-248						

Injection Well **IW-02**

Project MOC/Indian Basin Gas Plant

Owner *Marathon Oil Company*

Location *Indian Basin, Carlsbad NM*

Prn1 No 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
248		0	36			
250						
252						
254						
256						
258						
260						
262						
264						
266						0
268						
270						
272						
274		0	60			270-275 Ft: Pale brown (10 yr 6/3) SANDSTONE , very fine- to fine-grained, moderately cemented, subrounded, moderately sorted.
276						
278						
280		0	30			
						275-280 Ft: SANDSTONE (as above) and yellowish brown (10 yr 5/6) DOLOMITE , microcrystalline, hard, conchoidal fractures.



Drilling Log

Injection Well **IW-02**

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%		
280		0	33			280-285 Ft: Light gray (10 yr 7/2) SANDSTONE , very fine- grained, well sorted, subrounded, slightly silty, moderately cemented.		
282								
284		0	33			285-290 Ft: Light reddish brown (5 yr 6/4) SANDSTONE , very fine-grained, well sorted, subrounded, moderately cemented.		
286								
288		0	21			290-295 Ft: Same as above (sandstone is light reddish brown and pale brown (10 yr 6/3).		
290								
292		0				295-300 Ft: Reddish brown (2.5 yr 4/4) and light reddish brown (2.5 yr 6/4) SANDSTONE , very fine- to fine-grained, moderately sorted, subrounded, moderately cemented.		
294								
296		0	20					
298								
300								
302						TD at 1830 hrs. on 7/24/96		
304								
306								
308								
310								
312								



Drilling Log

Supply Well SW-03

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Indian Basin, Carlsbad NM Proj. No. 023350105
Surface Elev. _____ Total Hole Depth 230 ft. Diameter 12.25/7.875 in.
Top of Casing _____ Water Level Initial _____ Static _____
Screen: Dia Open Hole Length _____ Type/Size _____
Casing: Dia 8 in. Length 81.5 ft. Type Steel
Fill Material Portland Cement Rig/Core Gardner Denver 1500
Drill Co. WT Water Well Service Method Air Rotary
Driller Ronnie Kieth Log By Kevin Spencer Date 6/3/96 Permit # RA-5131-S-26
Checked By Underwood/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Estimated flow rate during drilling: 10-15 gpm.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						12.25-inch borehole with 8-inch casing 0 to 81.5 Ft.
2		2.0	60			0-5 Ft: White (5 yr 8/1) LIMESTONE (chalky) and pinkish gray (5 yr 6/2) DOLOMITE , conchoidal fractures, massive, dense.
4						5-10 Ft: Same as above (dolomite has vuggy porosity).
6						
8		5.0	75			
10						10-15 Ft: Same as above (dolomite s. darker l. gray (10 yr 6/1).
12		5.0	60			
14						
16		5.0	50			15-20 Ft: Same as above (dolomite pinkish gray (5 yr 6/2) and dark gray (7.5 yr 4/1).
18						
20						20-25 Ft: Light brownish gray (10 yr 6/2) sandy LIMESTONE and pinkish gray (5 yr 6/2) DOLOMITE , massive, dense, conchoidal fractures.
22		5.0	33			
24						

Project MOC/Indian Basin Gas Plant
Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26		2.3				25-30 Ft: Light gray (2.5y 7/2) and white (5 yr 8/1) LIME STONE chalky, silty, dry. White limestone is very soft and powdery. Minor pinkish gray (7.5 yr 6/2) and gray (7.5 yr N5/) dolomite, conchoidal fractures, microcrystalline, dry.
28						Mist hole to bring cuttings up, then add soap to mist.
30						30-35 Ft: Gray (7.5 yr 5.4/) and pale red (2.5 yr 6/2) DOLOMITE , microcrystalline, occasional vuggy porosity, some pinkish gray (7.5 yr 6.5/2) limestone, conchoidal fractures, vuggy porosity.
32		2.3	60			
34						35-37 Ft: Same as above (hard).
36						
38		7.7	75			
40						37-45 Ft: Dark gray (10 yr 4/1) dolomitic SANDSTONE , slightly cemented, fine-grained, no reaction with HCl.
42		7.3	75			
44						
46						45-50 Ft: Gray (2.5y N2/ and 5y 5/) dolomitic SANDSTONE , fine-grained, poorly cemented and gray (5y N6/) DOLOMITE , micro- crystalline, conchoidal fractures, slightly sandy.
48		4.8	23			
50						50-55 Ft: Same as above (interbedded dolomitic sandstone (2.5y N2/) and gray (5y N6/) dolomite).
52		4.8	25			
54						
56		4.8	75			55-60 Ft: Same as above



Drilling Log

Supply Well SW-03

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		4.8	75			
58						
60						
62		2.3	33			
64						
66		4.8	25			60-65 Ft: Same as above (dolomite has vuggy porosity, and dolomitic sandstone is poorly to well cemented).
68						
70						65-70 Ft: Gray (2.5y N5/) DOLOMITE , microcrystalline, very hard, interbedded with dark gray (2.5y N4/) dolomitic sandstone.
72		4.8	27			
74						
76		4.8	16			70-75 Ft: Gray (10 yr 5/1) DOLOMITE , microcrystalline, conchoidal fractures.
78						
80		4.8	11			75-80 Ft: Gray (10 yr 6/1) DOLOMITE , microcrystalline, some sand grains (wackstone), hard, conchoidal fractures.
82						80-81.5 Ft: Same as above 7.875-inch open borehole from 81.5 to 230 Ft.
84		3.7	14			81.5-85 Ft: V. dark grayish brown (10 yr 3/2) dolomitic SANDSTONE , very fine- to fine-grained, moderately sorted, subrounded, alternating beds of moderately and poorly cemented sandstone.
86						85-87 Ft: Same as above
88		6.3				87-90 Ft: Grayish brown (10 yr 5/2) DOLOMITE , microcrystalline, hard, conchoidal fractures, dry.



Drilling Log

Supply Well SW-03

 Project MOC/Indian Basin Gas Plant
 Location Indian Basin, Carlsbad NM

 Owner Marathon Oil Company
 Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		6.3				
90						90-95 Ft: Same as above
92						
94		1.2	12			
96						95-98 Ft: Grayish brown (10 yr 5/2) sandy DOLOMITE , fine-grained sand in dolomite matrix, hard, conchoidal fractures, dry.
98		1.2	18			98-107 Ft: Grayish brown (10 yr 5/2) dolomitic SANDSTONE , fine-grained, subrounded, well sorted, soft, friable to poorly cemented, moist from 104'-106'.
100						
102		3.7	60			
104						
106						
108		54	27			107-109 Ft: Grayish brown (10 yr 5/2) sandy DOLOMITE , very fine-grained, subrounded, moderately hard, conchoidal fractures, dry.
110						109-115 Ft: Gray (10 yr 5/1) SANDSTONE , very fine- to fine-grained, well to subrounded, moderately sorted, poorly cemented, dry.
112		8.9	50			
114						115-118 Ft: Same as above (very slightly moist).
116						
118		12	43			118-120 Ft: Gray (10 yr 5/1) sandy DOLOMITE , very hard, fine-grained, dry.
120						



Drilling Log

Supply Well SW-03

Project MOC/Indian Basin Gas Plant

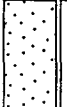
Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120						120-125 Ft: Light brownish gray (10 yr 4/2) DOLOMITE , very hard, conchoidal fractures, microcrystalline, dry. (powdery).
122		0	13			
124						125-130 Ft: Same as above
126						
128		1.2	14			
130						130-135 Ft: Same as above
132						
134		1.2	17			
136						135-140 Ft: Same as above
138		1.2	17			
140						140-145 Ft: Same as above (very pale brown (10 yr 7/3).
142						
144		3.7	27			
146						145-150 Ft: Light brownish gray (10 yr 4/2) and yellow (10 yr 7/6) DOLOMITE , slightly sandy, hard, conchoidal fractures, dry, mostly powder.
148		1.2	18			
150						150-155 Ft: Same as above
152						

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152		1.2	19			
154						155-160 Ft: Same as above
156						
158		1.2	19			
160						160-165 Ft: Same as above
162						
164		1.2	20			
166						165-170 Ft: Same as above
168						
170		1.2	20			
172		3.7	18			170-175 Ft: Light brownish gray (10 yr 6/2) DOLOMITE, microcrystalline, conchoidal fractures, hard.
174						
176						175-180 Ft: Same as above
178		1.2	14			
180						
182						180-185 Ft: Grayish brown (2.5y 5/2) SANDSTONE, very fine to fine-grained, subrounded to subangular, moderately sorted, moderately cemented, no reaction with HCl.
184		1.2	15			



Drilling Log

Supply Well SW-03

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Indian Basin, Carlsbad NM

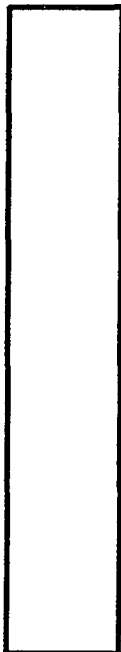
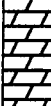
Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184						185-190 Ft: Same as above
186						
188		1.2	38			190-195 Ft: Light yellowish brown (2.5y6/4) sandy LIMESTONE and light gray (10 yr 6/2) DOLOMITE, microcrystalline, angular fractures.
190						
192		1.2	100			
194						
196						195-200 Ft: Same as above (minor dolomite).
198		1.2	43			
200						200-205 Ft: Pink (5 yr 7/4) SANDSTONE, very fine- to fine- grained, moderately sorted, subangular to subrounded, poorly sorted, poorly cemented.
202		1.2	43			
204						
206						
208		1.2	21			205-210 Ft: Same as above (minor light gray (10 yr 6/1) dolomite microcrystalline, hard).
210						
212						210-215 Ft: Reddish brown (2.5 yr 5/4) SANDSTONE, very fine to fine-grained, moderately sorted, subrounded to subangular, poorly cemented.
214		0	50			
216						215-220 Ft: Red (10r 5/4), weak, SANDSTONE, very fine- to medium-grained, poorly sorted, moderately cemented, subangular.

Drilling Log

Supply Well SW-03

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Indian Basin, Carlsbad NM Proj. No. 023350105

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
216						
218		0	27			
220						220-225 Ft: Pinkish gray (7.5 yr 7/2) SANDSTONE , very fine to fine-grained, well sorted, subangular, moderately cemented, minor dolomite, microcrystalline, conchoidal fractures.
222		0	27			
224						
226						225-230 Ft: Pinkish gray (7.5 yr 6/2) DOLOMITE , micro-crystalline, conchoidal fractures.
228		0	100			
230						TD at 230 ft.
232						
234						
236						
238						
240						
242						
244						
246						
248						

Drilling Log

FLUOR DANIEL GTI 

Vapor Point VE-1

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60
 Surface Elev. _____ Total Hole Depth 214 ft. Diameter 12.25 in. / 7 7/8 in.
 Top of Casing 33" (aq) ft Water Level Initial 209 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size Open Borehole in.
 Casing: Dia 8 5/8 in. Length 80 ft. Type Steel
 Fill Material Portland Cement Rig/Core Gardner Denver 15 W
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Ronnie Keith Log By Bob Davis Date 12/9/96 Permit # _____
 Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Drilled 0-77.5' on 12/9/96. Drilled 77.5' to 120' on 12/13/96. Drilled from 120' to 214' TD on 12/16/96. Steel casing sticks up 33" above grade.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						12.25-inch borehole with 8 5/8-inch surface casing from 0 to 77.5 Ft. 7 3/8-inch borehole drilled from 77.5 Ft to 214 Ft total depth.
0						0-.5 Ft: Soil.
2						.5-21 Ft: Very light gray (N7) LIMESTONE, dry, very dense, microcrystalline, no hydrocarbon odor, slight reaction with HCL.
4			21			
6		0				
8						
10		0	100			
12						
14			50			
16		0				
18						
20		0	50			
22						21-27 Ft: Grayish orange (10 yr 7/4) SANDSTONE, damp, mod. hard, very fine-grained, subrounded to rounded, well sorted, no hydrocarbon odor.
24			75			

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Eddy County, New Mexico

Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0				
26			75			
28						27-32 Ft: Dark yellowish orange (10yr 6/6) SANDSTONE , damp, mod. hard, very fine-grained, subrounded to rounded, well sorted, no hydrocarbon odor.
30		0				
32			43			32-48 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE .
34						
36		0	75			
38						
40		0				
42			60			
44		0				
46						
48			38			48-52 Ft: Light gray (N4) to medium light gray LIMESTONE , dry, very dense, microcrystalline, no hydrocarbon odor, slight reaction with HCL.
50		0				
52			43			52-74 Ft: Gray (N7) to brownish gray (5yr 4/1) SANDSTONE , dry, mod. hard, very fine- to fine- grained, subrounded, well sorted, no hydrocarbon odor.
54						
56		0				



Drilling Log

Vapor Point VE-1

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Eddy County, New Mexico

Proj. No. 023350213.60

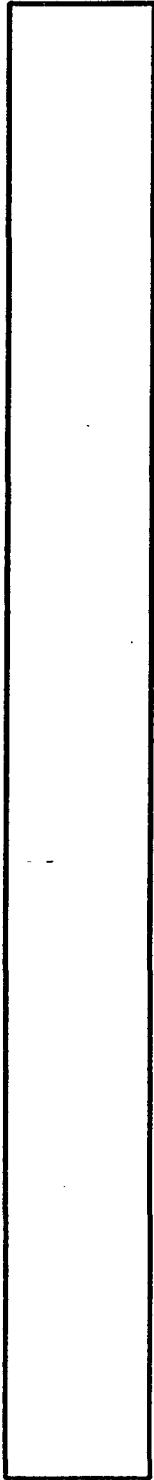
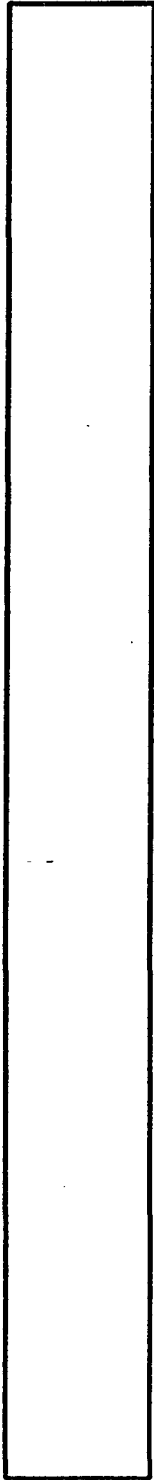
Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			75			
60		0				60-65 Ft: SANDSTONE as above.
62			75			
64		0				65-70 Ft: SANDSTONE as above.
66						
68			75			
70		0				70-74 Ft: SANDSTONE as above.
72						
74		0	43			74-80 Ft: Light gray (N7) SANDSTONE, grades to sandy DOLOMITE, dry, very hard, conchoidal fractures, microcrystalline, no hydrocarbon odor.
76						
78			15			Open borehole from 77.5 to total boring depth.
80		0				80-85 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE, damp, dense, fine-grained, subrounded, mod. sorted, calcareous, no hydrocarbon odor.
82			75			
84						
86		80				85-90 Ft: SANDSTONE as above (faint hydrocarbon odor).
88			30			

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Eddy County, New Mexico

Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		40	30			
90						90-95 Ft: Light brownish gray (5 yr 6/1) DOLOMITE , dry, hard, microcrystalline, conchoidal fractures, no hydrocarbon odor.
92			17			
94		40				
96						95-100 Ft: DOLOMITE (as above) interbedded with thin beds of medium gray (N5) CLAY , damp, mod. soft, platy, and light brownish gray (5yr 6/1) LIMESTONE , dense, microcrystalline, mod. reaction with HCL, no hydrocarbon odor.
98			23			
100		0				100-105 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE , dry, mod. dense, very fine- to fine-grained, mod. well sorted, subrounded, calcareous, no hydrocarbon odor.
102			20			
104						105-110 Ft: SANDSTONE as above.
106		0				
108			38			110-115 Ft: SANDSTONE as above.
110						
112			27			
114		0				
116						115-120 Ft: Light brownish gray (5yr 6/1) DOLOMITE , dry, v. hard, microcrystalline, occ. dolomite crystals, conchoidal fractures, no hydrocarbon odor.
118			20			
120		0				



Drilling Log

Vapor Point VE-1

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Eddy County, New MexicoProj. No. 023350213.60

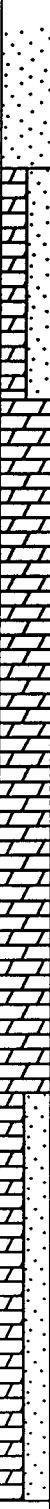
Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0				120-125 Ft: DOLOMITE as above.
122						
124			43			
126		0				125-130 Ft: Light brownish gray (5yr 6/1) DOLOMITE, dry, very hard, microcrystalline, interbedded with SANDSTONE, mod. dense, v. fine-grained, subrounded, mod. well sorted, no hydrocarbon odor.
128			33			
130		0				130-135 Ft: DOLOMITE and SANDSTONE as above.
132			25			
134						
136		0				135-140 Ft: DOLOMITE and SANDSTONE as above.
138			50			
140		0				140-145 Ft: DOLOMITE and SANDSTONE as above.
142			30			
144						
146		0				145-150 Ft: Light brownish gray (5yr 6/1) SANDSTONE, dry, mod. dense, v. fine-grained, subrounded to subangular, mod. well sorted, no hydrocarbon odor.
148			30			
150		0				150-155 Ft: SANDSTONE as above.
152			43			

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Eddy County, New Mexico

Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152			43			
154						
156		0				155-180 Ft: Light brown (5yr 6/1) DOLOMITE , dry, v. hard, microcrystalline, conchoidal fractures, with minor SANDSTONE , no hydrocarbon odor.
158			19			
160		0				180-185 Ft: DOLOMITE as above (no sandstone).
162						
164		0	17			185-170 Ft: DOLOMITE as above.
166						
168			25			170-175 Ft: DOLOMITE as above.
170		0				
172			19			
174		0				175-180 Ft: Light brown (5yr 6/1) DOLOMITE , dry, v. hard, microcrystalline, conchoidal fractures, with minor SANDSTONE , no hydrocarbon odor.
176						
178			25			
180		0				180-185 Ft: Brownish gray (5yr 4/1) SANDSTONE , dry, mod. dense, v. fine-grained, mod. well sorted, subrounded to subangular, no hydrocarbon odor, interbedded with light brownish gray (5yr 6/1) DOLOMITE , hard, microcrystalline. (Sandstone is predominate).
182			23			
184						

Proj. No. 023350213.60

Page: 7 of 7



Drilling Log

Vapor Point VE-2

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60
 Surface Elev. _____ Total Hole Depth 210 ft. Diameter 12.25 in./7 3/8 in.
 Top of Casing 33" (aq) ft Water Level Initial 205 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size Open Borehole in.
 Casing: Dia 8 5/8 in. Length 75 ft. Type Steel
 Fill Material Portland Cement Rig/Core Gardner Denver 15 W
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Ronnie Keith Log By Bob Davis Date 12/10/96 Permit # _____
 Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Drilling Dates: 12/10/96, 0 to 35 ft.,
12/11/96, 35 to 72.5 ft., 12/17/96, 72.5 to
210 ft.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						12.25-inch borehole with 8 5/8-inch surface casing from 0 to 72.5 ft. 7 7/8-inch borehole drilled to 210 ft. T.D.
0						0-.5 Ft: Soil, sandy loam.
2			100			.5-8 Ft: Very pale orange (10yr 8/2) LIMESTONE , dry, soft, microcrystalline, reacts with 10% HCl, interbedded with pale yellowish brown (10yr 8/2) SANDSTONE , dry, friable, very fine-grained, subrounded, no hydrocarbon odor.
4		0				
6						
8			27			
10		0				9-10 Ft: Light gray (N7) to light med. gray (N6) LIMESTONE , dry, dense, microcrystalline, reacts with HCl, no hydrocarbon odor.
12			27			10-15 Ft: Light gray (N7) to mod. yellowish brown (10yr 5/4) SANDSTONE , dry, mod. dense, v. fine- to fine-grained, subrounded to subangular, very calcareous, no hydrocarbon odor.
14		0				15-20 Ft: SANDSTONE as above.
16						
18			25			
20		0				20-25 Ft: SANDSTONE as above (with mod. hydrocarbon odor and occ. grayish orange (10yr 7/4) CHERT , dense, conchoidal fractures.
22						
24			43			



Drilling Log

Vapor Point VE-2

Project MOC/Indian Basin Gas Plant
Location Eddy County, New Mexico

Owner Marathon Oil Company

Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0				25-30 Ft: SANDSTONE as above.
26			100			
28						
30		0				30-42 Ft: Pale yellowish brown (10yr 6/2) to mod. yellowish brown (10yr 5/4) SANDSTONE, dry, mod. dense, v. fine-grained, subrounded, slightly calcareous, faint hydrocarbon odor, interbedded with med. gray (N6) LIMESTONE, mod. dense, microcrystalline, v. faint hydrocarbon odor.
32			50			
34						
36		0				
38			38			
40		0				42-48 Ft: Light brownish gray (5yr 6/1) to brownish gray (5yr 4/1) SANDSTONE, damp, med. vense, v. fine- to fine-grained, subrounded, calcareous cementation, mod. hydrocarbon odor.
42			50			
44						
46		0				48-55 Ft: Light brownish gray (5yr 6/1) to brownish gray (5yr 4/1) SANDSTONE, damp, dense to v. dense, very fine- to fine-grained, subrounded, calcareous, no hydrocarbon odor.
48			30			
50		0				
52			27			55-60 Ft: SANDSTONE as above.
54						
56		0				



Drilling Log

Vapor Point VE-2

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Eddy County, New MexicoProj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			50			
60		0				60-62 Ft: SANDSTONE as above.
62			75			62-70 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE, damp, mod. dense, v.fine- to fine-grained, subrounded, mod. well sorted, slightly calcareous, faint hydrocarbon odor.
64		0				
66						
68			50			
70		0				70-75 Ft: SANDSTONE as above.
72						Open borehole from 72.5 to total boring depth.
74			100			
76		0				75-80 Ft: Light brownish gray (5yr 6/1) DOLOMITE, dry, v. hard, microcrystalline, conchoidal fractures.
78			15			
80		0				80-85 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE, damp, soft, v.fine- to fine-grained, subrounded to rounded, mod. hydrocarbon odor.
82			60			
84						
86		0				85-90 Ft: SANDSTONE as above.
88			75			



Drilling Log

Vapor Point VE-2

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Eddy County, New MexicoProj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		0	75			90-95 Ft: SANDSTONE as above (dense, faint hydrocarbon odor).
90						
92		0	33			
94						
96		0				95-100 Ft: Light brownish gray (5yr 6/1) DOLOMITE, dry, hard, microcrystalline, conchoidal fractures, interbedded with pale brown (5yr 5/2) SANDSTONE, dense, v. fine-grained, well sorted, subrounded, well cemented, no hydrocarbon odor.
98			25			
100		0				100-105 Ft: Light brownish gray (5yr 6/1) DOLOMITE, dry, hard, microcrystalline, conchoidal fractures, no hydrocarbon odor.
102			27			
104		0				105-110 Ft: Interbedded DOLOMITE and SANDSTONE (refer to 95-100 Ft.).
106						
108		0	27			110-115 Ft: Med. light gray (N6) SANDSTONE, dry, dense, v. fine-grained, well sorted, subrounded, well cemented, faint hydrocarbon odor, minor dolomite.
110						
112		0	43			115-120 Ft: SANDSTONE as above.
114						
116						
118			33			
120		0				



Drilling Log

Vapor Point VE-2

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

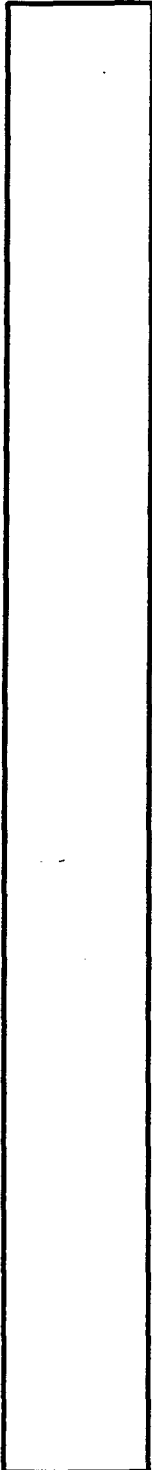
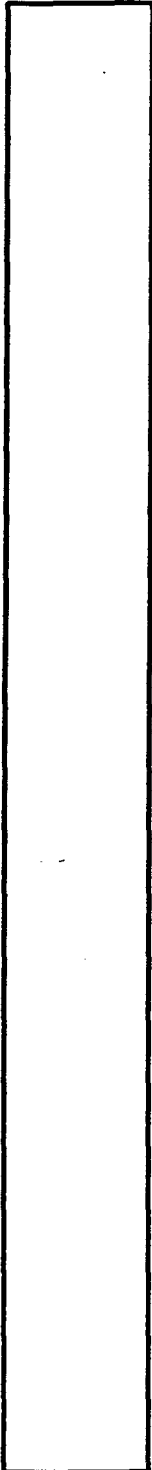
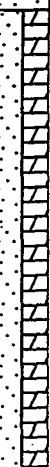
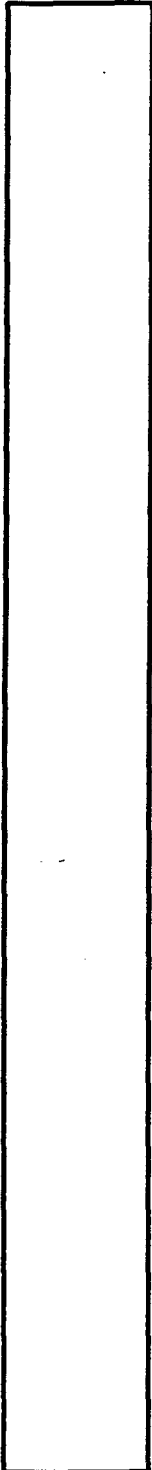
Location Eddy County, New Mexico

Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0	27	NNNNNNNN		120-125 Ft: SANDSTONE as above, interbedded with light brownish gray (5yr 6/1) DOLOMITE, dry, hard, micro crystalline, conchoidal fractures, no hydrocarbon odor.
122						
124		0	16			125-130 Ft: Very light gray (N8) SANDSTONE, dry, mod. dense, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, no hydrocarbon odor.
126						
128		0	25			130-135 Ft: SANDSTONE as above.
130						
132		0	19			135-140 Ft: SANDSTONE as above.
134						
136		0	30			140-145 Ft: SANDSTONE as above.
138						
140		0	21			145-150 Ft: SANDSTONE as above.
142						
144		0				
146						
148						
150						
152						

Project MOC/Indian Basin Gas Plant
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152		0	21			155-160 Ft: SANDSTONE as above.
154						
156						
158						
160						
162						
164						
166						
168						
170						
172		0	13			165-170 Ft: SANDSTONE as above with minor light brownish gray (5yr 6/1) DOLOMITE, hard, microcrystalline, conchoidal fractures. 170-175 Ft: SANDSTONE and DOLOMITE as above.
174						
176						
178						
180						
182						
184						
186						
188						
190						
192		0	19			175-180 Ft: Very pale orange (10 yr 8/2) SANDSTONE, dry, mod. dense, v. fine-grained, well sorted, subrounded, calcareous, no hydrocarbon odor. 180-185 Ft: Very pale orange (10yr 8/2) SANDSTONE, dry, v. fine-grained, well sorted, subrounded, interbedded with light brownish gray DOLOMITE, hard, microcrystalline, no hydrocarbon odor.
194						
196						
198						
200						
202						
204						
206						
208						
210						



Drilling Log

Vapor Point VE-2

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Eddy County, New MexicoProj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184		0	21			
186						185-190 Ft: Very pale orange (10yr 8/2) SANDSTONE, dry, mod. dense, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, no hydrocarbon odor.
188						
190						190-195 Ft: SANDSTONE as above.
192						
194						195-200 Ft: SANDSTONE as above (with minor dolomite).
196						
198						
200						200-205 Ft: SANDSTONE as above.
202						
204		0	30			
206						Groundwater encountered at 205 ft. on 12/17/96. 205-210 Ft: SANDSTONE as above (saturated).
208						
210						Boring terminated at 210 ft.
212						
214						
216						



Drilling Log

Vapor Point VE-3

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60
 Surface Elev. _____ Total Hole Depth 202 ft. Diameter 12.25 in./7 7/8 in.
 Top of Casing 38" (aq) ft Water Level Initial 197 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size Open Borehole in.
 Casing: Dia 8 5/8 in. Length 75 ft. Type Steel
 Fill Material Portland Cement Rig/Core Gardner Denver 15W
 Drill Co. WT Water Well Service Method Air Rotary
 Driller Ronnie Keith Log By Bob Davis Date 12/9/96 Permit # _____
 Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Casing is 30" above grade. Drilling dates:
12/9/96: 0 to 72.5 ft., 12/17/96: 72.5 to
140 ft., 12/18/96: 140 to 202 ft.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						12.25-inch borehole with 8 5/8-inch surface casing from 0 to 72.5 ft. 7 7/8-inch hole drilled to 202 ft. total depth.
0		0				0-5 Ft: Soil.
2			60			5-5 Ft: Light gray (N7) LIMESTONE, dry, mod. dense, micro crystalline, no hydrocarbon odor, slight reaction with HCl, interbedded with thin beds of mod. yellowish brown (10yr 5/4) SILTSTONE, dry, mod. soft.
4		0				5-7 Ft: Light gray (N7) LIMESTONE, dry, dense, micro crystalline, no hydrocarbon odor, trace of pale yellowish brown (10yr 6/2) chert, hard, conchoidal fractures.
6						7-20 Ft: Light gray to pale yellowish brown SANDSTONE, dry, med. dense, v. fine-grained, subrounded, well sorted, calcareous, no hydrocarbon odor.
8			50			
10		0				
12			75			
14		0				
16						
18		0	50			
20		0				20-31 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE, dry, med. dense, v. fine-grained, subrounded, mod. well sorted, calcareous, no hydrocarbon odor.
22						
24			100			

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Eddy County, New MexicoProj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28			100			
30		0				
32			27			31-40 Ft: Light gray (N7) to pale yellowish brown (10yr 6/2), SANDSTONE dry, dense, v. fine-grained, mod. well sorted, no hydrocarbon odor, calcareous cementation, no hydrocarbon odor, occ. very thin beds of brownish gray (5yr 4/1) sandy silt.
34		0				
36						
38			50			
40		0				40-45 Ft: SANDSTONE as above.
42						
44			19			45-50 Ft: SANDSTONE as above.
46						
48			43			
50						50-55 Ft: SANDSTONE as above.
52			38			
54						
56						55-60 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE . damp, mod. dense, v. fine-grained, subrounded, well sorted, poorly cemented, no hydrocarbon odor.



Drilling Log

Vapor Point VE-3

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Eddy County, New Mexico

Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			43			
60		0				
62			38			
64		0				63-72.5 Ft: Light gray (N7) to pale yellowish brown (10yr 6/2) SANDSTONE , damp, dense, v. fine- to fine-grained, subrounded, well sorted, no hydrocarbon odor, occ. v. thin beds of v. pale orange (10yr 8/2) CHERT , v. dense, conchoidal fractures. slightly calcareous, faint hydrocarbon odor.
66						
68			75			
70		0				
72			60			
74		0	27			Open borehole from 72.5 Ft. to total boring depth. 72.5-75 Ft: Light brownish gray (5yr 6/1) DOLOMITE , hard, microcrystalline, interbedded with minor SANDSTONE , dry, soft, v. fine-grained, mod. sorted, subrounded, calcareous cementation, no hydrocarbon odor.
76		0				75-80 Ft: SANDSTONE as above.
78			23			
80		0				80-85 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE , dry, mod. dense, v. fine-grained, well sorted, subrounded, poorly cemented, faint hydrocarbon odor.
82			38			
84						
86		0				85-90 Ft: SANDSTONE as above (no hydrocarbon odor).
88			33			



Drilling Log

Vapor Point VE-3

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Eddy County, New MexicoProj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		0	33			90-95 Ft: SANDSTONE as above.
90						
92		0	16			95-100 Ft: Light brownish gray (5yr 6/1) DOLOMITE, dry, v. hard, microcrystalline, conchoidal fractures, with minor v. light gray (N8) SANDSTONE, v. fine-grained, mod. soft, well sorted, poorly cemented, calcareous.
94						
96		0	19			100-105 Ft: SANDSTONE as above.
98						
100		0	20			105-110 Ft: Light brownish gray (5yr 6/1) SANDSTONE, dry mod. dense, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, no hydrocarbon odor.
102						
104		0	25			110-115 Ft: SANDSTONE as above.
106						
108		0	38			115-120 Ft: SANDSTONE as above.
110						
112		0	25			
114						
116		0				
118						
120		0				



Drilling Log

Vapor Point VE-3

Project MOC/Indian Basin Gas PlantOwner Marathon Oil CompanyLocation Eddy County, New MexicoProj. No. 023350213.60

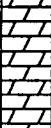
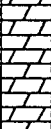
Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0				120-125 Ft: SANDSTONE as above.
122						
124			23			
126		0				125-130 Ft: SANDSTONE as above (with minor dolomite).
128			25			
130		0				130-135 Ft: SANDSTONE as above.
132			27			
134						
136		0				135-140 Ft: SANDSTONE as above.
138			18			
140		0				140-145 Ft: SANDSTONE as above.
142			30			
144						
146		0				145-150 Ft: SANDSTONE as above.
148			33			
150		0				150-155 Ft: SANDSTONE as above.
152						

Drilling Log

Vapor Point VE-3

Project MOC/Indian Basin Gas Plant
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152		0	33			155-180 Ft: SANDSTONE as above.
154						
156						
158						
160						
162						
164						
166						
168						
170						
172		0	30			180-185 Ft: SANDSTONE as above.
174						
176						
178						
180						
182						
184		0	15			165-170 Ft: SANDSTONE as above.
186						
188						
190						
192		0	16			170-175 Ft: SANDSTONE as above.
194						
196						
198						
200		0	14			175-180 Ft: Yellowish gray (5yr 8/1) DOLOMITE, dry, v. hard, microcrystalline, conchoidal fractures, no hydrocarbon odor.
202						
204						
206						
208		0	18			180-185 Ft: DOLOMITE as above.
210						
212						
214						



Drilling Log

Vapor Point VE-3

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Eddy County, New Mexico

Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
184		0				
186						185-190 Ft: Very pale orange (10yr 8/2) SANDSTONE, dry, mod. dense, v. fine-grained, well sorted, subrounded, poorly cemented, v. calcareous.
188		0	50			
190						190-195 Ft: SANDSTONE as above.
192		0	50			
194						195-200 Ft: SANDSTONE as above.
196		0	50			Groundwater encountered at 197 Ft. on 12/18/96.
198						
200		0	100			200-202 Ft: SANDSTONE as above (saturated).
202						Boring terminated at 202 Ft.
204						
206						
208						
210						
212						
214						
216						



Drilling Log

Vapor Point VE-4

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350213.60
Surface Elev. _____ Total Hole Depth 183 ft. Diameter 12.25 in./7 7/8 in.
Top of Casing 34" (ag) ft Water Level Initial 178 ft. Static _____
Screen: Dia _____ Length _____ Type/Size Open Borehole in.
Casing: Dia 8 5/8 in. Length 60 ft. Type Steel
Fill Material Portland Cement Rig/Core Gardner Denver 15 W
Drill Co. WT Water Well Service Method Air Rotary
Driller Ronnie Keith Log By Bob Davis Date 12/11/96 Permit # _____
Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Drilling dates: 12/11/96: 0 to 57.5 ft.,
12/18/96: 57.5 to 175 ft., 12/19/96: 175 to
183 ft.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						12.25-inch borehole with 8 5/8-inch surface casing from 0 to 57.5 Ft. 7 7/8-inch borehole to 183 Ft. total depth.
0						0-4 Ft: Med. light gray (N6) LIMESTONE, dry, mod. dense, microcrystalline, no hydrocarbon odor, strong reaction with HCl, weathered.
2			60			
4						4-10 Ft: Med. light gray (N6) to brownish gray (5yr 4/1), SANDSTONE, dry, med. dense, v. fine-grained, well sorted, subrounded, slight reaction with HCl, no hydrocarbon odor.
6		0				
8			27			
10		0				10-15 Ft: SANDSTONE as above,
12			23			
14						
16		0				15-23 Ft: Med. light gray (N6) to pale yellowish brown (10yr 6/2) SANDSTONE, dry, dense, v. fine-grained, well sorted, subrounded, well cemented, no hydrocarbon odor, with occ. thin beds of LIMESTONE, dense, microcrystalline.
18			43			
20		0				
22						
24			43			23-30 Ft: Pale yellowish brown (10yr 8/6) SANDSTONE, damp, mod. dense, v. fine-grained, mod. rounded to subrounded, well sorted, no hydrocarbon odor.

Drilling Log

Vapor Point VE-4

Project MOC/Indian Basin Gas Plant
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0				
26						
28			33			
30		0				30-35 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE , damp, dense, v. fine-grained, mod. well sorted, subrounded, calcareous, no hydrocarbon odor, with occasional beds of DOLOMITE , dense, microcrystalline.
32			14			
34		0				35-40 Ft: Dark yellowish brown SANDSTONE , damp, mod. dense, v. fine-grained, well sorted, subrounded, no hydrocarbon odor.
36			75			
38						
40		0				40-45 Ft: Pale yellowish brown (10yr 6/2) to dark yellowish brown (10yr 4/2) SANDSTONE as above.
42			21			
44		0				45-50 Ft: SANDSTONE as above.
46						
48			43			
50		0				50-55 Ft: SANDSTONE as above.
52			38			
54						55-60 Ft: SANDSTONE as above.
56		0				



Drilling Log

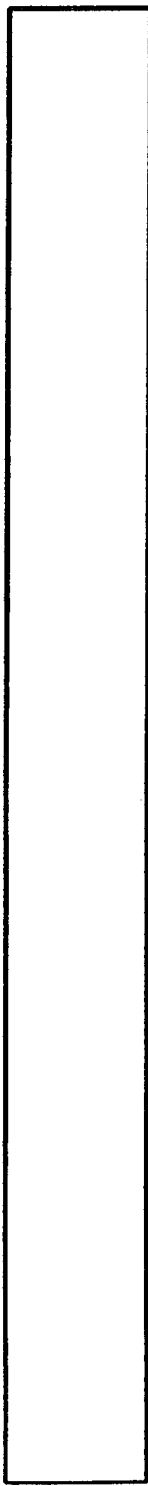
Vapor Point VE-4

Project MOC/Indian Basin Gas Plant
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56		0				
58			60			Open borehole from 57.5 Ft. to total boring depth.
60		0				60-65 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE , dry, mod. dense, v. fine-grained, well sorted, subrounded, v. calcareous, no hydrocarbon odor.
62			60			
64		0				65-70 Ft: Brownish gray (5yr 4/1) SANDSTONE , dry, dense, v. fine-grained, well sorted, subrounded to subangular, well cemented, no hydrocarbon odor.
66						
68			38			
70		0				70-78 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE , dry, v. hard, microcrystalline, some conchoidal fracturing, no hydrocarbon odor.
72			10			
74		0				
76						78-80 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE , dry, mod. dense, v. fine-grained, well sorted, subrounded, poorly cemented, v. calcareous, no hydrocarbon odor.
78			25			
80		0				80-85 Ft: SANDSTONE as above.
82			30			
84		0				85-90 Ft: SANDSTONE as above.
86						
88			19			

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		0	19			
90						80-85 Ft: Dark yellowish orange (10yr 6/6) DOLOMITE , dry, hard, microcrystalline, conchoidal fractures, no hydrocarbon odor.
92			12.5			
94						
96			20			95-100 Ft: Light brownish gray (5yr 6/1) DOLOMITE , dry, hard, microcrystalline, interbedded with pale yellowish brown (10yr 6/2) SANDSTONE , mod. dense, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, no hydrocarbon odor.
98						
100			16			100-105 Ft: SANDSTONE as above.
102						
104			43			105-110 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE , dry, soft, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, no hydrocarbon odor.
106						
108			38			110-115 Ft: Interbedded DOLOMITE and SANDSTONE (refer to 95-100 ft).
110						
112			13			115-120 Ft: Light brownish gray (5yr 6/1) DOLOMITE , dry, hard, microcrystalline, no hydrocarbon odor, with minor calcareous SANDSTONE (cuttings are sand-sized).
114						
116						
118						
120						



Drilling Log

Vapor Point VE-4

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Eddy County, New Mexico

Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0	14			120-125 Ft: DOLOMITE as above (with minor SANDSTONE).
122						
124						
126		0	27			125-130 Ft: Light brownish gray (5yr 6/1) DOLOMITE, dry, hard, microcrystalline (cuttings are sand-sized), with interbedded pale yellowish brown (10yr 6/2) SANDSTONE, mod. dense, v. fine-grained, well sorted, subrounded to rounded, fair cementation, calcareous, no hydrocarbon odor.
128						
130		0				130-135 Ft: DOLOMITE and SANDSTONE as above.
132			21			
134						
136		0	19			135-140 Ft: DOLOMITE and SANDSTONE as above.
138						
140		0				
142			30			140-145 Ft: Light brownish gray (5yr 6/1) SANDSTONE, dry, soft, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, no hydrocarbon odor.
144						
146		0	50			145-150 Ft: SANDSTONE as above.
148						
150		0				150-155 Ft: SANDSTONE as above.
152						



Drilling Log

Vapor Point VE-4

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-152						
-154			33			
-156		0				155-160 Ft: SANDSTONE as above.
-158			38			
-160		0				160-165 Ft: Gray orange (10yr 7/4) SANDSTONE, damp, soft, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, no hydrocarbon odor.
-162			38			
-164		0				
-166						165-170 Ft: SANDSTONE (as above) with light brownish gray (5yr6/1) DOLOMITE, hard, microcrystalline, (cuttings are sand-sized), no hydrocarbon odor.
-168			21			
-170		0				170-175 Ft: SANDSTONE and DOLOMITE as above.
-172			15			
-174		0				
-176						175-180 Ft: Pale yellowish brown (10 yr 6/2) SANDSTONE, mod. dense, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, faint hydrocarbon odor, (saturated at 178 ft).
-178			20			Groundwater encountered at 178 Ft. on 12/19/96.
-180		0				180-183 Ft: SANDSTONE as above.
-182			15			
-184		0				Boring terminated at 183 Ft.



Drilling Log

Vapor Point VE-5

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350213.60
Surface Elev. _____ Total Hole Depth 168 ft. Diameter 12.25 in./7 7/8 in.
Top of Casing 2.5' (ag) ft Water Level Initial 163 ft. Static _____
Screen: Dia _____ Length _____ Type/Size Open Borehole in.
Casing: Dia 8 5/8 in. Length 60 ft. Type Steel
Fill Material Portland Cement Rig/Core Gardner Denver 15 W
Drill Co. WT Water Well Service Method Air Rotary
Driller Ronnie Keith Log By Bob Davis Date 12/12/96 Permit # _____
Checked By Davis/Fields License No. _____

See Site Map
For Boring Location

COMMENTS:

Drilling dates: 12/13/96: 0 to 57.5 ft.,
12/19/96: 57.5 to 168 ft.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						12.25-inch borehole with 8 5/8-inch surface casing from 0 to 57.5 ft. 7 7/8-inch borehole to 163 Ft. total depth.
0						0-5 Ft: Pale brown (5yr 5/2) sandy LOAM, dry, loose, v. fine-grained SAND and SILT, no hydrocarbon odor, strong reaction with HCl, calcareous.
2			4			
4						
6		0				5-10 Ft: Very pale orange (10yr 8/2) SANDSTONE, dry, med. dense, subrounded, well sorted, calcareous, strong reaction with HCL, no hydrocarbon odor.
8			7			
10		0				10-15 Ft: SANDSTONE as above (pale brown [5yr 5/2]).
12			6			
14						
16		0				15-20 Ft: SANDSTONE as above (very pale orange [10yr 8/2]).
18			6			
20		0				20-25 Ft: SANDSTONE as above.
22						
24			21			



Drilling Log

Vapor Point VE-5.

Project MOC/Indian Basin Gas Plant
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26		0				25-30 Ft: SANDSTONE as above.
28			9			
30		0				30-35 Ft: SANDSTONE as above (pale brownish yellow [10yr 6/2]).
32			5			
34		0				35-40 Ft: SANDSTONE as above.
36			4			
38						
40		140				40-45 Ft: SANDSTONE as above (moderate hydrocarbon odor).
42			5			
44		140				45-51 Ft: Pale yellowish brown (10yr 6/2) to pale brown (5yr 6/2) SANDSTONE, dry, mod. dense, v. fine-grained, well sorted, rounded to subrounded, calcareous, mod. hydrocarbon odor.
46						
48			8			
50		80				
52						51-57.5 Ft: Light brownish gray (5yr 6/1) DOLOMITE, dry, dense, crystalline, interbedded with pale yellowish brown (10yr 6/2) SANDSTONE, dry, v. fine-grained, well sorted, subrounded, calcareous, mod. hydrocarbon odor.
54			18			
56		160	13			



Drilling Log

Vapor Point VE-5

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

Location Eddy County, New Mexico

Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56			13			Open borehole from 57.5 ft. to total boring depth.
58		0	43			57.5-60 Ft: Pale brown (5yr 5/2) SANDSTONE , dry, mod. dense, v. fine-grained, well sorted, subrounded, calcareous, poor to well cementation, no hydrocarbon odor.
60		0				
62			30			
64						
66		0				65-70 Ft: Pale brown (5yr 5/2) SANDSTONE , dry, mod. dense, v. fine-grained, well sorted, subrounded, well cemented, calcareous, no hydrocarbon odor, interbedded with pale yellowish brown (10yr 6/2) DOLOMITE , dry, hard, microcrystalline, conchoidal fractures.
68		0	25			
70		0				70-75 Ft: SANDSTONE and DOLOMITE as above.
72						
74			21			
76						75-80 Ft: SANDSTONE and DOLOMITE as above (dolomite is sand-sized in drill cuttings).
78			18			
80						80-85 Ft: SANDSTONE and DOLOMITE as above.
82						
84		0	13			
86						85-90 Ft: Light brownish gray (5yr 6/1) SANDSTONE , dry, mod. dense, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, mod. hydrocarbon odor.
88			30			



Drilling Log

Vapor Point VE-5

 Project MOC/Indian Basin Gas Plant
 Location Eddy County, New Mexico
Owner Marathon Oil CompanyProj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88			30			90-95 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE , dry, dense, v. fine-grained, well sorted, subrounded, well cemented, calcareous, faint hydrocarbon odor.
90		0				
92			23			95-100 Ft: Light brownish gray (5yr 6/1) SANDSTONE , dry, dense, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, interbedded with light brownish gray (5yr 6/1) DOLOMITE , hard, microcrystalline, no hydrocarbon odor (cuttings are sand-sized).
94		0				
96			14			100-105 Ft: SANDSTONE and DOLOMITE as above.
98		0				
100		0	19			105-110 Ft: SANDSTONE and DOLOMITE as above.
102		0				
104		0	21			110-115 Ft: SANDSTONE and DOLOMITE as above.
106						
108		0	18			115-120 Ft: SANDSTONE and DOLOMITE as above.
110		0				
112			27			
114						
116		0				
118						
120		0				



Drilling Log

Vapor Point VE-5

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-120		0	27			120-125 Ft: SANDSTONE and DOLOMITE as above (with minor dolomite).
-122						
-124						
-126		0	43			125-130 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE, dry, soft, v. fine-grained, well sorted, subrounded, poorly cemented, faint hydrocarbon odor.
-128						
-130		0				130-135 Ft: SANDSTONE as above.
-132			27			
-134		0				
-136		0				135-140 Ft: SANDSTONE as above.
-138			33			
-140		0				140-145 Ft: SANDSTONE as above (with minor dolomite).
-142			23			
-144						
-146		0	20			145-150 Ft: Light brownish gray (5yr 6/1) SANDSTONE, dry, mod. dense, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, with interbedded DOLOMITE, v. hard, microcrystalline to crystalline (some rhombohedral dolomite crystals observed, drill cuttings are sand-sized), no hydrocarbon odor.
-148		0				
-150						150-155 Ft: SANDSTONE and DOLOMITE as above.
-152						



Drilling Log

Vapor Point VE-5

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152						
154		0	17			155-160 Ft: SANDSTONE and DOLOMITE as above.
156		0				
158			17			
160		0				
162						160-165 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE, soft, v. fine-grained, well sorted, subrounded, poorly cemented, calcareous, no hydrocarbon odor.
164			25			Groundwater encountered at 163 ft. on 12/19/96.
166		0				165-170 Ft: SANDSTONE as above.
168		0	18			
170						Boring terminated at 168 ft.
172						
174						
176						
178						
180						
182						
184						



Drilling Log

Vapor Point VE-16

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60
 Surface Elev. _____ Total Hole Depth 150 ft. Diameter 12 1/4" & 7 7/8 in.
 Top of Casing 2.5 ft. Water Level Initial 140 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size _____
 Casing: Dia 8 5/8 in. Length 42.5 ft. Type steel
 Fill Material _____ Rig/Core Gardner Denver 15W
 Drill Co. West Texas Water Serv Method Air Rotary
 Driller Ronny Keith Log By Bob Davis Date 05/14/97 Permit # _____
 Checked By Peter Raftery License No. RG 4018

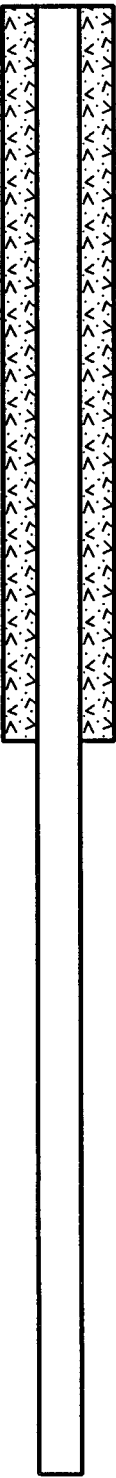
See Site Map
For Boring Location

COMMENTS:

12 1/4" borehole drilled to 40 ft. 8 5/8" steel casing run to 40 ft. 7 7/8" borehole drilled to 150 ft total depth. Bedrock @ surface.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5						
0						All percentages are approximate.
2		27				0-5 Ft: Pale yellowish brown (10yr 6/2) DOLOMITE , hard microcrystalline, conchoidal fractures, no hydrocarbon odor.
4		2.0				5-10 Ft.: DOLOMITE , as above.
6		19				
8						
10		1.6				10-15 Ft.: DOLOMITE , as above.
12		25				
14		3.4				15-20 Ft.: DOLOMITE , as above.
16						
18		20				
20		9.1				20-25 Ft.: DOLOMITE , as above, interbedded with pale yellowish brown (10yr 6/2) SANDSTONE , moderately dense, very fine-grained, subrounded, well-sorted, well cemented, calcareous, no hydrocarbon odor.
22						
24		38				

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		27.5				25-30 Ft.: SANDSTONE and DOLOMITE , as above. Sandstone predominates.
26			30			
28						
30		7.9				30-35 Ft.: DOLOMITE and SANDSTONE , as above. Dolomite predomantes.
32			23			
34						
36		65.5				35-40 Ft.: Pale yellowish brown (10yr 6/2) to pale brown (5yr 5/2) SANDSTONE , moderately dense, very fine-grained, subrounded, well-sorted, moderately well cemented, dry, no hydrocarbon odors. Minor DOLOMITE as above.
38			43			
40		9.7				40-45 Ft.: Pale yellowish brown (10yr 6/2) SANDSTONE , moderately dense, very fine-grained, subrounded, well-sorted, moderately cemented, calcareous, damp, no hydrocarbon odor.
42			50			
44		0				45-50 Ft.: SANDSTONE , as above.
46						
48			23			
50		1.8				50-55 Ft.: SANDSTONE , as above, with pale yellowish brown (10yr 6/2) DOLOMITE , hard, microcrystalline, conchoidal fractures, damp, no odor.
52			20			
54						
56		27.8				55-60 Ft.: SANDSTONE and DOLOMITE , as above.



Drilling Log

Vapor Point VE-16

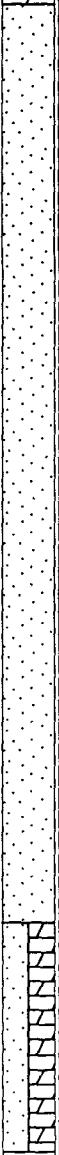
Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			16			
60		119				80-85 Ft.: SANDSTONE and DOLOMITE, as above.
62						
64			20			
66		9.5				85-70 Ft.: Grayish orange (10yr 7/4) DOLOMITE, hard, microcrystalline, conchoidal fractures, damp, no hydrocarbon odor.
68			16			
70		63.4				70-75 Ft.: Pale yellowish brown (10yr 6/2) SANDSTONE, moderately dense to dense, very fine-grained, subrounded, well-sorted, well cemented, calcareous, damp, no hydrocarbon odor with DOLOMITE, as above.
72			20			
74		49.9				75-80 Ft.: Pale yellowish brown (10yr 6/2) DOLOMITE, hard, microcrystalline, conchoidal fractures, damp, no hydrocarbon odor.
76			20			
78						
80		176				80-85 Ft.: DOLOMITE, as above.
82			17			
84		294				85-90 Ft.: DOLOMITE, as above.
86						
88			16			

Drilling Log

Vapor Point VE-16

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88			16			
90		252				90-95 Ft.: DOLOMITE, as above.
92			17			
94						
96		0				95-100 Ft.: Pale yellowish brown (10 yr 6/2) DOLOMITIC SANDSTONE, hard, fine- to medium-grained, angular, well-sorted, poorly cemented, damp, no hydrocarbon odor.
98			27			
100		0				100-105 Ft.: Grayish orange (10yr 7/1) DOLOMITIC SANDSTONE, dense, very fine-grained, subangular to angular, well-sorted, poorly cemented, calcareous, damp, no hydrocarbon odor.
102			30			
104						
106		0				105-110 Ft.: DOLOMITIC SANDSTONE, as above.
108			27			
110		0				110-115 Ft.: DOLOMITIC SANDSTONE, as above.
112			50			
114						
116		0				115-120 Ft.: Grayish orange (10yr 7/4) SANDSTONE, moderately dense, very fine-grained, subrounded to subangular, well-sorted, poorly cemented, calcareous, damp, no hydrocarbon odor.
118			30			
120		0				

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0				120-125 Ft.: SANDSTONE , as above with very minor moderate brown (5yr 4/4) SILTSTONE .
122			38			
124						
126		0				125-130 Ft.: SANDSTONE , as above (no siltstone).
128			50			
130		0				130-135 Ft.: SANDSTONE , as above.
132			60			
134						
136		433				135-140 Ft.: Pale yellowish orange (10yr 8/6) SANDSTONE , moderately dense, very fine-grained, subrounded, well-sorted, poorly cemented, calcareous, moist, no hydrocarbon odor.
138			50			
140		1999+			▽	140-145 Ft.: SANDSTONE , as above. Note: well making water at 140 ft. - saturated at 140 ft.
142			100			
144						
146		22				145-150 Ft.: Dark yellowish orange (10yr 6/6) SANDSTONE , dense, medium- to coarse-grained, subrounded to subangular, well-sorted, poorly cemented, saturated, no odor, with pale yellowish brown (10yr 6/2) DOLOMITE , hard, microcrystalline, conchoidal fractures.
148			75			
150		200				Total depth: 150 ft.
152						



Drilling Log

Vapor Point VE-17

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60
 Surface Elev. _____ Total Hole Depth 130 ft. Diameter 12 1/4" & 7 7/8 in.
 Top of Casing 2.5 ft. Water Level Initial 120 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size _____
 Casing: Dia 8 5/8 in. Length 40 ft. Type steel
 Fill Material _____ Rig/Core Gardner Denver 15W
 Drill Co. West Texas Water Serv Method Air Rotary
 Driller Ronny Keith Log By Bob Davis Date 05/19-20/97 Permit # _____
 Checked By Peter Rafferty License No. RG 4018

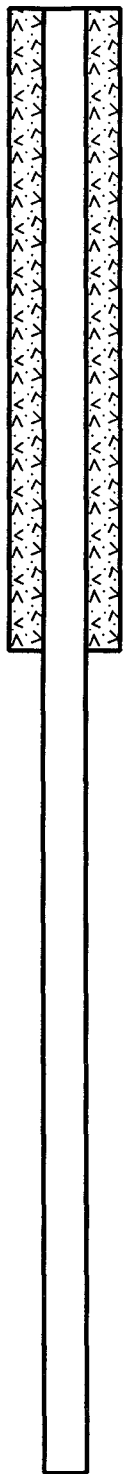
See Site Map
For Boring Location

COMMENTS:

12 1/4" borehole drilled to 38 ft. 8 5/8" steel casing run to 38 ft. 7 7/8" borehole drilled to 130 ft total depth. Bedrock @ 23 ft.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5						
0						All percentages are approximate.
2						0-5 Ft: Light brown (5yr 6/4) silt, 100% silt, sof, dry, no odor. Note: Lithology described from sidewall of mudpit adjacent to well.
4						5-10 Ft: ARROYO ALLUVIUM, light brown (5yr 6/4) silt, loose, with interbedded dolomite and sandstone fragments from cobbles and boulders. Note: Lithology inferred from adjacent arroyo bedcut and adjacent wells.
6						10-15 Ft: ARROYO ALLUVIUM, as above.
8						15-20 Ft: ARROYO ALLUVIUM, as above.
10						20-23 Ft: ARROYO ALLUVIUM, as above.
12						23-38 Ft: BEDROCK. Unable to describe lithology due to drilling mud.
14						
16						
18						
20						
22						
24						

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28						
30						
32						
34						
36						
38						
40						38-45 Ft: Pale yellowish brown (10yr 6/2) SANDSTONE , moderately dense, fine-grained, subrounded to angular, well-sorted, well cement, calcareous matrix, damp, no hydrocarbon odor.
42		19				
44		0				
46						45-50 Ft: SANDSTONE , as above.
48		19				
50		0				50-55 Ft: SANDSTONE , as above.
52						
54		19				
56		0				55-60 Ft: Pale yellowish orange (10yr 8/6) SANDSTONE , moderately dense, subrounded, well-sorted, well cemented, calcareous, damp, no hydrocarbon odor.



Drilling Log

Vapor Point VE-17

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			30			
60		0				
62			11			80-85 Ft: Very pale orange (10yr 8/2) SANDSTONE , moderately dense, subrounded to subangular, well-sorted, moderate to poorly cemented, calcareous, damp, no hydrocarbon, interbedded with pale brown (5 yr 5/2) DOLOMITE , hard, microcrystalline, conchoidal fractures.
64						
66		492				85-70 Ft: SANDSTONE and DOLOMITE , as above.
68			23			
70		403				70-75 Ft: Pale yellowish orange (10yr 8/6) SANDSTONE , moderately-dense, fine-grained, well-sorted, well cemented, calcareous matrix, damp, no hydrocarbon odor, and DOLOMITE , as above.
72			23			
74		72.1				
76						75-80 Ft.: DOLOMITE , as above. Interbedded with pale yellowish brown (10yr 6/2) LIMESTONE , dense, microcrystalline, damp, no odor.
78			21			
80		660				
82						80-85 Ft.: Grayish orange (10yr 7/4) to pale yellowish-brown (10yr 6/2) DOLOMITE , hard, microcrystalline, conchoidal fractures, damp, no hydrocarbon odor.
84			27			
86		430				85-90 Ft.: DOLOMITE , as above.
88			17			



Drilling Log

Vapor Point VE-17

Project Indian Basin Remediation

Owner Marathon Oil Company

Location Eddy County, New Mexico

Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88		418	15			90-95 Ft.: DOLOMITE, as above.
90						
92						
94		431	27			95-100 Ft.: Grayish orange (10yr 7/4) SANDSTONE, moderately dense, fine- to medium-grained, subrounded, well-sorted, poorly cemented, calcareous, damp, no hydrocarbon odor.
96						
98		150	23			100-105 Ft.: Grayish orange (10yr 7/4) SANDSTONE, moderately dense, fine-grained, subrounded, well-sorted. Moderate to well cemented, calcareous matrix, damp, no hydrocarbon odor, pale yellowish brown (10yr 6/2). DOLOMITE, hard, microcrystalline, conchoidal fractures and pale yellowish brown (10yr 6/2) LIMESTONE, dense, microcrystalline.
100						
102		202	25			105-110 Ft.: Pale yellowish brown (10yr 6/2) SANDSTONE, dense, fine-grained, subrounded to subangular, well-sorted, well cemented, calcareous, damp, no odor.
104						
106		751	23			110-115 Ft.: SANDSTONE, as above. Interbedded with pale yellowish brown (10yr 6/2) DOLOMITE, hard, microcrystalline, conchoidal fractures, damp, no hydrocarbon odor.
108						
110						
112		816	19			115-120 Ft.: DOLOMITE and minor SANDSTONE, as above.
114						
116		1999				
118						
120						



Drilling Log

Vapor Point VE-17

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		1999				Water encountered at 120 ft.
122						120-125 Ft.: DOLOMITE and SANDSTONE, as above, saturated.
124			38			
126		164				125-130 Ft.: DOLOMITE and SANDSTONE, as above.
128			38			
130		121				Total depth: 130 ft.
132						
134						
136						
138						
140						
142						
144						
146						
148						
150						
152						



Drilling Log

Vapor Point VE-18

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60
 Surface Elev. _____ Total Hole Depth 163 ft. Diameter 8 7/8 in.
 Top of Casing 2.5 ft. Water Level Initial 153 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size _____
 Casing: Dia 8 5/8 in. Length 37.5 ft. Type steel
 Fill Material _____ Rig/Core Gardner Denver 15W
 Drill Co. West Texas Water Serv Method Air Rotary
 Driller Ronny Keith Log By Bob Davis Date 05/27/97 Permit # _____
 Checked By _____ License No. _____

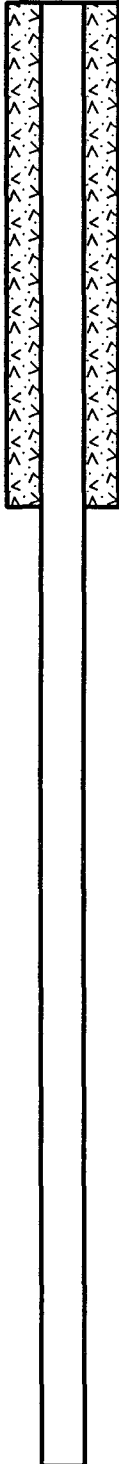
See Site Map
For Boring Location

COMMENTS:

12 1/4" borehole drilled to 35 ft. 8 5/8" steel casing run to 35 ft. 7 7/8" borehole drilled to 163 ft total depth. Bedrock @ 15 ft. No sample recovery from 150 to 163 ft.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5						
0						
2						
4						
6		0				
8						
10		0				
12						
14		0				
16						
18						
20		0				
22						
24						

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0				
26						
28						
30		0				
32						
34		0				
36						
38		17				35-40 Ft.: Pale yellowish brown (10yr 6/2), SANDSTONE , dense, fine-grained, subrounded, well-sorted, well cemented, calcareous matrix, dry, no hydrocarbon odor.
40		6.4				40-45 Ft.: SANDSTONE , as above, with interbedded pale yellowish brown (10yr 6/2) DOLOMITE , hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor.
42		18				
44		15.6				45-50 Ft.: SANDSTONE and DOLOMITE , as above.
46		23				
48						
50		5.9				50-55 Ft.: Medium gray (N5) to pale yellowish brown (10yr 6/2), SANDSTONE , as above.
52		20				
54						
56		29.2				55-80 Ft.: SANDSTONE , as above.



Drilling Log

Vapor Point VE-18

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			27			
60		15.0				60-65 Ft.: Very pale orange (10yr 8/2) SANDSTONE , moderately dense, very fine-grained, subrounded to subangular, well-sorted, poorly cemented, calcareous, dry, no hydrocarbon odor, approximately 30 to 40% of sand grains are dolomite.
62			17			
64		1.5				65-70 Ft.: SANDSTONE , as above.
66			43			
68						
70		31.3				70-75 Ft.: SANDSTONE , as above.
72			27			
74		18.2				75-80 Ft.: SANDSTONE , as above.
76			27			
78						
80		2.1				80-85 Ft.: SANDSTONE , as above.
82			50			
84		0.5				85-90 Ft.: Very pale orange (10yr 8/2) to pale yellowish brown (10yr 6/2) SANDSTONE , moderately dense, very fine- to fine-grained, subrounded to subangular, well-sorted, poorly cemented, calcareous, dry, no hydrocarbon odor.
86			21			
88						



Drilling Log

Vapor Point VE-18

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft./min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88						
90		167.1				90-95 Ft.: SANDSTONE, as above.
92			25			
94						
96		6.8				95-100 Ft.: SANDSTONE, as above.
98			25			
100		1.7				100-105 Ft.: SANDSTONE, as above.
102			30			
104						
106		8.1				105-110 Ft.: SANDSTONE, as above.
108			33			
110		3.3				110-115 Ft.: SANDSTONE, as above.
112			30			
114						
116		.3				115-120 Ft.: SANDSTONE, as above.
118			30			
120		4.1				



Drilling Log

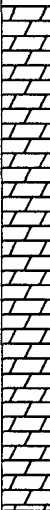
Vapor Point VE-18

Project Indian Basin Remediation
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		4.1				120-125 Ft.: SANDSTONE, as above.
122			27			
124						
126		6.3				125-130 Ft.: SANDSTONE, as above.
128			25			
130		0.5				130-135 Ft.: Medium gray (N5) to pale yellowish brown (10yr 6/2) SANDSTONE, moderately dense, very fine- to coarse-grained, subrounded to subangular, well-sorted, poorly cemented, calcareous, dry, no hydrocarbon odor.
132			27			
134						
136		5.3				135-140 Ft.: SANDSTONE, as above.
138			33			
140		0.9				140-145 Ft.: Light gray (N7) SANDSTONE, moderately dense, very fine-grained, subrounded to subangular, well-sorted, poorly cemented, calcareous, dry, no hydrocarbon odor.
142			43			
144						
146		15.3				145-150 Ft.: SANDSTONE, as above.
148			27			
150						150-155 Ft.: No recovery. Drilling characteristics indicate dolomite lithology. Lack of recovery probably due to formation fractures.
152						

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%		
152			23			Water at 153 ft.		
154						155-160 Ft.: No recovery. Probable DOLOMITE.		
156			27			160-163 Ft.: No recovery. Probable DOLOMITE.		
158								
160			27			Total depth: 163 ft.		
162								
164								
166								
168								
170								
172								
174								
176								
178								
180								
182								
184								



Drilling Log

Vapor Point VE-19

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60
 Surface Elev. _____ Total Hole Depth 150 ft. Diameter 8 7/8 in.
 Top of Casing 2.5 ft. Water Level Initial 140 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size _____
 Casing: Dia 8 5/8 in. Length 37.5 ft. Type steel
 Fill Material _____ Rig/Core Gardner Denver 15W
 Drill Co. West Texas Water Serv Method Air Rotary
 Driller Ronny Keith Log By Bob Davis Date 05/28/97 Permit # _____
 Checked By Peter Raftery License No. RG 4018

See Site Map
For Boring Location

COMMENTS:

12 1/4" borehole drilled to 35 ft. 8 5/8"
 steel casing run to 35 ft. 7 7/8"
 borehole drilled to 150 ft total depth.
 Bedrock @ 9 ft.

Depth (ft.)	Well Completion	PTD (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5 Not to scale						All percentages are approximate.
0						0-5 Ft: ARROYO ALLUVIUM, light brown (5yr 6/4) silt, loose, with interbedded dolomite and sandstone fragments from cobbles and boulders. Note: Lithology descriptions inferred from adjacent arroyo bedcut.
2						
4						5-9 Ft.: ARROYO ALLUVIUM, as above.
6						
8						
10						9-35 Ft.: Bedrock. Unable to describe lithology due to drilling mud.
12						
14						
16						
18						
20						
22						
24						



Drilling Log

Vapor Point VE-19

Project Indian Basin RemediationOwner Marathon Oil CompanyLocation Eddy County, New MexicoProj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		0				
26						
28						
30		0				
32						
34						
36		0				35-40 Ft.: Pale yellowish brown (10yr 6/2) to dark yellowish orange (10yr 6/6) SANDSTONE , moderately dense, very fine to fine-grained, subrounded to subangular, well-sorted, moderate to well cemented, calcareous matrix, damp, no hydrocarbon odor, interbedded with pale yellowish brown (10yr 6/2) DOLOMITE , hard, microcrystalline, conchoidal fracture.
38		30				
40		746				40-45 Ft.: SANDSTONE and DOLOMITE , as above.
42						
44		33				
46		422				45-50 Ft.: SANDSTONE with minor DOLOMITE , as above.
48						
50		38				
52		81.0				50-55 Ft.: Medium gray (N4) to dark yellowish orange (10yr 6/6) SANDSTONE with minor DOLOMITE , as above.
54		30				
56		97.1				55-60 Ft.: SANDSTONE and DOLOMITE , as above.



Drilling Log

Vapor Point VE-19

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			21			
60		377				
62			21			80-85 Ft.: Pale brown (5yr 5/2) DOLOMITE , hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor.
64						
66		0.6				65-70 Ft.: DOLOMITE as above, with grayish orange (10yr 7/4) SANDSTONE , moderately dense to dense, fine-grained, subrounded to subangular, well-sorted, well cemented, calcareous, damp, no hydrocarbon odor.
68			23			
70		150.7				70-75 Ft.: DOLOMITE with minor SANDSTONE , as above.
72			21			
74		0				75-80 Ft.: DOLOMITE and minor SANDSTONE , as above.
76						
78			23			
80		0				80-85 Ft.: DOLOMITE and minor SANDSTONE , as above.
82			33			
84						
86		0				85-90 Ft.: DOLOMITE , as above, with very pale orange (10yr 8/2) SANDSTONE , dense, fine-grained, well-sorted, poorly cemented, calcareous, dry, no hydrocarbon odor. Note: approximately 30-40% sand grains are dolomitic.
88			33			



Drilling Log

Vapor Point VE-19

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88			33			
90		0				90-95 Ft.: SANDSTONE, as above.
92			33			
94						
96		0				95-100 Ft.: Pale yellowish brown (10yr 6/2) DOLOMITE, very hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor and SANDSTONE, as above.
98			43			
100		0				100-105 Ft.: DOLOMITE and SANDSTONE, as above.
102			43			
104						
106		0				105-110 Ft.: DOLOMITE and SANDSTONE, as above.
108			38			
110		0				110-115 Ft.: DOLOMITE and SANDSTONE, as above.
112			43			
114		0				
116						115-120 Ft.: Very pale orange (10yr 8/2) SANDSTONE, moderately dense, very fine-grained, subrounded, well-sorted, poorly cemented, calcareous, dry, no hydrocarbon odor.
118			38			
120		0				



Drilling Log

Vapor Point VE-19

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		0				120-125 Ft.: SANDSTONE, as above.
122		43				
124						
126		0				125-130 Ft.: SANDSTONE, as above.
128		43				
130		0				130-135 Ft.: Pale yellowish orange (10yr 8/2) SANDSTONE, moderately dense, very fine-grained, subrounded, well-sorted, poorly cemented, calcareous, damp, no hydrocarbon odor.
132		43				
134						
136		0				135-140 Ft.: SANDSTONE, as above.
138		50				
140		0				140-145 Ft.: SANDSTONE, as above, with pale yellowish brown (10yr 6/2) DOLOMITE, hard, microcrystalline, conchoidal fractures, saturated, no hydrocarbon odor. Note: Driller reported strong hydrocarbon odor while drilling from 140 to 150 ft. No volatiles recorded with PID.
142		60				
144						
146		0				145-150 Ft.: SANDSTONE, as above.
148		75				
150		0				Total depth: 150 ft.
152						



Drilling Log

Vapor Point VE-20

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60
 Surface Elev. _____ Total Hole Depth 160 ft. Diameter 8 7/8 in.
 Top of Casing 2.5 ft. Water Level Initial 150 ft. Static _____
 Screen: Dia _____ Length _____ Type/Size _____
 Casing: Dia 8 5/8 in. Length 37.5 ft. Type steel
 Fill Material _____ Rig/Core Gardner Denver 15W
 Drill Co. West Texas Water Serv Method Air Rotary
 Driller Ronny Keith Log By Bob Davis Date 05/29/97 Permit # _____
 Checked By Peter Rafferty License No. RG 4018

See Site Map
For Boring Location

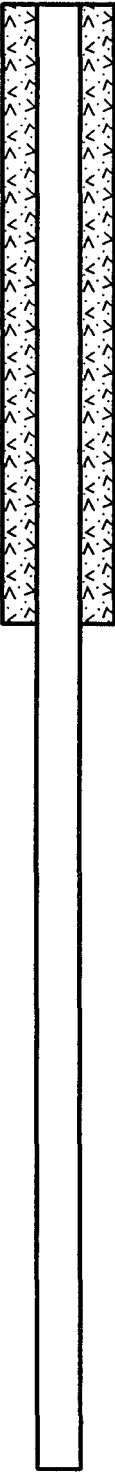
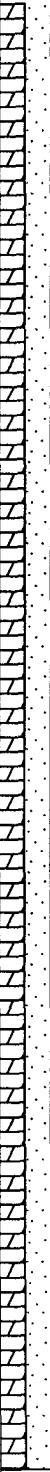
COMMENTS:

12 1/4" borehole drilled to 37.5 ft. 8 5/8" steel casing run to 37.5 ft. 7 7/8" borehole drilled to 160 ft total depth. Bedrock @ 4 ft.

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.5						
0						All percentages are approximate.
2						0-4 Ft: ARROYO ALLUVIUM, light brown (5yr 6/4) silt, loose, dolomite and sandstone fragments from cobbles and boulders, dry, no hydrocarbon odor.
4						4-10 Ft.: Pale yellowish brown (10yr 6/2) to dark yellowish orange (10yr 6/6) DOLOMITE, hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor.
6		0				
8			38			
10		0				10-15 Ft.: Pale yellowish brown (10yr 6/2) DOLOMITE, as above.
12			21			
14						
16		0				15-20 Ft.: DOLOMITE, as above.
18			15			
20		44.3				
22			21			20-25 Ft.: DOLOMITE, as above, with interbedded, very pale orange (10yr 8/2) SANDSTONE, moderately dense, very fine-grained, well-sorted, moderately to poorly cemented, calcareous, dry, no hydrocarbon odor.
24						

Project Indian Basin Remediation
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		4.5				25-30 Ft.: DOLOMITE and SANDSTONE, as above.
26						
28			17			
30		0.6				30-35 Ft.: DOLOMITE and SANDSTONE, as above.
32			17			
34						
36		19.2				35-40 Ft.: DOLOMITE and pale yellowish brown (10yr 6/2) SANDSTONE, moderately dense, very fine-grained, subrounded to subangular, well-sorted, well cemented, calcareous matrix, dry, no hydrocarbon odor.
38			27			
40		0				40-45 Ft.: DOLOMITE and SANDSTONE, as above.
42						
44			19			
46		20.0				45-50 Ft.: DOLOMITE and SANDSTONE, as above.
48			21			
50		6.4				50-55 Ft.: DOLOMITE and SANDSTONE, as above. SANDSTONE color ranges from pale yellowish brown (10yr 6/2) to dark yellowish orange (10yr 6/6).
52			30			
54		94.0				
56						



Drilling Log

Vapor Point VE-20

Project Indian Basin Remediation
Location Eddy County, New Mexico

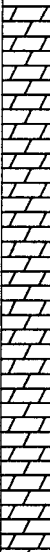
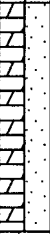
Owner Marathon Oil Company

Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
56						
58			23			
60		34.7				60-65 Ft.: DOLOMITE and SANDSTONE , as above. Note: sandstone is pale yellowish brown (10yr 6/2).
62						
64			20			
66		28.2				65-70 Ft.: Pale yellowish brown (10yr 6/2) DOLOMITE , very hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor.
68			17			
70		41.1				70-75 Ft.: Dark yellowish brown (10yr 6/2) DOLOMITE , very hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor with minor pale yellowish orange (10yr 8/6) SANDSTONE , moderately dense, fine-grained, subrounded to subangular, well-sorted, well cemented, calcareous, dry, no hydrocarbon odor.
72						
74						75-80 Ft.: DOLOMITE and SANDSTONE , as above.
76						
78						
80						80-85 Ft.: DOLOMITE and SANDSTONE , as above.
82						
84						
86						85-90 Ft.: Pale yellowish brown (10yr 6/2) DOLOMITE , hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor.
88						

Project Indian Basin Remediation
Location Eddy County, New Mexico

Owner Marathon Oil Company
Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
88			18			
90		2.8				90-95 Ft.: DOLOMITE, as above.
92			17			
94						
96		0				95-100 Ft.: DOLOMITE, as above.
98			25			
100		68.2				
102			25			100-105 Ft.: DOLOMITE, as above, and very pale orange (10yr 8/2) SANDSTONE, dolomitic, dense, fine- to coarse-grained, subrounded to angular, well-sorted, poorly cemented, calcareous, dy, no hydrocarbon odor.
104						
106		210.0				105-110 Ft.: Pale yellowish brown (10yr 6/2) DOLOMITE, hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon odor.
108			23			
110		977.1				110-115 Ft.: DOLOMITE, as above, and dolomitic SANDSTONE, as above.
112			21			
114		6.9				
116						115-120 Ft.: Pale yellowish orange (10yr 8/6) SANDSTONE, moderately dense, very fine-grained, subrounded, well-sorted, poorly cemented, calcareous, moist, no hydrocarbo odor.
118			50			
120		41.6				



Drilling Log

Vapor Point VE-20

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
120		41.6				120-125 Ft.: SANDSTONE, as above.
122			33			
124						
126		103.1				125-130 Ft.: SANDSTONE, as above.
128			50			
130		1999+				130-135 Ft.: SANDSTONE, as above, strong hydrocarbon odor.
132			60			
134						
136		359.0				135-140 Ft.: SANDSTONE, as above, strong hydrocarbon odor.
138			60			
140		296.2				140-145 Ft.: SANDSTONE, as above, no hydrocarbon odor.
142			60			
144						
146		237.3				145-150 Ft.: SANDSTONE, as above, no hydrocarbon odor.
148			38			
150		145.1				150-155 Ft.: Water at 150 ft. SANDSTONE, as above, no hydrocarbon odor.
152			43			

Project Indian Basin Remediation Owner Marathon Oil Company
 Location Eddy County, New Mexico Proj. No. 023350213.60

Depth (ft.)	Well Completion	PID (ppm)	Drill Rate (ft/min)	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
152			43			155-180 Ft.: SANDSTONE, as above, no hydrocarbon odor.
154		0				
156			43			
158						
160		0				Total depth: 160 ft.
162						
164						
166						
168						
170						
172						
174						
176						
178						
180						
182						
184						

APPENDIX B

Cumulative Summary of Fluid-Level Data: 1991-1997

dg/moc-05/cscr.wpd

FLUOR DANIEL GTI



Marathon Oil Company, Indian Basin Remediation
Groundwater Elevations in ft AMSL corrected for free-phase when observed

	May-91	Jun-91	Jul-91	Aug-91	Sep-91	Oct-91	Nov-91	Mar-92	Apr-92	May-92	Jun-92	Jul-92	Aug-92	Sep-92	Oct-92	Nov-92	Dec-92	Jan-93	Feb-93	Mar-93	Apr-93	May-93	Jun-93	Jul-93	Aug-93	Sep-93	Oct-93
MW-57	3627.45	3627.45	3627.41	3632.20	3633.41	3630.59	3630.20	3629.78	3630.11	3639.70	3636.49	3633.63	3632.46	3632.03	3631.69	3631.39	3631.15	3631.02	3630.91	3630.70	3630.75	3630.47	3630.57	3630.28	3630.42	3630.13	3630.05
MW-58			3626.40	3630.55	3631.05	3629.86	3629.54																				
MW-59			3625.61	3629.75	3630.21	3628.94	3629.59																				
MW-60			3627.06	3630.47	3630.96	3629.78	3629.85	3629.28	3629.49	3635.18	3633.61	3632.07	3631.67	3631.34	3631.10	3630.84	3630.61	3630.53	3630.42	3630.20	3630.26	3629.99	3630.05	3629.81	3629.87	3629.62	3629.58
MW-61A			3626.91	3629.12	3629.05	3627.98	3628.97																				
MW-62				3630.39	3630.79	3629.10	3630.30																				
MW-63				3632.43	3635.51	3631.87	3630.82	3629.34	3629.14	3642.91	3638.95	3637.16	3633.43	3632.51	3631.92	3631.26	3630.84	3630.61	3630.32	3630.02	3630.17	3629.82	3629.73	3629.54	3629.47	3629.23	3629.27
MW-64				3631.14	3631.36	3629.91	3629.67	3629.37	3629.57	3636.99	3634.32	3632.21	3631.75	3631.40	3631.12	3630.94	3630.72	3630.58	3630.49	3630.31	3630.35	3630.05	3630.11	3629.87	3629.98	3629.74	3629.69
MW-65A				3631.90	3632.35	3630.17	3629.56																				
MW-66				3632.21	3630.25	3629.28	3629.10	3628.61	3628.73	3633.73	3632.90	3631.63	3631.21	3630.81	3630.58	3630.22	3630.00	3629.88	3629.75	3629.49	3629.60	3629.35	3629.39	3629.16	3629.20	3628.97	3628.89
MW-67					3631.88	3630.13	3629.87	3629.52	3629.62	3638.21	3634.79	3632.63	3631.98	3631.63	3631.54	3631.11	3630.87	3630.77	3630.68	3630.48	3630.50	3630.24	3630.29	3630.06	3630.18	3629.88	3629.83
MW-68					3631.15	3628.46	3630.53																				
MW-70					3630.98	3630.89	3630.37	3629.83	3629.95	3632.60	3634.15	3633.70	3633.03	3632.55	3632.09	3631.71	3631.40	3631.18	3631.03	3630.80	3630.77	3630.48	3630.39	3630.25	3630.27	3630.04	3629.92
MW-71																											3628.37
MW-72																											3629.64
MW-73																											
MW-74																											
MW-75																											
MW-76																											
MW-81																											
MW-82																											
MW-83																											
MW-84																											
MW-85																											
MW-86																											
MW-87																											
MW-87A																											
MW-88																											
MW-89																											
MW-94																											
MW-95																											
MW-96																											
MW-97																											
MW-98																											
MW-104																											
MW-108																											
IW-1																											
IW-2																											
SW-1																											
SW-2				3628.26	3628.26	3629.05	3629.35	3628.67	3628.79	3632.27	3632.73	3632.73	3631.80	3631.22	3630.77	3630.48	3629.73	3629.91	3629.71	3629.48	3629.75	3629.57	3629.40	3629.03	3629.03	3628.93	3629.16
SW-3																											

Marathon Oil Company, Indian Basin Remediation
Groundwater Elevations in ft AMSL corrected for free-phase when observed

	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jul-94	Aug-94	Sep-94	Oct-94	Dec-94	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Apr-96	Jul-96	Aug-96	Oct-96	Jan-97	Feb-97	Mar-97	Apr-97				
MW-57	3629.81	3629.74	3629.79	3628.92	3628.78	3628.74	3628.96	3629.21	3629.54	3629.56	3629.39	3628.19	3628.93	3628.74	3629.64	3628.47	3628.03	3625.75	3625.68			3628.87		3627.81		3627.47	MW-57	3787.70	
MW-58																						3628.30		3621.07		3619.93	MW-58	3824.31	
MW-59																	3627.03	3627.22	3627.23			3628.05		3626.82		3625.50	MW-59	3819.59	
MW-60	3629.32	3629.30	3629.35	3628.49	3630.37	3628.37	3628.57	3628.74	3629.94	3629.04	3628.84	3627.74	3628.47	3628.27	3628.19	3627.99	3627.52	3627.45	3627.24			3627.39		3627.09	3626.88	3626.80	MW-60	3815.28	
MW-61A												3628.71	3627.73	3628.40									3627.99		3627.83	MW-61A	3815.97		
MW-62																	3627.87	3627.52	3627.57			3628.46		3627.33		3627.01	MW-62	3819.90	
MW-63	3628.84	3628.73	3628.83	3627.74	3627.79	3628.69	3627.88	3628.18	3629.04	3628.83	3628.42	3627.16	3627.96	3627.70	3627.67	3627.59	3627.26	3626.93	3627.25			3631.27		3627.15		3626.70	MW-63	3826.16	
MW-64	3629.48	3629.44	3629.45	3628.65	3628.52	3628.54	3628.68	3628.92	3630.18	3629.25	3629.01	3627.86	3628.63	3628.44	3628.33	3628.24	3627.70	3627.59	3627.30			3628.09		3627.32	3627.02	3627.19	MW-64	3798.57	
MW-65A																										3763.26	MW-65A	3763.26	
MW-66	3628.63	3628.56	3628.65	3627.59	3627.54	3627.62	3627.72	3628.07	3629.12	3628.32	3628.15	3627.02	3627.94	3626.72	3627.39	3627.36	3628.09	3626.69	3626.53			3628.18		3626.38		3626.14	MW-66	3828.98	
MW-67	3629.61	3629.56	3629.62	3628.71	3628.65	3628.56	3628.73	3629.05	3630.32	3629.29	3629.16	3627.98	3628.78	3628.58	3628.47	3628.33	3627.85	3627.74	3627.73			3628.34		3627.50		3627.23	MW-67	3765.87	
MW-68																											MW-68	3797.83	
MW-70	3629.66	3629.61	3629.58	3628.55	3628.57	3629.38	3628.71	3628.98	3629.48	3629.40	3629.19	3627.99	3629.74	3628.46	3628.38	3628.38	3627.89	3627.63	3627.87			3628.59		3628.10		3627.56	MW-70	3822.57	
MW-71	3628.15	3628.12	3628.13	3627.11	3627.15	3628.07	3627.41	3627.68	3628.70	3627.86	3627.64	3626.64	3627.40	3627.17	3627.21	3626.90	3626.69	3626.31	3626.36			3628.33		3625.66		3625.53	MW-71	3778.05	
MW-72	3629.41	3629.03																3616.66	3626.02			3612.53		3608.38		3623.49	MW-72	3819.32	
MW-73												3627.78	3627.25	3627.76	3627.24	3627.74	3626.19	3617.35	3627.36			3628.68		3627.09		3626.00	MW-73	3820.09	
MW-74												3628.51	3629.43	3632.34	3632.75			3633.52	3634.30			3642.05		3638.32		3636.90	MW-74	3820.82	
MW-75												3627.02	3628.20	3626.23	3623.77			3626.98	3627.00			3627.42		3623.26		3616.07	MW-75	3816.12	
MW-76												3628.65	3630.49		3627.70	3628.50	3628.02	3627.14	3628.97			3624.15		3627.03		3622.05	MW-76	3796.01	
MW-81																		3619.94	3619.61			3621.12		3619.78		3612.63	MW-81	3817.03	
MW-82																			3615.95	3602.27			3628.75		3601.41		3575.86	MW-82	3825.07
MW-83																			3614.87	3618.17			3618.00		3615.35		3614.71	MW-83	3794.12
MW-84																			3628.38			3628.58		3627.70		3625.96	MW-84	3759.60	
MW-85																			3626.97			3627.38		3626.52		3807.49	MW-85	3824.93	
MW-86																			3705.52			3630.67		3633.00		3626.62	MW-86	3823.99	
MW-87																				3627.39	3628.31		3627.56		3627.29	MW-87	3740.50		
MW-87A																					3614.62	3634.78		3635.84		3635.10	MW-87A	3739.53	
MW-88																					3626.11	3627.48		3626.32		3626.16	MW-88	3789.70	
MW-89																					3626.27	3627.73		3626.29		3626.01	MW-89	3827.68	
MW-94																						3625.27		3623.88		3821.48	MW-94	3821.48	
MW-95																											MW-95	3746.26	
MW-96																											MW-96	3739.80	
MW-97																											MW-97	3750.16	
MW-98																											MW-98	3770.15	
MW-104																											MW-104	3793.64	
MW-108																											MW-108	3747.13	
IW-1																			3628.26			3628.77		3626.88		3625.43	IW-1	3808.55	
IW-2																				3628.64	3630.34		3782.94		3806.97	IW-2	3835.86		
SW-1																											SW-1	3808.19	
SW-2	3628.40	3629.17	3628.38	3627.24	3628.69	3628.21	3627.66	3627.79	3628.18	3628.27	3627.23	3623.90	3627.53	3627.29	3627.17	3627.09	3626.58	3626.54	3626.55			3627.90	3626.58	3626.48		3625.99	SW-2	3808.79	
SW-3																			3626.77			3628.78		3626.66		3626.15	SW-3	3842.29	

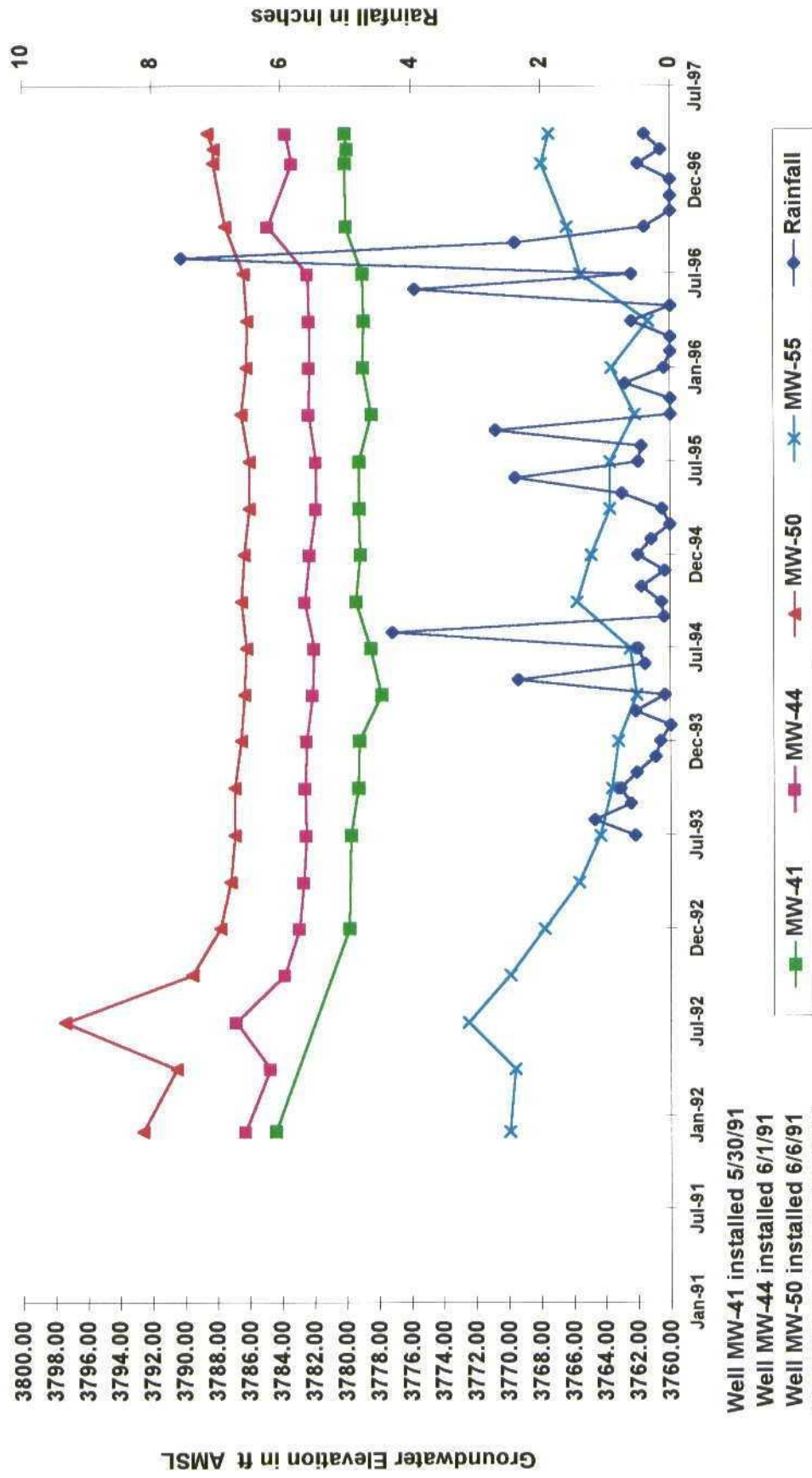
APPENDIX C

Hydrographs for Selected Wells

GROUNDWATER LEVELS IN SHALLOW ZONE MONITOR WELLS

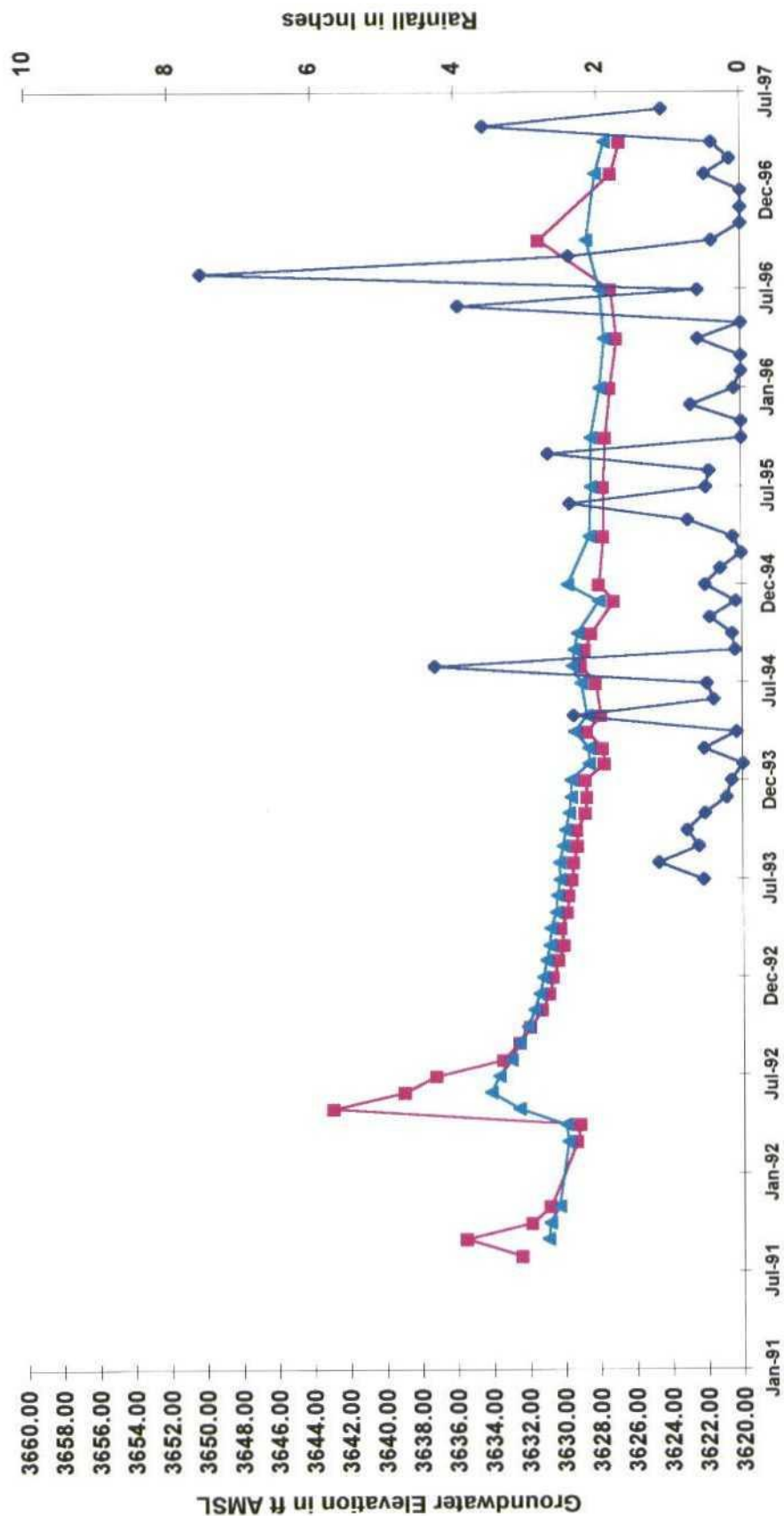
MW-41, MW-44, MW-50, AND MW-55

1991 - 1997



Well MW-41 installed 5/30/91
 Well MW-44 installed 6/1/91
 Well MW-50 installed 6/6/91
 Well MW-55 installed 6/25/91

GROUNDWATER LEVEL IN UPGRADE LOWER QUEEN MONITOR WELLS MW-63 AND MW-70 1991 - 1997



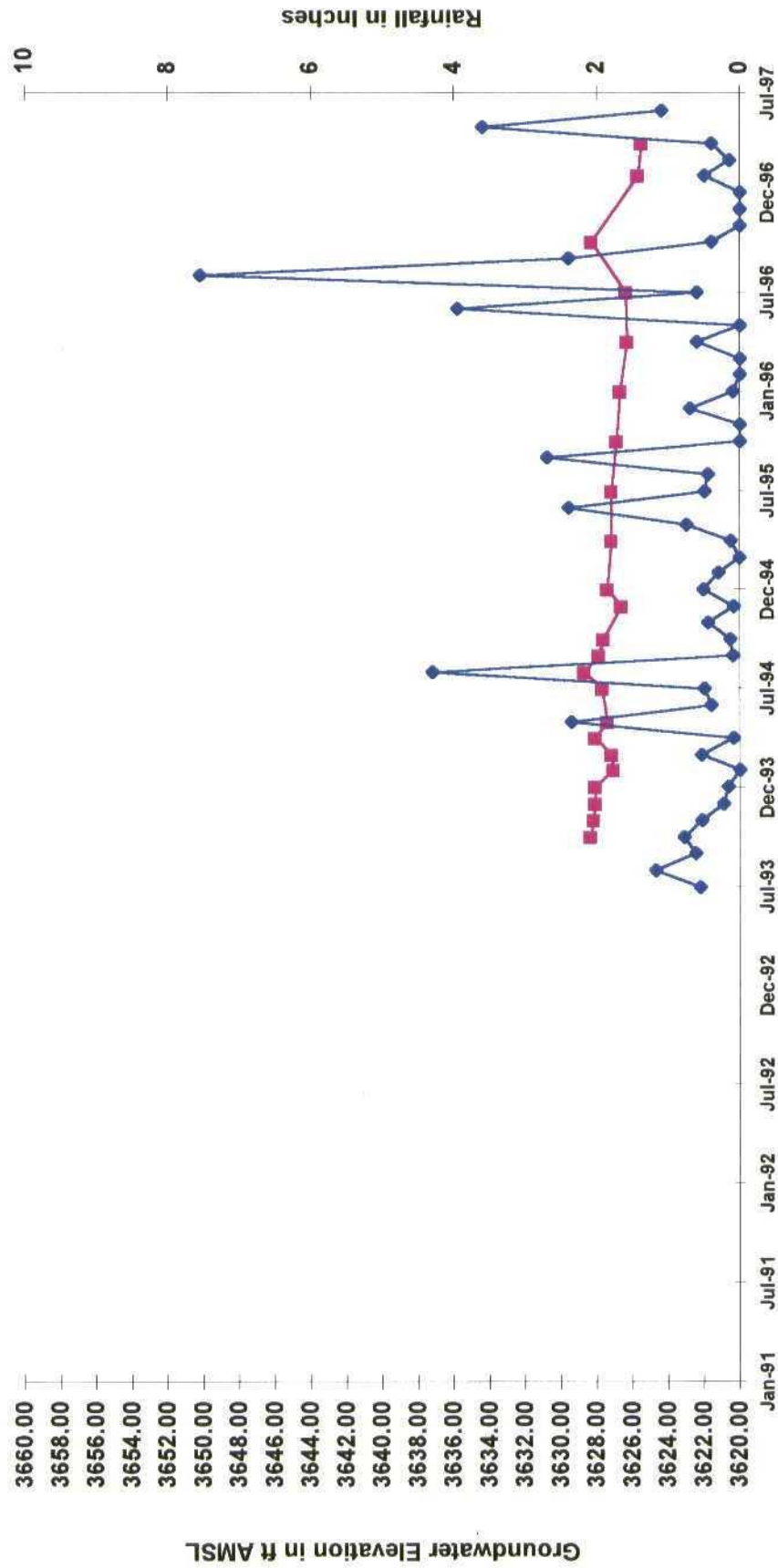
Well MW-63 installed 7/30/91
Well MW-70 installed 9/12/91

Legend: MW-63 (Red line with square markers), MW-70 (Blue line with triangle markers), Rainfall (Blue line with diamond markers)

GROUNDWATER LEVELS IN DOWNGRADIENT LOWER QUEEN MONITOR

WELL MW-71

1991 - 1997



Well installed 8/24/93

—■— MW-71

—◆— Rainfall

APPENDIX D

Soil Analytical Data from Phase II Site Assessment of the Indian Basin Gas Plant

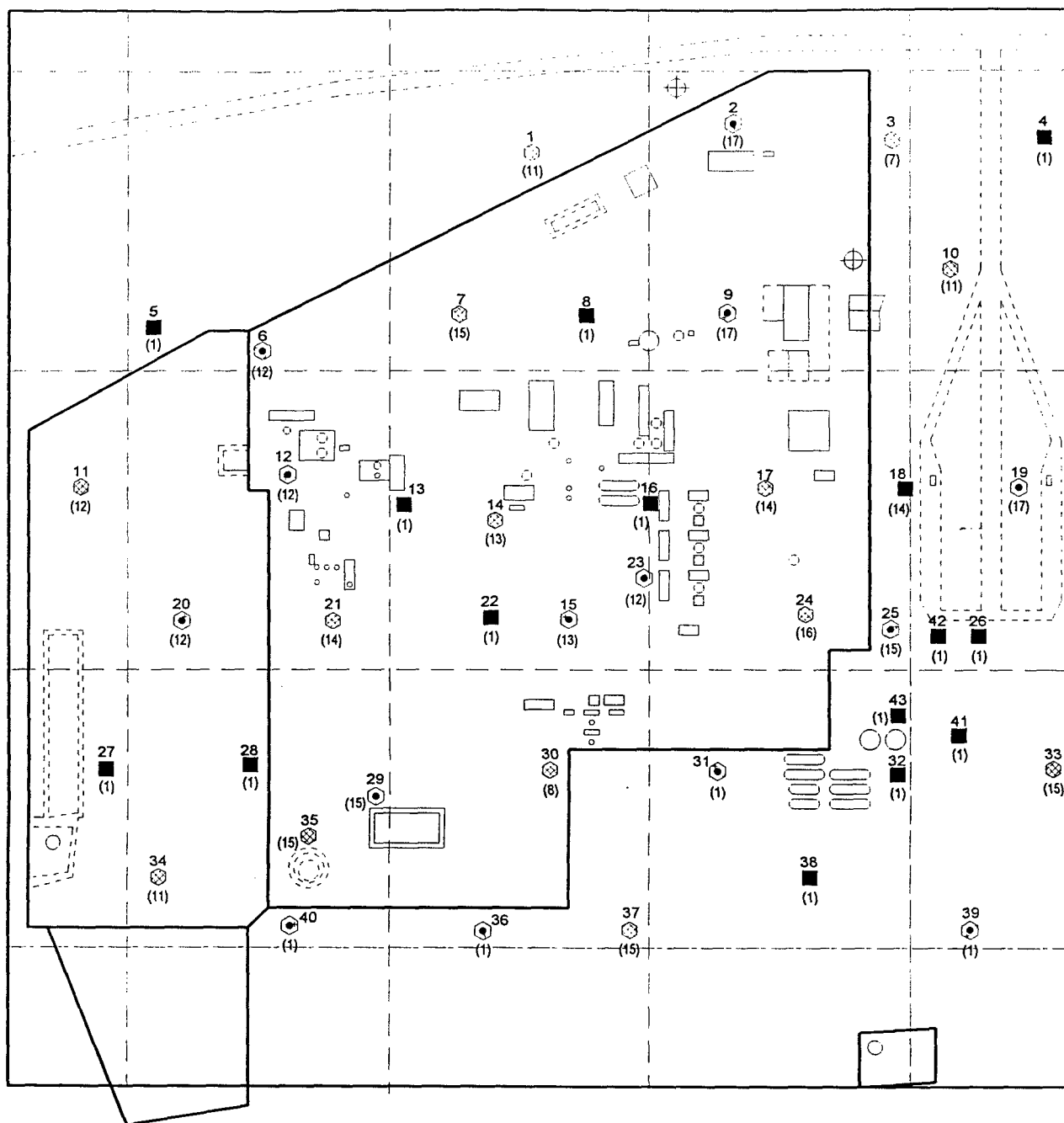


TABLE OF CONTENTS

Subject	Section	Page
Report	1	
Introduction		1
Selection of Boring Sites		1
Performance of Soil Borings & Sampling.....		2
Packaging and Shipping of Samples		2
Quality Assurance/Quality Control.....		2
Analysis and Reporting		3
Figures	2	
Figure One, Site Assessment Boring Location Map		
Figure Two, Site Assessment Boring Location and Depth Map		
Figure Three, Site Screening Data		
Analytical Summary	3	
Laboratory Chain of Custody Documents	4	
Miscellaneous Laboratory Documents	5	
Attachments	6	
Laboratory Analysis and Soil Characterizations		

Notice

This report was prepared for Marathon Oil Company and is considered privileged and confidential information by our client. The report and all of its contents may not be used for any other purpose without written permission from Marathon Oil Company and/or Indian Environmental Services. The scope of work is limited to matters expressly covered. The site assessment was performed in accordance with standards of care and due diligence normally practiced by recognized consulting firms in performing services of a similar nature.



LEGEND	
■	0-1 Ft. Boring
⊙	10-15 Ft.
⊗	20-25 Ft. Boring
⊕	Existing MW
()	Actual Boring Depth

200 0 200 Feet

MARATHON OIL COMPANY

INDIAN BASIN GAS PLANT
SITE ASSESSMENT
BORING LOCATION & DEPTH MAP

PREPARED BY
INDIAN ENVIRONMENTAL SERVICES
(A Division of Indian Fire & Safety, Inc.)

Date Prepared: 10/6/84

Figure 2

**Figure 3
Site Screening Data**

Sample Number	Description	PID	FID	Notes
1-15-1	Red Silty Clay	0		No Odor
1-15-11	Gravel	0		No Odor, Refusal
2-25-1	Red Silty clay	0		No Odor
2-25-12	Tan Silty Clay with Cobbles	0		No Odor
2-25-17	Moist, Tan Silty Clay with Cobbles	0		No Odor, Refusal
3-15-1	Red Silty Clay	0		No Odor
3-15-7	Clacified, Fine Silty Sand	0		No Odor, Refusal
4-1-1	Tan Silty Sand	0		No Odor
5-1-1	Tan Silty Clay	0		No Odor
6-25-1	Tan Silty Clay	0		No Odor
6-25-12	Tan Sandy Silty	0		No Odor, Very Tight, Refusal Afterwards
7-15-1	Tan Silty Clay	0		No Odor
7-15-15	Moist, Tan Silty Clay with Cobbles	4		Slight Odor
8-1-1	Tan Silty Clay	0		No Odor
9-25-1	Tan Silty Clay	0		No Odor
9-25-15	Tan Clay with Cobbles	0		No Odor
9-25-17	Tan Clay with Cobbles	0		No Odor, Refusal Afterwards
10-15-1	Red Silty Clay	0		No Odor
10-15-11	Calcified, Fine Silty Sand	0		No Odor, Refusal Afterwards
11-15-1	Red Silty Clay	0		No Odor
11-15-12	Cobbles with Silt	0		No Odor Refusal Afterwards
12-25-1	Tan Silty Clay	0		No Odor
12-25-12	Cobbley, Tan Silty Clay			No Odor, Refusal Afterwards
13-1-1	Tan Silty Clay	0		No Odor
14-15-1	Tan Silty Clay	0		No Odor
14-15-13	Black Stained Sandy Silt			Faint Odor, Very Moist, Stopped Boring
15-25-1	Tan Cobbley Silt			No Odor
15-25-13	Tan Silty Clay with Cobbles			Strong Odor (Hydrocarbon), Refusal

Marathon Oil Company
Indian Basin Gas Plant, Phase II Assessment
Figure 3, (Continued)

Sample Number	Description	PID	FID	Notes
16-1-1	Brown Silty Clay	0		No Odor
17-15-1	Brown Silty Clay	0		No Odor
17-15-14	Tan Silty Clay with Cobbles	10		Slight Odor, Refusal
18-1-1	Brown Silty Clay	0		Strong Odor
18-1-13	Tan Silty Clay with Cobbles		120	No Odor, FID at Opening
18-1-14	Tan Silty Clay with Cobbles		2	Faint Odor, Encountered Water
18-1-14	Water		9	No Odor
19-25-1	Red Silty Clay	0		No Odor
19-25-11	Cobbles with silt	0		No Odor
19-25-17	Encountered Water	12		Strong Odor (Hydrocarbon)
20-25-1	Brown Clayey Silt	0		No Odor
20-25-12	Brown Clay with Cobbles	0		No Odor, Refusal Afterwards
21-15-1	Brown tan Silty Clay	0		No Odor
21-15-14	Cobbly Tan Silty Clay	0		No Odor, Refusal Afterwards
22-1-1	Tan Silty Clay	0		No Odor
23-25-1	Tan Silty Clay	0		No Odor
23-25-12	Tan Silty Clay with Cobbles	0		No Odor, Refusal Afterwards
24-15-1	Tan Silty Clay	0		No Odor
24-15-15	Black Stained Cobbly Silt	10		Strong Odor
24-15-16	Black Stained Cobbly Silt	12		Strong Odor
25-25-1	Red Clayey Silt	.5	0	No Odor
25-25-14	Moist/Wet Black Stained Cobbly Silt	4	35	Strong Odor (Hydrocarbon)
25-25-14	Water	20	400	Strong Odor (Hydrocarbon)
25-25-15	Black Stained Cobbly Silt	5	25	Slight Odor (Hydrocarbon)
26-1-1	Tan Silty Sand	0		No Odor
27-1-1	Tan Silty Clay	0		No Odor
28-1-1	Tan Silty Clay	0		No Odor
29-25-1	Tan Silty Clay	0		No Odor

Marathon Oil Company
Indian Basin Gas Plant, Phase II Assessment
Figure 3, (Continued)

Sample Number	Description	PID	FID	Notes
29-25-15	Black Stained Cobbly Silt	15		Strong Odor (Hydrocarbon), Refusal
30-15-1	Brown Clayey Silt	0		No Odor
30-15-8	Tan Silt with Cobbles	0		No Odor, Refusal at 9'
31-25-1	Brown Clayey Silt	0	0	No Odor, Refusal at 4'
32-1-1	Tan Silty Sand	0		No Odor
33-15-1	Red Clayey Silt	0	0	No Odor
33-15-7	Cobbled Tan Silty Clay	0	0	No Odor
33-15-15	Tan Clayey Silt	2	5	Slight Hydrocarbon Odor
34-15-1	Brown Clayey Silt	0		No Odor
34-15-11	Tan Clay with Cobbles	0		No Odor, Refusal at 13'
35-15-1	Brown Silty Clay	0		Slight Odor
35-15-13	Tan Silty Clay with Cobbles	8		Strong Odor (Hydrocarbon)
35-15-15	Gray/Blk Silty Clay with Cobbles	10		Strong Odor (Hydrocarbon)
36-25-1	Brown Clayey Silt	0		No Odor, Refusal at 5'
37-15-1	Brown Clayey Silt	0	0	No Odor
37-15-15	Moist Clayey Silt with Cobbles	2		Slight Odor
38-1-1	Brown Clayey Silt	0		No Odor
39-25-1	Brown Clayey Silt	0		No Odor, Refusal at 5'
40-25-1	Brown Clayey Silt	0		No Odor, Refusal at 4'
41-1-1	Brown Clayey Silt	1		Slight Odor
42-1-1	Tan Clayey Silty Sand	0		No Odor
43-1-1	Moist Brown Clayey Silt	0		No Odor, Observed Slight Staining

Legend & Notes

1. ND = Not Detected

2. Detection limits are provided on Pages 4 & 5.

3. K = 1000

4. Cap = Capillary Fringe

5. Only the values for compounds found are shown. All others tested for were non detect.

6. All 8240 and 8310 values are in ug/kg for soil and ug/L for water.

7. Soils Characterizations are provided on Page 3.

8. BR = Sample broken during shipment and unable to analyze.

APPENDIX E

Groundwater Analytical Data: 1996 - 1997



American Environmental Network, Inc.

AEN I.D.

705377

June 18, 1997

FLUOR DANIEL GTI
3353 MOCHELSON DR.
IRVINE, CA 92698

Project Name MARATHON OIL IBGP
Project Number (none)

Attention: SARA BROTHERS

On 5/30/97 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze aqueous samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8240 was performed by American Environmental Network (NM) Inc., Albuquerque, NM.

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

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



Kimberly D. McNeill
Project Manager



H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt

Enclosure

CLIENT	: FLUOR DANIEL GTI	AEN I.D.	: 705377
PROJECT #	: (none)	DATE RECEIVED	: 5/30/97
PROJECT NAME	: MARATHON OIL IBGP	REPORT DATE	: 6/18/97

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	MW-46	AQUEOUS	5/29/97
02	MW-46	AQUEOUS	5/29/97
03	MW-46	AQUEOUS	5/29/97
04	MW-46	AQUEOUS	5/29/97
05	TRIP BLANK	AQUEOUS	5/23/97

"FINAL REPORT FORMAT - SINGLE"

Accession: 705622
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705377
Project Name: MARATHON OIL IBGP
Project Location: FLUOR DANIEL
Test: TOTAL ALKALINITY
Matrix: WATER
QC Level: II

Lab ID: 001
Client Sample Id: 705377-01

Sample Date/Time: 29-MAY-97 1000
Received Date: 31-MAY-97

Parameters:	Units:	Results:	Rpt Lmts:	Q:	Batch:	Analyst:
ALKALINITY, TOTAL (2320B)	MG/L	990	1		ASW018	ED
PH (150.1)	UNITS	7.5	NA		PHW112	AB
BICARBONATE, CACO3 (2330B)	MG/L	987	1		NONE	JL
CARBONATE, CACO3 (2330B)	MG/L	3	1		NONE	JL
CARBON DIOXIDE, FREE AS CACO3	MG/L	62	1		NONE	JL
HYDROXIDE (2330B) AS CACO3	MG/L	0	1		NONE	JL

Comments:

"Method Report Summary"

Accession Number: 705622
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705377
Project Name: MARATHON OIL IBGP
Project Location: FLUOR DANIEL
Test: TOTAL ALKALINITY

Client Sample Id:	Parameter:	Unit:	Result:
705377-01	ALKALINITY, TOTAL (2320B)	MG/L	990
	PH (150.1)	UNITS	7.5
	BICARBONATE, CACO3 (2330B)	MG/L	987
	CARBONATE, CACO3 (2330B)	MG/L	3
	CARBON DIOXIDE, FREE AS CACO3	MG/L	62
	HYDROXIDE (2330B) AS CACO3	MG/L	0

"WetChem Quality Control Report"

Parameter:	ALKALINITY	PH
Batch Id:	ASW018	PHW112
Blank Result:	<1	N/A
Anal. Method:	2320B	150.1
Prep. Method:	N/A	N/A
Analysis Date:	02-JUN-97	04-JUN-97
Prep. Date:	02-JUN-97	04-JUN-97

Sample Duplication

Sample Dup:	705432-1	705622-1
Rept Limit:	<4	N/A
Sample Result:	612	7.45
Dup Result:	612	7.44
Sample RPD:	0	0.01
Max RPD:	4	0.12
Dry Weight%	N/A	N/A

Matrix Spike

Sample Spiked:	705432-1	N/A
Rept Limit:	<4	N/A
Sample Result:	612	
Spiked Result:	657	
Spike Added:	50	
% Recovery:	90	
% Rec Limits:	77-122	
Dry Weight%	N/A	

ICV

ICV Result:	251	10.05
True Result:	250	10.00
% Recovery:	100	101
% Rec Limits:	90-110	90-110

LCS

LCS Result:	6.81
True Result:	6.87
% Recovery:	99
% Rec Limits:	96-103

"Quality Control Comments"

Batch Id: Comments:

ASW018	705622-1; 705677-1,3,4,6,9,10,11,12; WERE ADDED TO BATCH
ASW018	ON 04-JUNE-97

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

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

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

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

DPH = DOLLY P. HWANG	RB = REBECCA BROWN	AB = ANDY BROTHERTON
JL = JAN LECLEAR	NSB = NANCY S. BUTLER	MM = MIKE MCKENZIE
ED = ESTHER DANTIN	LV = LASSANDRA VON APPEN	JTZ = JONATHAN T. ZIENTARSKI
PLD = PAULA L. DOUGHTY	RH = RICKY HAGENDORFER	MG = MARY GUTIERREZ

"FINAL REPORT FORMAT - SINGLE"

Accession: 705622
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705377
Project Name: MARATHON OIL IBGP
Project Location: FLUOR DANIEL
Test: Group of Single Wetchem
Matrix: WATER
QC Level: II

Lab ID: 001
Client Sample Id: 705377-01

Sample Date/Time: 29-MAY-97 1000
Received Date: 31-MAY-97

Parameters:	Units:	Results:	Rpt Lmts:	Q:	Batch:	Analyst:
CHLORIDE (325.3)	MG/L	132	10	#	CIW050	RB
CONDUCTIVITY (120.1/2510 B)	UMH/CM	2100	1		CDW013	ED
FLUORIDE (340.2/4500-F C)	MG/L	1.3	0.2		FLW017	ED
NITRITE-NITRATE, NITROGEN (353.2)	MG/L	ND	0.1		N3W32A	MM
SULFATE (375.4)	MG/L	106	50	+	SEW041	MG
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1300	5		TDW032	ED

Comments:

"Method Report Summary"

Accession Number: 705622
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705377
Project Name: MARATHON OIL IBGP
Project Location: FLUOR DANIEL
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
705377-01	CHLORIDE (325.3)	MG/L	132
	CONDUCTIVITY (120.1/2510 B)	UMH/CM	2100
	FLUORIDE (340.2/4500-F C)	MG/L	1.3
	SULFATE (375.4)	MG/L	106
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1300

"WetChem Quality Control Report"

Parameter:	CHLORIDE	CONDUCT'Y	FLUORIDE	NO2NO3	SULFATE	TDS
Batch Id:	CIW050	CDW013	FLW017	N3W32A	SEW041	TDW032
Blank Result:	<1	<1	<0.2	<0.1	<10	<5
Anal. Method:	325.3	120.1	340.2	353.2	375.4	160.1
Prep. Method:	N/A	N/A	N/A	N/A	N/A	N/A
Analysis Date:	09-JUN-97	10-JUN-97	10-JUN-97	09-JUN-97	09-JUN-97	05-JUN-97
Prep. Date:	09-JUN-97	10-JUN-97	10-JUN-97	09-JUN-97	09-JUN-97	03-JUN-97

Sample Duplication

Sample Dup:	705720-1	705622-1	705727-1	705622-1	705677-1	705605-2
Rept Limit:	<1	<1	<0.2	<0.1	<50+	<5
Sample Result:	215.4	2060	<0.2	<0.1	68.5	106
Dup Result:	215.3	2050	<0.2	<0.1	70.5	114
Sample RPD:	0	0	N/C	N/C	3	7
Max RPD:	6	2	0.2	0.1	50	15
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	705720-1	N/A	705727-1	705662-1	705677-1	N/A
Rept Limit:	<1	N/A	<0.2	<0.1	<50+	N/A
Sample Result:	215.4		<0.2	<0.1	68.5	
Spiked Result:	268.7		0.843	0.98	166.5	
Spike Added:	55.0		0.800	1.0	100.0	
% Recovery:	97		105	98	98	
% Rec Limits:	88-113		81-127	70-127	64-150	
Dry Weight%	N/A		N/A	N/A	N/A	

ICV

ICV Result:	96.2	1421	1.19	2.02	19.5	
True Result:	100	1421	1.20	2.00	20.0	
% Recovery:	96	100	99	101	98	
% Rec Limits:	90-110	90-110	90-110	90-110	90-110	

LCS

LCS Result:						278
True Result:						293
% Recovery:						95
% Rec Limits:						77-122

"Quality Control Comments"

Batch Id:

Comments:

TDW032

705622-1 WAS ADDED TO BATCH ON 05-JUNE-97

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

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

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

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

DPH = DOLLY P. HWANG RB = REBECCA BROWN AB = ANDY BROTHERTON
JL = JAN LECLEAR NSB = NANCY S. BUTLER MM = MIKE MCKENZIE
ED = ESTHER DANTIN LV = LASSANDRA VON APPEN JTZ = JONATHAN T. ZIENTARSKI
PLD = PAULA L. DOUGHTY RH = RICKY HAGENDORFER MG = MARY GUTIERREZ

"FINAL REPORT FORMAT - SINGLE"

Accession: 705622
 Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
 Project Number: 705377
 Project Name: MARATHON OIL IBGP
 Project Location: FLUOR DANIEL
 Test: Group of Single Metals
 Matrix: WATER
 QC Level: II

Lab Id: 001
 Client Sample Id: 705377-01
 Sample Date/Time: 29-MAY-97 1000
 Received Date: 31-MAY-97

Parameters:	Units:	Results:	Rpt Lmts:	Q:	Batch:	Analyst:
CALCIUM (200.7)	MG/L	140	0.5		IOW132	JR
MERCURY (245.1)	MG/L	ND	0.0002		M2W046	LV
MERCURY, DISSOLVED (245.1)	MG/L	ND	0.0002		M2D007	LV
POTASSIUM (200.7)	MG/L	3.6	0.1		XOW132	JR
MAGNESIUM (200.7)	MG/L	140	0.05		JOW132	JR
SODIUM (200.7)	MG/L	120	0.1		IOW132	JR
SILVER (200.7)	MG/L	ND	0.005		AOW132	JR
SILVER, DISSOLVED (200.7)	MG/L	ND	0.005		AOD024	JR
ALUMINUM (200.7)	MG/L	2.6	0.1		L0W132	JR
ALUMINUM, DISSOLVED (200.7)	MG/L	ND	0.1		L0D024	JR
ARSENIC (200.7)	MG/L	0.006	0.005		R0W132	JR
ARSENIC, DISSOLVED (200.7)	MG/L	0.005	0.005		R0D024	JR
BORON (200.7)	MG/L	0.22	0.05		O0W132	JR
BORON, DISSOLVED (200.7)	MG/L	0.23	0.05		O0D024	JR
BARIUM (200.7)	MG/L	0.33	0.001		B0W132	JR
BARIUM, DISSOLVED (200.7)	MG/L	0.31	0.001		B0D024	JR
CADMIUM (200.7)	MG/L	ND	0.001		C0W132	JR
CADMIUM, DISSOLVED (200.7)	MG/L	ND	0.001		C0D024	JR
COBALT (200.7)	MG/L	ND	0.005		T0W132	JR
COBALT, DISSOLVED (200.7)	MG/L	ND	0.005		T0D024	JR
CHROMIUM (200.7)	MG/L	0.007	0.005		H0W132	JR
CHROMIUM, DISSOLVED (200.7)	MG/L	ND	0.005		H0D024	JR
COPPER (200.7)	MG/L	0.013	0.005		F0W132	JR
COPPER, DISSOLVED (200.7)	MG/L	ND	0.005		F0D024	JR
IRON (200.7)	MG/L	3.9	0.05		N0W132	JR
IRON, DISSOLVED (200.7)	MG/L	ND	0.05		N0D024	JR
MANGANESE (200.7)	MG/L	0.16	0.005		G0W132	JR
MANGANESE, DISSOLVED (200.7)	MG/L	0.068	0.005		G0D024	JR
MOLYBDENUM (200.7)	MG/L	ND	0.005		D0W132	JR
MOLYBDENUM, DISSOLVED (200.7)	MG/L	ND	0.005		D0D024	JR
NICKEL (200.7)	MG/L	0.009	0.005		E0W132	JR
NICKEL, DISSOLVED (200.7)	MG/L	ND	0.005		E0D024	JR
LEAD (200.7)	MG/L	ND	0.003		P0W132	JR
LEAD, DISSOLVED (200.7)	MG/L	ND	0.003		P0D024	JR
SELENIUM (200.7)	MG/L	ND	0.005		S0W132	JR
SELENIUM, DISSOLVED (200.7)	MG/L	ND	0.005		S0D024	JR
SILICON (200.7)	MG/L	20	0.1		20W132	JR
SILICON, DISSOLVED (200.7)	MG/L	15	0.1		20D024	JR
ZINC (200.7)	MG/L	0.03	0.02		50W132	JR
ZINC, DISSOLVED (200.7)	MG/L	ND	0.02		50D024	JR

"Method Report Summary"

Accession Number: 705622
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705377
Project Name: MARATHON OIL IBGP
Project Location: FLUOR DANIEL
Test: Group of Single Metals

Client Sample Id:	Parameter:	Unit:	Result:
705377-01	CALCIUM (200.7)	MG/L	140
	POTASSIUM (200.7)	MG/L	3.6
	MAGNESIUM (200.7)	MG/L	140
	SODIUM (200.7)	MG/L	120
	ALUMINUM (200.7)	MG/L	2.6
	ARSENIC (200.7)	MG/L	0.006
	ARSENIC, DISSOLVED (200.7)	MG/L	0.005
	BORON (200.7)	MG/L	0.22
	BORON, DISSOLVED (200.7)	MG/L	0.23
	BARIUM (200.7)	MG/L	0.33
	BARIUM, DISSOLVED (200.7)	MG/L	0.31
	CHROMIUM (200.7)	MG/L	0.007
	COPPER (200.7)	MG/L	0.013
	IRON (200.7)	MG/L	3.9
	MANGANESE (200.7)	MG/L	0.16
	MANGANESE, DISSOLVED (200.7)	MG/L	0.068
	NICKEL (200.7)	MG/L	0.009
	SILICON (200.7)	MG/L	20
	SILICON, DISSOLVED (200.7)	MG/L	15
	ZINC (200.7)	MG/L	0.03

"Metals Quality Control Report"

Parameter:	CALCIUM	MERCURY	MERCURY	POTASSIUM	MAGNESIUM	SODIUM
Batch Id:	I0W132	M2W046	M2D007	X0W132	J0W132	10W132
Blank Result:	<0.5	<0.0002	<0.0002	<0.1	<0.05	<0.1
Anal. Method:	200.7	245.1	245.1	200.7	200.7	200.7
Prep. Method:	200.7	245.1	245.1	200.7	200.7	200.7
Analysis Date:	10-JUN-97	05-JUN-97	12-JUN-97	08-JUN-97	08-JUN-97	10-JUN-97
Prep. Date:	05-JUN-97	05-JUN-97	12-JUN-97	05-JUN-97	05-JUN-97	05-JUN-97

Sample Duplication

Sample Dup:	705684-1	705651-1	705622-1	705684-1	705684-1	705684-1
Rept Limit:	<0.5	<0.0002	<0.0002	<0.1	<0.05	<0.1
Sample Result:	130	0.0056	0.0046	23	22	37
Dup Result:	130	0.0056	0.0046	23	22	37
Sample RPD:	0	0	0	0	0	0
Max RPD:	20	20	20	20	20	20
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	705684-1	705651-1	705622-1	705684-1	705684-1	705684-1
Rept Limit:	<0.5	<0.0002	<0.0002	<0.1	<0.05	<0.1
Sample Result:	110	<0.0002	<0.0002	2.0	2.3	18
Spiked Result:	130	0.0056	0.0046	23	22	37
Spike Added:	20F	0.0050	0.0050	20	20	20
% Recovery:	100	112	92	105	99	95
% Rec Limits:	75-125	75-125	75-125	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

ICV

ICV Result:	5.23	0.0040	0.0042	4.96	4.98	4.91
True Result:	5.0	0.0040	0.0040	5.0	5.0	5.0
% Recovery:	105	100	105	99	100	98
% Rec Limits:	90-110	80-120	80-120	90-110	90-110	90-110

LCS

LCS Result:	21	0.0053	0.0050	20	20	21
True Result:	20	0.0050	0.0050	20	20	20
% Recovery:	105	106	100	100	100	105
% Rec Limits:	80-120	80-120	80-120	80-120	80-120	80-120

"Metals Quality Control Report"

Parameter:	SILVER	SILVER	ALUMINUM	ALUMINUM	ARSENIC	ARSENIC
Batch Id:	A0W132	A0D024	L0W132	L0D024	R0W132	R0D024
Blank Result:	<0.005	N/A	<0.1	N/A	<0.005	N/A
Anal. Method:	200.7	200.7	200.7	200.7	200.7	200.7
Prep. Method:	200.7	N/A	200.7	N/A	200.7	N/A
Analysis Date:	08-JUN-97	10-JUN-97	08-JUN-97	10-JUN-97	08-JUN-97	10-JUN-97
Prep. Date:	05-JUN-97	N/A	05-JUN-97	N/A	05-JUN-97	N/A

Sample Duplication

Sample Dup:	705684-1	705670-3	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.005	<0.005	<0.1	<0.005	<0.005	<0.005
Sample Result:	2.0	1.8	3.2	1.9	2.1	2.0
Dup Result:	2.0	1.8	3.0	1.9	2.2	2.0
Sample RPD:	0	0	6	0	5	0
Max RPD:	20	20	20	20	20	20
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	705684-1	705670-3	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.005	<0.005	<0.1	<0.005	<0.005	<0.005
Sample Result:	<0.005	<0.005	1.4	<0.005	<0.005	<0.005
Spiked Result:	2.0	1.8	3.2	1.9	2.1	2.0
Spike Added:	2.0	2.0	2.0	2.0	2.0	2.0
% Recovery:	100	90	90	95	105	100
% Rec Limits:	75-125	75-125	75-125	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

ICV

ICV Result:	0.49	0.49	4.94	4.91	1.00	1.01
True Result:	0.5	0.5	5.0	5.0	1.0	1.0
% Recovery:	98	98	99	98	100	101
% Rec Limits:	90-110	90-110	90-110	90-110	90-110	90-110

LCS

LCS Result:	2.0		2.0		2.1	
True Result:	2.0		2.0		2.0	
% Recovery:	100		100		105	
% Rec Limits:	80-120		80-120		80-120	

"Metals Quality Control Report"

Parameter:	BORON	BORON	BARIUM	BARIUM	CADMIUM	CADMIUM
Batch Id:	OOW132	OOD024	BOW132	BOD024	COW132	COD024
Blank Result:	<0.05	N/A	<0.001	N/A	<0.001	N/A
Anal. Method:	200.7	200.7	200.7	200.7	200.7	200.7
Prep. Method:	200.7	N/A	200.7	N/A	200.7	N/A
Analysis Date:	08-JUN-97	10-JUN-97	08-JUN-97	10-JUN-97	08-JUN-97	10-JUN-97
Prep. Date:	05-JUN-97	N/A	05-JUN-97	N/A	05-JUN-97	N/A

Sample Duplication

Sample Dup:	705684-1	705670-3	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.05	<0.05	<0.001	<0.001	<0.001	<0.001
Sample Result:	2.1	2.0	2.1	2.2	2.0	1.9
Dup Result:	2.1	2.0	2.1	2.2	2.1	1.8
Sample RPD:	0	0	0	0	5	5
Max RPD:	20	20	20	20	20	20
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	705684-1	705670-3	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.05	<0.05	<0.001	<0.001	<0.001	<0.001
Sample Result:	<0.05	<0.05	0.018	0.33	<0.001	<0.001
Spiked Result:	2.1	2.0	2.1	2.2	2.0	1.9
Spike Added:	2.0	2.0	2.0	2.0	2.0	2.0
% Recovery:	105	100	104	94	100	95
% Rec Limits:	75-125	75-125	75-125	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

ICV

ICV Result:	1.02	1.04	0.97	0.98	0.99	1.01
True Result:	1.0	1.0	1.0	1.0	1.0	1.0
% Recovery:	102	104	97	98	99	101
% Rec Limits:	90-110	90-110	90-110	90-110	90-110	90-110

LCS

LCS Result:	2.0		2.1		2.0	
True Result:	2.0		2.0		2.0	
% Recovery:	100		105		100	
% Rec Limits:	80-120		80-120		80-120	

"Metals Quality Control Report"

Parameter:	COBALT	COBALT	CHROMIUM	CHROMIUM	COPPER	COPPER
Batch Id:	TOW132	TOD024	HOW132	HOD024	FOW132	FOD024
Blank Result:	<0.005	N/A	<0.005	N/A	<0.005	N/A
Anal. Method:	200.7	200.7	200.7	200.7	200.7	200.7
Prep. Method:	200.7	N/A	200.7	N/A	200.7	N/A
Analysis Date:	08-JUN-97	10-JUN-97	08-JUN-97	10-JUN-97	08-JUN-97	10-JUN-97
Prep. Date:	05-JUN-97	N/A	05-JUN-97	N/A	05-JUN-97	N/A

Sample Duplication

Sample Dup:	705684-1	705670-3	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Sample Result:	2.1	1.9	2.1	1.9	2.4	2.0
Dup Result:	2.1	1.8	2.1	1.9	2.4	2.0
Sample RPD:	0	5	0	0	0	0
Max RPD:	20	20	20	20	20	20
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	705684-1	705670-3	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Sample Result:	<0.005	<0.005	<0.005	<0.005	0.24	<0.005
Spiked Result:	2.1	1.9	2.1	1.9	2.4	2.0
Spike Added:	2.0	2.0	2.0	2.0	2.0	2.0
% Recovery:	105	95	105	95	108	100
% Rec Limits:	75-125	75-125	75-125	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

ICV

ICV Result:	0.97	0.98	1.00	1.02	1.00	0.99
True Result:	1.0	1.0	1.0	1.0	1.0	1.0
% Recovery:	97	98	100	102	100	99
% Rec Limits:	90-110	90-110	90-110	90-110	90-110	90-110

LCS

LCS Result:	2.1		2.0		2.2	
True Result:	2.0		2.0		2.0	
% Recovery:	105		100		110	
% Rec Limits:	80-120		80-120		80-120	

"Metals Quality Control Report"

Parameter:	IRON	IRON	MANGANESE	MANGANESE	MOLYBDENUM	MOLYBDENUM
Batch Id:	NOW132	NOD024	GOW132	GOD024	DOW132	DOD024
Blank Result:	<0.05	N/A	<0.005	N/A	<0.005	N/A
Anal. Method:	200.7	200.7	200.7	200.7	200.7	200.7
Prep. Method:	200.7	N/A	200.7	N/A	200.7	N/A
Analysis Date:	10-JUN-97	10-JUN-97	08-JUN-97	10-JUN-97	08-JUN-97	10-JUN-97
Prep. Date:	05-JUN-97	N/A	05-JUN-97	N/A	05-JUN-97	N/A

Sample Duplication

Sample Dup:	705684-1	705670-3	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.05	<0.05	<0.005	<0.005	<0.005	<0.005
Sample Result:	7.1	2.0	2.0	3.6	2.2	1.9
Dup Result:	7.1	2.0	2.1	3.6	2.2	1.9
Sample RPD:	0	0	5	0	0	0
Max RPD:	20	20	20	20	20	20
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	705684-1	705670-3	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.05	<0.05	<0.005	<0.005	<0.005	<0.005
Sample Result:	4.9	<0.05	0.026	1.8	<0.005	0.006
Spiked Result:	7.1	2.0	2.0	3.6	2.2	1.9
Spike Added:	2.0	2.0	2.0	2.0	2.0	2.0
% Recovery:	110	100	99	90	110	95
% Rec Limits:	75-125	75-125	75-125	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

ICV

ICV Result:	5.18	5.18	0.98	0.99	0.99	1.01
True Result:	5.0	5.0	1.0	1.0	1.0	1.0
% Recovery:	104	104	98	99	99	101
% Rec Limits:	90-110	90-110	90-110	90-110	90-110	90-110

LCS

LCS Result:	2.2		2.0		2.1	
True Result:	2.0		2.0		2.0	
% Recovery:	110		100		105	
% Rec Limits:	80-120		80-120		80-120	

"Metals Quality Control Report"

Parameter:	NICKEL	NICKEL	LEAD	LEAD	SELENIUM	SELENIUM
Batch Id:	E0W132	E0D024	P0W132	P0D024	S0W132	S0D024
Blank Result:	<0.005	N/A	<0.003	N/A	<0.005	N/A
Anal. Method:	200.7	200.7	200.7	200.7	200.7	200.7
Prep. Method:	200.7	N/A	200.7	N/A	200.7	N/A
Analysis Date:	08-JUN-97	10-JUN-97	08-JUN-97	10-JUN-97	10-JUN-97	10-JUN-97
Prep. Date:	05-JUN-97	N/A	05-JUN-97	N/A	05-JUN-97	N/A

Sample Duplication

Sample Dup:	705684-1	705670-3	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.005	<0.005	<0.003	<0.003	<0.005	<0.005
Sample Result:	2.2	1.9	2.1	1.9	1.9	2.0
Dup Result:	2.2	1.9	2.1	1.9	1.9	2.0
Sample RPD:	0	0	0	0	0	0
Max RPD:	20	20	20	20	20	20
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	705684-1	705670-3	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.005	<0.005	<0.003	<0.003	<0.005	<0.005
Sample Result:	<0.005	<0.005	0.008	0.003	<0.005	<0.005
Spiked Result:	2.2	1.9	2.1	1.9	1.9	2.0
Spike Added:	2.0	2.0	2.0	2.0	2.0	2.0
% Recovery:	110	95	105	95	95	100
% Rec Limits:	75-125	75-125	75-125	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A	N/A	N/A	N/A

ICV

ICV Result:	0.98	1.00	0.99	1.01	1.01	1.01
True Result:	1.0	1.0	1.0	1.0	1.0	1.0
% Recovery:	98	100	99	101	101	101
% Rec Limits:	90-110	90-110	90-110	90-110	90-110	90-110

LCS

LCS Result:	2.2		2.1		2.0	
True Result:	2.0		2.0		2.0	
% Recovery:	110		105		100	
% Rec Limits:	80-120		80-120		80-120	

"Metals Quality Control Report"

Parameter:	SILICON	SILICON	ZINC	ZINC
Batch Id:	20W132	20D024	50W132	50D024
Blank Result:	<0.1	N/A	<0.02	N/A
Anal. Method:	200.7	200.7	200.7	200.7
Prep. Method:	200.7	N/A	200.7	N/A
Analysis Date:	10-JUN-97	10-JUN-97	08-JUN-97	10-JUN-97
Prep. Date:	05-JUN-97	N/A	05-JUN-97	N/A

Sample Duplication

Sample Dup:	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.1	<0.1	<0.02	<0.02
Sample Result:	6.1	7.8	2.1	1.9
Dup Result:	5.9	7.8	2.1	1.9
Sample RPD:	3	0	0	0
Max RPD:	20	20	20	20
Dry Weight%	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	705684-1	705670-3	705684-1	705670-3
Rept Limit:	<0.1	<0.1	<0.02	<0.02
Sample Result:	4.3	5.8	0.05	0.04
Spiked Result:	6.1	7.8	2.1	1.9
Spike Added:	2.0	2.0	2.0	2.0
% Recovery:	90	100	103	93
% Rec Limits:	75-125	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A	N/A

ICV

ICV Result:	1.9	1.9	0.99	1.00
True Result:	2.0	2.0	1.0	1.0
% Recovery:	95	95	99	100
% Rec Limits:	90-110	90-110	90-110	90-110

LCS

LCS Result:	2.0		2.1	
True Result:	2.0		2.0	
% Recovery:	100		105	
% Rec Limits:	80-120		80-120	

"Quality Control Comments"

Batch Id: Comments:

	Batch Id:	Comments:
IOW132	ANALYST: JR	
IOW132	The results reported under "Sample Duplication" are the MS/MSD.	
M2W046	ANALYST: LV	
M2W046	The results reported under "Sample Duplication" are the MS/MSD.	
M2D007	ANALYST: LV	
M2D007	The results reported under "Sample Duplication" are the MS/MSD.	
XOW132	ANALYST: JR	
XOW132	The results reported under "Sample Duplication" are the MS/MSD.	
JOW132	ANALYST: JR	
JOW132	The results reported under "Sample Duplication" are the MS/MSD.	
LOW132	ANALYST: JR	
LOW132	The results reported under "Sample Duplication" are the MS/MSD.	
AOW132	ANALYST: JR	
AOW132	The results reported under "Sample Duplication" are the MS/MSD.	
AOD024	ANALYST: JR	
AOD024	The results reported under "Sample Duplication" are the MS/MSD.	
LOW132	ANALYST: JR	
LOW132	The results reported under "Sample Duplication" are the MS/MSD.	
LOD024	ANALYST: JR	
LOD024	The results reported under "Sample Duplication" are the MS/MSD.	
ROW132	ANALYST: JR	
ROW132	The results reported under "Sample Duplication" are the MS/MSD.	
ROD024	ANALYST: JR	
ROD024	The results reported under "Sample Duplication" are the MS/MSD.	
OOW132	ANALYST: JR	
OOW132	The results reported under "Sample Duplication" are the MS/MSD.	
OOD024	ANALYST: JR	
OOD024	The results reported under "Sample Duplication" are the MS/MSD.	
BOW132	ANALYST: JR	
BOW132	The results reported under "Sample Duplication" are the MS/MSD.	
BOD024	ANALYST: JR	
BOD024	The results reported under "Sample Duplication" are the MS/MSD.	
COW132	ANALYST: JR	
COW132	The results reported under "Sample Duplication" are the MS/MSD.	
COD024	ANALYST: JR	
COD024	The results reported under "Sample Duplication" are the MS/MSD.	
TOW132	ANALYST: JR	
TOW132	The results reported under "Sample Duplication" are the MS/MSD.	
TOD024	ANALYST: JR	
TOD024	The results reported under "Sample Duplication" are the MS/MSD.	
HOW132	ANALYST: JR	
HOW132	The results reported under "Sample Duplication" are the MS/MSD.	
HOD024	ANALYST: JR	
HOD024	The results reported under "Sample Duplication" are the MS/MSD.	
FOW132	ANALYST: JR	
FOW132	The results reported under "Sample Duplication" are the MS/MSD.	
FOD024	ANALYST: JR	
FOD024	The results reported under "Sample Duplication" are the MS/MSD.	
NOW132	ANALYST: JR	
NOW132	The results reported under "Sample Duplication" are the MS/MSD.	
NOD024	ANALYST: JR	
NOD024	The results reported under "Sample Duplication" are the MS/MSD.	
GOW132	ANALYST: JR	
GOW132	The results reported under "Sample Duplication" are the MS/MSD.	
GOD024	ANALYST: JR	

"Quality Control Comments"

Batch Id: Comments:

G0D024	The results reported under "Sample Duplication" are the MS/MSD.
D0W132	ANALYST: JR
D0W132	The results reported under "Sample Duplication" are the MS/MSD.
D0D024	ANALYST: JR
D0D024	The results reported under "Sample Duplication" are the MS/MSD.
E0W132	ANALYST: JR
E0W132	The results reported under "Sample Duplication" are the MS/MSD.
E0D024	ANALYST: JR
E0D024	The results reported under "Sample Duplication" are the MS/MSD.
P0W132	ANALYST: JR
P0W132	The results reported under "Sample Duplication" are the MS/MSD.
P0D024	ANALYST: JR
P0D024	The results reported under "Sample Duplication" are the MS/MSD.
S0W132	ANALYST: JR
S0W132	The results reported under "Sample Duplication" are the MS/MSD.
S0D024	ANALYST: JR
S0D024	The results reported under "Sample Duplication" are the MS/MSD.
20W132	ANALYST: JR
20W132	The results reported under "Sample Duplication" are the MS/MSD.
20D024	ANALYST: JR
20D024	The results reported under "Sample Duplication" are the MS/MSD.
50W132	ANALYST: JR
50W132	The results reported under "Sample Duplication" are the MS/MSD.
50D024	ANALYST: JR
50D024	The results reported under "Sample Duplication" are the MS/MSD.

----- Common Footnotes Metals -----

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

FROM ANALYSIS REPORT:

RL= REPORTING LIMIT BASED ON METHOD DETECTION LIMIT STUDIES.
Q= QUALIFIER (FOOTNOTE)

FROM QUALITY CONTROL REPORT:

RPD= RELATIVE PERCENT DEVIATION.
RPT LIMIT= REPORTING LIMIT BASED ON METHOD DETECTION LIMIT STUDIES.

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

SW-846, 3rd Edition, latest revision.

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

NIOSH Manual of Analytical Methods, 4th Edition.

Standard Methods For the Examination of Water and Wastewater, 18th Edition, 1992.

Methods For the Determination of Metals in Environmental Samples - Supplement I,
EPA 600/R-94-111, May 1994.

GJ = GARY JACOBS
JLH = JAMES L. HERED
CD = CHRISTY DRAPER

JR = JOHN REED
LV = LASSANDRA VON APPEN

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8240
 CLIENT : FLUOR DANIEL - GTI
 PROJECT # : (none)
 PROJECT NAME : MARATHON OIL IBGP

AEN I.D. : 705377
 DATE RECEIVED : 5/30/97

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
705377-01	MW-46	AQUEOUS	5/29/97	N/A	06/03/97	100
PARAMETER	DET. LIMIT		UNITS			

Dichlorodifluoromethane	1.0	< 100	ug/L
Chloromethane	1.0	< 100	ug/L
Vinyl Chloride	1.0	< 100	ug/L
Bromomethane	1.0	< 100	ug/L
Chloroethane	1.0	< 100	ug/L
Trichlorofluoromethane	1.0	< 100	ug/L
Acetone	10	< 1000	ug/L
1,1-Dichloroethene	1.0	< 100	ug/L
Iodomethane	1.0	< 100	ug/L
Methylene Chloride	1.0	< 100	ug/L
cis-1,2-Dichloroethene	1.0	< 100	ug/L
1,1-Dichloroethane	1.0	< 100	ug/L
trans-1,2-Dichloroethene	1.0	< 100	ug/L
2-Butanone	10	< 1000	ug/L
Carbon Disulfide	1.0	< 100	ug/L
Chloroform	1.0	< 100	ug/L
1,2-Dichloroethane	1.0	< 100	ug/L
Vinyl Acetate	1.0	< 100	ug/L
1,1,1-Trichloroethane	1.0	< 100	ug/L
Carbon Tetrachloride	1.0	< 100	ug/L
Benzene	1.0	5000	ug/L
1,2-Dichloropropane	1.0	< 100	ug/L
Trichloroethene	1.0	< 100	ug/L
Bromodichloromethane	1.0	< 100	ug/L
2-Chloroethyl Vinyl Ether	10	< 1000	ug/L
cis-1,3-Dichloropropene	1.0	< 100	ug/L
trans-1,3-Dichloropropene	1.0	< 100	ug/L
1,1,2-Trichloroethane	1.0	< 100	ug/L
Toluene	1.0	1200	ug/L
1,2-Dibromoethane	1.0	< 100	ug/L
4-Methyl-2-Pentanone	10	< 1000	ug/L
2-Hexanone	10	< 1000	ug/L
Dibromochloromethane	1.0	< 100	ug/L
Tetrachloroethene	1.0	< 100	ug/L
Chlorobenzene	1.0	< 100	ug/L
Ethylbenzene	1.0	230	ug/L
m&p Xylenes	1.0	< 100	ug/L
o-Xylene	1.0	< 100	ug/L
Styrene	1.0	< 100	ug/L
Bromoform	1.0	< 100	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 100	ug/L
1,3-Dichlorobenzene	1.0	< 100	ug/L
1,4-Dichlorobenzene	1.0	< 100	ug/L
1,2-Dichlorobenzene	1.0	< 100	ug/L

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8240
 CLIENT : FLUOR DANIEL - GT1
 PROJECT # : (none)
 PROJECT NAME : MARATHON OIL IBGP

AEN I.D. : 705377
 DATE RECEIVED : 5/30/97

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
705377-01	MW-46	AQUEOUS	5/29/97	N/A	06/03/97	100
PARAMETER	DET. LIMIT	UNITS				

SURROGATE % RECOVERY

1,2-Dichloroethane-d4	92 (76 - 114)
Toluene-d8	107 (88 - 110)
Bromofluorobenzene	105 (86 - 115)

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8240
 CLIENT : FLUOR DANIEL - GTI
 PROJECT # : (none)
 PROJECT NAME : MARATHON OIL IBGP

AEN I.D. : 705377
 DATE RECEIVED : 5/30/97

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
705377-05	TRIP BLANK	AQUEOUS	5/23/97	N/A	06/03/97	1
PARAMETER	DET. LIMIT		UNITS			

Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8240
 CLIENT : FLUOR DANIEL - GTI
 PROJECT # : (none)
 PROJECT NAME : MARATHON OIL IBGP

AEN I.D. : 705377
 DATE RECEIVED : 5/30/97

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
705377-05	TRIP BLANK	AQUEOUS	5/23/97	N/A	06/03/97	1
PARAMETER	DET. LIMIT		UNITS			

SURROGATE % RECOVERY

1,2-Dichloroethane-d4	96 (76 - 114)
Toluene-d8	105 (88 - 110)
Bromofluorobenzene	103 (86 - 115)

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8240
 CLIENT : FLUOR DANIEL - GTI
 PROJECT # : (none)
 PROJECT NAME : MARATHON OIL IBGP

AEN I.D. : 705377

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	060397	AQUEOUS	N/A	06/03/97	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8240
 CLIENT : FLUOR DANIEL - GTI
 PROJECT # : (none)
 PROJECT NAME : MARATHON OIL IBGP

AEN I.D. : 705377

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	060397	AQUEOUS	N/A	06/03/97	1
PARAMETER	DET. LIMIT	UNITS			

SURROGATE % RECOVERY

1,2-Dichloroethane-d4	84	(78 - 114)
Toluene-d8	107	(88 - 110)
Bromofluorobenzene	100	(86 - 115)

Spike Recovery and RPD Summary Report - WATER

Method : C:\HPCHEM\1\METHODS\8260E4.M (RTE Integrator)
 Title : AEN New Mexico GC/MS
 Last Update : Tue Jun 03 14:22:57 1997
 Response via : Initial Calibration

Non-Spiked Sample: WRB01.D

Spike Sample	Spike Duplicate Sample
File ID : 060397S3.D	060397S2.D
Sample : BS	BSD
Acq Time: 3 Jun 97 3:18 pm	3 Jun 97 2:37 pm

Compound	Sample Conc	Spike Added	Spike Res	Dup Res	Spike %Rec	Dup %Rec	RPD	QC Limits RPD	Limits % Rec
1,1-Dichloroethene	0.0	50	57	56	115	112	3	14	61-145
Benzene	0.1	50	52	53	104	105	1	11	76-127
Trichloroethene	0.0	50	52	51	105	103	2	14	71-120
Toluene	0.2	50	51	50	102	100	2	13	76-125
Chlorobenzene	0.1	50	51	51	102	102	0	13	75-130

- Fails Limit Check

8260E4.M

Tue Jun 03 15:46:57 1997

"FINAL REPORT FORMAT - SINGLE"

Accession: 705622
 Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
 Project Number: 705377
 Project Name: MARATHON OIL IBGP
 Project Location: FLUOR DANIEL
 Test: POLYNUCLEAR AROMATICS BY 8310
 Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Matrix: WATER
 QC Level: II

Lab Id: 001
 Client Sample Id: 705377-01
 Sample Date/Time: 29-MAY-97 1000
 Received Date: 31-MAY-97
 Batch: PAW109
 Blank: A
 Dry Weight %: N/A
 Extraction Date: 02-JUN-91
 Analysis Date: 05-JUN-91

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	58	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a) ANTHRACENE	UG/L	13	1	
BENZO(a) PYRENE	UG/L	5	1	
BENZO(b) FLUORANTHENE	UG/L	6	1	
BENZO(g,h,i) PERYLENE	UG/L	ND	1	
BENZO(k) FLUORANTHENE	UG/L	8	1	
CHRYSENE	UG/L	22	1	
DIBENZO(a,h) ANTHRACENE	UG/L	16	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	ND	1	
INDENO(1,2,3-cd) PYRENE	UG/L	2	1	
NAPHTHALENE	UG/L	5	1	
PHENANTHRENE	UG/L	3	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	31	1	
2-METHYLNAPHTHALENE	UG/L	29	1	
2-CHLOROANTHRACENE	%REC/SURR	164*	28-138	
ANALYST	INITIALS	JBT		

Comments:
 *SURROGATE RECOVERY OUTSIDE ACCEPTANCE LIMITS
 DUE TO MATRIX INTERFERENCE.

"Method Report Summary"

Accession Number: 705622
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705377
Project Name: MARATHON OIL IBGP
Project Location: FLUOR DANIEL
Test: POLYNUCLEAR AROMATICS BY 8310

Client Sample Id:	Parameter:	Unit:	Result:
705377-01	ACENAPHTHENE	UG/L	58
	BENZO (a) ANTHRACENE	UG/L	13
	BENZO (a) PYRENE	UG/L	5
	BENZO (b) FLUORANTHENE	UG/L	6
	BENZO (k) FLUORANTHENE	UG/L	8
	CHRYSENE	UG/L	22
	DIBENZO (a, h) ANTHRACENE	UG/L	16
	INDENO (1, 2, 3-cd) PYRENE	UG/L	2
	NAPHTHALENE	UG/L	5
	PHENANTHRENE	UG/L	3
	1-METHYLNAPHTHALENE	UG/L	31
	2-METHYLNAPHTHALENE	UG/L	29

"QC Report"

Title: Water Blank
 Batch: PAW109
 Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Blank Id: A Date Analyzed: 05-JUN-91 Date Extracted: 02-JUN-91

Parameters:	Units:	Results:	Reporting Limits:
ACENAPHTHENE	UG/L	ND	1
ACENAPHTHYLENE	UG/L	ND	1
ANTHRACENE	UG/L	ND	1
BENZO (a) ANTHRACENE	UG/L	ND	1
BENZO (a) PYRENE	UG/L	ND	1
BENZO (b) FLUORANTHENE	UG/L	ND	1
BENZO (g, h, i) PERYLENE	UG/L	ND	1
BENZO (k) FLUORANTHENE	UG/L	ND	1
CHRYSENE	UG/L	ND	1
DIBENZO (a, h) ANTHRACENE	UG/L	ND	1
FLUORANTHENE	UG/L	ND	1
FLUORENE	UG/L	ND	1
INDENO (1, 2, 3-cd) PYRENE	UG/L	ND	1
NAPHTHALENE	UG/L	ND	1
PHENANTHRENE	UG/L	ND	1
PYRENE	UG/L	ND	1
1-METHYLNAPHTHALENE	UG/L	ND	1
2-METHYLNAPHTHALENE	UG/L	ND	1
2-CHLOROANTHRACENE	%REC/SURR	120	28-138
ANALYST	INITIALS	JBT	

Comments:

"QC Report"

Title: Water Reagent
 Batch: PAW109
 Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

RS Date Analyzed: 06-JUN-97
 RSD Date Analyzed: 06-JUN-97

RS Date Extracted: 02-JUN-97
 RSD Date Extracted: 02-JUN-97

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	RSD Conc	RSD %Rec	RPD	RPD Lmts	Rec Lmts
ACENAPHTHYLENE	10.0	<1	10.2	102	9.4	94	8	35	45-127
BENZO(k) FLUORANTHENE	10.0	<1	10.7	107	10.0	100	7	23	68-131
CHRYSENE	10.0	<1	9.9	99	9.3	93	6	24	69-131
PHENANTHRENE	10.0	<1	9.4	94	8.7	87	8	26	63-124
PYRENE	10.0	<1	10.3	103	9.8	98	5	25	61-126
Surrogates:									
2-CHLOROANTHRACENE				120		122			28-138

Comments:

Notes:

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

"QC Report"

Title: Water Matrix
 Batch: PAW109
 Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Dry Weight %: N/A
 Sample Spiked: 705622-1
 MS Date Analyzed: 05-JUN-97
 MSD Date Analyzed: 05-JUN-97
 MS Date Extracted: 02-JUN-97
 MSD Date Extracted: 02-JUN-97

Parameters:	Spike Added	Sample Conc	MS Conc	MS %Rec	MSD Conc	MSD %Rec	RPD	Rec Lmts
ACENAPHTHYLENE	10.0	<1	6.6	66	6.5	65	2	51 18-146
BENZO (k) FLUORANTHENE	10.0	<1	13.0	130	13.7	137	5	40 26-137
CHRYSENE	10.0	22.2	31.6	94	30.9	87	8	69 16-156
PHENANTHRENE	10.0	3.3	9.8	65	10.8	75	14	36 30-145
PYRENE	10.0	<1	9.1	91	8.6	86	6	41 39-137
Surrogates:								
2-CHLOROANTHRACENE				147*		150*		28-138

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

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

Common notation for Organic reporting

N/S = NOT SUBMITTED
N/A = NOT APPLICABLE
D = DILUTED OUT
UG = MICROGRAMS
UG/L = PARTS PER BILLION.
UG/KG = PARTS PER BILLION.
MG/M3 = MILLIGRAM PER CUBIC METER.
PPMV = PART PER MILLION BY VOLUME.
MG/KG = PARTS PER MILLION.
MG/L = PARTS PER MILLION.
< = LESS THAN DETECTION LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS
Y = IMPROPER PRESERVATION, NO PRESERVATIVE PRESENT IN SAMPLE UPON RECEIPT.

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

ORGANIC SOILS ARE REPORTED ON A DRYWEIGHT BASIS.

ND = NOT DETECTED ABOVE REPORTING LIMIT.

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

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)

AEN/GC/FID

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

AEN/GC/FIX

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

AEN/GC/FPD

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

AEN/GC/PID

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

AEN/GC/TCD

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

SW-846 METHOD 9020

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

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

SW = STEVE WILHITE
PL = PAUL LESCHENSKY
RW = ROBERT WOLFE
KS = KENDALL SMITH
KL = KERRY LEMONT
RP = ROB PEREZ
JBT = JENNIFER TORRANCE
LP = LAVERNE PETERSON
PLD = PAULA DOUGHTY

SHADED AREAS ARE FOR LAB USE ONLY

PLEASE FILL THIS FORM IN COMPLETELY.

[illegible]



American Environmental Network
Albuquerque, New Mexico

Interlab Chain of Custody

DATE: 5-30-97 PAGE: 1 of 1

NETWORK PROJECT MANAGER: KIMBERLY D. McNEILL

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

705622

CLIENT PROJECT MANAGER

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals - TAL	Metals - PP List	Metals - RCRA	RCRA Metals by TCLP (1311)	Metals total ?	Metals Dissolved ?	TOX	TOC	Gen Chemistry	Oil and Grease	BOD	COD	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	8240 (TCLP 1311) ZHE	8270 (TCLP 1311)	TC-14	Gross Alpha/Beta	NUMBER OF CONTAINERS
705377-01	5-28	1000	AA	1																						
-02				2																						
-03				3																						
-04																										

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NUMBER	705377	TOTAL NUMBER OF CONTAINERS	
PROJECT NAME	Fluor David	CHAIN OF CUSTODY SEALS	
OK LEVEL	IV	INTACT?	
OK RECEIVED	MS MSD BLANK	RECEIVED GOOD COND/COLD	
TAI	STANDARD	LAB NUMBER	
DUE DATE: 6-19-97		Dissolved Metals	
MUSH SURCHARGE:		Not Preserved or Filtered	
CLIENT DISCOUNT:			
SPECIAL CEMENTATION REQUIRED: [] YES [] NO			
SAMPLES SENT TO:		RELINQUISHED BY:	
SAN DIEGO		Signature: [Signature] Time: 1700	
Paragon		Printed Name: Brian Price Date: 05-30-97	
RENTON		Abuquerque	
PENSACOLA		RECEIVED BY: NM	
PORTLAND		Signature: [Signature] Time: 0945	
PHOENIX		Printed Name: K.E. Shepard Date: 5/31/97	
Company:		Company: AEN	

American Environmental Network of Florida

PROJECT SAMPLE INSPECTION FORM

Lab Accession #: 705622

Date Received: 31-May-97

- | | |
|---|---|
| <p>1. Was there a Chain of Custody? <u>Yes</u> No*</p> <p>2. Was Chain of Custody properly filled out and relinquished? <u>Yes</u> No*</p> <p>3. Were samples received cold? <u>Yes</u> No* N/A
(Criteria: 1° - 4°C: AEN-SOP 1055)</p> <p>4. Were all samples properly labeled and identified? <u>Yes</u> No*</p> <p>5. Did samples require splitting? Yes* <u>No</u>
Req By: PM Client Other*</p> <p>6. Were samples received in proper containers for analysis requested? <u>Yes</u> No*</p> <p>7. Were all sample containers received intact? <u>Yes</u> No*</p> | <p>8. Were samples checked for preservative? <u>Yes</u> No* N/A
(Check pH of all H₂O requiring preservative except VOA vials that require zero headspace)*</p> <p>9. Is there sufficient volume for analysis requested? <u>Yes</u> No* <u>6/4/97</u></p> <p>10. Were samples received within Holding Time? <u>Yes</u> No* (REFER TO AEN-SOP 1040)</p> <p>11. Is Headspace visible > ¼" in diameter in VOA vials?* If any headspace is evident, comment in out-of-control section. Yes* No <u>N/A</u></p> <p>12. If sent, were matrix spike bottles returned? Yes No* <u>N/A</u></p> <p>13. Was Project Manager notified of problems? (initials: _____) Yes No* <u>N/A</u></p> |
|---|---|

Airbill Number(s): 218 3328 777

Shipped By: FEDEX

Cooler Number(s): N/A

Shipping Charges: N/A

Cooler Weight(s): N/A

Cooler Temp(s) (°C): 2°C - CLK 5

(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

Out of Control Events and Inspection Comments:

Client Cooler
metals samples on hold in Sample Control.
notification received 6/4/97 @ 1125 from ^{client} for additional log-
in parameters, see attached. PH sample is out of hold time.

(USE BACK OF PSIF FOR ADDITIONAL NOTES AND COMMENTS)

Inspected By: PJE Date: 5/31/97 Logged By: PJE Date: 5/31/97

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

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

* All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (AEN-SOP 938, section 2.2.9).

* According to EPA, ¼" of headspace is allowed in 40 ml vials requiring volatile analysis, however, AEN makes it policy to record any headspace as out-of-control (AEN-SOP 938, section 2.2.12).



American Environmental Network, Inc.

AEN I.D. 610376

November 5, 1996

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

Project Name IB Remediation
Project Number (none)

Attention: BOB MENZIE

On 10/21/96 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8020 was performed by American Environmental Network (NM) Inc., Albuquerque, NM.

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

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



Kimberly D. McNeill
Project Manager



H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt

Enclosure

CLIENT : MARATHON OIL CO. AEN I.D. : 610376
PROJECT # : (none) DATE RECEIVED : 10/21/96
PROJECT NAME : IB Remediation REPORT DATE : 11/5/96

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	DI H2O	AQUEOUS	10/16/96
02	INT RB	AQUEOUS	10/16/96
03	MW-70RB	AQUEOUS	10/16/96
04	MW-70	AQUEOUS	10/16/96
05	SW-03RB	AQUEOUS	10/16/96
06	SW-03	AQUEOUS	10/16/96
07	MW-63RB	AQUEOUS	10/16/96
08	MW-63	AQUEOUS	10/16/96
09	MW-89RB	AQUEOUS	10/16/96
10	MW-89	AQUEOUS	10/16/96
11	MW-66RB	AQUEOUS	10/16/96
12	MW-66	AQUEOUS	10/16/96
	MW-58	AQUEOUS	10/16/96
	MW-88RB	AQUEOUS	10/17/96
15	MW-88	AQUEOUS	10/17/96
16	MW-71RB	AQUEOUS	10/17/96
17	MW-71	AQUEOUS	10/17/96
18	MW-60RB	AQUEOUS	10/17/96
19	MW-60	AQUEOUS	10/17/96
20	MW-87RB	AQUEOUS	10/17/96
21	MW-87	AQUEOUS	10/17/96
22	MW-87ARB	AQUEOUS	10/17/96
23	MW-57RB	AQUEOUS	10/17/96
24	MW-57	AQUEOUS	10/17/96
25	MW-78RB	AQUEOUS	10/18/96
26	MW-78	AQUEOUS	10/18/96
27	MW-55RB	AQUEOUS	10/18/96
28	MW-55	AQUEOUS	10/18/96
29	MW-54RB	AQUEOUS	10/18/96
30	MW-54	AQUEOUS	10/18/96
31	MW-61RB	AQUEOUS	10/18/96
32	MW-61	AQUEOUS	10/18/96
33	MW-77	AQUEOUS	10/18/96
34	MW-87A	AQUEOUS	10/18/96
35	MW-50	AQUEOUS	10/18/96
36	MW-49	AQUEOUS	10/18/96
37	MW-44	AQUEOUS	10/18/96
38	MW-43	AQUEOUS	10/19/96
	MW-41	AQUEOUS	10/19/96

CLIENT	: MARATHON OIL CO.	AEN I.D.	: 610376
PROJECT #	: (none)	DATE RECEIVED	: 10/21/96
PROJECT NAME	: IB Remediation	REPORT DATE	: 11/5/96

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
40	MW-11	AQUEOUS	10/19/96
41	MW-13	AQUEOUS	10/19/96
42	MW-38	AQUEOUS	10/19/96
43	MW-39	AQUEOUS	10/19/96
44	MW-19	AQUEOUS	10/19/96
45	MW-48	AQUEOUS	10/19/96
46	MW-47	AQUEOUS	10/19/96
47	MW-46	AQUEOUS	10/19/96
48	MW-56	AQUEOUS	10/19/96
49	MW-79	AQUEOUS	10/19/96
50	MW-65	AQUEOUS	10/19/96
51	SW-1	AQUEOUS	10/17/96
	E STRIPPER INLET	AQUEOUS	10/17/96
	E STRIPPER OUTLET	AQUEOUS	10/17/96
54	W STRIPPER INLET	AQUEOUS	10/17/96
55	W STRIPPER OUTLET	AQUEOUS	10/17/96
56	LYMAN	AQUEOUS	10/17/96
57	ARROYO	AQUEOUS	10/17/96
58	BIEBBLE	AQUEOUS	10/17/96
59	LYMAN	AQUEOUS	10/18/96
60	ARROYO	AQUEOUS	10/18/96
61	BIEBBLE	AQUEOUS	10/18/96
62	MW-76	AQUEOUS	10/18/96
63	MW-61A	AQUEOUS	10/18/96

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 610510
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 610376
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 610376-04			Lab ID: 001		
CHLORIDE (325.3)	MG/L	10	1	CIW059	
Comments:					
Client ID: 610376-06			Lab ID: 002		
CHLORIDE (325.3)	MG/L	24	1	CIW059	
Comments:					
Client ID: 610376-08			Lab ID: 003		
CHLORIDE (325.3)	MG/L	7	1	CIW059	
Comments:					
Client ID: 610376-10			Lab ID: 004		
CHLORIDE (325.3)	MG/L	63	1	CIW059	
Comments:					
Client ID: 610376-12			Lab ID: 005		
CHLORIDE (325.3)	MG/L	7	1	CIW059	
Comments:					
Client ID: 610376-13			Lab ID: 006		
CHLORIDE (325.3)	MG/L	38	1	CIW059	
Comments:					
Client ID: 610376-15			Lab ID: 007		
CHLORIDE (325.3)	MG/L	25	1	CIW059	
Comments:					
Client ID: 610376-17			Lab ID: 008		
CHLORIDE (325.3)	MG/L	30	1	CIW059	
Comments:					

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 610510
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 610376
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 610376-19			Lab ID: 009		
CHLORIDE (325.3)	MG/L	12	1	CIW059	
Comments:					
Client ID: 610376-21			Lab ID: 010		
CHLORIDE (325.3)	MG/L	12	1	CIW059	
Comments:					
Client ID: 610376-24			Lab ID: 011		
CHLORIDE (325.3)	MG/L	30	1	CIW059	
Comments:					
Client ID: 610376-26			Lab ID: 012		
CHLORIDE (325.3)	MG/L	31	1	CIW059	
Comments:					
Client ID: 610376-28			Lab ID: 013		
CHLORIDE (325.3)	MG/L	210	1	CIW060	
Comments:					
Client ID: 610376-30			Lab ID: 014		
CHLORIDE (325.3)	MG/L	110	1	CIW060	
Comments:					
Client ID: 610376-32			Lab ID: 015		
CHLORIDE (325.3)	MG/L	420	10	CIW060	+
Comments:					
Client ID: 610376-33			Lab ID: 016		
CHLORIDE (325.3)	MG/L	140	1	CIW060	
Comments:					

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 610510
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 610376
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 610376-34			Lab ID: 017		
CHLORIDE (325.3)	MG/L	110	1	CIW060	
Comments:					
Client ID: 610376-35			Lab ID: 018		
CHLORIDE (325.3)	MG/L	360	10	CIW060	+
Comments:					
Client ID: 610376-36			Lab ID: 019		
CHLORIDE (325.3)	MG/L	36	1	CIW060	
Comments:					
Client ID: 610376-37			Lab ID: 020		
CHLORIDE (325.3)	MG/L	32	1	CIW060	
Comments:					
Client ID: 610376-38			Lab ID: 021		
CHLORIDE (325.3)	MG/L	380	10	CIW060	+
Comments:					
Client ID: 610376-39			Lab ID: 022		
CHLORIDE (325.3)	MG/L	250	10	CIW060	+
Comments:					
Client ID: 610376-40			Lab ID: 023		
CHLORIDE (325.3)	MG/L	16	1	CIW060	
Comments:					
Client ID: 610376-41			Lab ID: 024		
CHLORIDE (325.3)	MG/L	45	1	CIW060	
Comments:					

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 610510
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 610376
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 610376-42			Lab ID: 025		
CHLORIDE (325.3)	MG/L	280	10	CIW061	+
Comments:					
Client ID: 610376-43			Lab ID: 026		
CHLORIDE (325.3)	MG/L	140	1	CIW060	
Comments:					
Client ID: 610376-44			Lab ID: 027		
CHLORIDE (325.3)	MG/L	96	1	CIW060	
Comments:					
Client ID: 610376-45			Lab ID: 028		
CHLORIDE (325.3)	MG/L	200	1	CIW060	
Comments:					
Client ID: 610376-46			Lab ID: 029		
CHLORIDE (325.3)	MG/L	700	10	CIW060	+
Comments:					
Client ID: 610376-47			Lab ID: 030		
CHLORIDE (325.3)	MG/L	170	10	CIW060	+
Comments:					
Client ID: 610376-48			Lab ID: 031		
CHLORIDE (325.3)	MG/L	270	10	CIW061	+
Comments:					
Client ID: 610376-49			Lab ID: 032		
CHLORIDE (325.3)	MG/L	20	1	CIW061	
Comments:					

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 610510
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 610376
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 610376-50			Lab ID: 033		
CHLORIDE (325.3)	MG/L	3	1	CIW061	
Comments:					
Client ID: 610376-51			Lab ID: 034		
CHLORIDE (325.3)	MG/L	23	1	CIW059	
Comments:					
Client ID: 610376-59			Lab ID: 035		
CHLORIDE (325.3)	MG/L	10	1	CIW060	
Comments:					
Client ID: 610376-60			Lab ID: 036		
CHLORIDE (325.3)	MG/L	8	1	CIW060	
Comments:					
Client ID: 610376-61			Lab ID: 037		
CHLORIDE (325.3)	MG/L	11	1	CIW061	
Comments:					

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 610510
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 610376
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: Group of Single Wetchem

Client ID:	Lab Matrix: ID:	Date/Time Sampled:	Date Received:
610376-04	001 WATER	16-OCT-96 1030	22-OCT-96
610376-06	002 WATER	16-OCT-96 1240	22-OCT-96
610376-08	003 WATER	16-OCT-96 1350	22-OCT-96
610376-10	004 WATER	16-OCT-96 1530	22-OCT-96
610376-12	005 WATER	16-OCT-96 1650	22-OCT-96
610376-13	006 WATER	16-OCT-96 1810	22-OCT-96
610376-15	007 WATER	17-OCT-96 0820	22-OCT-96
610376-17	008 WATER	17-OCT-96 1205	22-OCT-96
610376-19	009 WATER	17-OCT-96 1325	22-OCT-96
610376-21	010 WATER	17-OCT-96 1450	22-OCT-96
610376-24	011 WATER	17-OCT-96 1755	22-OCT-96
610376-26	012 WATER	18-OCT-96 1005	22-OCT-96
610376-28	013 WATER	18-OCT-96 1055	22-OCT-96
610376-30	014 WATER	18-OCT-96 1220	22-OCT-96
610376-32	015 WATER	18-OCT-96 1350	22-OCT-96
610376-33	016 WATER	18-OCT-96 1440	22-OCT-96
610376-34	017 WATER	18-OCT-96 1505	22-OCT-96
610376-35	018 WATER	18-OCT-96 1525	22-OCT-96
610376-36	019 WATER	18-OCT-96 1555	22-OCT-96
610376-37	020 WATER	18-OCT-96 1620	22-OCT-96
610376-38	021 WATER	19-OCT-96 0720	22-OCT-96
610376-39	022 WATER	19-OCT-96 0735	22-OCT-96
610376-40	023 WATER	19-OCT-96 0750	22-OCT-96
610376-41	024 WATER	19-OCT-96 0822	22-OCT-96
610376-42	025 WATER	19-OCT-96 0900	22-OCT-96
610376-43	026 WATER	19-OCT-96 0925	22-OCT-96
610376-44	027 WATER	19-OCT-96 0950	22-OCT-96
610376-45	028 WATER	19-OCT-96 1025	22-OCT-96
610376-46	029 WATER	19-OCT-96 1045	22-OCT-96
610376-47	030 WATER	19-OCT-96 1110	22-OCT-96
610376-48	031 WATER	19-OCT-96 1145	22-OCT-96
610376-49	032 WATER	19-OCT-96 1210	22-OCT-96
610376-50	033 WATER	19-OCT-96 1250	22-OCT-96
610376-51	034 WATER	17-OCT-96 1455	22-OCT-96
610376-59	035 WATER	18-OCT-96 1221	22-OCT-96
610376-60	036 WATER	18-OCT-96 1228	22-OCT-96
610376-61	037 WATER	18-OCT-96 1241	22-OCT-96

American Environmental Network, Inc.

"Method Report Summary"

Accession Number: 610510
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 610376
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
610376-04	CHLORIDE (325.3)	MG/L	10
610376-06	CHLORIDE (325.3)	MG/L	24
610376-08	CHLORIDE (325.3)	MG/L	7
610376-10	CHLORIDE (325.3)	MG/L	63
610376-12	CHLORIDE (325.3)	MG/L	7
610376-13	CHLORIDE (325.3)	MG/L	38
610376-15	CHLORIDE (325.3)	MG/L	25
610376-17	CHLORIDE (325.3)	MG/L	30
610376-19	CHLORIDE (325.3)	MG/L	12
610376-21	CHLORIDE (325.3)	MG/L	12
610376-24	CHLORIDE (325.3)	MG/L	30
610376-26	CHLORIDE (325.3)	MG/L	31
610376-28	CHLORIDE (325.3)	MG/L	210
610376-30	CHLORIDE (325.3)	MG/L	110
610376-32	CHLORIDE (325.3)	MG/L	420
610376-33	CHLORIDE (325.3)	MG/L	140
610376-34	CHLORIDE (325.3)	MG/L	110
610376-35	CHLORIDE (325.3)	MG/L	360
610376-36	CHLORIDE (325.3)	MG/L	36

"Method Report Summary"

Accession Number: 610510
Client: AMERICAN ENVIRONMENTAL NETWORK OF NEW MEXICO
Project Number: 610376
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
610376-37	CHLORIDE (325.3)	MG/L	32
610376-38	CHLORIDE (325.3)	MG/L	380
610376-39	CHLORIDE (325.3)	MG/L	250
610376-40	CHLORIDE (325.3)	MG/L	16
610376-41	CHLORIDE (325.3)	MG/L	45
610376-42	CHLORIDE (325.3)	MG/L	280
610376-43	CHLORIDE (325.3)	MG/L	140
610376-44	CHLORIDE (325.3)	MG/L	96
610376-45	CHLORIDE (325.3)	MG/L	200
610376-46	CHLORIDE (325.3)	MG/L	700
610376-47	CHLORIDE (325.3)	MG/L	170
610376-48	CHLORIDE (325.3)	MG/L	270
610376-49	CHLORIDE (325.3)	MG/L	20
610376-50	CHLORIDE (325.3)	MG/L	3
610376-51	CHLORIDE (325.3)	MG/L	23
610376-59	CHLORIDE (325.3)	MG/L	10
610376-60	CHLORIDE (325.3)	MG/L	8
610376-61	CHLORIDE (325.3)	MG/L	11

American Environmental Network, Inc.

"WetChem Quality Control Report"

Parameter:	CHLORIDE	CHLORIDE	CHLORIDE
Batch Id:	CIW059	CIW060	CIW061
Blank Result:	<1	<1	<1
Anal. Method:	325.3	325.3	325.3
Prep. Method:	N/A	N/A	N/A
Analysis Date:	23-OCT-96	23-OCT-96	23-OCT-96
Prep. Date:	23-OCT-96	23-OCT-96	23-OCT-96

Sample Duplication

Sample Dup:	610509-2	610510-15	610510-25
Rept Limit:	<10+	<10+	<10+
Sample Result:	305	420	279
Dup Result:	304	421	281
Sample RPD:	0	0	1
Max RPD:	6	6	6
Dry Weight%	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	610509-2	610510-15	610510-25
Rept Limit:	<10+	<10+	<10+
Sample Result:	305	420	279
Spiked Result:	891	999	835
Spike Added:	550	550	550
% Recovery:	107	105	101
% Rec Limits:	89-110	89-110	89-110
Dry Weight%	N/A	N/A	N/A

ICV

ICV Result:	93	100	99
True Result:	100	100	100
% Recovery:	93	100	99
% Rec Limits:	90-110	90-110	90-110

LCS

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

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

N/A = NOT APPLICABLE.
N/S = NOT SUBMITTED.
N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW AEN REPORTING LIMIT;
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.
N/D = NOT DETECTED.
DISS. OR D = DISSOLVED
T & D = TOTAL AND DISSOLVED
R = REACTIVE
T = TOTAL
G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT
OR BELOW AEN REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".
Q = THE ANALYTICAL (POST-DISTILLATION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY
BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DISTILLATION) SPIKE.
= ELEVATED REPORTING LIMIT DUE TO INSUFFICIENT SAMPLE.
+ = ELEVATED REPORTING LIMIT DUE TO DILUTION INTO CALIBRATION RANGE.
* = ELEVATED REPORTING LIMIT DUE TO MATRIX INTERFERENCE. (DILUTION PRIOR
TO ANALYSIS)
@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX. (DILUTION PRIOR TO
DIGESTION)
P = ANALYTICAL (POST DIGESTION) SPIKE.
I = DUPLICATE INJECTION.
& = AUTOMATED
F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
N/C+ = NOT CALCULABLE
N/C* = NOT CALCULABLE; SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.
H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND THE
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN REPORTING
LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".
A = SAMPLE AND DUPLICATE RESULTS ARE "OUT OF CONTROL".
Z = THE SAMPLE RESULT FOR THE SPIKE IS BELOW THE REPORTING LIMIT. HOWEVER,
THIS RESULT IS REPORTED FOR ACCURATE QC CALCULATIONS.
NH= SAMPLE AND / OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".
SAMPLE IS NON-HOMOGENEOUS.
(*) = DETECTION LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.
(CA) = SEE CORRECTIVE ACTIONS FORM.
**= MATRIX INTERFERENCE
SW-846, 3rd Edition, latest revision
EPA 600/4-79-020, Revised March 1983.
STANDARD METHODS, For the Examination of Water and Wastewater, 18TH ED., 1992
NIOSH Manual of Analytical Methods, 4th Edition.
ANNUAL BOOK OF ASTM STANDARDS, VOLUME 11.01, 1991.
METHODS FOR THE DETERMINATION OF INORGANIC SUBSTANCES IN ENVIRONMENTAL SAMPLES,
EPA600/R-93/100, AUGUST 1993

1. COLIFORM. COLIFORM PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN
THE LOGARITHM OF COLONIES PER 100 MLS OF SAMPLE ON DUPLICATE PLATES.
2. PH. PH PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN THE
SAMPLE AND DUPLICATE ANALYSIS.
3. FLASHPOINT. FLASHPOINT PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN
THE SAMPLE AND DUPLICATE ANALYSIS. IF FLASHPOINT IS LESS THAN 25
DEGREES CELSIUS, THE DETECTION LIMIT BECOMES THE INITIAL STARTING
TEMPERATURE.

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

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

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
01	DI H2O	AQUEOUS	10/16/96	NA	10/21/96	1
02	INT RB	AQUEOUS	10/16/96	NA	10/21/96	1
03	MW-70RB	AQUEOUS	10/16/96	NA	10/22/96	1
PARAMETER		DET. LIMIT	UNITS	01	02	03
BENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE		0.5	UG/L	< 0.5	< 0.5	0.5
ETHYLBENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES		0.5	UG/L	25	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

104

97

105

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
04	MW-70	AQUEOUS	10/16/96	NA	10/22/96	1
05	SW-03RB	AQUEOUS	10/16/96	NA	10/22/96	1
06	SW-03	AQUEOUS	10/16/96	NA	10/22/96	1
PARAMETER		DET. LIMIT	UNITS	04	05	06
BENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE		0.5	UG/L	< 0.5	0.5	< 0.5
ETHYLBENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
AL XYLENES		0.5	UG/L	< 0.5	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

99

100

99

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
07	MW-63RB	AQUEOUS	10/16/96	NA	10/22/96	1
08	MW-63	AQUEOUS	10/16/96	NA	10/22/96	1
09	MW-89RB	AQUEOUS	10/16/96	NA	10/22/96	1

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

SURROGATE:

BROMOFLUOROBENZENE (%)

106

93

98

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
10	MW-89	AQUEOUS	10/16/96	NA	10/22/96	1
11	MW-66RB	AQUEOUS	10/16/96	NA	10/22/96	1
12	MW-66	AQUEOUS	10/16/96	NA	10/22/96	1
PARAMETER		DET. LIMIT	UNITS	10	11	12
BENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES		0.5	UG/L	< 0.5	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

98

94

103

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
 CLIENT : MARATHON OIL CO.
 PROJECT # : (none)
 PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
13	MW-58	AQUEOUS	10/16/96	NA	10/22/96	100
14	MW-88RB	AQUEOUS	10/17/96	NA	10/22/96	1
15	MW-88	AQUEOUS	10/17/96	NA	10/23/96	1

PARAMETER	DET. LIMIT	UNITS	13	14	15
BENZENE	0.5	UG/L	110	< 0.5	< 0.5
TOLUENE	0.5	UG/L	320	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	940	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	10000	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)		149*	105	101
SURROGATE LIMITS	(80 - 120)			

CHEMIST NOTES:

*SURROGATE OUTSIDE CONTROL LIMITS DUE TO MATRIX INTERFERENCE.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
16	MW-71RB	AQUEOUS	10/17/96	NA	10/22/96	1
17	MW-71	AQUEOUS	10/17/96	NA	10/22/96	1
18	MW-60RB	AQUEOUS	10/17/96	NA	10/22/96	1

PARAMETER	DET. LIMIT	UNITS	16	17	18
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	0.8	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)	104	105	107
SURROGATE LIMITS (80 - 120)			

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	
19	MW-60	AQUEOUS	10/17/96	NA	10/22/96	1
20	MW-87RB	AQUEOUS	10/17/96	NA	10/22/96	1
21	MW-87	AQUEOUS	10/17/96	NA	10/22/96	1

PARAMETER	DET. LIMIT	UNITS	19	20	21
BENZENE	0.5	UG/L	2.5	< 0.5	< 0.5
TOLUENE	0.5	UG/L	0.9	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES	0.5	UG/L	< 0.5	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%) 100 101 100

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
22	MW-87ARB	AQUEOUS	10/17/96	NA	10/22/96	1
23	MW-57RB	AQUEOUS	10/17/96	NA	10/22/96	1
24	MW-57	AQUEOUS	10/17/96	NA	10/22/96	1

PARAMETER	DET. LIMIT	UNITS	22	23	24
BENZENE	0.5	UG/L	< 0.5	0.5	54
TOLUENE	0.5	UG/L	< 0.5	< 0.5	2.8
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	3.4
TOTAL XYLENES	0.5	UG/L	< 0.5	< 0.5	13

SURROGATE:

BROMOFLUOROBENZENE (%) 98 98 103

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
25	MW-78RB	AQUEOUS	10/18/96	NA	10/23/96	1
26	MW-78	AQUEOUS	10/18/96	NA	10/23/96	1
27	MW-55RB	AQUEOUS	10/18/96	NA	10/23/96	1
PARAMETER		DET. LIMIT	UNITS	25	26	27
BENZENE		0.5	UG/L	< 0.5	32	< 0.5
TOLUENE		0.5	UG/L	0.5	15	< 0.5
ETHYLBENZENE		0.5	UG/L	< 0.5	9.1	< 0.5
TOTAL XYLENES		0.5	UG/L	< 0.5	35	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

103

110

96

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
28	MW-55	AQUEOUS	10/18/96	NA	10/23/96	10
29	MW-54RB	AQUEOUS	10/18/96	NA	10/23/96	1
30	MW-54	AQUEOUS	10/18/96	NA	10/23/96	1
PARAMETER		DET. LIMIT	UNITS	28	29	30
BENZENE		0.5	UG/L	520	< 0.5	0.9
TOLUENE		0.5	UG/L	32	< 0.5	< 0.5
ETHYLBENZENE		0.5	UG/L	460	< 0.5	0.6
TOTAL XYLENES		0.5	UG/L	84	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)	101	98	100
SURROGATE LIMITS (80 - 120)			

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
31	MW-61RB	AQUEOUS	10/18/96	NA	10/23/96	1
32	MW-61	AQUEOUS	10/18/96	NA	10/23/96	1
33	MW-77	AQUEOUS	10/18/96	NA	10/23/96	50
PARAMETER	DET. LIMIT	UNITS	31	32	33	
BENZENE	0.5	UG/L	< 0.5	< 0.5		160
TOLUENE	0.5	UG/L	< 0.5	< 0.5		320
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5		150
TOTAL XYLENES	0.5	UG/L	6.7	< 0.5		1000

SURROGATE:

BROMOFLUOROBENZENE (%)		100	95	108
SURROGATE LIMITS	(80 - 120)			

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
34	MW-87A	AQUEOUS	10/18/96	NA	10/23/96	1
35	MW-50	AQUEOUS	10/18/96	NA	10/23/96	1
36	MW-49	AQUEOUS	10/18/96	NA	10/23/96	10
PARAMETER		DET. LIMIT	UNITS	34	35	36
BENZENE		0.5	UG/L	< 0.5	< 0.5	95
TOLUENE		0.5	UG/L	< 0.5	< 0.5	16
ETHYLBENZENE		0.5	UG/L	< 0.5	< 0.5	36
TOTAL XYLENES		0.5	UG/L	< 0.5	< 0.5	12

SURROGATE:

BROMOFLUOROBENZENE (%)	106	99	101
SURROGATE LIMITS (80 - 120)			

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
37	MW-44	AQUEOUS	10/18/96	NA	10/23/96	1
38	MW-43	AQUEOUS	10/19/96	NA	10/23/96	1
39	MW-41	AQUEOUS	10/19/96	NA	10/23/96	1

PARAMETER	DET. LIMIT	UNITS	37	38	39
BENZENE	0.5	UG/L	33	230	8.1
TOLUENE	0.5	UG/L	2.7	2.1	2.4
ETHYLBENZENE	0.5	UG/L	20	4.3	5.8
TOTAL XYLENES	0.5	UG/L	2.6	3.6	5.5

SURROGATE:

BROMOFLUOROBENZENE (%)

98

115

97

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
40	MW-11	AQUEOUS	10/19/96	NA	10/23/96	10
41	MW-13	AQUEOUS	10/19/96	NA	10/23/96	100
42	MW-38	AQUEOUS	10/19/96	NA	10/23/96	1

PARAMETER	DET. LIMIT	UNITS	40	41	42
BENZENE	0.5	UG/L	270	1100	0.6
TOLUENE	0.5	UG/L	15	520	< 0.5
ETHYLBENZENE	0.5	UG/L	230	1200	< 0.5
AL XYLENES	0.5	UG/L	1600	2800	0.7

SURROGATE:

BROMOFLUOROBENZENE (%)

104

130*

92

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

*SURROGATE OUTSIDE CONTROL LIMITS DUE TO MATRIX INTERFERENCE.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
43	MW-39	AQUEOUS	10/19/96	NA	10/23/96	1
44	MW-19	AQUEOUS	10/19/96	NA	10/23/96	5
45	MW-48	AQUEOUS	10/19/96	NA	10/23/96	1

PARAMETER	DET. LIMIT	UNITS	43	44	45
BENZENE	0.5	UG/L	20	140	< 0.5
TOLUENE	0.5	UG/L	< 0.5	5.9	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	5.2	< 0.5
AL XYLENES	0.5	UG/L	< 0.5	17	1.0

SURROGATE:

BROMOFLUOROBENZENE (%)	129*	104	97
SURROGATE LIMITS (80 - 120)			

CHEMIST NOTES:

*SURROGATE OUTSIDE CONTROL LIMITS DUE TO MATRIX INTERFERENCE.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
46	MW-47	AQUEOUS	10/19/96	NA	10/23/96	10
47	MW-46	AQUEOUS	10/19/96	NA	10/24/96	10
48	MW-56	AQUEOUS	10/19/96	NA	10/23/96	10
PARAMETER		DET. LIMIT	UNITS	46	47	48
BENZENE		0.5	UG/L	1500	900	1000
TOLUENE		0.5	UG/L	59	33	23
ETHYLBENZENE		0.5	UG/L	200	440	94
TOTAL XYLENES		0.5	UG/L	250	59	92

SURROGATE:

BROMOFLUOROBENZENE (%)

119

99

111

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
49	MW-79	AQUEOUS	10/19/96	NA	10/23/96	1
50	MW-65	AQUEOUS	10/19/96	NA	10/24/96	1
51	SW-1	AQUEOUS	10/17/96	NA	10/24/96	1
PARAMETER		DET. LIMIT	UNITS	49	50	51
BENZENE		0.5	UG/L	1.7	< 0.5	< 0.5
TOLUENE		0.5	UG/L	5.8	< 0.5	< 0.5
ETHYLBENZENE		0.5	UG/L	1.0	< 0.5	< 0.5
TOTAL XYLENES		0.5	UG/L	4.2	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

93

101

102

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
52	E STRIPPER INLET	AQUEOUS	10/17/96	NA	10/24/96	10
53	E STRIPPER OUTLET	AQUEOUS	10/17/96	NA	10/24/96	1
54	W STRIPPER INLET	AQUEOUS	10/17/96	NA	10/24/96	10
PARAMETER	DET. LIMIT	UNITS	52	53	54	
BENZENE	0.5	UG/L	25	0.5	64	
TOLUENE	0.5	UG/L	36	1.7	26	
ETHYLBENZENE	0.5	UG/L	13	1.0	13	
TOTAL XYLENES	0.5	UG/L	120	6.5	160	

SURROGATE:

BROMOFLUOROBENZENE (%)

108

114

104

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
55	W STRIPPER OUTLET	AQUEOUS	10/17/96	NA	10/24/96	1
56	LYMAN	AQUEOUS	10/17/96	NA	10/24/96	1
57	ARROYO	AQUEOUS	10/17/96	NA	10/24/96	1

PARAMETER	DET. LIMIT	UNITS	55	56	57
BENZENE	0.5	UG/L	0.7	< 0.5	< 0.5
TOLUENE	0.5	UG/L	2.9	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	1.5	< 0.5	< 0.5
AL XYLENES	0.5	UG/L	13	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

108

103

99

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation

AEN I.D.: 610376

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
58	BIEBBLE	AQUEOUS	10/18/96	NA	10/24/96	1
62	MW-76	AQUEOUS	10/18/96	NA	10/24/96	1
63	MW-61A	AQUEOUS	10/18/96	NA	10/24/96	1

PARAMETER	DET. LIMIT	UNITS	58	62	63
BENZENE	0.5	UG/L	< 0.5	< 0.5	1.7
TOLUENE	0.5	UG/L	< 0.5	< 0.5	1.7
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	1.3
AL XYLENES	0.5	UG/L	0.5	< 0.5	9.4

SURROGATE:

BROMOFLUOROBENZENE (%)	95	101	100
SURROGATE LIMITS (80 - 120)			

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 610376
BLANK I. D.	: 102196 B	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 10/21/96
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB Remediation		

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

ROGATE:
BROMOFLUOROBENZENE (%) 108
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 610376
BLANK I. D.	: 102296	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 10/22/96
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB Remediation		

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

PROGATE:
BROMOFLUOROBENZENE (%) 105
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 610376
BLANK I. D.	: 102296 B	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 10/22/96
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB Remediation		

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

SURROGATE:
BROMOFLUOROBENZENE (%) 101
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 610376
BLANK I. D.	: 102396	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 10/23/96
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB Remediation		

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

SURROGATE:
BROMOFLUOROBENZENE (%) 95
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 610376
BLANK I. D.	: 102396 B	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 10/23/96
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB Remediation		

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

SURROGATE:
BROMOFLUOROBENZENE (%) 102
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 610376
BLANK I. D.	: 102496	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 10/24/96
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB Remediation		

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

SURROGATE:
BROMOFLUOROBENZENE (%) 105
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 610376
BLANK I. D.	: 102496 B	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 10/24/96
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB Remediation		

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

SURROGATE:
BROMOFLUOROBENZENE (%) 101
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: BTEX (EPA 8020)	AEN I.D.	: 610376
MSMSD #	: 610376-03	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 10/22/96
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB Remediation	UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.5	10.0	11.3	113	10.8	108	5	(80 - 120)	20
TOLUENE	0.5	10.0	11.4	109	10.9	104	4	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	11.0	110	10.4	104	6	(80 - 120)	20
TOTAL XYLENES	<0.5	30.0	33.6	112	32.2	107	4	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 610376-42
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB Remediation
AEN I.D. : 610376
DATE EXTRACTED : NA
DATE ANALYZED : 10/23/96
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	0.6	10.0	10.0	94	9.7	91	3	(80 - 120)	20
TOLUENE	<0.5	10.0	9.7	97	9.7	97	0	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	9.6	96	9.5	95	1	(80 - 120)	20
TOTAL XYLENES	0.7	30.0	29.4	96	32.6	106	10	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: BTEX (EPA 8020)	AEN I.D.	: 610376
MSMSD #	: 610376-22	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 10/22/96
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB Remediation	UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.5	10.0	10.6	106	10.4	104	2	(80 - 120)	20
TOLUENE	<0.5	10.0	10.8	108	10.6	106	2	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	10.4	104	10.1	101	3	(80 - 120)	20
TOTAL XYLENES	<0.5	30.0	31.8	106	30.9	103	3	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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



American Environmental Network
Albuquerque, New Mexico

Interlab Chain of Custody

DATE: 10/21 PAGE 1 OF 5

NETWORK PROJECT MANAGER: KIMBERLY D. McNEILL

ANALYSIS REQUEST

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

610510.

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals - TAL	Metals - PP List	Metals - RCRA	RCRA Metals by TCLP (1311)	Chloride	TOX	TOC	Gen Chemistry	Oil and Grease	BOD	COD	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	8240 (TCLP 1311) ZHE	8270 (TCLP 1311)	TC-14	Gross Alpha/Beta	NUMBER OF CONTAINERS
610376-04	10/16/16	1230	AG	1					X																
-06	10/16/16	1240		2					X																
-08	10/16/16	1352		3					X																
-10	10/16/16	1530		4					X																
-12	10/16/16	1652		5					X																
-13	10/16/16	1810		6					X																
-15	10/17/16	0820		7					X																
-17	10/17/16	1205		8					X																
-19	10/17/16	1325		9					X																

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY:		RELINQUISHED BY:	
PROJECT NUMBER:		TOTAL NUMBER OF CONTAINERS		SAN DIEGO		Signature:	Time:	Signature:	Time:
PROJECT NAME:	Indian Basin Remediation	CHAIN OF CUSTODY SEALS		Paragon		Printed Name:	Date:	Printed Name:	Date:
QC LEVEL:	STD IV	INTACT?		BENTON		Signature:	Time:	Signature:	Time:
QC REQUIRED:	MS MSD BLANK	RECEIVED GOOD COND/COLD		PENSACOLA		Signature:	Time:	Signature:	Time:
LAB:	STANDARD RUSH	LAB NUMBER		PORTLAND		Signature:	Time:	Signature:	Time:
DATE:	10/31			PHOENIX		Signature:	Time:	Signature:	Time:
INSTRUMENT:						Signature:	Time:	Signature:	Time:
INSTRUMENT:						Signature:	Time:	Signature:	Time:
SPECIAL:						Signature:	Time:	Signature:	Time:
LOCATION REQUIRED:	☐ YES ☒ NO					Signature:	Time:	Signature:	Time:

Interlab Chain of Custody

DATE: 10/21 PAGE: 2 of 5

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

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

610510.

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals - TAL	Metals - PP List	Metals - RCRA	RCRA Metals by TCLP (1311)	Cheride	TOX	TOC	Gen Chemistry	Oil and Grease	BOD	COD	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	8240 (TCLP 1311) ZHE	8270 (TCLP 1311)	TO-15	Gross Alpha/Beta	NUMBER OF CONTAINERS
610376-21	10/17	1450	AR	10					X																
-24	10/17	1755		11					X																
-26	10/18	1005		12					X																
-28	10/18	1055		13					X																
-30	10/18	1220		14					X																
-32	10/18	1350	AR	15					X																
-33	10/18	1440		16					X																
-34	10/18	1505		17					X																
-35	10/18	1525		18					X																

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY:		RELINQUISHED BY:	
PROJECT NUMBER	610376	TOTAL NUMBER OF CONTAINERS		SAN DIEGO		Signature:	Time:	Signature:	Time:
PROJECT NAME	IB remediation	CHAIN OF CUSTODY SEALS		Paragon		Printed Name:	Date:	Printed Name:	Date:
DEVELOPER	STD IV	INTACT?		RENTON		Signature:	Time:	Signature:	Time:
ANALYST	MS MSD BLANK	RECEIVED GOOD COND/COLD		PENSACOLA	X	Printed Name:	Date:	Printed Name:	Date:
LAB	STANDARD RUSH	LAB NUMBER		PORTLAND		Signature:	Time:	Signature:	Time:
DATE	10/31/96			PHOENIX		RECEIVED BY:	1.	RECEIVED BY: (LAB)	2.
TEST SURVEILLANCE						Signature:	Time:	Signature:	Time:
LABORATORY						Printed Name:	Date:	Printed Name:	Date:
SPECIAL						Company:		Company:	

Interlab Chain of Custody

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

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

610510

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals - TAL	Metals - PP List	Metals - RCRA	RCRA Metals by TCLP (1311)	TOX	TOC	Gen Chemistry	Oil and Grease	BOD	COD	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	8240 (TCLP 1311) ZHE	8270 (TCLP 1311)	TO-14	Gross Alpha/Beta	NUMBER OF CONTAINERS
610326-36	10/19/04	1555	AR	19																				
-37	↓	1620		20				X																
-38	10/19/04	0720		21				X																
-39		0735		22				X																
-40	↓	0750		23				X																
-41	10/19	0822		24				X																
-42	↓	0900		25				X																
-43	↓	0925		26				X																
-44	↓	0950		27				X																

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY:		RELINQUISHED BY:	
PROJECT NUMBER: <u>610326</u>	TOTAL NUMBER OF CONTAINERS: <u>27</u>	SAN DIEGO	Signature: <u>[Signature]</u> Time: <u>11:00</u>	Signature: <u>[Signature]</u> Time: <u>11:00</u>					
PROJECT NAME: <u>IEB cem.</u>	CHAIN OF CUSTODY SEALS	Paragon	Printed Name: <u>Kim McNeill</u> Date: <u>10/21/04</u>	Printed Name: <u>[Signature]</u> Date: <u>10/21/04</u>					
QC LEVEL: <u>STD</u> IV	INTACT?	RENTON	Signature: <u>[Signature]</u> Time: <u>11:00</u>	Signature: <u>[Signature]</u> Time: <u>11:00</u>					
QC REQUIRED: <u>MS</u> MSD BLANK	RECEIVED GOOD COND/COLD	PENSACOLA	Signature: <u>[Signature]</u> Time: <u>11:00</u>	Signature: <u>[Signature]</u> Time: <u>11:00</u>					
LAB: <u>STANDARD</u> / RUSH	LAB NUMBER	PORTLAND	Signature: <u>[Signature]</u> Time: <u>11:00</u>	Signature: <u>[Signature]</u> Time: <u>11:00</u>					
DATE: <u>10/31</u>		PHOENIX	Signature: <u>[Signature]</u> Time: <u>11:00</u>	Signature: <u>[Signature]</u> Time: <u>11:00</u>					
INSTRUMENT: <u>10/31</u>			Signature: <u>[Signature]</u> Time: <u>11:00</u>	Signature: <u>[Signature]</u> Time: <u>11:00</u>					
CLIENT DISCOUNT: <u>10/31</u>			Signature: <u>[Signature]</u> Time: <u>11:00</u>	Signature: <u>[Signature]</u> Time: <u>11:00</u>					
SPECIAL: <u>10/31</u>			Signature: <u>[Signature]</u> Time: <u>11:00</u>	Signature: <u>[Signature]</u> Time: <u>11:00</u>					
NOTIFICATION REQUIRED: <u>YES</u> <u>NO</u>			Signature: <u>[Signature]</u> Time: <u>11:00</u>	Signature: <u>[Signature]</u> Time: <u>11:00</u>					

Interlab Chain of Custody

DATE: 10/21/16 PAGE: 4 of 5

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

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

6105.1.0

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals - TAL	Metals - PP List	Metals - RCRA	RCRA Metals by TCLP (1311)	Chloride	TOX	TOC	Gen Chemistry	Oil and Grease	BOD	COD	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	8240 (TCLP 1311) ZHE	8270 (TCLP 1311)	TC-14	Gross Alpha/Beta	NUMBER OF CONTAINERS
610376-45	10/19/16	1025	AA	28					X																
-46		1045		29					X																
-47		1112		30					X																
-48		1145		31					X																
-49		1210		32					X																
-50		1250		33					X																
-51		1455		34					X																
-59	10/18	1221		35					X																
-60		1228		36					X																

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NUMBER 610376	TOTAL NUMBER OF CONTAINERS		
PROJECT NAME I.B. Rem.	CHAIN OF CUSTODY SEALS		
QC LEVEL (STD) IV	INTACT?		
QC REQUIRED (MS MSD BLANK)	RECEIVED GOOD COND/COLD		
LAB (STANDARD) RUSH	LAB NUMBER		
DATE 10/31/16			
MUSL SURCHARGE			
CARTON DISCOUNT			
SPECIAL LOCATION REQUIRED: [] YES [] NO			
SAMPLES SENT TO:		RELINQUISHED BY: 1.	
SAN DIEGO		Signature: [Signature] Time: 10/20/16	
Paragon		Printed Name: [Name] Date: 10/21/16	
RENTON			
PENSACOLA			
PORTLAND			
PHOENIX			
RECEIVED BY: 1.		RECEIVED BY: (LAB) 2.	
Signature: [Signature] Time: 10/21/16		Signature: [Signature] Time: 10/21/16	
Printed Name: [Name] Date: 10/21/16		Printed Name: [Name] Date: 10/21/16	
Company: [Company]		Company: [Company]	

Interlab Chain of Custody

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

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

6105.10

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID DATE TIME MATRIX LAB ID

61037C-61 10/18/96 1241 AQ 37

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

NUMBER OF CONTAINERS

ANALYSIS REQUEST

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER: 61037C

TOTAL NUMBER OF CONTAINERS

SAN DIEGO
 Paragon

Signature: [Signature]
 Time: 1:20
 Printed Name: John C. McNeill
 Date: 10/21/96

Signature: [Signature]
 Time: 10/22/96
 Printed Name: [Name]
 Date: 10/22/96

PROJECT NAME: F&B Remediation

CHAIN OF CUSTODY SEALS

RENTON

Signature: [Signature]
 Time: [Time]
 Printed Name: [Name]
 Date: [Date]

Signature: [Signature]
 Time: [Time]
 Printed Name: [Name]
 Date: [Date]

PROJECT: (STD) IV

INTACT?

PENSACOLA

Signature: [Signature]
 Time: [Time]
 Printed Name: [Name]
 Date: [Date]

Signature: [Signature]
 Time: [Time]
 Printed Name: [Name]
 Date: [Date]

PROJECT: (MS) MSD BLANK

RECEIVED GOOD COND/COLD

PORTLAND

Signature: [Signature]
 Time: [Time]
 Printed Name: [Name]
 Date: [Date]

Signature: [Signature]
 Time: [Time]
 Printed Name: [Name]
 Date: [Date]

PROJECT: (STD) NUSII

LAB NUMBER

PHOENIX

Signature: [Signature]
 Time: [Time]
 Printed Name: [Name]
 Date: [Date]

Signature: [Signature]
 Time: [Time]
 Printed Name: [Name]
 Date: [Date]

DATE: 10/21

PROJECT: NUSII SURCHARGE

PROJECT: NUSII DISCOUNT

SPECIAL: CAUTION REQUIRED: [] YES [] NO

Company: [Company]

Company: [Company]

AEN LAB I.D. 6-10-77/

Price 6/10 5/10

REGISTRATION While Faring AEM Find Compensation

CHAIN OF CUSTODY

DATE: 10/16/96 TIME: 7:11 PM PAGE: 2 OF 7

AEN LAB I.D. 194

610570/194376 6/105/10

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: <u>Bob Menzies</u>		COMPANY: <u>Marathon O/C</u>	
ADDRESS: <u>P.O. Box 552</u>		ADDRESS: <u>Midline, TX 79702</u>	
PHONE: <u>(915) 687-8312</u>		FAX: <u>(915) 687-8305</u>	
BILL TO: <u>Same as ABOVE</u>		COMPANY: <u>Same as ABOVE</u>	
ADDRESS: <u>Same as ABOVE</u>			

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
mw-66 RB	10/16/96	1640	Water	1011
mw-6c	10/16/96	1650		12
mw-58	10/16/96	1810		13
mw-88 RB	10/17/96	0810		14
mw-88	10/17/96	0820		15
mw-71 RB	10/17/96	1150		16
mw-71	10/17/96	1205		17
mw-60 RB	10/17/96	1310		18
mw-6c	10/17/96	1325		19
mw-87 RB	10/17/96	1435		20

ANALYSIS REQUEST	NUMBER OF CONTAINERS
Petroleum Hydrocarbons (418.1) TRPH	
(MOD.8015) Diesel/Direct/Inject	
(M8015) Gas/Purge & Trap	
Gasoline/BTEX & MTBE (M8015/8020)	
BTEX/MTBE (8020)	
BTEX & Chlorinated Aromatics (602/8020)	
BTEX/MTBE/EDC & EDB (8020/8010/Short)	
Chlorinated Hydrocarbons (601/8010)	
Chlorine	
504 EDB / DBCP	
Polynuclear Aromatics (610/8310)	
Volatile Organics (624/8240) GC/MS	
Volatile Organics (8260) GC/MS	
Pesticides/PCB (608/8080)	
Herbicides (615/8150)	
Base/Neutr/Acid Compounds GC/MS (625/8270)	
General Chemistry:	
Priority Pollutant Metals (13)	
Target Analyte List Metals (23)	
RCRA Metals (8)	
RCRA Metals by TCLP Method (311)	
Metals	

PROJECT INFORMATION		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS	
PROJ NO:		(RUSH) ☐ 12hr ☐ 14hr ☐ 72hr ☐ 1 WEEK	(NORMAL) ☐ 1 WEEK
PROJ NAME:	<u>Federal Govt Resid</u>	CERTIFICATION REQUIRED: ☐ INM ☐ SDWA ☐ OTHER	
PO NO:		METHANOL PRESERVATION ☐	
SHIPPED VIA:		COMMENTS: ☐ FIXED FEE ☐	
SAMPLE RECEIPT		MW 58 - high L.L.S	
NO. CONTAINERS	<u>25</u>		
CUSTODY BEALS	<u>25</u>		
RECEIVED INTACT	<u>25</u>		
BE	<u>25</u>		

RELINQUISHED BY: 1.		RELINQUISHED BY: 2.	
Signature:	<u>Ken Cook</u>	Signature:	<u>Ken Cook</u>
Printed Name:	<u>Ken Cook</u>	Printed Name:	<u>Ken Cook</u>
Date:	<u>10/21/96</u>	Date:	<u>10/21/96</u>
Company:	<u>Marathon</u>	Company:	<u>Marathon</u>
RECEIVED BY:	<u>Ken Cook</u>	RECEIVED BY: (LAB)	<u>Ken Cook</u>
Time:	<u>0800</u>	Time:	<u>0800</u>
Date:	<u>10/21/96</u>	Date:	<u>10/21/96</u>
Company:	<u>Marathon</u>	Company:	<u>Marathon</u>

CHAIN OF CUSTODY

DATE: 10/17/96 PAGE: 3 OF 7

AEN LAB I.D.

610334 146 10/22/96 10510

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bob Martinez		COMPANY: Marathon Oil Co.	
ADDRESS: PO Box 552		ADDRESS: Midland TX 79701	
PHONE: (915) 687-8312		FAX: (915) 687-8305	
BILL TO: Same as above		BILL TO: Same as above	
COMPANY: Same as above		COMPANY: Same as above	
ADDRESS: Same as above		ADDRESS: Same as above	

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
mw-87	10/17/96	1450	WATER	21
mw-87A RB		1600		22
mw-57 RB		1740		23
mw-57	✓	1755		24
mw-78 RB	10/18/96	0955		25
mw-78		1005		26
mw-55 RB		1045		27
mw-55		1055		28
mw-54 RB		1210		29
mw-54		1220	✓	30

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS	RELINQUISHED BY:	RELINQUISHED BY:
(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☐	Signature: [Signature] Time: 0800	Signature: [Signature] Time: 0800
CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER	Printed Name: Kevin Cook Date: 10/17/96	Printed Name: Kevin Cook Date: 10/21/96
METHANOL PRESERVATION ☐	Company: [Signature]	Company: [Signature]
COMMENTS: FIXED FEE ☐	RECEIVED BY: [Signature] Time: 10/17/96	RECEIVED BY: (LAB) [Signature] Time: 0800
	Printed Name: [Signature] Date: 10/21/96	Printed Name: [Signature] Date: 10/21/96
	Company: American Environmental Network (NM), Inc.	Company: American Environmental Network (NM), Inc.

ANALYSIS REQUEST	NUMBER OF CONTAINERS
Petroleum Hydrocarbons (418.1) TRPH	5
(MOD.8015) Diesel/Direct/Inject	2
(M8015) Gas/Purge & Trap	2
Gasoline/BTEX & MTBE (M8015/8020)	2
BTEX/MTBE (8020)	2
BTEX & Chlorinated Aromatics (602/8020)	2
BTEX/MTBE/EDC & EDB (8020/8010/Short)	2
Chlorinated Hydrocarbons (601/8010)	2
Chlorine	2
504 EDB ☐ / DBCP ☐	2
Polynuclear Aromatics (610/8310)	2
Volatile Organics (624/8240) GC/MS	2
Volatile Organics (8260) GC/MS	2
Pesticides/PCB (608/8080)	2
Herbicides (615/8150)	2
Base/Neutr/Acid Compounds GC/MS (625/8270)	2
General Chemistry:	2
Priority Pollutant Metals (13)	2
Target Analyte List Metals (23)	2
PCPA Metals (8)	2
PCPA Metals by TCLP Method (311)	2
Metals	2

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

CHAIN OF CUSTODY

AEN LAB I.D. #
610510

DATE: 10/18/96 PAGE: 4 OF 7

PROJECT MANAGER: Rob Meier

ANALYSIS REQUEST

COMPANY: Marathon O.C.
ADDRESS: PO Box 552

PHONE: (915) 657-8312
FAX: (915) 657-8305

BILL TO: _____
COMPANY: _____
ADDRESS: _____

SAME AS ABOVE

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Pe	(M	(M	Gas	BT	BT	BT	Ch	50	Pol	Vol	Vol	Pe	He	Bas	G	Pr	Tar	PC	PC	Na	
MW-61 RB	10/14/96	1340	Water	31					X																	3
MW-61		1350		33					X																	3
MW-77		1440		33					X																	3
MW-87H		1505		31					X																	3
MW-50		1525		35					X																	3
MW-49		1555		36					X																	3
MW-44		1620		37					X																	3
MW-43	10/19/96	0720		38					X																	3
MW-41		0735		39					X																	3
MW-11		0750		40					X																	3

PROJECT INFORMATION

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

PROJ NO: _____ (RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☐

PROJ NAME: Tulsa Basis Remediation CERTIFICATION REQUIRED: ☐ IMM ☐ SDWA ☐ OTHER

PO NO: _____ METHANOL PRESERVATION ☐

SHIPPED VIA: _____ COMMENTS: ☐ FIXED FEE ☐

SAMPLE RECEIPT

NO. CONTAINERS: 29

CUSTODY SEALS: IN/OUT

RECEIVED INTACT: YES

BL: GB

RELINQUISHED BY: 1.

RELINQUISHED BY: 2.

Signature: Rob Meier Time: 0800

Printed Name: Rob Meier Date: 10/21/96

Company: American Environmental Network (NM), Inc.

RECEIVED BY: FDG Time: 1.

Signature: _____

Printed Name: _____ Date: _____

Company: _____

RECEIVED BY: (LAB) FDG Time: 0600

Signature: FDG

Printed Name: FDG Date: 10/21/96

Company: American Environmental Network (NM), Inc.

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.

CHAIN OF CUSTODY

DATE: 10/19/96 PAGE: 5 OF 7

AEN LAB I.D. #40374

10/21/96 610510

PROJECT MANAGER: Bob Mezzie

COMPANY: Marathon oc

ADDRESS: PO Box 552

Musland TX 79702

PHONE: (915) 657-8312

FAX: (915) 657-8305

BILL TO: JANE AS ABOVE

COMPANY: JANE AS ABOVE

ADDRESS: JANE AS ABOVE

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct/Inject	(M8015) Gas/Purge & Trap	Gasoline/BTEX & MTBE (M8015/8020)	BTEX/MTBE (8020)	BTEX & Chlorinated Aromatics (602/8020)	BTEX/MTBE/EDC & EDB (8020/8010/Short)	Chlorinated Hydrocarbons (601/8010)	Chlorine	504 EDB / DBCP	Polynuclear Aromatics (610/8310)	Volatile Organics (624/8240) GC/MS	Volatile Organics (8260) GC/MS	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutr/Acid Compounds GC/MS (625/8270)	General Chemistry	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	PCPA Metals (8)	PCPA Metals by TCLP Method (311)	Metals	NUMBER OF CONTAINERS
MW-13	10/19/96	0822	Water	41																							3
MW-38		0900		42																							3
MW-39		0925		43																							3
MW-19		0950		44																							3
MW-48		1025		45																							3
MW-47		1045		46																							3
MW-46		1110		47																							3
MW-56		1145		48																							3
MW-79		1210		49																							3
MW-65	10/19/96	1250		50																							3

ANALYSIS REQUEST

PROJECT INFORMATION

PROJ. NO.: (RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☐

PROJ. NAME: Indian Bmw Ranch

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

SHIPMENT VIA: COMMENTS: FIXED FEE ☐

SAMPLE RECEIPT

NO. CONTAINERS: 30

CUSTODY BEARS: (Signature)

RECEIVED INTACT: (Signature)

BU: (Signature)

RELINQUISHED BY:

Signature: (Signature)

Printed Name: Kevin Galt

Date: 10/21/96

Company: (Signature)

RECEIVED BY: 1.

Signature: (Signature)

Printed Name: (Signature)

Date: 10/21/96

Company: American Environmental Network (NM), Inc.

RELINQUISHED BY:

Signature: (Signature)

Printed Name: (Signature)

Date: (Signature)

Company: (Signature)

RECEIVED BY: (LAB) 2.

Signature: (Signature)

Printed Name: (Signature)

Date: 10/21/96

Company: American Environmental Network (NM), Inc.

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.



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

CHAIN OF CUSTODY

DATE: 10-17-96 PAGE: 6 OF 7

AT LAB ID

460346
6/10/5/10

PROJECT MANAGER: BOB MENZIE

COMPANY: MARATHON OIL CO
ADDRESS: P.O. BOX 552
Middletown TX 79701

PHONE: 915 687-8312

FAX: 915 687-8305

BILL TO:

COMPANY:

ADDRESS:

same as above

SAMPLE ID

DATE

TIME

MATRIX

LAB ID

SW-1

10-17

2:50

Water

51

E STRIPPED INLET

2:22

52

E STRIPPED OUTLET

2:29

53

W STRIPPED INLET

2:50

54

W STRIPPED OUTLET

2:45

55

LYMAN

1:04

56

17R010

11:25

57

Bottle

11:31

58

Petroleum Hydrocarbons (418.1) TRPH
(MOD.8015) Diesel/Direct/Inject

(M8015) Gas/Purge & Trap
Gasoline/BTEX & MTBE (M8015/8020)

BTEX/MTBE (8020)
BTEX & Chlorinated Aromatics (602/8020)
BTEX/MTBE/EDC & EDB (8020/8010/Short)

Chlorinated Hydrocarbons (601/8010)

Chloride
504 EDB ☐ / DBCP ☐

Polynuclear Aromatics (610/8310)

Volatile Organics (624/8240) GC/MS

Volatile Organics (8260) GC/MS

Pesticides/PCB (608/8080)

Herbicides (615/8150)

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

General Chemistry

Priority Pollutant Metals (13)

Target Analyte List Metals (23)

PCRA Metals (9)

PCRA Metals by TCLP Method (311)

NUMBER OF CONTAINERS

ANALYSIS REQUEST

PROJECT INFORMATION

PROJECT NO:

PROJECT NAME: Indian Basin Remed.

P.O. NO:

SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS

CUSTODY SEALS

RECEIVED INTACT

RECEIVED BY:

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK

(NORMAL) ☒ 2 WEEK

CERTIFICATION REQUIRED: ☐ NM ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS:

RELINQUISHED BY:

Signature: Bigo Aguilar Time: 4:55

Printed Name: Bigo Aguilar Date: 9-17-96

Company: Marathon

RECEIVED BY:

Signature: K. Galt Time: 1652

Printed Name: K. Galt Date: 10/21/96

Company: Marathon

RECEIVED BY: (LAB)

Signature: K. Galt Time: 0800

RELINQUISHED BY:

Signature: K. Galt Time: 0800

Printed Name: K. Galt Date: 10/21/96

Company: Marathon

RECEIVED BY: (LAB)

Signature: K. Galt Time: 0800

Printed Name: K. Galt Date: 10/21/96

Company: Marathon

RECEIVED BY: (LAB)

Signature: K. Galt Time: 0800

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.



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

CHAIN OF CUSTODY

DATE: 10-18-96 PAGE: 7 OF 7

AT LAB I.D. # 610374 10/21/96 610510

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT INFORMATION		PRIORITY AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS		RELINQUISHED BY:		RELINQUISHED BY:	
PROJECT NO.	(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒ 2 WEEK	Signature:	Time:	Signature:	Time:	Signature:	Time:
PROJECT NAME: I.B. Remediation	CERTIFICATION REQUIRED: ☐ NM ☐ OTHER	Signature: [Signature]	Time: 1:33 PM	Signature: [Signature]	Time: 0800	Signature: [Signature]	Time: 0800
PROJECT NO.	METHANOL PRESERVATION ☐	Printed Name: [Name]	Date: 10-18-96	Printed Name: [Name]	Date: 10/21/96	Printed Name: [Name]	Date: 10/21/96
SHIPED VIA:	COMMENTS:	Company: Marathon Oil Co	RECEIVED BY: 1.	Company: EOG	RECEIVED BY: (LAB) 2.	Company: [Name]	RECEIVED BY: (LAB) 2.
NO. CONTAINERS	SAMPLE RECEIPT	Signature: [Signature]	Time: 1:33 PM	Signature: [Signature]	Time: 0800	Signature: [Signature]	Time: 0800
CUSTODY SEALS	YIN YANG	Printed Name: [Name]	Date: 10/18/96	Printed Name: [Name]	Date: 10/21/96	Printed Name: [Name]	Date: 10/21/96
RECEIVED INTACT	Y	Signature: [Signature]	Time: 1:33 PM	Signature: [Signature]	Time: 0800	Signature: [Signature]	Time: 0800
BLANK	Y	Signature: [Signature]	Time: 1:33 PM	Signature: [Signature]	Time: 0800	Signature: [Signature]	Time: 0800

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	ANALYSIS REQUEST	NUMBER OF CONTAINERS
LYMAY	10-18-96	12:21	Water	59	Petroleum Hydrocarbons (418.1) TRPH	1
ADA 840		12:28		66	(MOD.8015) Diesel/Direct/Inject	1
B1E551E		12:44		61	(M8015) Gas/Purge & Trap	1
MW-76		1:02		62	Gasoline/BTEX & MTBE (M8015/8020)	2
MW-61A		1:38		63	BTX/MTBE (8020)	2
					BTEX & Chlorinated Aromatics (602/8020)	1
					BTEX/MTBE/EDC & EDB (8020/8010/Short)	1
					Chlorinated Hydrocarbons (601/8010)	1
					Chloride	1
					504 EDB ☐ / DBCP ☐	1
					Polynuclear Aromatics (610/8310)	1
					Volatile Organics (624/8240) GC/MS	1
					Volatile Organics (8260) GC/MS	1
					Pesticides/PCB (608/8080)	1
					Herbicides (615/8150)	1
					Base/Neutral/Acid Compounds GC/MS (625/8270)	1
					General Chemistry	1
					Priority Pollutant Metals (13)	1
					Target Analyte List Metals (23)	1
					PCRA Metals (8)	1
					PCRA Metals by TCLP Method (311)	1

CHAIN OF CUSTODY

AEI LAB I.D.
 610376

DATE: 10/16/96 PAGE: 1 OF 7

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bob Messie				ANALYSIS REQUEST			
COMPANY: Marathon Oil Co ADDRESS: PO Box 552 Midvale, TX. 79702 PHONE: (915) 687-8312 FAX: (915) 687-8305 BILL TO: COMPANY: Same As Above ADDRESS:				Petroleum Hydrocarbons (418.1) TRPH (MOD.8015) Diesel/Direct/Inject (M8015) Gas/Purge & Trap Gasoline/BTEX & MTBE (M8015/8020) BTEX/MTBE (8020) BTEX & Chlorinated Aromatics (602/8020) BTEX/MTBE/EDC & EDB (8020/8010/Short) Chlorinated Hydrocarbons (601/8010) Chloride 504 EDB ☐ / DBCP ☐ Polynuclear Aromatics (610/8310) Volatile Organics (624/8240) GC/MS Volatile Organics (8260) GC/MS Pesticides/PCB (608/8080) Herbicides (615/8150) Base/Neutral/Acid Compounds GC/MS (625/8270) General Chemistry: Priority Pollutant Metals (13) Target Analyte List Metals (23) RCRA Metals (8) RCRA Metals by TCLP (Method 1311) Metals: NUMBER OF CONTAINERS			
SAMPLE ID DATE TIME MATRIX LAB I.D.							
DI H2O	10/16/96	0840	WATER	01			
INT RB		0900		02			
MW-70RB		1005		03			
MW-70		1030		04			
SW-03RB		1225		05			
SW-03		1240		06			
MW-63RB		1340		07			
MW-63		1350		08			
MW-89RB		1515		09			
MW-89		1530		10			
PROJECT INFORMATION				PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS			
PROJ. NO.: PROJ. NAME: Taylor Basin Remediation P.O. NO.: SHIPPED VIA: SAMPLE RECEIPT: NO. CONTAINERS: 24 CUSTODY SEALS: Y/N/A RECEIVED INTACT: Y BLIND: 5				(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☐ CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER METHANOL PRESERVATION ☐ COMMENTS: FIXED FEE ☐			
RELINQUISHED BY: 1.				RELINQUISHED BY: 2.			
Signature: [Signature] Printed Name: Kevin Cook Date: 10/21/96 Company: American Environmental Network (NM), Inc.				Signature: [Signature] Printed Name: [Blank] Date: [Blank] Company: [Blank]			
RECEIVED BY: 1.				RECEIVED BY: (LAB) 2.			
Signature: [Signature] Printed Name: [Blank] Date: [Blank] Company: [Blank]				Signature: [Signature] Printed Name: [Blank] Date: [Blank] Company: [Blank]			

CHAIN OF CUSTODY

AEN LAB I.D.
 6103740

DATE: 10/16/96 PAGE: 2 OF 7

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: <u>Bob Menzies</u>			
COMPANY: <u>Microchem O/C</u>			
ADDRESS: <u>P.O. Box 552</u>			
<u>Molokai, TX 79702</u>			
PHONE: <u>(915) 687-8312</u>			
FAX: <u>(915) 687-8305</u>			
BILL TO: <u>ABOVE</u>			
COMPANY: <u>State of TX</u>			
ADDRESS: <u>State of TX</u>			

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
MW-66 RB	10/16/96	1640	water	1011
MW-66		1650		12
MW-58		1810		13
MW-88 RB	10/17/96	0810		14
MW-88		0820		15
MW-71 RB		1150		16
MW-71		1205		17
MW-60 RB		1310		18
MW-60		1325		19
MW-87 RB		1435		20

ANALYSIS REQUEST	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
Petroleum Hydrocarbons (418.1) TRPH		
(MOD.8015) Diesel/Direct/Inject		
(M8015) Gas/Purge & Trap		
Gasoline/BTEX & MTBE (M8015/8020)		
BTEX/MTBE (8020)		
BTEX & Chlorinated Aromatics (602/8020)		
BTEX/MTBE/EDC & EDB (8020/8010/Short)		
Chlorinated Hydrocarbons (601/8010)		
Chlorine		
504 EDB ☐ / DBCP ☐		
Polynuclear Aromatics (610/8310)		
Volatile Organics (624/8240) GC/MS		
Volatile Organics (8260) GC/MS		
Pesticides/PCB (608/8080)		
Herbicides (615/8150)		
Base/Neutral/Acid Compounds GC/MS (625/8270)		
General Chemistry:		
Priority Pollutant Metals (13)		
Target Analyte List Metals (23)		
RCRA Metals (8)		
RCRA Metals by TCLP (Method 1311)		
Metals:		
NUMBER OF CONTAINERS		

PROJECT INFORMATION		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS	
PROJ. NO.:		(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK	(NORMAL) ☐
PROJ. NAME: <u>Indian Basin Reclamation</u>	CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER		
P.O. NO.:	METHANOL PRESERVATION ☐		
SHIPPED VIA:	COMMENTS: FIXED FEE ☐		
SAMPLE RECEIPT	MW 58 - L.I.S. L.I.S.		
NO. CONTAINERS	25		
CUSTODY SEALS	@N/NA		
RECEIVED INTACT	1		
TEMPERATURE	5°C		

RECEIVED BY: 1.		RECEIVED BY: (LAB) 2.	
Signature: <u>PO GTR</u>	Time: <u>0800</u>	Signature: <u>Kennedy</u>	Time: <u>0800</u>
Printed Name: <u>Kennedy</u>	Date: <u>10/21/96</u>	Printed Name: <u>Kennedy</u>	Date: <u>10/21/96</u>
Company: <u>PO GTR</u>		Company: <u>American Environmental Network (NM), Inc.</u>	

CHAIN OF CUSTODY

DATE: 10/17/96 PAGE: 3 OF 7

AEN LAB I.D.
610376

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bob Mezie			
COMPANY: Marathon Oil Co.			
ADDRESS: PO Box 552 Midvale UT 84042			
PHONE: (915) 687-8312			
FAX: (915) 687-8305			
BILL TO:			
COMPANY:			
ADDRESS: 5000 AS AVE			

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
MW-87	10/17/96	1450	WATER	21
MW-874 RB		1600		22
MW-57 RB		1740		23
MW-57	10/18/96	1755		24
MW-78 RB		0955		25
MW-78		1005		26
MW-55 RB		1045		27
MW-55		1055		28
MW-54 RB		1210		29
MW-54		1220		30

Petroleum Hydrocarbons (418.1) TRPH	
(MOD.8015) Diesel/Direct/Inject	
(M8015) Gas/Purge & Trap	
Gasoline/BTEX & MTBE (M8015/8020)	
BTEX/MTBE (8020)	
BTEX & Chlorinated Aromatics (602/8020)	
BTEX/MTBE/EDC & EDB (8020/8010/Short)	
Chlorinated Hydrocarbons (601/8010)	
Chlorine	
504 EDB / DBCP	
Polynuclear Aromatics (610/8310)	
Volatile Organics (624/8240) GC/MS	
Volatile Organics (8260) GC/MS	
Pesticides/PCB (608/8080)	
Herbicides (615/8150)	
Base/Neutral/Acid Compounds GC/MS (625/8270)	
General Chemistry:	
Priority Pollutant Metals (13)	
Target Analyte List Metals (23)	
RCRA Metals (8)	
RCRA Metals by TCLP (Method 1311)	
Metals:	
NUMBER OF CONTAINERS	

PROJECT INFORMATION		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS	
PROJ. NO.:		(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK	(NORMAL) ☐
PROJ. NAME:	Indian Basin Reservoir	CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER	
P.O. NO.:		METHANOL PRESERVATION ☐	
SHIPPED VIA:		COMMENTS: FIXED FEE ☐	
SAMPLE RECEIPT			
NO. CONTAINERS	25		
CUSTODY SEALS	VINAD		
RECEIVED INTACT	1		
RECEIVED BY:	Signature: [Signature] Printed Name: Ken Cook Date: 10/19/96	RECEIVED BY: (LAB)	Signature: [Signature] Printed Name: [Signature] Date: 10/24/96

CHAIN OF CUSTODY

DATE: 10/18/96 PAGE: 1 OF 7

AEN LAB I.D.
610376

PROJECT MANAGER: Bob Meier

COMPANY: MacArthur O.C.

ADDRESS: PO Box 552

PHONE: (915) 657-8312

FAX: (915) 657-8305

BILL TO: ~~Same as above~~

COMPANY: ~~Same as above~~

ADDRESS: ~~Same as above~~

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum	(MOD.8	(M8015	Gasolin	BTXEM	BTEX &	BTEX/M	Chlorina	Chloro	504	Polynuc	Volatile	Volatile	Pesticid	Herbicid	Base/Neu	Genera	Priority	Target A	RCRA M	RCRA M	Metals:	NUMBER
MW-61 RB	10/18/96	1340	Water	31																							2
MW-61		1350		33																							3
MW-72		1440		33																							3
MW-874		1505		34																							3
MW-50		1525		35																							3
MW-44		1555		36																							3
MW-44		1620		37																							3
MW-43	10/19/96	0720		38																							3
MW-41		0725		39																							3
MW-11		0750		40																							3

PROJECT INFORMATION

PROJ NO: (RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☐

PROJ NAME: Telles Basin Remediation

P.O. NO: CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

SHIPPED VIA: METHANOL PRESERVATION ☐

SAMPLE RECEIPT

NO. CONTAINERS: 29

CUSTODY SEALS: Y/N (A)

RECEIVED INTACT: Y

BLANK: SC

RELINQUISHED BY: 1.

Signature: K. Cook Time: 0800

Printed Name: K. Cook Date: 10/21/96

Company: American Environmental Network (NM), Inc.

RECEIVED BY: 1.

Signature: F. D. G. Time: 1021/96

Printed Name: F. D. G. Date: 1021/96

Company: American Environmental Network (NM), Inc.

RELINQUISHED BY: 2.

Signature: K. Cook Time: 0800

Printed Name: K. Cook Date: 1021/96

Company: American Environmental Network (NM), Inc.

RECEIVED BY: (LAB) 2.

Signature: K. Cook Time: 0800

Printed Name: K. Cook Date: 1021/96

Company: American Environmental Network (NM), Inc.

ANALYSIS REQUEST

General Chemistry:

Priority Pollutant Metals (13)

Target Analyte List Metals (23)

RCRA Metals (8)

RCRA Metals by TCLP (Method 1311)

Metals:

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bob Mezzie				ANALYSIS REQUEST
COMPANY: Marathon OC				ANALYSIS REQUEST Petroleum Hydrocarbons (418.1) TRPH (MOD.8015) Diesel/Direct/Inject (M8015) Gas/Purge & Trap Gasoline/BTEX & MTBE (M8015/8020) BTEX/MTBE (8020) BTEX & Chlorinated Aromatics (602/8020) BTEX/MTBE/EDC & EDB (8020/8010/Short) Chlorinated Hydrocarbons (601/8010) Chlorine 504 EDB ☐ / DBCP ☐ Polynuclear Aromatics (610/8310) Volatile Organics (624/8240) GC/MS Volatile Organics (8260) GC/MS Pesticides/PCB (608/8080) Herbicides (615/8150) Base/Neutral/Acid Compounds GC/MS (625/8270) General Chemistry: Priority Pollutant Metals (13) Target Analyte List Metals (23) RCRA Metals (8) RCRA Metals by TCLP (Method 1311) Metals: NUMBER OF CONTAINERS
ADDRESS: PO Box 552				
PHONE: (915) 657-8312				
FAX: (915) 657-8305				
BILL TO:				
COMPANY:				
ADDRESS: J Fine PS PO Box				
SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
MW-13	10/19/98	0822	Water	41
MW-38		0900		42
MW-39		0925		43
MW-19		0950		44
MW-48		1025		45
MW-47		1045		46
MW-46		1110		47
MW-56		1145		48
MW-79		1210		49
MW-65	10/19/98	1250		50

PROJECT INFORMATION		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS		RELINQUISHED BY: 1.		RELINQUISHED BY: 2.	
PROJ. NO.:		(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☐		Signature: <i>McLeod</i>	Time: <i>0800</i>	Signature:	Time:
PROJ. NAME:	<i>Indian Gully Remed</i>	CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER		Printed Name:	Date: <i>10/21/96</i>	Printed Name:	Date:
P.O. NO.:		METHANOL PRESERVATION ☐		Company:		Company:	
SHIPPED VIA:		COMMENTS: FIXED FEE ☐		RECEIVED BY: <i>POIT</i>	1.	RECEIVED BY: (LAB)	2.
SAMPLE RECEIPT				Signature:	Time:	Signature: <i>McLeod</i>	Time: <i>0800</i>
NO. CONTAINERS	<i>30</i>			Printed Name:	Date:	Printed Name: <i>McLeod</i>	Date: <i>10/21/96</i>
CUSTODY SEALS	<i>20 N/A</i>			Company:		American Environmental Network (NM), Inc.	
RECEIVED INTACT	<i>Y</i>						
BY: <i>POIT</i>	<i>50</i>						



DATE: 10-11-10 PAGE: 6 OF 1

610344

SHADED AREAS ARE FOR LAB USE ONLY.

PROJECT INFORMATION		PRIORITY AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS	
PROJ. NO.:		(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒ 2 WEEK	
PROJ. NAME:	Indian Basin Remed.	CERTIFICATION REQUIRED: ☐ NM ☐ OTHER	
P.O. NO.:		METHANOL PRESERVATION ☐	
SHIPPED VIA:		COMMENTS:	
SAMPLE RECEIPT			
NO. CONTAINERS	17		
CUSTODY SEALS	Y/N/N/A		
RECEIVED INTACT	Y		
BL	50		
RELINQUISHED BY: 1.		RELINQUISHED BY: 2.	
Signature: B. Go	Time: 4:55	Signature: B. Go	Time: 0800
Printed Name: B. Go	Date: 9-17-96	Printed Name: Kevin Galt	Date: 10/21/96
Company: m. hartman		Company: FOGITE	
RECEIVED BY: 1.		RECEIVED BY: (LAB) 2.	
Signature: K. Galt	Time: 1652	Signature: B. Go	Time: 0800
Printed Name: K. Galt	Date: 10/1/96	Printed Name: B. Go	Date: 10/21/96
Company: Kevin Galt		Analytical Technologies of New Mexico	



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

CHAIN OF CUSTODY
DATE: 10-18-96 PAGE: 1 OF 1

ATI LAB I.D.
610376

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.

PROJECT MANAGER: BOB MENZIE		COMPANY: Marathon Oil Co		
ADDRESS: P.O. Box 552		ADDRESS: Midland TX. 79702		
PHONE: 915-657-8312		FAX: 915-657-8305		
BILL TO:		COMPANY:		
ADDRESS:		SAMPLE		
SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
LYMAN	10-18-96	1221	Water	59
AR 840		1228		60
B.E.B.I.E		1244		61
MW-26		1:02		62
MW-61A		1:38		63
Petroleum Hydrocarbons (418.1) TRPH				
(MOD.8015) Diesel/Direct/Inject				
(M8015) Gas/Purge & Trap				
Gasoline/BTEX & MTBE (M8015/8020)				
BTXE/MTBE (8020)				
BTEX & Chlorinated Aromatics (602/8020)				
BTEX/MTBE/EDC & EDB (8020/8010/Short)				
Chlorinated Hydrocarbons (601/8010)				
chloride				
504 EDB ☐ / DBCP ☐				
Polynuclear Aromatics (610/8310)				
Volatile Organics (624/8240) GC/MS				
Volatile Organics (8260) GC/MS				
Pesticides/PCB (608/8080)				
Herbicides (615/8150)				
Base/Neutral/Acid Compounds GC/MS (625/8270)				
General Chemistry				
Priority Pollutant Metals (13)				
Target Analyte List Metals (23)				
RCRA Metals (8)				
RCRA Metals by TCLP (Method 1311)				
NUMBER OF CONTAINERS				

PROJECT INFORMATION		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS	
PROJ. NO.:		(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK	(NORMAL) ☒ 2 WEEK
PROJ. NAME: IB Remediation	CERTIFICATION REQUIRED: ☐ NM ☐ OTHER		
P.O. NO.:	METHANOL PRESERVATION ☐		
SHIPPED VIA:	COMMENTS:		
SAMPLE RECEIPT			
NO. CONTAINERS	7		
CUSTODY SEALS	Y/N ☒		
RECEIVED INTACT	Y		
BL. ☒	5°		
RELINQUISHED BY: 1.		RELINQUISHED BY: 2.	
Signature: <i>Bob Menzie</i> Time: 1:53 PM		Signature: <i>Kevin Cook</i> Time: 0800	
Printed Name: <i>Bob Menzie</i> Date: 10-18-96		Printed Name: <i>Kevin Cook</i> Date: 10/21/96	
Company: <i>Marathon Oil Co</i>		Company: <i>FOGTE</i>	
RECEIVED BY: 1.		RECEIVED BY: (LAB) 2.	
Signature: <i>Kevin Cook</i> Time: 1:53		Signature: <i>Kevin Cook</i> Time: 0800	
Printed Name: <i>Kevin Cook</i> Date: 10/18/96		Printed Name: <i>Kevin Cook</i> Date: 10/21/96	
Company: <i>Marathon Oil Co</i>		Company: <i>Analytical Technologies of New Mexico</i>	



American Environmental Network, Inc.

AEN I.D. 702327

March 10, 1997

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

Project Name IB REMEDIATION
Project Number (none)

Attention: BOB MENZIE

On 2/13/97 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8020 was performed by American Environmental Network (NM) Inc., Albuquerque, NM.

EPA methods 6010 and 8310 were performed by American Environmental Network (FL) Inc., 11 East Olive Road, Pensacola, FL.

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

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



Kimberly D. McNeill
Project Manager



H. Mitchell Rubenstein, Ph. D.
General Manager

CLIENT	: MARATHON OIL CO.	AEN I.D.	: 702327
PROJECT #	: (none)	DATE RECEIVED	: 2/13/97
PROJECT NAME	: IB REMEDIATION	REPORT DATE	: 3/10/97

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	SW-1	AQUEOUS	2/10/97
02	W STRIPPER INLET	AQUEOUS	2/10/97
03	W STRIPPER OUTLET	AQUEOUS	2/10/97
04	E STRIPPER INLET	AQUEOUS	2/10/97
05	E STRIPPER OUTLET	AQUEOUS	2/10/97
06	LYMAN	AQUEOUS	2/10/97
07	ARROYO	AQUEOUS	2/10/97
08	BIEBBLE	AQUEOUS	2/10/97
09	MW-71RB	AQUEOUS	2/9/97
10	MW-71	AQUEOUS	2/9/97
	MW-59	AQUEOUS	2/9/97
	MW-60RB	AQUEOUS	2/9/97
13	MW-60	AQUEOUS	2/9/97
14	MW-87RB	AQUEOUS	2/9/97
15	MW-87	AQUEOUS	2/9/97
16	MW-87ARB	AQUEOUS	2/9/97
17	MW-87A	AQUEOUS	2/9/97
18	MW-67RB	AQUEOUS	2/10/97
19	MW-67	AQUEOUS	2/10/97
20	MW-57RB	AQUEOUS	2/10/97
21	MW-57	AQUEOUS	2/10/97
22	MW-55RB	AQUEOUS	2/10/97
23	MW-55	AQUEOUS	2/10/97
24	MW-54RB	AQUEOUS	2/10/97
25	MW-54	AQUEOUS	2/10/97
26	MW-61RB	AQUEOUS	2/10/97
27	MW-61	AQUEOUS	2/10/97
28	MW-90	AQUEOUS	2/10/97
29	MW-90RB	AQUEOUS	2/10/97
30	MW-79	AQUEOUS	2/10/97
31	MW-78RB	AQUEOUS	2/10/97
32	MW-78	AQUEOUS	2/10/97
33	MW-106	AQUEOUS	2/11/97
34	MW-91	AQUEOUS	2/11/97
35	MW-65	AQUEOUS	2/11/97
36	MW-62	AQUEOUS	2/11/97
37	MW-64	AQUEOUS	2/11/97
	MW-56	AQUEOUS	2/11/97
	MW-10	AQUEOUS	2/11/97
40	MW-46	AQUEOUS	2/11/97

American Environmental Network, Inc.

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 702327
PROJECT NAME : MARATHON OIL
ATI I.D. : 702165

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	702327-01	AQUEOUS	02/10/97
02	702327-06	AQUEOUS	02/10/97
03	702327-07	AQUEOUS	02/10/97
04	702327-08	AQUEOUS	02/10/97
05	702327-10	AQUEOUS	02/09/97
06	702327-11	AQUEOUS	02/09/97
07	702327-13	AQUEOUS	02/09/97
08	702327-15	AQUEOUS	02/09/97
09	702327-17	AQUEOUS	02/09/97
10	702327-19	AQUEOUS	02/10/97
11	702327-21	AQUEOUS	02/10/97
12	702327-23	AQUEOUS	02/10/97
13	702327-25	AQUEOUS	02/10/97
14	702327-27	AQUEOUS	02/10/97
15	702327-28	AQUEOUS	02/10/97
16	702327-30	AQUEOUS	02/10/97
17	702327-32	AQUEOUS	02/10/97
18	702327-33	AQUEOUS	02/11/97
19	702327-34	AQUEOUS	02/11/97
20	702327-35	AQUEOUS	02/11/97
21	702327-36	AQUEOUS	02/11/97
22	702327-37	AQUEOUS	02/11/97
23	702327-38	AQUEOUS	02/11/97
24	702327-39	AQUEOUS	02/11/97
25	702327-40	AQUEOUS	02/11/97

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	25

ATI STANDARD DISPOSAL PRACTICE

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

GENERAL CHEMISTRY RESULTS

ATI I.D. : 702165

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 702327
PROJECT NAME : MARATHON OIL

PARAMETER	UNITS	01	02	03	04	05
CARBONATE (CACO3)	MG/L	<1	-	-	-	-
BICARBONATE (CACO3)	MG/L	275	-	-	-	-
HYDROXIDE (CACO3)	MG/L	<1	-	-	-	-
TOTAL ALKALINITY (AS CACO3)	MG/L	275	-	-	-	-
BROMIDE (EPA 300.0)	MG/L	<0.3	-	-	-	-
CHLORIDE (EPA 325.2)	MG/L	21	11	11	10	24
CONDUCTIVITY, (UMHOS/CM)		796	-	-	-	-
FLUORIDE (EPA 340.2)	MG/L	0.54	-	-	-	-
PH (EPA 150.1)	UNITS	7.6	-	-	-	-
SULFATE (EPA 375.2)	MG/L	140	-	-	-	-
T. DISSOLVED SOLIDS (160.1)	MG/L	520	-	-	-	-

GENERAL CHEMISTRY RESULTS

ATI I.D. : 702165

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 702327
PROJECT NAME : MARATHON OIL

PARAMETER	UNITS	06	07	08	09	10
CARBONATE (CACO3)	MG/L	-	-	<1	<1	-
BICARBONATE (CACO3)	MG/L	-	-	222	352	-
HYDROXIDE (CACO3)	MG/L	-	-	<1	<1	-
TOTAL ALKALINITY (AS CACO3)	MG/L	-	-	222	352	-
BROMIDE (EPA 300.0)	MG/L	-	-	<0.3	1.2	-
CHLORIDE (EPA 325.2)	MG/L	29	9	11	150	9
CONDUCTIVITY, (UMHOS/CM)		-	-	814	3350	-
FLUORIDE (EPA 340.2)	MG/L	-	-	0.63	1.90	-
PH (EPA 150.1)	UNITS	-	-	7.8	7.2	-
SULFATE (EPA 375.2)	MG/L	-	-	230	1900	-
T. DISSOLVED SOLIDS (160.1)	MG/L	-	-	580	3200	-

GENERAL CHEMISTRY RESULTS

ATI I.D. : 702165

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 702327
PROJECT NAME : MARATHON OIL

PARAMETER	UNITS	11	12	13	14	15
CARBONATE (CACO3)	MG/L	-	-	-	-	<1
BICARBONATE (CACO3)	MG/L	-	-	-	-	370
HYDROXIDE (CACO3)	MG/L	-	-	-	-	<1
TOTAL ALKALINITY (AS CACO3)	MG/L	-	-	-	-	370
BROMIDE (EPA 300.0)	MG/L	-	-	-	-	<0.3
CHLORIDE (EPA 325.2)	MG/L	32	270	180	410	26
CONDUCTIVITY, (UMHOS/CM)		-	-	-	-	749
FLUORIDE (EPA 340.2)	MG/L	-	-	-	-	0.36
PH (EPA 150.1)	UNITS	-	-	-	-	7.4
SULFATE (EPA 375.2)	MG/L	-	-	-	-	25
T. DISSOLVED SOLIDS (160.1)	MG/L	-	-	-	-	460

GENERAL CHEMISTRY RESULTS

ATI I.D. : 702165

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 702327
PROJECT NAME : MARATHON OIL

PARAMETER	UNITS	16	17	18	19	20
CARBONATE (CACO3)	MG/L	-	-	<1	<1	-
BICARBONATE (CACO3)	MG/L	-	-	315	510	-
HYDROXIDE (CACO3)	MG/L	-	-	<1	<1	-
TOTAL ALKALINITY (AS CACO3)	MG/L	-	-	315	510	-
BROMIDE (EPA 300.0)	MG/L	-	-	<0.3	0.5	-
CHLORIDE (EPA 325.2)	MG/L	24	75	10	80	1.3
CONDUCTIVITY, (UMHOS/CM)	-	-	-	636	1010	-
FLUORIDE (EPA 340.2)	MG/L	-	-	0.24	0.19	-
PH (EPA 150.1)	UNITS	-	-	7.4	7.5	-
SULFATE (EPA 375.2)	MG/L	-	-	37	<5	-
T. DISSOLVED SOLIDS (160.1)	MG/L	-	-	430	590	-

American Environmental Network, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 702165

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 702327
PROJECT NAME : MARATHON OIL

PARAMETER	UNITS	21	22	23	24	25
CHLORIDE (EPA 325.2)	MG/L	150	11	170	120	220

American Environmental Network, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
 PROJECT # : 702327
 PROJECT NAME : MARATHON OIL

ATI I.D. : 702165

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CARBONATE	MG/L	70215701	<1	<1	NA	NA	NA	NA
BICARBONATE	MG/L		216	216	0	NA	NA	NA
HYDROXIDE	MG/L		<1	<1	NA	NA	NA	NA
TOTAL ALKALINITY	MG/L		216	216	0	NA	NA	NA
BROMIDE	MG/L	70211001	0.4	0.4	0	2.9	2.0	125
CHLORIDE	MG/L	70210303	230	230	0	480	250	100
CHLORIDE	MG/L	70216505	24	24	0	76	50	104
CHLORIDE	MG/L	70216517	75	74	1	180	100	105
CHLORIDE	MG/L	70220501	60	60	0	160	100	100
CONDUCTIVITY (UMHOS/CM)		70210303	1100	1110	0.9	NA	NA	NA
CONDUCTIVITY (UMHOS/CM)		70218004	464	463	0.2	NA	NA	NA
FLUORIDE	MG/L	70211705	1.46	1.48	1	3.02	1.50	104
PH	UNITS	70213602	7.9	7.9	0	NA	NA	NA
SULFATE	MG/L	70231501	260	240	8	510	250	100
SULFATE	MG/L	70227603	70	70	0	170	100	100
TOTAL DISSOLVED SOLIDS	MG/L	70216501	520	530	2	NA	NA	NA

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

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

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 702255
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702327
Project Name: MARATHON OIL CO.
Project Location: N/S
Test: Group of Single Metals
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 702327-01			Lab ID:001		
CALCIUM (200.7)	MG/L	100	1	I0W039	
POTASSIUM (200.7)	MG/L	ND	2	X0W039	
MAGNESIUM (200.7)	MG/L	40	0.2	J0W039	
SODIUM (200.7)	MG/L	13	0.2	10W039	

Comments:

Client ID: 702327-15			Lab ID:002		
CALCIUM (200.7)	MG/L	130	1	I0W039	
POTASSIUM (200.7)	MG/L	ND	2	X0W039	
MAGNESIUM (200.7)	MG/L	50	0.2	J0W039	
SODIUM (200.7)	MG/L	12	0.2	10W039	

Comments:

Client ID: 702327-17			Lab ID:003		
CALCIUM (200.7)	MG/L	390	1	I0W039	
POTASSIUM (200.7)	MG/L	9	2	X0W039	
MAGNESIUM (200.7)	MG/L	270	0.2	J0W039	
SODIUM (200.7)	MG/L	190	0.2	10W039	

Comments:

Client ID: 702327-28			Lab ID:004		
CALCIUM (200.7)	MG/L	95	1	I0W039	
POTASSIUM (200.7)	MG/L	3	2	X0W039	
MAGNESIUM (200.7)	MG/L	50	0.2	J0W039	
SODIUM (200.7)	MG/L	15	0.2	10W039	

Comments:

Client ID: 702327-33			Lab ID:005		
CALCIUM (200.7)	MG/L	460	1	I0W039	
POTASSIUM (200.7)	MG/L	14	2	X0W039	
MAGNESIUM (200.7)	MG/L	210	0.2	J0W039	
SODIUM (200.7)	MG/L	6.6	0.2	10W039	

Comments:

Client ID: 702327-34			Lab ID:006		
CALCIUM (200.7)	MG/L	110	1	I0W039	
POTASSIUM (200.7)	MG/L	ND	2	X0W039	
MAGNESIUM (200.7)	MG/L	63	0.2	J0W039	
SODIUM (200.7)	MG/L	57	0.2	10W039	

Comments:

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 702255
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702327
Project Name: MARATHON OIL CO.
Project Location: N/S
Test: Group of Single Metals

Client Id:	Lab Matrix: Id:	Date/Time Sampled:	Date Received:
702327-01	001 WATER	10-FEB-97 1215	14-FEB-97
702327-15	002 WATER	09-FEB-97 1440	14-FEB-97
702327-17	003 WATER	09-FEB-97 1645	14-FEB-97
702327-28	004 WATER	10-FEB-97 1505	14-FEB-97
702327-33	005 WATER	11-FEB-97 0910	14-FEB-97
702327-34	006 WATER	11-FEB-97 0950	14-FEB-97

American Environmental Network, Inc.

"Method Report Summary"

Accession Number: 702255
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702327
Project Name: MARATHON OIL CO.
Project Location: N/S
Test: Group of Single Metals

Client Sample Id:	Parameter:	Unit:	Result:
702327-01	CALCIUM (200.7)	MG/L	100
	MAGNESIUM (200.7)	MG/L	40
	SODIUM (200.7)	MG/L	13
702327-15	CALCIUM (200.7)	MG/L	130
	MAGNESIUM (200.7)	MG/L	50
	SODIUM (200.7)	MG/L	12
702327-17	CALCIUM (200.7)	MG/L	390
	POTASSIUM (200.7)	MG/L	9
	MAGNESIUM (200.7)	MG/L	270
	SODIUM (200.7)	MG/L	190
702327-28	CALCIUM (200.7)	MG/L	95
	POTASSIUM (200.7)	MG/L	3
	MAGNESIUM (200.7)	MG/L	50
	SODIUM (200.7)	MG/L	15
702327-33	CALCIUM (200.7)	MG/L	460
	POTASSIUM (200.7)	MG/L	14
	MAGNESIUM (200.7)	MG/L	210
	SODIUM (200.7)	MG/L	6.6
702327-34	CALCIUM (200.7)	MG/L	110
	MAGNESIUM (200.7)	MG/L	63
	SODIUM (200.7)	MG/L	57

American Environmental Network, Inc.

"Metals Quality Control Report"

Parameter:	CALCIUM	POTASSIUM	MAGNESIUM	SODIUM
Batch Id:	IOW039	XOW039	JOW039	10W039
Blank Result:	<1	<2	<0.2	<0.2
Anal. Method:	200.7	200.7	200.7	200.7
Prep. Method:	EPA 600	EPA 600	EPA 600	EPA 600
Analysis Date:	25-FEB-97	25-FEB-97	25-FEB-97	25-FEB-97
Prep. Date:	25-FEB-97	25-FEB-97	25-FEB-97	25-FEB-97

Sample Duplication

Sample Dup:	702255-1	702255-1	702255-1	702255-1
Rept Limit:	<1	<2	<0.2	<0.2
Sample Result:	130	25	62	35
Dup Result:	130	24	62	35
Sample RPD:	0	4	0	0
Max RPD:	20	20	20	20
Dry Weight%	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	702255-1	702255-1	702255-1	702255-1
Rept Limit:	<1	<2	<0.2	<0.2
Sample Result:	100	<2	40	13
Spiked Result:	130	25	62	35
Spike Added:	20F	20	20	20
% Recovery:	150	125	110	110
% Rec Limits:	75-125	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A	N/A

ICV

ICV Result:	10.1	50	5.0	9.6
True Result:	10	50	5.0	10
% Recovery:	101	100	100	96
% Rec Limits:	90-110	90-110	90-110	90-110

LCS

LCS Result:	23	23	23	22
True Result:	20	20	20	20
% Recovery:	115	115	115	110
% Rec Limits:	80-120	80-120	80-120	80-120

"Quality Control Comments"

Batch Id: Comments:

IOW039	ANALYST: JR
IOW039	The results reported under "Sample Duplication" are the MS/MSD.
XOW039	ANALYST: JR
XOW039	The results reported under "Sample Duplication" are the MS/MSD.
JOW039	ANALYST: JR
JOW039	The results reported under "Sample Duplication" are the MS/MSD.
1OW039	ANALYST: JR
1OW039	The results reported under "Sample Duplication" are the MS/MSD.

----- Common Footnotes Metals -----

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

FROM ANALYSIS REPORT:
RL= REPORTING LIMIT BASED ON METHOD DETECTION LIMIT STUDIES.
Q= QUALIFIER (FOOTNOTE)

FROM QUALITY CONTROL REPORT:
RPD= RELATIVE PERCENT DEVIATION.
RPT LIMIT= REPORTING LIMIT BASED ON METHOD DETECTION LIMIT STUDIES.

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

SW-846, 3rd Edition, latest revision.
EPA 600/4-79-020, Revised March 1983.
NIOSH Manual of Analytical Methods, 4th Edition.
Standard Methods For the Examination of Water and Wastewater, 18th Edition, 1992.
Methods For the Determination of Metals in Environmental Samples - Supplement 1,
EPA 600/R-94-111, May 1994.

GJ = GARY JACOBS
JLH = JAMES L. HERED
CD = CHRISTY DRAPER

JR = JOHN REED
LV = LASSANDRA VON APPEN

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
01	SW-1	AQUEOUS	2/10/97	NA	2/13/97	1
02	W STRIPPER INLET	AQUEOUS	2/10/97	NA	2/13/97	10
03	W STRIPPER OUTLET	AQUEOUS	2/10/97	NA	2/13/97	1
PARAMETER		DET. LIMIT	UNITS	01	02	03
BENZENE		0.5	UG/L	< 0.5	68	2.3
TOLUENE		0.5	UG/L	< 0.5	8.5	7.9
ETHYLBENZENE		0.5	UG/L	< 0.5	61	1.3
AL XYLENES		0.5	UG/L	< 0.5	270	5.7

SURROGATE:

TRIFLUOROTOLUENE (%)

91

89

79

SURROGATE LIMITS (69 - 117)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE		MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
ID. #	CLIENT I.D.					
04	E STRIPPER INLET	AQUEOUS	2/10/97	NA	2/13/97	10
05	E STRIPPER OUTLET	AQUEOUS	2/10/97	NA	2/13/97	1
06	LYMAN	AQUEOUS	2/10/97	NA	2/13/97	1
PARAMETER		DET. LIMIT	UNITS	04	05	06
BENZENE		0.5	UG/L	60	2.7	< 0.5
TOLUENE		0.5	UG/L	6.4	8.4	< 0.5
ETHYLBENZENE		0.5	UG/L	55	2.1	< 0.5
AL XYLENES		0.5	UG/L	250	9.9	< 0.5
SURROGATE:						
TRIFLUOROTOLUENE (%)				86	81	91
SURROGATE LIMITS		(69 - 117)				

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
07	ARROYO	AQUEOUS	2/10/97	NA	2/13/97	1
08	BIEBBLE	AQUEOUS	2/10/97	NA	2/13/97	1
09	MW-71RB	AQUEOUS	2/9/97	NA	2/13/97	1

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

SURROGATE:

TRIFLUOROTOLUENE (%)

92

97

97

SURROGATE LIMITS (69 - 117)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
10	MW-71	AQUEOUS	2/9/97	NA	2/13/97	1
12	MW-60RB	AQUEOUS	2/9/97	NA	2/13/97	1
13	MW-60	AQUEOUS	2/9/97	NA	2/13/97	1
PARAMETER		DET. LIMIT	UNITS	10	12	13
BENZENE		0.5	UG/L	5.2	< 0.5	< 0.5
TOLUENE		0.5	UG/L	1.3	< 0.5	< 0.5
ETHYLBENZENE		0.5	UG/L	0.8	< 0.5	0.5
METHYL XYLENES		0.5	UG/L	1.3	< 0.5	0.8

SURROGATE:

TRIFLUOROTOLUENE (%)

92

94

87

SURROGATE LIMITS

(69 - 117)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
14	MW-87RB	AQUEOUS	2/9/97	NA	2/13/97	1
15	MW-87	AQUEOUS	2/9/97	NA	2/13/97	1

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

SURROGATE:

TRIFLUOROTOLUENE (%)

91

86

SURROGATE LIMITS

(69 - 117)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
16	MW-87ARB	AQUEOUS	2/9/97	NA	2/13/97	1
17	MW-87A	AQUEOUS	2/9/97	NA	2/13/97	1
18	MW-67RB	AQUEOUS	2/10/97	NA	2/13/97	1

PARAMETER	DET. LIMIT	UNITS	16	17	18
BENZENE	0.5	UG/L	< 0.5	0.9	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	0.7	< 0.5
AL XYLENES	0.5	UG/L	< 0.5	1.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

104

104

106

SURROGATE LIMITS

(80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
19	MW-67	AQUEOUS	2/10/97	NA	2/13/97	1
20	MW-57RB	AQUEOUS	2/10/97	NA	2/13/97	1
21	MW-57	AQUEOUS	2/10/97	NA	2/13/97	1

PARAMETER	DET. LIMIT	UNITS	19	20	21
BENZENE	0.5	UG/L	15.0	< 0.5	< 0.5
TOLUENE	0.5	UG/L	4.8	< 0.5	0.9
ETHYLBENZENE	0.5	UG/L	1.9	< 0.5	< 0.5
AL XYLENES	0.5	UG/L	41.0	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

114

107

95

SURROGATE LIMITS

(80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
 CLIENT : MARATHON OIL CO.
 PROJECT # : (none)
 PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
22	MW-55RB	AQUEOUS	2/10/97	NA	2/13/97	1
23	MW-55	AQUEOUS	2/10/97	NA	2/13/97	10
24	MW-54RB	AQUEOUS	2/10/97	NA	2/13/97	1
PARAMETER		DET. LIMIT	UNITS	22	23	24
BENZENE		0.5	UG/L	1.7	410	6.0
TOLUENE		0.5	UG/L	< 0.5	20	0.8
ETHYLBENZENE		0.5	UG/L	1.1	230	4.3
L XYLENES		0.5	UG/L	< 0.5	64	0.7
SURROGATE:						
BROMOFLUOROBENZENE (%)				101	105	107
SURROGATE LIMITS		(80 - 120)				

CHEMIST NOTES:
 N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
25	MW-54	AQUEOUS	2/10/97	NA	2/13/97	1
26	MW-61RB	AQUEOUS	2/10/97	NA	2/13/97	1
27	MW-61	AQUEOUS	2/10/97	NA	2/13/97	1
PARAMETER	DET. LIMIT	UNITS	25	26	27	
BENZENE	0.5	UG/L	< 0.5	15	< 0.5	
TOLUENE	0.5	UG/L	< 0.5	1.2	< 0.5	
ETHYLBENZENE	0.5	UG/L	< 0.5	10	< 0.5	
AL XYLENES	0.5	UG/L	< 0.5	3.0	< 0.5	

SURROGATE:
BROMOFLUOROBENZENE (%) 107 101 103
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
28	MW-90	AQUEOUS	2/10/97	NA	2/13/97	1
29	MW-90RB	AQUEOUS	2/10/97	NA	2/14/97	1
30	MW-79	AQUEOUS	2/10/97	NA	2/13/97	1

PARAMETER	DET. LIMIT	UNITS	28	29	30
BENZENE	0.5	UG/L	17	< 0.5	< 0.5
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	15	< 0.5	< 0.5
AL XYLENES	0.5	UG/L	1.4	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)		104	102	101
SURROGATE LIMITS	(80 - 120)			

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
31	MW-78RB	AQUEOUS	2/10/97	NA	2/13/97	1
32	MW-78	AQUEOUS	2/10/97	NA	2/13/97	1
33	MW-106	AQUEOUS	2/11/97	NA	2/13/97	1
PARAMETER		DET. LIMIT	UNITS	31	32	33
BENZENE		0.5	UG/L	< 0.5	41	< 0.5
TOLUENE		0.5	UG/L	< 0.5	7.9	< 0.5
ETHYLBENZENE		0.5	UG/L	< 0.5	7.4	< 0.5
AL XYLENES		0.5	UG/L	< 0.5	12	< 0.5
SURROGATE:						
BROMOFLUOROBENZENE (%)				103	108	104
SURROGATE LIMITS		(80 - 120)				

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
34	MW-91	AQUEOUS	2/11/97	NA	2/14/97	10
35	MW-65	AQUEOUS	2/11/97	NA	2/14/97	1
38	MW-56	AQUEOUS	2/11/97	NA	2/14/97	10
PARAMETER		DET. LIMIT	UNITS	34	35	38
BENZENE		0.5	UG/L	340	< 0.5	370
TOLUENE		0.5	UG/L	14	< 0.5	12
ETHYLBENZENE		0.5	UG/L	50	< 0.5	51
TOTAL XYLENES		0.5	UG/L	55	< 0.5	51

SURROGATE:

BROMOFLUOROBENZENE (%)

102

101

101

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION

AEN I.D.: 702327

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
39	MW-10	AQUEOUS	2/11/97	NA	2/14/97	1
40	MW-46	AQUEOUS	2/11/97	NA	2/13/97	100

PARAMETER	DET. LIMIT	UNITS	39	40
BENZENE	0.5	UG/L	< 0.5	3300
TOLUENE	0.5	UG/L	< 0.5	550
ETHYLBENZENE	0.5	UG/L	< 0.5	1000
TOTAL XYLENES	0.5	UG/L	< 0.5	1400

SURROGATE:

BROMOFLUOROBENZENE (%)

105

113

SURROGATE LIMITS

(80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 702327
BLANK I. D.	: 021397B	DATE EXTRACTED	: N/A
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 2/13/97
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REMEDIATION		

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

SURROGATE:
BROMOFLUOROBENZENE (%) 105

SURROGATE LIMITS: (80 - 120)

ANALYST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 702327
BLANK I. D.	: 021397	DATE EXTRACTED	: N/A
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 2/13/97
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REMEDIATION		

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

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

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 702327
BLANK I. D.	: 021397C	DATE EXTRACTED	: N/A
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 2/13/97
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REMEDIATION		

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

SURROGATE:

TRIFLUOROTOLUENE (%)	92
----------------------	----

SURROGATE LIMITS: (69 - 117)

ANALYST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 702327
BLANK I. D.	: 021497	DATE EXTRACTED	: N/A
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 2/14/97
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REMEDIATION		

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

SURROGATE:

BROMOFLUOROBENZENE (%)	104
------------------------	-----

SURROGATE LIMITS: (80 - 120)

ADDITIONAL NOTES:

N/A

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST : BTEX (EPA 8020)
MSMSD # : 702327-26
CLIENT : MARATHON OIL CO.
PROJECT # : (none)
PROJECT NAME : IB REMEDIATION
AEN I.D. : 702327
DATE EXTRACTED : N/A
DATE ANALYZED : 2/13/97
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	14.8	10.0	25.7	109	26.5	117	3	(80 - 120)	20
TOLUENE	<0.5	10.0	11.4	114	11.8	118	3	(80 - 120)	20
ETHYLBENZENE	10.3	10.0	20.6	206	20.9	106	1	(80 - 120)	20
TOTAL XYLENES	3.0	30.0	32.3	108	32.7	99	1	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: BTEX (EPA 8020)	AEN I.D.	: 702327
MSMSD #	: 702327-15	DATE EXTRACTED	: N/A
CLIENT	: MARATHON OIL CO.	DATE ANALYZED	: 2/13/97
PROJECT #	: (none)	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REMEDIATION	UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.5	10.0	8.5	85	9.3	93	9	(80 - 120)	20
TOLUENE	<0.5	10.0	8.3	83	9.2	92	10	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	8.6	86	9.4	94	9	(80 - 120)	20
TOTAL XYLENES	<0.5	30.0	26.8	89	29.3	98	9	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8240 BTEX ONLY
CLIENT : MARATHON OIL COMPANY
PROJECT # : 23350224.80
PROJECT NAME : INDIAN BASIN REMEDIATION

AEN I.D. : 702327
DATE RECEIVED : 2/13/97

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
702327-10	MW-71	AQUEOUS	2/9/97	N/A	02/20/97	1
PARAMETER	DET. LIMIT		UNITS			
Benzene	1.0	5.9	ug/L			
Toluene	1.0	1.7	ug/L			
Ethylbenzene	1.0	1.3	ug/L			
m&p Xylenes	1.0	2.4	ug/L			
o-Xylene	1.0	< 1.0	ug/L			

SURROGATE % RECOVERY

1,2-Dichloroethane-d4 81
(78 - 114)
Toluene-d8 110
(88 - 110)
Bromofluorobenzene 108
(86 - 115)

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8240 BTEX ONLY
CLIENT : MARATHON OIL COMPANY AEN I.D. : 702327
PROJECT # : 23350224.60 DATE RECEIVED : 2/13/97
PROJECT NAME : INDIAN BASIN REMEDIATION

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
702327-19	MW-67	AQUEOUS	2/10/97	N/A	02/20/97	1
PARAMETER	DET. LIMIT		UNITS			

Benzene	1.0	14	ug/L
Toluene	1.0	2.9	ug/L
Ethylbenzene	1.0	1.7	ug/L
m&p Xylenes	1.0	35	ug/L
o-Xylene	1.0	6.8	ug/L

SURROGATE % RECOVERY

1,2-Dichloroethane-d4	89 (76 - 114)
Toluene-d8	103 (88 - 110)
Bromofluorobenzene	108 (86 - 115)

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8240 BTEX ONLY
CLIENT : MARATHON OIL COMPANY
PROJECT # : 23350224.60
PROJECT NAME : INDIAN BASIN REMEDIATION

AEN I.D. : 702327

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	022097	AQUEOUS	N/A	02/20/97	1

PARAMETER	DET. LIMIT	UNITS
Benzene	1.0	< 1.0 ug/L
Toluene	1.0	< 1.0 ug/L
Ethylbenzene	1.0	< 1.0 ug/L
m&p Xylenes	1.0	< 1.0 ug/L
o-Xylene	1.0	< 1.0 ug/L

SURROGATE % RECOVERY

1,2-Dichloroethane-d4	105 (76 - 114)
Toluene-d8	106 (88 - 110)
Bromofluorobenzene	106 (86 - 115)

Spike Recovery and RPD Summary Report - WATER

Method : C:\HPCHEM\2\METHODS\8260E3.M
Title : ATI ALBUQUERQUE GC/MS
Last Update : Fri Dec 13 08:18:23 1996
Response via : Initial Calibration

Non-Spiked Sample: 021897B1.D

Spike Sample	Spike Duplicate Sample
File ID : 021897S1.D	021897S2.D
Sample : 021897 BS	021897 BSD
Acq Time: 18 Feb 97 7:52 pm	18 Feb 97 8:45 pm

Compound	Sample Conc	Spike Added	Spike Res	Dup Res	Spike %Rec	Dup %Rec	RPD	QC Limits RPD	% Rec
1,1-Dichloroethene	0.0	50	60	59	120	119	1	14	61-145
Benzene	0.0	50	55	53	110	109	1	11	76-127
Trichloroethene	0.0	50	52	51	103	102	1	14	71-120
Toluene	0.0	50	50	50	100	100	1	13	76-125
Chlorobenzene	0.0	50	55	55	111	110	1	13	75-130

8260E3.M

Wed Feb 19 07:35:26 1997

MS1

"FINAL REPORT FORMAT - SINGLE"

Accession: 702255
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702327
Project Name: MARATHON OIL CO.
Project Location: N/S
Test: POLYNUCLEAR AROMATICS BY 8310
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 002 Sample Date/Time: 09-FEB-97 1440
Client Sample Id: 702327-15 Received Date: 14-FEB-97
Batch: PAW025 Extraction Date: 14-FEB-97
Blank: B Dry Weight %: N/A Analysis Date: 21-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a) ANTHRACENE	UG/L	ND	1	
BENZO(a) PYRENE	UG/L	ND	1	
BENZO(b) FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i) PERYLENE	UG/L	ND	1	
BENZO(k) FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h) ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	ND	1	
INDENO(1,2,3-cd) PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	93	28-138	
ANALYST	INITIALS	JBT		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 702255
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702327
Project Name: MARATHON OIL CO.
Project Location: N/S
Test: POLYNUCLEAR AROMATICS BY 8310
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 003 Sample Date/Time: 09-FEB-97 1645
Client Sample Id: 702327-17 Received Date: 14-FEB-97

Batch: PAW025 Extraction Date: 14-FEB-97
Blank: B Dry Weight %: N/A Analysis Date: 21-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	19	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a)ANTHRACENE	UG/L	ND	1	
BENZO(a)PYRENE	UG/L	ND	1	
BENZO(b)FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i)PERYLENE	UG/L	ND	1	
BENZO(k)FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	ND	1	
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	108	28-138	
ANALYST	INITIALS	JBT		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 702255
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702327
Project Name: MARATHON OIL CO.
Project Location: N/S
Test: POLYNUCLEAR AROMATICS BY 8310
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 004 Sample Date/Time: 10-FEB-97 1505
Client Sample Id: 702327-28 Received Date: 14-FEB-97

Batch: PAW025 Extraction Date: 14-FEB-97
Blank: B Dry Weight %: N/A Analysis Date: 21-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a) ANTHRACENE	UG/L	ND	1	
BENZO(a) PYRENE	UG/L	ND	1	
BENZO(b) FLUORANTHENE	UG/L	ND	1	
BENZO(g, h, i) PERYLENE	UG/L	ND	1	
BENZO(k) FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a, h) ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	1	1	
INDENO(1, 2, 3-cd) PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	100	28-138	
ANALYST	INITIALS	JBT		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 702255
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702327
Project Name: MARATHON OIL CO.
Project Location: N/S
Test: POLYNUCLEAR AROMATICS BY 8310
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 005
Client Sample Id: 702327-33
Sample Date/Time: 11-FEB-97 0910
Received Date: 14-FEB-97
Batch: PAW025
Blank: B
Dry Weight %: N/A
Extraction Date: 14-FEB-97
Analysis Date: 21-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO (a) ANTHRACENE	UG/L	ND	1	
BENZO (a) PYRENE	UG/L	ND	1	
BENZO (b) FLUORANTHENE	UG/L	ND	1	
BENZO (g, h, i) PERYLENE	UG/L	ND	1	
BENZO (k) FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO (a, h) ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	1	1	
INDENO (1, 2, 3-cd) PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	65	28-138	
ANALYST	INITIALS	JBT		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 702255
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702327
Project Name: MARATHON OIL CO.
Project Location: N/S
Test: POLYNUCLEAR AROMATICS BY 8310
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 006
Client Sample Id: 702327-34
Sample Date/Time: 11-FEB-97 0950
Received Date: 14-FEB-97
Batch: PAW025
Blank: B
Dry Weight %: N/A
Extraction Date: 14-FEB-97
Analysis Date: 21-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	2	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a) ANTHRACENE	UG/L	ND	1	
BENZO(a) PYRENE	UG/L	ND	1	
BENZO(b) FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i) PERYLENE	UG/L	ND	1	
BENZO(k) FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h) ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	1	1	
INDENO(1,2,3-cd) PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	2	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	5	1	
2-METHYLNAPHTHALENE	UG/L	2	1	
2-CHLOROANTHRACENE	%REC/SURR	86	28-138	
ANALYST	INITIALS	JBT		

Comments:

"Method Report Summary"

Accession Number: 702255
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702327
Project Name: MARATHON OIL CO.
Project Location: N/S
Test: POLYNUCLEAR AROMATICS BY 8310

Client Sample Id:	Parameter:	Unit:	Result:
702327-17	ACENAPHTHENE	UG/L	19
702327-28	FLUORENE	UG/L	1
702327-33	FLUORENE	UG/L	1
702327-34	ACENAPHTHENE	UG/L	2
	FLUORENE	UG/L	1
	NAPHTHALENE	UG/L	2
	1-METHYLNAPHTHALENE	UG/L	5
	2-METHYLNAPHTHALENE	UG/L	2

"QC Report"

Title: Water Blank
Batch: PAW025
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Blank Id: B Date Analyzed: 21-FEB-97 Date Extracted: 14-FEB-97

Parameters:	Units:	Results:	Reporting Limits:
ACENAPHTHENE	UG/L	ND	1
ACENAPHTHYLENE	UG/L	ND	1
ANTHRACENE	UG/L	ND	1
BENZO(a)ANTHRACENE	UG/L	ND	1
BENZO(a)PYRENE	UG/L	ND	1
BENZO(b)FLUORANTHENE	UG/L	ND	1
BENZO(g,h,i)PERYLENE	UG/L	ND	1
BENZO(k)FLUORANTHENE	UG/L	ND	1
CHRYSENE	UG/L	ND	1
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1
FLUORANTHENE	UG/L	ND	1
FLUORENE	UG/L	ND	1
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1
NAPHTHALENE	UG/L	ND	1
PHENANTHRENE	UG/L	ND	1
PYRENE	UG/L	ND	1
1-METHYLNAPHTHALENE	UG/L	ND	1
2-METHYLNAPHTHALENE	UG/L	ND	1
2-CHLOROANTHRACENE	%REC/SURR	111	28-138
ANALYST	INITIALS	JBT	

Comments:

American Environmental Network, Inc.

"QC Report"

Title: Water Reagent
Batch: PAW025
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

RS Date Analyzed: 16-FEB-97
RSD Date Analyzed: 16-FEB-97

RS Date Extracted: 13-FEB-97
RSD Date Extracted: 13-FEB-97

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	RSD Conc	RSD %Rec	RPD	Rec Lmts	Rec Lmts
ACENAPHTHYLENE	10.0	<1	10.0	100	10.9	109	9	35	45-127
BENZO(k) FLUORANTHENE	10.0	<1	10.4	104	9.9	99	5	23	68-131
CHRYSENE	10.0	<1	10.1	101	9.8	98	3	24	69-131
PHENANTHRENE	10.0	<1	9.5	95	9.7	97	2	26	63-124
PYRENE	10.0	<1	9.6	96	9.5	95	1	25	61-126

Surrogates:									
2-CHLOROANTHRACENE				115		119			28-138

Comments:

Notes:

N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/L = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.

* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.

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

American Environmental Network, Inc.

"QC Report"

Title: Water Matrix
Batch: PAW025
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Dry Weight %: N/A
Sample Spiked: 702214-14
MS Date Analyzed: 17-FEB-97
MSD Date Analyzed: 17-FEB-97
MS Date Extracted: 13-FEB-97
MSD Date Extracted: 13-FEB-97

Parameters:	Spike Added	Sample Conc	MS Conc	MS %Rec	MSD Conc	MSD %Rec	RPD	RPD Lmts	Rec Lmts
ACENAPHTHYLENE	10.0	8	27.0	190*	20.7	127	40	51	18-146
BENZO(k) FLUORANTHENE	10.0	<1	8.8	88	6.8	68	26	40	26-137
CHRYSENE	10.0	3	1.8	-12*	8.7	57	307*	69	16-156
PHENANTHRENE	10.0	2.7	18.3	156*	13.2	105	39*	36	30-145
PYRENE	10.0	<1	14.5	145*	10.1	101	36	41	39-137

Surrogates:
2-CHLOROANTHRACENE
164*
118
28-138

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

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

American Environmental Network, Inc.

Common notation for Organic reporting

N/S = NOT SUBMITTED
N/A = NOT APPLICABLE
D = DILUTED OUT
UG = MICROGRAMS
UG/L = PARTS PER BILLION.
UG/KG = PARTS PER BILLION.
MG/M3 = MILLIGRAM PER CUBIC METER.
PPMV = PART PER MILLION BY VOLUME.
MG/KG = PARTS PER MILLION.
MG/L = PARTS PER MILLION.
< = LESS THAN DETECTION LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS
Y = IMPROPER PRESERVATION, NO PRESERVATIVE PRESENT IN SAMPLE UPON RECEIPT.

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

ORGANIC SOILS ARE REPORTED ON A DRYWEIGHT BASIS.

ND = NOT DETECTED ABOVE REPORTING LIMIT.

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

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)

AEN/GC/FID

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

AEN/GC/FIX

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

AEN/GC/FPD

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

AEN/GC/PID

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

AEN/GC/TCD

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

SW-846 METHOD 9020

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

SW = STEVE WILHITE
PL = PAUL LESCHENSKY
RW = ROBERT WOLFE
KS = KENDALL SMITH
KK = KERRY LEMONT
RP = ROB PEREZ
JBT = JENNIFER TORRANCE
LP = LAVERNE PETERSON
PLD = PAULA DOUGHTY



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

CHAIN OF CUSTODY

DATE: 1/15/97 PAGE: 1 OF 1

ATI LAB ID.
702327

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: <u>BOB MENZIE</u>		COMPANY: <u>MARATHON OIL Co</u>		ADDRESS: <u>P.O. BOX 552</u>		PHONE: <u>Midland TX 79702</u>		FAX: <u>915 687-8312</u>		BILL TO: <u>915 687-8305</u>		COMPANY: <u>SPRUE AS ABOVE</u>		ADDRESS: <u></u>	
SAMPLE ID	DATE	TIME	MATRIX	LAB ID.	Petroleum Hydrocarbons (418.1) TRPH (MOD.8015) Diesel/Direct/Inject (M8015) Gas/Purge & Trap Gasoline/BTEX & MTBE (M8015/8020) BTX/EDC (8020) BTEX & Chlorinated Aromatics (602/8020) BTEX/MTBE/EDC & EDB (8020/8010/Short) Chlorinated Hydrocarbons (601/8010) 504 EDB ☐ / DBCP ☐ Polynuclear Aromatics (610/8310) Volatile Organics (624/8240) GC/MS Volatile Organics (8260) GC/MS Pesticides/PCB (608/8080) Herbicides (615/8150) Base/Neutral/Acid Compounds GC/MS (625/8270) CATIONS / ANIONS General Chemistry Chloride, TDS, PH, conductivity Priority Pollutant Metals (13) Target Analyte List Metals (23) RCRA Metals (8) RCRA Metals by TCLP (Method 1311)										
<u>SW-1</u>	<u>2-10-97</u>	<u>12:15 PM</u>	<u>WATER</u>	<u>01</u>											
<u>W SKIPPED outlet</u>		<u>1:03 PM</u>		<u>02</u>											
<u>W SKIPPED outlet</u>		<u>1:06 PM</u>		<u>03</u>											
<u>E SKIPPED inlet</u>		<u>1:15 PM</u>		<u>04</u>											
<u>E SKIPPED outlet</u>		<u>1:28 PM</u>		<u>05</u>											
<u>LYMAN</u>		<u>10:15 AM</u>		<u>06</u>											
<u>ARROYO</u>		<u>10:18 AM</u>		<u>07</u>											
<u>Biebble</u>		<u>10:30 AM</u>		<u>08</u>											
					ANALYSIS REQUEST								NUMBER OF CONTAINERS		

PROJECT INFORMATION		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS		RELINQUISHED BY: 1.		RELINQUISHED BY: 2.	
PROJ. NO.:		(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK	(NORMAL) ☒ 2 WEEK	Signature: <u>Brian Hayden</u>	Time: <u>1:54</u>	Signature: <u>Kevin Cook</u>	Time: <u>0820</u>
PROJ. NAME:	<u>18 Remediation</u>	CERTIFICATION REQUIRED: ☐ NM ☐ OTHER		Printed Name: <u>Brian Hayden</u>	Date: <u>2/10/97</u>	Printed Name: <u>Kevin Cook</u>	Date: <u>2/10/97</u>
P.O. NO.:		METHANOL PRESERVATION ☐		Signature: <u>Mark Howard</u>	Time: <u>1:54</u>	Signature: <u>Kevin Cook</u>	Time: <u>0820</u>
SHIPPED VIA:		COMMENTS:		Company: <u>Marathon Oil Co</u>		Company: <u>ATI</u>	
SAMPLE RECEIPT				RECEIVED BY: <u>1.</u>		RECEIVED BY: (LAB) <u>2.</u>	
NO. CONTAINERS	<u>21</u>			Signature: <u>Kevin Cook</u>	Time: <u>1:54</u>	Signature: <u>Kevin Cook</u>	Time: <u>0820</u>
CUSTODY SEALS	<u>Y/N (M)</u>			Printed Name: <u>Kevin Cook</u>	Date: <u>2-10-97</u>	Printed Name: <u>Kevin Cook</u>	Date: <u>2/10/97</u>
RECEIVED INTACT	<u>Y</u>			Company: <u>ATI</u>		Company: <u>ATI</u>	
BILL OF LADING	<u>20</u>			Signature: <u>Mark Howard</u>	Time: <u>1:54</u>	Signature: <u>Kevin Cook</u>	Time: <u>0820</u>

ATI Labs: San Diego (619) 438-9141 • Phoenix (602) 496-4400 • Seattle (206) 228-8335 • Pensacola (904) 474-1001 • Portland (503) 684-0447 • Albuquerque (505) 344-3777 DISTRIBUTION: White, Canary, ATI Pink • ORIGINATOR



American
Environmental
Network (Arizona), Inc.

REPORT: Attn. to: Bob Merwin

COMPANY: Matthew OK
ADDRESS: PO Box 552

PHONE: Melina, TX 79702
FAX: (915) 687-8312
(915) 687 8305

BILL TO: _____
COMPANY: _____
ADDRESS: Same as above

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
<u>mw-67RB</u>	<u>2/10/97</u>	<u>0940</u>	<u>WATER</u>	<u>18</u>
<u>mw-67</u>		<u>0945</u>		<u>19</u>
<u>mw-57RB</u>		<u>1105</u>		<u>20</u>
<u>mw-57</u>		<u>1110</u>		<u>21</u>
<u>mw-55RB</u>		<u>1150</u>		<u>22</u>
<u>mw-55</u>		<u>1235</u>		<u>23</u>
<u>mw-54RB</u>		<u>1240</u>		<u>24</u>
<u>mw-54</u>		<u>1335</u>		<u>25</u>
<u>mw-61RB</u>				<u>26</u>

PROJECT INFORMATION

PROD. NO.: 02350224.60

PROD. NAME: Indian Basin Remediation

SHIPED VIA: _____

NO. CONTAINERS: 22

CUSTODY SEALS: Y/N/NA

RECEIVED INTRAC: Y/N/NA

RECEIVED ICE: Y/N/NA

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

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

Comments:

COMPOSITE OR GRAB

ANALYSIS REQUEST	NUMBER OF CONTAINERS
Petroleum Hydrocarbons (418.1)	
(MOD.8015) Fuel Fingerprint	
(M8015) Gas	
(BLS-191) Diesel	
BTX (MTBE) (8020/602)	
Chlorine, TOS, Ph, Concentration	
Chlorinated Hydrocarbons (601/8010)	
Aromatic Hydrocarbons (602/8020)	
Volatiles 502.2 (SDWA/UST)	
Cations / Anions	
PAHs 8310	
Pesticides/PCB (608/8080/505/508)	
Herbicides (615/8150/515)	
Semi-Volatiles GC/MS (Tics/No Tics)	
Volatile Organics GC/MS (624/8240/8260)	
Polynuclear Aromatics (610/8310)	
RCRA Metals by Total Digestion	
RCRA Metals by TCLP (1311)	

CHAIN OF CUSTODY

DATE 2/10/97 PAGE 23 OF 45

ANALYSIS REQUEST

AEN LAB I.D.

702327

SAMPLED & RELINQUISHED BY: 1. Kevin Cook Signature: Kevin Cook Time: 0820

2. Phil Daniel Signature: _____ Time: _____

3. _____ Signature: _____ Time: _____

RECEIVED BY: 1. _____ Signature: _____ Time: _____

2. _____ Signature: _____ Time: _____

3. _____ Signature: _____ Time: _____

Printed Name: _____ Date: _____

Printed Name: _____ Date: _____

Printed Name: _____ Date: _____

Company: _____

Company: _____

Company: _____



American
Environmental
Network (Arizona), Inc.

REPORT ATTN TO: Bob Mevize

COMPANY: Marathon O/C

ADDRESS: PO Box 552

MOLAND TX 79702

PHONE: (915) 687-8312

FAX: (915) 687-8305

BILL TO:

COMPANY:

ADDRESS:

5 Ave ASBONE

SAMPLE ID DATE TIME MATRIX LAB ID

mw-6	2/10/97	1340	water	27
mw-90		1505		28
mw-90 RB		1515		29
mw-79		1540		30
mw-79 RB		1630		31
mw-78		1635		32
mw-106	2-1-97	0910		33
mw-91		0950		34
mw-65		1020		35

PROJECT INFORMATION

SAMPLE RECEIPT

PROJ. NO.: 0335-022460

PROJ. NAME: Indian Bend Remediation

P.O. NO.:

SHIPED VIA: ☐ OTHER

PRICH AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

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

Comments:

CHAIN OF CUSTODY

DATE 2/10-11/97 PAGE 14 OF 45

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1)	Chlorine, TDS, PH, Conductivity	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	Volatiles 502.2 (SDWA/UST)	PAHs 8310	Pesticides/PCB (608/8080/505/508)	Herbicides (615/8150/515)	Semi-Volatiles GC/MS (Tics/No Tics)	Volatile Organics GC/MS (624/8240/8260)	Polynuclear Aromatics (610/8310)	RCRA Metals by Total Digestion	RCRA Metals by TCLP (1311)
--------------------------------	---------------------------------	-------------------------------------	----------------------------------	----------------------------	-----------	-----------------------------------	---------------------------	-------------------------------------	---	----------------------------------	--------------------------------	----------------------------

SAMPLED & RELINQUISHED BY: 1. RELINQUISHED BY: 2. RELINQUISHED BY: 3.

Signature: Me-Lok Time: 0820

Printed Name: Me-Lok Date: 2/13/97

Company: Phone: 242-3110

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

Signature: Time: 2000

Printed Name: Date: 2/13/97

Company: American Environmental Network



American
Environmental
Network (Arizona), Inc.

REPORT Attn. to: Bob Mazze

COMPANY: Martinez O/C

ADDRESS: P.O. Box 552

Molokai TX 79202

PHONE: (915) 687-8312

FAX: (915) 687-8305

BILL TO:

COMPANY:

ADDRESS:

Sample # Above

SAMPLE ID DATE TIME MATRIX LAB ID

MU-62 2/11/97 1035 WAT 36
MU-64 1050 365
MU-56 1115 38
MU-10 1145 39
MU-46 1215 40

COMPOSITE OR GRAB

Petroleum Hydrocarbons (418.1)

(MOD.8015) Fuel Fingerprint

(M8015) Gas

(BLS-191) Diesel

BTX/M/TBE (8020/602)

Chloride, TDS, pH, Conductivity

Chlorinated Hydrocarbons (601/8010)

Aromatic Hydrocarbons (602/8020)

Volatiles 502.2 (SDWA/UST)

PAHs 8310
CAUTION: RISK

Pesticides/PCB (608/8080/505/508)

Herbicides (615/8150/515)

Semi-Volatiles GC/MS (Tics/No Tics)

Volatiles Organics GC/MS (624/8240/8260)

Polynuclear Aromatics (610/8310)

RCRA Metals by Total Digestion

RCRA Metals by TCLP (1311)

NUMBER OF CONTAINERS

1-333

CHAIN OF CUSTODY
DATE 2/11/97 PAGE 4/5 OF 4/5

ANALYSIS REQUEST

AEN LAB ID.

702324

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLED & RELINQUISHED BY: 1.

RELINQUISHED BY: 2.

RELINQUISHED BY: 3.

PROJECT NO: 023550224/60

PROJECT NAME: Indian Basin Remediation

PO NO: 1

SAMPLED VIA: 1 OTHER

NO. CONTAINERS: 11

CUSTODY SEAL: SDWA

RECEIVED INITIAL: NA

RECEIVED ICE: NA

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK

(NORMAL) ☐ 2 WEEKS

Comments:

SIGNATURE: He-Carl

DATE: 2/11/97

TIME: 0820

SIGNATURE: He-Carl

DATE: 2/11/97

TIME: 0820

SIGNATURE: He-Carl

DATE: 2/11/97

TIME: 0820

PRINTED NAME: He-Carl

DATE: 2/11/97

TIME: 0820

PRINTED NAME: He-Carl

DATE: 2/11/97

TIME: 0820

PRINTED NAME: He-Carl

DATE: 2/11/97

TIME: 0820

PRINTED NAME: He-Carl

DATE: 2/11/97

TIME: 0820

PRINTED NAME: He-Carl

DATE: 2/11/97

TIME: 0820

Interlab Chain of Custody

DATE 2/13 PAGE 1 OF 3

NETWORK PROJECT MANAGER: **KIMBERLY D. MCNEILL**

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

CURRI PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals - TAL	Metals - PP List	Metals - RCRA	RCRA Metals by TCLP (1311)	Chloride	Fluoride Bromide, SO4	100 TDS, pH, EC	100 Total Alk (Bicarbonate + Carbonate)	Gen Chemistry	Oil and Grease	BOD	COD	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	8240 (TCLP 1311) ZHE	8270 (TCLP 1311)	TC-14	Gross Alpha/Beta	NUMBER OF CONTAINERS
7023327-01	2/10/97	1215	AA	1					X	X	X	X														1
-06		1015		2					X	X	X	X														1
-07		1018		3					X	X	X	X														1
-08		1030		4					X	X	X	X														1
-10	2/9/97	1130		5					X	X	X	X														1
-11		1200		6					X	X	X	X														1
-13		1325		7					X	X	X	X														1
-15		1440		8					X	X	X	X														1
-17		1645		9					X	X	X	X														1

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER 7023327

TOTAL NUMBER OF CONTAINERS 9

SAN DIEGO

Signature: Kim McNeill Time: 1700

Signature: John C. Howell Time: 2/13/97

PROJECT NAME TTPurathon Oil Co.

CHAIN OF CUSTODY SEALS

Paragon

Printed Name: John C. Howell Date: 2/13/97

Printed Name: John C. Howell Date: 2/13/97

GC LEVEL (STD) IV

IMPACT?

RENTON

Signature: John C. Howell Time: 2/13/97

Signature: John C. Howell Time: 2/13/97

GC METHOD (MS MSID BLANK)

RECEIVED GOOD COND/COLD

PENSACOLA

Signature: John C. Howell Time: 2/13/97

Signature: John C. Howell Time: 2/13/97

LAB (STANDARD) RUSH

LAB NUMBER 7021105/105105

PORTLAND

Signature: John C. Howell Time: 2/13/97

Signature: John C. Howell Time: 2/13/97

DATE 2/26

* Sample 7023327-15 received with 9 off

RENTON

Signature: John C. Howell Time: 2/13/97

Signature: John C. Howell Time: 2/13/97

PROJECT DISCOUNT

CONFIRMATION REQUIRED: 1 YES 1 NO

RENTON

Signature: John C. Howell Time: 2/13/97

Signature: John C. Howell Time: 2/13/97



American Environmental Network
Albuquerque, New Mexico

Interlab Chain of Custody

DATE: 2/13 PAGE: 2 OF 3

NETWORK PROJECT MANAGER: KIMBERLY D. McNEILL

ANALYSIS REQUEST

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

CURRENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals - TAL	Metals - PP List	Metals - RCRA	RCRA Metals by TCLP (1311)	Chloride,	Fluoride, Bromide, SO ₄	TDS, pH, EC	Total Alk (Bicarb)	Gen Chemistry	Oil and Grease	BOD	COD	Pesticides/PCB (606/8080)	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8240)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	8240 (TCLP 1311) ZHE	8270 (TCLP 1311)	TO-14	Gross Alpha/Beta	NUMBER OF CONTAINERS
702327-19	2/10/97	0945	AG	16					X	X	X	X	X													1
-21		1110		11					X	X	X	X	X													1
-23		1150		12					X	X	X	X	X													1
-25		1240		13					X	X	X	X	X													1
-27		1340		14					X	X	X	X	X													1
-28		1505		15					X	X	X	X	X													1
-30		1540		16					X	X	X	X	X													1
-32		1635		17					X	X	X	X	X													1
-33	2/11/97	0910		18					X	X	X	X	X													1

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER: 702327

TOTAL NUMBER OF CONTAINERS: 9

SAN DIEGO

Signature: [Signature] Time: 1700

Signature: [Signature] Time: [Time]

PROJECT NAME: M. Crafton Co./Co.

CHAIN OF CUSTODY SEALS: NA

PARAGON

Printed Name: [Name] Date: 2/13/97

Printed Name: [Name] Date: [Date]

QC LEVEL: STD IV

INITIALS: [Initials]

RENTON

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

QC METHOD: MS MSD BLANK

RECEIVED GOOD COND/COLD

PENSACOLA

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

QC METHOD: STANDARD RUSH

LAB NUMBER: 70216016 702165

PORTLAND

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

DUE DATE: 2/26

RECEIVED BY: [Signature]

PHOENIX

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

INSTRUMENT: [Instrument]

RECEIVED BY: [Signature]

ALBUQUERQUE

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

QUALITY ASSURANCE REQUIRED: (YES) (NO)

RECEIVED BY: [Signature]

ALBUQUERQUE

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

Interlab Chain of Custody

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

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

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
702327-34	2/11/97	0950	QA	19
-35		1020		20
-36		1035		21
-37		1050		22
-38		1115		23
-39		1145		24
-40		1215		25

Metals - TAL	
Metals - PP List	
Metals - RCRA	
RCRA Metals by TCLP (1311)	
Chloride	X
Fluoride, Bromide, SO ₄	X
TDS, pH, EC	X
Total Alk (Ca ²⁺ + Mg ²⁺)	X
Gen Chemistry	
Oil and Grease	
BOD	
COD	
Pesticides/PCB (608/8080)	
Herbicides (615/8150)	
Base/Neutral Acid Compounds GC/MS (625/8270)	
Volatile Organics GC/MS (624/8240)	
Polynuclear Aromatics (610/8310)	
8240 (TCLP 1311) ZHE	
8270 (TCLP 1311)	
TO-14	
Gross Alpha/Beta	
NUMBER OF CONTAINERS	1

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER: 702327

TOTAL NUMBER OF CONTAINERS: 7

SAND DIEGO

Signature: [Signature] Time: 1:00

Signature: [Signature] Time: 10:02

PROJECT NAME: Matheson Oil Co.

CHAIN OF CUSTODY SEALS

Paragon

Printed Name: [Signature] Date: 4/3/97

Printed Name: [Signature] Date: 4/11/97

OC LEVEL: STD IV

INTACT?

RENTON

Signature: [Signature] Time: 1:00

Signature: [Signature] Time: 10:02

QC (REQUIRED) MS MSD BLANK

RECEIVED GOOD COM/ICOLD

PENSACOLA

Signature: [Signature] Time: 1:00

Signature: [Signature] Time: 10:02

TAI (STANDARD) RUSII

LAB NUMBER: 702327-34

PORTLAND

Signature: [Signature] Time: 1:00

Signature: [Signature] Time: 10:02

DATE: 2/26

Sample 702327-34 was received w/ 1 of 7 containers sealed in a bag.

PHOENIX

Signature: [Signature] Time: 1:00

Signature: [Signature] Time: 10:02

INSURANCE:

Sealed in a bag.

RECEIVED BY: 1.

Signature: [Signature] Time: 1:00

Signature: [Signature] Time: 10:02

CLIENT DISCOUNT:

Sealed in a bag.

RECEIVED BY: 2.

Signature: [Signature] Time: 1:00

Signature: [Signature] Time: 10:02

SPECIAL APPLICATION REQUIRED: 1 YES 1 NO

Sealed in a bag.

RECEIVED BY: 2.

Signature: [Signature] Time: 1:00

Signature: [Signature] Time: 10:02



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

CHAIN OF CUSTODY

DATE: 10/23/97 PAGE: 1 OF 5

AT LAB I.D.
702307

PROJECT MANAGER: BOB MENZIE

COMPANY: MARATHON OIL Co

ADDRESS: P.O. BOX 552
MIDLAND TX 79702

PHONE: 915 687-8312

FAX: 915 687-8305

BILL TO:

COMPANY:

ADDRESS:

SAMPLE AS ABOVE

SAMPLE ID DATE TIME MATRIX LAB ID.

SW-1 2-10-97 12:50 PM WATER 01

W STRIPPER INLET 1:03 PM 02

W STRIPPER OUTLET 1:06 PM 03

E STRIPPER INLET 1:15 PM 04

E STRIPPER OUTLET 1:28 PM 05

LYMAN 10:15 AM 06

ARLOYO 10:18 AM 07

Biebble 10:30 AM 08

Petroleum Hydrocarbons (418.1) TRPH
(MOD.8015) Diesel/Direct/Inject

(M8015) Gas/Purge & Trap
Gasoline/BTEX & MTBE (M8015/8020)
BTXE/MTE (8020)

BTEX & Chlorinated Aromatics (602/8020)
BTEX/MTBE/EDC & EDB (8020/8010/Short)
Chlorinated Hydrocarbons (601/8010)

Chloride
504 EDB ☐ / DBCP ☐

Polynuclear Aromatics (610/8310)
Volatile Organics (624/8240) GC/MS
Volatile Organics (8260) GC/MS
PAH 3310 RT
Pesticides/PCB (608/8080)
Herbicides (615/8150)
Base/Neutral/Acid Compounds GC/MS (625/8270)

CATIONS / ANIONS
General Chemistry
Chloride, TOS, PH, conductivity

Priority Pollutant Metals (113)
Target Analyte List Metals (23)
RCRA Metals (8)
RCRA Metals by TCLP Method (311)

NUMBER OF CONTAINERS

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.

PROJECT INFORMATION

PROJECT NO. 18 Remediation

PROJ. NAME: 18 Remediation

P.O. NO. 18

SHIPPED VIA: 18

NO. CONTAINERS: 21

CUSTOMER: Y/N

RECEIVED INVOICE: Y

PRICE: 20

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr (14hr) ☐ 72hr (11 WEEK) ☒ (NORMAL) ☒ WEEK

CERTIFICATION REQUIRED: (1) NM (1) OTHER

METHANOL PRESERVATION (1)

COMMENTS:

RELINQUISHED BY: 1.

Signature: Bob Menzie Time: 1:54

Printed Name: Bob Menzie Date: 2/10/97

Company: Marathon Oil Co

RECEIVED BY: 1.

Signature: David GTE Time: 1:54

Printed Name: David GTE Date: 2-10-97

Company: Marathon Oil Co

RECEIVED BY: 1.

RELINQUISHED BY: 2.

Signature: David GTE Time: 08:30

Printed Name: David GTE Date: 2/10/97

Company: Marathon Oil Co

RECEIVED BY: 2.

Signature: David GTE Time: 08:30

Printed Name: David GTE Date: 2/10/97

Company: Marathon Oil Co

RECEIVED BY: 2.



American Environmental Network (AEN), Inc.

REPORT ATTN: Bob Mezie

COMPANY: Marathon O/C
ADDRESS: P.O. Box 552
Midland, TX 79702
PHONE: (915) 687-8312
FAX: (915) 687-8305
BILL TO:
COMPANY:
ADDRESS:

3 Ave NS ABOVE

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
MW-7/RB	2/7/97	11:25	WATER	09
MW-71		11:30		10
MW-59		12:00		11
MW-60RB		12:20		12
MW-60		13:25		13
MW-87RB		14:35		14
MW-87		14:40		15
MW-87A RB		16:40		16
MW-87A		16:45		17

PROJECT INFORMATION

PROJECT NO: 0335024.60
PROJECT NAME: Edin 875 Rendition
PROJECT ID: 101111
SAMPLE TYPE: 101111

SAMPLE RECEIPT

NO. CONTAINERS: 27
CUSTODY SEALS: Y/N/NA
RECEIVED INAC: Y/N/NA
RECEIVED ICE: Y/N/NA
PRICH AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS
(NORMAL) | 12 WEEKS

CHAIN OF CUSTODY

DATE: 2/9/97 PAGE: 1 OF 4

ANALYSIS REQUEST

COMPOSITE OR GRAB	Petroleum Hydrocarbons (418.1)	(MOD.8015) Fuel Fingerprint	(M8015) Gas	(BLS-191) Diesel	BTX/MTBE (8020/602)	Chlorine, TOS, Pb, Cadmium	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	Volatiles 502.2 (SDWA/UST)	Pesticides/PCB (608/8080/505/508)	Herbicides (615/8150/515)	Semi-Volatiles GC/MS (TICS/NC TICS)	Volatile Organics GC/MS (624/8240/8260)	Polynuclear Aromatics (610/8310)	ROA Metals by Total Digestion	ROA Metals by TQCP (131)
6																

SAMPLED & RELINQUISHED BY:

1. SIGNED BY: Ken Cook Time: 0820
Printed Name: Ken Cook Date: 2/13/97
Company: Ken Cook Phone: 242-3113
2. RECEIVED BY: Ken Cook Time: 0820
Printed Name: Ken Cook Date: 2/13/97
Company: Ken Cook
3. RECEIVED BY: Ken Cook Time: 0820
Printed Name: Ken Cook Date: 2/13/97
Company: Ken Cook

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



AMERICAN ENVIRONMENTAL NETWORK
National Environmental Inc.

CHAIN OF CUSTODY

LAB ID: 702321

DATE: 2/10/97 PAGE 23 OF 45

ANALYSIS REQUEST

REPORT TO: Bob Mewize

COMPANY: Marathon O/C
ADDRESS: PO Box 552
Midland, TX 79702

PHONE: (915) 687-8312
FAX: (915) 687-8305

DATE TO: 1/3/97
COMPANY: Same as above
ADDRESS: Same as above

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
MW-67RB	2/10/97	0940	WATER	18
MW-67		0945		19
MW-57RB		1105		20
MW-57		1110		21
MW-55RB		1115		22
MW-55		1150		23
MW-54RB		1235		24
MW-54		1240		25
MW-61RB		1335		26

COMPOSITE OR GRAB

Petroleum Hydrocarbons (418.1)	
(MOD.8015) Fuel Fingerprint	
(MOD.8015) Gas	
(BLS-191) Diesel	
BTX (MTBE) (8020/602)	
Chloride, TOS, Pb, Concentration	
Chlorinated Hydrocarbons (601/8010)	
Aromatic Hydrocarbons (602/8020)	
Volatiles 502.2 (SDWA/UST)	
PAHs 8310	
Pesticides/PCB (608/8080/505/506)	
Herbicides (615/8150/5151)	
Semi-Volatiles GC/MS (Tics/Nc Tics)	
Volatile Organics GC/MS (624/8240/8260)	
Polynuclear Aromatics (610/8310)	
RCRA Metals by Total Digestion	
RCRA Metals by TCLP (6311)	

NUMBER OF CONTAINERS

2 3 2 3 2 3 2 3 2

PROJECT INFORMATION

PROJECT ID: 02330224.65
PROJECT NAME: Indian Basin Remediation
PROJECT TYPE: RCRA
PROJECT LOCATION: Indian Basin
PROJECT STATUS: In Progress
PROJECT START DATE: 1/1/97
PROJECT END DATE: 1/1/97

SAMPLE RECEIPT

NO. CONTAINERS: 22
CUSTODY SEALS: Y/N/A
RECEIVED IN/AC: Y/N/A
RECEIVED ICE: Y/N/A

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ (NORMAL) ☐ 2 WEEKS

SAMPLED & RELINQUISHED BY: 1

Signature: [Signature]
Printed Name: Kevin Cook
Date: 2/12/97
Company: American Environmental Network

RELINQUISHED BY: 2

Signature: [Signature]
Printed Name: [Signature]
Date: [Date]
Company: [Company]

RELINQUISHED BY: 3

Signature: [Signature]
Printed Name: [Signature]
Date: [Date]
Company: [Company]

RECEIVED BY: 1

Signature: [Signature]
Printed Name: [Signature]
Date: [Date]
Company: [Company]

2

Signature: [Signature]
Printed Name: [Signature]
Date: [Date]
Company: [Company]

RECEIVED BY: (LAB) 3

Signature: [Signature]
Printed Name: [Signature]
Date: [Date]
Company: [Company]

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



Environmental
Network, Inc. Inc.

REPORT TO: Bob Newze

COMPANY: Marathon O/C
ADDRESS: PO Box 552
Midland TX 79702

PHONE: (915) 687-8312
FAX: (915) 687-8305

BILL TO:
COMPANY:
ADDRESS:

Same as above

SAMPLE ID DATE TIME MATRIX LAB ID

mw-4	2/10/97	1340	water	27
mw-90		1505		28
mw-30RB		1515		29
mw-79		1540		30
mw-79RB		1630		31
mw-78		1635		32
mw-106	2-11-97	0910		33
mw-91		0950		34
mw-65		1030		35

PROJECT INFORMATION SAMPLE RECEIPT

FROM TO	0335022460	NO. CONTAINERS	34
FROM FROM		CUSTODY SEALS	Y/N/NA
FROM FROM		RECEIVED INVOICE	Y/N/NA
FROM FROM		RECEIVED BY	Y/N/NA
FROM FROM		RECEIVED BY	Y/N/NA

PRICH AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

PRICH AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS (NORMAL) 12 WEEKS

Comments:

CHAIN OF CUSTODY

DATE 2/10-11/97 PAGE 14 OF 15

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1)	
(MOD.8015) Fuel Fingerprint	
(M8015) Gas	
(BLS-191) Diesel	
BTX/MTBE (8020/502)	
Chlorides, TDS, PH, Ammonia	
Chlorinated Hydrocarbons (601/8010)	
Aromatic Hydrocarbons (602/3020)	
Volatiles 502.2 (SDWA/UST)	
PAHs 8310	
Pesticides/PCB (608/8080/505/508)	
Herbicides (615/8150/515)	
Semi-Volatiles GC/MS (Tics/Nc Tics)	
Volatile Organics GC/MS (624/8240/6260)	
Polynuclear Aromatics (610/8310)	
RCRA Metals by Total Digestion	
RCRA Metals by TCEP Digestion	

NUMBER OF CONTAINERS

SAMPLED & RELINQUISHED BY: 1. RELINQUISHED BY: 2. RELINQUISHED BY: 3.

Signature: Kevin Cook	Date: 2/13/97	Signature: Kevin Cook	Date: 2/13/97	Signature: Kevin Cook	Date: 2/13/97
Printed Name: Kevin Cook	Date: 2/13/97	Printed Name: Kevin Cook	Date: 2/13/97	Printed Name: Kevin Cook	Date: 2/13/97
Company: American Environmental Network	Phone: 742-3110	Company: American Environmental Network	Phone: 742-3110	Company: American Environmental Network	Phone: 742-3110

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

Signature: Kevin Cook	Date: 2/13/97	Signature: Kevin Cook	Date: 2/13/97	Signature: Kevin Cook	Date: 2/13/97
Printed Name: Kevin Cook	Date: 2/13/97	Printed Name: Kevin Cook	Date: 2/13/97	Printed Name: Kevin Cook	Date: 2/13/97
Company: American Environmental Network	Phone: 742-3110	Company: American Environmental Network	Phone: 742-3110	Company: American Environmental Network	Phone: 742-3110

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

Interlab Chain of Custody

DATE: 2/13 PAGE: 1 OF 1

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

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

702255

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals - TAL	Metals - PP List	Metals - RCRA	RCRA Metals by TCLP (1311)	TOX	TOC	Gen Chemistry	Oil and Grease	BOD	COD	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (640/8310)	8240 (TCLP 1311) ZHE	8270 (TCLP 1311)	TO-14	Gross Alpha/Beta	NUMBER OF CONTAINERS
702322-01	2/10/97	1215	AA																					
-15	2/11/97	1440	AA																					
-17	2/11/97	1645	AA																					
-28	2/10/97	1505	AA																					
-33	2/11/97	0910	AA																					
-34	2/11/97	0950	AA																					

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY:		RELINQUISHED BY:	
PROJECT NUMBER	702322	TOTAL NUMBER OF CONTAINERS		SAN DIEGO		Signature:	Time:	Signature:	Time:
PROJECT NAME	Marathon Oil Co.	CHAIN OF CUSTODY SEALS		Paragon		Printed Name:	Date:	Printed Name:	Date:
QC LEVEL	STD IV	INITIAL?		RENTON		Signature:	Time:	Signature:	Time:
QC REQUIRED	MS MSD BLANK	RECEIVED GOOD COND/COLD		PENSACOLA		Printed Name:	Date:	Printed Name:	Date:
LAB	STANDARD RUSHI	LAB NUMBER		PORTLAND		Signature:	Time:	Signature:	Time:
DUE DATE:	2/26			PHOENIX		RECEIVED BY:	1.	RECEIVED BY: (LAB)	2.
RUSH SURCHARGE:						Signature:	Time:	Signature:	Time:
CLIENT DISCOUNT:						Printed Name:	Date:	Printed Name:	Date:
SPECIAL:						Signature:	Time:	Signature:	Time:

LABS: San Diego (619) 458-9141 • Phoenix (602) 496-4400 • Seattle (206) 228-8335 • Pensacola (904) 474-1001 • Portland (503) 684-0447 • Albuquerque (505) 344-3777

The 8310's have only a few days left before they break-hold

American Environmental Network

11 East Olive Road

Pensacola, Florida 32514

(904)474-1001

PROJECT SAMPLE INSPECTION FORM

Accession #:

702255

Date Received:

14-Feb-97

1. Was there a Chain of Custody? ☒ Yes No

2. Was Chain of Custody properly relinquished? ☒ Yes No

3. Were samples received cold? (Check Temperature of Cooler) ☒ Yes No N/A

4. Were all samples properly labeled and identified? ☒ Yes No

5. Were samples received in proper containers for analysis requested? ☒ Yes No

6. Were all sample containers received intact? ☒ Yes No

7. Are samples preserved? (Check pH of all H₂O except 40ml vials)* ☒ Yes No N/A

8. Is there sufficient volume for analysis requested? ☒ Yes No

9. Were samples received within Holding Time? ☒ Yes No

10. Is Headspace visible > 1/4" in diameter in 40ml vials? * If any headspace is evident, comment in out-of-control section. Yes No ☒ N/A

11. If sent, were matrix spike bottles returned? Yes No ☒ N/A

Airbill Number:

3141821051

Shipped By:

Jedx

Cooler Number:

N/A

Shipping Charges:

N/A

Cooler Weight:

N/A

Cooler Temp (°C):

4°C

Out of Control Events and Inspection Comments:

Metals Sample # 702327-28 received in Plastic Zip lock Bag with Approx 1/2 bottle of Sample because lid came off bottle and is in the plastic bag

Inspected By:

L. Kitt

Date: 14-Feb-97

Logged By:

L. Kitt

Date: 14-Feb-97

All preservatives for the State of North Carolina and the State of New York are to be recorded on the sheet provided to record pH results (SOP 938, section 2.2.9).

According to EPA, 1/4" of headspace is allowed in 40ml vials, however, AEN makes it policy to record any headspace as out-of-control (SOP 938, section 2.2.12).



American Environmental Network, Inc.

AEN I.D.

702321

March 10, 1997

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

Project Name IB REBEDIATION
Project Number 023350224.60

Attention: BOB MENZIE

On 2/8/97 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze aqueous samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8020 was performed by American Environmental Network (NM) Inc., Albuquerque, NM.

EPA methods 8310 and 6010 were performed by American Environmental Network (FL) Inc., 11 East Olive Road, Pensacola, FL.

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

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



Kimberly D. McNeill
Project Manager



H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt
Enclosure

CLIENT : MARATHON OIL COMPANY
PROJECT # : 023350224.60
PROJECT NAME : IB REBEDIATION

AEN I.D. : 702321
DATE RECEIVED : 2/8/97
REPORT DATE : 3/10/97

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	DI H2O	AQUEOUS	2/5/97
02	INT RB	AQUEOUS	2/5/97
03	MW-70RB	AQUEOUS	2/5/97
04	MW-70	AQUEOUS	2/5/97
05	MW-63RB	AQUEOUS	2/5/97
06	MW-63	AQUEOUS	2/5/97
07	MW-89RB	AQUEOUS	2/5/97
08	MW-89	AQUEOUS	2/5/97
09	MW-66RB	AQUEOUS	2/5/97
10	MW-66	AQUEOUS	2/5/97
11	MW-88RB	AQUEOUS	2/5/97
12	MW-88	AQUEOUS	2/5/97
13	MW-61ARB	AQUEOUS	2/6/97
14	MW-61A	AQUEOUS	2/6/97
15	MW-50	AQUEOUS	2/7/97
16	MW-49	AQUEOU	2/7/97
17	MW-44	AQUEOUS	2/7/97
18	MW-43	AQUEOUS	2/7/97
19	MW-41	AQUEOUS	2/7/97
20	MW-38	AQUEOUS	2/7/97
21	MW-39	AQUEOUS	2/7/97
22	MW-19	AQUEOUS	2/7/97
23	MW-13	AQUEOUS	2/7/97
24	MW-11	AQUEOUS	2/7/97
25	MW-69	AQUEOUS	2/7/97

American Environmental Network, Inc.

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 702321
PROJECT NAME : MARATHON O/C
ATI I.D. : 702094

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	702321-04	AQUEOUS	02/05/97
02	702321-06	AQUEOUS	02/05/97
03	702321-08	AQUEOUS	02/05/97
04	702321-10	AQUEOUS	02/05/97
05	702321-12	AQUEOUS	02/05/97
06	702321-14	AQUEOUS	02/06/97
07	702321-15	AQUEOUS	02/07/97
08	702321-16	AQUEOUS	02/07/97
09	702321-17	AQUEOUS	02/07/97
10	702321-18	AQUEOUS	02/07/97
11	702321-19	AQUEOUS	02/07/97
12	702321-20	AQUEOUS	02/07/97
13	702321-21	AQUEOUS	02/07/97
14	702321-22	AQUEOUS	02/07/97
15	702321-23	AQUEOUS	02/07/97
16	702321-24	AQUEOUS	02/07/97
17	702321-25	AQUEOUS	02/07/97

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	17

ATI STANDARD DISPOSAL PRACTICE

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

GENERAL CHEMISTRY RESULTS

ATI I.D. : 702094

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 702321
PROJECT NAME : MARATHON O/C

PARAMETER	UNITS	01	02	03	04	05
CARBONATE (CACO3)	MG/L	-	-	<1	-	<1
BICARBONATE (CACO3)	MG/L	-	-	286	-	332
HYDROXIDE (CACO3)	MG/L	-	-	<1	-	<1
TOTAL ALKALINITY (AS CACO3)	MG/L	-	-	286	-	332
BROMIDE (EPA 300.0)	MG/L	-	-	<0.3	-	0.3
CHLORIDE (EPA 325.2)	MG/L	10	7	60	9	30
CONDUCTIVITY, (UMHOS/CM)		-	-	1090	-	1240
FLUORIDE (EPA 340.2)	MG/L	-	-	0.80	-	1.13
PH (EPA 150.1)	UNITS	-	-	7.7	-	7.6
SULFATE (EPA 375.2)	MG/L	-	-	250	-	390
T. DISSOLVED SOLIDS (160.1)	MG/L	-	-	840	-	970

GENERAL CHEMISTRY RESULTS

ATI I.D. : 702094

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 702321
PROJECT NAME : MARATHON O/C

PARAMETER	UNITS	06	07	08	09	10
CARBONATE (CACO3)	MG/L	<1	-	-	-	-
BICARBONATE (CACO3)	MG/L	266	-	-	-	-
HYDROXIDE (CACO3)	MG/L	<1	-	-	-	-
TOTAL ALKALINITY (AS CACO3)	MG/L	266	-	-	-	-
BROMIDE (EPA 300.0)	MG/L	<0.3	-	-	-	-
CHLORIDE (EPA 325.2)	MG/L	13	360	410	180	330
CONDUCTIVITY, (UMHOS/CM)		1020	-	-	-	-
FLUORIDE (EPA 340.2)	MG/L	0.85	-	-	-	-
PH (EPA 150.1)	UNITS	7.5	-	-	-	-
SULFATE (EPA 375.2)	MG/L	340	-	-	-	-
T. DISSOLVED SOLIDS (160.1)	MG/L	840	-	-	-	-

American Environmental Network, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 702094

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 702321
PROJECT NAME : MARATHON O/C

PARAMETER	UNITS	11	12	13	14	15
CHLORIDE (EPA 325.2)	MG/L	180	310	160	240	70

American Environmental Network, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 702094

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 702321
PROJECT NAME : MARATHON O/C

PARAMETER	UNITS	16	17
CHLORIDE (EPA 325.2)	MG/L	46	70

American Environmental Network, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
 PROJECT # : 702321
 PROJECT NAME : MARATHON O/C

ATI I.D. : 702094

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CARBONATE	MG/L	70208101	<1	<1	NA	NA	NA	NA
BICARBONATE	MG/L		257	255	0.8	NA	NA	NA
HYDROXIDE	MG/L		<1	<1	NA	NA	NA	NA
TOTAL ALKALINITY	MG/L		257	255	0.8	NA	NA	NA
BROMIDE	MG/L	70204801	<0.3	<0.3	NA	1.9	2.0	95
CHLORIDE	MG/L	70209401	10	9	11	60	50	100
CHLORIDE	MG/L	70210303	230	230	0	480	250	100
CHLORIDE	MG/L	70209411	180	180	0	700	500	104
CONDUCTIVITY (UMHOS/CM)		70208101	950	952	0.2	NA	NA	NA
FLUORIDE	MG/L	70208101	0.28	0.28	0	0.61	0.30	110
PH	UNITS	70208101	8.1	8.1	0	NA	NA	NA
SULFATE	MG/L	70205905	12	11	9	29	20	85
SULFATE	MG/L	70210303	115	117	2	220	100	105
TOTAL DISSOLVED SOLIDS	MG/L	70205102	380	370	3	NA	NA	NA

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

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

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 702191
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702321
Project Name: MARATHON O/C
Project Location: N/S
Test: Group of Single Metals
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 702321-08			Lab ID:001		
CALCIUM (6010)	MG/L	140	1	I6W031	
POTASSIUM (6010)	MG/L	ND	2	X6W031	
MAGNESIUM (6010)	MG/L	55	0.2	J6W031	
SODIUM (6010)	MG/L	31	0.2	16W034	

Comments:

Client ID: 702321-12			Lab ID:002		
CALCIUM (6010)	MG/L	160	1	I6W031	
POTASSIUM (6010)	MG/L	4	2	X6W031	
MAGNESIUM (6010)	MG/L	74	0.2	J6W031	
SODIUM (6010)	MG/L	31	0.2	16W034	

Comments:

Client ID: 702321-14			Lab ID:003		
CALCIUM (6010)	MG/L	150	1	I6W031	
POTASSIUM (6010)	MG/L	ND	2	X6W031	
MAGNESIUM (6010)	MG/L	57	0.2	J6W031	
SODIUM (6010)	MG/L	16	0.2	16W034	

Comments:

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 702191
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702321
Project Name: MARATHON O/C
Project Location: N/S
Test: Group of Single Metals

Client Id:	Lab Matrix: Id:	Date/Time Sampled:	Date Received:
702321-08	001 WATER	05-FEB-97 1310	11-FEB-97
702321-12	002 WATER	05-FEB-97 1625	11-FEB-97
702321-14	003 WATER	06-FEB-97 1000	11-FEB-97

"Method Report Summary"

Accession Number: 702191
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702321
Project Name: MARATHON O/C
Project Location: N/S
Test: Group of Single Metals

Client Sample Id:	Parameter:	Unit:	Result:
702321-08	CALCIUM (6010)	MG/L	140
	MAGNESIUM (6010)	MG/L	55
	SODIUM (6010)	MG/L	31
702321-12	CALCIUM (6010)	MG/L	160
	POTASSIUM (6010)	MG/L	4
	MAGNESIUM (6010)	MG/L	74
	SODIUM (6010)	MG/L	31
702321-14	CALCIUM (6010)	MG/L	150
	MAGNESIUM (6010)	MG/L	57
	SODIUM (6010)	MG/L	16

American Environmental Network, Inc.

"Metals Quality Control Report"

Parameter:	CALCIUM	POTASSIUM	MAGNESIUM	SODIUM
Batch Id:	I6W031	X6W031	J6W031	16W034
Blank Result:	<1	<2	<0.2	<0.2
Anal. Method:	6010	6010	6010	6010
Prep. Method:	3010	3010	3010	3010
Analysis Date:	18-FEB-97	18-FEB-97	18-FEB-97	19-FEB-97
Prep. Date:	14-FEB-97	14-FEB-97	14-FEB-97	19-FEB-97

Sample Duplication

Sample Dup:	702189-2	702189-2	702189-2	702153-1
Rept Limit:	<1	<2	<0.2	<0.2
Sample Result:	260	23	130	24
Dup Result:	270	24	130	24
Sample RPD:	4	4	0	0
Max RPD:	20	20	20	20
Dry Weight%	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	702189-2	702189-2	702189-2	702153-1
Rept Limit:	<1	<2	<0.2	<0.2
Sample Result:	240	<2	100	1.6
Spiked Result:	260	23	130	24
Spike Added:	20F	20	20F	20
% Recovery:	100	115	150	112
% Rec Limits:	75-125	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A	N/A

ICV

ICV Result:	9.9	50	5.0	9.7
True Result:	10	50	5.0	10
% Recovery:	99	100	100	97
% Rec Limits:	90-110	90-110	90-110	90-110

LCS

LCS Result:	22	23	22	22
True Result:	20	20	20	20
% Recovery:	110	115	110	110
% Rec Limits:	80-120	80-120	80-120	80-120

"Quality Control Comments"

Batch Id: Comments:

I6W031	ANALYST: JR
I6W031	The results reported under "Sample Duplication" are the MS/MSD.
X6W031	ANALYST: JR
X6W031	The results reported under "Sample Duplication" are the MS/MSD.
J6W031	ANALYST: JR
J6W031	The results reported under "Sample Duplication" are the MS/MSD.
16W034	ANALYST: JR
16W034	The results reported under "Sample Duplication" are the MS/MSD.

----- Common Footnotes Metals -----

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

FROM ANALYSIS REPORT:

RL= REPORTING LIMIT BASED ON METHOD DETECTION LIMIT STUDIES.
Q= QUALIFIER (FOOTNOTE)

FROM QUALITY CONTROL REPORT:

RPD= RELATIVE PERCENT DEVIATION.
RPT LIMIT= REPORTING LIMIT BASED ON METHOD DETECTION LIMIT STUDIES.

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

SW-846, 3rd Edition, latest revision.
EPA 600/4-79-020, Revised March 1983.
NIOSH Manual of Analytical Methods, 4th Edition.
Standard Methods For the Examination of Water and Wastewater, 18th Edition, 1992.
Methods For the Determination of Metals in Environmental Samples - Supplement I,
EPA 600/R-94-111, May 1994.

GJ = GARY JACOBS
JLH = JAMES L. HERED
CD = CHRISTY DRAPER

JR = JOHN REED
LV = LASSANDRA VON APPEN

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 023350224.60
PROJECT NAME : IB REBEDIATION

AEN I.D.: 702321

SAMPLE		MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
ID. #	CLIENT I.D.					
01	DI H2O	AQUEOUS	2/5/97	NA	2/10/97	1
02	INT RB	AQUEOUS	2/5/97	NA	2/10/97	1
03	MW-70RB	AQUEOUS	2/5/97	NA	2/10/97	1
PARAMETER		DET. LIMIT	UNITS	01	02	03
BENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES		0.5	UG/L	< 0.5	< 0.5	< 0.5

SURROGATE:

TRIFLUOROTOLUENE (%)

97

90

90

SURROGATE LIMITS: (69 - 117)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 023350224.60
PROJECT NAME : IB REBEDIATION

AEN I.D.: 702321

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
04	MW-70	AQUEOUS	2/5/97	NA	2/10/97	1
05	MW-63RB	AQUEOUS	2/5/97	NA	2/10/97	1
06	MW-63	AQUEOUS	2/5/97	NA	2/10/97	1

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

SURROGATE:

TRIFLUOROTOLUENE (%)

96

91

92

SURROGATE LIMITS: (69 - 117)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 023350224.60
PROJECT NAME : IB REBEDIATION

AEN I.D.: 702321

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
07	MW-89RB	AQUEOUS	2/5/97	NA	2/10/97	1
08	MW-89	AQUEOUS	2/5/97	NA	2/10/97	1
09	MW-66RB	AQUEOUS	2/5/97	NA	2/10/97	1
PARAMETER		DET. LIMIT	UNITS	07	08	09
BENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
AL XYLENES		0.5	UG/L	< 0.5	< 0.5	< 0.5

SURROGATE:

TRIFLUOROTOLUENE (%)

95

95

95

SURROGATE LIMITS:

(69 - 117)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 023350224.60
PROJECT NAME : IB REBEDIATION

AEN I.D.: 702321

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	MW-66	AQUEOUS	2/5/97	NA	2/10/97	1
11	MW-88RB	AQUEOUS	2/5/97	NA	2/10/97	1
12	MW-88	AQUEOUS	2/5/97	NA	2/11/97	1

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

SURROGATE:

TRIFLUOROTOLUENE (%)

96

96

95

SURROGATE LIMITS: (69 - 117)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 023350224.60
PROJECT NAME : IB REBEDIATION

AEN I.D.: 702321

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
13	MW-61ARB	AQUEOUS	2/6/97	NA	2/11/97	1
14	MW-61A	AQUEOUS	2/6/97	NA	2/11/97	1
15	MW-50	AQUEOUS	2/7/97	NA	2/11/97	1

PARAMETER	DET. LIMIT	UNITS	13	14	15
BENZENE	0.5	UG/L	< 0.5	42	< 0.5
TOLUENE	0.5	UG/L	< 0.5	3.4	< 0.5
ETHYLBENZENE	0.5	UG/L	< 0.5	8.4	< 0.5
AL XYLENES	0.5	UG/L	< 0.5	46	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%) NA 110 110
SURROGATE LIMITS (80 - 120)

TRIFLUOROTOLUENE (%) 91
SURROGATE LIMITS: (69 - 117)

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 023350224.60
PROJECT NAME : IB REBEDIATION

AEN I.D.: 702321

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
16	MW-49	AQUEOUS	2/7/97	NA	2/10/97	10
17	MW-44	AQUEOUS	2/7/97	NA	2/10/97	10
18	MW-43	AQUEOUS	2/7/97	NA	2/10/97	1
PARAMETER		DET. LIMIT	UNITS	16	17	18
BENZENE		0.5	UG/L	79	270	64
TOLUENE		0.5	UG/L	66	26	8.1
ETHYLBENZENE		0.5	UG/L	45	53	18
TOTAL XYLENES		0.5	UG/L	160	48	28

SURROGATE:

BROMOFLUOROBENZENE (%)

107

107

179*

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

*SURROGATE OUTSIDE CONTROL LIMITS DUE TO MATRIX INTERFERENCE.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 023350224.60
PROJECT NAME : IB REBEDIATION

AEN I.D.: 702321

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
19	MW-41	AQUEOUS	2/7/97	NA	2/11/97	1
20	MW-38	AQUEOUS	2/7/97	NA	2/11/97	1
21	MW-39	AQUEOUS	2/7/97	NA	2/11/97	1

PARAMETER	DET. LIMIT	UNITS	19	20	21
BENZENE	0.5	UG/L	82	0.7	< 0.5
TOLUENE	0.5	UG/L	6.2	< 0.5	< 0.5
ETHYLBENZENE	0.5	UG/L	7.2	< 0.5	< 0.5
AL XYLENES	0.5	UG/L	9.1	0.7	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

130*

112

113

SURROGATE LIMITS

(80 - 120)

CHEMIST NOTES:

*SURROGATE OUTSIDE CONTROL LIMITS DUE TO MATRIX INTERFERENCE.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8020)
CLIENT : MARATHON OIL COMPANY
PROJECT # : 023350224.60
PROJECT NAME : IB REBEDIATION

AEN I.D.: 702321

SAMPLE		MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
ID. #	CLIENT I.D.					
22	MW-19	AQUEOUS	2/7/97	NA	2/11/97	500
23	MW-13	AQUEOUS	2/7/97	NA	2/11/97	50
24	MW-11	AQUEOUS	2/7/97	NA	2/11/97	10
PARAMETER		DET. LIMIT	UNITS	22	23	24
BENZENE		0.5	UG/L	360	1300	270
TOLUENE		0.5	UG/L	980	130	20
ETHYLBENZENE		0.5	UG/L	1100	690	81
AL XYLENES		0.5	UG/L	5600	1000	1400
SURROGATE:						
BROMOFLUOROBENZENE (%)				124*	114	108
SURROGATE LIMITS				(80 - 120)		

CHEMIST NOTES:

*SURROGATE OUTSIDE CONTROL LIMITS DUE TO MATRIX INTERFERENCE.

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 702321
BLANK I. D.	: 021097	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL COMPANY	DATE ANALYZED	: 2/10/97
PROJECT #	: 023350224.60	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REBEDIATION		

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

SURROGATE:
BROMOFLUOROBENZENE (%) 108

SURROGATE LIMITS: (80 - 120)

ANALYST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 702321
BLANK I. D.	: 021097	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL COMPANY	DATE ANALYZED	: 2/10/97
PROJECT #	: 023350224.60	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REBEDIATION		

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

SURROGATE:

TRIFLUOROTOLUENE (%)	81
----------------------	----

SURROGATE LIMITS: (69 - 117)

TEST NOTES:

N/A

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: BTEX (EPA 8020)	AEN I.D.	: 702321
MSMSD #	: 702321-14	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL COMPANY	DATE ANALYZED	: 2/11/97
PROJECT #	: 023350224.60	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REBEDIATION	UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	42	10.0	53	110	53	110	0	(80 - 120)	20
TOLUENE	3.4	10.0	13	96	13	96	0	(80 - 120)	20
ETHYLBENZENE	8.4	10.0	18	96	17	86	6	(80 - 120)	20
TOTAL XYLENES	46	30.0	75	97	74	93	1	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: BTEX (EPA 8020)	AEN I.D.	: 702321
MSMSD #	: 702321-10	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL COMPANY	DATE ANALYZED	: 2/10/97
PROJECT #	: 023350224.60	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REBEDIATION	UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.5	10.0	9.2	92	8.1	81	13	(80 - 120)	20
TOLUENE	<0.5	10.0	9.4	94	8.3	83	12	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	9.3	93	8.3	83	11	(80 - 120)	20
TOTAL XYLENES	<0.5	30.0	29.2	97	26.1	87	11	(80 - 120)	20

CHEMIST NOTES:
N/A

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

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

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX (EPA 8020)	AEN I.D.	: 702321
BLANK I. D.	: 021197	DATE EXTRACTED	: NA
CLIENT	: MARATHON OIL COMPANY	DATE ANALYZED	: 2/11/97
PROJECT #	: 023350224.60	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IB REBEDIATION		

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

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

"FINAL REPORT FORMAT - SINGLE"

Accession: 702191
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702321
Project Name: MARATHON O/C
Project Location: N/S
Test: POLYNUCLEAR AROMATICS BY 8310
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 001
Client Sample Id: 702321-08
Sample Date/Time: 05-FEB-97 1310
Received Date: 11-FEB-97
Batch: PAW024
Blank: A
Dry Weight %: N/A
Extraction Date: 11-FEB-97
Analysis Date: 14-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a) ANTHRACENE	UG/L	ND	1	
BENZO(a) PYRENE	UG/L	ND	1	
BENZO(b) FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i) PERYLENE	UG/L	ND	1	
BENZO(k) FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h) ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	1	1	
INDENO(1,2,3-cd) PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	111	28-138	
ANALYST	INITIALS	JBT		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 702191
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702321
Project Name: MARATHON O/C
Project Location: N/S
Test: POLYNUCLEAR AROMATICS BY 8310
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 002 Sample Date/Time: 05-FEB-97 1625
Client Sample Id: 702321-12 Received Date: 11-FEB-97
Batch: PAW024 Extraction Date: 11-FEB-97
Blank: A Dry Weight %: N/A Analysis Date: 14-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a) ANTHRACENE	UG/L	ND	1	
BENZO(a) PYRENE	UG/L	ND	1	
BENZO(b) FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i) PERYLENE	UG/L	ND	1	
BENZO(k) FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h) ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	1	1	
INDENO(1,2,3-cd) PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	1	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	110	28-138	
ANALYST	INITIALS	JBT		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 702191
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702321
Project Name: MARATHON O/C
Project Location: N/S
Test: POLYNUCLEAR AROMATICS BY 8310
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 003
Client Sample Id: 702321-14
Sample Date/Time: 06-FEB-97 1000
Received Date: 11-FEB-97
Batch: PAW024
Blank: A
Dry Weight %: N/A
Extraction Date: 11-FEB-97
Analysis Date: 14-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a)ANTHRACENE	UG/L	ND	1	
BENZO(a)PYRENE	UG/L	ND	1	
BENZO(b)FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i)PERYLENE	UG/L	1	1	
BENZO(k)FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	1	1	
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	100	28-138	
ANALYST	INITIALS	JBT		

Comments:

"Method Report Summary"

Accession Number: 702191
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 702321
Project Name: MARATHON O/C
Project Location: N/S
Test: POLYNUCLEAR AROMATICS BY 8310

Client Sample Id:	Parameter:	Unit:	Result:
702321-08	FLUORENE	UG/L	1
702321-12	FLUORENE	UG/L	1
	NAPHTHALENE	UG/L	1
702321-14	BENZO(g,h,i) PERYLENE	UG/L	1
	FLUORENE	UG/L	1

American Environmental Network, Inc.

"QC Report"

Title: Water Blank
Batch: PAW024
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Blank Id: A Date Analyzed:

Date Extracted: 11-FEB-97

Parameters:	Units:	Results:	Reporting Limits:
ACENAPHTHENE	UG/L	ND	1
ACENAPHTHYLENE	UG/L	ND	1
ANTHRACENE	UG/L	ND	1
BENZO(a)ANTHRACENE	UG/L	ND	1
BENZO(a)PYRENE	UG/L	ND	1
BENZO(b)FLUORANTHENE	UG/L	ND	1
BENZO(g,h,i)PERYLENE	UG/L	ND	1
BENZO(k)FLUORANTHENE	UG/L	ND	1
CHRYSENE	UG/L	ND	1
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1
FLUORANTHENE	UG/L	ND	1
FLUORENE	UG/L	ND	1
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1
NAPHTHALENE	UG/L	ND	1
PHENANTHRENE	UG/L	ND	1
PYRENE	UG/L	ND	1
1-METHYLNAPHTHALENE	UG/L	ND	1
2-METHYLNAPHTHALENE	UG/L	ND	1
2-CHLOROANTHRACENE	%REC/SURR	110	28-138
ANALYST	INITIALS	JBT	

Comments:

American Environmental Network, Inc.

"QC Report"

Title: Water Reagent
Batch: PAW024
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

RS Date Analyzed: 14-FEB-97
RSD Date Analyzed: 14-FEB-97

RS Date Extracted: 11-FEB-97
RSD Date Extracted: 11-FEB-97

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	RSD Conc	RSD %Rec	RPD	RPD Lmts	Rec Lmts
ACENAPHTHYLENE	10.0	<1	12.0	120	11.5	115	4	35	45-127
BENZO(k) FLUORANTHENE	10.0	<1	11.3	113	10.9	109	4	23	68-131
CHRYSENE	10.0	<1	11.3	113	10.7	107	5	24	69-131
PHENANTHRENE	10.0	<1	11.1	111	10.5	105	6	26	63-124
PYRENE	10.0	<1	11.2	112	10.3	103	8	25	61-126

Surrogates:									
2-CHLOROANTHRACENE				134		125			28-138

Comments:

Notes:

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

American Environmental Network, Inc.

"QC Report"

Title: Water Matrix
Batch: PAW024
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Dry Weight %: N/A
Sample Spiked: 702191-1

MS Date Analyzed: 14-FEB-97
MSD Date Analyzed: 14-FEB-97

MS Date Extracted: 11-FEB-97
MSD Date Extracted: 11-FEB-97

Parameters:	Spike Added	Sample Conc	MS Conc	MS %Rec	MSD Conc	MSD %Rec	RPD	RPD Lmts	Rec Lmts
ACENAPHTHYLENE	10.0	<1	7.5	75	9.6	96	25	51	18-146
BENZO(k) FLUORANTHENE	10.0	<1	9.2	92	9.1	91	1	40	26-137
CHRYSENE	10.0	<1	9.1	91	9.2	92	1	69	16-156
PHENANTHRENE	10.0	<1	7.2	72	8.5	85	17	36	30-145
PYRENE	10.0	<1	8.5	85	8.8	88	3	41	39-137

Surrogates:
2-CHLOROANTHRACENE 97 104 28-138

Comments:

Notes:

N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/L = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.

* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.

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

American Environmental Network, Inc.

Common notation for Organic reporting

N/S = NOT SUBMITTED
N/A = NOT APPLICABLE
D = DILUTED OUT
UG = MICROGRAMS
UG/L = PARTS PER BILLION.
UG/KG = PARTS PER BILLION.
MG/M3 = MILLIGRAM PER CUBIC METER.
PPMV = PART PER MILLION BY VOLUME.
MG/KG = PARTS PER MILLION.
MG/L = PARTS PER MILLION.
< = LESS THAN DETECTION LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS
Y = IMPROPER PRESERVATION, NO PRESERVATIVE PRESENT IN SAMPLE UPON RECEIPT.

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

ORGANIC SOILS ARE REPORTED ON A DRYWEIGHT BASIS.

ND = NOT DETECTED ABOVE REPORTING LIMIT.

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

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)

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

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

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

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

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

SW-846 METHOD 9020
PARTICULATE MATTER IS REMOVED BY ALLOWING PARTICULATES TO SETTLE IN THE SAMPLE CONTAINER AND DECANTING THE SUPERNATANT LIQUID. EXCESSIVE PARTICULATES ARE REMOVED BY FILTRATION OF THE SUPERNATANT LIQUID.

SW = STEVE WILHITE
PL = PAUL LESCHENSKY
RW = ROBERT WOLFE
KS = KENDALL SMITH
KK = KERRY LEMONT
RP = ROB PEREZ
JBT = JENNIFER TORRANCE
LP = LAVERNE PETERSON
PLD = PAULA DOUGHTY



American
Environmental
Network (Arizona), Inc.

CHAIN OF CUSTODY

DATE 2/17/97 PAGE 3 OF 3

AEN LAB I.D.

702321

ANALYSIS REQUEST

REPORT: Attn. to: Bob Menzies

COMPANY:

MacArthur O/C

ADDRESS:

P.O. Box 552

Melrose, TX. 77022

PHONE:

(915) 687-9312

FAX:

(915) 687-8305

BILL TO:

COMPANY:

ADDRESS:

Same as Above

SAMPLE ID

DATE

TIME

MATRIX

LAB ID

COMPOSITE OR GRAB

Petroleum Hydrocarbons (418.1)

(MOD.8015) Fuel Fingerprint

(M8015) Gas

(BLS-191) Diesel

Chlorine (8020/602)

Chlorinated Hydrocarbons (601/8010)

Aromatic Hydrocarbons (602/8020)

Volatiles 502.2 (SDWA/UST)

Pesticides/PCB (608/8080/505/508)

Herbicides (615/8150/515)

Semi-Volatiles GC/MS (Tics/No Tics)

Volatile Organics GC/MS (624/8240/8260)

Polynuclear Aromatics (610/8310)

RCRA Metals by Total Digestion

RCRA Metals by TCLP (1311)

NUMBER OF CONTAINERS

7 5 2 3 1

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLED & RELINQUISHED BY: 1.

RELINQUISHED BY: 2.

RELINQUISHED BY: 3.

PROJ. NO.: 02350224.60

☐ USI (72 hr ext.)

NO. CONTAINERS

19

PROJ. NAME: Indian Basin Remediation

☐ NPDES

CUSTODY SEALS

Y/N/NA

P.O. NO.:

☐ SDWA

RECEIVED INTACT

Y/N/NA

SHIPPED VIA:

☐ RCRA

RECEIVED

Y/N/NA

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK

(NORMAL) ☐ 2 WEEKS

Comments:

Signed by: Neil Cook

Time: 1720

Signed by: Neil Cook

Time: 2/17/97

Signed by: Neil Cook

Time: 1105

Printed Name:

Date:

Printed Name:

Date:

Printed Name:

Date:

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

AFN Lab:

Albuquerque (505) 344-3777 • Columbia (410) 730-8525 • Pensacola (904) 474-1001 • Pleasant Hill (510) 930-9090 • Portland (503) 684-0447

DISTRIBUTION: While Canav. AFN (Arizona) Inc. • Print - ORIGINATOR

REPORT ATTN TO: **Bob Menzies**

COMPANY: **Marathon O/C**
 ADDRESS: **P.O. Box 552**
Midland, TX, 79702

PHONE: **(915) 687-8312**
 FAX: **(915) 687-8305**

BILL TO:
 COMPANY:
 ADDRESS:

State of Texas

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
PI H2O	2/5/97	0850	water	-01
INT RB	2/5/97	0900		-02
MW-70RB		1010		-03
MW-70		1025		-04
MW-63RB		1135		-05
MW-63		1145		-06
MW-89RB		1300		-07
MW-89		1310		-08
MW-66RB		1415		-09

PROJECT INFORMATION

PROJECT ID: **003350224.60**
 PROJECT NAME: **Midland Basin Remediation**
 PROJECT TYPE: ☐ AIRPORTS ☐ SOWA ☐ RCRA ☐ OTHER
 PROJECT LOCATION: **10000 N. 10th Ave., Suite 100**
 PROJECT STATUS: ☐ 1 WEEK ☐ 2 WEEKS (NORMAL) ☐ 2 WEEKS
 PROJECT AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

SAMPLE RECEIPT

SAMPLED & HELINDUSTRIED BY: **1. Signature: [Signature] Time: 1730**
 PRINTED NAME: **Kew Coh** DATE: **2/7/97**
 COMPANY: **Fluor Daniel GTE 241-3413**

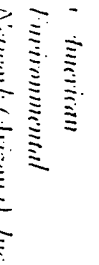
RECEIVED BY: **2. Signature: [Signature] Time: 11:05**
 PRINTED NAME: **AMK [Signature]** DATE: **2/8/97**
 COMPANY: **American Environmental Services**

COMPOSITE OR GRAB

Petroleum Hydrocarbons (418.1)	
(MOD.8015) Fuel Fingerprint	
(M8015) Gas	
(BLS-191) Diesel	
(BTX)MTBE (8020/602)	
Chloride	
Chlorinated Hydrocarbons (601/8010)	
Aromatic Hydrocarbons (602/8020)	
Volatiles 502.2 (SDWA/UST)	
Chloride, TDS, Ph, Conductivity	
Pesticides/PCB (608/8080/505/508)	
Herbicides (615/8150/515)	
Semi-Volatiles GC/MS (Tics/No Tics)	
Volatiles Organics GC/MS (624/8240/6260)	
Polynuclear Aromatics (610/6310)	
PAHs 8310	
RCRA Metals by Total Digestion	
RCRA Metals by TCLP (131)	

ANALYSIS REQUEST

CHAIN OF CUSTODY
 DATE: **2/5/97** PAGE: **1** OF **3**
 ANALYST ID: **702321 / 1902191**



COMPANY: Marathon OC
ADDRESS: PO Box 552

PHONE: (915) 687-8312
FAX: (915) 687-8305

BILL TO: _____
COMPANY: _____
ADDRESS: _____
25-6 ~~PS~~ *play*

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
1	2010-01-01	10:00	1	1
2	2010-01-01	10:00	1	1
3	2010-01-01	10:00	1	1
4	2010-01-01	10:00	1	1
5	2010-01-01	10:00	1	1
6	2010-01-01	10:00	1	1
7	2010-01-01	10:00	1	1
8	2010-01-01	10:00	1	1
9	2010-01-01	10:00	1	1
10	2010-01-01	10:00	1	1
11	2010-01-01	10:00	1	1
12	2010-01-01	10:00	1	1
13	2010-01-01	10:00	1	1
14	2010-01-01	10:00	1	1
15	2010-01-01	10:00	1	1
16	2010-01-01	10:00	1	1
17	2010-01-01	10:00	1	1
18	2010-01-01	10:00	1	1
19	2010-01-01	10:00	1	1
20	2010-01-01	10:00	1	1
21	2010-01-01	10:00	1	1
22	2010-01-01	10:00	1	1
23	2010-01-01	10:00	1	1
24	2010-01-01	10:00	1	1
25	2010-01-01	10:00	1	1
26	2010-01-01	10:00	1	1
27	2010-01-01	10:00	1	1
28	2010-01-01	10:00	1	1
29	2010-01-01	10:00	1	1
30	2010-01-01	10:00	1	1
31	2010-01-01	10:00	1	1
32	2010-01-01	10:00	1	1
33	2010-01-01	10:00	1	1
34	2010-01-01	10:00	1	1
35	2010-01-01	10:00	1	1
36	2010-01-01	10:00	1	1
37	2010-01-01	10:00	1	1
38	2010-01-01	10:00	1	1
39	2010-01-01	10:00	1	1
40	2010-01-01	10:00	1	1
41	2010-01-01	10:00	1	1
42	2010-01-01	10:00	1	1
43	2010-01-01	10:00	1	1
44	2010-01-01	10:00	1	1
45	2010-01-01	10:00	1	1
46	2010-01-01	10:00	1	1
47	2010-01-01	10:00	1	1
48	2010-01-01	10:00	1	1
49	2010-01-01	10:00	1	1
50	2010-01-01	10:00	1	1
51	2010-01-01	10:00	1	1
52	2010-01-01	10:00	1	1
53	2010-01-01	10:00	1	1
54	2010-01-01	10:00	1	1
55	2010-01-01	10:00	1	1
56	2010-01-01	10:00	1	1
57	2010-01-01	10:00	1	1
58	2010-01-01	10:00	1	1
59	2010-01-01	10:00	1	1
60	2010-01-01	10:00	1	1
61	2010-01-01	10:00	1	1
62	2010-01-01	10:00	1	1
63	2010-01-01	10:00	1	1
64	2010-01-01	10:00	1	1
65	2010-01-01	10:00	1	1
66	2010-01-01	10:00	1	1
67	2010-01-01	10:00	1	1
68	2010-01-01	10:00	1	1
69	2010-01-01	10:00	1	1
70	2010-01-01	10:00	1	1
71	2010-01-01	10:00	1	1
72	2010-01-01	10:00	1	1
73				

mw-6	2/5/97	1425	Water	-10
mw-88 RB	↓	1615	↓	-11
mw-88	2/6/97	1625		-12
mw-61A RB	↓	0950		-13
mw-61A	2/7/97	1000		-14
mw-50	↓	0910		-15
mw-49		0930		-16
mw-44		1000		-17
mw-43	↓	1025		-18

PROJECT INFORMATION

UNITED STATES	03350224, 60	() USI (7th ed.)	NO. CONTAINERS	32
UNITED STATES		NIPDES		

☐ SDWA ☐ RCRA ☐ OTHER	RECEIVED INACTIVE RECEIVED ICE	Y / N / NA Y / N / NA
--	-----------------------------------	--------------------------

PRIME AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

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

CHAIN OF CUSTODY

DATE 2/5/97 PAGE 2 OF 3

Index # 0008414204 + 0008414215

LAEN LAB I.D.

ANALYSIS REQUEST

[illegible]

SAMPLED & HELINDUSHED BY: 1.

Signature: Heidi Cook Time: 1730

Printed Name: Kevin Cook Date: 2/7/97
Company: _____ Phone: _____
Fluor Daniel Corp 242-3113

RELINQUISHED BY:

Signature _____ Im

Printed Name: _____ Date: _____

Company: _____

2. RELINQUISHED BY:

Country	Support
---------	---------

Printed Name	Signature
Company:	

RECEIVED BY:

Signature:

RECEIVED BY:

Signature: _____

2. RECEIVED BY: (LAB)

Signature: _____ Title: _____

Company:	Company:
----------	----------

Company:

American National
 Memorial



American Environmental Services, Inc.
 10000 N. 10th Ave., Suite 100
 Denver, CO 80231
 (303) 751-3777

CHAIN OF CUSTODY

DATE: 1/19/97 PAGE: 3 OF 3
 ANALYSIS REQUEST
 AEN LAB I.D. 702321/702191

REPORT: AEN Inc. **Bob Menzies**

COMPANY: **Marathon O/C**
 ADDRESS: **P.O. Box 552**
Melburn, TX 79702
 PHONE: **(915) 687-8312**
 FAX: **(915) 687-8305**

BILL TO:
 COMPANY:
 ADDRESS:

Specs as above

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
MW-41	2/7/97	1055	water	-19
MW-38		1115		-20
MW-31		1115		-21
MW-19		1200		-22
MW-13		1225		-23
MW-11		1255		-24
MW-69		1335		-25

COMPOSITE DR. GRAB	ANALYSIS REQUEST	NUMBER OF CONTAINERS
Petroleum Hydrocarbons (418.1)		
(MOD.8015) Fuel Fingerprint		
(M8015) Gas		
(BLS-191) Diesel		
BTX/MTBE (6020/602)		
Chlorinated Hydrocarbons (601/8010)		
Aromatic Hydrocarbons (602/8020)		
Volatiles 502.2 (SDWA/UST)		
Pesticides/PCB (608/8080/505/508)		
Herbicides (615/8150/515)		
Semi-Volatiles GC/MS (Tics/No Tics)		
Volatile Organics GC/MS (624/8240/8260)		
Polynuclear Aromatics (610/8310)		
RCRA Metals by Total Digestion		
RCRA Metals by TCLP (131)		

PROJECT INFORMATION

PROJECT NO: **02350224.60**
 PROJECT NAME: **Indian Basin Remediation**
 PROJECT LOCATION: **Indian Basin**
 PROJECT TYPE: **Remediation**

SAMPLE RECEIPT

NO. CONTAINERS: **19**
 CUSTODY SEALS: **Y/N/NA**
 RECEIVED INTACT: **Y/N/NA**
 RECEIVED BY: **PC**
 RECEIVED DATE: **2/1/97**

PRIME AUTHORIZATION IS REQUIRED FOR HUSH PROJECTS

PRIME AUTHORIZATION IS REQUIRED FOR HUSH PROJECTS
 (HUSH) ☐ 12hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☐ 2 WEEKS

SAMPLED & RELINQUISHED BY: 1.

Signature: **Heide** Time: **1220**
 Printed Name: **Heide** Date: **2/1/97**
 Company: **Fluor Daniel** Phone: **342-5473**

RELINQUISHED BY: 2.

Signature: _____ Time: _____
 Printed Name: _____ Date: _____
 Company: _____

RELINQUISHED BY: 3.

Signature: _____ Time: _____
 Printed Name: _____ Date: _____
 Company: _____

RECEIVED BY: 1.

Signature: _____ Time: _____
 Printed Name: _____ Date: _____
 Company: _____

RECEIVED BY: 2.

Signature: _____ Time: _____
 Printed Name: _____ Date: _____
 Company: _____

RECEIVED BY: (LAB) 3.

Signature: **Heide** Time: **1105**
 Printed Name: **Heide** Date: **2/8/97**
 Company: **American Environmental Services, Inc.**

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



American Environmental Network
Albuquerque, New Mexico

Interlab Chain of Custody

Revision # 2

DATE: 2/11 PAGE: 1 OF 1

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

COMPANY:

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

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID

DATE

TIME

MATRIX

LAB ID

Metals - TAL

Metals - PP List

Metals - RCRA

RCRA Metals by TCLP (1311)

Co, K, Mg, Na

TOX

TOC

Gen Chemistry

Oil and Grease

BOD

COD

Pesticides/PCB (608/8080)

Herbicides (615/8150)

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

Volatile Organics GC/MS (624/8240)

Polynuclear Aromatics (810/8310)

8240 (TCLP 1311) ZHE

8270 (TCLP 1311)

TO-14

Gross Alpha/Beta

NUMBER OF CONTAINERS

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER:

702321

TOTAL NUMBER OF CONTAINERS

SAN DIEGO

Signature: [Signature]

Signature: [Signature]

PROJECT NAME:

Weather Oil Comp.

CHAIN OF CUSTODY SEALS

PARAGON

Printed Name: [Name]

Printed Name: [Name]

QC LEVEL:

STD IV

INTACT?

RENTON

Date: [Date]

Date: [Date]

QC RECORDED:

MS MSD BLANK

RECEIVED GOOD COND/COLD

PENSACOLA

Albuquerque

Company:

TAT:

STANDARD RUSH

LAB NUMBER

PORTLAND

RECEIVED BY:

RECEIVED BY: (LAB)

DUE DATE:

2/20

RUSH SURCHARGE:

CLIENT DISCOUNT:

SPECIAL VERIFICATION REQUIRED: ☐ YES ☐ NO

American Environmental Network

11 East Olive Road

Pensacola, Florida 32514

(904)474-1001

PROJECT SAMPLE INSPECTION FORM

Accession #:

702191

Date Received:

11-Feb-97

1. Was there a Chain of Custody? ☒ Yes No

2. Was Chain of Custody properly relinquished? ☒ Yes No

3. Were samples received cold? (Check Temperature of Cooler) ☒ Yes No N/A

4. Were all samples properly labeled and identified? ☒ Yes No

5. Were samples received in proper containers for analysis requested? ☒ Yes No

6. Were all sample containers received intact? ☒ Yes No

7. Are samples preserved? (Check pH of all H₂O except 40ml vials)* ☒ Yes No N/A

8. Is there sufficient volume for analysis requested? ☒ Yes No

9. Were samples received within Holding Time? ☒ Yes No

10. Is Headspace visible > 1/4" in diameter in 40ml vials?* If any headspace is evident, comment in out-of-control section. Yes No ☒ N/A

11. If sent, were matrix spike bottles returned? Yes No ☒ N/A

Airbill Number: 398 4000 377

Shipped By:

Yedx

Cooler Number: N/A

Shipping Charges:

N/A

Cooler Weight: N/A

Cooler Temp (°C):

4°C

Out of Control Events and Inspection Comments:

Inspected By:

L. Kett

Date: 11-Feb-97

Logged By:

L. Kett

Date: 11-Feb-97

+ All preservatives for the State of North Carolina and the State of New York are to be recorded on the sheet provided to record pH results (SOP 838, section 2.2.9).

* According to EPA, 1/4" of headspace is allowed in 40ml vials, however, AEN makes it policy to record any headspace as out-of-control (SOP 838, section 2.2.12).



American Environmental Network
Albuquerque, New Mexico

Interlab Chain of Custody

DATE: 2/10 PAGE 1 OF 2

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

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

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals - TAL	Metals - PP List	Metals - RCRA	RCRA Metals by TCLP (1311)	Chloride	F, Bromide, SO ₄ , TO S	pH, EC	Total Alk (Bicarbonate Carbonate)	Gen Chemistry	Oil and Grease	BOD	COD	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	8240 (TCLP 1311) ZHE	8270 (TCLP 1311)	TO-14	Gross Alpha/Beta	NUMBER OF CONTAINERS
702321 -24	2/5/97	1025	AR	1					X																	1
-06		1145		2					X																	1
-08		1310		3					X																	1
-10		1425		4					X																	1
-12		1625		5					X																	2
-14	2/6/97	1000		6					X																	1
-15	2/7/97	0940		7					X																	1
-16		0930		8					X																	1
-17		1000		9					X																	1

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER 702321

TOTAL NUMBER OF CONTAINERS 11

SAN DIEGO

Signature: Kim McNeill

Signature: [Signature]

PROJECT NAME Marathon O/C

CHAIN OF CUSTODY SEALS

PARAGON

Printed Name: [Name]

Printed Name: [Name]

OC LEVEL (SID) IV

INTACT?

RENTON

Date: 2/6/97

Date: 2/11/97

OC REQUIRED MS MSD BLANK

RECEIVED GOOD COND (GOLD)

PENSACOLA

Signature: [Signature]

Signature: [Signature]

OC REQUIRED STANDARD RUSH

LAB NUMBER

PORTLAND

Signature: [Signature]

Signature: [Signature]

LAB NUMBER 702094

RECEIVED BY: 1.

PHOENIX

Signature: [Signature]

Signature: [Signature]

DUE DATE 2/10

RECEIVED BY: 2.

Signature: [Signature]

Signature: [Signature]

MUST SIGNATURE

RECEIVED BY: 1.

Signature: [Signature]

Signature: [Signature]

CLIENT DISCOUNT

RECEIVED BY: 2.

Signature: [Signature]

Signature: [Signature]

SPECIAL DISCOUNT

RECEIVED BY: 1.

Signature: [Signature]

Signature: [Signature]



American Environmental Network
Albuquerque, New Mexico

Interlab Chain of Custody

DATE: 3/10 PAGE: 2 OF 3

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

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

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
702321-18	2/7/97	10:55	AQ	10
-19		10:55		11
-20		11:15		12
-21		11:35		13
-22		12:00		14
-23		12:25		15
-24		12:55		16
-25		1:35		17

Metals - TAL
Metals - PP List
Metals - RCRA
RCRA Metals by TCLP (1311)

Chloride
TOX
TOC
Gen Chemistry

Oil and Grease
BOD
COD
Pesticides/PCB (608/8080)
Herbicides (615/8150)
Base/Neutral Acid Compounds GC/MS (625/8270)
Volatile Organics GC/MS (624/8240)
Polynuclear Aromatics (610/8310)
8240 (TCLP 1311) ZHE
8270 (TCLP 1311)

TO-14
Gross Alpha/Beta

NUMBER OF CONTAINERS

ANALYSIS REQUEST

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER 702321

TOTAL NUMBER OF CONTAINERS

SAN DIEGO

Signature: [Signature]

Signature [Signature]

PROJECT NAME Marathon etc

CHAIN OF CUSTODY SEALS

Paragon

Printed Name: [Signature]

Printed Name [Signature]

OX LEVEL STD IV

INTACT?

RENTON

Printed Name: [Signature]

Printed Name [Signature]

OX REQUIRED MS MSD BLANK

RECEIVED GOOD COND

PENSACOLA

Abuquerque

Company

LAB STANDARD RUSH

LAB NUMBER 702094

PHOENIX

RECEIVED BY:

RECEIVED BY: (LAB)

DUE DATE 2/20

INITIAL SIGNATURE

CLIENT DISCOUNT

SPECIAL CERTIFICATION REQUIRED: [] YES [] NO

Company:

Company:



American Environmental Network, Inc.

AEN I.D. 703361

April 9, 1997

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

Project Name/Number: MOC/IBGP 023350224.64

Attention: Bob Menzie

On 03/24/97, American Environmental Network (NM), Inc., (ADHS License No. AZ0015) received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

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

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



Kimberly D. McNeill
Project Manager



H. Mitchell Rubenstein, Ph.D.
General Manager

MR:ft

Enclosure

American Environmental Network, Inc.

CLIENT : MARATHON OIL COMPANY DATE RECEIVED : 03/24/97
PROJECT # : 023350224.64
PROJECT NAME : MOC/IBGP REPORT DATE : 04/09/97

AEN ID: 703361

	AEN ID #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	703361-01	MW-60	AQUEOUS	03/19/97
02	703361-02	MW-41	AQUEOUS	03/20/97
03	703361-03	MW-49	AQUEOUS	03/20/97
04	703361-04	MW-50	AQUEOUS	03/20/97
05	703361-05	MW-56	AQUEOUS	03/21/97
06	703361-06	MW-13	AQUEOUS	03/21/97

---TOTALS---

<u>MATRIX</u>	<u>#SAMPLES</u>
AQUEOUS	6

AEN STANDARD DISPOSAL PRACTICE

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

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 703361-01			Lab ID: 001		
FLUORIDE (340.2/4500-F C)	MG/L	0.8	0.2	FLW011	
SULFATE (375.4)	MG/L	280	250	SEW023	+
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	760	5	TDW016	

Comments:

Client ID: 703361-02			Lab ID: 002		
FLUORIDE (340.2/4500-F C)	MG/L	1.5	0.2	FLW011	
SULFATE (375.4)	MG/L	98	50	SEW023	+
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1500	5	TDW016	

Comments:

Client ID: 703361-03			Lab ID: 003		
FLUORIDE (340.2/4500-F C)	MG/L	1.4	0.2	FLW011	
SULFATE (375.4)	MG/L	1000	500	SEW023	+
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	3100	5	TDW016	

Comments:

Client ID: 703361-04			Lab ID: 004		
FLUORIDE (340.2/4500-F C)	MG/L	1.2	0.2	FLW011	
SULFATE (375.4)	MG/L	3600	1000	SEW023	+
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	5900	5	TDW016	

Comments:

Client ID: 703361-05			Lab ID: 005		
FLUORIDE (340.2/4500-F C)	MG/L	1.5	0.2	FLW011	
SULFATE (375.4)	MG/L	ND	10	SEW023	
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1200	5	TDW016	

Comments:

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 703361-06		Lab ID: 006			
FLUORIDE (340.2/4500-F C)	MG/L	0.4	0.2	FLW011	
SULFATE (375.4)	MG/L	ND	10	SEW023	
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	770	5	TDW016	
Comments:					

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: Group of Single Wetchem

Client ID:	Lab Matrix: ID:	Date/Time Sampled:	Date Received:
703361-01	001 WATER	19-MAR-97 1730	25-MAR-97
703361-02	002 WATER	20-MAR-97 1530	25-MAR-97
703361-03	003 WATER	20-MAR-97 1610	25-MAR-97
703361-04	004 WATER	20-MAR-97 1710	25-MAR-97
703361-05	005 WATER	20-MAR-97 0830	25-MAR-97
703361-06	006 WATER	20-MAR-97 0930	25-MAR-97

"Method Report Summary"

Accession Number: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
703361-01	FLUORIDE (340.2/4500-F C)	MG/L	0.8
	SULFATE (375.4)	MG/L	280
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	760
703361-02	FLUORIDE (340.2/4500-F C)	MG/L	1.5
	SULFATE (375.4)	MG/L	98
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1500
703361-03	FLUORIDE (340.2/4500-F C)	MG/L	1.4
	SULFATE (375.4)	MG/L	1000
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	3100
703361-04	FLUORIDE (340.2/4500-F C)	MG/L	1.2
	SULFATE (375.4)	MG/L	3600
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	5900
703361-05	FLUORIDE (340.2/4500-F C)	MG/L	1.5
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	1200
703361-06	FLUORIDE (340.2/4500-F C)	MG/L	0.4
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	770

American Environmental Network, Inc.

"WetChem Quality Control Report"

Parameter:	FLUORIDE	SULFATE	TDS
Batch Id:	FLW011	SEW023	TDW016
Blank Result:	<0.2	<10	<5
Anal. Method:	340.2	375.4	160.1
Prep. Method:	N/A	N/A	N/A
Analysis Date:	31-MAR-97	01-APR-97	27-MAR-97
Prep. Date:	31-MAR-97	01-APR-97	26-MAR-97

Sample Duplication

Sample Dup:	703291-1	703290-1	703361-1
Rept Limit:	<0.2	<50+	<5
Sample Result:	0.48	134	280
Dup Result:	0.46	135	244
Sample RPD:	0.02G	1G	14
Max RPD:	0.2	50+	16
Dry Weight%	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	703291-1	703290-1	N/A
Rept Limit:	<0.2	<100+	N/A
Sample Result:	0.48	134	
Spiked Result:	1.32	328	
Spike Added:	0.8	200	
% Recovery:	105	97	
% Rec Limits:	81-127	64-150	
Dry Weight%	N/A	N/A	

ICV

ICV Result:	1.12	19.6	354
True Result:	1.20	20	293
% Recovery:	93	98	121
% Rec Limits:	90-110	90-110	90-110

LCS

LCS Result:		354
True Result:		294
% Recovery:		120
% Rec Limits:		66-122

"Quality Control Comments"

Batch Id: Comments:

FLW011	703172-1; WAS ADDED TO BATCH ON 02-APR-97	
TDW016	703361-1; 26-MAR-97; PREP DATE: 26-MAR-97; ANALYSIS DATE: 27-MAR-97	
TDW016	703432-1 WAS ADDED TO BATCH ON 27-MAR-97	

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

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

DPH = DOLLY P. HWANG RB = REBECCA BROWN AB = ANDY BROTHERTON
JL = JAN LECLEAR NSB = NANCY S. BUTLER MM = MIKE MCKENZIE
MB = MICHELLE BOTTS ED = ESTHER DANTIN
PLD = PAULA L. DOUGHTY RH = RICKY HAGENDORFER

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: Group of Single Metals
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 703361-01		Lab ID:001			
BARIUM (200.7)	MG/L	0.03	0.01	BOW068	
IRON (200.7)	MG/L	0.67	0.02	NOW068	
MANGANESE (200.7)	MG/L	0.03	0.01	GOW068	

Comments:

Client ID: 703361-02		Lab ID:002			
BARIUM (200.7)	MG/L	0.37	0.01	BOW068	
IRON (200.7)	MG/L	0.69	0.02	NOW068	
MANGANESE (200.7)	MG/L	0.11	0.01	GOW068	

Comments:

Client ID: 703361-03		Lab ID:003			
BARIUM (200.7)	MG/L	0.07	0.01	BOW068	
IRON (200.7)	MG/L	6.8	0.02	NOW068	
MANGANESE (200.7)	MG/L	0.33	0.01	GOW068	

Comments:

Client ID: 703361-04		Lab ID:004			
BARIUM (200.7)	MG/L	0.03	0.01	BOW068	
IRON (200.7)	MG/L	6.5	0.02	NOW068	
MANGANESE (200.7)	MG/L	0.64	0.01	GOW068	

Comments:

Client ID: 703361-05		Lab ID:005			
BARIUM (200.7)	MG/L	0.66	0.01	BOW068	
IRON (200.7)	MG/L	28	0.02	NOW068	
MANGANESE (200.7)	MG/L	0.24	0.01	GOW068	

Comments:

Client ID: 703361-06		Lab ID:006			
BARIUM (200.7)	MG/L	0.37	0.01	BOW068	
IRON (200.7)	MG/L	29	0.02	NOW068	
MANGANESE (200.7)	MG/L	0.48	0.01	GOW068	

Comments:

American Environmental Network, Inc.

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: Group of Single Metals

Client Id:	Lab Matrix: Id:	Date/Time Sampled:	Date Received:
703361-01	001 WATER	19-MAR-97 1730	25-MAR-97
703361-02	002 WATER	20-MAR-97 1530	25-MAR-97
703361-03	003 WATER	20-MAR-97 1610	25-MAR-97
703361-04	004 WATER	20-MAR-97 1710	25-MAR-97
703361-05	005 WATER	20-MAR-97 0830	25-MAR-97
703361-06	006 WATER	20-MAR-97 0930	25-MAR-97

"Method Report Summary"

Accession Number: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: Group of Single Metals

Client Sample Id:	Parameter:	Unit:	Result:
703361-01	BARIUM (200.7)	MG/L	0.03
	IRON (200.7)	MG/L	0.67
	MANGANESE (200.7)	MG/L	0.03
703361-02	BARIUM (200.7)	MG/L	0.37
	IRON (200.7)	MG/L	0.69
	MANGANESE (200.7)	MG/L	0.11
703361-03	BARIUM (200.7)	MG/L	0.07
	IRON (200.7)	MG/L	6.8
	MANGANESE (200.7)	MG/L	0.33
703361-04	BARIUM (200.7)	MG/L	0.03
	IRON (200.7)	MG/L	6.5
	MANGANESE (200.7)	MG/L	0.64
703361-05	BARIUM (200.7)	MG/L	0.66
	IRON (200.7)	MG/L	28
	MANGANESE (200.7)	MG/L	0.24
703361-06	BARIUM (200.7)	MG/L	0.37
	IRON (200.7)	MG/L	29
	MANGANESE (200.7)	MG/L	0.48

American Environmental Network, Inc.

"Metals Quality Control Report"

Parameter:	BARIUM	IRON	MANGANESE
Batch Id:	B0W068	N0W068	G0W068
Blank Result:	<0.01	<0.02	<0.01
Anal. Method:	200.7	200.7	200.7
Prep. Method:	EPA 600	EPA 600	EPA 600
Analysis Date:	02-APR-97	02-APR-97	02-APR-97
Prep. Date:	02-APR-97	02-APR-97	02-APR-97

Sample Duplication

Sample Dup:	703418-1	703418-1	703418-1
Rept Limit:	<0.01	<0.02	<0.01
Sample Result:	2.0	2.7	2.0
Dup Result:	2.1	2.7	2.0
Sample RPD:	5	0	0
Max RPD:	20	20	20
Dry Weight%	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	703418-1	703418-1	703418-1
Rept Limit:	<0.01	<0.02	<0.01
Sample Result:	0.03	0.67	0.03
Spiked Result:	2.0	2.7	2.0
Spike Added:	2.0	2.0	2.0
% Recovery:	99	102	99
% Rec Limits:	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A

ICV

ICV Result:	5.0	5.1	5.0
True Result:	5.0	5.0	5.0
% Recovery:	100	102	100
% Rec Limits:	90-110	90-110	90-110

LCS

LCS Result:	2.0	2.1	2.0
True Result:	2.0	2.0	2.0
% Recovery:	100	105	100
% Rec Limits:	80-120	80-120	80-120

"Quality Control Comments"

Batch Id:

Comments:

BOW068	ANALYST: JR
BOW068	The results reported under "Sample Duplication" are the MS/MSD.
NOW068	ANALYST: JR
NOW068	The results reported under "Sample Duplication" are the MS/MSD.
GOW068	ANALYST: JR
GOW068	The results reported under "Sample Duplication" are the MS/MSD.

----- Common Footnotes Metals -----

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

FROM ANALYSIS REPORT:

RL= REPORTING LIMIT BASED ON METHOD DETECTION LIMIT STUDIES.
Q= QUALIFIER (FOOTNOTE)

FROM QUALITY CONTROL REPORT:

RPD= RELATIVE PERCENT DEVIATION.
RPT LIMIT= REPORTING LIMIT BASED ON METHOD DETECTION LIMIT STUDIES.

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

SW-846, 3rd Edition, latest revision.

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

NIOSH Manual of Analytical Methods, 4th Edition.

Standard Methods For the Examination of Water and Wastewater, 18th Edition, 1992.
Methods For the Determination of Metals in Environmental Samples - Supplement I,
EPA 600/R-94-111, May 1994.

GJ = GARY JACOBS
JLH = JAMES L. HERED
CD = CHRISTY DRAPER

JR = JOHN REED
LV = LASSANDRA VON APPEN

"FINAL REPORT FORMAT - SINGLE"

Accession: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: ACID EXTRACTABLES (8270)
Analysis Method: 8270/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id:	001	Sample Date/Time:	19-MAR-97 1730
Client Sample Id:	703361-01	Received Date:	25-MAR-97
Batch: ALW062		Extraction Date:	26-MAR-97
Blank: A	Dry Weight %: N/A	Analysis Date:	04-APR-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
PHENOL	MG/L	ND	0.004	
2-FLUOROPHENOL	%REC/SURR	76	21-100	
PHENOL-D6	%REC/SURR	72	10-100	
2,4,6-TRIBROMOPHENOL	%REC/SURR	75	10-123	
ANALYST	INITIALS	RW		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: ACID EXTRACTABLES (8270)
Analysis Method: 8270/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id:	002	Sample Date/Time:	20-MAR-97 1530
Client Sample Id:	703361-02	Received Date:	25-MAR-97
Batch: ALW062		Extraction Date:	26-MAR-97
Blank: A	Dry Weight %: N/A	Analysis Date:	04-APR-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
PHENOL	MG/L	ND	0.003	
2-FLUOROPHENOL	%REC/SURR	89	21-100	
PHENOL-D6	%REC/SURR	76	10-100	
2,4,6-TRIBROMOPHENOL	%REC/SURR	100	10-123	
ANALYST	INITIALS	RW		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: ACID EXTRACTABLES (8270)
Analysis Method: 8270/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 003 Sample Date/Time: 20-MAR-97 1610
Client Sample Id: 703361-03 Received Date: 25-MAR-97

Batch: ALW062 Extraction Date: 26-MAR-97
Blank: A Dry Weight %: N/A Analysis Date: 04-APR-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
PHENOL	MG/L	ND	0.003	
2-FLUOROPHENOL	%REC/SURR	92	21-100	
PHENOL-D6	%REC/SURR	81	10-100	
2,4,6-TRIBROMOPHENOL	%REC/SURR	101	10-123	
ANALYST	INITIALS	RW		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: ACID EXTRACTABLES (8270)
Analysis Method: 8270/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id:	004	Sample Date/Time:	20-MAR-97 1710
Client Sample Id:	703361-04	Received Date:	25-MAR-97
Batch: ALW062		Extraction Date:	26-MAR-97
Blank: A	Dry Weight %: N/A	Analysis Date:	04-APR-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
PHENOL	MG/L	ND	0.003	
2-FLUOROPHENOL	%REC/SURR	75	21-100	
PHENOL-D6	%REC/SURR	52	10-100	
2,4,6-TRIBROMOPHENOL	%REC/SURR	96	10-123	
ANALYST	INITIALS	RW		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: ACID EXTRACTABLES (8270)
Analysis Method: 8270/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id:	005	Sample Date/Time:	20-MAR-97 0830
Client Sample Id:	703361-05	Received Date:	25-MAR-97
Batch: ALW062		Extraction Date:	26-MAR-97
Blank: A	Dry Weight %: N/A	Analysis Date:	04-APR-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
PHENOL	MG/L	ND	0.003	
2-FLUOROPHENOL	%REC/SURR	76	21-100	
PHENOL-D6	%REC/SURR	60	10-100	
2,4,6-TRIBROMOPHENOL	%REC/SURR	111	10-123	
ANALYST	INITIALS	RW		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 703418
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 703361
Project Name: MARATHON OIL CO.
Project Location: MOC/IBGP
Test: ACID EXTRACTABLES (8270)
Analysis Method: 8270/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id:	006	Sample Date/Time:	20-MAR-97 0930
Client Sample Id:	703361-06	Received Date:	25-MAR-97
Batch: ALW062		Extraction Date:	26-MAR-97
Blank: A	Dry Weight %: N/A	Analysis Date:	04-APR-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
PHENOL	MG/L	ND	0.006	
2-FLUOROPHENOL	%REC/SURR	83	21-100	
PHENOL-D6	%REC/SURR	72	10-100	
2,4,6-TRIBROMOPHENOL	%REC/SURR	87	10-123	
ANALYST	INITIALS	RW		

Comments:

"QC Report"

Title: Water Blank
 Batch: ALW062
 Analysis Method: 8270/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3520/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Blank Id: A Date Analyzed: 03-APR-97 Date Extracted: 26-MAR-97

Parameters:	Units:	Results:	Reporting Limits:
P-CHLORO-M-CRESOL	UG/L	ND	10
2-CHLOROPHENOL	UG/L	ND	10
O-CRESOL	UG/L	ND	10
M,P CRESOL	UG/L	ND	10
2,4-DICHLOROPHENOL	UG/L	ND	10
2,6-DICHLOROPHENOL	UG/L	ND	10
2,4-DIMETHYLPHENOL	UG/L	ND	10
4,6-DINITRO-O-CRESOL	UG/L	ND	50
2,4-DINITROPHENOL	UG/L	ND	10
2-NITROPHENOL	UG/L	ND	10
4-NITROPHENOL	UG/L	ND	50
PENTACHLOROPHENOL	UG/L	ND	50
PHENOL	UG/L	ND	10
2,3,4,6-TETRACHLOROPHENOL	UG/L	ND	10
2,4,5-TRICHLOROPHENOL	UG/L	ND	50
2,4,6-TRICHLOROPHENOL	UG/L	ND	10
ACENAPHTHENE	UG/L	ND	10
ACENAPHTHYLENE	UG/L	ND	10
ACETOPHENONE	UG/L	ND	10
2-ACETYLAMINOFLUORENE	UG/L	ND	10
4-AMINOBIIPHENYL	UG/L	ND	10
ANILINE	UG/L	ND	10
ANTHRACENE	UG/L	ND	10
ARAMITE	UG/L	ND	10
BENZO (A) ANTHRACENE	UG/L	ND	10
BENZO (A) PYRENE	UG/L	ND	10
BENZO (B) FLUORANTHENE	UG/L	ND	10
BENZO (G,H,I) PERYLENE	UG/L	ND	10
BENZO (K) FLUORANTHENE	UG/L	ND	10
BENZYL ALCOHOL	UG/L	ND	10
BIS(2-CHLORO-1-METHYLETHYL) ETHER	UG/L	ND	10
BIS(2-CHLOROETHOXY) METHANE	UG/L	ND	10
BIS(2-CHLOROETHYL) ETHER	UG/L	ND	10
BIS(2-ETHYLHEXYL) PHTHALATE	UG/L	ND	10
4-BROMOPHENYL PHENYL ETHER	UG/L	ND	10
BUTYLBENZYL PHTHALATE	UG/L	ND	10
P-CHLOROANILINE	UG/L	ND	10
CHLOROBENZILATE	UG/L	ND	10
2-CHLORONAPHTHALENE	UG/L	ND	10
4-CHLOROPHENYL PHENYL ETHER	UG/L	ND	10
CHRYSENE	UG/L	ND	10
DIALATE	UG/L	ND	10
DIBENZO (A,H) ANTHRACENE	UG/L	ND	10
DIBENZOFURAN	UG/L	ND	10
1,2-DICHLOROBENZENE	UG/L	ND	10
1,3-DICHLOROBENZENE	UG/L	ND	10

"QC Report"

Title: Water Blank
 Batch: ALW062
 Analysis Method: 8270/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3520/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Parameters:	Units:	Results:	Reporting Limits:
1,4-DICHLORO BENZENE	UG/L	ND	10
3,3'-DICHLORO BENZIDINE	UG/L	ND	50
DIETHYLPHTHALATE	UG/L	ND	10
DIMETHOATE	UG/L	ND	10
P-DIMETHYLAMINOAZO BENZENE	UG/L	ND	10
7,12-DIMETHYLBENZ (A) ANTHRACENE	UG/L	ND	10
3,3'-DIMETHYLBENZIDINE	UG/L	ND	10
A,A-DIMETHYLPHENETHYLAMINE	UG/L	ND	10
DIMETHYLPHTHALATE	UG/L	ND	10
DI-N-BUTYLPHTHALATE	UG/L	ND	10
M-DINITRO BENZENE	UG/L	ND	10
2,4-DINITROTOLUENE	UG/L	ND	10
2,6-DINITROTOLUENE	UG/L	ND	10
DI-N-OCTYLPHTHALATE	UG/L	ND	10
DIPHENYLAMINE	UG/L	ND	10
ETHYL METHANESULFONATE	UG/L	ND	10
FAMPHUR	UG/L	ND	10
FLUORANTHENE	UG/L	ND	10
FLUORENE	UG/L	ND	10
HEXACHLORO BENZENE	UG/L	ND	10
HEXACHLORO BUTADIENE	UG/L	ND	10
HEXACHLOROCYCLOPENTADIENE	UG/L	ND	10
HEXACHLOROETHANE	UG/L	ND	10
HEXACHLOROPHENE	UG/L	ND	10
HEXACHLOROPROPENE	UG/L	ND	10
INDENO (1,2,3-CD) PYRENE	UG/L	ND	10
ISODRIN	UG/L	ND	10
ISOPHORONE	UG/L	ND	10
ISOSAFROLE	UG/L	ND	10
KEPONE	UG/L	ND	10
METHAPYRILENE	UG/L	ND	10
3-METHYLCHOLANTHRENE	UG/L	ND	10
METHYL METHANESULFONATE	UG/L	ND	10
1-METHYLNAPHTHALENE	UG/L	ND	10
2-METHYLNAPHTHALENE	UG/L	ND	10
NAPHTHALENE	UG/L	ND	10
1,4-NAPHTHOQUINONE	UG/L	ND	10
1-NAPHTHYLAMINE	UG/L	ND	10
2-NAPHTHYLAMINE	UG/L	ND	10
2-NITROANILINE	UG/L	ND	50
3-NITROANILINE	UG/L	ND	50
4-NITROANILINE	UG/L	ND	50
NITRO BENZENE	UG/L	ND	10
5-NITRO-O-TOLUIDINE	UG/L	ND	10
4-NITROQUINOLINE-1-OXIDE	UG/L	ND	10
N-NITROSODIETHYLAMINE	UG/L	ND	10
N-NITROSODIMETHYLAMINE	UG/L	ND	10

"QC Report"

Title: Water Blank
 Batch: ALW062
 Analysis Method: 8270/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3520/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Parameters:	Units:	Results:	Reporting Limits:
N-NITROSODI-N-BUTYLAMINE	UG/L	ND	10
N-NITROSODIPHENYLAMINE	UG/L	ND	10
N-NITROSOMETHYLETHYLAMINE	UG/L	ND	10
N-NITROSOMORPHOLINE	UG/L	ND	10
N-NITROSOPIPERIDINE	UG/L	ND	10
N-NITROSOPYRROLIDINE	UG/L	ND	10
PARATHION	UG/L	ND	10
PENTACHLOROBENZENE	UG/L	ND	10
PENTACHLOROETHANE	UG/L	ND	10
PENTACHLORONITROBENZENE	UG/L	ND	10
PHENACETIN	UG/L	ND	10
PHENANTHRENE	UG/L	ND	10
2-PICOLINE	UG/L	ND	10
P-PHENYLENEDIAMINE	UG/L	ND	10
PRONAMIDE	UG/L	ND	10
PYRENE	UG/L	ND	10
PYRIDINE	UG/L	ND	10
SAFROLE	UG/L	ND	10
SULFOTEPP	UG/L	ND	10
1,2,4,5-TETRACHLOROBENZENE	UG/L	ND	10
THIONAZIN	UG/L	ND	10
O-TOLUIDINE	UG/L	ND	10
1,2,4 TRICHLOROBENZENE	UG/L	ND	10
SYM-TRINITROBENZENE	UG/L	ND	10
O,O,O-TRIETHYL PHOSPHOROTHATE	UG/L	ND	10
BENZIDINE	UG/L	ND	10
BIS(2-CHLOROISOPROPYL) ETHER	UG/L	ND	10
2-(SEC BUTYL) 4,6-DINITRO-PHENOL (DINOSEB)	UG/L	ND	10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	ND	10
6-METHYL CHRYSENE	UG/L	ND	20
INDENE	UG/L	ND	20
QUINOLINE	UG/L	ND	50
BENZENETHIOL	UG/L	ND	20
2-FLUOROBIPHENYL	%REC/SURR	88	43-116
TERPHENYL-D14	%REC/SURR	90	33-124
NITROBENZENE-D5	%REC/SURR	74	35-114
2-FLUOROPHENOL	%REC/SURR	65	21-100
PHENOL-D6	%REC/SURR	65	10-100
2,4,6-TRIBROMOPHENOL	%REC/SURR	65	10-123
ANALYST	INITIALS	RW	

Comments:

"QC Report"

Title: Water Reagent
 Batch: ALW062
 Analysis Method: 8270/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3520/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

RS Date Analyzed: 03-APR-97
 RSD Date Analyzed: 03-APR-97

RS Date Extracted: 26-MAR-97
 RSD Date Extracted: 26-MAR-97

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	RSD Conc	RSD %Rec	RPD	RPD Lmts	Rec Lmts
PHENOL	150	<10	128	85	102	68	22	32	5-112
2-CHLOROPHENOL	150	<10	142	95	112	75	24	27	40-120
1,4-DICHLOROBENZENE	100	<10	74	74	86	86	15	29	32-119
N-NITRO-DI-N-PROPYLAMINE	100	<10	76	76	82	82	8	30	26-128
1,2,4 TRICHLOROBENZENE	100	<10	70	70	80	80	13	28	44-142
4-CHLORO-3-METHYLPHENOL	150	<10	126	84	112	75	11	28	30-128
ACENAPHTHENE	100	<10	98	98	104	104	6	26	47-145
4-NITROPHENOL	150	<50	102	68	91	61	11	50	1-132
2,4-DINITROTOLUENE	100	<10	98	98	100	100	2	29	39-138
PENTACHLOROPHENOL	150	<50	112	75	102	68	10	24	15-157
PYRENE	100	<10	94	94	100	100	6	25	52-115
Surrogates:									
NITROBENZENE-D5				77		82			35-114
2-FLUOROBIPHENYL				88		88			43-116
TERPHENYL-D14				91		96			33-124
PHENOL-D6				76		58			10-100
2-FLUOROPHENOL				78		59			21-100
2,4,6-TRIBROMOPHENOL				77		67			10-123

Comments:

Notes:

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

"QC Report"

Title: Water Matrix
 Batch: ALW062
 Analysis Method: 8270/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3520/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Dry Weight %: N/A
 Sample Spiked: 703304-2
 MS Date Analyzed: 03-APR-97
 MSD Date Analyzed: 03-APR-97
 MS Date Extracted: 28-MAR-97
 MSD Date Extracted: 28-MAR-96

Parameters:	Spike Added	Sample Conc	MS Conc	MS %Rec	MSD Conc	MSD %Rec	RPD	RPD Lmts	Rec Lmts
PHENOL	300	<10	216	72	260	87	19	38	5-112
2-CHLOROPHENOL	300	<10	232	77	284	95	21	25	38-120
1,4-DICHLOROBENZENE	200	<10	148	74	156	78	5	27	39-112
N-NITRO-DI-N-PROPYLAMINE	200	<10	164	82	180	90	9	30	32-125
1,2,4 TRICHLOROBENZENE	200	<10	160	80	172	86	7	30	44-118
4-CHLORO-3-METHYLPHENOL	300	<10	208	69	248	83	18	23	42-131
ACENAPHTHENE	200	<10	188	94	192	96	2	21	47-131
4-NITROPHENOL	300	<50	136	45	160	53	16	36	1-116
2,4-DINITROTOLUENE	200	<10	160	80	172	86	7	22	39-138
PENTACHLOROPHENOL	300	<50	204	68	248	83	20	36	14-164
PYRENE	200	<10	180	90	192	96	6	21	52-115

Surrogates:									
NITROBENZENE-D5				81		86			35-114
2-FLUOROBIPHENYL				84		89			43-116
TERPHENYL-D14				85		90			33-124
PHENOL-D6				70		81			10-100
2-FLUOROPHENOL				68		78			21-100
2,4,6-TRIBROMOPHENOL				76		87			10-123

Comments:

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

American Environmental Network, Inc.

Common notation for Organic reporting

N/S = NOT SUBMITTED
N/A = NOT APPLICABLE
D = DILUTED OUT
UG/L = PARTS PER BILLION.
UG/KG = PARTS PER BILLION.
MG/KG = PARTS PER MILLION.
MG/L = PARTS PER MILLION.
MG/M3 = MILLIGRAMS PER CUBIC METER.
NG = NANOGRAMS.
UG = MICROGRAMS.
PPBV = PARTS PER BILLION/VOLUME.
< = LESS THAN DETECTION LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS
J = THE REPORTED VALUE IS EITHER LESS THAN THE REPORTING LIMIT BUT
GREATER THAN ZERO, OR QUANTITATED AS A TIC; THEREFORE, IT IS
ESTIMATED.
JJ = REPORTED VALUE IS ESTIMATED DUE TO MATRIX INTERFERENCE.
ND = NOT DETECTED ABOVE REPORT LIMIT.
RPT LIMIT = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.
RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)

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

ORGANIC SOILS ARE REPORTED ON A DRY WEIGHT BASIS.

DUE TO THE NATURE OF THE SAMPLE MATRIX, MATRIX SPIKE/MATRIX SPIKE
DUPLICATE ANALYSIS CANNOT BE PERFORMED FOR AIR ANALYSIS.

CLP SOW 1991, USEPA CONTRACT LABORATORY PROGRAM, STATEMENT OF WORK FOR
ORGANICS ANALYSIS, DOCUMENT NUMBER OLM01.8, AUGUST 1991.

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

LP = LEVERNE PETERSON	RW = RITA WINGO
LD = LARRY DILMORE	LL = LANCE LARSON
PL = PAUL LESCHENSKY	BV = BEN VAUGHN
DWB = DAVID BOWERS	



American Environmental Network
Albuquerque, New Mexico

Interlab Chain of Custody

DATE: 3/24/97 PAGE: 1 OF 1

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

ANALYSIS REQUEST

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

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID DATE TIME MATRIX LAB ID

203361-01 3/19/97 1730 AQ 1

-02 3/20 1530 2

-03 3/20 1610 3

-04 3/20 1710 4

-05 3/21 0830 5

-06 3/31 0930 6

Metals - TAL

Metals - PP List

Metals - RCRA

RCRA Metals by TCLP (1311)

Barium, Manganese, Fe

TDS, 304, F

TOX - Total Phenolics by 8220

TOC

Gen Chemistry

Oil and Grease

BOD

COD

Pesticides/PCB (608/8080)

Herbicides (615/8150)

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

Volatile Organics GC/MS (624/8240)

Polynuclear Aromatics (610/8310)

8240 (TCLP 1311) ZHE

8270 (TCLP 1311)

TC-14

Gross Alpha/Beta

NUMBER OF CONTAINERS

PROJECT INFORMATION

PROJECT NUMBER: 703361

PROJECT NAME: Marathon Oil Co.

OBJECT: STD IV

OC REQUIRED: MS MSD BLANK

LAB STANDARD RUSH

LAB NUMBER 703418

DUE DATE: 4/5

FINISH SURCHARGE:

CLIENT DISCOUNT:

SPECIAL CIRCUMSTANCES REQUIRED: [] YES [] NO

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS

CHAIN OF CUSTODY SEALS

INTACT?

RECEIVED GOOD COND/COLD

LAB NUMBER 703418

SAMPLES SENT TO:

SAN DIEGO

PARAGON

RENTON

PENSACOLA

PORTLAND

PHOENIX

RELINQUISHED BY:

Signature: John McNeill

Printed Name: John McNeill

Date: 3/24/97

Albuquerque

RECEIVED BY:

Signature: [Signature]

Printed Name: [Name]

Date: [Date]

Company: [Company]

RELINQUISHED BY:

Signature: [Signature]

Printed Name: [Name]

Date: 3/25/97

Company: [Company]

RECEIVED BY: (LAB)

Signature: [Signature]

Printed Name: [Name]

Date: 3/25/97

Company: [Company]

American Environmental Network of Florida

PROJECT SAMPLE INSPECTION FORM

Accession #: 703418

Date Received: 25-Mar-97

- | | |
|---|---|
| <p>1. Was there a Chain of Custody? <u>Yes</u> No*</p> <p>2. Was Chain of Custody properly filled out and relinquished? <u>Yes</u> No*</p> <p>3. Were samples received cold? <u>Yes</u> No* N/A
(Criteria: 1° - 4°C: AEN-SOP 1055)</p> <p>4. Were all samples properly labeled and identified? <u>Yes</u> No*</p> <p>5. Did samples require splitting? Yes* <u>No</u>
Req By: PM Client Other*</p> <p>6. Were samples received in proper containers for analysis requested? <u>Yes</u> No*</p> <p>7. Were all sample containers received intact? <u>Yes</u> No*</p> | <p>8. Were samples checked for preservative? <u>Yes</u> No* N/A
(Check pH of all H₂O requiring preservative except VOA vials that require zero headspace)*</p> <p>9. Is there sufficient volume for analysis requested? <u>Yes</u> No*</p> <p>10. Were samples received within Holding Time? <u>Yes</u> No*
(REFER TO AEN-SOP 1040)</p> <p>11. Is Headspace visible > ¼" in diameter in VOA vials? * If any headspace is evident, comment in out-of-control section. Yes* No <u>N/A</u></p> <p>12. If sent, were matrix spike bottles returned? Yes No* <u>N/A</u></p> <p>13. Was Project Manager notified of problems? (initials: _____) Yes No* N/A</p> |
|---|---|

Airbill Number(s): _____

Shipped By: FEDEX

Cooler Number(s): N/A

Shipping Charges: N/A

Cooler Weight(s): N/A

Cooler Temp(s) (°C): 2°C - CCH4

(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

Out of Control Events and Inspection Comments:

Client Cooler

(USE BACK OF PSIF FOR ADDITIONAL NOTES AND COMMENTS)

Inspected By: PJE Date: 3/25/97 Logged By: PJE Date: 3/25/97

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

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

All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (AEN-SOP 938, section 2.2.9).

* According to EPA, ¼" of headspace is allowed in 40 ml vials requiring volatile analysis, however, AEN makes it policy to record any headspace as out-of-control (AEN-SOP 938, section 2.2.12).

CHAIN OF CUSTODY

DATE: 3/14/97 PAGE: 1 OF 1

PROJECT MANAGER: Susan Frazee

COMPANY: River Water CTE

ADDRESS: 2501 First Street SE #204

ADDRESS: Albuquerque New Mexico 87104

PHONE: 505-242-3443

FAX: 505-242-1103

BILL TO: Matthew C. Company (Bob Harris)

COMPANY:

ADDRESS:

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
MW-60	3/19/97	17:30	AR	-01
MW-41	3/20/97	15:30		-02
MW-49	3/20/97	16:10		-03
MW-50	3/20/97	17:10		-04
MW-56	3/21/97	08:30		-05
MW-13	3/21/97	09:30		-06

Petroleum Hydrocarbons (418.1) TRPH
 (MOD.8015) Diesel/Direct/Inject

(M8015) Gas/Purge & Trap
 Gasoline/BTEX & MTBE (M8015/8020)
 BTEX/MTBE (8020)
 BTEX & Chlorinated Aromatics (602/8020)
 BTEX/MTBE/EDC & EDB (8020/8010/Short)
 Chlorinated Hydrocarbons (601/8010)

504 EDB / DBCP
 Polynuclear Aromatics (610/8310)
 Volatile Organics (624/8240) GC/MS
 Volatile Organics (8260) GC/MS
 Pesticides/PCB (608/8080)
 Herbicides (615/8150)
 Base/Neutral/Acid Compounds GC/MS (625/8270)

PHENOL
 General Chemistry:
 BARIUM, MANGANESE, IRON
 TDS, SO4, F
 Priority Pollutant Metals (13)
 Target Analyte List Metals (23)
 RCRA Metals (8)
 RCRA Metals by TCLP (Method 1311)
 Metals:

NUMBER OF CONTAINERS

PROJECT INFORMATION

PROJ NO: 023350227-64

PROJ NAME: MOC/18CB

P.O. NO:

SHIPPED VIA:

SAMPLE RECEIPT

NO. OF CONTAINERS: 18

CLUSTERS: 18

RECEIVED IN LAB: YES

RECEIVED IN LAB: YES

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

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

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

RELINQUISHED BY: 1.

Signature: [Signature] Time: 08:10

Printed Name: JAMES J. BRISCOE Date: 3/24/97

Company: River Water CTE

RELINQUISHED BY: 2.

Signature: [Signature] Time: 08:20

Printed Name: [Signature] Date: 3/24/97

Company: American Environmental Network (NM), Inc.

2.

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.



American Environmental Network, Inc.

AEN I.D.

705309

May 28, 1997

MARATHON O/C
PO BOX 552
MIDLAND TX, 79702

Project Name IND. BASIN REM.
Project Number 23350224.61

Attention: BOB MENZIE

On 5/2/97 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze aqueous samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8020 was performed by American Environmental Network (NM) Inc., Albuquerque, NM.

Bromide analysis was performed by American Environmental Network (AZ) Inc., 9830 S. 51st Street, Suite B-113, Phoenix, AZ.

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

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



Kimberly D. McNeill
Project Manager



H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt

Enclosure

CLIENT : MARATHON O/C
PROJECT # : 23350225
PROJECT NAME : IND. BASIN REM.

AEN I.D. : 705309
DATE RECEIVED : 5/2/97
REPORT DATE : 5/28/97

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	DI WATER	AQ	4/29/97
02	INT RB	AQ	4/29/97
03	MW-89	AQ	4/30/97
04	MW-89RB	AQ	4/30/97
05	MW-88	AQ	4/30/97
06	MW-88RB	AQ	4/30/97
07	MW-96	AQ	4/30/97
08	MW-96RB	AQ	4/30/97
09	MW97	AQ	4/30/97
10	MW-97RB	AQ	4/30/97
11	MW-95	AQ	4/30/97
12	MW-95RB	AQ	4/30/97
13	MW-98	AQ	4/30/97
14	TRIP BLANK	AQ	4/24/97

American Environmental Network, Inc.

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 705309
PROJECT NAME : MARATHON OIL
ATI I.D. : 705069

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	705309-07	AQUEOUS	04/30/97
02	705309-09	AQUEOUS	04/30/97
03	705309-11	AQUEOUS	04/30/97
04	705309-13	AQUEOUS	04/30/97

=====

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	4

ATI STANDARD DISPOSAL PRACTICE

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

American Environmental Network, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 705069

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.
PROJECT # : 705309
PROJECT NAME : MARATHON OIL

PARAMETER	UNITS	01	02	03	04
BROMIDE (EPA 300.0)	MG/L	<0.3	<0.3	<0.3	<0.3

American Environmental Network, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : AMERICAN ENV. NETWORK OF NM, INC.

PROJECT # : 705309

PROJECT NAME : MARATHON OIL

ATI I.D. : 705069

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
BROMIDE	MG/L	70506901	<0.3	<0.3	NA	1.0	1.0	100

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

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

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 705014
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705309
Project Name: MARATHON OIL CO.
Project Location: MOC
Test: TOTAL ALKALINITY
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 705309-07		Lab ID: 003			
ALKALINITY, TOTAL (2320B)	MG/L	300	1	ASW016	
PH (150.1)	UNITS	7.1	NA	PHW092	
BICARBONATE, CaCO ₃ (2330B)	MG/L	300	1	NONE	
CARBONATE, CaCO ₃ (2330B)	MG/L	ND	1	NONE	
CARBON DIOXIDE, FREE AS CaCO ₃	MG/L	48	1	NONE	
HYDROXIDE (2330B) AS CaCO ₃	MG/L	ND	1	NONE	
Comments:					

Client ID: 705309-09		Lab ID: 004			
ALKALINITY, TOTAL (2320B)	MG/L	270	1	ASW016	
PH (150.1)	UNITS	7.3	NA	PHW092	
BICARBONATE, CaCO ₃ (2330B)	MG/L	270	1	NONE	
CARBONATE, CaCO ₃ (2330B)	MG/L	1	1	NONE	
CARBON DIOXIDE, FREE AS CaCO ₃	MG/L	27	1	NONE	
HYDROXIDE (2330B) AS CaCO ₃	MG/L	ND	1	NONE	
Comments:					

Client ID: 705309-11		Lab ID: 005			
ALKALINITY, TOTAL (2320B)	MG/L	310	1	ASW016	
PH (150.1)	UNITS	7.3	NA	PHW092	
BICARBONATE, CaCO ₃ (2330B)	MG/L	310	1	NONE	
CARBONATE, CaCO ₃ (2330B)	MG/L	1	1	NONE	
CARBON DIOXIDE, FREE AS CaCO ₃	MG/L	31	1	NONE	
HYDROXIDE (2330B) AS CaCO ₃	MG/L	ND	1	NONE	
Comments:					

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 705014
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705309
Project Name: MARATHON OIL CO.
Project Location: MOC
Test: TOTAL ALKALINITY
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 705309-13		Lab ID: 006			
ALKALINITY, TOTAL (2320B)	MG/L	240	1	ASW016	
PH (150.1)	UNITS	7.4	NA	PHW092	
BICARBONATE, CACO3 (2330B)	MG/L	240	1	NONE	
CARBONATE, CACO3 (2330B)	MG/L	1	1	NONE	
CARBON DIOXIDE, FREE AS CACO3	MG/L	19	1	NONE	
HYDROXIDE (2330B) AS CACO3	MG/L	ND	1	NONE	

Comments:

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 705014
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705309
Project Name: MARATHON OIL CO.
Project Location: MOC
Test: TOTAL ALKALINITY

Client ID:	Lab Matrix: ID:	Date/Time Sampled:	Date Received:
705309-07	003 WATER	30-APR-97 1255	03-MAY-97
705309-09	004 WATER	30-APR-97 1445	03-MAY-97
705309-11	005 WATER	30-APR-97 1635	03-MAY-97
705309-13	006 WATER	30-APR-97 1800	03-MAY-97

"Method Report Summary"

Accession Number: 705014
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705309
Project Name: MARATHON OIL CO.
Project Location: MOC
Test: TOTAL ALKALINITY

Client Sample Id:	Parameter:	Unit:	Result:
705309-07	ALKALINITY, TOTAL (2320B)	MG/L	300
	PH (150.1)	UNITS	7.1
	BICARBONATE, CaCO_3 (2330B)	MG/L	300
	CARBON DIOXIDE, FREE AS CaCO_3	MG/L	48
705309-09	ALKALINITY, TOTAL (2320B)	MG/L	270
	PH (150.1)	UNITS	7.3
	BICARBONATE, CaCO_3 (2330B)	MG/L	270
	CARBONATE, CaCO_3 (2330B)	MG/L	1
	CARBON DIOXIDE, FREE AS CaCO_3	MG/L	27
705309-11	ALKALINITY, TOTAL (2320B)	MG/L	310
	PH (150.1)	UNITS	7.3
	BICARBONATE, CaCO_3 (2330B)	MG/L	310
	CARBONATE, CaCO_3 (2330B)	MG/L	1
	CARBON DIOXIDE, FREE AS CaCO_3	MG/L	31
705309-13	ALKALINITY, TOTAL (2320B)	MG/L	240
	PH (150.1)	UNITS	7.4
	BICARBONATE, CaCO_3 (2330B)	MG/L	240
	CARBONATE, CaCO_3 (2330B)	MG/L	1
	CARBON DIOXIDE, FREE AS CaCO_3	MG/L	19

"WetChem Quality Control Report"

Parameter:	ALKALINITY	PH
Batch Id:	ASW016	PHW092
Blank Result:	<1	N/A
Anal. Method:	2320B	150.1
Prep. Method:	N/A	N/A
Analysis Date:	12-MAY-97	05-MAY-97
Prep. Date:	12-MAY-97	05-MAY-97

Sample Duplication

Sample Dup:	705014-3	705014-3
Rept Limit:	<1	N/A
Sample Result:	300	7.13
Dup Result:	303	7.04
Sample RPD:	1	0.09
Max RPD:	4	0.08
Dry Weight%	N/A	N/A

Matrix Spike

Sample Spiked:	705014-3	N/A
Rept Limit:	<1	N/A
Sample Result:	300	
Spiked Result:	348	
Spike Added:	50	
% Recovery:	96	
% Rec Limits:	77-122	
Dry Weight%	N/A	

ICV

ICV Result:	254	10.04
True Result:	250	10.00
% Recovery:	102	100
% Rec Limits:	90-110	90-110

LCS

LCS Result:	6.60
True Result:	6.87
% Recovery:	96
% Rec Limits:	96-103

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

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

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

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

DPH = DOLLY P. HWANG RB = REBECCA BROWN AB = ANDY BROTHERTON
JL = JAN LECLEAR NSB = NANCY S. BUTLER MM = MIKE MCKENZIE
ED = ESTHER DANTIN LV = LASSANDRA VON APPEN JTZ = JONATHAN T. ZIENTARSKI
PLD = PAULA L. DOUGHTY RH = RICKY HAGENDORFER

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 705014
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705309
Project Name: MARATHON OIL CO.
Project Location: MOC
Test: Group of Single Wetchem
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 705309-03		Lab ID: 001			
CHLORIDE (325.3)	MG/L	58	1	CIW043	
Comments:					
Client ID: 705309-05		Lab ID: 002			
CHLORIDE (325.3)	MG/L	26	1	CIW043	
Comments:					
Client ID: 705309-07		Lab ID: 003			
FLUORIDE (340.2/4500-F C)	MG/L	0.8	0.2	FLW015	
SULFATE (375.4)	MG/L	160	50	SEW034	+
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	560	5	TDW026	
Comments:					
Client ID: 705309-09		Lab ID: 004			
FLUORIDE (340.2/4500-F C)	MG/L	0.5	0.2	FLW015	
SULFATE (375.4)	MG/L	150	50	SEW034	+
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	550	5	TDW026	
Comments:					
Client ID: 705309-11		Lab ID: 005			
FLUORIDE (340.2/4500-F C)	MG/L	0.4	0.2	FLW015	
SULFATE (375.4)	MG/L	19	10	SEW034	
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	370	5	TDW026	
Comments:					
Client ID: 705309-13		Lab ID: 006			
FLUORIDE (340.2/4500-F C)	MG/L	0.4	0.2	FLW015	
SULFATE (375.4)	MG/L	25	10	SEW036	
TOTAL DISSOLVED SOLIDS (160.1)	MG/L	330	5	TDW026	
Comments:					

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 705014
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705309
Project Name: MARATHON OIL CO.
Project Location: MOC
Test: Group of Single Wetchem

Client ID:	Lab Matrix: ID:	Date/Time Sampled:	Date Received:
705309-03	001 WATER	30-APR-97 0955	03-MAY-97
705309-05	002 WATER	30-APR-97 1120	03-MAY-97
705309-07	003 WATER	30-APR-97 1255	03-MAY-97
705309-09	004 WATER	30-APR-97 1445	03-MAY-97
705309-11	005 WATER	30-APR-97 1635	03-MAY-97
705309-13	006 WATER	30-APR-97 1800	03-MAY-97

"Method Report Summary"

Accession Number: 705014
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705309
Project Name: MARATHON OIL CO.
Project Location: MOC
Test: Group of Single Wetchem

Client Sample Id:	Parameter:	Unit:	Result:
705309-03	CHLORIDE (325.3)	MG/L	58
705309-05	CHLORIDE (325.3)	MG/L	26
705309-07	FLUORIDE (340.2/4500-F C)	MG/L	0.8
	SULFATE (375.4)	MG/L	160
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	560
705309-09	FLUORIDE (340.2/4500-F C)	MG/L	0.5
	SULFATE (375.4)	MG/L	150
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	550
705309-11	FLUORIDE (340.2/4500-F C)	MG/L	0.4
	SULFATE (375.4)	MG/L	19
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	370
705309-13	FLUORIDE (340.2/4500-F C)	MG/L	0.4
	SULFATE (375.4)	MG/L	25
	TOTAL DISSOLVED SOLIDS (160.1)	MG/L	330

"WetChem Quality Control Report"

Parameter:	CHLORIDE	FLUORIDE	SULFATE	TDS	SULFATE
Batch Id:	CIW043	FLW015	SEW034	TDW026	SEW036
Blank Result:	<1	<0.2	<10	<5	<10
Anal. Method:	325.3	340.2	375.4	160.1	375.4
Prep. Method:	N/A	N/A	N/A	N/A	N/A
Analysis Date:	05-MAY-97	13-MAY-97	06-MAY-97	07-MAY-97	13-MAY-97
Prep. Date:	05-MAY-97	13-MAY-97	06-MAY-97	06-MAY-97	13-MAY-97

Sample Duplication

Sample Dup:	704587-1	705081-1	704587-1	705014-3	705014-6
Rept Limit:	<1	<0.2	<1000+	<5	<10
Sample Result:	29.8	<0.2	1510	562	25.4
Dup Result:	30.0	<0.2	1450	602	26.0
Sample RPD:	1	N/C	60G	7	0.6G
Max RPD:	6	0.2	1000	15	10
Dry Weight%	N/A	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	704587-1	705081-1	704587-1	N/A	705014-6
Rept Limit:	<1	<0.2	<1000+	N/A	<20+
Sample Result:	29.8	<0.2	1510		25.4
Spiked Result:	84.6	1.09	3490		65.0
Spike Added:	55.0	0.80	2000		40
% Recovery:	100	118	99		99
% Rec Limits:	88-113	81-127	64-150		64-150
Dry Weight%	N/A	N/A	N/A		N/A

ICV

ICV Result:	98.3	1.16	20.8		19.8
True Result:	100	1.20	20.0		20.0
% Recovery:	98	97	104		99
% Rec Limits:	90-110	90-110	90-110		90-110

LCS

LCS Result:			352	
True Result:			293	
% Recovery:			120	
% Rec Limits:			77-122	

"Quality Control Comments"

Batch Id: Comments:

CIW043	705030-2,3	WERE ADDED TO BATCH ON 06-MAY-97
CIW043	705071-1	WAS ADDED TO BATCH ON 07-MAY
CIW043	705030-3	SAMPLE RESULT 102.3, SAMPLE DUPLICATE 101.1 , RPD = 6
CIW043	705030-3	SPIKE ADDED 275, SPIKE RESULT 350.6 = 90 %
FLW015	705158-2	SAMPLE RESULT 0.37, SAMPLE DUPLICATE 0.34 RPD = 0.03G
FLW015	705158-2	SPIKE ADDED 0.8, SPIKE RESULT 1.09 = 90%

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

N/A = NOT APPLICABLE.

N/S = NOT SUBMITTED.

N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW AEN REPORTING LIMIT;
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.

N/D = NOT DETECTED.

R = REACTIVE

T = TOTAL

G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT
OR BELOW AEN REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".

Q = THE ANALYTICAL (POST-DISTILLATION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY
BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DISTILLATION) SPIKE.

= ELEVATED REPORTING LIMIT DUE TO INSUFFICIENT SAMPLE.

+ = ELEVATED REPORTING LIMIT DUE TO DILUTION INTO CALIBRATION RANGE.

* = ELEVATED REPORTING LIMIT DUE TO MATRIX INTERFERENCE. (DILUTION PRIOR
TO ANALYSIS)

@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX. (DILUTION PRIOR TO
DIGESTION)

P = ANALYTICAL (POST DIGESTION) SPIKE.

I = DUPLICATE INJECTION.

& = AUTOMATED

F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.

N/C+ = NOT CALCULABLE

H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND THE
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN REPORTING
LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".

A = SAMPLE AND DUPLICATE RESULTS ARE "OUT OF CONTROL".

Z = THE SAMPLE RESULT FOR THE SPIKE IS BELOW THE REPORTING LIMIT. HOWEVER,
THIS RESULT IS REPORTED FOR ACCURATE QC CALCULATIONS.

NH= SAMPLE AND / OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".
SAMPLE IS NON-HOMOGENEOUS.

(*) = DETECTION LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.

(CA) = SEE CORRECTIVE ACTIONS FORM.

**= MATRIX INTERFERENCE

SW-846, 3rd Edition, latest EPA-approved edition.

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

STANDARD METHODS, For the Examination of Water and Wastewater, latest EPA-approved edition.

NIOSH Manual of Analytical Methods, 4th Edition.

ANNUAL BOOK OF ASTM STANDARDS, VOLUMES 11.01 and 11.02, latest EPA-approved edition.

METHODS FOR THE DETERMINATION OF INORGANIC SUBSTANCES IN ENVIRONMENTAL SAMPLES,

EPA600/R-93/100, AUGUST 1993

AEN-PN USES THE MOST CURRENT PROMULGATED METHODS FROM THE REFERENCES LISTED ABOVE.

METHODS FOR SOIL ANALYSIS, PART 2, CHEMICAL AND MICROBIOLOGICAL PROPERTIES, 2ND EDITION.

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

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION).

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

DPH = DOLLY P. HWANG

RB = REBECCA BROWN

AB = ANDY BROTHERTON

JL = JAN LECLEAR

NSB = NANCY S. BUTLER

MM = MIKE MCKENZIE

ED = ESTHER DANTIN

LV = LASSANDRA VON APPEN

JTZ = JONATHAN T. ZIENTARSKI

PLD = PAULA L. DOUGHTY

RH = RICKY HAGENDORFER

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 705014
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705309
Project Name: MARATHON OIL CO.
Project Location: MOC
Test: Group of Single Metals
QcLevel: II

Parameter:	Unit:	Result:	R.L:	Batch:	Q:
Client ID: 705309-07		Lab ID:003			
CALCIUM (200.7)	MG/L	120	0.5	IOW106	
POTASSIUM (200.7)	MG/L	2.0	0.1	XOW106	
MAGNESIUM (200.7)	MG/L	46	0.05	JOW106	
SODIUM (200.7)	MG/L	9.0	0.2	10X106	

Comments:

Client ID: 705309-09		Lab ID:004			
CALCIUM (200.7)	MG/L	120	0.5	IOW106	
POTASSIUM (200.7)	MG/L	2.7	0.1	XOW106	
MAGNESIUM (200.7)	MG/L	45	0.05	JOW106	
SODIUM (200.7)	MG/L	5.7	0.2	10X106	

Comments:

Client ID: 705309-11		Lab ID:005			
CALCIUM (200.7)	MG/L	85	0.5	IOW106	
POTASSIUM (200.7)	MG/L	2.3	0.1	XOW106	
MAGNESIUM (200.7)	MG/L	35	0.05	JOW106	
SODIUM (200.7)	MG/L	3.7	0.2	10X106	

Comments:

Client ID: 705309-13		Lab ID:006			
CALCIUM (200.7)	MG/L	99	0.5	IOW106	
POTASSIUM (200.7)	MG/L	2.8	0.1	XOW106	
MAGNESIUM (200.7)	MG/L	35	0.05	JOW106	
SODIUM (200.7)	MG/L	5.1	0.2	10X106	

Comments:

"FINAL REPORT FORMAT - MULTIPLE"

Accession: 705014
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705309
Project Name: MARATHON OIL CO.
Project Location: MOC
Test: Group of Single Metals

Client Id:	Lab Matrix: Id:	Date/Time Sampled:	Date Received:
705309-07	003 WATER	30-APR-97 1255	03-MAY-97
705309-09	004 WATER	30-APR-97 1445	03-MAY-97
705309-11	005 WATER	30-APR-97 1635	03-MAY-97
705309-13	006 WATER	30-APR-97 1800	03-MAY-97

"Method Report Summary"

Accession Number: 705014
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705309
Project Name: MARATHON OIL CO.
Project Location: MOC
Test: Group of Single Metals

Client Sample Id:	Parameter:	Unit:	Result:
705309-07	CALCIUM (200.7)	MG/L	120
	POTASSIUM (200.7)	MG/L	2.0
	MAGNESIUM (200.7)	MG/L	46
	SODIUM (200.7)	MG/L	9.0
705309-09	CALCIUM (200.7)	MG/L	120
	POTASSIUM (200.7)	MG/L	2.7
	MAGNESIUM (200.7)	MG/L	45
	SODIUM (200.7)	MG/L	5.7
705309-11	CALCIUM (200.7)	MG/L	85
	POTASSIUM (200.7)	MG/L	2.3
	MAGNESIUM (200.7)	MG/L	35
	SODIUM (200.7)	MG/L	3.7
705309-13	CALCIUM (200.7)	MG/L	99
	POTASSIUM (200.7)	MG/L	2.8
	MAGNESIUM (200.7)	MG/L	35
	SODIUM (200.7)	MG/L	5.1

American Environmental Network, Inc.

"Metals Quality Control Report"

Parameter:	CALCIUM	POTASSIUM	MAGNESIUM	SODIUM
Batch Id:	IOW106	XOW106	JOW106	10X106
Blank Result:	<0.5	<0.1	<0.05	<0.2
Anal. Method:	200.7	200.7	200.7	200.7
Prep. Method:	200.7	200.7	200.7	200.7
Analysis Date:	09-MAY-97	09-MAY-97	09-MAY-97	12-MAY-97
Prep. Date:	09-MAY-97	09-MAY-97	09-MAY-97	09-MAY-97

Sample Duplication

Sample Dup:	705014-3	705014-3	705014-3	705014-3
Rept Limit:	<0.5	<0.1	<0.05	<0.2
Sample Result:	140	24	67	30
Dup Result:	140	23	65	29
Sample RPD:	0	4	3	3
Max RPD:	20	20	20	20
Dry Weight%	N/A	N/A	N/A	N/A

Matrix Spike

Sample Spiked:	705014-3	705014-3	705014-3	705014-3
Rept Limit:	<0.5	<0.1	<0.05	<0.2
Sample Result:	120	2.0	46	9.0
Spiked Result:	140	24	67	30
Spike Added:	20F	20	20	20
% Recovery:	100	110	105	105
% Rec Limits:	75-125	75-125	75-125	75-125
Dry Weight%	N/A	N/A	N/A	N/A

ICV

ICV Result:	5.1	4.9	4.8	24
True Result:	5.0	5.0	5.0	25
% Recovery:	102	98	96	96
% Rec Limits:	90-110	90-110	90-110	90-110

LCS

LCS Result:	21	19	20	20
True Result:	20	20	20	20
% Recovery:	105	95	100	100
% Rec Limits:	80-120	80-120	80-120	80-120

"Quality Control Comments"

Batch Id: Comments:

IOW106	ANALYST: JR
IOW106	The results reported under "Sample Duplication" are the MS/MSD.
XOW106	ANALYST: JR
XOW106	The results reported under "Sample Duplication" are the MS/MSD.
JOW106	ANALYST: JR
JOW106	The results reported under "Sample Duplication" are the MS/MSD.
10X106	ANALYST: JR
10X106	The results reported under "Sample Duplication" are the MS/MSD.

----- Common Footnotes Metals -----

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

FROM ANALYSIS REPORT:

RL= REPORTING LIMIT BASED ON METHOD DETECTION LIMIT STUDIES.

Q= QUALIFIER (FOOTNOTE)

FROM QUALITY CONTROL REPORT:

RPD= RELATIVE PERCENT DEVIATION.

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

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

SW-846, 3rd Edition, latest revision.

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

NIOSH Manual of Analytical Methods, 4th Edition.

Standard Methods For the Examination of Water and Wastewater, 18th Edition, 1992.

Methods For the Determination of Metals in Environmental Samples - Supplement I,

EPA 600/R-94-111, May 1994.

J = GARY JACOBS

JR = JOHN REED

JLH = JAMES L. HERED

LV = LASSANDRA VON APPEN

CD = CHRISTY DRAPER

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, (EPA 8020)
 CLIENT : MARATHON O/C
 PROJECT # : 23350224.61
 PROJECT NAME : IND. BASIN REM.

AEN I.D.: 705309

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
01	DI WATER	AQUEOUS	4/29/97	NA	5/6/97	1
02	INT RB	AQUEOUS	4/29/97	NA	5/6/97	1
03	MW-89	AQUEOUS	4/30/97	NA	5/6/97	1
PARAMETER		DET. LIMIT	UNITS	01	02	03
BENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE		0.5	UG/L	1.2	< 0.5	< 0.5
ETHYLBENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES		0.5	UG/L	7.2*	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

109

110

111

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

- * - COMPOUND RESULT NOT CONFIRMED BY MASS SPECTROSCOPY. RESULT DUE TO COELUTING COMPOUND.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, (EPA 8020)
 CLIENT : MARATHON O/C
 PROJECT # : 23350224.61
 PROJECT NAME : IND. BASIN REM.

AEN I.D.: 705309

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
04	MW-89RB	AQUEOUS	4/30/97	NA	5/6/97	1
05	MW-88	AQUEOUS	4/30/97	NA	5/6/97	1
06	MW-88RB	AQUEOUS	4/30/97	NA	5/6/97	1
PARAMETER	DET. LIMIT	UNITS	04	05	06	
BENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5	
TOLUENE	0.5	UG/L	< 0.5	< 0.5	< 0.5	
ETHYLBENZENE	0.5	UG/L	< 0.5	< 0.5	< 0.5	
AL XYLENES	0.5	UG/L	< 0.5	< 0.5	< 0.5	

SURROGATE:

BROMOFLUOROBENZENE (%)

107

113

111

SURROGATE LIMITS

(80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, (EPA 8020)
CLIENT : MARATHON O/C
PROJECT # : 23350224.61
PROJECT NAME : IND. BASIN REM.

AEN I.D.: 705309

SAMPLE			DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.	MATRIX	SAMPLED	EXTRACTED	ANALYZED	FACTOR
07	MW-96	AQUEOUS	4/30/97	NA	5/6/97	1
08	MW-96RB	AQUEOUS	4/30/97	NA	5/6/97	1
09	MW-97	AQUEOUS	4/30/97	NA	5/6/97	1
PARAMETER		DET. LIMIT	UNITS	07	08	09
BENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOLUENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
ETHYLBENZENE		0.5	UG/L	< 0.5	< 0.5	< 0.5
TOTAL XYLENES		0.5	UG/L	< 0.5	< 0.5	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

111

106

111

SURROGATE LIMITS

(80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, (EPA 8020)
CLIENT : MARATHON O/C
PROJECT # : 23350224.61
PROJECT NAME : IND. BASIN REM.

AEN I.D.: 705309

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
10	MW-97RB	AQUEOUS	4/30/97	NA	5/6/97	1
11	MW-95	AQUEOUS	4/30/97	NA	5/6/97	1
12	MW-95RB	AQUEOUS	4/30/97	NA	5/6/97	1

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

SURROGATE:

BROMOFLUOROBENZENE (%)

109

114

109

SURROGATE LIMITS

(80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, (EPA 8020)
CLIENT : MARATHON O/C
PROJECT # : 23350224.61
PROJECT NAME : IND. BASIN REM.

AEN I.D.: 705309

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
13	MW-98	AQUEOUS	4/30/97	NA	5/6/97	1
14	TRIP BLANK	AQUEOUS	4/24/97	NA	5/6/97	1

PARAMETER	DET. LIMIT	UNITS	13	14
BENZENE	0.5	UG/L	5.8	< 0.5
TOLUENE	0.5	UG/L	3.5	< 0.5
ETHYLBENZENE	0.5	UG/L	1.5	< 0.5
TOTAL XYLENES	0.5	UG/L	26	< 0.5

SURROGATE:

BROMOFLUOROBENZENE (%)

107

113

SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX, (EPA 8020)	AEN I.D.	: 705309
BLANK I. D.	: 050697	DATE EXTRACTED	: NA
CLIENT	: MARATHON O/C	DATE ANALYZED	: 5/6/97
PROJECT #	: 23350224.6	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IND. BASIN REM.		

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

SURROGATE:
BROMOFLUOROBENZENE (%) 119
SURROGATE LIMITS: (80 - 120)
CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEX, (EPA 8020)	AEN I.D.	: 705309
BLANK I. D.	: 050797	DATE EXTRACTED	: NA
CLIENT	: MARATHON O/C	DATE ANALYZED	: 5/7/97
PROJECT #	: 23350224.6	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IND. BASIN REM.		

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

SURROGATE:

BROMOFLUOROBENZENE (%)

110

SURROGATE LIMITS: (80 - 120)

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: BTEX, (EPA 8020)	AEN I.D.	: 705309
MSMSD #	: 705309-03	DATE EXTRACTED	: NA
CLIENT	: MARATHON O/C	DATE ANALYZED	: 5/7/97
PROJECT #	: 23350224.6	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: IND. BASIN REM.	UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.5	10.0	9.5	95	10.3	103	8	(80 - 120)	20
TOLUENE	<0.5	10.0	9.4	94	11.3	113	19	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	9.9	99	10.4	104	5	(80 - 120)	20
TOTAL XYLENES	<0.5	30.0	29.8	99	32.6	109	9	(80 - 120)	20

CHEMIST NOTES:

N/A

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

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

"FINAL REPORT FORMAT - SINGLE"

Accession: 705014
 Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
 Project Number: 705309
 Project Name: MARATHON OIL CO.
 Project Location: MOC
 Test: POLYNUCLEAR AROMATICS BY 8310
 Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Matrix: WATER
 QC Level: II

Lab Id: 003 Sample Date/Time: 30-APR-97 1255
 Client Sample Id: 705309-07 Received Date: 03-MAY-97
 Batch: PAW093 Extraction Date: 06-MAY-97
 Blank: A Dry Weight %: N/A Analysis Date: 09-MAY-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a)ANTHRACENE	UG/L	ND	1	
BENZO(a)PYRENE	UG/L	ND	1	
BENZO(b)FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i)PERYLENE	UG/L	ND	1	
BENZO(k)FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	ND	1	
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	102	28-138	
ANALYST	INITIALS	KS		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 705014
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 705309
Project Name: MARATHON OIL CO.
Project Location: MOC
Test: POLYNUCLEAR AROMATICS BY 8310
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 004 Sample Date/Time: 30-APR-97 1445
Client Sample Id: 705309-09 Received Date: 03-MAY-97

Batch: PAW093 Extraction Date: 06-MAY-97
Blank: A Dry Weight %: N/A Analysis Date: 09-MAY-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a) ANTHRACENE	UG/L	ND	1	
BENZO(a) PYRENE	UG/L	ND	1	
BENZO(b) FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i) PERYLENE	UG/L	ND	1	
BENZO(k) FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h) ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	ND	1	
INDENO(1,2,3-cd) PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	111	28-138	
ANALYST	INITIALS	KS		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 705014
 Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
 Project Number: 705309
 Project Name: MARATHON OIL CO.
 Project Location: MOC
 Test: POLYNUCLEAR AROMATICS BY 8310
 Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Matrix: WATER
 QC Level: II

Lab Id: 005 Sample Date/Time: 30-APR-97 1635
 Client Sample Id: 705309-11 Received Date: 03-MAY-97

Batch: PAW093 Extraction Date: 06-MAY-97
 Blank: A Dry Weight %: N/A Analysis Date: 09-MAY-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO (a) ANTHRACENE	UG/L	ND	1	
BENZO (a) PYRENE	UG/L	ND	1	
BENZO (b) FLUORANTHENE	UG/L	ND	1	
BENZO (g, h, i) PERYLENE	UG/L	ND	1	
BENZO (k) FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO (a, h) ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	ND	1	
INDENO (1, 2, 3-cd) PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	150*	28-138	
ANALYST	INITIALS	SW		

Comments:
 *SURROGATE RECOVERY OUTSIDE ACCEPTANCE LIMITS
 DUE TO MATRIX INTERFERENCE.

"FINAL REPORT FORMAT - SINGLE"

Accession: 705014
 Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
 Project Number: 705309
 Project Name: MARATHON OIL CO.
 Project Location: MOC
 Test: POLYNUCLEAR AROMATICS BY 8310
 Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Matrix: WATER
 QC Level: II

Lab Id: 006
 Client Sample Id: 705309-13
 Sample Date/Time: 30-APR-97 1800
 Received Date: 03-MAY-97
 Batch: PAW093
 Blank: A
 Dry Weight %: N/A
 Extraction Date: 06-MAY-97
 Analysis Date: 09-MAY-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a)ANTHRACENE	UG/L	ND	1	
BENZO(a)PYRENE	UG/L	ND	1	
BENZO(b)FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i)PERYLENE	UG/L	ND	1	
BENZO(k)FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	ND	1	
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	88	28-138	
ANALYST	INITIALS	KS		

Comments:

"QC Report"

Title: Water Blank
Batch: PAW093
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Blank Id: A Date Analyzed: 08-MAY-97 Date Extracted: 06-MAY-97

Parameters:	Units:	Results:	Reporting Limits:
ACENAPHTHENE	UG/L	ND	1
ACENAPHTHYLENE	UG/L	ND	1
ANTHRACENE	UG/L	ND	1
BENZO(a) ANTHRACENE	UG/L	ND	1
BENZO(a) PYRENE	UG/L	ND	1
BENZO(b) FLUORANTHENE	UG/L	ND	1
BENZO(g,h,i) PERYLENE	UG/L	ND	1
BENZO(k) FLUORANTHENE	UG/L	ND	1
CHRYSENE	UG/L	ND	1
DIBENZO(a,h) ANTHRACENE	UG/L	ND	1
FLUORANTHENE	UG/L	ND	1
FLUORENE	UG/L	ND	1
INDENO(1,2,3-cd) PYRENE	UG/L	ND	1
NAPHTHALENE	UG/L	ND	1
PHENANTHRENE	UG/L	ND	1
PYRENE	UG/L	ND	1
1-METHYLNAPHTHALENE	UG/L	ND	1
2-METHYLNAPHTHALENE	UG/L	ND	1
2-CHLOROANTHRACENE	%REC/SURR	83	28-138
ANALYST	INITIALS	JBT	

Comments:

"QC Report"

Title: Water Reagent
 Batch: PAW093
 Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

RS Date Analyzed: 08-MAY-97
 RSD Date Analyzed: 08-MAY-97

RS Date Extracted: 06-MAY-97
 RSD Date Extracted: 06-MAY-97

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	RSD Conc	RSD %Rec	RPD	Rec Lmts
ACENAPHTHYLENE	10.0	<1	7.5	75	7.7	77	3	45-127
BENZO(k) FLUORANTHENE	10.0	<1	7.3	73	7.5	75	3	68-131
CHRYSENE	10.0	<1	9.7	97	9.9	99	2	69-131
PHENANTHRENE	10.0	<1	9.8	98	10.6	106	8	63-124
PYRENE	10.0	<1	8.7	87	9.1	91	4	61-126

Surrogates:	RS %Rec	RSD %Rec	Rec Lmts
2-CHLOROANTHRACENE	83	88	28-138

Comments:

Notes:

N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
 UG/L = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.

* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.

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

"QC Report"

Title: Water Matrix
 Batch: PAW093
 Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
 Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Dry Weight %: N/A
 Sample Spiked: 705014-3

MS Date Analyzed: 09-MAY-97
 MSD Date Analyzed: 09-MAY-97

MS Date Extracted: 06-MAY-97
 MSD Date Extracted: 06-MAY-97

Parameters:	Spike Added	Sample Conc	MS Conc	MS %Rec	MSD Conc	MSD %Rec	RPD	Rec Lmts
ACENAPHTHYLENE	10.0	<1	5.3	53	6.4	64	19	51 18-146
BENZO(k) FLUORANTHENE	10.0	<1	3.6	36	4.7	47	27	40 26-137
CHRYSENE	10.0	<1	4.5	45	6.3	63	33	69 16-156
PHENANTHRENE	10.0	<1	6.9	69	8.5	85	21	36 30-145
PYRENE	10.0	<1	6.2	62	7.5	75	19	41 39-137

Surrogates:
 2-CHLOROANTHRACENE 60 75 28-138

Comments:

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

Common notation for Organic reporting

N/S = NOT SUBMITTED
N/A = NOT APPLICABLE
D = DILUTED OUT
UG = MICROGRAMS
UG/L = PARTS PER BILLION.
UG/KG = PARTS PER BILLION.
MG/M3 = MILLIGRAM PER CUBIC METER.
PPMV = PART PER MILLION BY VOLUME.
MG/KG = PARTS PER MILLION.
MG/L = PARTS PER MILLION.
< = LESS THAN DETECTION LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS
Y = IMPROPER PRESERVATION, NO PRESERVATIVE PRESENT IN SAMPLE UPON RECEIPT.

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

ORGANIC SOILS ARE REPORTED ON A DRYWEIGHT BASIS.

ND = NOT DETECTED ABOVE REPORTING LIMIT.

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

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)

AEN/GC/FID

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

AEN/GC/FIX

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

AEN/GC/FPD

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

AEN/GC/PID

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

AEN/GC/TCD

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

SW-846 METHOD 9020

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

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

SW = STEVE WILHITE
PL = PAUL LESCHENSKY
RW = ROBERT WOLFE
KS = KENDALL SMITH
KL = KERRY LEMONT
RP = ROB PEREZ
JBT = JENNIFER TORRANCE
LP = LAVERNE PETERSON
PLD = PAULA DOUGHTY

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bob Mezie				
COMPANY: MacArthur O/C				
ADDRESS: P.O. Box 552				
PHONE: 915 687-8312				
FAX: 915 687-8305				
BILL TO: <u>State of NM</u>				
COMPANY: <u>State of NM</u>				
ADDRESS: <u>State of NM</u>				
SAMPLE ID	DATE	TIME	MATRIX	LAB ID
DI WATER	4/29/97	1400	Water	-01
INT RB	4/30/97	0930		-02
MW-89	4/30/97	0955		-03
MW-89RB		1030		-04
MW-88		1120		-05
MW-88RB		1200		-06
MW-96		1255		-07
MW-96RB		1340		-08
MW-97		1445		-09
MW-97RB	4/30	1530		-10

Petroleum Hydrocarbons (418.1) TRPH	
(MOD.8015) Diesel/Direct/Inject	
(M8015) Gas/Purge & Trap	
Gasoline (BTEX) & MTBE (M8015/8020)	
BTEX & MTBE (8020)	
BTEX & Chlorinated Aromatics (602/8020)	
BTEX/MTBE/EDC & EDB (8020/8010/Short)	
Chlorinated Hydrocarbons (601/8010)	
504 EDB / DBCP	
Polynuclear Aromatics (610/8310)	
Volatile Organics (624/8240) GC/MS	
Volatile Organics (8260) GC/MS	
CATIONS	
Pesticides/PCB (608/8080)	
Herbicides (615/8150)	
Base/Neutral/Acid Compounds GC/MS (625/8270)	
ANIONS	
General Chemistry:	
PAHs 8310	
Priority Pollutant Metals (13)	
Target Analyte List Metals (23)	
RCRA Metals (8)	
RCRA Metals by TCLP (Method 1311)	
Metals:	
NUMBER OF CONTAINERS	2

PROJECT INFORMATION		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS	
PROJ. NO.: 023350224.61	(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK	(NORMAL) ☒	
PROJ. NAME: Indian Reservation	CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER		
P.O. NO.:	METHANOL PRESERVATION ☐		
SHIPPED VIA:	COMMENTS: FIXED FEE ☐		
RECEIVED BY: <u>Field</u>		RECEIVED BY: <u>Field</u>	

Signature: <u>Field</u>	Time: <u>1800</u>	Signature: <u>Field</u>	Time: <u>1800</u>
Printed Name: <u>Field</u>	Date: <u>5/1/97</u>	Printed Name: <u>Field</u>	Date: <u>5/1/97</u>
Company: <u>Field</u>		Company: <u>Field</u>	

Signature: <u>Field</u>	Time: <u>1800</u>	Signature: <u>Field</u>	Time: <u>1800</u>
Printed Name: <u>Field</u>	Date: <u>5/1/97</u>	Printed Name: <u>Field</u>	Date: <u>5/1/97</u>
Company: <u>Field</u>		Company: <u>Field</u>	

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bob Meazie				ANALYSIS REQUEST											
COMPANY: <u>Meredith O/C</u>				Petroleum Hydrocarbons (418.1) TRPH											
ADDRESS: <u>PO Box 552</u>				(MOD.8015) Diesel/Direct/Inject											
PHONE: <u>Midland TX 79702</u>				<u>Chloroac 352.4</u>											
FAX: <u>(915) 687-8312</u>				(M8015) Gas/Purge & Trap											
BILL TO: <u>Same as above</u>				Gasoline/BTEX & MTBE (M8015/8020)											
COMPANY: <u>Same as above</u>				BTXE/MTBE (8020)											
ADDRESS: <u>Same as above</u>				BTEX & Chlorinated Aromatics (602/8020)											
				BTEX/MTBE/EDC & EDB (8020/8010/Short)											
				Chlorinated Hydrocarbons (601/8010)											
				<u>PAHs 8310</u>											
				504 EDB ☐ / DBCP ☐											
				Polynuclear Aromatics (610/8310)											
				Volatile Organics (624/8240) GC/MS											
				Volatile Organics (8260) GC/MS											
				<u>CATIONS</u>											
				Pesticides/PCB (608/8080)											
				Herbicides (615/8150)											
				Base/Neutral/Acid Compounds GC/MS (625/8270)											
				<u>ANIONS</u>											
				General Chemistry:											
				Priority Pollutant Metals (13)											
				Target Analyte List Metals (23)											
				RCRA Metals (8)											
				RCRA Metals by TCLP (Method 1311)											
				Metals:											
				NUMBER OF CONTAINERS											
PROJECT INFORMATION				PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS											
PROJECT NO. <u>02335022461</u>				(RUSH) ☐ 24hr ☐ 148hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒											
PROJECT NAME: <u>Edwin Davis Remediation</u>				CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER											
P.O. NO.:				METHANOL PRESERVATION ☐											
SHIPPED VIA:				COMMENTS: FIXED FEE ☐											
SAMPLE RECEIPT				RECEIVED BY: <u>FDATC</u>											
NO. CONTAINERS: <u>1</u>				Signature: <u>Reid</u> Time: <u>1800</u>											
DATE: <u>5/2/97</u>				Printed Name: <u>Reid</u> Date: <u>5/1/97</u>											
RECEIVED BY: <u>FDATC</u>				Company: <u>FDATC</u>											
NO. CONTAINERS: <u>1</u>				Signature: <u>Reid</u> Time: <u>1800</u>											
DATE: <u>5/2/97</u>				Printed Name: <u>Reid</u> Date: <u>5/1/97</u>											
RECEIVED BY: <u>FDATC</u>				Company: <u>FDATC</u>											
NO. CONTAINERS: <u>1</u>				Signature: <u>Reid</u> Time: <u>1800</u>											
DATE: <u>5/2/97</u>				Printed Name: <u>Reid</u> Date: <u>5/1/97</u>											
RECEIVED BY: <u>FDATC</u>				Company: <u>FDATC</u>											



American Environmental Network
Albuquerque, New Mexico

Interlab Chain of Custody

DATE: 05-23-92 PAGE: 1 OF 1

NETWORK PROJECT MANAGER: KIMBERLY D. McNEILL

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

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
705308-07	4/29/92	12:55	AC	1
-09		14:45		2
-11		16:35		3
-13		18:00		4

Metals - TAL
Metals - PP List
Metals - RCRA
RCRA Metals by TCLP (1311)

~~XXXX~~ Bromide

TOX
TOC
Gen Chemistry

Oil and Grease
BOD
COD
Pesticides/PCB (608/8080)
Herbicides (615/8150)
Base/Neutral Acid Compounds GC/MS (625/8270)
Volatile Organics GC/MS (624/8240)
Polynuclear Aromatics (810/8310)
8240 (TCLP 1311) ZHE
8270 (TCLP 1311)

TC-14
Gross Alpha/Beta

NUMBER OF CONTAINERS

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER: 705308

TOTAL NUMBER OF CONTAINERS: 4

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NAME: MARIATHAN OIL

CHAIN OF CUSTODY SEALS

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

OC LEVEL: STD IV

IRIACIT?

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

MS MSD BLANK

RECEIVED GOOD COND/COLD

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

RECEIVED GOOD COND/COLD

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

DUE DATE: 05-23-92

TEST SURCHARGE:

QUANTITY:

SPECIAL HANDLING REQUIRED: ☐ YES ☐ NO

Albuquerque (505) 458-9141 • Phoenix (602) 458-4400 • Seattle (206) 228-8335 • Pensacola (904) 474-1001 • Portland (503) 684-0447 • Albuquerque (505) 344-3177

American Environmental Network of Florida
PROJECT SAMPLE INSPECTION FORM

Lab Accession #: 705014

Date Received: 03-May-97

- | | |
|---|---|
| <p>1. Was there a Chain of Custody? Yes <u>No*</u></p> <p>2. Was Chain of Custody properly filled out and relinquished? Yes <u>No*</u></p> <p>3. Were samples received cold? <u>Yes</u> No* N/A
(Criteria: 1° - 4°C: AEN-SOP 1055)</p> <p>4. Were all samples properly labeled and identified? Yes <u>No*</u></p> <p>5. Did samples require splitting? Yes* <u>No</u>
Req By: PM Client Other*</p> <p>6. Were samples received in proper containers for analysis requested? <u>Yes</u> No*</p> <p>7. Were all sample containers received intact? <u>Yes</u> No*</p> | <p>8. Were samples checked for preservative? <u>Yes</u> No* N/A
<small>(Check pH of all H₂O requiring preservative except VOA vials that require zero headspace)*</small></p> <p>9. Is there sufficient volume for analysis requested? <u>Yes</u> No*</p> <p>10. Were samples received within Holding Time? <u>Yes</u> No*
<small>(REFER TO AEN-SOP 1040)</small></p> <p>11. Is Headspace visible > ¼" in diameter in VOA vials?* If any headspace is evident, comment in out-of-control section. Yes* No <u>N/A</u></p> <p>12. If sent, were matrix spike bottles returned? Yes No* <u>N/A</u></p> <p>13. Was Project Manager notified of problems? (initials: _____) Yes No* <u>N/A</u></p> |
|---|---|

Airbill Number(s): 1725502807

Shipped By: FEDEX

Cooler Number(s): MS

Shipping Charges: N/A

Cooler Weight(s): N/A

Cooler Temp(s) (°C): 1°C - CCK5

(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

Out of Control Events and Inspection Comments:

1, 2 & 4. Project received without any paperwork at all. Project logged in from historical data. Project information taken from bottle labels. CCK and additional Duplicates sent on 5/5/97. Relayed for info on TWD. SF 5/5/97

(USE BACK OF PSIF FOR ADDITIONAL NOTES AND COMMENTS)

Inspected By: PFE Date: 5/3/97 Logged By: PFE Date: 5/3/97

- * Note all Out-of-Control and/or questionable events on Comment Section of this form.
- * Note who requested the splitting of samples on the Comment Section of this form.
- * All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (AEN-SOP 938, section 2.2.9).
- * According to EPA, ¼" of headspace is allowed in 40 ml vials requiring volatile analysis, however, AEN makes it policy to record any headspace as out-of-control (AEN-SOP 938, section 2.2.12).

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY

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

CHAIN OF CUSTODY
 DATE 4/30/97 PAGE 2 OF 2

PROJECT MANAGER: Bob Mezie

COMPANY: Mataro O/C

ADDRESS: PO Box 552

PHONE: (915) 487-8312

FAX: (915) 687-8305

BILL TO:

COMPANY:

ADDRESS:

SAMPLE ID

DATE

TIME

MATRIX

LAB I.D.

MW-95

MW-95R0

MW-98

NA THERM Blank

BP 05-02-97

TRIP Blank

4/29/97 10:05 AM

4/4

4/4

4/4

4/4

4/4

4/4

4/4

4/4

4/4

4/4

4/4

4/4

PROJECT INFORMATION

PROJ. NO. 0235022461

PROJ. NAME: Edin Park Residential

PO NO:

SHIPPED VIA:

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

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

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

BP 5/2/97

ANALYSIS REQUEST

- Petroleum Hydrocarbons (418.1) TRPH
- (MOD.8015) Diesel/Direct/Inject
- Chloroc 352.4
- (M8015) Gas/Purge & Trap
- Gasoline/BTEX & MTBE (M8015/8020)
- BTEX/MTBE (8020)
- BTEX & Chlorinated Aromatics (602/8020)
- BTEX/MTBE/EDC & EDB (8020/8010/Short)
- Chlorinated Hydrocarbons (601/8010)
- PAHs 8310
- 504 EDB ☐ / DBCP ☐
- Polynuclear Aromatics (610/8310)
- Volatile Organics (624/8240) GC/MS
- Volatile Organics (8260) GC/MS
- CATIONS
- Pesticides/PCB (608/8080)
- Herbicides (615/8150)
- Base/Neutral Acid Compounds GC/MS (625/8270)
- ANIONS
- General Chemistry:
- Priority Pollutant Metals (13)
- Target Analyte List Metals (23)
- RCRA Metals (8)
- RCRA Metals by TCLP (Method 1311)
- Metals:

NUMBER OF CONTAINERS

RELINQUISHED BY:

RELINQUISHED BY:

Signature: *Reichert* Time: 1800

Printed Name: *Reichert* Date: 5/1/97

Company:

Signature:

Printed Name:

Company:

Signature:

Printed Name:

Company:

RECEIVED BY:

RECEIVED BY:

155014



American Environmental Network
Albuquerque, New Mexico

Interlab Chain of Custody

DATE: 03-02-97 PAGE: 1 OF 1

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

COMPANY:

American Environmental Network
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

ANALYSIS REQUEST

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID DATE TIME MATRIX LAB ID

705309-03 4-30-97 9:55 AQ 1

-05 1 11:20 AQ 2

-07 4-30-97 12:55 3

-09 14:45 4

-11 16:35 5

-13 18:00 6

Metals - TAL
Metals - PP List
Metals - RCRA
RCRA Metals by TCLP (1311)
8310
TOX
TOC
Gen Chemistry
Cd (352.4)
Cation / Anions
Oil and Grease
BOD
COD
Pesticides/PCB (608/8080)
Herbicides (615/8150)
Base/Neutral Acid Compounds GC/MS (625/8270)
Volatile Organics GC/MS (624/8240)
Polynuclear Aromatics (610/8310)
8240 (TCLP 1311) ZHE
8270 (TCLP 1311)

TO-14
Gross Alpha/Beta

NUMBER OF CONTAINERS

PROJECT INFORMATION

SAMPLE RECEIPT

SAMPLES SENT TO:

RELINQUISHED BY:

RELINQUISHED BY:

PROJECT NUMBER: 705309

TOTAL NUMBER OF CONTAINERS

SAN DIEGO
Paragon

Signature: [Signature]
Time: 1700

Signature: [Signature]
Time: [Time]

PROJECT NAME: Marathon Oil

CHAIN OF CUSTODY SEALS

RENTON

Printed Name: [Name]
Date: 05-02-97

Printed Name: [Name]
Date: [Date]

OC LEVEL: STD IV

INTEGRITY

PENSACOLA

Signature: [Signature]
Time: [Time]

Signature: [Signature]
Time: [Time]

OC EQUIP: MS MSD BLANK

RECEIVED GOOD COND/COLD

PORTLAND

Abuquerque
Signature: [Signature]
Time: [Time]

Signature: [Signature]
Time: [Time]

OC EQUIP: NUSHI

LAB NUMBER

PHOENIX

Signature: [Signature]
Time: [Time]

Signature: [Signature]
Time: [Time]

DATE DATE:

INSTRUMENT CHANGE:

CLIENT DISCOUNT:

SPECIAL CIRCUMSTANCES REQUIRED: () YES () NO

Company:

Company: Aven

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY

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

CHAIN OF CUSTODY
 DATE: 4/29-8/97 PAGE: 1 OF 2

755014

PROJECT MANAGER: Bob Mezie

COMPANY: Mactech O/C
 ADDRESS: P.O. Box 552
 Midland TX, 79702

PHONE: (915) 687-8312
 FAX: (915) 687-8305

BILL TO:
 COMPANY:
 ADDRESS: Same as Above

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct/Inject	(M8015) Gas/Purge & Trap	Gasoline (BTEX) & MTBE (M8015/8020)	BTXE (8020)	BTEX & Chlorinated Aromatics (602/8020)	BTEX/MTBE/EDC & EDB (8020/8010/Short)	Chlorinated Hydrocarbons (601/8010)	504 EDB / DBCP	Polynuclear Aromatics (610/8310)	Volatile Organics (624/8240) GC/MS	Volatile Organics (8260) GC/MS	CATIONS	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutr/Acid Compounds GC/MS (625/8270)	ANIONS	General Chemistry:	PAHs 8310	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:	NUMBER OF CONTAINERS			
DI WATER	4/29/97	1400	WATER	1021																												2
FW RB	4/30/97	0955		1021																												3
MW-89 RB		1030		1030																												3
MW-88		1120		1030																												2
MW-88 RB		1200		1030																												2
MW-96		1255		1030																												2
MW-96 RB		1340		1030																												2
MW-97		1445		1030																												2
MW-97 RB		1530		1030																												2

PROJECT INFORMATION

PROJECT NO: 023350224661

PROJECT NAME: Taylor Basin Remediation

P.O. NO:

SHIPPED VIA:

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

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

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

RELINQUISHED BY: 1.

Signature: [Signature] Time: 1800

Printed Name: [Name] Date: 6/1/97

Company: [Company]

RELINQUISHED BY: 2.

Signature: [Signature] Time:

Printed Name: [Name] Date:

Company: [Company]

Signature: [Signature] Time:

Printed Name: [Name] Date:

Company: [Company]

APPENDIX F

Condensate Volatilization Analytical Data: 1991 - 1997



American Environmental Network, Inc.

AEN I.D. 608314

August 23, 1996

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

Project Name MARATHON
Project Number 053350105

Attention: BOB MENZIE

On 8/8/96 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze **product** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

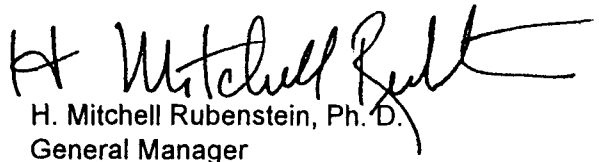
If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.



Kimberly D. McNeill
Project Manager

MR: mt

Enclosure



H. Mitchell Rubenstein, Ph. D.
General Manager

CASE NARRATIVE

A procedure designed by Fluor Daniel-GTI was performed separately on two well samples received by American Environmental Network (NM). Using a syringe, 100 ml of sample (Natural Gas Condensate) was injected into each of two 250 ml sampling containers. The ambient temperature was 31C. The sample containers were allowed to sit for 24 hours at which time the temperature was measured at 29C. 100 mls of distilled water was placed into a gas sampling bulb. 100 mls of the gas phase from one of the two sampling containers was placed into a tedlar bag and analyzed via EPA Method 8015/8020. From the remaining sample container, 150 mls of gas phase was removed and introduced into a 250 ml gas sampling bulb (150 mls of air previously removed). The gas sampling bulb was allowed to sit for 24 hours and the ambient temperature was measured at 29C. Using the bottom drain, a 40 ml VOA vial was filled from the gas sampling bulb. This sample was analyzed via EPA Method 8015/8020.

CLIENT	: MARATHON	AEN I.D.	: 608314
PROJECT #	: 053350105	DATE RECEIVED	: 8/8/96
PROJECT NAME	: MARATHON	REPORT DATE	: 8/23/96

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	MW-86	AQUEOUS	8/6/96
02	MW-72	AQUEOUS	8/7/96

GAS CHROMATOGRAPHY RESULTS

TEST : BTEXM, GAS (EPA 8020 / 8015), PURGE & TRAP
 CLIENT : MARATHON
 PROJECT # : 053350105
 PROJECT NAME : MARATHON

AEN I.D.: 608314

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	FACTOR
01	MW-86	AIR	8/6/96	8/16/96	8/16/96	500
02	MW-72	AIR	8/7/96	8/16/96	8/16/96	10
PARAMETER		DET. LIMIT	UNITS	01	02	
FUEL HYDROCARBONS		5.0	MG/M ³	200000	1300	
HYDROCARBON RANGE				C6-C14	C6-C14	
HYDROCARBONS QUANTITATED USING				GASOLINE	GASOLINE	
BENZENE		0.05	MG/M ³	570	0.6	
TOLUENE		0.05	MG/M ³	380	0.8	
ETHYLBENZENE		0.05	MG/M ³	160	0.6	
TOTAL XYLENES		0.05	MG/M ³	270	4.6	
METHYL-t-BUTYL ETHER		0.25	MG/M ³	1800	< 2.5	
SURROGATE:						
BROMOFLUOROBENZENE (%)				67*	171*	
SURROGATE LIMITS (74 - 120)						

CHEMIST NOTES: *SURROGATE OUTSIDE CONTROL LIMIT DUE TO MATRIX INTERFERENCE.
 N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEXM, GAS (EPA 8020 / 8015), PURGE & TRAP
 CLIENT : MARATHON
 PROJECT # : 053350105
 PROJECT NAME : MARATHON

AEN I.D.: 608314

SAMPLE		MATRIX	DATE	DATE	DATE	DIL.
ID. #	CLIENT I.D.		SAMPLED	EXTRACTED	ANALYZED	
01	MW-86	AQUEOUS	8/6/96	8/17/96	8/19/96	1
02	MW-72	AQUEOUS	8/7/96	8/17/96	8/19/96	1
PARAMETER		DET. LIMIT	UNITS	01	02	
FUEL HYDROCARBONS		50.0	UG/L	4100	120	
HYDROCARBON RANGE				C6-C14	C10-C14	
HYDROCARBONS QUANTITATED USING				GASOLINE	GASOLINE	

BENZENE	0.5	UG/L	240	< 0.5
TOLUENE	0.5	UG/L	6.5	< 0.5
ETHYLBENZENE	0.5	UG/L	95	< 0.5
TOTAL XYLENES	0.5	UG/L	41	< 0.5
METHYL-t-BUTYL ETHER	2.5	UG/L	15	< 2.5

SURROGATE:
 BROMOFLUOROBENZENE (%) 87 104
 SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
 N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST : BTEXM, GAS (EPA 8020 / 8015), PURGE & TRAP
BLANK I.D. : 081696 AEN I.D. : 608314
CLIENT : MARATHON
PROJECT # : 053350105 DATE ANALYZED : 8/16/96
PROJECT NAME : MARATHON SAMPLE MATRIX : AIR

PARAMETER	UNITS	
FUEL HYDROCARBONS	MG/M ³	<5.0
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-
BENZENE	MG/M ³	<0.05
TOLUENE	MG/M ³	<0.05
XYLBENZENE	MG/M ³	<0.05
TOTAL XYLENES	MG/M ³	<0.05
METHYL-t-BUTYL ETHER	MG/M ³	<0.25
SURROGATE:		
BROMOFLUOROBENZENE (%)		102
SURROGATE LIMITS (80 - 120)		

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST : BTEXM, GAS (EPA 8020 / 8015), PURGE & TRAP
BLANK I.D. : EXTRACTION BLANK AEN I.D. : 608314
CLIENT : MARATHON
PROJECT # : 053350105 DATE ANALYZED : 8/16/96
PROJECT NAME : MARATHON SAMPLE MATRIX : AIR

PARAMETER	UNITS	
FUEL HYDROCARBONS	MG/M ³	<5.0
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-
BENZENE	MG/M ³	<0.05
TOLUENE	MG/M ³	<0.05
XYLBENZENE	MG/M ³	<0.05
TOTAL XYLENES	MG/M ³	<0.05
METHYL-t-BUTYL ETHER	MG/M ³	<0.25
SURROGATE:		
BROMOFLUOROBENZENE (%)		104
SURROGATE LIMITS	(80 - 120)	

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS
REAGENT BLANK

TEST	: BTEXM, GAS (EPA 8020 / 8015), PURGE & TRAP		
BLANK I.D.	: 081996	AEN I.D.	: 608314
CLIENT	: MARATHON	DATE EXTRACTED	: N/A
PROJECT #	: 053350105	DATE ANALYZED	: 8/19/96
PROJECT NAME	: MARATHON	SAMPLE MATRIX	: AQUEOUS

PARAMETER	UNITS	
FUEL HYDROCARBONS	UG/L	<50
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-
BENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
XYLBENZENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5
SURROGATE:		
BROMOFLUOROBENZENE (%)		105
SURROGATE LIMITS (80 - 120)		

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEXM, GAS (EPA 8020 / 8015), PURGE & TRAP		
BLANK I.D.	: 082096	AEN I.D.	: 608314
CLIENT	: MARATHON	DATE EXTRACTED	: N/A
PROJECT #	: 053350105	DATE ANALYZED	: 8/20/96
PROJECT NAME	: MARATHON	SAMPLE MATRIX	: AQUEOUS

PARAMETER	UNITS	
FUEL HYDROCARBONS	UG/L	<50
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-
BENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
XYLBENZENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5
SURROGATE:		
BROMOFLUOROBENZENE (%)		101
SURROGATE LIMITS (80 - 120)		

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

TEST	: BTEXM, GAS (EPA 8020 / 8015), PURGE & TRAP		
BLANK I.D.	: EXTRACTION BLANK	AEN I.D.	: 608314
CLIENT	: MARATHON	DATE EXTRACTED	: 8/17/96
PROJECT #	: 053350105	DATE ANALYZED	: 8/19/96
PROJECT NAME	: MARATHON	SAMPLE MATRIX	: AQUEOUS

PARAMETER	UNITS	
FUEL HYDROCARBONS	UG/L	<50
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-
BENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
XYLBENZENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5
METHYL-1-BUTYL ETHER	UG/L	<2.5
SURROGATE:		
BROMOFLUOROBENZENE (%)		97
SURROGATE LIMITS (80 - 120)		

CHEMIST NOTES:
N/A

GAS CHROMATOGRAPHY QUALITY CONTROL

MSMSD

TEST : BTEXM, GAS (EPA 8020 / 8015), PURGE & TRAP
 MSMSD # : 081696 AEN I.D. : 608314
 CLIENT : MARATHON
 PROJECT # : 053350105 DATE ANALYZED : 8/16/96
 PROJECT NAME : MARATHON SAMPLE MATRIX : AIR
 UNITS : MG/M³

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.05	1.00	0.96	96	0.96	96	0	(80 - 120)	20
TOLUENE	<0.05	1.00	0.96	96	0.95	95	1	(80 - 120)	20
ETHYLBENZENE	<0.05	1.00	0.96	96	0.95	95	1	(80 - 120)	20
TOTAL XYLENES	<0.05	3.00	2.92	97	2.97	99	2	(80 - 120)	20
METHYL-t-BUTYL ETHER	<0.25	2.00	2.21	111	2.25	113	2	(70 - 133)	20

CHEMIST NOTES:
 N/A

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

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

GAS CHROMATOGRAPHY QUALITY CONTROL
MSMSD

TEST	: BTEX, MTBE (EPA 8020)	AEN I.D.	: 608314
MSMSD #	: 60833701	DATE EXTRACTED	: N/A
CLIENT	: MARATHON	DATE ANALYZED	: 8/19-8/20/96
PROJECT #	: 053350105	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: MARATHON	UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
BENZENE	<0.5	10.0	10.2	102	9.7	97	5	(80 - 120)	20
TOLUENE	<0.5	10.0	10.1	101	9.8	98	3	(80 - 120)	20
ETHYLBENZENE	<0.5	10.0	10.1	101	9.7	97	4	(80 - 120)	20
TOTAL XYLENES	<0.5	30.0	31.0	103	29.8	99	4	(80 - 120)	20
METHYL-t-BUTYL ETHER	<2.5	20.0	18.4	92	21.5	108	16	(70 - 133)	20

CHEMIST NOTES:
N/A

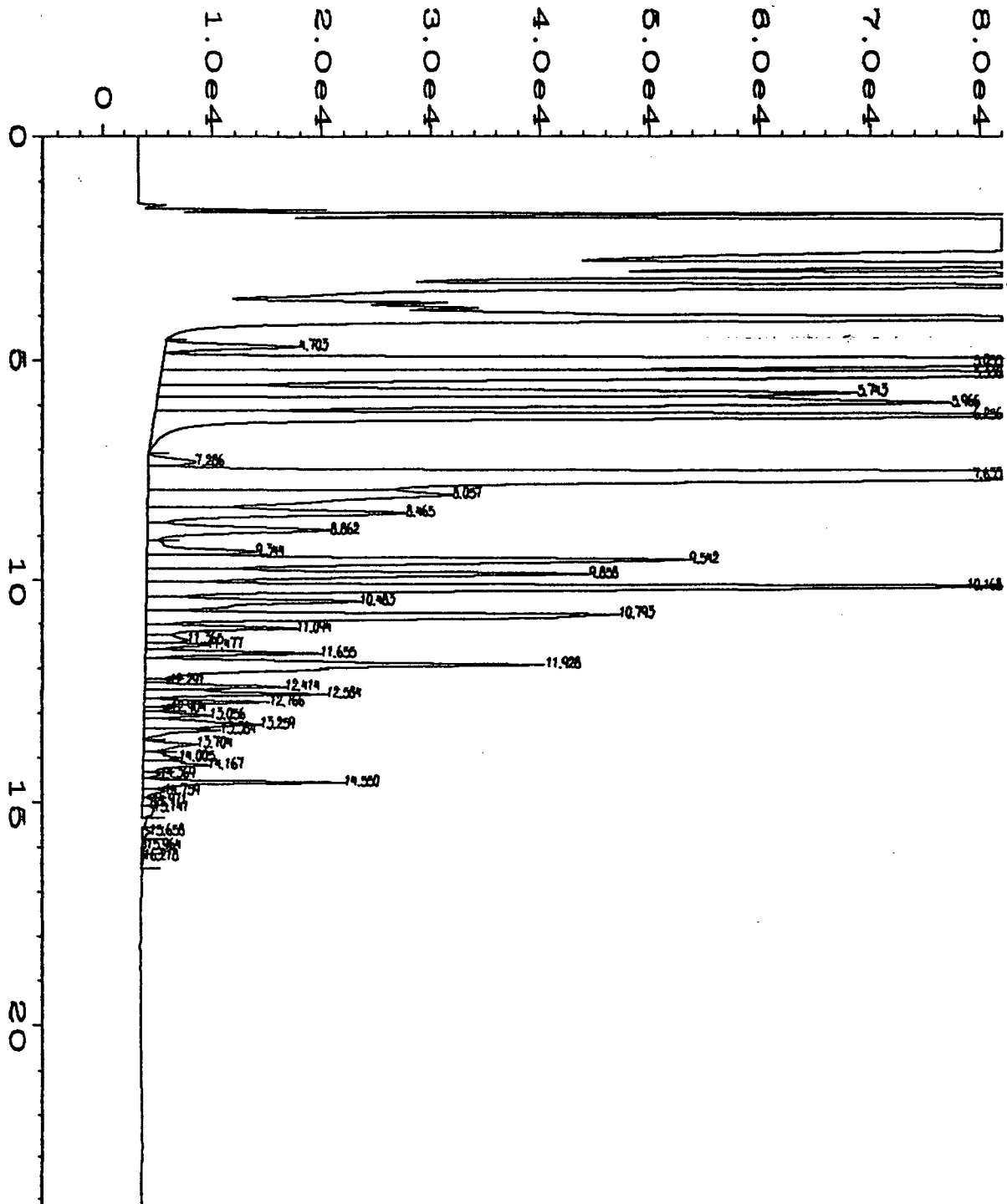
$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

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

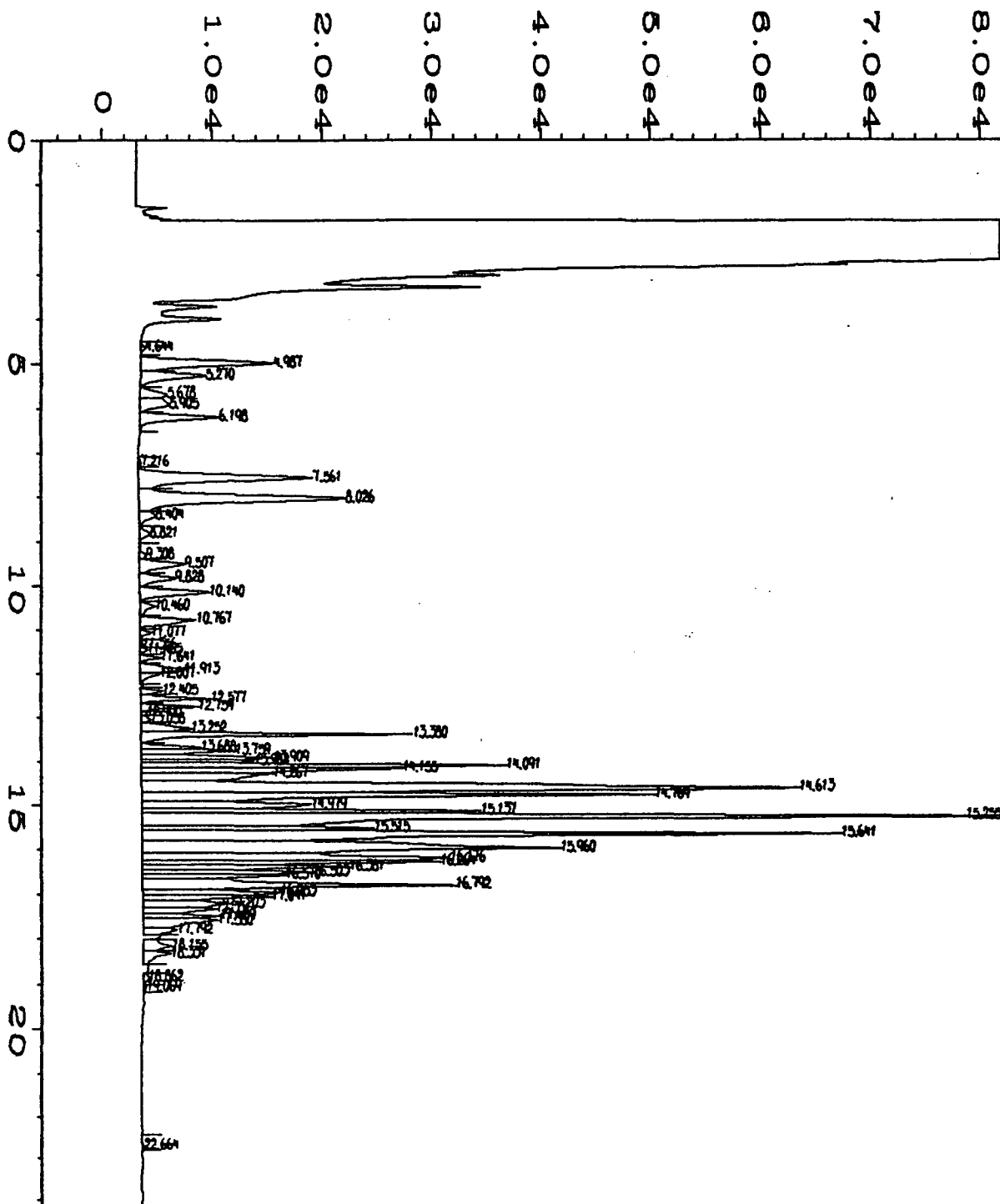
PAGE: 1 OF 1

60831

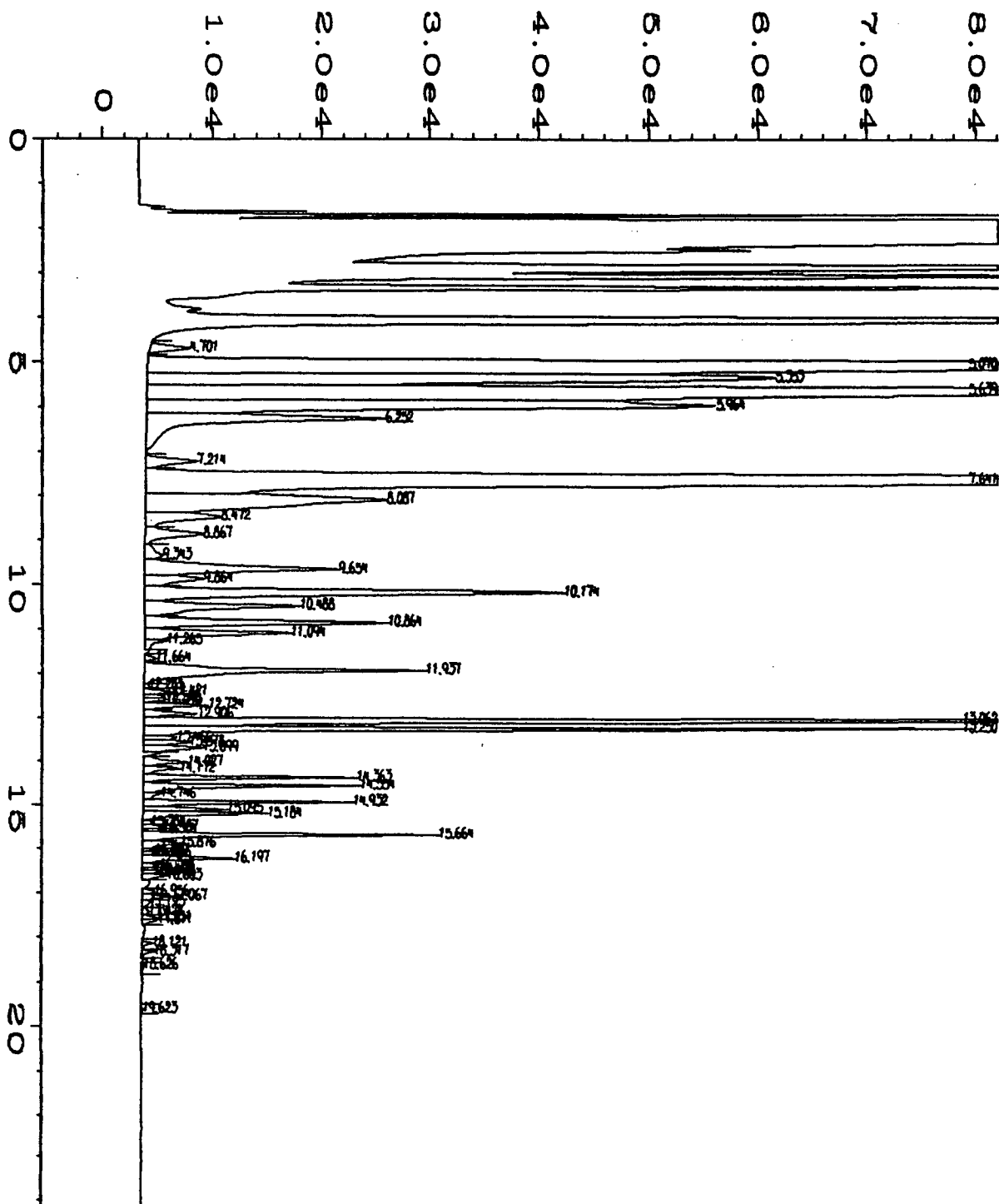
DISTRIBUTION: White, Canary - ~~men~~ Pink - ORIGINATOR



Data File Name	: C:\HPCHEM\2\DATA\16AUG96\006R0101.D	Page Number	: 1
Operator	: JAHNA E. MARY G	Vial Number	: 6
Instrument	: 5890A-#2	Injection Number	: 1
Sample Name	: 608314-01*500	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	WAVG0328.MTH
Acquired on:	16 Aug 96 03:59 PM	Analysis Method	: PEAKS.MTH
Report Created on:	16 Aug 96 04:24 PM		
Multiplier	: 50		
Sample Info	: AIR BAG		

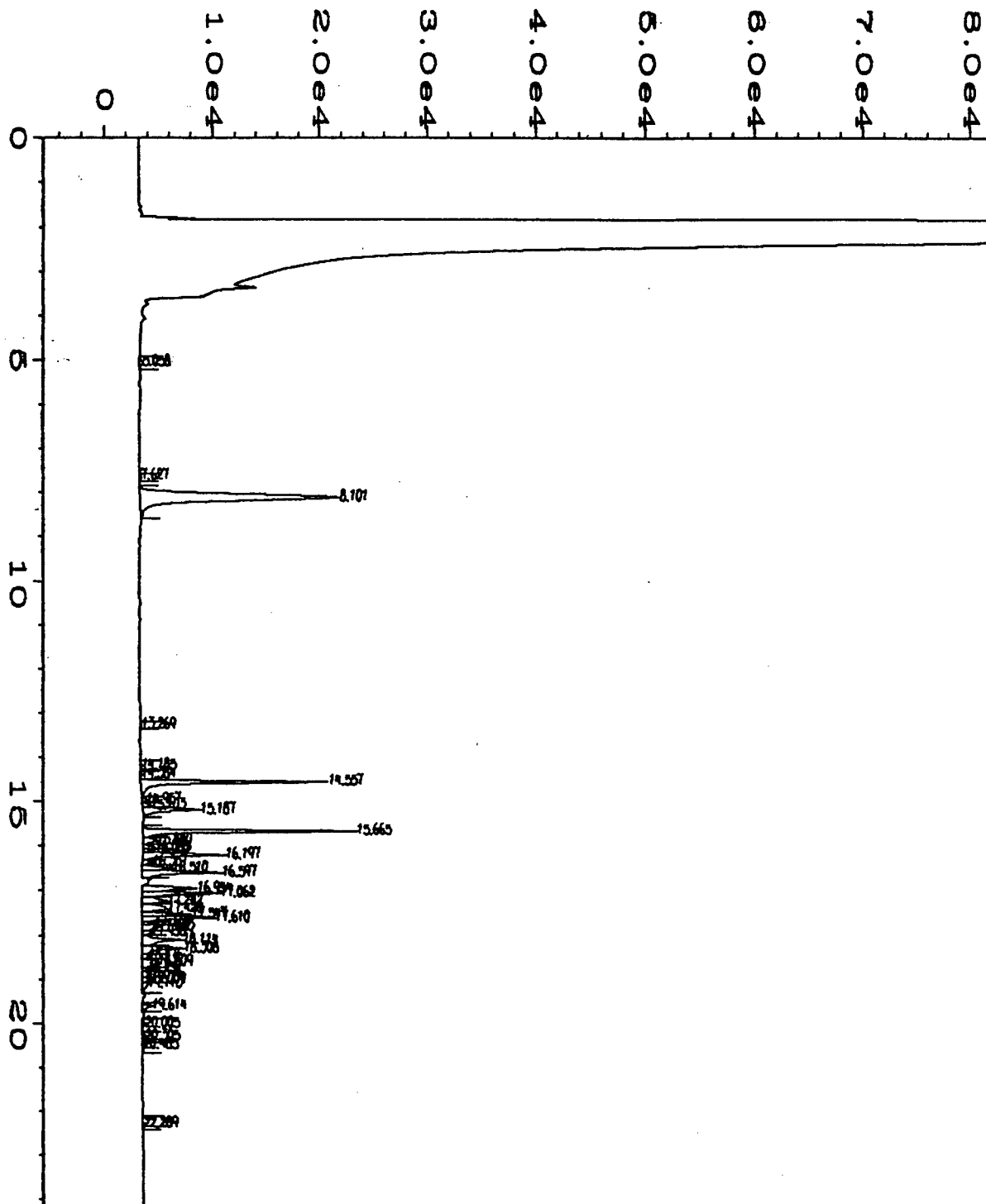


Data File Name	: C:\HPCHEM\2\DATA\16AUG96\009R0101.D	Page Number	: 1
Operator	: JAHNA E. MARY G	Vial Number	: 9
Instrument	: 5890A-#2	Injection Number	: 1
Sample Name	: 608314-02*10	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	WAV60328.MTH
Acquired on	: 16 Aug 96 05:44 PM	Analysis Method	: PEAKS.MTH
Report Created on:	16 Aug 96 06:09 PM		
Sample Info	: AIR BAG		



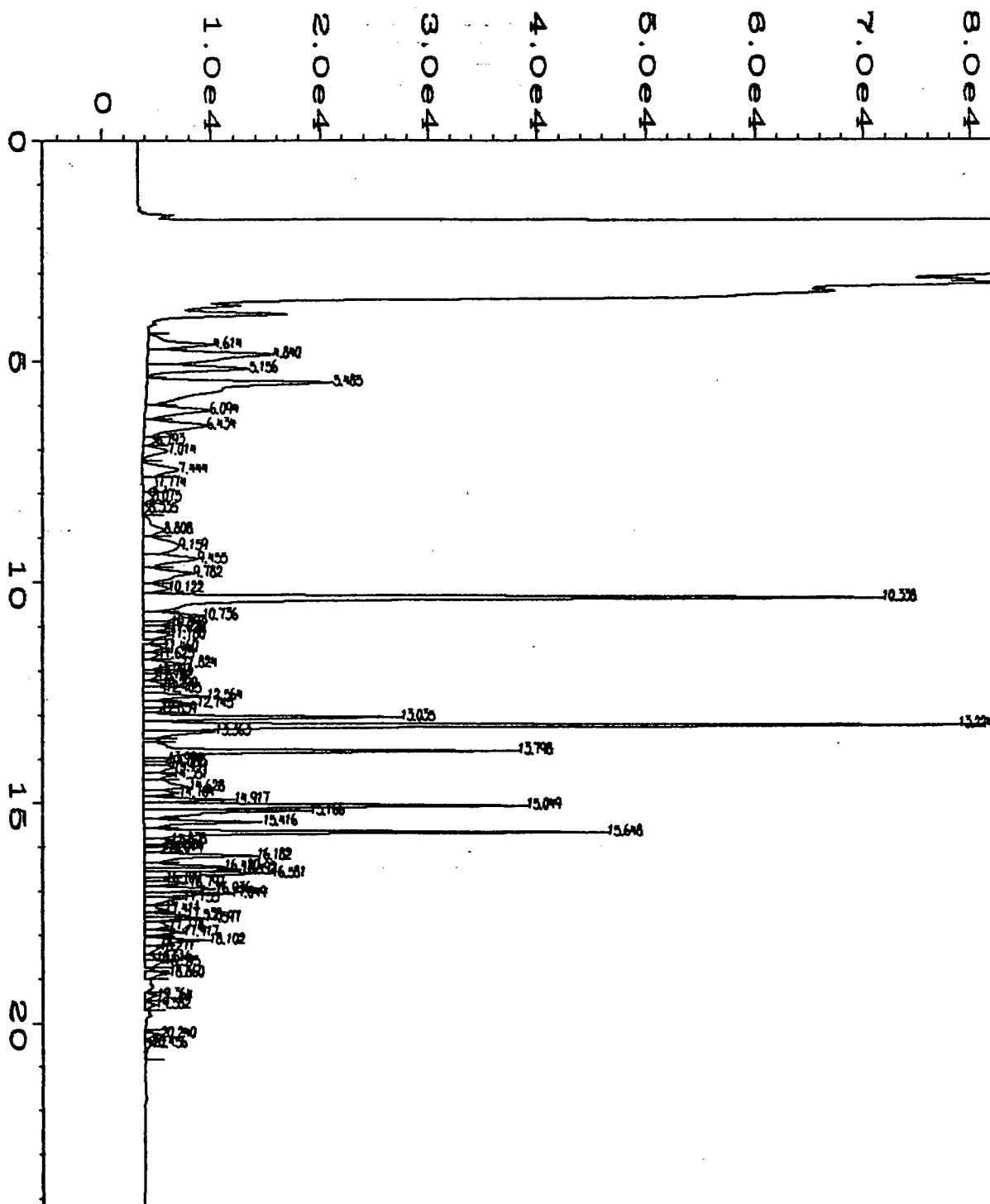
Data File Name	: C:\HPCHEM\2\DATA\19AUG96\005R0101.D	Page Number	: 1
Operator	: JAHNA E. MARY G	Vial Number	: 5
Instrument	: 5890A-#2	Injection Number	: 1
Sample Name	: 608314-01	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	WAVG0328.MTH
Acquired on	: 19 Aug 96 10:44 AM	Analysis Method	: PEAKS.MTH
Report Created on:	19 Aug 96 11:10 AM		

WATER SAMPLE

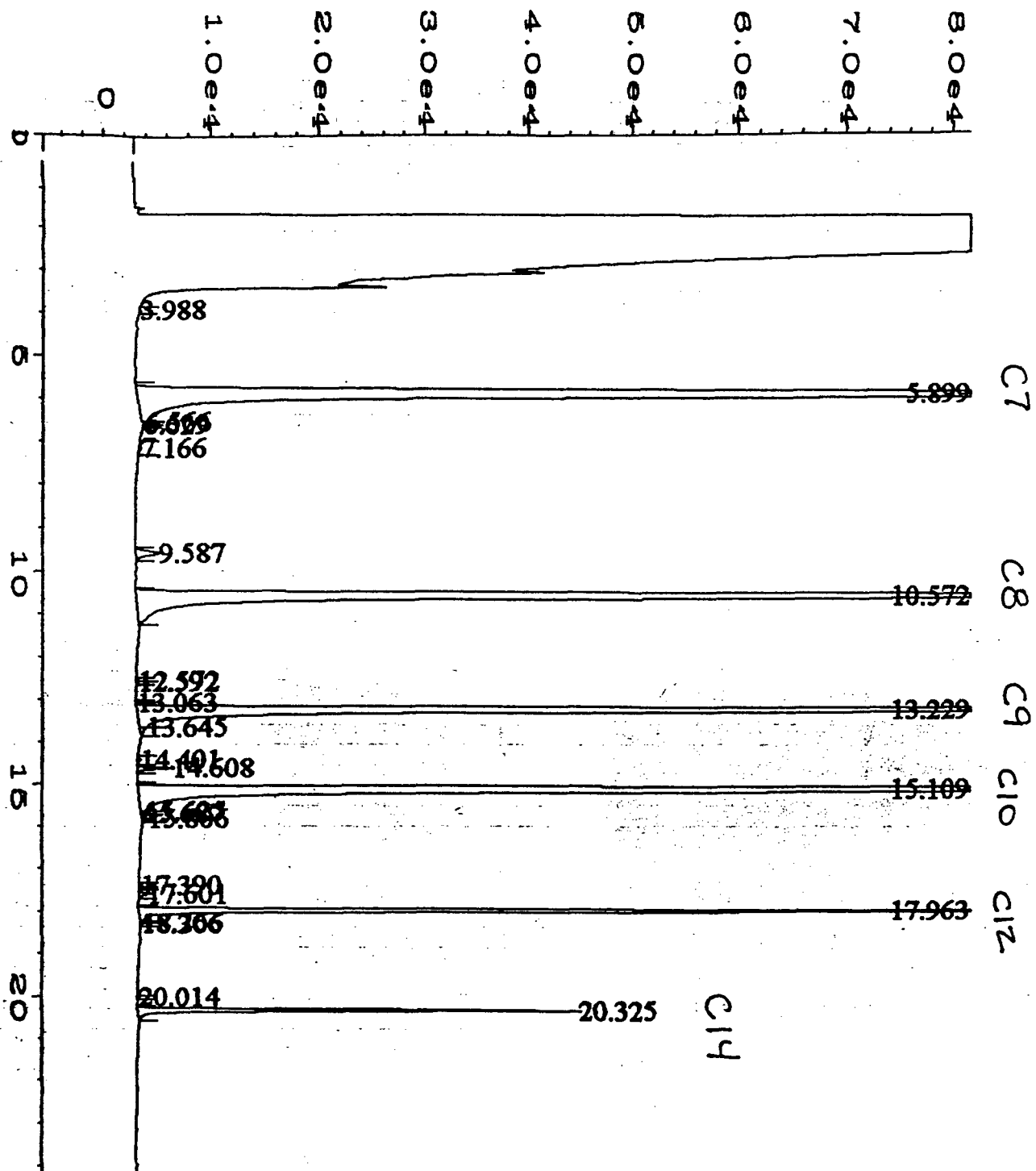


Data File Name	: C:\HPCHEM\2\DATA\19AUG96\007R0101.D	Page Number	: 1
Operator	: JAHNA E. MARY G	Vial Number	: 7
Instrument	: 5890A-#2	Injection Number	: 1
Sample Name	: 608314-02	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	WAV60328.MTH
Acquired on	: 19 Aug 96 12:24 PM	Analysis Method	: PEAKS.MTH
Report Created on:	19 Aug 96 12:49 PM		

WATER SAMPLE



Data File Name	: C:\HPCHEM\2\DATA\19AUG96\001R0101.D	Page Number	: 1
Operator	: JAHNA E. MARY G	Vial Number	: 1
Instrument	: 5890A-#2	Injection Number	: 1
Sample Name	: GC2-47-22 GAS	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: WAVG0328.MTH
Acquired on	: 19 Aug 96 08:16 AM	Analysis Method	: PEAKS.MTH
Report Created on:	19 Aug 96 08:41 AM		



Data File Name	: C:\HPCHEM\2\DATA\28NOV95\007R0101.D	Page Number	: 1
Operator	: PEGGY N. JAHNA E. MARY 8	Vial Number	: 7
Instrument	: 5890A-#2	Injection Number	: 1
Sample Name	: RETENTION TIME	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: WAVG1102.MTH
Acquired on	: 28 Nov 95 01:56 PM	Analysis Method	: PEAKS.MTH
Report Created on:	: 28 Nov 95 02:50 PM		

**BARRIER VAPOR EXTRACTION SYSTEM
STARTUP TESTING
INDIAN BASIN REMEDIATION PROJECT
NEW MEXICO**

Project No. 023350173

April 2, 1997

Prepared for:
Marathon Oil Company
P.O. Box 552
Midland, Texas 79702

Fluor Daniel GTI, Inc.
Written by:

Kyle W. Rutherford CL
Kyle W. Rutherford, P.E.
Lead Engineer

Fluor Daniel GTI, Inc.
Reviewed by:

Curtis Wright (TB)
Curtis S. Wright, P.E.
Senior Engineer

Susan Fields
Susan Fields, P.E.
Project Manager



CONTENTS

Figures	I
Tables	I
Appendixes	I
1.0 INTRODUCTION	1
2.0 SCOPE OF WORK	2
2.1 Construction Verification	2
2.2 Startup Testing	2
3.0 LABORATORY RESULTS	4
4.0 DATA EVALUATION	5
5.0 CONCLUSIONS AND RECOMMENDATIONS	8
5.1 System Analysis and Future Strategy	9

Figures

1. BVES Layout
2. Effluent Concentration versus Time
3. Induced Vacuum in MW-66
4. Step Test
5. Barometric Pressure versus Time
6. Proposed VE Test along Arroyo

Tables

1. Analytical Results of Air Samples Collected During Start-up Testing

Appendixes

- A. Field Data
- B. Lab Data
- C. Barometric Pressure Data

1.0 INTRODUCTION

Assessment at the Indian Basin Remediation Project identified dissolved hydrocarbons in Lower Queen groundwater at large distances downgradient of the known free-phase condensate plume. Since it's involvement in the project in 1994, Fluor Daniel GTI has worked to define the mechanism for these downgradient impacts to groundwater. It was postulated that migration of vapors from the free-phase condensate far exceeded the advancement of the free-phase itself. Theoretically, vapors could travel relatively large distances, condense and impact groundwater downgradient of the advancement of the free-phase. Pilot tests conducted in January 1995 to evaluate the effectiveness of vapor extraction for remediation of the vadose zone suggested effects of barometric pumping. This was an indication that vapor phase transport might be responsible for expansion of the dissolved contaminant plume.

Design of a Barrier Vapor Extraction System (BVES) was initiated in late 1995 to mitigate impacts to groundwater through the postulated vapor-transport mechanism. The system is intended to intercept, and remove from the subsurface, migrating vapors that could potentially condense and impact currently clean groundwater. The proposed system design includes several equipment compounds installed along the perimeter of the downgradient edge of the dissolved-phase plume (Figure 1).

In August 1996, Fluor Daniel GTI conducted a project summary to confirm that the regulatory and remediation strategy for the project remained appropriate. Existing data were reviewed, new information was collected, and the feasible regulatory exit strategies for the project were evaluated. The results of the project summary are documented in a report dated August 29, 1996.

Review of the vapor-transport mechanism and the BVES were components of the project summary. Several laboratory tests were conducted to test the ability of vapors to impact groundwater at the site. The tests showed that condensate in the more downgradient portion of the free-phase plume (MW-72) is orders of magnitude less volatile than more upgradient product (MW-86). This indicates a degraded, or weathered, product in areas distant from the source. As the condensate weathers, it is less able to impact groundwater because the more soluble components are lost. This suggested that vapor-phase migration may not be a major contributor to the spread of groundwater impacts at this site.

The BVES remained a recommended approach, but a phased installation with testing was proposed before full implementation of the system. This report documents construction of the first blower station, the startup testing and results.

2.0 SCOPE OF WORK

Marathon Oil Company (Marathon) completed installation of the northernmost blower station of the BVES. The layout of the system is shown on Figure 1.

The system consists of a Suterbilt 6L, 25 horsepower, 460 V blower with a 88-gallon moisture knockout, an outlet silencer, an inlet filter, and a vacuum relief valve. All vapor extraction components are trailer mounted. The system is designed to run continuously unless there is a power outage, or the high temperature sensor, high vacuum, or high level sensors in the knockout are triggered. The system is currently attached to five vapor extraction wells, VE-1 through VE-5, plus one monitor well, MW-61A. All vapor extraction piping is either 6" or 8" diameter. The vapor extraction wells are 7 7/8" diameter open-hole completions with an 8 5/8" conductor casing extending from depths ranging from 57.5 feet to 77.5 feet below ground surface (bgs) to just above ground surface. The total depths of the wells range from 168 feet to 214 feet bgs.

2.1 Construction Verification

Fluor Daniel GTI and a representative from Marathon verified construction of the system as described above on January 14, 1997. In addition, inspection of the system on January 20, 1997 prior to beginning the startup testing, revealed that a fresh air dilution valve had not been installed on the unit and the exhaust stack was shorter than air permit conditions allowed. Upon initiation of the startup testing on VE-1, a buried valve leading to a moisture pump-out line was identified to have not been closed during construction, allowing fresh air to enter the system. All other components of the vapor extraction system appeared to be operational.

On January 21, 1997, Marathon installed a fresh air dilution valve, closed and capped the pump-out line on the VE-1 pipe, lengthened the exhaust stack, and made various other minor system repairs.

2.2 Startup Testing

Testing of the system consisted of four distinct tests.

- Test 1: Short-term tests of individual extraction wells.
- Test 2: Long-term test on VE-1, including a step test.
- Test 3: Balancing the system flow rates.
- Test 4: Testing formation respiration.

Each test is described below.

Test 1: Short-term tests on extraction wells. Vacuum and contaminant concentrations at each extraction wellhead were taken prior to testing. The first short-term test was conducted on VE-1 on January 20, 1997. The valves to all wells except VE-1 were closed and the system was turned on. The

test was proposed to run until a steady state concentration of extracted vapors was reached. Steady state was reached almost immediately and the test was run for 90 minutes for confirmation. Start-up testing recommenced at 10:25 on January 21, 1997 with a short-term test on VE-3. Short-term tests on VE-2, VE-4, and VE-5 followed.

During the short-term testing, vacuum at the well head, influent flowrate and temperature, and effluent concentrations were all measured at 30-minute intervals. The concentration of oxygen, carbon dioxide, and methane were measured with a LandTech GA-90. Petroleum hydrocarbons, oxygen, and hydrogen sulfide were measured with a GasTech GT-302. The results of the short-term tests are given in Appendix A. An air sample was also collected at the conclusion of each short-term test and was sent to AEN Laboratories for analysis of TPH, BTEX by TO-14, and n-hexane by GC/FID. Analytical results are discussed in Section 3.0 and the lab reports are in Appendix B.

Test 2: Long-term test on VE-1. At 18:00 on January 21, 1997 the long-term test on VE-1 commenced. The test was conducted under full vacuum (dilution valve was 100% closed) and lasted 21.5 hours. Based on flow and photoionization detector (PID) concentration measurements, it appeared that the system reached steady state within the first three hours of operation. After 15 hours of operation, field monitoring detected methane in the effluent stream. Methane was present during the remainder of the test.

Pressure was measured at the wellhead of MW-66 and VE-2 during the test to determine if the vapor extraction system was causing influence. The vacuum reading upstream and downstream of the butterfly valve at the wellhead was reading approximately the same. It is likely that the valves on the VE-2 vapor extraction leg were leaking slightly. Therefore, the pressure measurements at VE-2 are not considered reliable.

After 21.5 hours, a step test was conducted by opening the fresh air dilution valve and reducing the vacuum at the blower to 2/3 of its full value. The flowrate stabilized almost immediately. The test was conducted for 45 minutes. An additional step test was then run by opening the knockout valve and reducing the blower vacuum to 1/3 of the maximum value. This test was also conducted for 45 minutes and the system appeared to stabilize almost immediately.

The results of the long-term test are shown in Appendix A. Figures 2-4 also contain pertinent information concerning the long-term test. The results presented in the figures are discussed in Section 4.0.

Test 3: Balance system flow rates. On January 23, 1997 all extraction wells were opened and the system was restarted. The intent was to balance the air flow evenly among all five wells. The flow from well VE-1, VE-2, and VE-3 was identical, but the flow from the combined VE-4,5 leg was lower. There was no way to increase the flow from the VE-4,5 leg without decreasing the flow from another leg so the system was left as it was. The steady state vacuum, flows, and concentrations were measured and are shown in Appendix A. An effluent air sample was collected after the balanced system was in operation for 45 minutes and was sent to AEN Laboratories for analysis of TPH, BTEX by TO-14, and n-hexane by GC/FID. The results of the effluent air sample are shown in Section 3.0 and in Appendix B.

Hydrocarbon concentration measured with a PID from the combined system showed a concentration almost equaling the maximum concentration recorded from any of the individual well tests. Additionally, the methane and carbon dioxide concentrations were much higher than in previous tests

from individual well, and the oxygen concentration was lower, indicating increased biological activity in the subsurface.

Test 4: Test formation respiration. Concurrent to the startup testing, a Baro-ball™ was installed on MW-73. A Baro-ball™ is a check valve that allows subsurface gas to be expelled from a well, while preventing air from entering the well bore through the surface casing. A 30-gallon plastic bag was taped over the effluent port of the device. The well was visited periodically during the day on January 22 to observe whether the bag inflated. Initially the bag was sucked into the device, which indicates that the check valve did not function properly. As the day progressed, the bag did inflate. At the maximum observed rate of inflation, it appeared that the flowrate leaving the Baro-ball™ was approximately 1 standard cubic foot of air per hour (SCFH).

During the testing on the Baro-ball™, the barometric pressure was being recorded. A weather station was setup at the Indian Basin Gas Plant which is located nearby. The weather station records the barometric pressure automatically at ten minute intervals. The data could be retrieved and then printed to give a continuous readout of the ambient barometric pressure in the vicinity of the test. Barometric pressure data are required to confirm when the effects of atmospheric pumping should be the most pronounced. Data were also collected during the Baro-ball™ testing and pilot testing in order to correlate some of the results that were observed. A total of 51 continuous hours of barometric pressure data were collected. The barometric pressure is tabulated in Appendix C. Figure 5 shows a graphical plot of the barometric pressure versus time.

The maximum rate of inflation did not occur at the time the lowest barometric pressure was recorded. It appeared that the maximum subsurface exhalation trailed the minimum barometric pressure by approximately 6-9 hours based on the Baro-ball™ data and the pressure measurements in well MW-66. It is speculated that up to 12 SCF of air may be expelled from well MW-73 per day, based on data collected during the test.

3.0 LABORATORY RESULTS

A total of six air samples were collected for laboratory analysis, one after each short-term test and one effluent sample with all wells open to the system. All air samples were analyzed by EPA Method TO-14 for volatile organic compounds, including benzene, toluene, ethylbenzene, and xylenes, total petroleum hydrocarbons, and for n-hexane by GC/FID. The pertinent results of the laboratory analyses are shown in Table 1. The complete analytical results are attached as Appendix B.

The laboratory results indicate that benzene, ethylbenzene, and xylenes were not detected. Toluene was detected at an extremely low concentration from the VE-5 sample. N-hexane was detected in all samples, except VE-5. Total petroleum hydrocarbons in the C₄-C₁₂ range, exclusive of n-hexane, were only detected in the VE-1 sample.

There is an incongruity between the n-hexane value established by Method 8015 and TO-14. While EPA Method 8015 used n-hexane for calculations, TO-14 is an estimated value based on the EPA TIC calculation method. In all cases the value for n-hexane is lower by TO-14.

AEN reviewed the chromatograms associated with each method and concluded that the lower n-hexane results indicated by TO-14 should be used for air emission calculations. The chromatography is more discriminating and, of course, the mass spectrometer is more selective. Furthermore, the mass spectrometer reconstructed ion chromatograms show that there are substantially more peaks than was indicated by the 8015 methodology.

In future analyses the n-hexane will be quantified by TO-14. Chromatograms and a discussion of the laboratory results are included in Appendix B.

4.0 DATA EVALUATION

The following calculations were made from the field data collected. All calculations are for the steady-state operation of the system with all wells open. A general air flowrate equation was used to calculate the air flow:

$$(\text{air velocity [ft/min]}) \times (\text{pipe area [ft}^2\text{]}) \times \frac{(\text{standard temperature [}^{\circ}\text{R]})}{(\text{air temperature [}^{\circ}\text{R]})} \times$$

$$\frac{(\text{local atmospheric pressure [inches Hg]})}{(\text{standard atmospheric pressure [inches Hg]})} = \text{air flowrate (scfm)}$$

The steady-state influent flowrate was calculated as the sum of the individual pipe flowrates:

For VE-1

$$450 \text{ ft/min} \times 0.2 \text{ ft}^2 \times \frac{528 \text{ }^{\circ}\text{R}}{533 \text{ }^{\circ}\text{R}} \times \frac{26.32 \text{ inches Hg}}{29.92 \text{ inches Hg}} = 77 \text{ scfm}$$

For VE-2

$$450 \text{ ft/min} \times 0.2 \text{ ft}^2 \times \frac{528 \text{ }^{\circ}\text{R}}{533 \text{ }^{\circ}\text{R}} \times \frac{26.32 \text{ inches Hg}}{29.92 \text{ inches Hg}} = 77 \text{ scfm}$$

For VE-3

$$450 \text{ ft/min} \times 0.2 \text{ ft}^2 \times \frac{528 \text{ }^\circ\text{R}}{533 \text{ }^\circ\text{R}} \times \frac{26.32 \text{ inches Hg}}{29.92 \text{ inches Hg}} = 77 \text{ scfm}$$

For VE-4 and VE-5

$$225 \text{ ft/min} \times 0.35 \text{ ft}^2 \times \frac{528 \text{ }^\circ\text{R}}{533 \text{ }^\circ\text{R}} \times \frac{26.32 \text{ inches Hg}}{29.92 \text{ inches Hg}} = 68 \text{ scfm}$$

The total influent flowrate is:

$$(77 \text{ scfm} + 77 \text{ scfm} + 77 \text{ scfm} + 68 \text{ scfm}) = 299 \text{ scfm}$$

Note: scfm = standard cubic feet per minute

The following general equation was used to calculate the mass emission rate based on field PID concentrations:

$$\left(\text{vapor flowrate} \left[\frac{\text{ft}^3}{\text{min}} \right] \right) \times \frac{1 \text{ lb mol TPH}}{379 \text{ ft}^3 \text{ TPH}} \times \frac{86 \text{ lb TPH}}{1 \text{ lb mol TPH}} \times \left(\text{vapor concentration} \left[\frac{\text{ft}^3 \text{ TPH}}{1,000,000 \text{ ft}^3} \right] \right) \times \frac{60 \text{ min}}{1 \text{ hr}} = \text{mass emission rate} \left(\frac{\text{lb TPH}}{\text{hr}} \right)$$

The steady state mass emission rate, based on a PID measurement of 40.5 ppmv, was calculated to be:

$$(299 \left[\frac{\text{ft}^3}{\text{min}} \right]) \times \frac{1 \text{ lb mol TPH}}{379 \text{ ft}^3 \text{ TPH}} \times \frac{86 \text{ lb TPH}}{1 \text{ lb mol TPH}} \times (40.5 \left[\frac{\text{ft}^3 \text{ TPH}}{1,000,000 \text{ ft}^3} \right]) \times \frac{60 \text{ min}}{1 \text{ hr}} = 0.165 \frac{\text{lb TPH}}{\text{hr}}$$

Note: assumes a molecular weight for TPH of 86 lb/lb mol

The steady state mass emission rate can also be calculated using the concentration obtained from the laboratory analysis of the combined effluent stream (1,800 µg/L TPH). The general equation that is used is:

$$\begin{aligned} & (\text{air flowrate } [\frac{\text{ft}^3}{\text{min}}]) \times (\text{influent concentration } [\frac{\mu\text{g}}{\text{L}}]) \times \frac{28.32 \text{ L}}{\text{ft}^3} \times \frac{1 \text{ lb}}{454 \times 10^6 \mu\text{g}} \times \frac{60 \text{ min}}{\text{hr}} = \\ & \text{mass emission rate } (\frac{\text{lbs}}{\text{hr}}) \end{aligned}$$

The calculated mass emission rate is:

$$(299 [\frac{\text{ft}^3}{\text{min}}]) \times (1,800 [\frac{\mu\text{g}}{\text{L}}]) \times \frac{28.32 \text{ L}}{\text{ft}^3} \times \frac{1 \text{ lb}}{454 \times 10^6 \mu\text{g}} \times \frac{60 \text{ min}}{\text{hr}} = 2.01 \frac{\text{lb TPH}}{\text{hr}}$$

Induced vacuum was not measured in the nearest monitoring well to the BVES (402 ft), so a definitive radius of influence from the BVES was not calculated (Figure 3). The lack of induced vacuum does not mean, however, that there was no air flow, which is the key to vapor extraction. Previous pilot testing indicated measured vacuum 200 feet away.

The following observations were made and results obtained from the startup testing.

- Well VE-1 had the highest field-measured contaminant levels, up to 55.3 ppmv.
- The hydrocarbon concentrations that were measured by the PID during the long-term test on well VE-1 were low and steady (Figure 2) indicating that the mass removal of the system is limited by the time necessary for contaminants to diffuse into continuous fractures.
- The LEL values did not correlate with the PID values. PID levels were low and LEL levels got as high as 52%. There were no analytes detected in the laboratory analyses that would be measured by the LEL and not by the PID. It is likely that methane, which is not detected with a PID, was contributing to the high LEL values. The presence of methane was confirmed by field measurements.
- No H₂S was detected from any well during the test.
- The vapor extraction system was able to deliver high vacuum to each well head.
- Step testing indicated that above 8 inches of mercury vacuum, flowrate increases decline rapidly. In addition, the rated capacity of the blower is 600 cfm, therefore additional wells can be hooked up to the system. Results of the step test are shown in Figure 4.

- There was no detectable vacuum response at well MW-66 during the test. All pressure fluctuations at the well were likely due to barometric pressure changes and not influenced from VE-1.
- Due to valve leakage, the induced vacuum measurements at VE-2 were not considered reliable.
- There is a significant amount of methane coming from the subsurface, indicating the anaerobic decay of hydrocarbons.
- Vapor extraction appears to be stimulating aerobic biodegradation in the subsurface.
- The mass removal rate from the combined system measured with field instruments during the test was 0.165 lbs/hr and the New Mexico Environment Department (NMED) air permit allows up to 57 lbs/hr to be emitted without vapor controls. The mass emission rate based on the laboratory data was 2.01 lbs/hr.
- The steady state flowrate measured during the test was 299 scfm. The NMED air permit allows up to 600 scfm per blower station.
- The Baro-ball™ demonstrated the exhalation of air from well MW-73 at a maximum observed rate of 1 SCFH. The check valve did not function properly, however, so air was drawn into the well also.
- No moisture was collected in the knockout drum during the test.
- All equipment functioned properly. The vacuum relief valve is slightly open due to the flow limited, high vacuum, conditions.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The following recommendations are provided to improve the performance and safety of the installed system.

- A filter should be installed on the vacuum relief valve to prevent dirt from being sucked directly into the blower.
- A battery powered sample pump is necessary to overcome vacuum in the lines so vapor samples from each well during combined system operation can be obtained.
- The dilution valve size should be increased from a two-inch to a four-inch valve to allow greater addition of dilution air.
- A 110 V service utility outlet should be installed at the treatment compound. The 110 V service is necessary to operate hand tools and sampling equipment.
- The components on the vapor extraction trailer downstream of the blower should be labeled with warning stickers alerting of high temperature hazard.

- A 0-200 inch H₂O magnehelic gauge should be utilized to make wellhead vacuum measurements. This gauge will allow greater accuracy and consistency of readings than the gauges currently installed.
- Based on an average per well flowrate of 70 scfm, approximately 8 wells can be hooked up to each blower station.
- Future equipment installations should follow the piping and instrumentation diagram and schematics that were presented to Marathon in the Draft Barrier Vapor Extraction System Design.

5.1 System Analysis and Future Strategy

The purpose of the BVES is to remove hydrocarbon vapors from the unsaturated zone along the leading edge of the liquid condensate plume in order to mitigate the threat of vapor migration. The northernmost station of the BVES was installed to evaluate mass removal rates, radius of influence, and variability of flowrate and concentration from well to well. The startup test proved that, mechanically, the vapor extraction system is working properly.

Laboratory testing in August 1996 identified widely varying volatility of the condensate in the free-phase. Along the leading edge of the liquid plume the volatility was low. Startup testing of the BVES confirms this, with low hydrocarbon concentrations in the effluent stream. It is also apparent that the wells connected to the system have a very low overall permeability to air. Therefore, the flowrate of air through the system is limited.

Based on the low ambient and low steady-state concentrations observed during the startup testing, it is concluded that vapor phase transport is not a significant threat to groundwater at the location of the test. To maximize the amount of contaminant mass removed for each dollar spent, remedial efforts should be conducted in the area of highest contaminant concentrations, and most volatile product. Although air flowrate limitations exist at the site, vapor extraction appears to remain the most feasible remedial technology given the geology and nature and distribution of the contaminant. The focus of vapor extraction should shift to removing as much hydrocarbon mass as possible from the fractured bedrock. This, combined with the current groundwater pumping and condensate recovery efforts, is the most effective way to reduce the potential migration of condensate.

To continue to gather technical and economic data on the feasibility of vapor extraction, the next phase of vapor extraction implementation is proposed in an area of the condensate plume where fresh, less degraded product is present. Figure 6 shows the location of five proposed vapor extraction wells along Rocky Arroyo, in the vicinity of MW-65A. It is proposed that the vacuum blower be moved from the existing compound to the proposed testing area along Rocky Arroyo. The system along Rocky Arroyo

should be operated for a minimum of two months to evaluate mass removal rate over time. Operation of the system in this area will provide valuable information for determination of the feasibility of full-scale vapor extraction.

The existing air permit for the BVES can be used for the allocated blower station. A letter should be submitted to the NMED notifying them of the relocated station.

Figure 2: Effluent concentration versus time for the long term test on VE-1

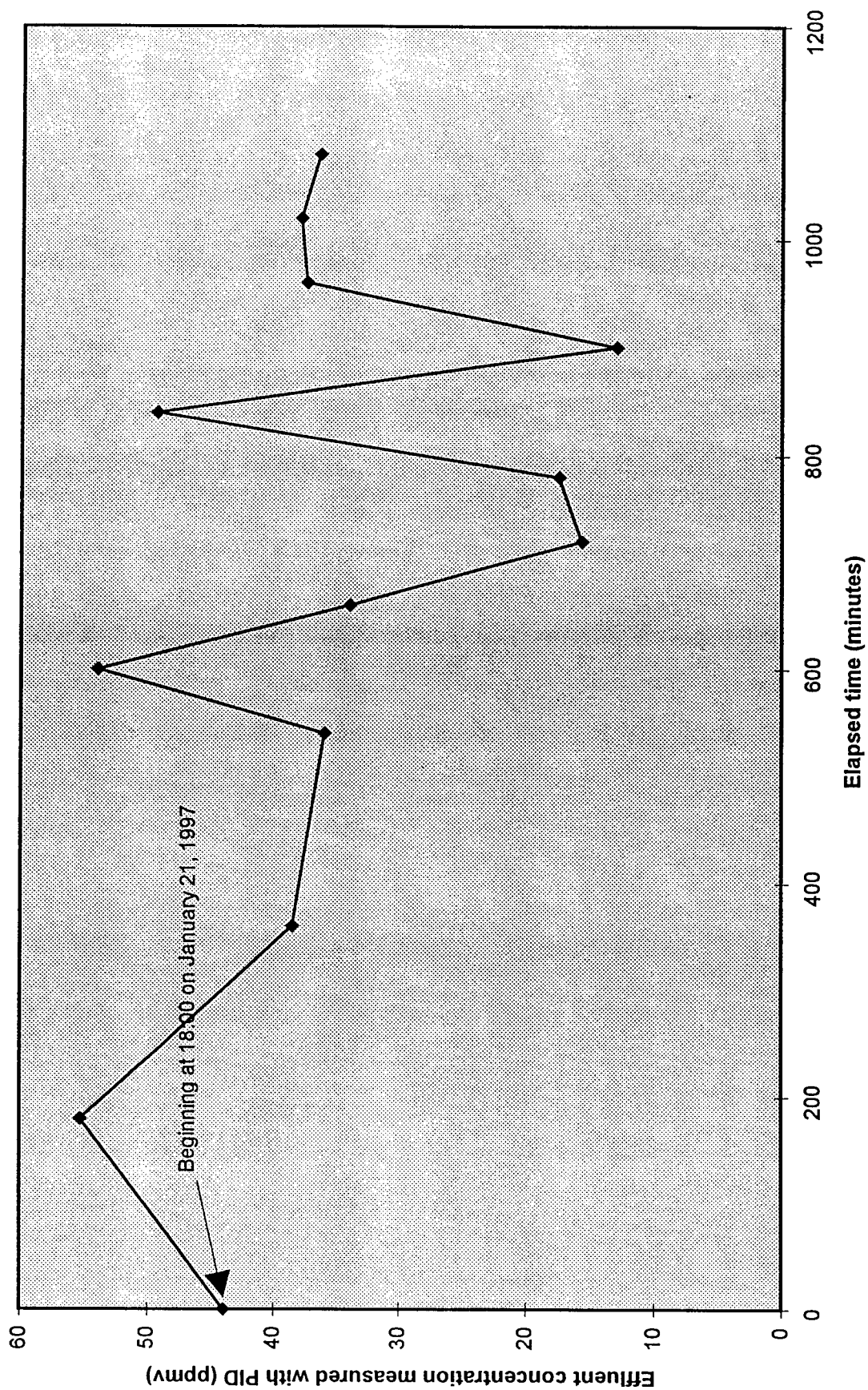


Figure 3: Induced vacuum in MW-66 for the long term test on VE-1

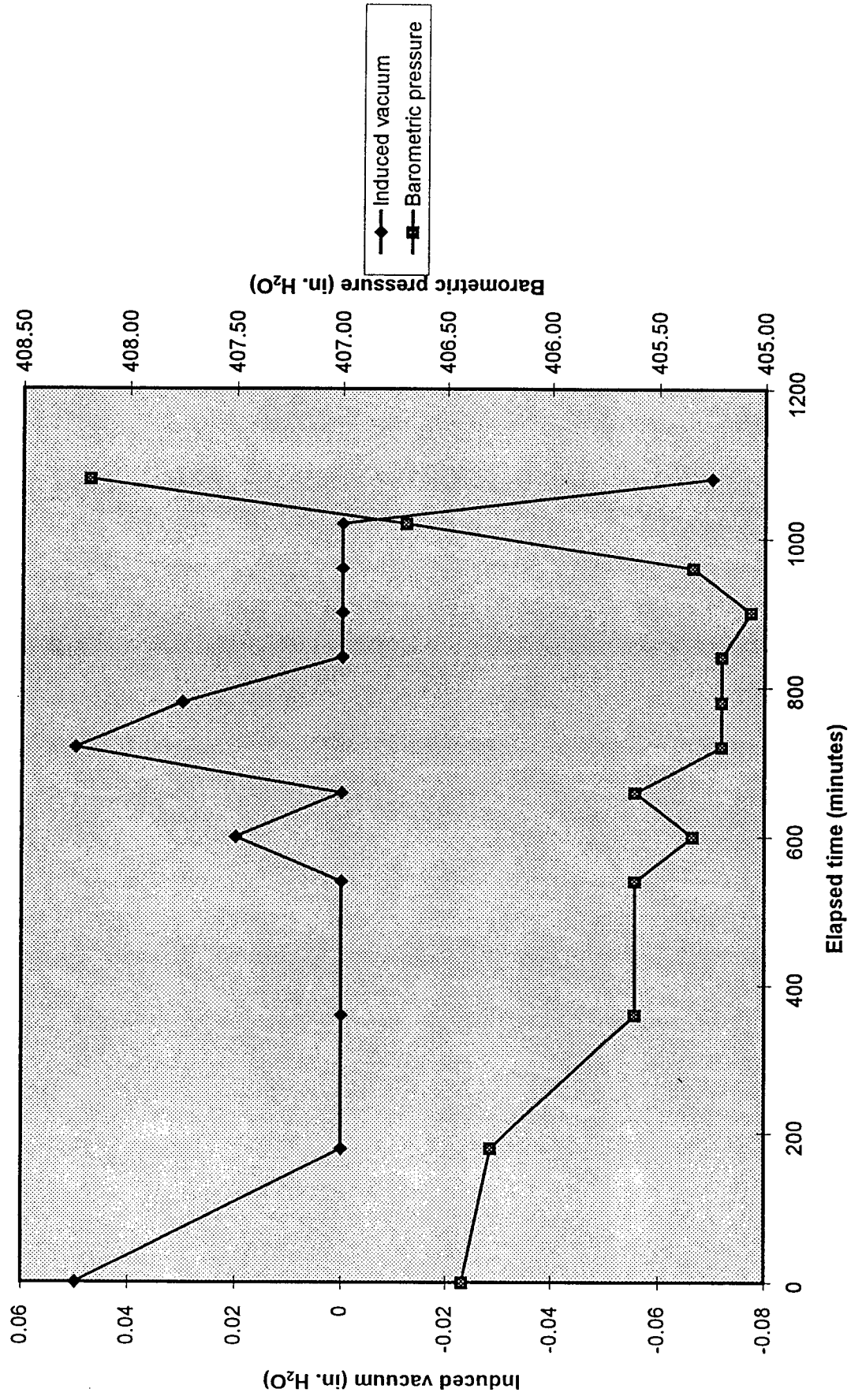


Figure 4: Step test results for VE-1

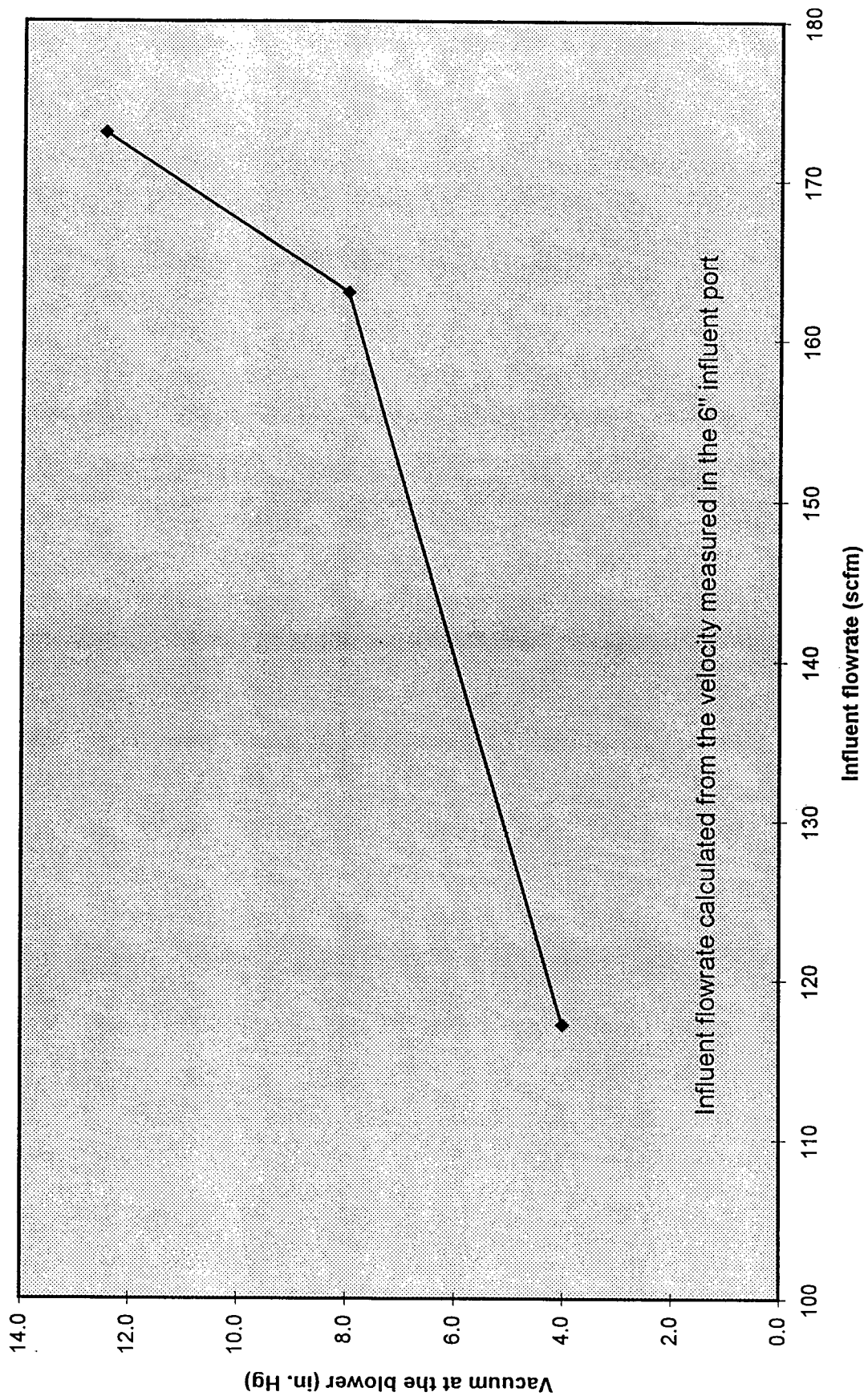


Figure 5: Barometric pressure at Indian Basin during start-up testing

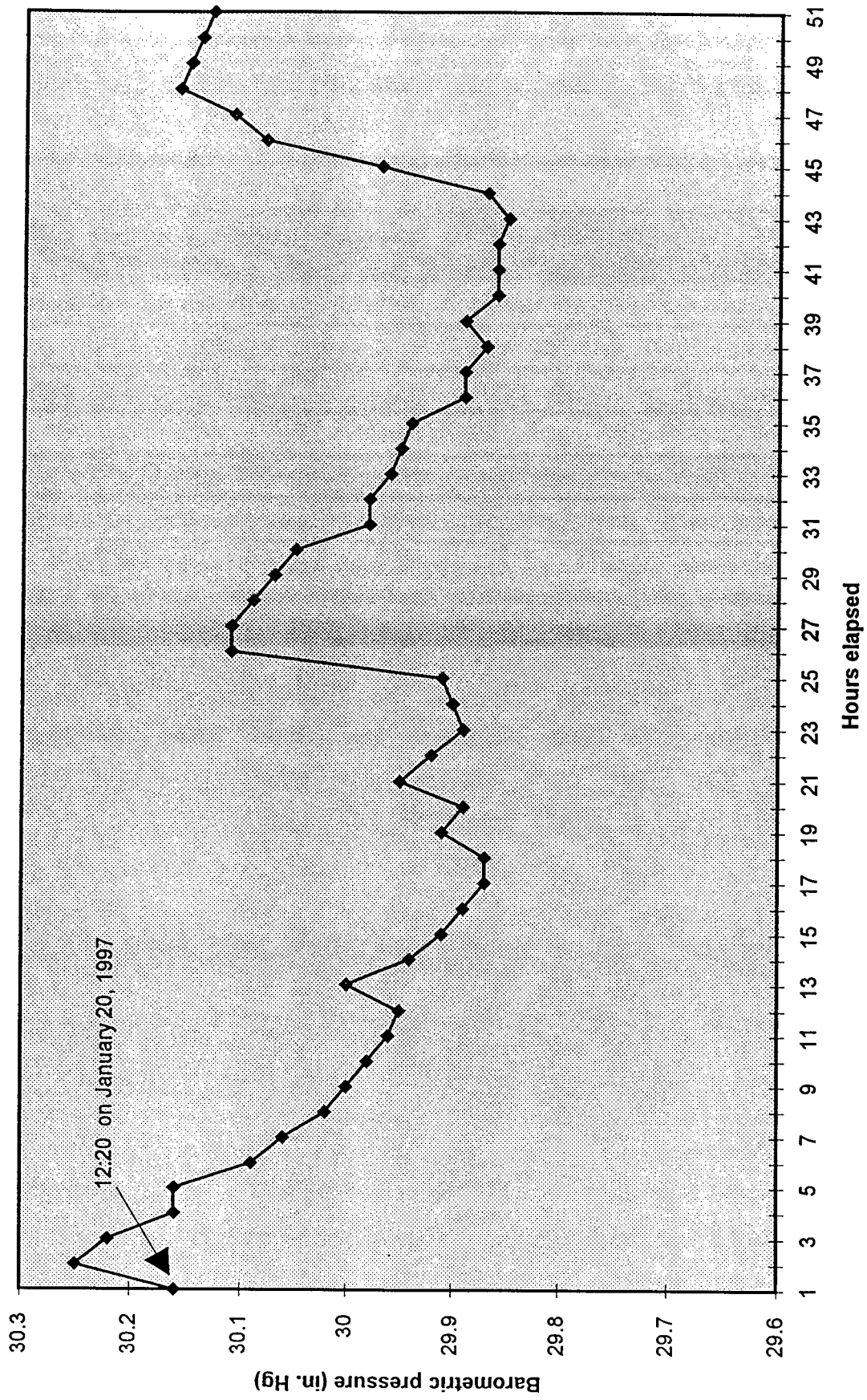


Table 1
Analytical results of air samples collected during start-up testing

	VE-1	VE-2	VE-3	VE-4	VE-5	Combined Effluent
Benzene	<1.7	<0.07	<0.07	<0.1	<0.07	<0.03
Toluene	<1.7	<0.07	<0.07	<0.1	0.1	<0.03
Ethylbenzene	<1.7	<0.07	<0.07	<0.1	<0.07	<0.03
Xylenes	<1.7	<0.07	<0.07	<0.1	<0.07	<0.03
TPH	1,590	960	680	390	<50	1,800
n-hexane	900	960	680	390	<50	1,800
All concentrations are in µg/L Samples collected on January 20-23, 1997 Analyses conducted by American Environmental Network. See Appendix B for reports.						

APPENDIX A

FIELD DATA

TEST WELL VE-1 Lower Queen Bedrock

Measured by: C. Briscoe, K. Rutherford

Distance from test well to monitoring point (ft.)

MW-66	VE-2
402'	758'

Date	Well	Time	Vacuum at Test Well (in. Hg)	Vacuum at Blower (in. Hg)	Flow from Test Well 5" pipe (in. FPM)	Influent Temp (°F)	Effluent PID (ppmv)	Effluent LEL (%)	Effluent CO2 (%)	Effluent O2 (%)	Effluent H2S (%)	Effluent CH4 (%)	Effluent Temp (°F)	Vacuum at Monitoring Points (in H2O)	
														MW-66	VE-2
1/20/97	VE-1	03:35		8.25	650	64		16	0	21.7	0	0		15	15
		04:05		8.0	600	61		19	0	21.7	0	0			
		04:35	8	8.25	650	59		16	0	21.7	0	0			
	VE-3	10:55	14	13.7	600	60	1.1	0	0		0	0			
		11:25	14.5	13.75	600	61	2.3	0	0		0	0			
		11:55	14	13.5	600	64	0.9	0	0		0	0			
1/21/97	VE-1	21:00	12.0	12.0	650	49	44	28	0	21.7	0	0		0.05	0.65
1/22/97		00:00	11.5	10.4	750	40	55.3	30	0.3	21.7	0	0		0	0.65
		03:00	11.5	10.5	750	38	38.5	30	0.0	21.7	meter malf.	0		0	0.45
		06:00	11.5	9.5	750	32	36.0	30	0.1	21.0	meter malf.	0		0	0.85
		07:00	15	9.6	750	28	54.0	52	0.1	21.2	meter malf.	0		0.02	1.0
		08:00	12.5	10.0	750	41	34.0	24	0.1	20.5	meter malf.	0		0	1.0
		09:00	13.7	11.7	750	49	15.7	17	0.2	20.5	0	0.7		0.05	1.2
		10:00	12.25	12.0	750	58	17.5	19	0.2	20.6	0	1.0		0.03	1.2
		11:00	12.5	12.8	750	65	49.4	19	0.1	20.5	0	1.2		0	0.85
		12:00	12.5	13.3	750	68	13.0	22	0	20.5	0	0.8		0	0.35
		13:00	12.25	13.3	750	70	37.5	21	0	20.5	0	0.7		0	0.00
		14:00	12.2	13.4	750	70	38.0	22	0	20.5	0	0.8		0	-0.20
		15:00	12.0	13.5	750	67	36.5	22	0	20.5	0	1.0		-0.07	-0.15
		15:25	N/A	13.0	750	63	33.1	23	0	20.5	0	0.9		N/A	N/A
		15:45	N/A	8.0	700	62	31.0	12	0	20.8	0	0.3		N/A	N/A
		16:00	N/A	8.0	700	62	28.0	13	0	20.5	0	0.5		N/A	N/A
		16:15	N/A	7.7	700	60	33.3	14	0	20.5	0	0.7		N/A	N/A
		16:30	N/A	4.0	500	59	32.4	6	0	20.5	0	0.2		N/A	N/A
		16:45	N/A	4.0	500	59	40.0	5	0	20.5	0	0.2		N/A	N/A
		17:00	N/A	3.9	500	57	44.0	5	0	20.5	0	0.3		N/A	N/A
VE-2		12:50	12.5	13.5	650	67	0.8	0	0		0	0			
		13:20	12.5	13.75	650	70	0.7	0	0		0	0			
		13:50	NA	13.5	650	68	1.2	0	0		0	0			
VE-4		14:50	11.5	13.5	650	74	3.1	5.0	0		0	0			
		15:20	11.5	13.3	650	73	3.8	10.0	0		0	0			
		15:50	11.5	13.5	650	70	4.1	10.0	0		0	0			
VE-5		16:30	12.5	13.0	650	64	2.3	0	0		0	0			
		17:00	12.5	13.0	650	60	2.3	10.0	0		0	0			
		17:30	12.5	13.0	650	57	4.1	10.0	0		0	0			

10:15 Started balancing system.

	VE-1	VE-2	VE-3	VE-4,5
Anometer Reading	450 fpm	450 fpm	450 fpm	225 fpm

Time	Vac. @ Blower	Influent Velocity	% LEL	% CO2	% CH4	% H2S	PID	Influent Temp	Effluent Discharge	O2%
10:50	13 in Hg	800 fpm	40	2	2.6	0	40.5	73oF	135oF	15

Sampled VES EFF taken @ 11:00

Vacuum at wells - Vacuum in In. Hg

VE-1	VE-2	VE-3	VE-4	VE-5
12.0	11.5	12.2	12.5	12.75

Notes:

1. There was water and/or sediment at the Tee where flow splits from VE-4 to VE-5
2. There was no good way to increase flow from VE-4 to VE-5 without restricting flow from other wells.
3. We did not have any instruments that would overcome the vacuum so we couldn't get individual leg concentrations.

APPENDIX B

LAB DATA

Figure 3: Induced vacuum in MW-66 for the long term test on VE-1

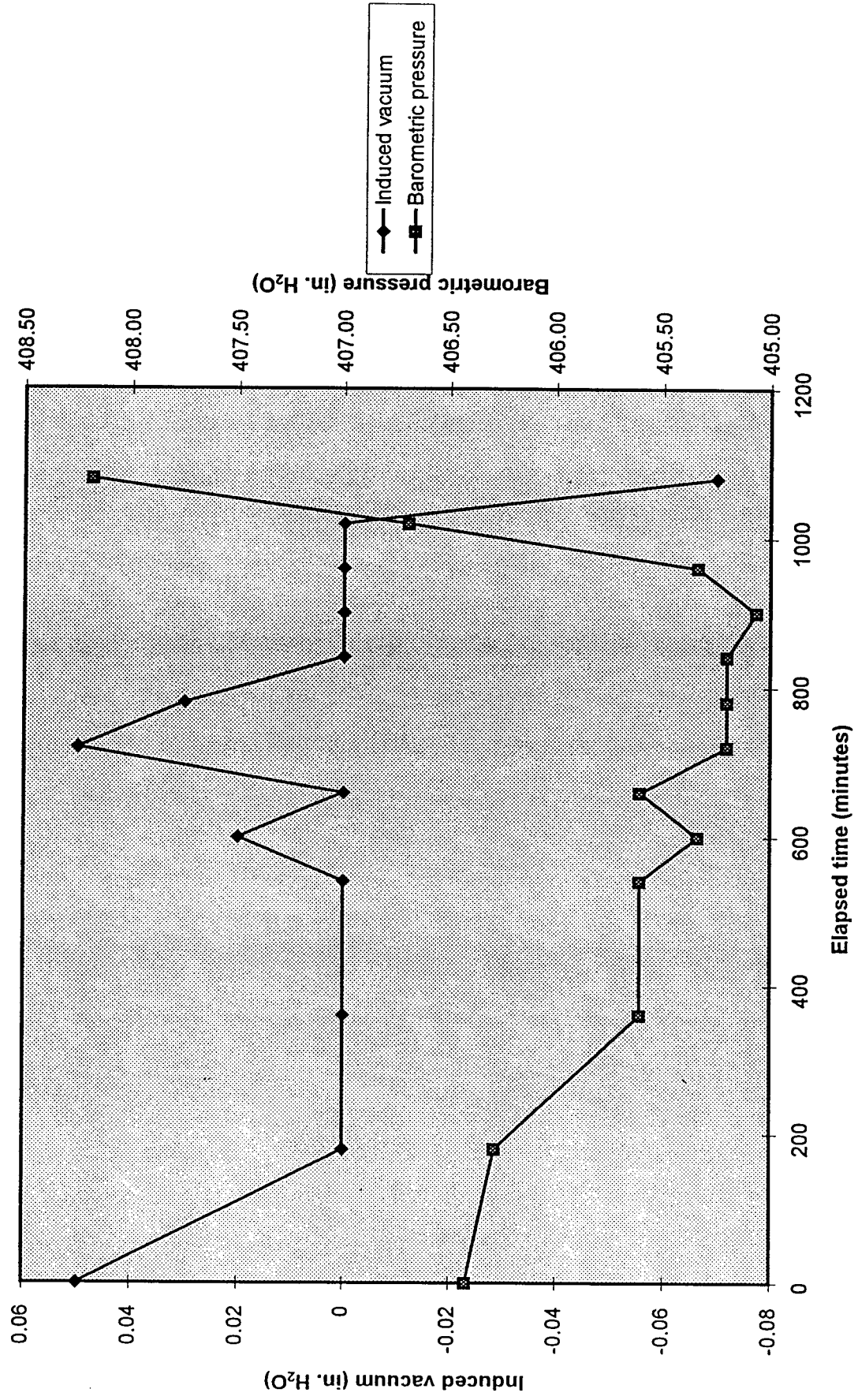


Figure 4: Step test results for VE-1

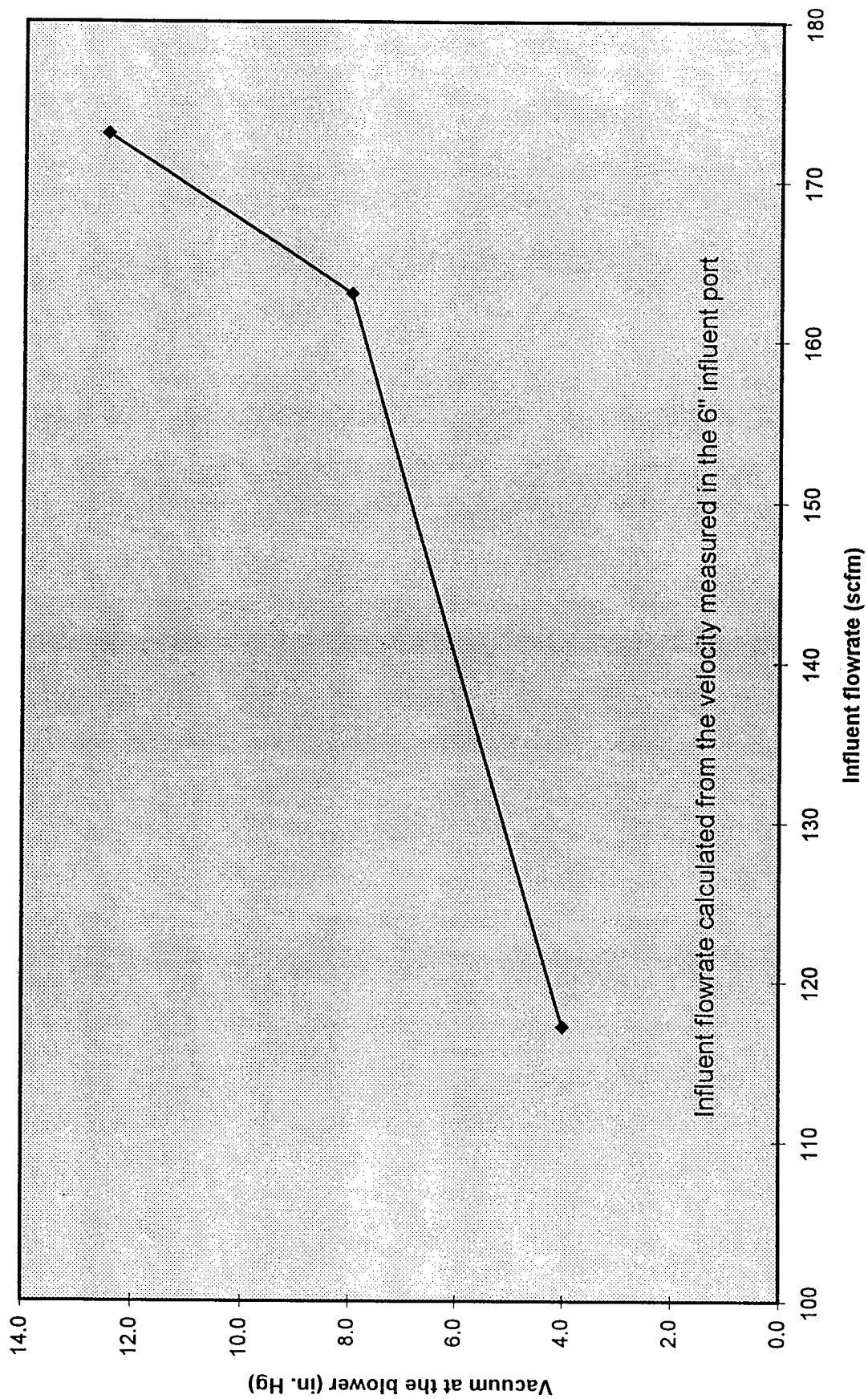


Figure 5: Barometric pressure at Indian Basin during start-up testing

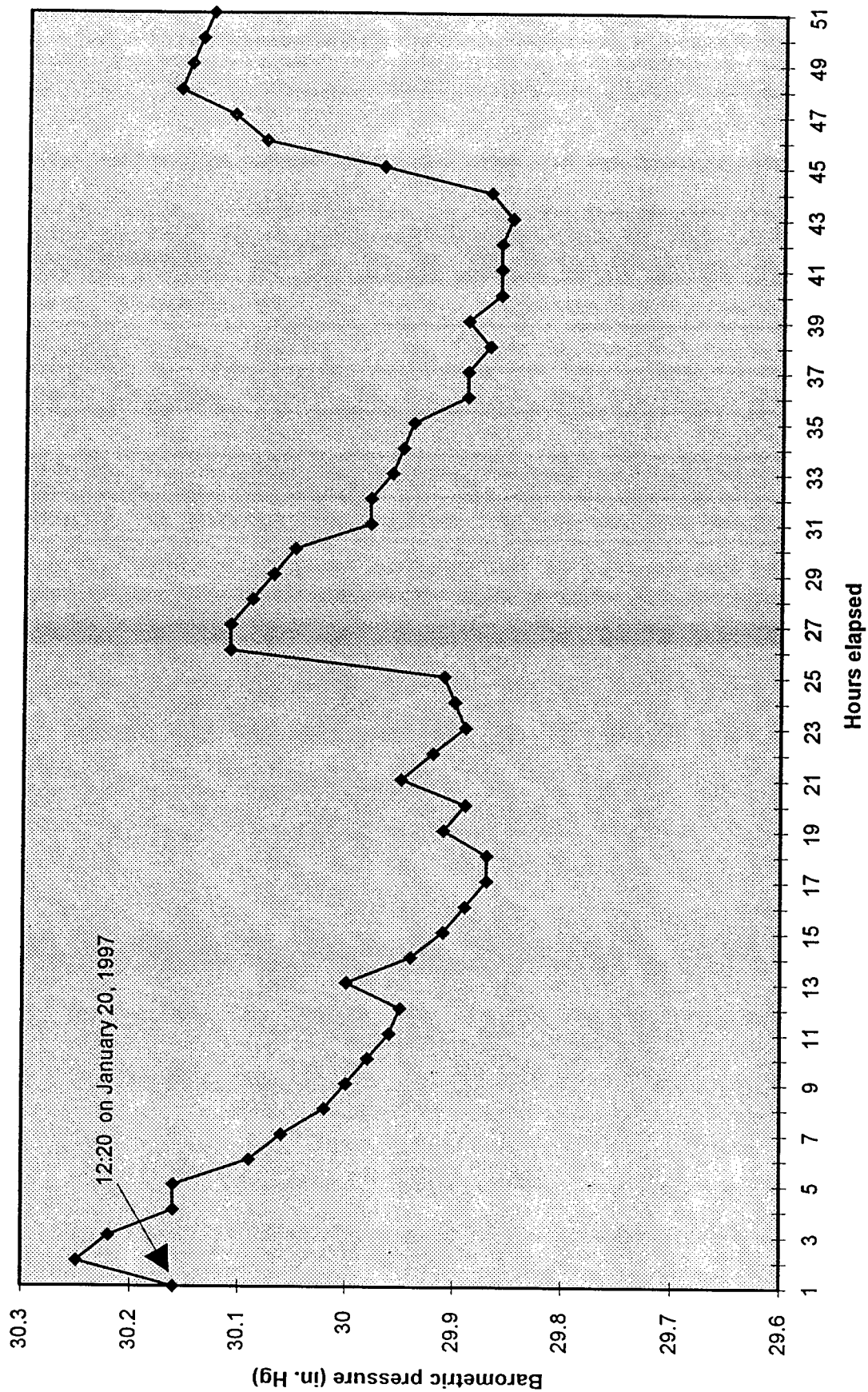


Table 1
Analytical results of air samples collected during start-up testing

	VE-1	VE-2	VE-3	VE-4	VE-5	Combined Effluent
Benzene	<1.7	<0.07	<0.07	<0.1	<0.07	<0.03
Toluene	<1.7	<0.07	<0.07	<0.1	0.1	<0.03
Ethylbenzene	<1.7	<0.07	<0.07	<0.1	<0.07	<0.03
Xylenes	<1.7	<0.07	<0.07	<0.1	<0.07	<0.03
TPH	1,590	960	680	390	<50	1,800
n-hexane	900	960	680	390	<50	1,800
All concentrations are in µg/L Samples collected on January 20-23, 1997 Analyses conducted by American Environmental Network. See Appendix B for reports.						

APPENDIX A

FIELD DATA

Measured by: C. Briscoe, K. Rutherford

TEST WELL VE-1 Lower Queen Bedrock

Distance from test well to monitoring point (ft.)

MW-65	VE-2
402'	758'

Date	Well	Time	Vacuum at Test Well (in. Hg)	Vacuum at Blower (in. Hg)	Flow from Test Well 6" pipe (in. FPM)	Influent Temp (oF)	Effluent PID (ppmv)	Effluent LEL (%)	Effluent CO2 (%)	Effluent O2 (%)	Effluent H ₂ S (%)	Effluent CH ₄ (%)	Effluent Temp (oF)	Vacuum at Monitoring Points (in. H ₂ O)	VE-2
1/20/97	VE-1	03:35		8.25	650	64		16	0	21.7	0	0		15	15
		04:05		8.0	600	61		19	0	21.7	0	0			
		04:35	8	8.25	650	59		16	0	21.7	0	0			
	VE-3	10:55	14	13.7	600	60	1.1	0	0		0	0			
		11:25	14.5	13.75	600	61	2.3	0	0		0	0			
		11:55	14	13.5	600	64	0.9	0	0		0	0			
1/21/97	VE-1	21:00	12.0	12.0	650	49	44	28	0	21.7	0	0		0.05	0.65
1/22/97		00:00	11.5	10.4	750	40	55.3	30	0.3	21.7	0	0		0	0.65
		03:00	11.5	10.5	750	38	38.5	30	0.0	21.7	meter mal.	0		0	0.45
		06:00	11.5	9.5	750	32	36.0	30	0.1	21.0	meter mal.	0		0	0.85
		07:00	15	9.6	750	28	54.0	52	0.1	21.2	meter mal.	0		0.02	1.0
		08:00	12.5	10.0	750	41	34.0	24	0.1	20.5	meter mal.	0		0	1.0
		09:00	13.7	11.7	750	49	15.7	17	0.2	20.5	0	0.7		0.05	1.2
		10:00	12.25	12.0	750	58	17.5	19	0.2	20.6	0	1.0		0.03	1.2
		11:00	12.5	12.8	750	65	49.4	19	0.1	20.5	0	1.2		0	0.85
		12:00	12.5	13.3	750	68	13.0	22	0	20.5	0	0.8		0	0.35
		13:00	12.25	13.3	750	70	37.5	21	0	20.5	0	0.7		0	0.00
		14:00	12.2	13.4	750	70	38.0	22	0	20.5	0	0.8		0	-0.20
		15:00	12.0	13.5	750	67	36.5	22	0	20.5	0	1.0		-0.07	-0.15
		15:25	N/A	13.0	750	63	33.1	23	0	20.5	0	0.9		N/A	N/A
		15:45	N/A	8.0	700	62	31.0	12	0	20.8	0	0.3		N/A	N/A
		16:00	N/A	8.0	700	62	28.0	13	0	20.5	0	0.5		N/A	N/A
		16:15	N/A	7.7	700	60	33.3	14	0	20.5	0	0.7		N/A	N/A
		16:30	N/A	4.0	500	59	32.4	6	0	20.5	0	0.2		N/A	N/A
		16:45	N/A	4.0	500	59	40.0	5	0	20.5	0	0.2		N/A	N/A
		17:00	N/A	3.9	500	57	44.0	5	0	20.5	0	0.3		N/A	N/A
VE-2		12:50	12.5	13.5	650	67	0.8	0	0		0	0			
		13:20	12.5	13.75	650	70	0.7	0	0		0	0			
		13:50	NA	13.5	650	68	1.2	0	0		0	0			
VE-4		14:50	11.5	13.5	650	74	3.1	5.0	0		0	0			
		15:20	11.5	13.3	650	73	3.8	10.0	0		0	0			
		15:50	11.5	13.5	650	70	4.1	10.0	0		0	0			
VE-5		16:30	12.5	13.0	650	64	2.3	0	0		0	0			
		17:00	12.5	13.0	650	60	2.3	10.0	0		0	0			
		17:30	12.5	13.0	650	57	4.1	10.0	0		0	0			

10:15 Started balancing system.

	VE-1	VE-2	VE-3	VE-4,5
Anometer Reading	450 fpm	450 fpm	450 fpm	225 fpm

Time	Vac. @ Blower	Influent Velocity	% LEL	% CO2	% CH4	% H2S	PID	Influent Temp	Effluent Discharge	O2%
10:50	13 in Hg	800 fpm	40	2	2.6	0	40.5	73oF	135oF	15

Sampled VES EFF taken @ 11:00

Vacuum at wells - Vacuum in ln. Hg

VE-1	VE-2	VE-3	VE-4	VE-5
12.0	11.5	12.2	12.5	12.75

Notes:

1. There was water and/or sediment at the Tee where flow splits from VE-4 to VE-5
2. There was no good way to increase flow from VE-4 to VE-5 without restricting flow from other wells.
3. We did not have any instruments that would overcome the vacuum so we couldn't get individual leg concentrations.

APPENDIX B

LAB DATA



March 20, 1997

To: Bob Menzie/Kyle Rutherford
From: Mitch Rubenstein
Subject: Review of TO-14 Data Vs. Mod. 8015 Data for Hexane

Bob,

The following table compares the 8015 data to an estimated value derived by a TIC search by GCMS.

Marathon Oil Company Data				
Comparison of 8015 (TO12) vs TO14 (estimated) Data				
SAMPLE		8015(Total) ug/L (=Mg/M ³)	8015(hexane) ug/L (=Mg/M ³)	TO14 Mg/M ³
70351-01(VE3)		680	680	0.34
70351-02(VE1)		1590	900	8.00
70351-03(VE2)		960	960	0.41
70351-04(VE4)		390	390	0.47
70351-05(VE5)		ND	ND	N/A
70351-06(VE5 EFF)		1800	1800	12

As illustrated in the Table, there is an incongruity between the hexane value established by Method 8015 and TO14. While EPA Method 8015 used n-hexane for calculations, TO-14 is an estimated value based on the EPA TIC calculation method. In all cases the value for n-hexane is lower by TO-14.

In review of the chromatograms associated with each method, I believe that the lower n-Hexane results indicated by TO-14 should be used for air emission calculations. My rationale is that I believe that the chromatography was more discriminating and, of course, the mass spectrometer is more selective. Furthermore, in reviewing the mass spectrometer reconstructed ion chromatograms it is obvious that there are substantially more peaks than was indicated by the Mod. 8015 methodology.

American Environmental Network, Inc.

In future analyses I will recommend that the n-hexane be quantified by TO-14.

If you have any questions or suggestions please do not hesitate to contact me at (505) 344-3777. I have attached and labeled the chromatograms for your review.

Sincerely,

A handwritten signature in black ink, appearing to read "Mitch Rubenstein", with a stylized flourish at the end.

Mitch Rubenstein, Ph.D.
General Manager

Analytical Technologies Inc.

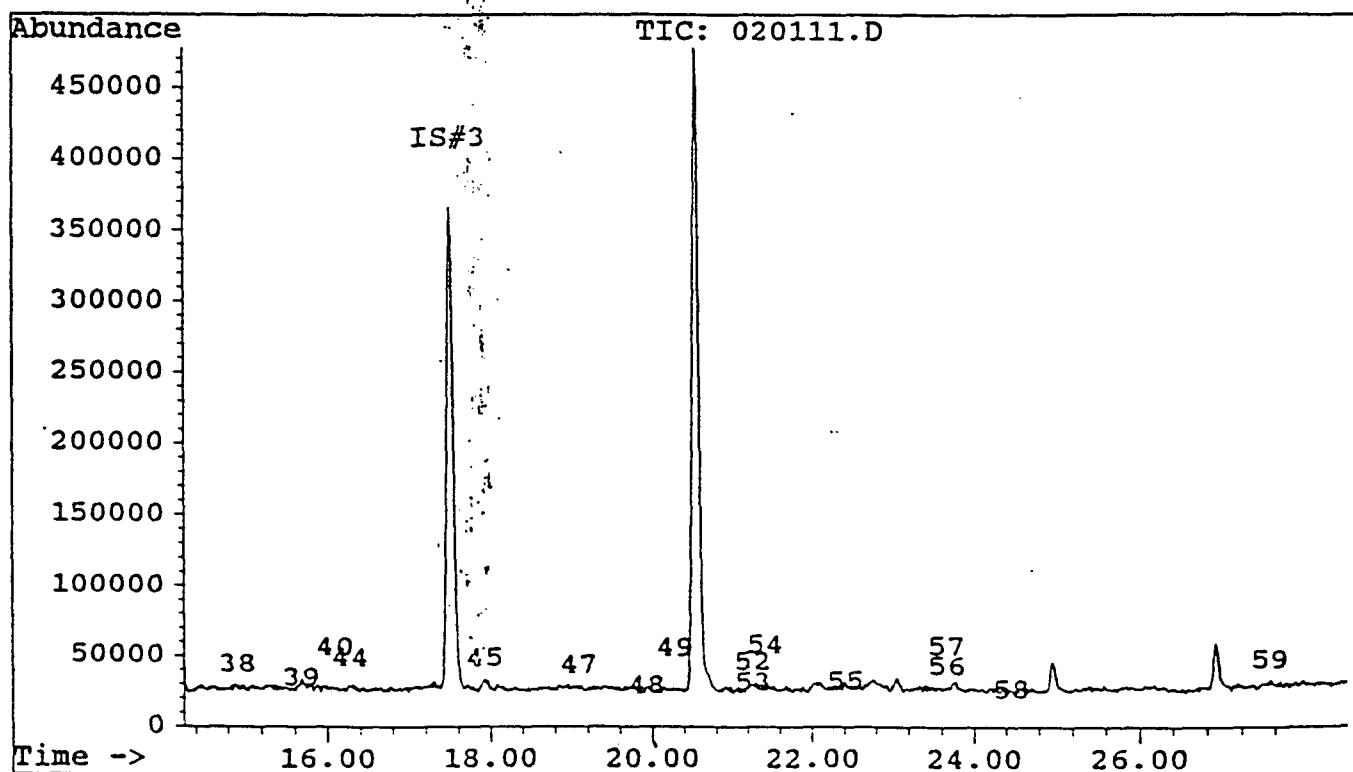
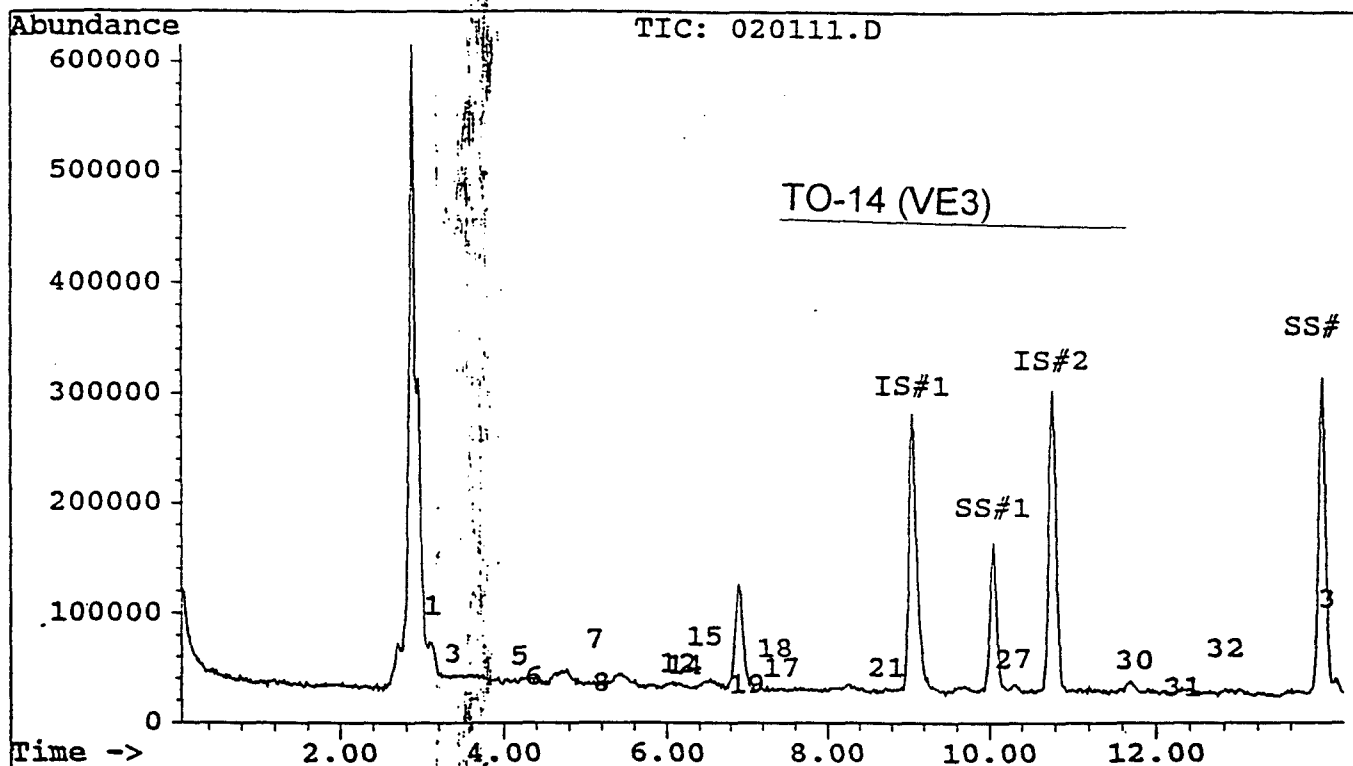
Operator ID: bv

Name: 702011-1

Misc:

500cc

Title: T014/8240 Purgeables Calibration



Analytical Technologies Inc.

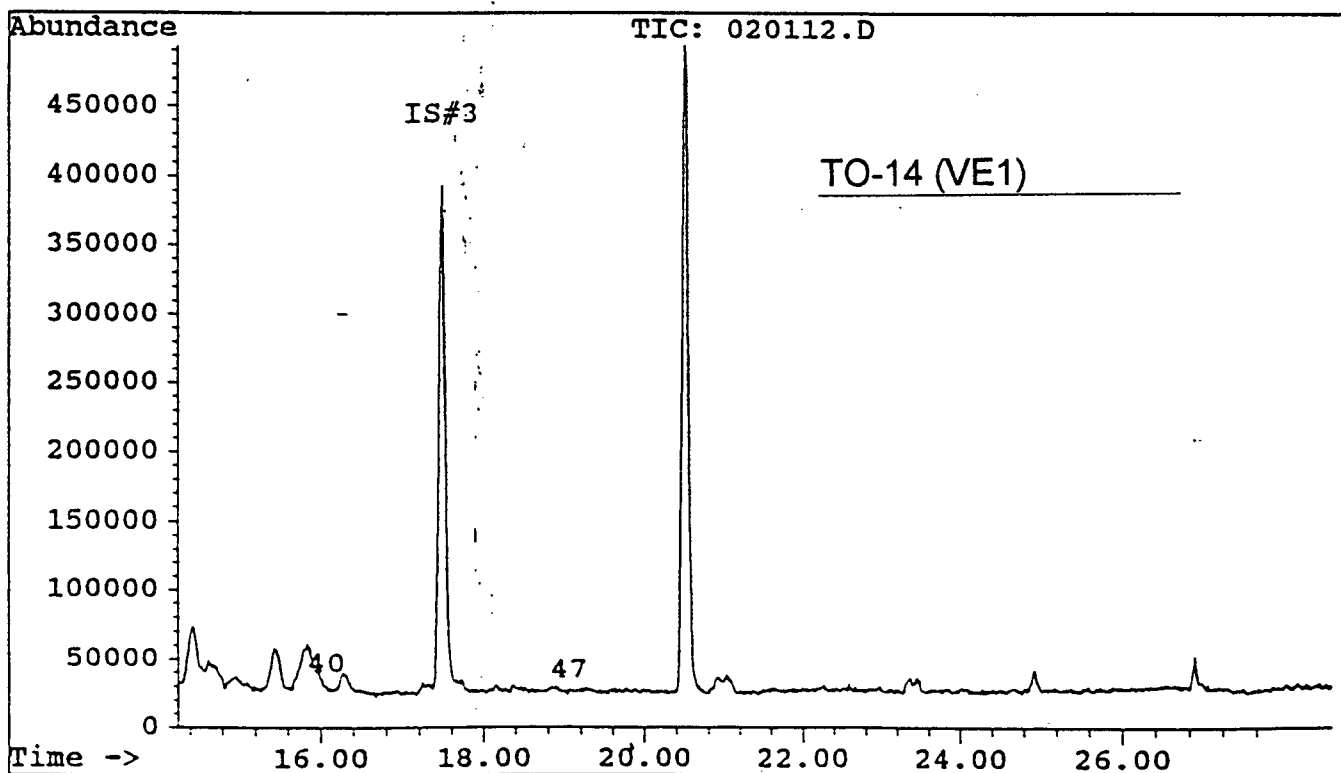
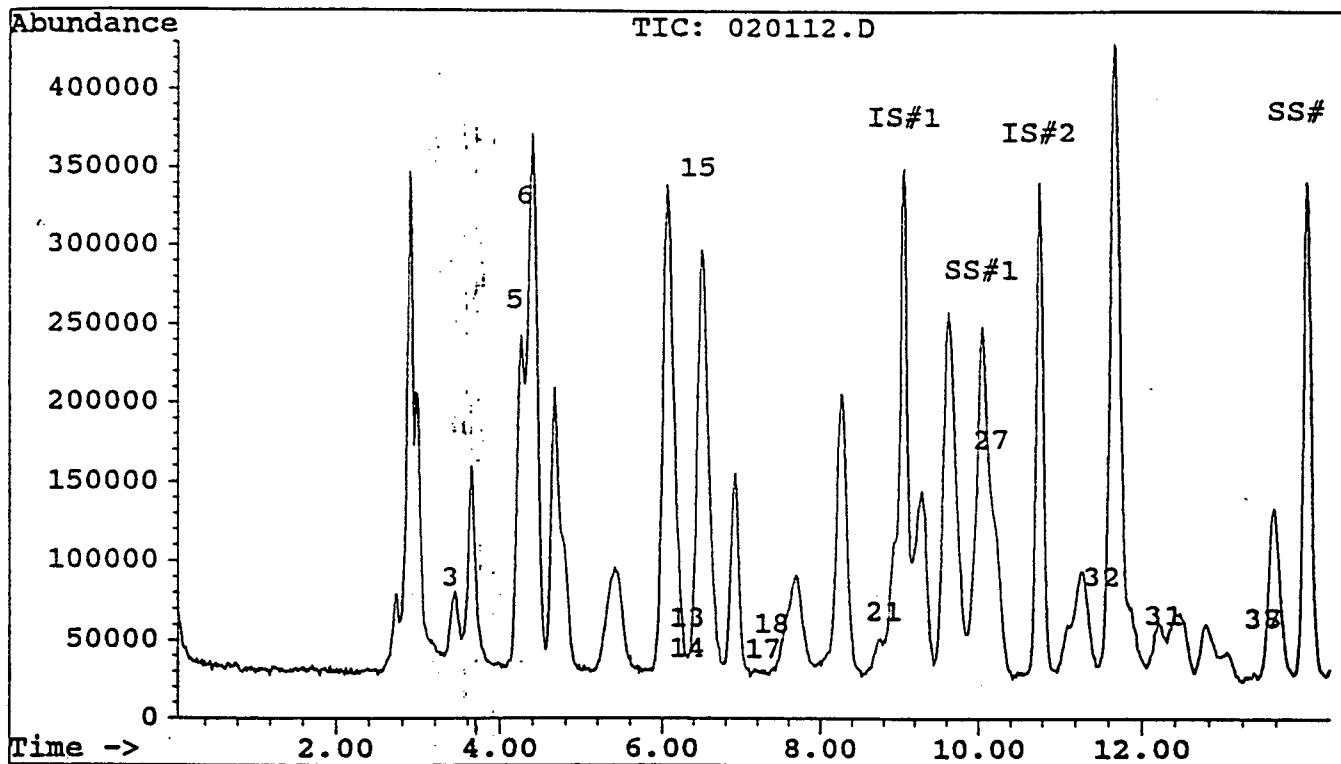
Operator ID: bv

Name: 702011-2

Misc:

20cc

Title: TO14/8240 Purgeables Calibration



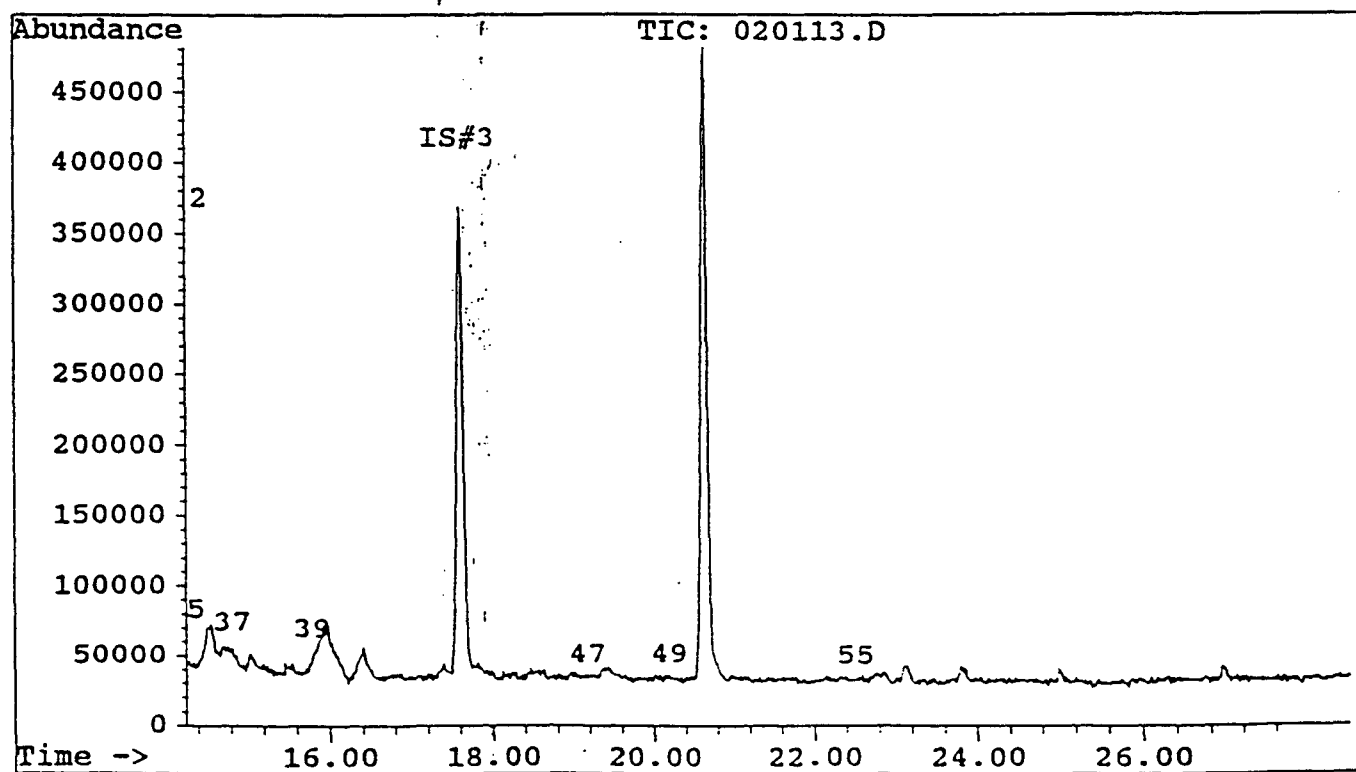
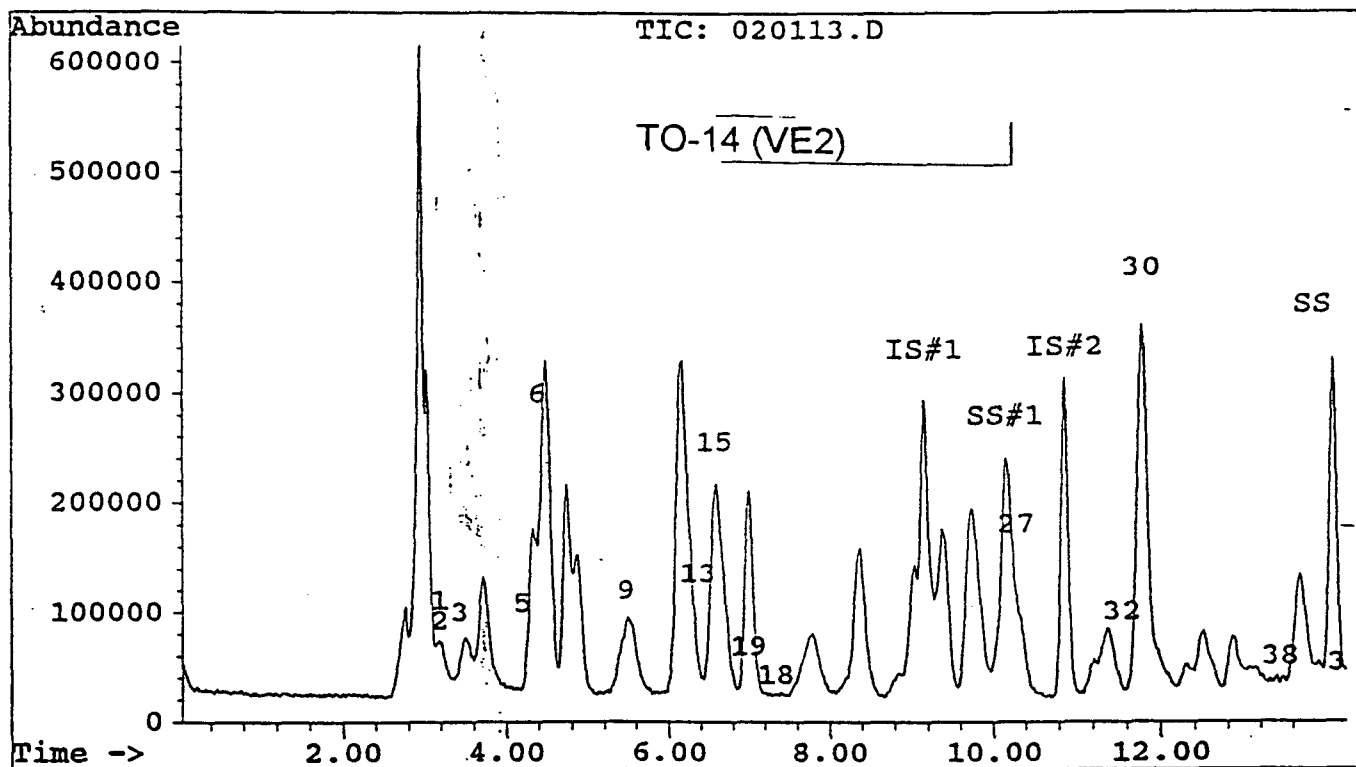
Analytical Technologies Inc.

Operator ID: bv

Name: 702011-3

Misc: 500cc

Title: TO14/8240 Purgeables Calibration



Analytical Technologies Inc.

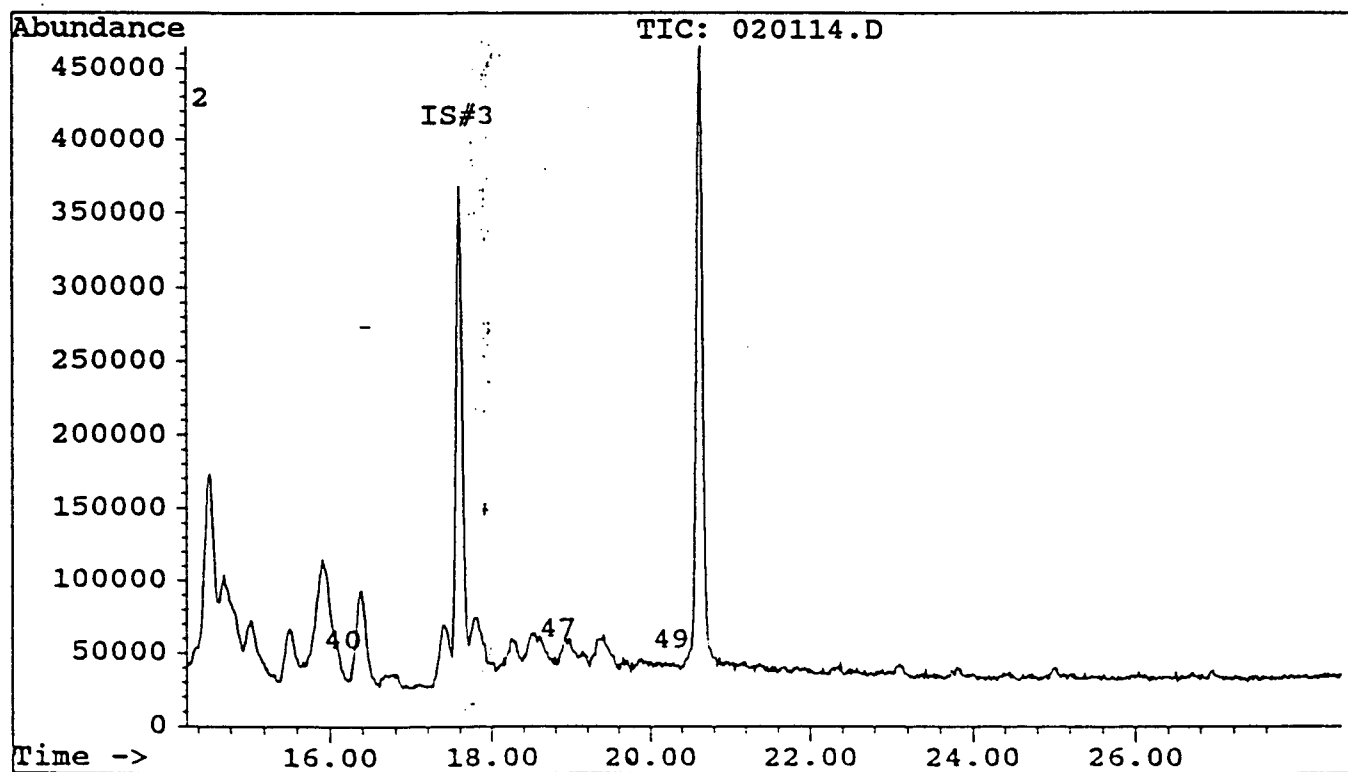
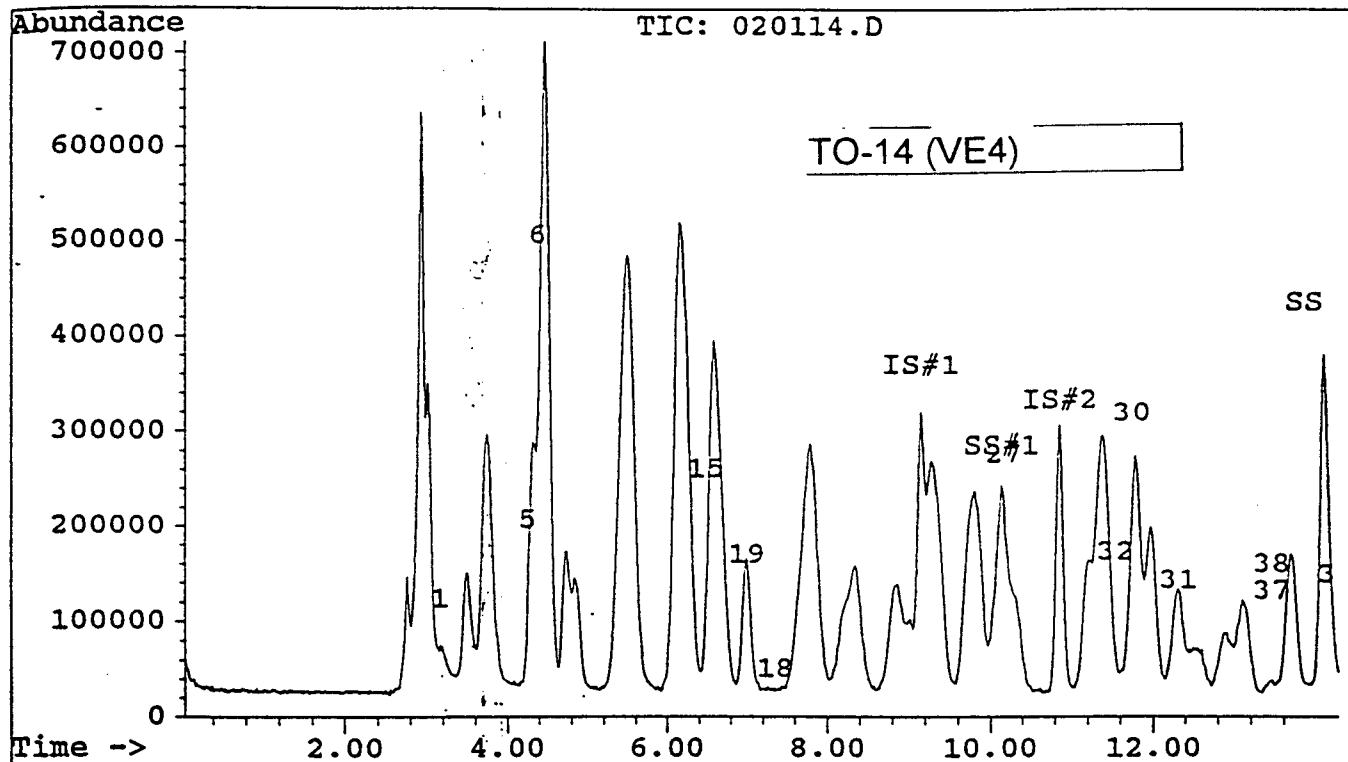
Operator ID: bv

Name: 702011-4

Misc:

250cc

Title: TO14/8240 Purgeables Calibration



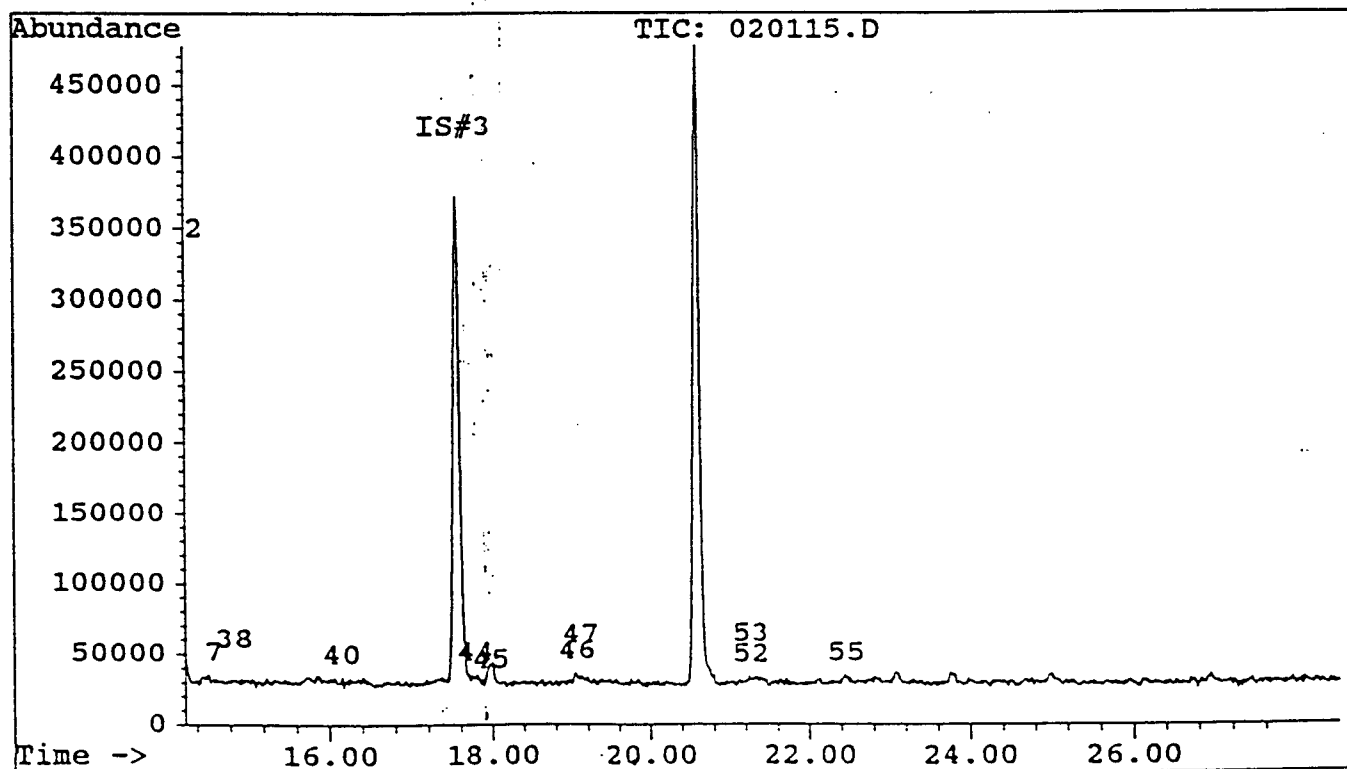
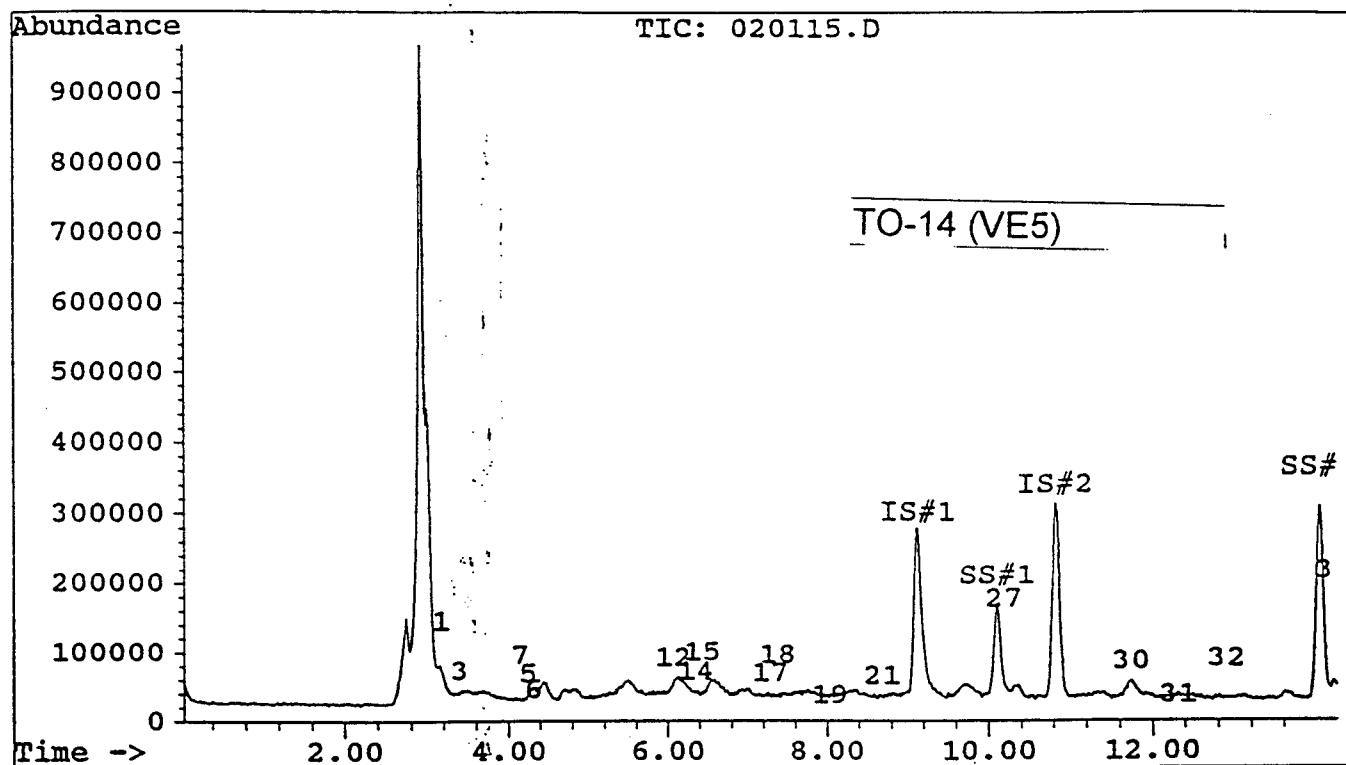
Analytical Technologies Inc.

Operator ID: bv

Name: 702011-5

Misc: 500cc

Title: TO14/8240 Purgeables Calibration



Analytical Technologies Inc.

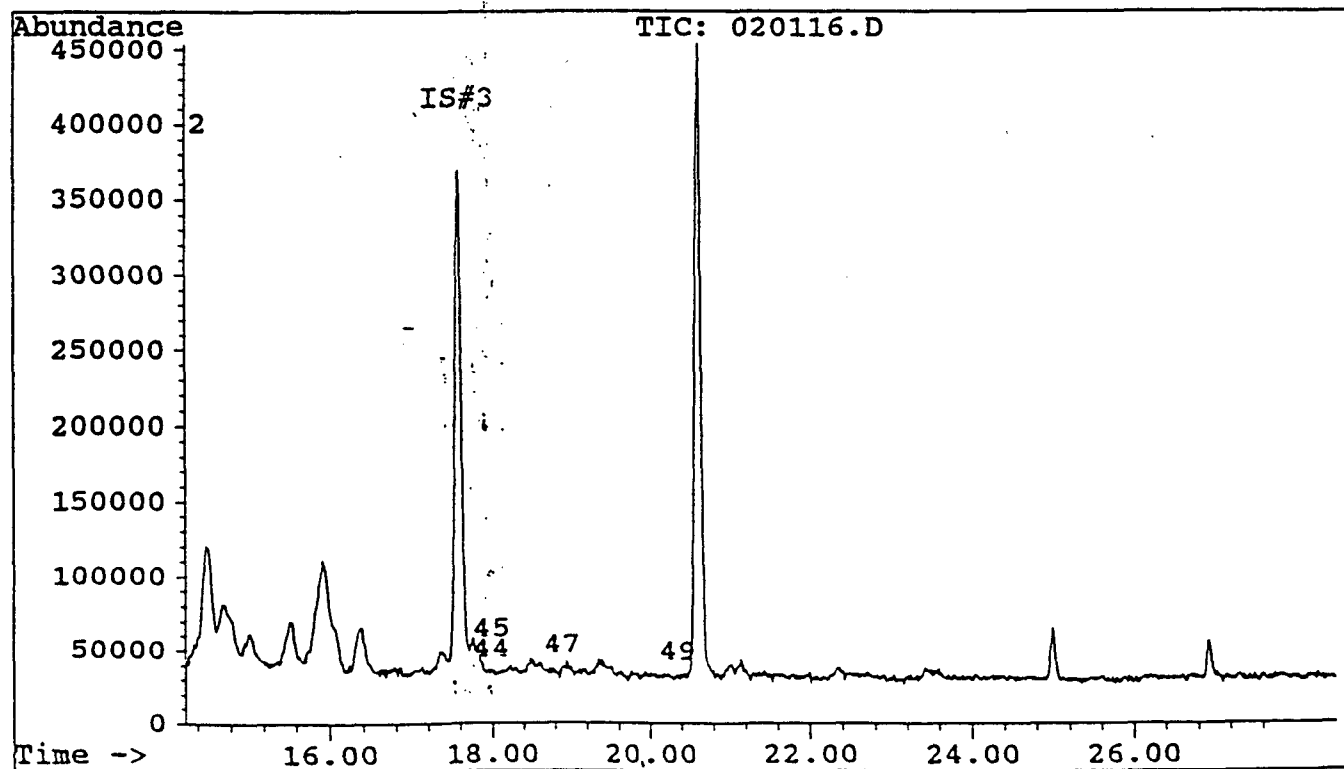
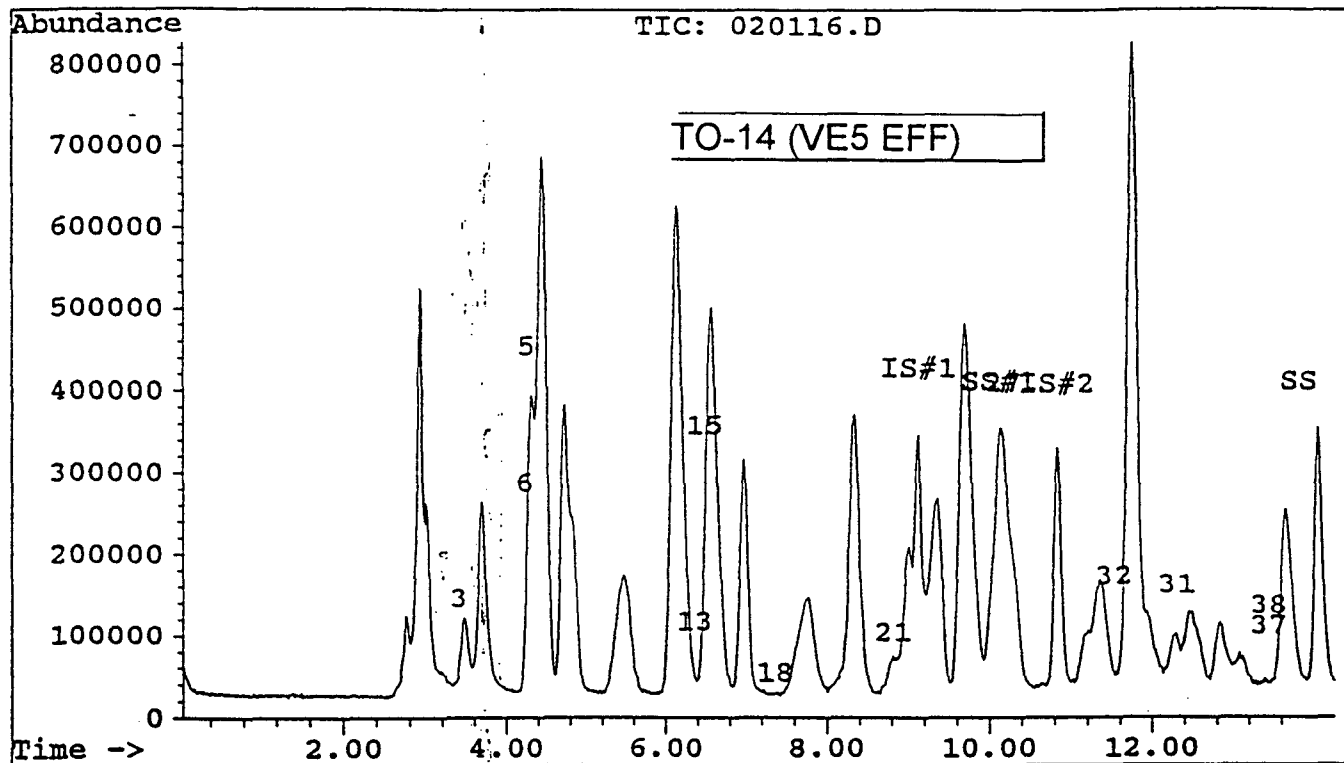
Operator ID: bv

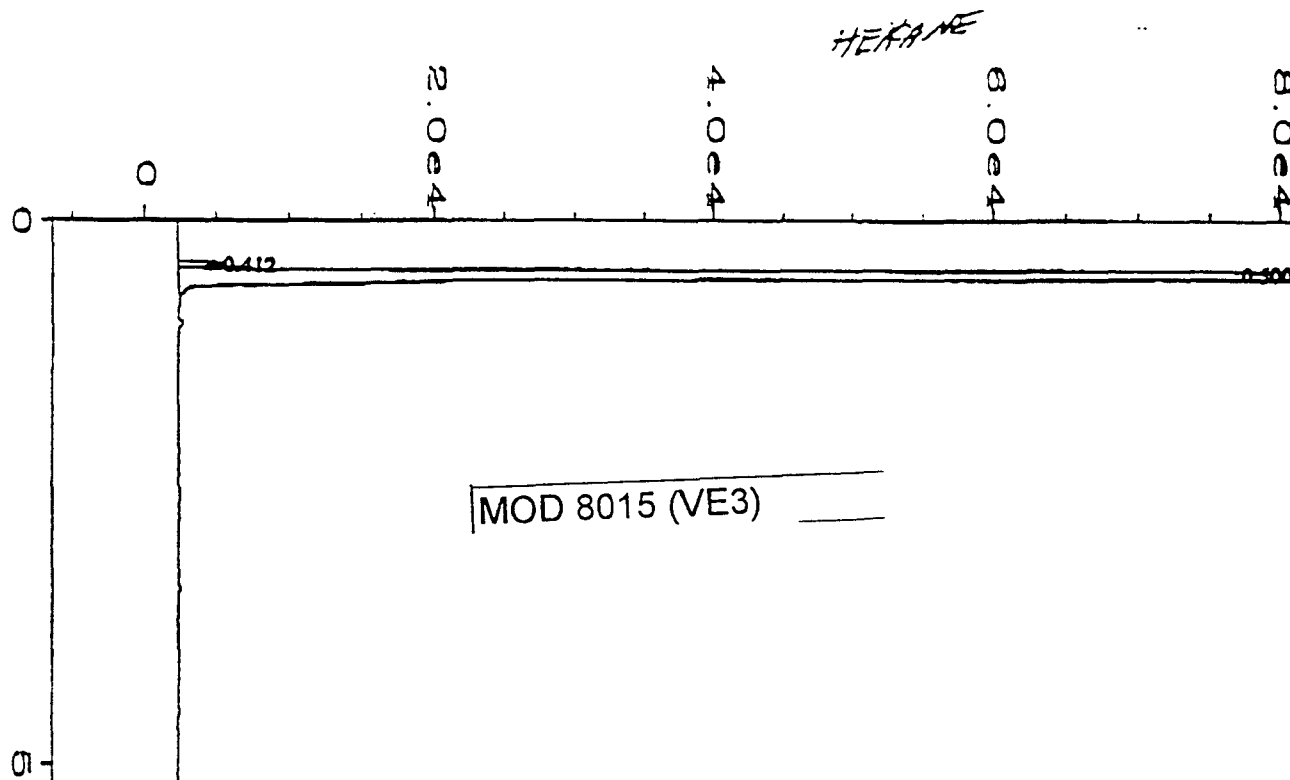
Name: 702011-6

Misc:

20cc

Title: T014/8240 Purgeables Calibration





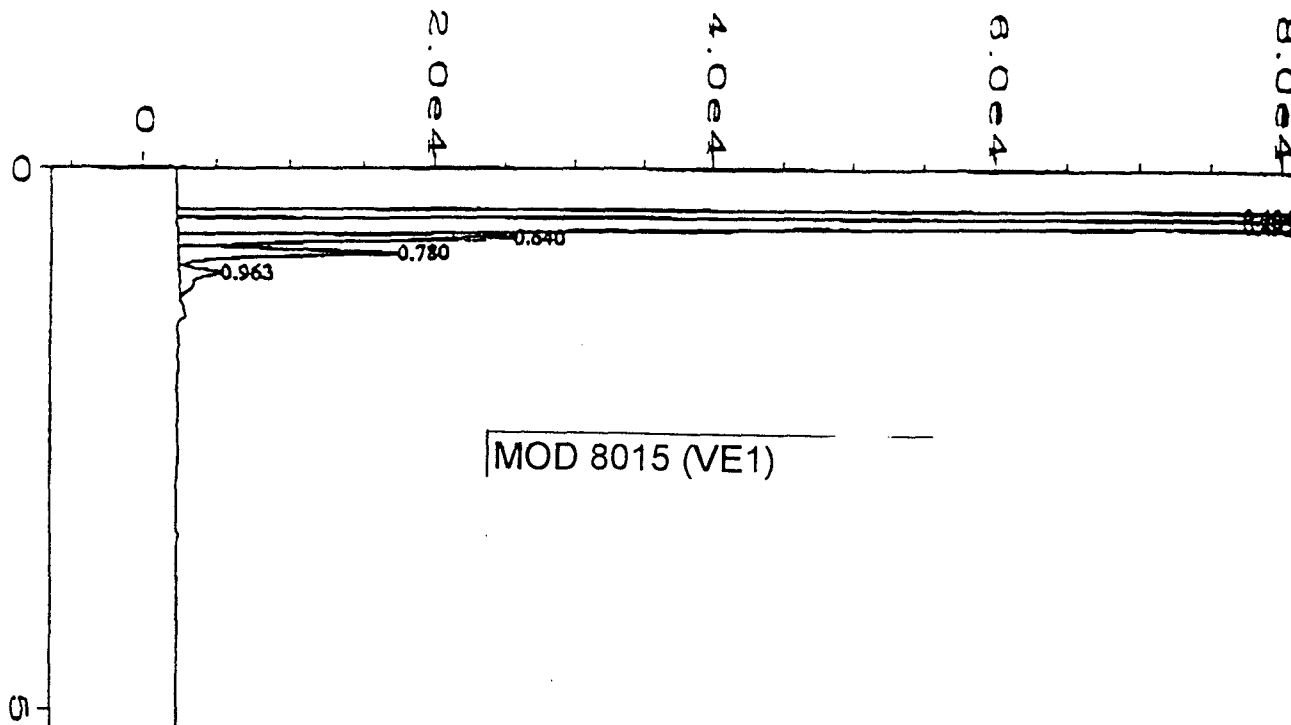
External Standard Report

Data File Name : C:\HPCHEM\1\DATA\020797\006R0101.D	Page Number : 1
Operator :	Vial Number : 6
Instrument : FRANCENE	Injection Number : 1
Sample Name : 2011-1	Sequence Line : 1
Run Time Bar Code:	Instrument Method: N-HEXANE.MTH
Acquired on : 07 Feb 97 04:32 PM	Analysis Method : N-HEXANE.MTH
Report Created on: 07 Feb 97 04:38 PM	Sample Amount : 0
Last Recalib on : 07 FEB 97 04:16 PM	ISTD Amount :
Multiplier : 1	

Sig. 2 in C:\HPCHEM\1\DATA\020797\006R0101.D

Ret Time	Area	Type	Width	Ref#	ug/ml	Name
0.500	2902105	VB	0.048	1	0.873	n-hexane
0.412	7866	BV	0.041		1.493	* uncalibrated *

$$\frac{2.90 \times 10^6}{2.85 \times 10^7} \times 6.67 = 6.78 \times 10^{-1} = 678 \text{ ppb} = 680$$



External Standard Report

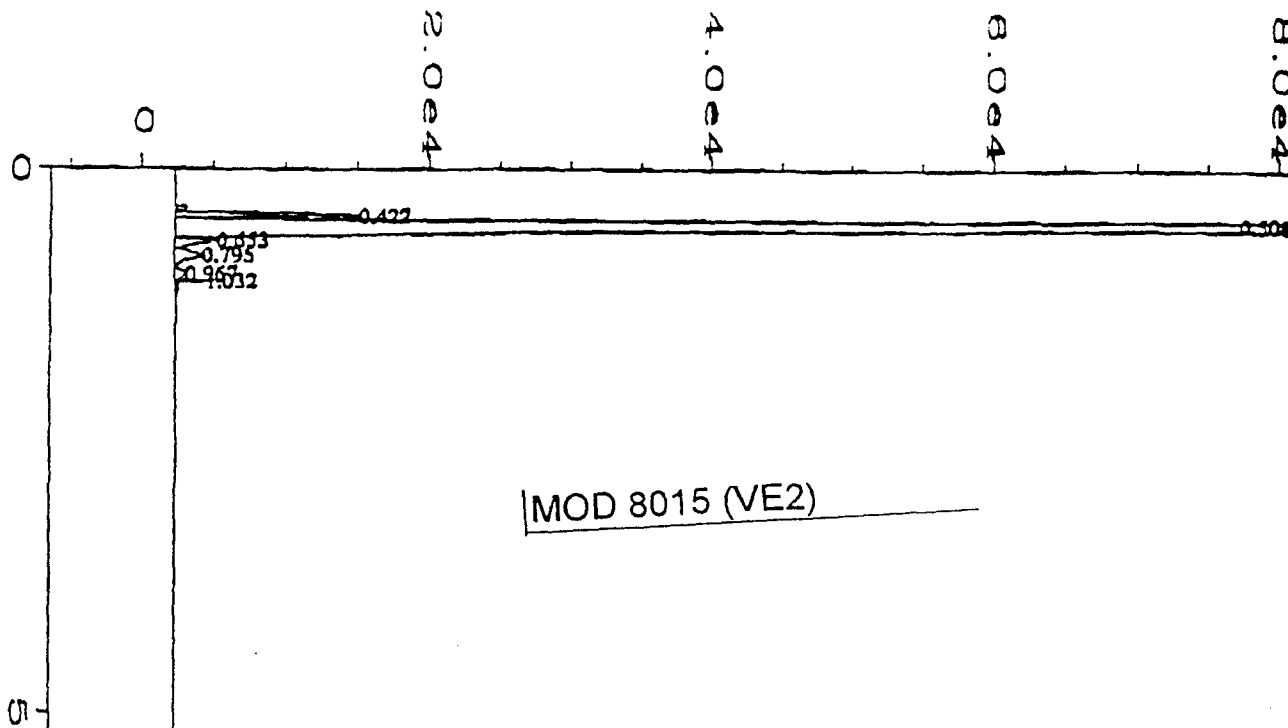
Data File Name	: C:\HPCHEM\1\DATA\020797\007R0101.D	Page Number	: 1
Operator	:	Vial Number	: 7
Instrument	: FRANCENE	Injection Number	: 1
Sample Name	: 2011-2	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	N-HEXANE.MTH
Acquired on	: 07 Feb 97 04:40 PM	Analysis Method	: N-HEXANE.MTH
Report Created on:	07 Feb 97 04:46 PM	Sample Amount	: 0
Last Recalib on	: 07 FEB 97 04:16 PM	ISTD Amount	:
Multiplier	: 1		

Sig. 2 in C:\HPCHEM\1\DATA\020797\007R0101.D

Ret Time	Area	Type	Width	Ref#	ug/ml	Name
0.492	3828215	VV	0.050	1	1.152	n-hexane
0.404	2759841	BV	0.043		523.818	* uncalibrated *
0.640	91082	VV	0.059		17.287	* uncalibrated *
0.780	66042	VV	0.067		12.535	* uncalibrated *
0.963	20412	VV	0.102		3.874	* uncalibrated *

$$\frac{3.82 \times 10^6}{2.85 \times 10^7} \times 6.67 = 8.96 \times 10^{-1} = 896 \mu\text{g} = 900 \mu\text{g}$$

$$\text{TPH} = \frac{2.94 \times 10^6}{2.85 \times 10^7} \times 6.67 = 6.88 \times 10^{-1} = 688 \mu\text{g} = 690 \mu\text{g}$$



External Standard Report

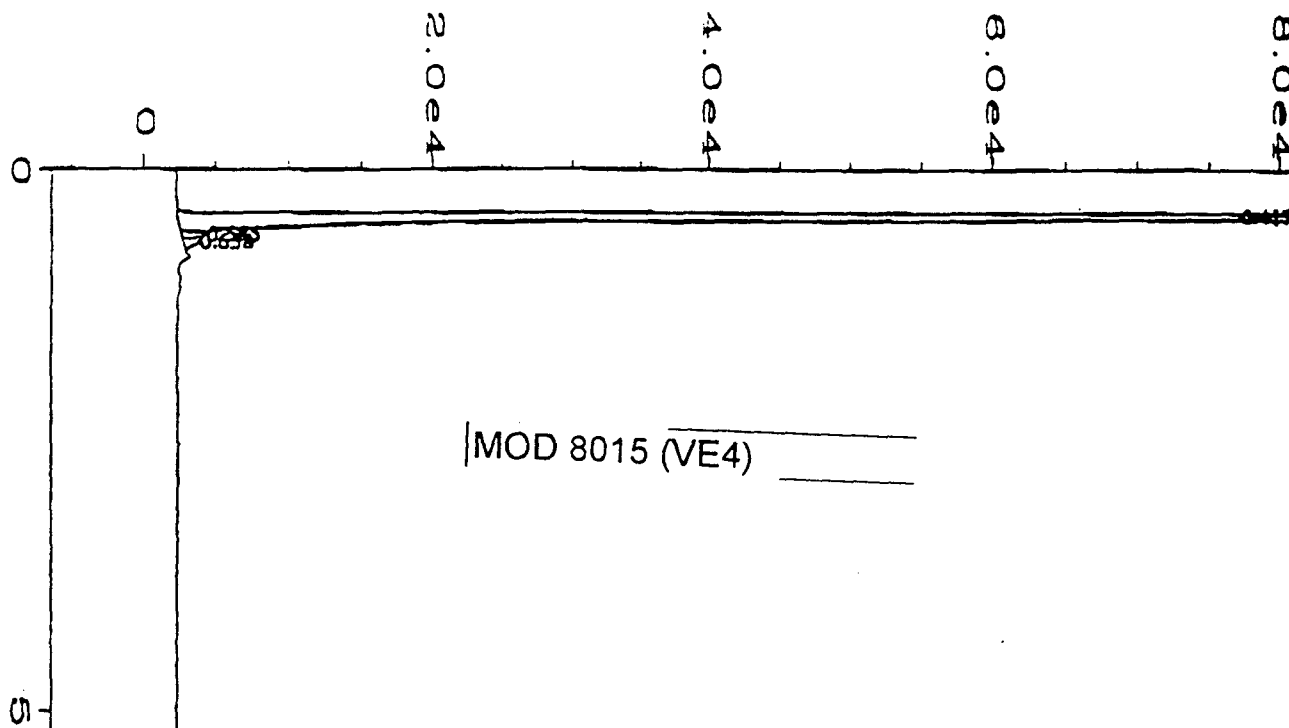
Data File Name	: C:\HPCHEM\1\DATA\020797\008R0101.D	Page Number	: 1
Operator	:	Vial Number	: 8
Instrument	: FRANCENE	Injection Number	: 1
Sample Name	: 2011-3	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	N-HEXANE.MTH
Acquired on	: 07 Feb 97 04:53 PM	Analysis Method	: N-HEXANE.MTH
Report Created on:	07 Feb 97 04:59 PM	Sample Amount	: 0
Last Recalib on	: 07 FEB 97 04:16 PM	ISTD Amount	:
Multiplier	: 1		

Sig. 2 in C:\HPCHEM\1\DATA\020797\008R0101.D

Ret Time	Area	Type	Width	Ref#	ug/ml	Name
0.508	4119719	VV	0.049	1	1.240	n-hexane
0.422	33351	BV	0.043		6.330	* uncalibrated *
0.653	10282	VV	0.052		1.951	* uncalibrated *
0.795	9215	VV	0.072		1.749	* uncalibrated *
0.967	3387	VV	0.065		0.643	* uncalibrated *
1.032	2344	PB	0.011		0.445	* uncalibrated *

$$\frac{4.12 \times 10^6}{2.85 \times 10^7} \times 6.67 = 9.64 \times 10^{-1} = 964 = 960 \text{ ppb}$$

$$\text{TPH} = \frac{5.86 \times 10^4}{2.85 \times 10^7} \times 6.67 = 13.7 \times 10^{-3} = \text{ND}$$



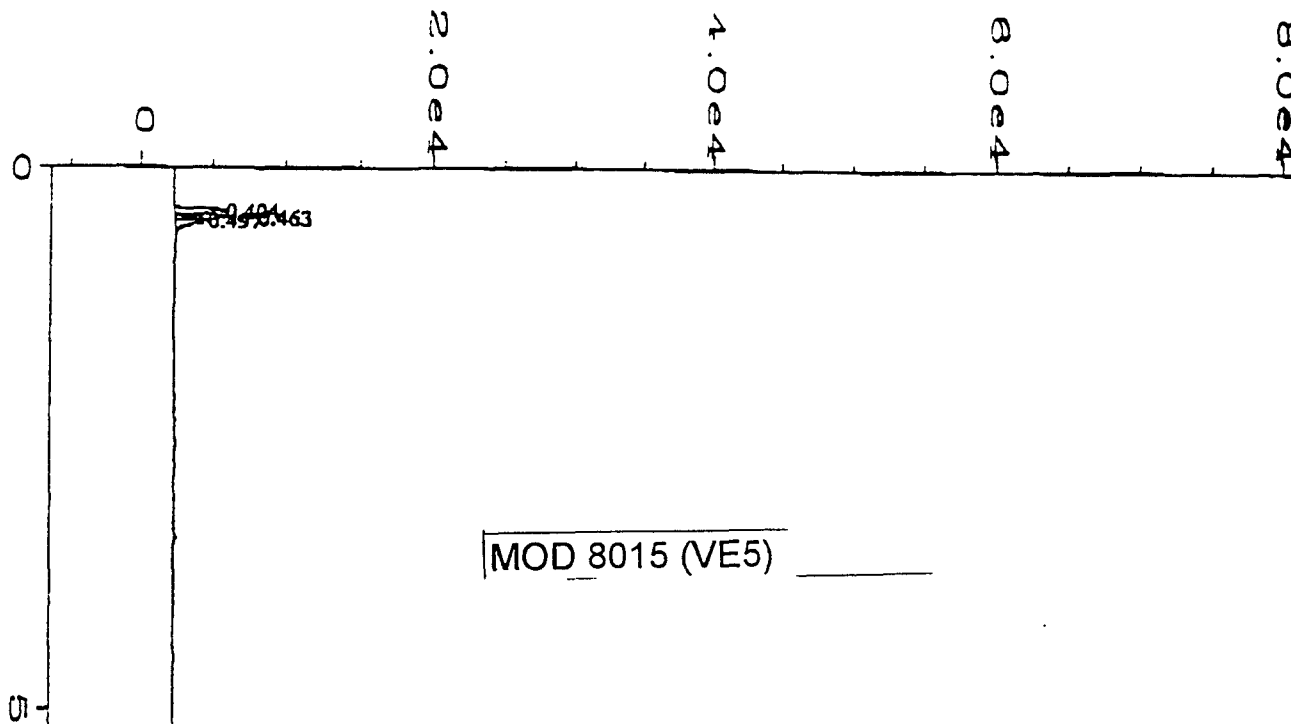
External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\020797\009R0101.D	Page Number	: 1
Operator	:	Vial Number	: 9
Instrument	: FRANCENE	Injection Number	: 1
Sample Name	: 2011-4	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	N-HEXANE.MTH
Acquired on	: 07 Feb 97 05:11 PM	Analysis Method	: N-HEXANE.MTH
Report Created on:	07 Feb 97 05:16 PM	Sample Amount	: 0
Last Recalib on	: 07 FEB 97 04:16 PM	ISTD Amount	:
Multiplier	: 1		

Sig. 2 in C:\HPCHEM\1\DATA\020797\009R0101.D

Ret Time	Area	Type	Width	Ref#	ug/ml	Name
0.585	5344	VV	0.044	1	0.00161	n-hexane
0.417	1671909	BV	0.037		317.328	* uncalibrated *
0.658	4567	VV	0.055		0.867	* uncalibrated *

$$\frac{1.67 \times 10^6}{2.85 \times 10^7} \times 6.67 = 0.391 = 390 \mu\text{pb}$$

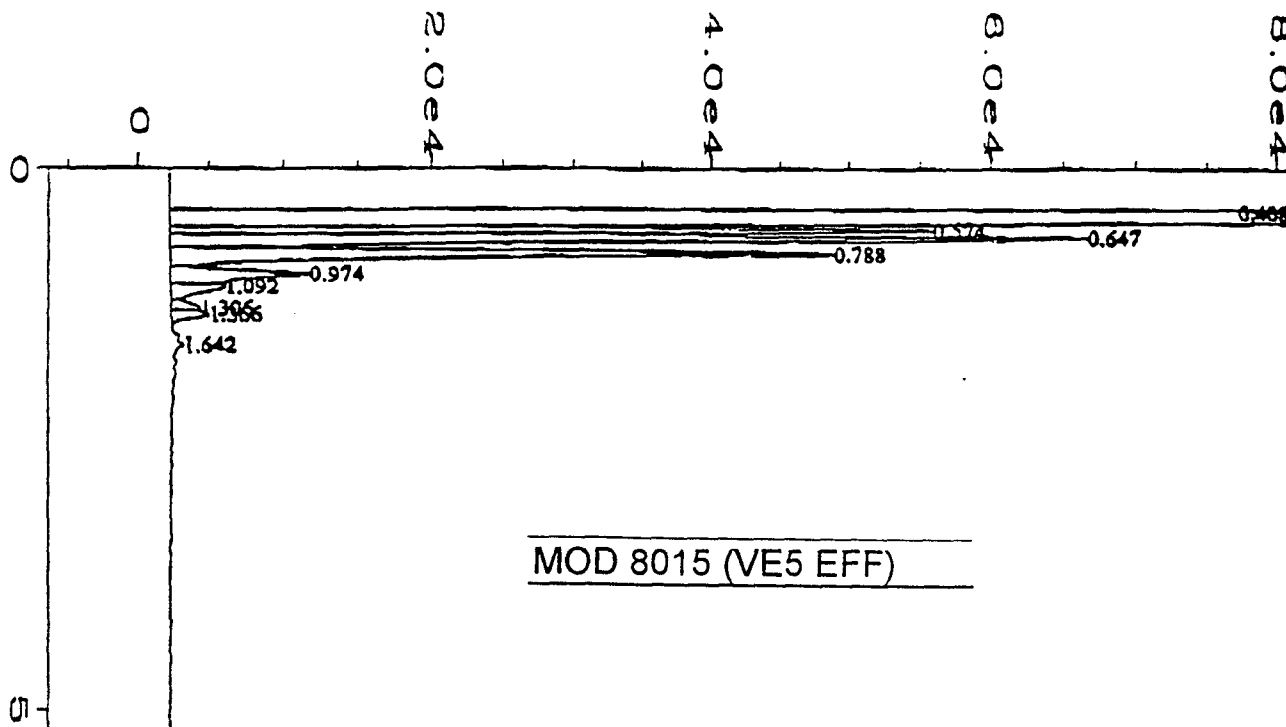


External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\020797\010R0101.D	Page Number	: 1
Operator	:	Vial Number	: 10
Instrument	: FRANCENE	Injection Number	: 1
Sample Name	: 2011-5	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: N-HEXANE.MTH
Acquired on	: 07 Feb 97 05:18 PM	Analysis Method	: N-HEXANE.MTH
Report Created on:	07 Feb 97 05:23 PM	Sample Amount	: 0
Last Recalib on	: 07 FEB 97 04:16 PM	ISTD Amount	:
Multiplier	: 1		

Sig. 2 in C:\HPCHEM\1\DATA\020797\010R0101.D

Ret Time	Area	Type	Width	Ref	ug/ml	Name
0.497	6413	VB	0.041	1	0.00193	n-hexane
0.404	10552	BV	0.043		2.003	* uncalibrated *
0.463	7686	VV	0.019		1.459	* uncalibrated *



External Standard Report

Data File Name : C:\HPCHEM\1\DATA\020797\011R0101.D
 Operator :
 Instrument : FRANCENE
 Sample Name : 2011-6
 Run Time Bar Code:
 Acquired on : 07 Feb 97 05:26 PM
 Report Created on: 07 Feb 97 05:31 PM
 Last Recalib on : 07 FEB 97 04:16 PM
 Multiplier : 1

Page Number : 1
 Vial Number : 11
 Injection Number : 1
 Sequence Line : 1
 Instrument Method: N-HEXANE.MTH
 Analysis Method : N-HEXANE.MTH
 Sample Amount : 0
 ISTD Amount :

Sig. 2 in C:\HPCHEM\1\DATA\020797\011R0101.D

Ret Time	Area	Type	Width	Ref#	ug/ml	Name
0.574	181494	VV	0.052	1	0.0546	n-hexane
0.408	7781375	BV	0.048		1476.905	* uncalibrated *
0.647	263955	VV	0.062		50.099	* uncalibrated *
0.788	208301	VV	0.068		39.536	* uncalibrated *
0.974	53994	VV	0.083		10.248	* uncalibrated *
1.092	21910	VV	0.086		4.159	* uncalibrated *
1.306	8868	VV	0.066		1.683	* uncalibrated *
1.366	11532	VV	0.066		2.189	* uncalibrated *
1.642	292	PBA	0.034		0.0554	* uncalibrated *

TRH

7.41

~~151494 X 10³~~

$$\frac{7.781375 \times 10^6}{2.85 \times 10^7} \times 6.67 = 18.2 \times 10^{-1} = 1800$$

~~250346 X 10³~~

~~2.85 X 10⁷~~

2026

~~2.63 X 10³~~

26 pgb



RECEIVED
MAR 21 1997

AEN I.D. 701371

March 21, 1997

MARATHON OIL COMPANY
PO BOX 552
MIDLAND TX, 79702

Project Name IB REMEDIATION
Project Number 23350173.60

Attention: BOB MENZIE

On 1/24/97 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze air samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

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

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

Kimberly D. McNeill
Project Manager

H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt

Enclosure

American Environmental Network, Inc.

CLIENT	: MARATHON OIL COMPANY	AEN I.D.	: 701371
PROJECT #	: 23350173.60	DATE RECEIVED	: 1/24/97
PROJECT NAME	: IB REMEDIATION	REPORT DATE	: 3/21/97

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	VE3	AIR	1/21/97
02	VE1	AIR	1/20/97
03	VE2	AIR	1/21/97
04	VE4	AIR	1/21/97
05	VE5	AIR	1/21/97
06	VE5 EFF	AIR	1/23/97

American Environmental Network, Inc.

[0] Page 1
Date 11-Feb-97

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: GENERIC GROUP GC/SEMI-VOLATILE

Parameter:	Units:	Results:	Rpt Lmts:	Q:
Sample Number:001	Dry Weight %:N/A	Client Id: 701371-01		
N-HEXANE	UG/L	680	50	
TOTAL PETROLEUM HYDROCARBON	UG/L	ND	50	
Comments:				
ANALYST: SW				
Sample Number:002	Dry Weight %:N/A	Client Id: 701371-02		
N-HEXANE	UG/L	900	50	
TOTAL PETROLEUM HYDROCARBON	UG/L	690	50	
Comments:				
ANALYST: SW				
Sample Number:003	Dry Weight %:N/A	Client Id: 701371-03		
N-HEXANE	UG/L	960	50	
TOTAL PETROLEUM HYDROCARBON	UG/L	ND	50	
Comments:				
ANALYST: SW				
Sample Number:004	Dry Weight %:N/A	Client Id: 701371-04		
N-HEXANE	UG/L	390	50	
TOTAL PETROLEUM HYDROCARBON	UG/L	ND	50	
Comments:				
ANALYST: SW				
Sample Number:005	Dry Weight %:N/A	Client Id: 701371-05		
N-HEXANE	UG/L	ND	50	
TOTAL PETROLEUM HYDROCARBON	UG/L	ND	50	
Comments:				
ANALYST: SW				
Sample Number:006	Dry Weight %:N/A	Client Id: 701371-06		
N-HEXANE	UG/L	1800	50	
TOTAL PETROLEUM HYDROCARBON	UG/L	ND	50	
Comments:				
ANALYST: SW				

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
 Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
 Project Number: 701371
 Project Name: MARATHON OIL CO.
 Project Location: IB REMEDIATION
 Test: TO14
 Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
 Extraction Method: N/A
 Matrix: AIR
 QC Level: I

Lab Id: 001
 Client Sample Id: 701371-01
 Sample Date/Time: 21-JAN-97 1155
 Received Date: 01-FEB-97
 Batch: MAB017
 Blank: B
 Dry Weight %: N/A
 Extraction Date: N/A
 Analysis Date: 09-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ALPHA-CHLOROTOLUENE	MG/M3	ND	0.07	
BENZENE	MG/M3	ND	0.07	
BROMOMETHANE	MG/M3	ND	0.07	
CARBON TETRACHLORIDE	MG/M3	ND	0.07	
CHLOROBENZENE	MG/M3	ND	0.07	
CHLOROETHANE	MG/M3	ND	0.07	
CHLOROFORM	MG/M3	ND	0.07	
CHLOROMETHANE	MG/M3	ND	0.07	
CIS 1,2-DICHLOROETHYLENE	MG/M3	ND	0.07	
DICHLORODIFLUOROMETHANE	MG/M3	ND	0.07	
1,1-DICHLOROETHANE	MG/M3	ND	0.07	
1,2-DICHLOROETHANE	MG/M3	ND	0.07	
1,2-DICHLOROPROPANE	MG/M3	ND	0.07	
CIS-1,3-DICHLOROPROPENE	MG/M3	ND	0.07	
TRANS-1,3-DICHLOROPROPENE	MG/M3	ND	0.07	
DICHLOROTETRAFLUOROETHANE	MG/M3	ND	0.07	
ETHYL BENZENE	MG/M3	ND	0.07	
HEXACHLOROBUTADIENE	MG/M3	ND	0.07	
M-DICHLOROBENZENE	MG/M3	ND	0.07	
M,P-XYLENE	MG/M3	ND	0.07	
METHYLENE CHLORIDE	MG/M3	ND	0.2	
O-DICHLOROBENZENE	MG/M3	ND	0.07	
O-XYLENE	MG/M3	ND	0.07	
P-DICHLOROBENZENE	MG/M3	ND	0.07	
STYRENE	MG/M3	ND	0.07	
1,1,2,2-TETRACHLOROETHANE	MG/M3	ND	0.07	
TETRACHLOROETHYLENE	MG/M3	ND	0.07	
TOLUENE	MG/M3	ND	0.07	
1,1,2-TRICHLOROETHANE	MG/M3	ND	0.07	
TRICHLOROETHYLENE	MG/M3	ND	0.07	
TRICHLOROFLUOROMETHANE	MG/M3	ND	0.07	
VINYL CHLORIDE	MG/M3	ND	0.07	
1,2-DIBROMOETHANE (EDB)	MG/M3	ND	0.07	
1,2,4-TRICHLOROBENZENE	MG/M3	ND	0.07	
1,2,4-TRIMETHYLBENZENE	MG/M3	ND	0.07	
1,3,5-TRIMETHYLBENZENE	MG/M3	ND	0.07	
1,1-DICHLOROETHENE	MG/M3	ND	0.07	
1,1,1-TRICHLOROETHANE	MG/M3	ND	0.07	

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id: 001
Client Sample Id: 701371-01
Sample Date/Time: 21-JAN-97 1155
Received Date: 01-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
TRICHLOROTRIFLUOROETHANE	MG/M3	ND	0.07	
4-ETHYLTOLUENE	MG/M3	ND	0.07	
BROMOFLUOROBENZENE	%REC/SURR	107	90-111	
1,2-DICHLOROETHANE-D4	%REC/SURR	97	85-115	
TOLUENE-D8	%REC/SURR	107	85-111	
ANALYST	INITIALS	BV		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id: 001 Sample Date/Time: 21-JAN-97 1155
Client Sample Id: 701371-01 Received Date: 01-FEB-97

"Sample Tic Report"

Number of Tics Found: 1
Concentration Units: MG/M3

Cas Number:	Compound Name:	RT:	Est Conc:	Q:
000110-54-3	N-HEXANE	6.90	0.3	J

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id: 002
Client Sample Id: 701371-02
Sample Date/Time: 20-JAN-97 1630
Received Date: 01-FEB-97
Batch: MAB017
Blank: A Dry Weight %: N/A
Extraction Date: N/A
Analysis Date: 08-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ALPHA-CHLOROTOLUENE	MG/M3	ND	1.7	
BENZENE	MG/M3	ND	1.7	
BROMOMETHANE	MG/M3	ND	1.7	
CARBON TETRACHLORIDE	MG/M3	ND	1.7	
CHLOROBENZENE	MG/M3	ND	1.7	
CHLOROETHANE	MG/M3	ND	1.7	
CHLOROFORM	MG/M3	ND	1.7	
CHLOROMETHANE	MG/M3	ND	1.7	
CIS 1,2-DICHLOROETHYLENE	MG/M3	ND	1.7	
DICHLORODIFLUOROMETHANE	MG/M3	ND	1.7	
1,1-DICHLOROETHANE	MG/M3	ND	1.7	
1,2-DICHLOROETHANE	MG/M3	ND	1.7	
1,2-DICHLOROPROPANE	MG/M3	ND	1.7	
CIS-1,3-DICHLOROPROPENE	MG/M3	ND	1.7	
TRANS-1,3-DICHLOROPROPENE	MG/M3	ND	1.7	
DICHLOROTETRAFLUOROETHANE	MG/M3	ND	1.7	
ETHYL BENZENE	MG/M3	ND	1.7	
HEXACHLOROBUTADIENE	MG/M3	ND	1.7	
M-DICHLOROBENZENE	MG/M3	ND	1.7	
M,P-XYLENE	MG/M3	ND	1.7	
METHYLENE CHLORIDE	MG/M3	ND	4.1	
O-DICHLOROBENZENE	MG/M3	ND	1.7	
O-XYLENE	MG/M3	ND	1.7	
P-DICHLOROBENZENE	MG/M3	ND	1.7	
STYRENE	MG/M3	ND	1.7	
1,1,2,2-TETRACHLOROETHANE	MG/M3	ND	1.7	
TETRACHLOROETHYLENE	MG/M3	ND	1.7	
TOLUENE	MG/M3	ND	1.7	
1,1,2-TRICHLOROETHANE	MG/M3	ND	1.7	
TRICHLOROETHYLENE	MG/M3	ND	1.7	
TRICHLOROFLUOROMETHANE	MG/M3	ND	1.7	
VINYL CHLORIDE	MG/M3	ND	1.7	
1,2-DIBROMOETHANE (EDB)	MG/M3	ND	1.7	
1,2,4-TRICHLOROBENZENE	MG/M3	ND	1.7	
1,2,4-TRIMETHYLBENZENE	MG/M3	ND	1.7	
1,3,5-TRIMETHYLBENZENE	MG/M3	ND	1.7	
1,1-DICHLOROETHENE	MG/M3	ND	1.7	
1,1,1-TRICHLOROETHANE	MG/M3	ND	1.7	

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id: 002 Sample Date/Time: 20-JAN-97 1630
Client Sample Id: 701371-02 Received Date: 01-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
TRICHLOROTRIFLUOROETHANE	MG/M3	ND	1.7	
4-ETHYLTOLUENE	MG/M3	ND	1.7	
BROMOFLUOROBENZENE	%REC/SURR	102	90-111	
1,2-DICHLOROETHANE-D4	%REC/SURR	98	85-115	
TOLUENE-D8	%REC/SURR	103	85-111	
ANALYST	INITIALS	BV		

Comments :

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id:	002	Sample Date/Time:	20-JAN-97 1630
Client Sample Id:	701371-02	Received Date:	01-FEB-97

"Sample Tic Report"

Number of Tics Found: 1
Concentration Units: MG/M3

Cas Number:	Compound Name:	RT:	Est Conc:	Q:
000110-54-3	N-HEXANE	6.92	8	

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id: 003
Client Sample Id: 701371-03
Sample Date/Time: 21-JAN-97 1350
Received Date: 01-FEB-97
Batch: MAB017
Blank: B
Dry Weight %: N/A
Extraction Date: N/A
Analysis Date: 09-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ALPHA-CHLOROTOLUENE	MG/M3	ND	0.07	
BENZENE	MG/M3	ND	0.07	
BROMOMETHANE	MG/M3	ND	0.07	
CARBON TETRACHLORIDE	MG/M3	ND	0.07	
CHLOROBENZENE	MG/M3	ND	0.07	
CHLOROETHANE	MG/M3	ND	0.07	
CHLOROFORM	MG/M3	ND	0.07	
CHLOROMETHANE	MG/M3	ND	0.07	
CIS 1,2-DICHLOROETHYLENE	MG/M3	ND	0.07	
DICHLORODIFLUOROMETHANE	MG/M3	ND	0.07	
1,1-DICHLOROETHANE	MG/M3	ND	0.07	
1,2-DICHLOROETHANE	MG/M3	ND	0.07	
1,2-DICHLOROPROPANE	MG/M3	ND	0.07	
CIS-1,3-DICHLOROPROPENE	MG/M3	ND	0.07	
TRANS-1,3-DICHLOROPROPENE	MG/M3	ND	0.07	
DICHLOROTETRAFLUOROETHANE	MG/M3	ND	0.07	
ETHYL BENZENE	MG/M3	ND	0.07	
HEXACHLOROBUTADIENE	MG/M3	ND	0.07	
M-DICHLOROBENZENE	MG/M3	ND	0.07	
M,P-XYLENE	MG/M3	ND	0.07	
METHYLENE CHLORIDE	MG/M3	ND	0.2	
O-DICHLOROBENZENE	MG/M3	ND	0.07	
O-XYLENE	MG/M3	ND	0.07	
P-DICHLOROBENZENE	MG/M3	ND	0.07	
STYRENE	MG/M3	ND	0.07	
1,1,2,2-TETRACHLOROETHANE	MG/M3	ND	0.07	
TETRACHLOROETHYLENE	MG/M3	ND	0.07	
TOLUENE	MG/M3	ND	0.07	
1,1,2-TRICHLOROETHANE	MG/M3	ND	0.07	
TRICHLOROETHYLENE	MG/M3	ND	0.07	
TRICHLOROFLUOROMETHANE	MG/M3	ND	0.07	
VINYL CHLORIDE	MG/M3	ND	0.07	
1,2-DIBROMOETHANE (EDB)	MG/M3	ND	0.07	
1,2,4-TRICHLOROBENZENE	MG/M3	ND	0.07	
1,2,4-TRIMETHYLBENZENE	MG/M3	ND	0.07	
1,3,5-TRIMETHYLBENZENE	MG/M3	ND	0.07	
1,1-DICHLOROETHENE	MG/M3	ND	0.07	
1,1,1-TRICHLOROETHANE	MG/M3	ND	0.07	

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id: 003
Client Sample Id: 701371-03
Sample Date/Time: 21-JAN-97 1350
Received Date: 01-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
TRICHLOROTRIFLUOROETHANE	MG/M3	ND	0.07	
4-ETHYLTOLUENE	MG/M3	ND	0.07	
BROMOFLUOROBENZENE	%REC/SURR	107	90-111	
1,2-DICHLOROETHANE-D4	%REC/SURR	100	85-115	
TOLUENE-D8	%REC/SURR	102	85-111	
ANALYST	INITIALS	BV		

Comments:

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id:	003	Sample Date/Time:	21-JAN-97 1350
Client Sample Id:	701371-03	Received Date:	01-FEB-97

"Sample Tic Report"

Number of Tics Found: 1
Concentration Units: MG/M3

Cas Number:	Compound Name:	RT:	Est Conc:	Q:
000110-54-3	N-HEXANE	7.00	0.4	J

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id: 004
Client Sample Id: 701371-04
Sample Date/Time: 21-JAN-97 1545
Received Date: 01-FEB-97
Batch: MAB017
Blank: B
Dry Weight %: N/A
Extraction Date: N/A
Analysis Date: 09-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ALPHA-CHLOROTOLUENE	MG/M3	ND	0.1	
BENZENE	MG/M3	ND	0.1	
BROMOMETHANE	MG/M3	ND	0.1	
CARBON TETRACHLORIDE	MG/M3	ND	0.1	
CHLOROBENZENE	MG/M3	ND	0.1	
CHLOROETHANE	MG/M3	ND	0.1	
CHLOROFORM	MG/M3	ND	0.1	
CHLOROMETHANE	MG/M3	ND	0.1	
CIS 1,2-DICHLOROETHYLENE	MG/M3	ND	0.1	
DICHLORODIFLUOROMETHANE	MG/M3	ND	0.1	
1,1-DICHLOROETHANE	MG/M3	ND	0.1	
1,2-DICHLOROETHANE	MG/M3	ND	0.1	
1,2-DICHLOROPROPANE	MG/M3	ND	0.1	
CIS-1,3-DICHLOROPROPENE	MG/M3	ND	0.1	
TRANS-1,3-DICHLOROPROPENE	MG/M3	ND	0.1	
DICHLOROTETRAFLUROETHANE	MG/M3	ND	0.1	
ETHYL BENZENE	MG/M3	ND	0.1	
HEXACHLOROBUTADIENE	MG/M3	ND	0.1	
M-DICHLOROBENZENE	MG/M3	ND	0.1	
M,P-XYLENE	MG/M3	ND	0.1	
METHYLENE CHLORIDE	MG/M3	ND	0.3	
O-DICHLOROBENZENE	MG/M3	ND	0.1	
O-XYLENE	MG/M3	ND	0.1	
P-DICHLOROBENZENE	MG/M3	ND	0.1	
STYRENE	MG/M3	ND	0.1	
1,1,2,2-TETRACHLOROETHANE	MG/M3	ND	0.1	
TETRACHLOROETHYLENE	MG/M3	ND	0.1	
TOLUENE	MG/M3	ND	0.1	
1,1,2-TRICHLOROETHANE	MG/M3	ND	0.1	
TRICHLOROETHYLENE	MG/M3	ND	0.1	
TRICHLOROFLUOROMETHANE	MG/M3	ND	0.1	
VINYL CHLORIDE	MG/M3	ND	0.1	
1,2-DIBROMOETHANE (EDB)	MG/M3	ND	0.1	
1,2,4-TRICHLOROBENZENE	MG/M3	ND	0.1	
1,2,4-TRIMETHYLBENZENE	MG/M3	ND	0.1	
1,3,5-TRIMETHYLBENZENE	MG/M3	ND	0.1	
1,1-DICHLOROETHENE	MG/M3	ND	0.1	
1,1,1-TRICHLOROETHANE	MG/M3	ND	0.1	

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id: 004
Client Sample Id: 701371-04
Sample Date/Time: 21-JAN-97 1545
Received Date: 01-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
TRICHLOROTRIFLUOROETHANE	MG/M3	ND	0.1	
4-ETHYLTOLUENE	MG/M3	ND	0.1	
BROMOFLUOROBENZENE	%REC/SURR	106	90-111	
1,2-DICHLOROETHANE-D4	%REC/SURR	96	85-115	
TOLUENE-D8	%REC/SURR	104	85-111	
ANALYST	INITIALS	BV		

Comments:

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id: 004 Sample Date/Time: 21-JAN-97 1545
Client Sample Id: 701371-04 Received Date: 01-FEB-97

"Sample Tic Report"

Number of Tics Found: 1
Concentration Units: MG/M3

Cas Number:	Compound Name:	RT:	Est Conc:	Q:
000110-54-3	N-HEXANE	6.99	0.5	

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
 Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
 Project Number: 701371
 Project Name: MARATHON OIL CO.
 Project Location: IB REMEDIATION
 Test: TO14
 Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
 Extraction Method: N/A
 Matrix: AIR
 QC Level: I

Lab Id: 005
 Client Sample Id: 701371-05
 Sample Date/Time: 21-JAN-97 1730
 Received Date: 01-FEB-97
 Batch: MAB017
 Blank: B
 Dry Weight %: N/A
 Extraction Date: N/A
 Analysis Date: 09-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ALPHA-CHLOROTOLUENE	MG/M3	ND	0.07	
BENZENE	MG/M3	ND	0.07	
BROMOMETHANE	MG/M3	ND	0.07	
CARBON TETRACHLORIDE	MG/M3	ND	0.07	
CHLOROBENZENE	MG/M3	ND	0.07	
CHLOROETHANE	MG/M3	ND	0.07	
CHLOROFORM	MG/M3	ND	0.07	
CHLOROMETHANE	MG/M3	ND	0.07	
CIS 1,2-DICHLOROETHYLENE	MG/M3	ND	0.07	
DICHLORODIFLUOROMETHANE	MG/M3	ND	0.07	
1,1-DICHLOROETHANE	MG/M3	ND	0.07	
1,2-DICHLOROETHANE	MG/M3	ND	0.07	
1,2-DICHLOROPROPANE	MG/M3	ND	0.07	
CIS-1,3-DICHLOROPROPENE	MG/M3	ND	0.07	
TRANS-1,3-DICHLOROPROPENE	MG/M3	ND	0.07	
DICHLOROTETRAFLUOROETHANE	MG/M3	ND	0.07	
ETHYL BENZENE	MG/M3	ND	0.07	
HEXACHLOROBUTADIENE	MG/M3	ND	0.07	
M-DICHLOROBENZENE	MG/M3	ND	0.07	
M, P-XYLENE	MG/M3	ND	0.07	
METHYLENE CHLORIDE	MG/M3	ND	0.2	
O-DICHLOROBENZENE	MG/M3	ND	0.07	
O-XYLENE	MG/M3	ND	0.07	
P-DICHLOROBENZENE	MG/M3	ND	0.07	
STYRENE	MG/M3	ND	0.07	
1,1,2,2-TETRACHLOROETHANE	MG/M3	ND	0.07	
TETRACHLOROETHYLENE	MG/M3	ND	0.07	
TOLUENE	MG/M3	0.10	0.07	
1,1,2-TRICHLOROETHANE	MG/M3	ND	0.07	
TRICHLOROETHYLENE	MG/M3	ND	0.07	
TRICHLOROFUOROMETHANE	MG/M3	ND	0.07	
VINYL CHLORIDE	MG/M3	ND	0.07	
1,2-DIBROMOETHANE (EDB)	MG/M3	ND	0.07	
1,2,4-TRICHLOROBENZENE	MG/M3	ND	0.07	
1,2,4-TRIMETHYLBENZENE	MG/M3	ND	0.07	
1,3,5-TRIMETHYLBENZENE	MG/M3	ND	0.07	
1,1-DICHLOROETHENE	MG/M3	ND	0.07	
1,1,1-TRICHLOROETHANE	MG/M3	ND	0.07	

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id: 005
Client Sample Id: 701371-05

Sample Date/Time: 21-JAN-97 1730
Received Date: 01-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
TRICHLOROTRIFLUOROETHANE	MG/M3	ND	0.07	
4-ETHYLTOLUENE	MG/M3	ND	0.07	
BROMOFLUOROBENZENE	%REC/SURR	105	90-111	
1,2-DICHLOROETHANE-D4	%REC/SURR	97	85-115	
TOLUENE-D8	%REC/SURR	104	85-111	
ANALYST	INITIALS	BV		

Comments:

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id:	005	Sample Date/Time:	21-JAN-97 1730
Client Sample Id:	701371-05	Received Date:	01-FEB-97

"Sample Tic Report"

Number of Tics Found: 0
Concentration Units: MG/M3

Cas Number:	Compound Name:	RT:	Est Conc:	Q:
-------------	----------------	-----	-----------	----

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
 Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
 Project Number: 701371
 Project Name: MARATHON OIL CO.
 Project Location: IB REMEDIATION
 Test: TO14
 Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
 Extraction Method: N/A
 Matrix: AIR
 QC Level: I

Lab Id: 006
 Client Sample Id: 701371-06
 Sample Date/Time: 23-JAN-97 1100
 Received Date: 01-FEB-97
 Batch: MAB017
 Blank: A
 Dry Weight %: N/A
 Extraction Date: N/A
 Analysis Date: 09-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ALPHA-CHLOROTOLUENE	MG/M3	ND	2	
BENZENE	MG/M3	ND	2	
BROMOMETHANE	MG/M3	ND	2	
CARBON TETRACHLORIDE	MG/M3	ND	2	
CHLOROBENZENE	MG/M3	ND	2	
CHLOROETHANE	MG/M3	ND	2	
CHLOROFORM	MG/M3	ND	2	
CHLOROMETHANE	MG/M3	ND	2	
CIS 1,2-DICHLOROETHYLENE	MG/M3	ND	2	
DICHLORODIFLUOROMETHANE	MG/M3	ND	2	
1,1-DICHLOROETHANE	MG/M3	ND	2	
1,2-DICHLOROETHANE	MG/M3	ND	2	
1,2-DICHLOROPROPANE	MG/M3	ND	2	
CIS-1,3-DICHLOROPROPENE	MG/M3	ND	2	
TRANS-1,3-DICHLOROPROPENE	MG/M3	ND	2	
DICHLOROTETRAFLUOROETHANE	MG/M3	ND	2	
ETHYL BENZENE	MG/M3	ND	2	
HEXACHLOROBUTADIENE	MG/M3	ND	2	
M-DICHLOROBENZENE	MG/M3	ND	2	
M,P-XYLENE	MG/M3	ND	2	
METHYLENE CHLORIDE	MG/M3	ND	4	
O-DICHLOROBENZENE	MG/M3	ND	2	
O-XYLENE	MG/M3	ND	2	
P-DICHLOROBENZENE	MG/M3	ND	2	
STYRENE	MG/M3	ND	2	
1,1,2,2-TETRACHLOROETHANE	MG/M3	ND	2	
TETRACHLOROETHYLENE	MG/M3	ND	2	
TOLUENE	MG/M3	ND	2	
1,1,2-TRICHLOROETHANE	MG/M3	ND	2	
TRICHLOROETHYLENE	MG/M3	ND	2	
TRICHLOROFLUOROMETHANE	MG/M3	ND	2	
VINYL CHLORIDE	MG/M3	ND	2	
1,2-DIBROMOETHANE (EDB)	MG/M3	ND	2	
1,2,4-TRICHLOROBENZENE	MG/M3	ND	2	
1,2,4-TRIMETHYLBENZENE	MG/M3	ND	2	
1,3,5-TRIMETHYLBENZENE	MG/M3	ND	2	
1,1-DICHLOROETHENE	MG/M3	ND	2	
1,1,1-TRICHLOROETHANE	MG/M3	ND	2	

American Environmental Network, Inc.

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id:	006	Sample Date/Time:	23-JAN-97 1100
Client Sample Id:	701371-06	Received Date:	01-FEB-97

Parameter:	Units:	Results:	Rpt Lmts:	Q:
TRICHLOROTRIFLUOROETHANE	MG/M3	ND	2	
4-ETHYLTOLUENE	MG/M3	ND	2	
BROMOFLUOROBENZENE	%REC/SURR	100	90-111	
1,2-DICHLOROETHANE-D4	%REC/SURR	99	85-115	
TOLUENE-D8	%REC/SURR	103	85-111	
ANALYST	INITIALS	BV		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A
Matrix: AIR
QC Level: I

Lab Id:	006	Sample Date/Time:	23-JAN-97 1100
Client Sample Id:	701371-06	Received Date:	01-FEB-97

"Sample Tic Report"

Number of Tics Found: 1
Concentration Units: MG/M3

Cas Number:	Compound Name:	RT:	Est Conc:	Q:
000110-54-3	N-HEXANE	6.98	12	

American Environmental Network, Inc.

"Method Report Summary"

Accession Number: 702011
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.
Project Number: 701371
Project Name: MARATHON OIL CO.
Project Location: IB REMEDIATION
Test: TO14

Client Sample Id:	Parameter:	Unit:	Result:
701371-05	TOLUENE	MG/M3	0.10

American Environmental Network, Inc.

"QC Report"

Title: Bag/Can Blank
Batch: MAB017
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A

Blank Id: B Date Analyzed: 09-FEB-97 Date Extracted: N/A

Parameters:	Units:	Results:	Reporting Limits:
ALPHA-CHLOROTOLUENE	MG/M3	ND	0.03
ACROLEIN	MG/M3	ND	1.0
ACETONE	MG/M3	ND	0.1
ACRYLONITRILE	MG/M3	ND	1.0
BENZENE	MG/M3	ND	0.03
BROMOMETHANE	MG/M3	ND	0.03
BROMOFORM	MG/M3	ND	0.03
2-BUTANONE	MG/M3	ND	0.10
BROMODICHLOROMETHANE	MG/M3	ND	0.03
CARBON TETRACHLORIDE	MG/M3	ND	0.03
CARBON DISULFIDE	MG/M3	ND	0.03
CHLOROBENZENE	MG/M3	ND	0.03
CHLOROETHANE	MG/M3	ND	0.03
CHLOROFORM	MG/M3	ND	0.03
CHLOROMETHANE	MG/M3	ND	0.03
CIS 1,2 DICHLOROETHYLENE	MG/M3	ND	0.03
TRANS 1,2 DICHLOROETHYLENE	MG/M3	ND	0.03
DICHLORODIFLUOROMETHANE	MG/M3	ND	0.03
DIBROMOCHLOROMETHANE	MG/M3	ND	0.03
1,1-DICHLOROETHANE	MG/M3	ND	0.03
1,2-DICHLOROETHANE	MG/M3	ND	0.03
1,2-DICHLOROPROPANE	MG/M3	ND	0.03
CIS-1,3-DICHLOROPROPENE	MG/M3	ND	0.03
TRANS-1,3-DICHLOROPROPENE	MG/M3	ND	0.03
DICHLOROTETRAFLUOROETHANE	MG/M3	ND	0.03
1,4-DICHLORO-2-BUTENE	MG/M3	ND	0.03
ETHYL BENZENE	MG/M3	ND	0.03
HEXACHLOROBUTADIENE	MG/M3	ND	0.03
2-HEXANONE	MG/M3	ND	0.10
M-DICHLOROBENZENE	MG/M3	ND	0.03
M,P-XYLENE	MG/M3	ND	0.03
METHYLENE CHLORIDE	MG/M3	ND	0.07
4-METHYL-2-PENTANONE	MG/M3	ND	0.10
O-DICHLOROBENZENE	MG/M3	ND	0.03
O-XYLENE	MG/M3	ND	0.03
P-DICHLOROBENZENE	MG/M3	ND	0.03
STYRENE	MG/M3	ND	0.03
1,1,2,2-TETRACHLOROETHANE	MG/M3	ND	0.03
TETRACHLOROETHYLENE	MG/M3	ND	0.03
TOLUENE	MG/M3	ND	0.03
1,1,2-TRICHLOROETHANE	MG/M3	ND	0.03
TRICHLOROETHYLENE	MG/M3	ND	0.03
TRICHLOROFLUOROMETHANE	MG/M3	ND	0.03
VINYL CHLORIDE	MG/M3	ND	0.03
VINYL ACETATE	MG/M3	ND	0.03
1,2-DIBROMOETHANE (EDB)	MG/M3	ND	0.03

American Environmental Network, Inc.

"QC Report"

Title: Bag/Can Blank
Batch: MAB017
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A

Parameters:	Units:	Results:	Reporting Limits:
1,2,4 TRICHLOROBENZENE	MG/M3	ND	0.03
1,2,4-TRIMETHYLBENZENE	MG/M3	ND	0.03
1,3,5-TRIMETHYLBENZENE	MG/M3	ND	0.03
1,1-DICHLOROETHENE	MG/M3	ND	0.03
1,1,1-TRICHLOROETHANE	MG/M3	ND	0.03
TRICHLOROTRIFLUOROETHANE	MG/M3	ND	0.03
4-ETHYLTOLUENE	MG/M3	ND	0.03
BROMOFLUOROBENZENE	%REC/SURR	105	90-111
1,2-DICHLOROETHANE-D4	%REC/SURR	98	85-115
TOLUENE-D8	%REC/SURR	105	85-111
ANALYST	INITIALS	BV	

Comments:

American Environmental Network, Inc.

"QC Report"

Title: Bag/Can Blank
Batch: MAB017
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A

Blank Id: A Date Analyzed: 09-FEB-97 Date Extracted: N/A

Parameters:	Units:	Results:	Reporting Limits:
ALPHA-CHLOROTOLUENE	MG/M3	ND	0.03
ACROLEIN	MG/M3	ND	1.0
ACETONE	MG/M3	ND	0.1
ACRYLONITRILE	MG/M3	ND	1.0
BENZENE	MG/M3	ND	0.03
BROMOMETHANE	MG/M3	ND	0.03
BROMOFORM	MG/M3	ND	0.03
2-BUTANONE	MG/M3	ND	0.10
BROMODICHLOROMETHANE	MG/M3	ND	0.03
CARBON TETRACHLORIDE	MG/M3	ND	0.03
CARBON DISULFIDE	MG/M3	ND	0.03
CHLOROBENZENE	MG/M3	ND	0.03
CHLOROETHANE	MG/M3	ND	0.03
CHLOROFORM	MG/M3	ND	0.03
CHLOROMETHANE	MG/M3	ND	0.03
CIS 1,2 DICHLOROETHYLENE	MG/M3	ND	0.03
TRANS 1,2 DICHLOROETHYLENE	MG/M3	ND	0.03
DICHLORODIFLUOROMETHANE	MG/M3	ND	0.03
DIBROMOCHLOROMETHANE	MG/M3	ND	0.03
1,1-DICHLOROETHANE	MG/M3	ND	0.03
1,2-DICHLOROETHANE	MG/M3	ND	0.03
1,2-DICHLOROPROPANE	MG/M3	ND	0.03
CIS-1,3-DICHLOROPROPENE	MG/M3	ND	0.03
TRANS-1,3-DICHLOROPROPENE	MG/M3	ND	0.03
DICHLOROTETRAFLUOROETHANE	MG/M3	ND	0.03
1,4-DICHLORO-2-BUTENE	MG/M3	ND	0.03
ETHYL BENZENE	MG/M3	ND	0.03
HEXACHLOROBUTADIENE	MG/M3	ND	0.03
2-HEXANONE	MG/M3	ND	0.10
M-DICHLOROBENZENE	MG/M3	ND	0.03
M,P-XYLENE	MG/M3	ND	0.03
METHYLENE CHLORIDE	MG/M3	ND	0.07
4-METHYL-2-PENTANONE	MG/M3	ND	0.10
O-DICHLOROBENZENE	MG/M3	ND	0.03
O-XYLENE	MG/M3	ND	0.03
P-DICHLOROBENZENE	MG/M3	ND	0.03
STYRENE	MG/M3	ND	0.03
1,1,2,2-TETRACHLOROETHANE	MG/M3	ND	0.03
TETRACHLOROETHYLENE	MG/M3	ND	0.03
TOLUENE	MG/M3	ND	0.03
1,1,2-TRICHLOROETHANE	MG/M3	ND	0.03
TRICHLOROETHYLENE	MG/M3	ND	0.03
TRICHLOROFLUOROMETHANE	MG/M3	ND	0.03
VINYL CHLORIDE	MG/M3	ND	0.03
VINYL ACETATE	MG/M3	ND	0.03
1,2-DIBROMOETHANE (EDB)	MG/M3	ND	0.03

American Environmental Network, Inc.

"QC Report"

Title: Bag/Can Blank
Batch: MAB017
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A

Parameters:	Units:	Results:	Reporting Limits:
1,2,4 TRICHLOROBENZENE	MG/M3	ND	0.03
1,2,4-TRIMETHYLBENZENE	MG/M3	ND	0.03
1,3,5-TRIMETHYLBENZENE	MG/M3	ND	0.03
1,1-DICHLOROETHENE	MG/M3	ND	0.03
1,1,1-TRICHLOROETHANE	MG/M3	ND	0.03
TRICHLOROTRIFLUOROETHANE	MG/M3	ND	0.03
4-ETHYLTOLUENE	MG/M3	ND	0.03
BROMOFLUOROBENZENE	%REC/SURR	105	90-111
1,2-DICHLOROETHANE-D4	%REC/SURR	96	85-115
TOLUENE-D8	%REC/SURR	105	85-111
ANALYST	INITIALS	BV	

Comments:

American Environmental Network, Inc.

"QC Report"

Title: Bag/Can Reagent
Batch: MAB017
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A

RS Date Analyzed: 08-FEB-97
RSD Date Analyzed: 08-FEB-97

RS Date Extracted: N/A
RSD Date Extracted: N/A

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	RSD Conc	RSD %Rec	RPD	Rec Lmts
1,1-DICHLOROETHENE	2.0	<0.03	2.0	100	1.8	90	11	36-134
TRICHLOROETHENE	2.0	<0.03	1.8	90	1.8	90	0	65-130
BENZENE	2.0	<0.03	1.9	95	1.9	95	0	61-140
TOLUENE	2.0	<0.03	2.0	100	1.9	95	5	70-130
CHLOROBENZENE	2.0	<0.03	2.1	105	2.0	100	5	77-137

Surrogates:	RS %Rec	RSD %Rec	Rec Lmts
1,2-DICHLOROETHANE-D4	100	96	85-115
TOLUENE-D8	105	105	85-111
BROMOFLUOROBENZENE	104	99	90-111

Comments:
DUE TO THE NATURE OF THE SAMPLE MATRIX, MATRIX SPIKE/MATRIX SPIKE DUPLICATE
CANNOT BE ANALYZED.

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
MG/M3 = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE
PROGRAM AND REFERENCED METHOD.

American Environmental Network, Inc.

Common notation for Organic reporting

N/S = NOT SUBMITTED
N/A = NOT APPLICABLE
D = DILUTED OUT
UG/L = PARTS PER BILLION.
UG/KG = PARTS PER BILLION.
MG/KG = PARTS PER MILLION.
MG/L = PARTS PER MILLION.
MG/M3 = MILLIGRAMS PER CUBIC METER.
NG = NANOGRAMS.
UG = MICROGRAMS.
PPBV = PARTS PER BILLION/VOLUME.
< = LESS THAN DETECTION LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS
J = THE REPORTED VALUE IS EITHER LESS THAN THE REPORTING LIMIT BUT
GREATER THAN ZERO, OR QUANTITATED AS A TIC; THEREFORE, IT IS
ESTIMATED.
JJ = REPORTED VALUE IS ESTIMATED DUE TO MATRIX INTERFERENCE.
ND = NOT DETECTED ABOVE REPORT LIMIT.
RPT LIMIT = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.
RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)

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

ORGANIC SOILS ARE REPORTED ON A DRY WEIGHT BASIS.

DUE TO THE NATURE OF THE SAMPLE MATRIX, MATRIX SPIKE/MATRIX SPIKE
DUPLICATE ANALYSIS CANNOT BE PERFORMED FOR AIR ANALYSIS.

CLP SOW 1991, USEPA CONTRACT LABORATORY PROGRAM, STATEMENT OF WORK FOR
ORGANICS ANALYSIS, DOCUMENT NUMBER OLM01.8, AUGUST 1991.

LP = LEVERNE PETERSON	RW = RITA WINGO
LD = LARRY DILMORE	LL = LANCE LARSON
PL = PAUL LESCHENSKY	BV = BEN VAUGHN
DWB = DAVID BOWERS	

BLANK ANALYSIS

DATE: 07-FEB-97

METHOD: AEN/GC/FID

BATCH: GEA011

COMPOUND	UNITS	REPORTING LIMIT	RESULT
N-HEXANE	UG/L	50	ND

DUPLICATE SAMPLE ANALYSIS

DATE: 07-FEB-97

METHOD: AEN/GC/FID

LAB SAMPLE #: 702011-1

BATCH: GEA011

COMPOUND	SAMPLE RESULT	DUPLICATE RESULT	%RPD	QC LIMITS
N-HEXANE	680	620	9	50

ALL RESULTS REPORTED IN UG/L.

ND = NOT DETECTED

NC = NOT CALCULABLE

**SOURCE FOR CONTROL LIMIT IS INTERNAL LABORATORY QUALITY ASSURANCE
PROGRAM AND AEN/GC/FID.**

American Environmental Network, Inc.

"QC Report"

Title: Bag/Can Blank
 Batch: MAB017
 Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
 Extraction Method: N/A

Blank Id: B Date Analyzed: 09-FEB-97 Date Extracted: N/A

Parameters:	Units:	Results:	Reporting Limits:
ALPHA-CHLOROTOLUENE	MG/M3	ND	0.03
ACROLEIN	MG/M3	ND	1.0
ACETONE	MG/M3	ND	0.1
ACRYLONITRILE	MG/M3	ND	1.0
BENZENE	MG/M3	ND	0.03
BROMOMETHANE	MG/M3	ND	0.03
BROMOFORM	MG/M3	ND	0.03
2-BUTANONE	MG/M3	ND	0.10
BROMODICHLOROMETHANE	MG/M3	ND	0.03
CARBON TETRACHLORIDE	MG/M3	ND	0.03
CARBON DISULFIDE	MG/M3	ND	0.03
CHLORO BENZENE	MG/M3	ND	0.03
CHLOROETHANE	MG/M3	ND	0.03
CHLOROFORM	MG/M3	ND	0.03
CHLOROMETHANE	MG/M3	ND	0.03
CIS 1,2 DICHLOROETHYLENE	MG/M3	ND	0.03
TRANS 1,2 DICHLOROETHYLENE	MG/M3	ND	0.03
DICHLORODIFLUOROMETHANE	MG/M3	ND	0.03
DIBROMOCHLOROMETHANE	MG/M3	ND	0.03
1,1-DICHLOROETHANE	MG/M3	ND	0.03
1,2-DICHLOROETHANE	MG/M3	ND	0.03
1,2-DICHLOROPROPANE	MG/M3	ND	0.03
CIS-1,3-DICHLOROPROPENE	MG/M3	ND	0.03
TRANS-1,3-DICHLOROPROPENE	MG/M3	ND	0.03
DICHLOROTETRAFLUOROETHANE	MG/M3	ND	0.03
1,4-DICHLORO-2-BUTENE	MG/M3	ND	0.03
ETHYL BENZENE	MG/M3	ND	0.03
HEXACHLOROBUTADIENE	MG/M3	ND	0.03
2-HEXANONE	MG/M3	ND	0.10
M-DICHLORO BENZENE	MG/M3	ND	0.03
M,P-XYLENE	MG/M3	ND	0.03
METHYLENE CHLORIDE	MG/M3	ND	0.07
4-METHYL-2-PENTANONE	MG/M3	ND	0.10
O-DICHLORO BENZENE	MG/M3	ND	0.03
O-XYLENE	MG/M3	ND	0.03
P-DICHLORO BENZENE	MG/M3	ND	0.03
STYRENE	MG/M3	ND	0.03
1,1,2,2-TETRACHLOROETHANE	MG/M3	ND	0.03
TETRACHLOROETHYLENE	MG/M3	ND	0.03
TOLUENE	MG/M3	ND	0.03
1,1,2-TRICHLOROETHANE	MG/M3	ND	0.03
TRICHLOROETHYLENE	MG/M3	ND	0.03
TRICHLOROFLUOROMETHANE	MG/M3	ND	0.03
VINYL CHLORIDE	MG/M3	ND	0.03
VINYL ACETATE	MG/M3	ND	0.03
1,2-DIBROMOETHANE (EDB)	MG/M3	ND	0.03

American Environmental Network, Inc.

"QC Report"

Title: Bag/Can Blank
Batch: MAB017
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A

Parameters:	Units:	Results:	Reporting Limits:
1,2,4 TRICHLOROBENZENE	MG/M3	ND	0.03
1,2,4-TRIMETHYLBENZENE	MG/M3	ND	0.03
1,3,5-TRIMETHYLBENZENE	MG/M3	ND	0.03
1,1-DICHLOROETHENE	MG/M3	ND	0.03
1,1,1-TRICHLOROETHANE	MG/M3	ND	0.03
TRICHLOROTRIFLUOROETHANE	MG/M3	ND	0.03
4-ETHYLTOLUENE	MG/M3	ND	0.03
BROMOFLUOROBENZENE	%REC/SURR	105	90-111
1,2-DICHLOROETHANE-D4	%REC/SURR	98	85-115
TOLUENE-D8	%REC/SURR	105	85-111
ANALYST	INITIALS	BV	

Comments:

American Environmental Network, Inc.

"QC Report"

Title: Bag/Can Blank
Batch: MAB017
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A

Blank Id: A Date Analyzed: 08-FEB-97 Date Extracted: N/A

Parameters:	Units:	Results:	Reporting Limits:
ALPHA-CHLOROTOLUENE	MG/M3	ND	0.03
ACROLEIN	MG/M3	ND	1.0
ACETONE	MG/M3	ND	0.1
ACRYLONITRILE	MG/M3	ND	1.0
BENZENE	MG/M3	ND	0.03
BROMOMETHANE	MG/M3	ND	0.03
BROMOFORM	MG/M3	ND	0.03
2-BUTANONE	MG/M3	ND	0.10
BROMODICHLOROMETHANE	MG/M3	ND	0.03
CARBON TETRACHLORIDE	MG/M3	ND	0.03
CARBON DISULFIDE	MG/M3	ND	0.03
CHLOROBENZENE	MG/M3	ND	0.03
CHLOROETHANE	MG/M3	ND	0.03
CHLOROFORM	MG/M3	ND	0.03
CHLOROMETHANE	MG/M3	ND	0.03
CIS 1,2 DICHLOROETHYLENE	MG/M3	ND	0.03
TRANS 1,2 DICHLOROETHYLENE	MG/M3	ND	0.03
DICHLORODIFLUOROMETHANE	MG/M3	ND	0.03
DIBROMOCHLOROMETHANE	MG/M3	ND	0.03
1,1-DICHLOROETHANE	MG/M3	ND	0.03
1,2-DICHLOROETHANE	MG/M3	ND	0.03
1,2-DICHLOROPROPANE	MG/M3	ND	0.03
CIS-1,3-DICHLOROPROPENE	MG/M3	ND	0.03
TRANS-1,3-DICHLOROPROPENE	MG/M3	ND	0.03
DICHLOROTETRAFLUOROETHANE	MG/M3	ND	0.03
1,4-DICHLORO-2-BUTENE	MG/M3	ND	0.03
ETHYL BENZENE	MG/M3	ND	0.03
HEXACHLOROBUTADIENE	MG/M3	ND	0.03
2-HEXANONE	MG/M3	ND	0.10
M-DICHLOROBENZENE	MG/M3	ND	0.03
M,P-XYLENE	MG/M3	ND	0.03
METHYLENE CHLORIDE	MG/M3	ND	0.07
4-METHYL-2-PENTANONE	MG/M3	ND	0.10
O-DICHLOROBENZENE	MG/M3	ND	0.03
O-XYLENE	MG/M3	ND	0.03
P-DICHLOROBENZENE	MG/M3	ND	0.03
STYRENE	MG/M3	ND	0.03
1,1,2,2-TETRACHLOROETHANE	MG/M3	ND	0.03
TETRACHLOROETHYLENE	MG/M3	ND	0.03
TOLUENE	MG/M3	ND	0.03
1,1,2-TRICHLOROETHANE	MG/M3	ND	0.03
TRICHLOROETHYLENE	MG/M3	ND	0.03
TRICHLOROFLUOROMETHANE	MG/M3	ND	0.03
VINYL CHLORIDE	MG/M3	ND	0.03
VINYL ACETATE	MG/M3	ND	0.03
1,2-DIBROMOETHANE (EDB)	MG/M3	ND	0.03

American Environmental Network, Inc.

"QC Report"

Title: Bag/Can Blank
Batch: MAB017
Analysis Method: TO14/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A

Parameters:	Units:	Results:	Reporting Limits:
1,2,4 TRICHLOROBENZENE	MG/M3	ND	0.03
1,2,4-TRIMETHYLBENZENE	MG/M3	ND	0.03
1,3,5-TRIMETHYLBENZENE	MG/M3	ND	0.03
1,1-DICHLOROETHENE	MG/M3	ND	0.03
1,1,1-TRICHLOROETHANE	MG/M3	ND	0.03
TRICHLOROTRIFLUOROETHANE	MG/M3	ND	0.03
4-ETHYLTOLUENE	MG/M3	ND	0.03
BROMOFLUOROBENZENE	%REC/SURR	105	90-111
1,2-DICHLOROETHANE-D4	%REC/SURR	96	85-115
TOLUENE-D8	%REC/SURR	105	85-111
ANALYST	INITIALS	BV	

Comments:

American Environmental Network, Inc.

"QC Report"

Title: Bag/Can Reagent
Batch: MAB017
Analysis Method: T014/SIM/Compendium of Methods, EPA-600/4-87-006, June 1988.
Extraction Method: N/A

RS Date Analyzed: 08-FEB-97
RSD Date Analyzed: 08-FEB-97

RS Date Extracted: N/A
RSD Date Extracted: N/A

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	RSD Conc	RSD %Rec	RPD	RPD Lmts	Rec Lmts
1,1-DICHLOROETHENE	2.0	<0.03	2.0	100	1.8	90	11	20	36-134
TRICHLOROETHENE	2.0	<0.03	1.8	90	1.8	90	0	20	65-130
BENZENE	2.0	<0.03	1.9	95	1.9	95	0	20	61-140
TOLUENE	2.0	<0.03	2.0	100	1.9	95	5	20	70-130
CHLOROBENZENE	2.0	<0.03	2.1	105	2.0	100	5	20	77-137
Surrogates:									
1,2-DICHLOROETHANE-D4				100		96			85-115
TOLUENE-D8				105		105			85-111
BROMOFLUOROBENZENE				104		99			90-111

Comments:
DUE TO THE NATURE OF THE SAMPLE MATRIX, MATRIX SPIKE/MATRIX SPIKE DUPLICATE CANNOT BE ANALYZED.

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
MG/M3 = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

American Environmental Network, Inc.

Common notation for Organic reporting

N/S = NOT SUBMITTED
N/A = NOT APPLICABLE
D = DILUTED OUT
UG/L = PARTS PER BILLION.
UG/KG = PARTS PER BILLION.
MG/KG = PARTS PER MILLION.
MG/L = PARTS PER MILLION.
MG/M3 = MILLIGRAMS PER CUBIC METER.
NG = NANOGRAMS.
UG = MICROGRAMS.
PPBV = PARTS PER BILLION/VOLUME.
< = LESS THAN DETECTION LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS
J = THE REPORTED VALUE IS EITHER LESS THAN THE REPORTING LIMIT BUT
GREATER THAN ZERO, OR QUANTITATED AS A TIC; THEREFORE, IT IS
ESTIMATED.
JJ = REPORTED VALUE IS ESTIMATED DUE TO MATRIX INTERFERENCE.
ND = NOT DETECTED ABOVE REPORT LIMIT.
RPT LIMIT = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.
RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)

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

ORGANIC SOILS ARE REPORTED ON A DRY WEIGHT BASIS.

DUE TO THE NATURE OF THE SAMPLE MATRIX, MATRIX SPIKE/MATRIX SPIKE
DUPLICATE ANALYSIS CANNOT BE PERFORMED FOR AIR ANALYSIS.

CLP SOW 1991, USEPA CONTRACT LABORATORY PROGRAM, STATEMENT OF WORK FOR
ORGANICS ANALYSIS, DOCUMENT NUMBER OLM01.8, AUGUST 1991.

LP = LEVERNE PETERSON	RW = RITA WINGO
LD = LARRY DILMORE	LL = LANCE LARSON
PL = PAUL LESCHENSKY	BV = BEN VAUGHN
DWB = DAVID BOWERS	

CHAIN OF CUSTODY

AEN LAB I.D.

DATE: 11/24/97 OF 1

723371

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bob Mearie				ANALYSIS REQUEST			
COMPANY: Macatol o/c				Petroleum Hydrocarbons (418.1) TRPH			
ADDRESS: Pobox 552				(MOD.8015) Diesel/Direct/Inject			
PHONE: (915) 687-8312				8015, 8020, TOLU, N-HEXANE			
FAX: (915) 687-8305				BTX THMT			
BILL TO:				(M8015) Gas/Purge & Trap			
COMPANY:				Gasoline/BTEX & MTBE (M8015/8020)			
ADDRESS:				BTXE/MTBE (8020)			
				BTEX & Chlorinated Aromatics (602/8020)			
				BTEX/MTBE/EDC & EDB (8020/8010/Short)			
				Chlorinated Hydrocarbons (601/8010)			
				504 EDB / DBCP			
				Polynuclear Aromatics (610/8310)			
				Volatile Organics (624/8240) GC/MS			
				Volatile Organics (8260) GC/MS			
				Pesticides/PCB (608/8080)			
				Herbicides (615/8150)			
				Base/Neutral/Acid Compounds GC/MS (625/8270)			
				General Chemistry:			
				Priority Pollutant Metals (13)			
				Target Analyte List Metals (23)			
				RCRA Metals (8)			
				RCRA Metals by TCLP (Method 1311)			
				Metals:			
				NUMBER OF CONTAINERS			

PROJECT INFORMATION			PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS		
PROJ. NO.: 02335 v173, 60	(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK	(NORMAL)			
PROJ. NAME: IB Remediation	CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER				
P.O. NO.:	METHANOL PRESERVATION ☐				
SHIPPED VIA:	COMMENTS: FIXED FEE ☐				

SAMPLE ID			DATE	TIME	MATRIX	LAB I.D.
VE3	11/21/97	1155	Air	-01		
VE1	11/20/97	1630		-02		
VE2	11/21/97	1350		-03		
VE4	11/21/97	1545		-04		
VE5	11/21/97	1730		-05		
VE5 EFF	11/23/97	1150		-06		

RELINQUISHED BY:			RELINQUISHED BY:		
Signature:	Time: 1200		Signature:	Time: 1:45	
Printed Name: Chuck Dasec	Date: 11/24/97		Printed Name: Kevin Ash	Date: 11/24/97	
Company: Fluor Daniel GTE			Company: Fluor Daniel GTE		

RECEIVED BY:			RECEIVED BY: (LAB)		
Signature:	Time: 1200		Signature:	Time: 1245	
Printed Name: Kevin Ash	Date: 11/24/97		Printed Name: Kevin Ash	Date: 11/24/97	
Company: Fluor Daniel GTE			Company: American Environmental Network (NM), Inc.		

American Environmental Network

11 East Olive Road

Pensacola, Florida 32514

(904)474-1001

PROJECT SAMPLE INSPECTION FORM

Accession #: 702011

Date Received: 2/1/97

1. Was there a Chain of Custody? ☒ Yes ☐ No

2. Was Chain of Custody properly relinquished? ☒ Yes ☐ No

3. Were samples received cold? ☐ Yes ☐ No ☒ N/A
(Check Temperature of Cooler)

4. Were all samples properly labeled and identified? ☒ Yes ☐ No

5. Were samples received in proper containers for analysis requested? ☒ Yes ☐ No

6. Were all sample containers received intact? ☒ Yes ☐ No

7. Are samples preserved? (Check pH of all H₂O except 40ml vials)* ☐ Yes ☐ No ☒ N/A

8. Is there sufficient volume for analysis requested? ☒ Yes ☐ No

9. Were samples received within Holding Time? ☒ Yes ☐ No

10. Is Headspace visible > 1/4" in diameter in 40ml vials?* If any headspace is evident, comment in out-of-control section. ☐ Yes ☐ No ☒ N/A

11. If sent, were matrix spike bottles returned? ☐ Yes ☐ No ☒ N/A

Airbill Number: 277 7576837

Shipped By: FelG

Cooler Number: 278 2575 631
N/A

Shipping Charges: N/A

Cooler Weight: N/A

Cooler Temp (°C): N/A

Out of Control Events and Inspection Comments:

Cons received on 1/31/97
CR received on 2/1/97
See discount rate on IWO, 10%, when the norm is
15%.

Inspected By: SE Date: 2/1/97 Logged By: SE Date: 2/1/97

+ All preservatives for the State of North Carolina and the State of New York are to be recorded on the sheet provided to record pH results (SOP 938, section 2.2.9).

* According to EPA, 1/4" of headspace is allowed in 40ml vials, however, AEN makes it policy to record any headspace as out-of-control (SOP 938, section 2.2.12).

Interlab Chain of Custody

DATE: 1/24 PAGE 1 OF 1

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

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

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
701371-01	1/21/97	1155	Flt	1
-02	1/20	1630		2
-03	1/21	1500		3
-04	1/21	1545		4
-05	1/21	1730		5
-06	1/23	1100		6

Metals - TAL	
Metals - PP List	
Metals - RCRA	
RCRA Metals by TCLP (1311)	
8015, 8016, 7014 see hydrocarbon range calc	
① C ₆ -C ₄ ② C ₃ -C ₂	
TOX BTEX + n-heptane	
TOC	
Gen Chemistry	
Oil and Grease	
BOD	
COD	
Pesticides/PCB (608/8080)	
Herbicides (615/8150)	
Base/Neutral Acid Compounds GC/MS (625/8270)	
Volatile Organics GC/MS (624/8240)	
Polynuclear Aromatics (610/8310)	
8240 (TCLP 1311) ZHE	
8270 (TCLP 1311)	
TO-14	
Gross Alpha/Beta	
NUMBER OF CONTAINERS	

ANALYSIS REQUEST

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY:		RELINQUISHED BY:	
PROJECT NUMBER:	701371	TOTAL NUMBER OF CONTAINERS		SAN DIEGO	PARAGON	Signature:	Time:	Signature:	Time:
PROJECT NAME:	matheson oil Co.	CHAIN OF CUSTODY SEALS		RENTON		Printed Name:	Date:	Printed Name:	Date:
QC LEVEL:	STD IV	INTEGRITY		PENSACOLA		Signature:	Time:	Signature:	Time:
QC INSTRUMENT:	MS MSD BLANK	RECEIVED GOOD COND/COLD		PORTLAND		Signature:	Time:	Signature:	Time:
QC STANDARD:	MS/MS	LAB NUMBER		PHOENIX		Signature:	Time:	Signature:	Time:
DATE:	Standard					Signature:	Time:	Signature:	Time:
MUCH SIGNATURE:						Signature:	Time:	Signature:	Time:
CLIENT DISCOUNT:						Signature:	Time:	Signature:	Time:
SPECIAL CERTIFICATION REQUIRED:	LYES LINO					Signature:	Time:	Signature:	Time:

CHAIN OF CUSTODY

DATE: 1/1/97 PAGE: 1 OF 1

AEN LAB ID.

72371

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.

PROJECT MANAGER: Bob Mearns				ANALYSIS REQUEST			
COMPANY: Marathon Oil				Petroleum Hydrocarbons (418.1) TRPH			
ADDRESS: P.O. Box 552				(MOD.8015) Diesel/Direct/Inject			
PHONE: Midvale TX, 79702				8015, 8020, 7014, N-Hexane			
FAX: (915) 687-8312				BTX, THM, H			
BILL TO: (915) 687-8305				(M8015) Gas/Purge & Trap			
COMPANY: Same as above				Gasoline/BTEX & MTBE (M8015/8020)			
ADDRESS: Same as above				BTX/MTBE (8020)			
				BTEX & Chlorinated Aromatics (602/8020)			
				BTEX/MTBE/EDC & EDB (8020/8010/Short)			
				Chlorinated Hydrocarbons (601/8010)			
				504 EDB / DBCP			
				Polynuclear Aromatics (610/8310)			
				Volatile Organics (624/8240) GC/MS			
				Volatile Organics (8260) GC/MS			
				Pesticides/PCB (608/8080)			
				Herbicides (615/8150)			
				Base/Neutrals/Acid Compounds GC/MS (625/8270)			
				General Chemistry:			
				Priority Pollutant Metals (13)			
				Target Analyte List Metals (23)			
				RCRA Metals (8)			
				RCRA Metals by TCLP Method (311)			
				Metals			
				NUMBER OF CONTAINERS			

PROJECT INFORMATION		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS	
PROJECT NO: 02335 0173, 60	(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK	(NORMAL) ☒	
PROJECT NAME: ID Roadway	CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER		
P.O. NO:	METHANOL PRESERVATION ☐		
SAMPLED VIA:	COMMENTS: FIXED FEE ☐		
SAMPLE RECEIPT			
NO CONTAINERS			
CUSTODY SEAL			
RECEIVED IN FACT			
BLUE ICE/ICE			

RELINQUISHED BY:		RELINQUISHED BY:	
Signature: [Signature]	Time: 1:00	Signature: [Signature]	Time: 1:45
Printed Name: [Name]	Date: 1/24/97	Printed Name: [Name]	Date: 1/24/97
Company: [Company]		Company: [Company]	
RECEIVED BY:	Time: 1:00	RECEIVED BY: (LAB)	Time: 1:45
Signature: [Signature]	Date: 1/24/97	Signature: [Signature]	Date: 1/24/97
Printed Name: [Name]		Printed Name: [Name]	
Company: [Company]		Company: [Company]	



W. L. GORE & ASSOCIATES, INC.

101 LEWISVILLE ROAD • P.O. BOX 1100 • ELKTON, MARYLAND 21922-1100 PHONE: 410/392-3300
FAX: 410/996-3325 • TELEX 467637 GORE FB ELKT
ENVIRONMENTAL PRODUCTS GROUP

Page 1 of 5

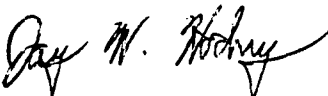
GORE-SORBERSM Screening Survey Final Report

Marathon Oil Company
Indian Basin, NM

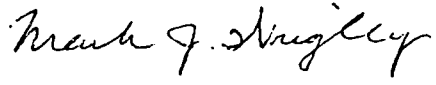
October 29, 1996

Prepared For:
Fluor Daniel GTI
2501 Yale Boulevard SE, Suite 204
Albuquerque, NM 87106

W.L. Gore & Associates, Inc.
Written/Submitted by


Jay W. Hodny, M.S.
Associate

W.L. Gore & Associates, Inc.
Reviewed/Approved by


Mark J. Wrigley, P.G.
Associate

I:\PROJECTS\FDGT\INDBASIN.NM\961029R.DOC

This document shall not be reproduced, except in full, without written approval of W.L. Gore & Associates

FORM 11R.3
Rev 10/25/96

**GORE-SORBERsm Screening Survey
Final Report**

REPORT DATE: October 29, 1996

AUTHOR: JWH

SITE INFORMATION

Site Reference: Marathon Oil Company, Indian Basin, NM

Customer Purchase Order Number: 014606

Gore Production Order Number: 070079

Gore Site Code: TS

FIELD PROCEDURES

Modules shipped: 55

Installation Date(s): 9-24,25,26-96

Field work performed by: Fluor Daniel GTI

Modules Installed: 50

Retrieval date(s): 10-15-96

Modules Retrieved: 55

Modules Lost in Field: 0

Exposure Time: 19-21 [days]

Trip Blanks Returned: 5

Unused Modules Returned: 0

Date/Time Received by Gore: 10-16-96 @ 1:15 pm **By:** CJF

Recorded Cooler/Water Temperature Control Blank temperature: 4.6 [°C]

Chain of Custody Form attached: √

Chain of Custody discrepancies: None.

Comments: None.

GORE-SORBERsm Screening Survey Final Report

ANALYTICAL PROCEDURES

W.L. Gore & Associates' Screening Module Laboratory operates under the guidelines of its Quality Assurance Manual, Operating Procedures and Methods. The quality assurance program is consistent with Good Laboratory Practices (GLP) and ISO Guide 25, "General Requirements for the Competence of Calibration and Testing Laboratories", third edition, 1990. The Laboratory is audited regularly by a quality system design, development and auditing company.

Instrumentation consists of Hewlett-Packard 5890 gas chromatographs and 5971 mass selective detectors, as well as Perkin-Elmer ATD 400 automated thermal desorption units. Sample preparation simply involves cutting the tip off the bottom of the sample module and transferring one or more exposed sorbent containers (sorbents, each containing 40mg of a suitable granular adsorbent) to a thermal desorption tube for analysis. Sorbents remain clean and protected from dirt, soil, and ground water by the insertion/retrieval cord, and require no further sample preparation.

Screening Method Quality Assurance:

Before each run sequence, two instrument blanks, a sorbent containing 5µg BFB (Bromofluorobenzene), and a method blank are analyzed. The BFB mass spectra must meet the criteria set forth in our methods before samples can be analyzed. A sorbent containing BFB is also analyzed after every 30 samples and/or trip blanks, as is a method blank. Standards containing the selected target compounds at three calibration levels of 5, 20, and 50µg are analyzed at the beginning of each run. The criterion for each target compound is less than 35% RSD (relative standard deviation). If this criterion is not met for any target compound, the analyst has the option of generating second- or third-order standard curves, as appropriate. A second-source reference standard, at a level of 20µg per target compound, is analyzed after every ten samples and/or trip blanks, and at the end of the run sequence. Positive identification of target compounds is determined by the presence of the target ion and at least two secondary ions, retention time versus reference standard, and the analyst's judgment.

NOTE: All data have been archived. Any replicate sorbents not used in the initial analysis will be discarded fifteen (15) days from the date of analysis.

Laboratory analysis: thermal desorption, gas chromatography, mass selective detection

Quality Assurance Level: 2 (ANA-4-A1.M)

Instrument ID: # 1

Chemist: JW/WW

Data Subdirectory: 070079

Compounds/mixtures requested: Gore A1; Fuel Hydrocarbons Target List (A2)

Deviations from Standard Method: None.

Comments: Soil vapor analytes and abbreviations are tabulated in the Data Table Key (page 5).

GORE-SORBERsm Screening Survey Final Report

DATA TABULATION

CONTOUR MAPS ENCLOSED: Three (3) B-size color contour maps
LIST OF MAPS ENCLOSED:

- Benzene, Toluene, Ethylbenzene, & m,p,o-Xylenes (BTEX)
- Toluene
- Petroleum Hydrocarbons

Compound Name	Method Detection Limit [µg]	Low Map (gray) Limit [µg]	Highest Detect Level [µg]	Upper Map (purple) Limit [µg]
BTEX	0.02	0.05	0.41	0.41
Toluene	0.14	0.14	0.41	0.41
Petro. Hydro.	*	1.45	70.48	70.48

* - no calculated MDL exists

NOTE: All data values presented in Appendix A represent masses of compound(s) desorbed from the GORE-SORBER Screening Modules received and analyzed by W.L. Gore, as identified in the Chain of Custody (Appendix A). The measurement traceability and instrument performance are reproducible and accurate for the measurement process documented. Semi-quantitation of the compound mass is based on either a single-level (QA Level 1) or three-level (QA Level 2) standard calibration.

Comments:

- The minimum (gray) contour level, for each mapped analyte or group of analytes, was set at the maximum blank level observed or the method detection limit, whichever was greater. The maximum contour level was set at the maximum value observed.

GORE-SORBER is a registered trademark of W. L. Gore & Associates, Inc.

**GORE-SORBERsm Screening Survey
Final Report**

**KEY TO DATA TABLE
Marathon Oil Company, Indian Basin, NM**

UNITS

μg micrograms (per sorber), reported for compounds using external standards.
MDL method detection limit

ANALYTES

BTEX combined masses of benzene, toluene, ethylbenzene and total xylenes (Gasoline Range Aromatics)
C11,C13&C15 combined masses of undecane, tridecane, and pentadecane (C11+C13+C15) (Diesel Range Alkanes)
MTBE methyl t-butyl ether
BENZ benzene
TOL toluene
OCT octane
EtBENZ ethylbenzene
mpXYL m-, p-xylene
oXYL o-xylene
135TMB 1,3,5-trimethylbenzene
124TMB 1,2,4-trimethylbenzene
UNDEC undecane
NAPH naphthalene
TRIDEC tridecane
2MeNAPH 2-methyl naphthalene
PENTADEC pentadecane

BLANKS

TBn unexposed trip blanks, which traveled with the exposed modules
method blankn method blank, retained at Gore

APPENDIX A:

1. CHAIN OF CUSTODY
2. DATA TABLE
3. COLOR CONTOUR MAPS

GORE-SORBER® Screening Survey Chain of Custody

For W.L. Gore & Associates use only
Production Order # 70079



W. L. Gore & Associates, Inc., Environmental Products Group
101 Lewisville Road • Elkton, Maryland 21921 • Tel: (410) 392-3300 • Fax (410) 996-3325

Instructions: Customer must complete ALL shaded cells

Customer Name: <u>FLUOR DANIEL GTI</u>				Site Name: <u>MARATHON OIL SITE</u>			
Address: <u>2501 YALE BLVD SOUTHEAST</u> <u>ALBUQUERQUE N.M 87106</u>				Site Address: <u>INDIAN BASIN</u>			
Phone: <u>505 242 3113</u>				Project Manager: <u>SUSAN FIELD</u>			
FAX: <u>505 242 1103</u>				Customer Project No.: <u>14606</u>			
				Customer P.O. #: <u>14606</u> Quote #: <u>BK 6391</u>			
Serial # of Modules Shipped				# of Modules for Installation <u>50</u> # of Trip Blanks <u>5</u>			
#	<u>127617</u>	through	#	<u>127624</u>	Total Modules Shipped: <u>55</u> Pieces		
#	<u>127749</u>	through	#	<u>127795</u>	Total Modules Received: <u>55</u> Pieces		
#		through	#		Total Modules Installed: <u>50</u> Pieces		
#		through	#		Serial # of Trip Blanks (Client Decides) #		
#		through	#		# <u>127791</u>	# <u>127794</u>	#
#		through	#		# <u>127792</u>	# <u>127795 NH</u>	#
#		through	#		# <u>127793</u>	#	#
Installation Performed By:				Installation Method(s) (circle those that apply):			
Name (please print): <u>Marc R. Smith / L. Scott Stevenson</u>				☒ Slide Hammer ☐ Hammer Drill ☐ Auger			
Company/Affiliation: <u>Fluor Daniel GTI</u>				Other: _____			
Installation Start Date and Time: <u>9 / 24 / 96</u> <u>10:17</u> <u>AM</u> <u>PM</u>							
Installation Complete Date and Time: <u>9 / 26 / 96</u> <u>12:40</u> <u>AM</u> <u>PM</u>							
Retrieval Performed By:				Total Modules Retrieved: <u>50</u> Pieces			
Name (please print): <u>Marc R. Smith / Kevin Cook</u>				Total Modules Lost in Field: <u>0</u> Pieces			
Company/Affiliation: <u>Fluor Daniel GTI</u>				Total Unused Modules Returned: <u>0</u> Pieces			
Retrieval Start Date and Time: <u>10 / 15 / 96</u> <u>09:20</u> <u>AM</u> <u>PM</u>							
Retrieval Complete Date and Time: <u>10 / 15 / 96</u> <u>16:17</u> <u>AM</u> <u>PM</u>							
Target Analytes to be Mapped (Check Options or List as appropriate):				To Be Determined Pending Completion of Lab Analysis [] or write "None", if applicable.			
Analyte #1:		Analyte #2:		Analyte #3:			
Other Instructions, if any: <u>To be analyzed per Susan Field's instructions / and/or mapped</u>							
Relinquished By	<u>CJ Fendren</u>	Date	<u>9/19/96</u>	Time	<u>15:00</u>	Received By:	
Affiliation:	<u>W.L. Gore & Associates, Inc.</u>					Affiliation:	
Relinquished By	<u>Mark Smith</u>	Date	<u>10-15-96</u>	Time	<u>1730</u>	Received By:	
Affiliation:	<u>FDGTI</u>					Affiliation:	
Relinquished By		Date		Time		Received By: <u>CJ Fendren</u>	
Affiliation:						Affiliation: <u>W.L. Gore & Associates, Inc.</u>	
						Date	<u>10/16/96</u>
						Time	<u>13:15</u>
Temperature of Samples When Received By Gore						<u>4.6 °C</u>	

GORE-SORBER® Screening Survey
Installation and Retrieval Log

SITE NAME & LOCATION

MARATHON - INDIAN BASIN
GAS PLANT Carlsbad NM

Page 1 of 2

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME 10-15-95 unless specified	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
1.	127617 ✓	24 Sept 96 / 10:17	1332			X		X	A-1
2.	127618 ✓	10:41	1344			X		X	A-2
3.	127619 ✓	11:35	1351			X		X	A-3
4.	127620 ✓	11:53	1359			X		X	A-4
5.	127621 ✓	12:19	1253			X		X	B-2
6.	127622 ✓	12:28	1314			X		X	B-1
7.	127623 ✓	12:57	1244			X		X	B-3
8.	127624 ✓	13:11	1236			X		X	B-4
9.	127749 ✓	13:50	1108			X		X	E-1
10.	127750 ✓	14:12	1114			X		X	E-2
11.	127751 ✓	14:36	1120			X		X	E-3
12.	127752 ✓	14:45	1124			X		X	E-4
13.	127753 ✓	15:14	1151			X		X	D-1
14.	127754 ✓	15:25	1144			X		X	D-2
15.	127755 ✓	15:34	1136			X		X	D-3
16.	127756 ✓	16:14	1214			X		X	C-2
17.	127757 ✓	25 Sept 96 / 08:34	1205			X		X	C-1
18.	127758 ✓	08:52	1222			X		X	C-3
19.	127759 ✓	09:07	1229			X		X	C-4
20.	127760 ✓	10:08	1027			X		X	H-1
21.	127760 ✓	10:21	1023			X		X	H-2
22.	127762 ✓	10:30	1017			X		X	H-3
23.	127763 ✓	10:45	1032			X		X	G-1
24.	127764 ✓	10:55	1037			X		X	G-2
25.	127765 ✓	11:09	1041			X		X	G-3
26.	127766 ✓	11:25	1059			X		X	F-1
27.	127767 ✓	11:37	1055			X		X	F-2
28.	127768 ✓	11:46	1053			X		X	F-3
29.	127769 ✓	11:54	1046			X		X	F-4
30.	127770 ✓	12:08	1050			X		X	OG-MW-95
31.	127771 ✓	13:27	1017			X		X	OG-MW-97
32.	127772 ✓	13:58	0920			X		X	J-3
33.	127773 ✓	14:12	0927			X		X	J-2
34.	127774 ✓	14:35	0933			X		X	J-1
35.	127775 ✓	14:48	0936			X		X	OG-NA-1
36.	127776 ✓	15:05	1005			X		X	I-3
37.	127777 ✓	15:20	0959			X		X	I-2
38.	127778 ✓	15:33	0953			X		X	I-1
39.	127779 ✓	26 Sept 96 / 09:06	1555			X		X	Z-2
40.	127780 ✓	09:15	1559			X		X	Z-1
41.	127781 ✓	09:38	1425			X		X	Z-3
42.	127782 ✓	09:51	1433			X		X	Z-4

GORE-SORBER® Screening Survey
Installation and Retrieval Log

SITE NAME & LOCATION

Marathon-INDIAN BASIN GAS PLANT

Carlsbad NM

Page 2 of 2

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
43.	127783 ✓	26540*19% / 10:16	1532			X		X	Y-1
44.	127784 ✓	10:30	1523			X		X	Y-2
45.	127785 ✓	10:42	1505			Y		X	Y-3
46.	127786 ✓	11:10	1510			X		X	X-2
47.	127787 ✓	11:46	1158			X		Y	OG-NA-2
48.	127788 ✓	12:02	1323			X		X	OG-NA-3
49.	127789 ✓	12:24	1441			X		X	OG-SA-1
50.	127790 ✓	12:40	1515			X		X	X-1
51.									
52.									
53.									
54.									
55.									
56.									
57.									
58.									
59.									
60.									
61.									
62.									
63.									
64.									
65.									
66.									
67.									
68.									
69.									
70.									
71.									
72.									
73.									
74.									
75.									
76.									
77.									
78.									
79.									
80.									
81.									
82.									
83.									
84.									
85.									

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
 FLUOR DANIEL GTI, ALBUQUERQUE, NM
 TARGET FUEL HYDROCARBONS (A2)
 MARATHON OIL SITE, CARLSBAD, NM
 SITE TS - PRODUCTION ORDER # 070079

DATE ANALYZED	SAMPLE NAME	MTBE, ug	BTEX, ug	BENZ, ug	TOL, ug	OCT, ug	EIBENZ, ug	mpXYL, ug	oXYL, ug	135TMB, ug	124TMB, ug	C11, C13, & C15, ug
	MDL =	0.26	0.02	0.02	0.14	0.03	0.02	0.03	0.02	0.02	0.02	0.02
10/18/96	127617	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
10/18/96	127618	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127619	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127620	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
10/18/96	127621	0.00	0.22	0.00	0.18	0.00	0.00	0.04	0.00	0.08	0.02	0.19
10/18/96	127622	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127623	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127624	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127749	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127751	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127752	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127753	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127754	0.00	0.24	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127755	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.29
10/18/96	127756	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
10/18/96	127757	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127758	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127759	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127760	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127761	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127762	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127763	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127764	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127765	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127766	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127767	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127768	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127769	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/19/96	127770	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/19/96	127771	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/19/96	127772	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
 FLUOR DANIEL GTI, ALBUQUERQUE, NM
 TARGET FUEL HYDROCARBONS (A2)
 MARATHON OIL SITE, CARLSBAD, NM
 SITE TS - PRODUCTION ORDER # 070079

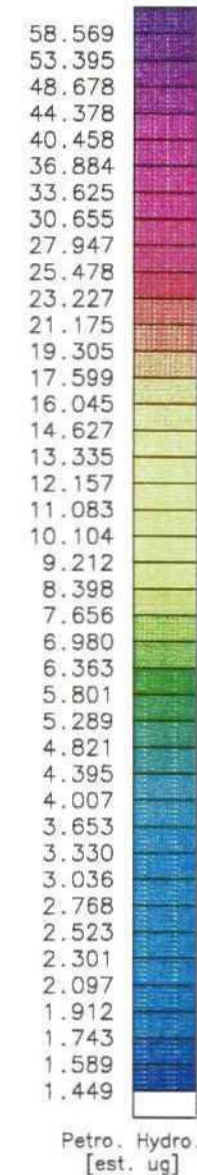
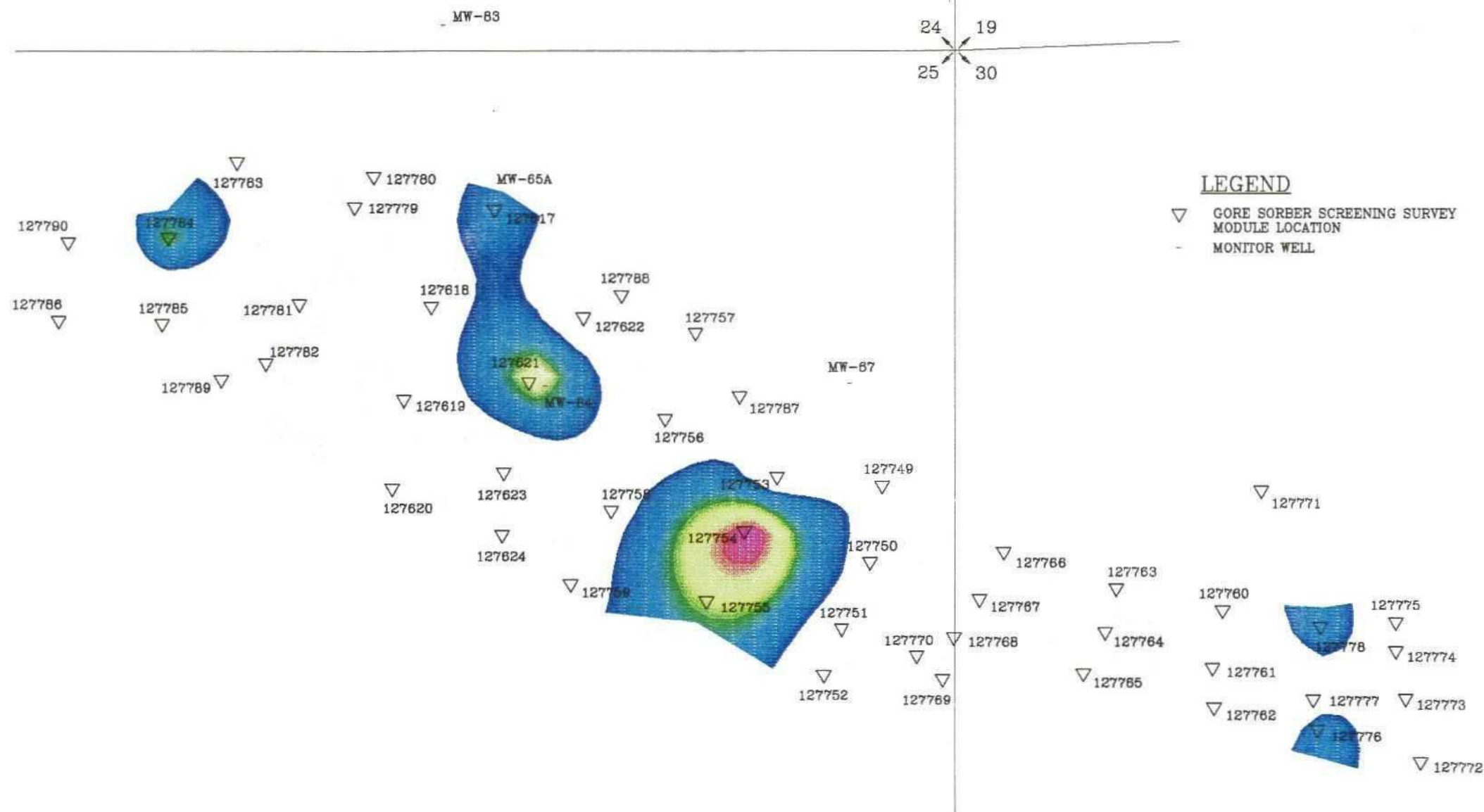
DATE ANALYZED	SAMPLE NAME	MTBE, ug	BTEX, ug	BENZ, ug	TOL, ug	OCT, ug	EtBENZ, ug	mpXYL, ug	oXYL, ug	135TMB, ug	124TMB, ug	C11, C13, & C15, ug
	MDL =	0.26	0.02	0.02	0.14	0.03	0.02	0.03	0.02	0.02	0.02	0.02
10/19/96	127773	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127774	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127775	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127776	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
10/19/96	127777	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127778	0.00	0.18	0.00	0.13	0.00	0.00	0.05	0.00	0.00	0.00	0.06
10/19/96	127779	0.00	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.02
10/19/96	127780	0.00	0.22	0.00	0.13	0.00	0.08	0.00	0.00	0.00	0.00	0.00
10/19/96	127781	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127782	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/19/96	127783	0.00	0.41	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.03
10/19/96	127784	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.03
10/19/96	127785	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127786	0.00	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.02
10/19/96	127787	0.00	0.12	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.02
10/19/96	127788	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127789	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/19/96	127790	0.00	0.14	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	TB 1, 127791	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	TB 2, 127792	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	TB 3, 127793	0.00	0.05	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.04
10/19/96	TB 4, 127794	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
10/19/96	TB 5, 127795	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
10/18/96	method blank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	method blank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Max Observed	0.00	0.41	0.00	0.41	0.00	0.08	0.09	0.00	0.08	0.05	0.29

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
 FLUOR DANIEL GTI, ALBUQUERQUE, NM
 TARGET FUEL HYDROCARBONS (A2)
 MARATHON OIL SITE, CARLSBAD, NM
 SITE TS - PRODUCTION ORDER # 070079

SAMPLE NAME	UNDEC, ug	NAPH, ug	TRIDE, ug	2MeNAPH, ug	PENTADEC, ug	Petroleum	
						Hydrocarbons, est. ug	
MDL =	0.02	0.03	0.03	0.05	0.04		
127617	0.01	0.00	0.00	0.00	0.02		2.98
127618	0.01	0.00	0.00	0.00	0.01		0.57
127619	0.01	0.00	0.00	0.00	0.00		0.48
127620	0.02	0.00	0.00	0.00	0.00		0.63
127621	0.19	0.00	0.00	0.00	0.00		19.00
127622	0.01	0.00	0.00	0.00	0.00		0.34
127623	0.01	0.00	0.00	0.00	0.00		0.27
127624	0.01	0.00	0.00	0.00	0.00		0.45
127749	0.00	0.00	0.00	0.00	0.00		1.26
127750	0.01	0.00	0.00	0.00	0.00		0.90
127751	0.00	0.00	0.00	0.00	0.00		0.54
127752	0.00	0.00	0.00	0.00	0.00		0.32
127753	0.00	0.00	0.00	0.00	0.00		0.50
127754	0.13	0.01	0.01	0.00	0.16		70.48
127755	0.08	0.00	0.00	0.00	0.03		7.87
127756	0.00	0.00	0.00	0.00	0.00		0.42
127757	0.00	0.00	0.00	0.00	0.00		0.29
127758	0.01	0.00	0.00	0.00	0.00		1.00
127759	0.01	0.00	0.00	0.00	0.00		0.85
127760	0.01	0.00	0.00	0.00	0.00		0.69
127761	0.00	0.00	0.00	0.00	0.00		0.26
127762	0.00	0.00	0.00	0.00	0.00		0.19
127763	0.00	0.00	0.00	0.00	0.00		0.63
127764	0.01	0.00	0.00	0.00	0.00		0.63
127765	0.00	0.00	0.00	0.00	0.00		0.39
127766	0.00	0.00	0.00	0.00	0.00		0.84
127767	0.01	0.00	0.00	0.00	0.00		0.44
127768	0.00	0.00	0.00	0.00	0.00		0.55
127769	0.01	0.00	0.00	0.00	0.00		0.45
127770	0.01	0.00	0.00	0.00	0.00		0.96
127771	0.01	0.00	0.00	0.00	0.00		0.71
127772	0.00	0.00	0.00	0.00	0.00		0.41

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
 FLUOR DANIEL GTI, ALBUQUERQUE, NM
 TARGET FUEL HYDROCARBONS (A2)
 MARATHON OIL SITE, CARLSBAD, NM
 SITE TS - PRODUCTION ORDER # 070079

SAMPLE NAME	UNDEC, ug	NAPH, ug	TRIDEC, ug	2MeNAPH, ug	PENTADEC, ug	Hydrocarbons, est. ug	Petroleum
MDL =	0.02	0.03	0.03	0.05	0.04		
127773	0.00	0.00	0.00	0.00	0.00		0.32
127774	0.00	0.00	0.00	0.00	0.00		0.61
127775	0.00	0.00	0.00	0.00	0.00		0.44
127776	0.02	0.00	0.00	0.00	0.00		3.26
127777	0.00	0.00	0.00	0.00	0.00		0.51
127778	0.06	0.00	0.00	0.00	0.00		3.04
127779	0.02	0.00	0.00	0.00	0.00		1.55
127780	0.00	0.00	0.00	0.00	0.00		0.41
127781	0.00	0.00	0.00	0.00	0.00		0.21
127782	0.01	0.00	0.00	0.00	0.00		0.37
127783	0.03	0.00	0.00	0.00	0.00		0.66
127784	0.03	0.00	0.00	0.00	0.00		7.96
127785	0.00	0.00	0.00	0.00	0.00		0.19
127786	0.02	0.00	0.00	0.00	0.00		1.14
127787	0.02	0.00	0.00	0.00	0.00		1.56
127788	0.00	0.00	0.00	0.00	0.00		0.22
127789	0.01	0.00	0.00	0.00	0.00		0.41
127790	0.00	0.00	0.00	0.00	0.00		0.14
TB 1, 127791	0.01	0.00	0.00	0.00	0.00		0.42
TB 2, 127792	0.00	0.00	0.00	0.00	0.00		0.30
TB 3, 127793	0.04	0.00	0.00	0.00	0.00		1.45
TB 4, 127794	0.03	0.00	0.00	0.00	0.00		1.11
TB 5, 127795	0.02	0.00	0.00	0.00	0.00		1.13
method blank	0.00	0.00	0.00	0.00	0.00		0.05
method blank	0.00	0.00	0.00	0.00	0.00		0.02
Max Observed	0.19	0.01	0.01	0.01	0.00	0.16	70.48



LEGEND

- ▽ GORE-SORBER SCREENING SURVEY
MODULE LOCATION
- MONITOR WELL

NOTE: CONTOUR PLOT REPRESENTS MASS OF COMPOUND
DESORBED FROM GORE-SORBER SCREENING MODULES.
IDENTIFIED AND QUANTIFIED BY GAS CHROMATOGRAPH
MASS SELECTIVE DETECTION.

THIS DRAWING AND ANY ATTACHMENTS HAVE BEEN PRODUCED FOR THE SOLE USE OF THE RECIPIENT AND MUST NOT
BE USED, REPRODUCED, MODIFIED OR COPIED IN ANY MANNER WITHOUT THE PROPER WRITTEN APPROVAL OF
W.L. GORE & ASSOCIATES. THIS DRAWING MAY CONTAIN CONFIDENTIAL AND PROPRIETARY INFORMATION OF
W.L. GORE & ASSOCIATES. ANY UNAUTHORIZED USE OF THIS DRAWING IS STRICTLY PROHIBITED.

Scale 1:6600
250 0 250 500 750
(feet)

GORE-SORBER SCREENING SURVEY



W.L. GORE & ASSOCIATES, INC.

P.O. BOX 1100
101 LEWISVILLE ROAD
ELKTON, MD 21922-1100
(410) 392-3300

MARATHON OIL COMPANY, INDIAN BASIN, NM

PETROLEUM HYDROCARBONS

FLUOR DANIEL GTI, ALBUQUERQUE, NM

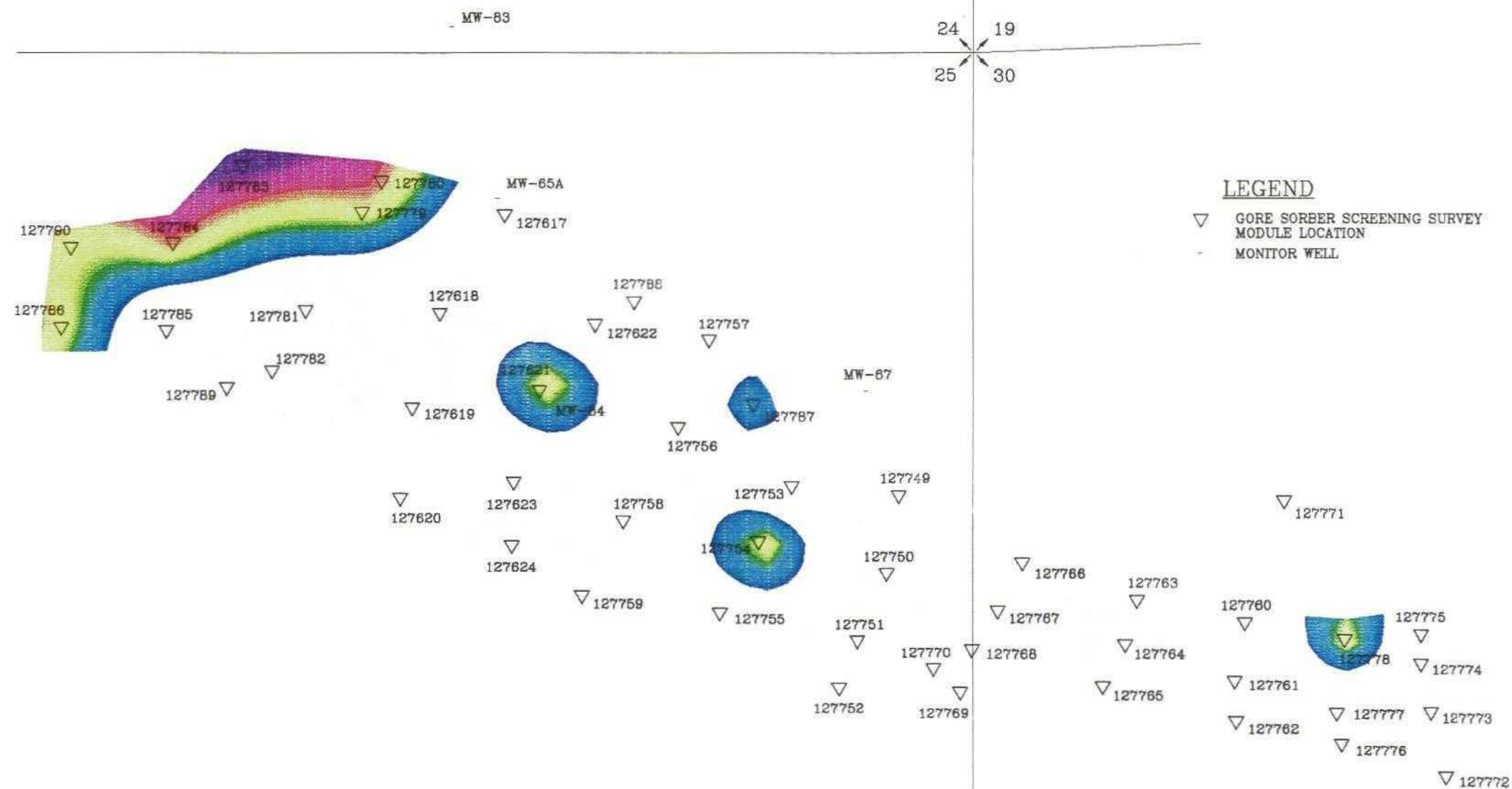
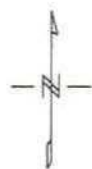
REV. #: 0

REV. DATE:

DATE DRAWN:	OCTOBER 11, 1996	GRID FILE:	B101.GRD
DRAWN BY:	RF/JH	PLOT FILE:	B1C.PLT
DATE GRIDDED:	OCTOBER 28, 1996	PROJECT NUMBER:	070079
GRIDDED BY:	RF/JH	SITE CODE:	TS

ORIG. CAD: 0194GORE

GORE-SORBER
GORE-SORBER SCREENING SURVEY
GORE-SORBER SCREENING MODULE
IS REG. U.S. PAT. & T.M. OFF.
IS A SERVICE MARK OF W.L. GORE & ASSOCIATES
IS A TRADEMARK OF W.L. GORE & ASSOCIATES



NOTE: CONTOUR PLOT REPRESENTS MASS OF COMPOUND DESORBED FROM GORE-SORBER SCREENING MODULES, IDENTIFIED AND QUANTIFIED BY GAS CHROMATOGRAPH MASS SELECTIVE DETECTION.

THIS DRAWING AND ANY ATTACHMENTS HAVE BEEN PRODUCED FOR THE SOLE USE OF THE RECIPIENT AND MUST NOT BE USED, REUSED, REPRODUCED, MODIFIED OR COPIED IN ANY MANNER WITHOUT THE PROPER WRITTEN APPROVAL OF W.L. GORE & ASSOCIATES. THIS DRAWING MAY CONTAIN CONFIDENTIAL AND PROPRIETARY INFORMATION OF W.L. GORE & ASSOCIATES. ANY UNAUTHORIZED USE OF THIS DRAWING IS STRICTLY PROHIBITED.

GORE-SORBER
GORE-SORBER SCREENING SURVEY
GORE-SORBER SCREENING MODULE

ORIG. CAD: 0194GORE

IS REG. U.S. PAT. & T.M. OFF.
IS A SERVICE MARK OF W.L. GORE & ASSOCIATES
IS A TRADEMARK OF W.L. GORE & ASSOCIATES

GORE-SORBER SCREENING SURVEY



W.L. GORE & ASSOCIATES, INC.

P.O. BOX 1100
101 LEWISVILLE ROAD
ELKTON, MD 21922-1100
(410) 392-3300

MARATHON OIL COMPANY, INDIAN BASIN, NM

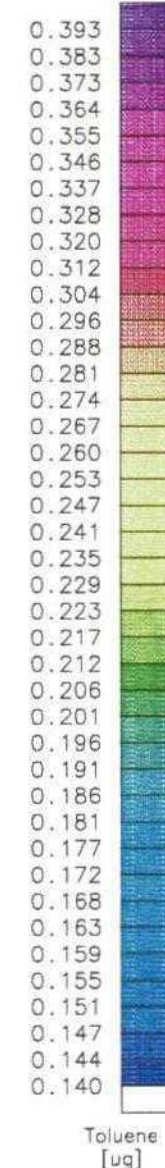
BTEX

FLUOR DANIEL GTI, ALBUQUERQUE, NM

REV. #: 0

REV. DATE:

DATE DRAWN:	OCTOBER 11, 1996	GRID FILE:	BT01.GRD
DRAWN BY:	RF/JH	PLOT FILE:	BTC.PLT
DATE GRIDDED:	OCTOBER 28, 1996	PROJECT NUMBER:	070079
GRIDDED BY:	RF/JH	SITE CODE:	TS



THIS DRAWING AND ANY ATTACHMENTS HAVE BEEN PRODUCED FOR THE SOLE USE OF THE RECIPIENT AND MUST NOT BE USED, REUSED, REPRODUCED, MODIFIED OR COPIED IN ANY MANNER WITHOUT THE PROPER WRITTEN APPROVAL OF W. L. GORE & ASSOCIATES. THIS DRAWING MAY CONTAIN CONFIDENTIAL AND PROPRIETARY INFORMATION OF W. L. GORE & ASSOCIATES. ANY UNAUTHORIZED USE OF THIS DRAWING IS STRICTLY PROHIBITED.

GORE-SORBER GORE-SORBER SCREENING SURVEY GORE-SORBER SCREENING MODULE	ORIG. CAD:	0194GORE
---	------------	----------

DATE DRAWN:	OCTOBER 11, 1996	GRID FILE:	TOD1.GRD
DRAWN BY:	RF/JH	PL0T FILE:	T0C.PL7
DATE GRIDDED:	OCTOBER 28, 1996	PROJECT NUMBER:	070079
GRIDDED BY:	RF/JH	SITE CODE:	TS



FLUOR DANIEL GTI

November 4, 1996

Mr. Robert J. Menzie, Jr.
Marathon Oil Company
P.O. Box. 552
Midland, TX 797001-0522

VIA: Facsimile followed by surface mail

RE: Well locations for additional shallow zone investigation at the Indian Basin Remediation Project

Dear Bob:

Fluor Daniel GTI has evaluated the data gathered in the GORESORBER survey along Rocky Arroyo. As you will recall, the survey was conducted to confirm the transport mechanism of condensate at the site and to guide well placement for additional investigation. The survey was designed assuming condensate migrated down Rocky Arroyo in the upper zone, as it also migrated downward and eventually north in the lower zone. The primary objective of the additional upper zone well installations is to define the extent of impacts from condensate to the south of the arroyo and downstream to the southeast.

A copy of the report for the GORESORBER survey was submitted to you under separate cover. Analysis of the data supports that condensate was transported down the arroyo in the upper zone. This is apparent particularly in the total petroleum hydrocarbons (TPH) mapping where the mapped hot spots lie within a meander of the arroyo bed. In addition, TPH detections less than 1.449 ug are not included on the mapping, yet there are many points at which TPH was detected in this range. The inclusion of these survey points of lower detection in the analysis confirms the connectivity of condensate in the upper zone along the arroyo.

Proposed well locations are shown in the table below and are plotted on the attached map. The coordinates given are from the established system used for well location at the site. The notes on the table indicate whether condensate is expected at the proposed well location. The well locations are proposed to define the extent of impacts in the upper zone and are selected so that they could be accessed by a drill rig and sampling equipment. Minor adjustments in location might be necessary due to field conditions.

dg/moc-03/bob1.ltr

Mr. Robert J. Menzie, Jr.
November 4, 1996

Page 2 of 2

WELL NO.	COORDINATES	TYPE
1	E 35+50, S 30+00	P
2	E 28+90, S 38+50	Z
3	E 42+50, S 46+00	Z
4	E 58+00, S 52+00	Z
5	E 68+00, S 47+00	P
6	E 86+00, S 48+50	Z
7	E 80+50, S 56+00	Z
8	E 57+00, S 46+00	H
9	E 57+00, S 39+30	H

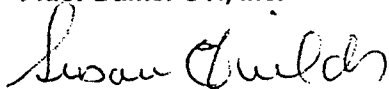
Notes: Z = Zero concentrations expected P = Potential concentrations H = Concentrations expected

The upper zone wells are proposed to be installed with a 4-inch diameter casing and will be on the order of 60 feet in depth. A detailed proposal for well installation and oversight will be submitted in the near future.

Please do not hesitate to contact me if you have any questions or comments on these recommendations.

Sincerely,

Fluor Daniel GTI, Inc.



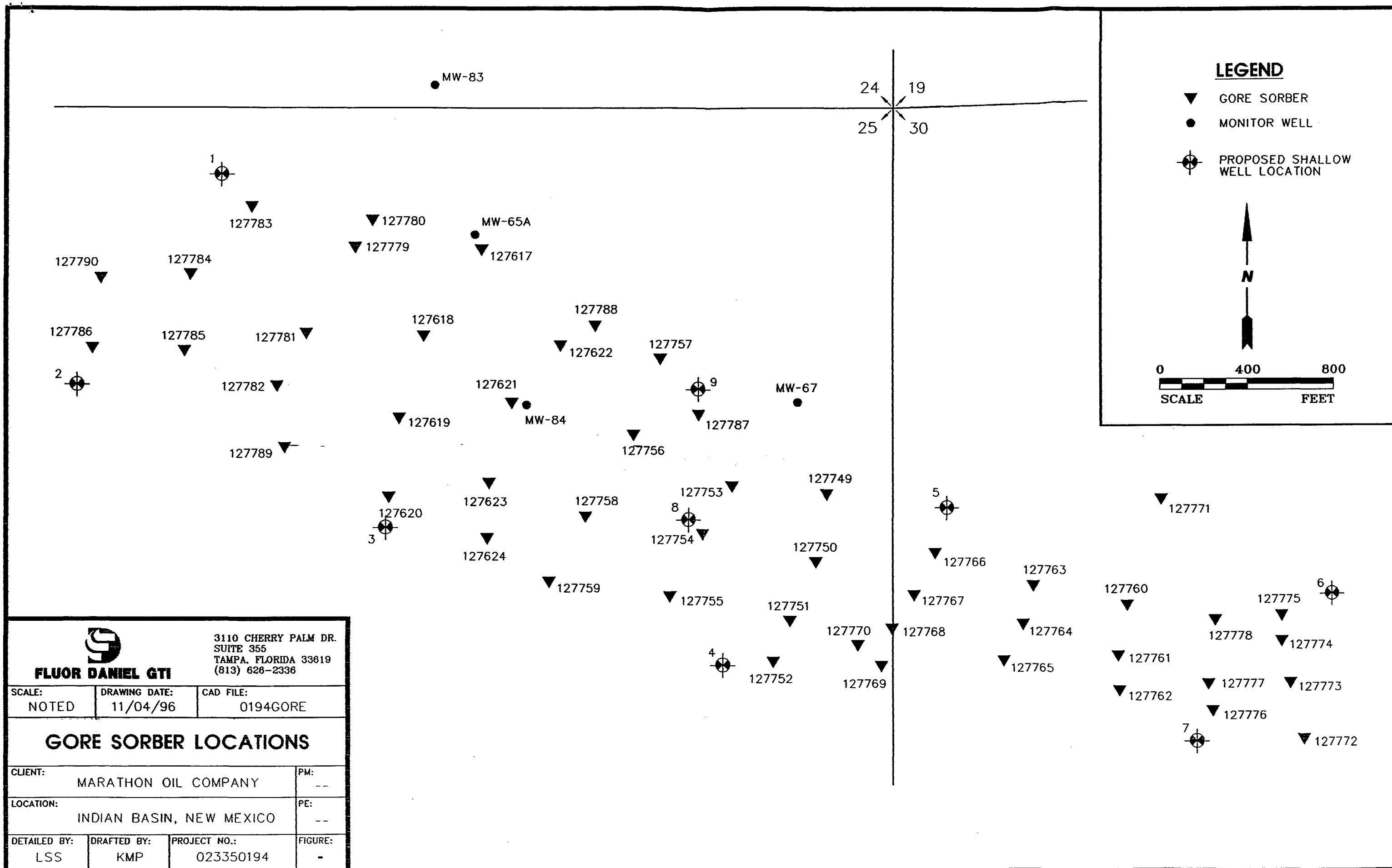
Susan Fields, P.E.
Operations Manager

c: Curtis Wright, Tempe
Kevin Spencer, Austin
file: MOC/Indian Basin/1996 GoreSorber Survey

dg/moc-03/bob1.ltr

FLUOR DANIEL GTI







FLUOR DANIEL GTI

November 4, 1996

RECEIVED

AUG 28 1997

Environmental Services
Oil Conservation Division

Mr. Robert J. Menzie, Jr.
Marathon Oil Company
P.O. Box. 552
Midland, TX 797001-0522

VIA: Facsimile followed by surface mail

RE: Well locations for additional shallow zone investigation at the Indian Basin Remediation Project

Dear Bob:

Fluor Daniel GTI has evaluated the data gathered in the GORESORBER survey along Rocky Arroyo. As you will recall, the survey was conducted to confirm the transport mechanism of condensate at the site and to guide well placement for additional investigation. The survey was designed assuming condensate migrated down Rocky Arroyo in the upper zone, as it also migrated downward and eventually north in the lower zone. The primary objective of the additional upper zone well installations is to define the extent of impacts from condensate to the south of the arroyo and downstream to the southeast.

A copy of the report for the GORESORBER survey was submitted to you under separate cover. Analysis of the data supports that condensate was transported down the arroyo in the upper zone. This is apparent particularly in the total petroleum hydrocarbons (TPH) mapping where the mapped hot spots lie within a meander of the arroyo bed. In addition, TPH detections less than 1.449 ug are not included on the mapping, yet there are many points at which TPH was detected in this range. The inclusion of these survey points of lower detection in the analysis confirms the connectivity of condensate in the upper zone along the arroyo.

Proposed well locations are shown in the table below and are plotted on the attached map. The coordinates given are from the established system used for well location at the site. The notes on the table indicate whether condensate is expected at the proposed well location. The well locations are proposed to define the extent of impacts in the upper zone and are selected so that they could be accessed by a drill rig and sampling equipment. Minor adjustments in location might be necessary due to field conditions.

dg/moc-03/bob1.ltr

Mr. Robert J. Menzie, Jr.
November 4, 1996

Page 2 of 2

WELL NO.	COORDINATES	TYPE
1	E 35+50, S 30+00	P
2	E 28+90, S 38+50	Z
3	E 42+50, S 46+00	Z
4	E 58+00, S 52+00	Z
5	E 68+00, S 47+00	P
6	E 86+00, S 48+50	Z
7	E 80+50, S 56+00	Z
8	E 57+00, S 46+00	H
9	E 57+00, S 39+30	H

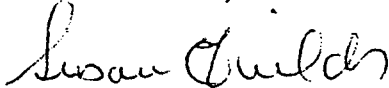
Notes: Z = Zero concentrations expected P = Potential concentrations H = Concentrations expected

The upper zone wells are proposed to be installed with a 4-inch diameter casing and will be on the order of 60 feet in depth. A detailed proposal for well installation and oversight will be submitted in the near future.

Please do not hesitate to contact me if you have any questions or comments on these recommendations.

Sincerely,

Fluor Daniel GTI, Inc.



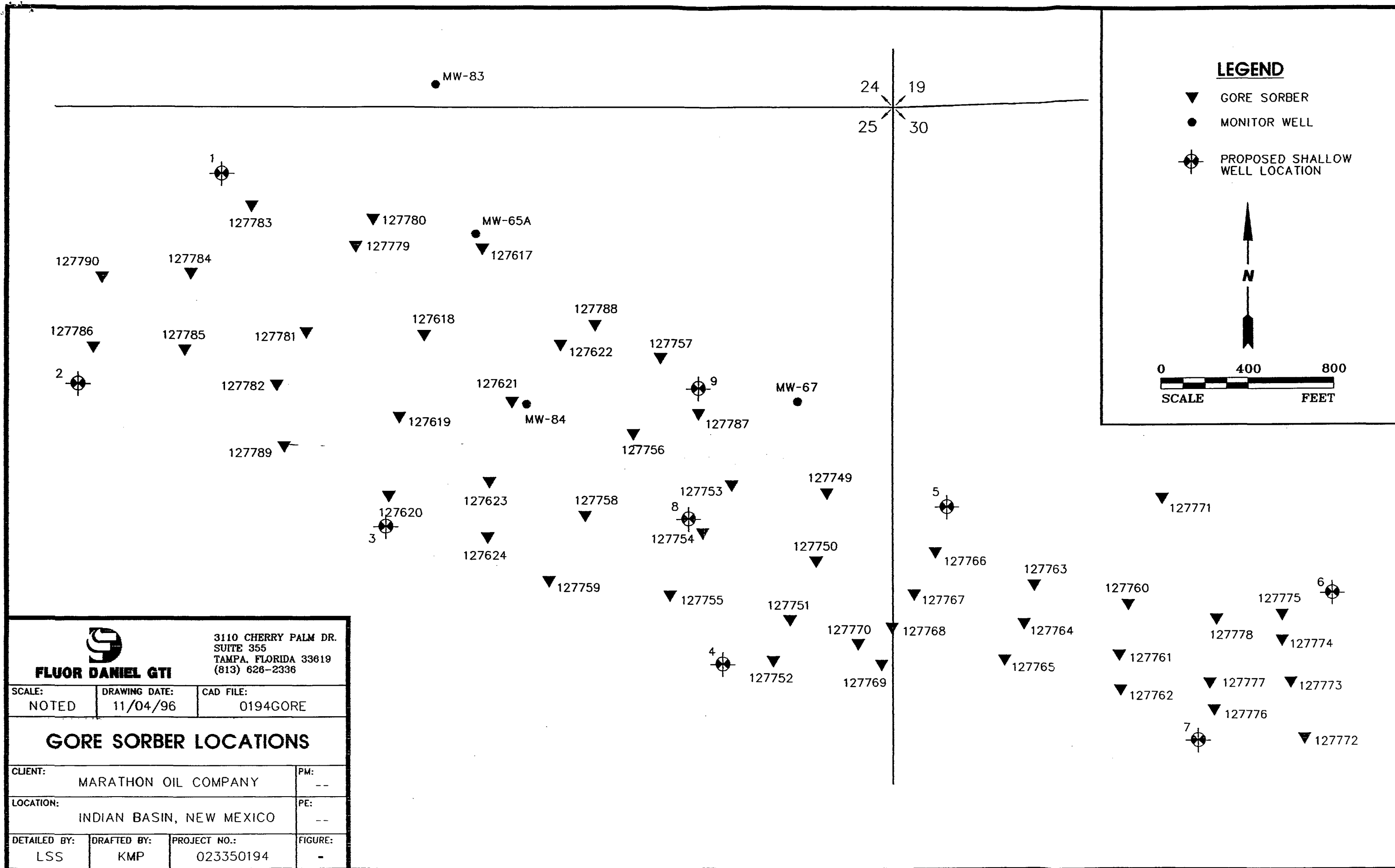
Susan Fields, P.E.
Operations Manager

c: Curtis Wright, Tempe
 Kevin Spencer, Austin
 file: MOC/Indian Basin/1996 GoreSorber Survey

dg/moc-03/bob1.ltr

FLUOR DANIEL GTI







W. L. GORE & ASSOCIATES, INC.

101 LEWISVILLE ROAD • P.O. BOX 1100 • ELKTON, MARYLAND 21922-1100 PHONE: 410/392-3300
FAX: 410/996-3325 • TELEX 467637 GORE FB ELKT
ENVIRONMENTAL PRODUCTS GROUP

Page 1 of 5

GORE-SORBERSSM Screening Survey Final Report

Marathon Oil Company
Indian Basin, NM

October 29, 1996

RECEIVED

AUG 28 1997

Environmental Bureau
Oil Conservation Division

Prepared For:
Fluor Daniel GTI
2501 Yale Boulevard SE, Suite 204
Albuquerque, NM 87106

W.L. Gore & Associates, Inc.
Written/Submitted by

Jay W. Hodny, M.S.
Associate

W.L. Gore & Associates, Inc.
Reviewed/Approved by

Mark J. Wrigley, P.G.
Associate

I:\PROJECTS\FDGT\INDBASIN.NM\961029R.DOC

This document shall not be reproduced, except in full, without written approval of W.L. Gore & Associates

FORM 11R.3
Rev 10/25/96

**GORE-SORBERsm Screening Survey
Final Report**

REPORT DATE: October 29, 1996

AUTHOR: JWH

SITE INFORMATION

Site Reference: Marathon Oil Company, Indian Basin, NM

Customer Purchase Order Number: 014606

Gore Production Order Number: 070079

Gore Site Code: TS

FIELD PROCEDURES

Modules shipped: 55

Installation Date(s): 9-24,25,26-96

Field work performed by: Fluor Daniel GTI

Modules Installed: 50

Retrieval date(s): 10-15-96

Modules Retrieved: 55

Modules Lost in Field: 0

Exposure Time: 19-21 [days]

Trip Blanks Returned: 5

Unused Modules Returned: 0

Date/Time Received by Gore: 10-16-96 @ 1:15 pm **By:** CJF

Recorded Cooler/Water Temperature Control Blank temperature: 4.6 [°C]

Chain of Custody Form attached: ✓

Chain of Custody discrepancies: None.

Comments: None.

GORE-SORBERsm Screening Survey Final Report

ANALYTICAL PROCEDURES

W.L. Gore & Associates' Screening Module Laboratory operates under the guidelines of its Quality Assurance Manual, Operating Procedures and Methods. The quality assurance program is consistent with Good Laboratory Practices (GLP) and ISO Guide 25, "General Requirements for the Competence of Calibration and Testing Laboratories", third edition, 1990. The Laboratory is audited regularly by a quality system design, development and auditing company.

Instrumentation consists of Hewlett-Packard 5890 gas chromatographs and 5971 mass selective detectors, as well as Perkin-Elmer ATD 400 automated thermal desorption units. Sample preparation simply involves cutting the tip off the bottom of the sample module and transferring one or more exposed sorbent containers (sorbent, each containing 40mg of a suitable granular adsorbent) to a thermal desorption tube for analysis. Sorbent remains clean and protected from dirt, soil, and ground water by the insertion/retrieval cord, and require no further sample preparation.

Screening Method Quality Assurance:

Before each run sequence, two instrument blanks, a sorbent containing 5µg BFB (Bromofluorobenzene), and a method blank are analyzed. The BFB mass spectra must meet the criteria set forth in our methods before samples can be analyzed. A sorbent containing BFB is also analyzed after every 30 samples and/or trip blanks, as is a method blank. Standards containing the selected target compounds at three calibration levels of 5, 20, and 50µg are analyzed at the beginning of each run. The criterion for each target compound is less than 35% RSD (relative standard deviation). If this criterion is not met for any target compound, the analyst has the option of generating second- or third-order standard curves, as appropriate. A second-source reference standard, at a level of 20µg per target compound, is analyzed after every ten samples and/or trip blanks, and at the end of the run sequence. Positive identification of target compounds is determined by the presence of the target ion and at least two secondary ions, retention time versus reference standard, and the analyst's judgment.

NOTE: All data have been archived. Any replicate sorbents not used in the initial analysis will be discarded fifteen (15) days from the date of analysis.

Laboratory analysis: thermal desorption, gas chromatography, mass selective detection
Quality Assurance Level: 2 (ANA-4-A1.M)

Instrument ID: # 1 **Chemist:** JW/WW **Data Subdirectory:** 070079

Compounds/mixtures requested: Gore A1; Fuel Hydrocarbons Target List (A2)

Deviations from Standard Method: None.

Comments: Soil vapor analytes and abbreviations are tabulated in the Data Table Key (page 5).

GORE-SORBERsm Screening Survey Final Report

DATA TABULATION

CONTOUR MAPS ENCLOSED: Three (3) B-size color contour maps
LIST OF MAPS ENCLOSED:

- Benzene, Toluene, Ethylbenzene, & m,p,o-Xylenes (BTEX)
- Toluene
- Petroleum Hydrocarbons

Compound Name	Method Detection Limit [µg]	Low Map (gray) Limit [µg]	Highest Detect Level [µg]	Upper Map (purple) Limit [µg]
BTEX	0.02	0.05	0.41	0.41
Toluene	0.14	0.14	0.41	0.41
Petro. Hydro.	*	1.45	70.48	70.48

* - no calculated MDL exists

NOTE: All data values presented in Appendix A represent masses of compound(s) desorbed from the GORE-SORBER Screening Modules received and analyzed by W.L. Gore, as identified in the Chain of Custody (Appendix A). The measurement traceability and instrument performance are reproducible and accurate for the measurement process documented. Semi-quantitation of the compound mass is based on either a single-level (QA Level 1) or three-level (QA Level 2) standard calibration.

Comments:

- The minimum (gray) contour level, for each mapped analyte or group of analytes, was set at the maximum blank level observed or the method detection limit, whichever was greater. The maximum contour level was set at the maximum value observed.

GORE-SORBER is a registered trademark of W. L. Gore & Associates, Inc.

**GORE-SORBERsm Screening Survey
Final Report**

**KEY TO DATA TABLE
Marathon Oil Company, Indian Basin, NM**

UNITS

μ g micrograms (per sorber), reported for compounds using
external standards.
MDL method detection limit

ANALYTES

BTEX combined masses of benzene, toluene, ethylbenzene and total xylenes
 (Gasoline Range Aromatics)
C11,C13&C15 combined masses of undecane, tridecane, and pentadecane (C11+C13+C15)
 (Diesel Range Alkanes)
MTBE methyl t-butyl ether
BENZ benzene
TOL toluene
OCT octane
EtBENZ ethylbenzene
mpXYL m-, p-xylene
oXYL o-xylene
135TMB 1,3,5-trimethylbenzene
124TMB 1,2,4-trimethylbenzene
UNDEC undecane
NAPH naphthalene
TRIDEC tridecane
2MeNAPH 2-methyl naphthalene
PENTADEC pentadecane

BLANKS

TBn unexposed trip blanks, which traveled with the exposed modules
method blankn method blank, retained at Gore

APPENDIX A:

1. CHAIN OF CUSTODY
2. DATA TABLE
3. COLOR CONTOUR MAPS

GORE-SORBER® Screening Survey Chain of Custody

For W.L. Gore & Associates use only
Production Date: #

70079



W. L. Gore & Associates, Inc., Environmental Products Group
101 Lewisville Road • Elkton, Maryland 21921 • Tel: (410) 392-3300 • Fax (410) 996-3325

Instructions: Customer must complete ALL shaded cells

Customer Name: <u>FLUOR DANIEL GTI</u>		Site Name: <u>MARATHON OIL SITE</u>	
Address: <u>2501 YALE BLVD. SOUTHEAST</u> <u>ALBUQUERQUE N.M 87106</u>		Site Address: <u>INDIAN BASIN</u>	
Phone: <u>505 242 3113</u>		Project Manager: <u>SUSAN FIELD</u>	
FAX: <u>505 242 1103</u>		Customer Project No.: <u>14606</u>	
		Customer P.O. #: <u>14606</u> Quote #: <u>BK 6391</u>	
Serial # of Modules Shipped		# of Modules for Installation <u>50</u> # of Trip Blanks <u>5</u>	
# <u>127617</u> through # <u>127624</u>	Total Modules Shipped: <u>55</u> Pieces		
# <u>127749</u> through # <u>127795</u>	Total Modules Received: <u>55</u> Pieces		
# through #	Total Modules Installed: <u>50</u> Pieces		
# through #	Serial # of Trip Blanks (Client Decides)		#
# through #	# <u>127791</u>	# <u>127794</u>	#
# through #	# <u>127792</u>	# <u>127795 NH</u>	#
# through #	# <u>127793</u>	#	#
Installation Performed By:		Installation Method(s) (circle those that apply):	
Name (please print): <u>Marc R. Smith / L. Scott Stevenson</u>		☒ Slide Hammer ☐ Hammer Drill ☐ Auger	
Company/Affiliation: <u>Fluor Daniel GTI</u>		Other: _____	
Installation Start Date and Time: <u>9/24/96</u> <u>10:17</u> <u>AM</u> <u>PM</u>			
Installation Complete Date and Time: <u>9/26/96</u> <u>12:40</u> <u>AM</u> <u>PM</u>			
Retrieval Performed By:		Total Modules Retrieved: <u>50</u> Pieces	
Name (please print): <u>Marc R. Smith / Kevin Cook</u>		Total Modules Lost in Field: <u>0</u> Pieces	
Company/Affiliation: <u>Fluor Daniel GTI</u>		Total Unused Modules Returned: <u>0</u> Pieces	
Retrieval Start Date and Time: <u>10/15/96</u> <u>09:20</u> <u>AM</u> <u>PM</u>			
Retrieval Complete Date and Time: <u>10/15/96</u> <u>16:17</u> <u>AM</u> <u>PM</u>			
Target Analytes to be Mapped (Check Options or List as appropriate):		To Be Determined Pending Completion of Lab Analysis [] or write "None", if applicable.	
Analyte #1:	Analyte #2:	Analyte #3:	
Other Instructions, if any: <u>To be analyzed per Susan Field's instructions / and/or mapped</u>			
Relinquished By: <u>CJ Jordan</u>	Date: <u>9/19/96</u> Time: <u>15:00</u>	Received By: _____	Date: _____ Time: _____
Affiliation: <u>W.L. Gore & Associates, Inc.</u>		Affiliation: _____	
Relinquished By: <u>[Signature]</u>	Date: <u>10-15-96</u> Time: <u>1730</u>	Received By: _____	Date: _____ Time: _____
Affiliation: <u>FDGTI</u>		Affiliation: _____	
Relinquished By: _____	Date: _____ Time: _____	Received By: <u>CJ Jordan</u>	Date: <u>10/16/96</u> Time: <u>13:15</u>
Affiliation: _____		Affiliation: <u>W.L. Gore & Associates, Inc.</u>	
Temperature of Samples When Received By Gore		<u>4.6</u> °C	

GORE-SORBER® Screening Survey
Installation and Retrieval Log

SITE NAME & LOCATION

MARATHON-INDIAN BASIN
GAS PLANT Carlsbad NM

Page 1 of 2

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME 10-15-95 unless specified	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
1.	127617 ✓	24 Sept 96 / 10:17	1332			X		X	A-1
2.	127618 ✓	10:41	1344			X		X	A-2
3.	127619 ✓	11:35	1351			X		X	A-3
4.	127620 ✓	11:53	1359			X		X	A-4
5.	127621 ✓	12:19	1253			X		X	B-2
6.	127622 ✓	12:28	1314			X		X	B-1
7.	127623 ✓	12:57	1244			X		X	B-3
8.	127624 ✓	13:11	1236			X		X	B-4
9.	127749 ✓	13:50	1108			X		X	E-1
10.	127750 ✓	14:12	1114			X		X	E-2
11.	127751 ✓	14:36	1120			X		X	E-3
12.	127752 ✓	14:45	1124			X		X	E-4
13.	127753 ✓	15:14	1151			X		X	D-1
14.	127754 ✓	15:25	1144			X		X	D-2
15.	127755 ✓	15:34	1136			X		X	D-3
16.	127756 ✓	16:14	1214			X		X	C-2
17.	127757 ✓	08:34	1205			X		X	C-1
18.	127758 ✓	08:52	1222			X		X	C-3
19.	127759 ✓	09:07	1229			X		X	C-4
20.	127760 ✓	10:08	1027			X		X	H-1
21.	127760 ✓	10:21	1023			X		X	H-2
22.	127762 ✓	10:30	1017			X		X	H-3
23.	127763 ✓	10:45	1032			X		X	G-1
24.	127764 ✓	10:55	1037			X		X	G-2
25.	127765 ✓	11:05	1041			X		X	G-3
26.	127766 ✓	11:25	1059			X		X	F-1
27.	127767 ✓	11:37	1055			X		X	F-2
28.	127768 ✓	11:46	1053			X		X	F-3
29.	127769 ✓	11:54	1046			X		X	F-4
30.	127770 ✓	12:08	1050			X		X	OG-MW-95
31.	127771 ✓	13:27	1017			X		X	OG-MW-97
32.	127772 ✓	13:58	0920			X		X	J-3
33.	127773 ✓	14:12	0927			X		X	J-2
34.	127774 ✓	14:35	0933			X		X	J-1
35.	127775 ✓	14:48	0936			X		X	OG-NA-1
36.	127776 ✓	15:05	1005			X		X	I-3
37.	127777 ✓	15:20	0959			X		X	I-2
38.	127778 ✓	15:33	0953			X		X	I-1
39.	127779 ✓	09:06	1555			X		X	Z-2
40.	127780 ✓	09:15	1559			X		X	Z-1
41.	127781 ✓	09:38	1425			X		X	Z-3
42.	127782 ✓	09:51	1433			X		X	Z-4

GORE-SORBER® Screening Survey **Installation and Retrieval Log**

SITE NAME & LOCATION

Marathon-INDIAN BASIN GAS PLANT

Carlsbad NM

Page 2 of 2

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
43.	127783 ✓	26 Sep 1976 / 10:16	1532			X		X	Y-1
44.	127784 ✓	10:30	1523			X		X	Y-2
45.	127785 ✓	10:42	1505			X		X	Y-3
46.	127786 ✓	11:10	1510			X		X	X-2
47.	127787 ✓	11:46	1158			X		X	OG-NA-2
48.	127788 ✓	12:02	1323			X		X	OG-NA-3
49.	127789 ✓	12:24	1441			X		X	OG-SA-1
50.	127790 ✓	12:40	1515			X		X	X-1
51.									
52.									
53.									
54.									
55.									
56.									
57.									
58.									
59.									
60.									
61.									
62.									
63.									
64.									
65.									
66.									
67.									
68.									
69.									
70.									
71.									
72.									
73.									
74.									
75.									
76.									
77.									
78.									
79.									
80.									
81.									
82.									
83.									
84.									
85.									

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
 FLUOR DANIEL GTI, ALBUQUERQUE, NM
 TARGET FUEL HYDROCARBONS (A2)
 MARATHON OIL SITE, CARLSBAD, NM
 SITE TS - PRODUCTION ORDER # 070079

DATE ANALYZED	SAMPLE NAME	MTBE, ug	BTEX, ug	BENZ, ug	TOL, ug	OCT, ug	EIBENZ, ug	mpXYL, ug	oXYL, ug	135TMB, ug	124TMB, ug	C11, C13, & C15, ug
	MDL =	0.26	0.02	0.02	0.14	0.03	0.02	0.03	0.02	0.02	0.02	0.02
10/18/96	127617	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
10/18/96	127618	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127619	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127620	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
10/18/96	127621	0.00	0.22	0.00	0.18	0.00	0.00	0.04	0.00	0.08	0.02	0.19
10/18/96	127622	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127623	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127624	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127749	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127751	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127752	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127753	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127754	0.00	0.24	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127755	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.29
10/18/96	127756	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
10/18/96	127757	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127758	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127759	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127760	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127761	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127762	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127763	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127764	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127765	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127766	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	127767	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	127768	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127769	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/19/96	127770	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/19/96	127771	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/19/96	127772	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
 FLUOR DANIEL GTI, ALBUQUERQUE, NM
 TARGET FUEL HYDROCARBONS (A2)
 MARATHON OIL SITE, CARLSBAD, NM
 SITE TS - PRODUCTION ORDER # 070079

DATE ANALYZED	SAMPLE NAME	MTBE, ug	BTEX, ug	BENZ, ug	TOL, ug	OCT, ug	EtBENZ, ug	mpXYL, ug	oXYL, ug	135TMB, ug	124TMB, ug	C11, C13, & C15, ug
	MDL =	0.26	0.02	0.02	0.14	0.03	0.02	0.03	0.02	0.02	0.02	0.02
10/19/96	127773	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127774	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127775	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127776	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127777	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127778	0.00	0.18	0.00	0.13	0.00	0.00	0.05	0.00	0.00	0.00	0.06
10/19/96	127779	0.00	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.02
10/19/96	127780	0.00	0.22	0.00	0.13	0.00	0.08	0.00	0.00	0.00	0.00	0.00
10/19/96	127781	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127782	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/19/96	127783	0.00	0.41	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.03
10/19/96	127784	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.03
10/19/96	127785	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127786	0.00	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.02
10/19/96	127787	0.00	0.12	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.02
10/19/96	127788	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/96	127789	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/19/96	127790	0.00	0.14	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	TB 1, 127791	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10/18/96	TB 2, 127792	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	TB 3, 127793	0.00	0.05	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.04
10/19/96	TB 4, 127794	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
10/19/96	TB 5, 127795	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
10/18/96	method blank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/96	method blank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Max Observed	0.00	0.41	0.00	0.41	0.00	0.08	0.09	0.00	0.08	0.05	0.29

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
 FLUOR DANIEL GTI, ALBUQUERQUE, NM
 TARGET FUEL HYDROCARBONS (A2)
 MARATHON OIL SITE, CARLSBAD, NM
 SITE TS - PRODUCTION ORDER # 070079

SAMPLE NAME	UNDEC, ug	NAPH, ug	TRIDEC, ug	2MeNAPH, ug	PENTADEC, ug	Hydrocarbons, est. ug	Petroleum
MDL =	0.02	0.03	0.03	0.05	0.04		
127617	0.01	0.00	0.00	0.00	0.02		2.98
127618	0.01	0.00	0.00	0.00	0.01		0.57
127619	0.01	0.00	0.00	0.00	0.00		0.48
127620	0.02	0.00	0.00	0.00	0.00		0.63
127621	0.19	0.00	0.00	0.00	0.00		19.00
127622	0.01	0.00	0.00	0.00	0.00		0.34
127623	0.01	0.00	0.00	0.00	0.00		0.27
127624	0.01	0.00	0.00	0.00	0.00		0.45
127749	0.00	0.00	0.00	0.00	0.00		1.26
127750	0.01	0.00	0.00	0.00	0.00		0.90
127751	0.00	0.00	0.00	0.00	0.00		0.54
127752	0.00	0.00	0.00	0.00	0.00		0.32
127753	0.00	0.00	0.00	0.00	0.00		0.50
127754	0.13	0.01	0.01	0.00	0.16		70.48
127755	0.08	0.00	0.00	0.00	0.03		7.87
127756	0.00	0.00	0.00	0.00	0.00		0.42
127757	0.00	0.00	0.00	0.00	0.00		0.29
127758	0.01	0.00	0.00	0.00	0.00		1.00
127759	0.01	0.00	0.00	0.00	0.00		0.85
127760	0.01	0.00	0.00	0.00	0.00		0.69
127761	0.00	0.00	0.00	0.00	0.00		0.26
127762	0.00	0.00	0.00	0.00	0.00		0.19
127763	0.00	0.00	0.00	0.00	0.00		0.63
127764	0.01	0.00	0.00	0.00	0.00		0.63
127765	0.00	0.00	0.00	0.00	0.00		0.39
127766	0.00	0.00	0.00	0.00	0.00		0.84
127767	0.01	0.00	0.00	0.00	0.00		0.44
127768	0.00	0.00	0.00	0.00	0.00		0.55
127769	0.01	0.00	0.00	0.00	0.00		0.45
127770	0.01	0.00	0.00	0.00	0.00		0.96
127771	0.01	0.00	0.00	0.00	0.00		0.71
127772	0.00	0.00	0.00	0.00	0.00		0.41

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
 FLUOR DANIEL GTI, ALBUQUERQUE, NM
 TARGET FUEL HYDROCARBONS (A2)
 MARATHON OIL SITE, CARLSBAD, NM
 SITE TS - PRODUCTION ORDER # 070079

SAMPLE NAME	UNDEC, ug	NAPH, ug	TRIDE, ug	2MeNAPH, ug	PENTADEC, ug	Hydrocarbons, est. ug	Petroleum
MDL =	0.02	0.03	0.03	0.05	0.04		
127773	0.00	0.00	0.00	0.00	0.00	0.32	
127774	0.00	0.00	0.00	0.00	0.00	0.61	
127775	0.00	0.00	0.00	0.00	0.00	0.44	
127776	0.02	0.00	0.00	0.00	0.00	3.26	
127777	0.00	0.00	0.00	0.00	0.00	0.51	
127778	0.06	0.00	0.00	0.00	0.00	3.04	
127779	0.02	0.00	0.00	0.00	0.00	1.55	
127780	0.00	0.00	0.00	0.00	0.00	0.41	
127781	0.00	0.00	0.00	0.00	0.00	0.21	
127782	0.01	0.00	0.00	0.00	0.00	0.37	
127783	0.03	0.00	0.00	0.00	0.00	0.66	
127784	0.03	0.00	0.00	0.00	0.00	7.96	
127785	0.00	0.00	0.00	0.00	0.00	0.19	
127786	0.02	0.00	0.00	0.00	0.00	1.14	
127787	0.02	0.00	0.00	0.00	0.00	1.56	
127788	0.00	0.00	0.00	0.00	0.00	0.22	
127789	0.01	0.00	0.00	0.00	0.00	0.41	
127790	0.00	0.00	0.00	0.00	0.00	0.14	
TB 1, 127791	0.01	0.00	0.00	0.00	0.00	0.42	
TB 2, 127792	0.00	0.00	0.00	0.00	0.00	0.30	
TB 3, 127793	0.04	0.00	0.00	0.00	0.00	1.45	
TB 4, 127794	0.03	0.00	0.00	0.00	0.00	1.11	
TB 5, 127795	0.02	0.00	0.00	0.00	0.00	1.13	
method blank	0.00	0.00	0.00	0.00	0.00	0.05	
method blank	0.00	0.00	0.00	0.00	0.00	0.02	
Max Observed	0.19	0.01	0.01	0.00	0.16	70.48	



▽ GORE SORBER SCREENING SURVEY
MODULE LOCATION
- MONITOR WELL

Petro. Hydro
[est. ug]

THIS DRAWING AND ANY ATTACHMENTS HAVE BEEN PRODUCED FOR THE SOLE USE OF THE RECIPIENT AND MUST NOT BE USED, REUSED, REPRODUCED, MODIFIED OR COPIED IN ANY MANNER WITHOUT THE PROPER WRITTEN APPROVAL OF W. L. GORE & ASSOCIATES. THIS DRAWING MAY CONTAIN CONFIDENTIAL AND PROPRIETARY INFORMATION OF W. L. GORE & ASSOCIATES. ANY UNAUTHORIZED USE OF THIS DRAWING IS STRICTLY PROHIBITED.

Scale 1:6600

(feet)



GORE
Creative Technologies
Worldwide

P.O. BOX 1100
101 LEWISVILLE ROAD
ELKTON, MD 21922-1100
(410) 392-3300

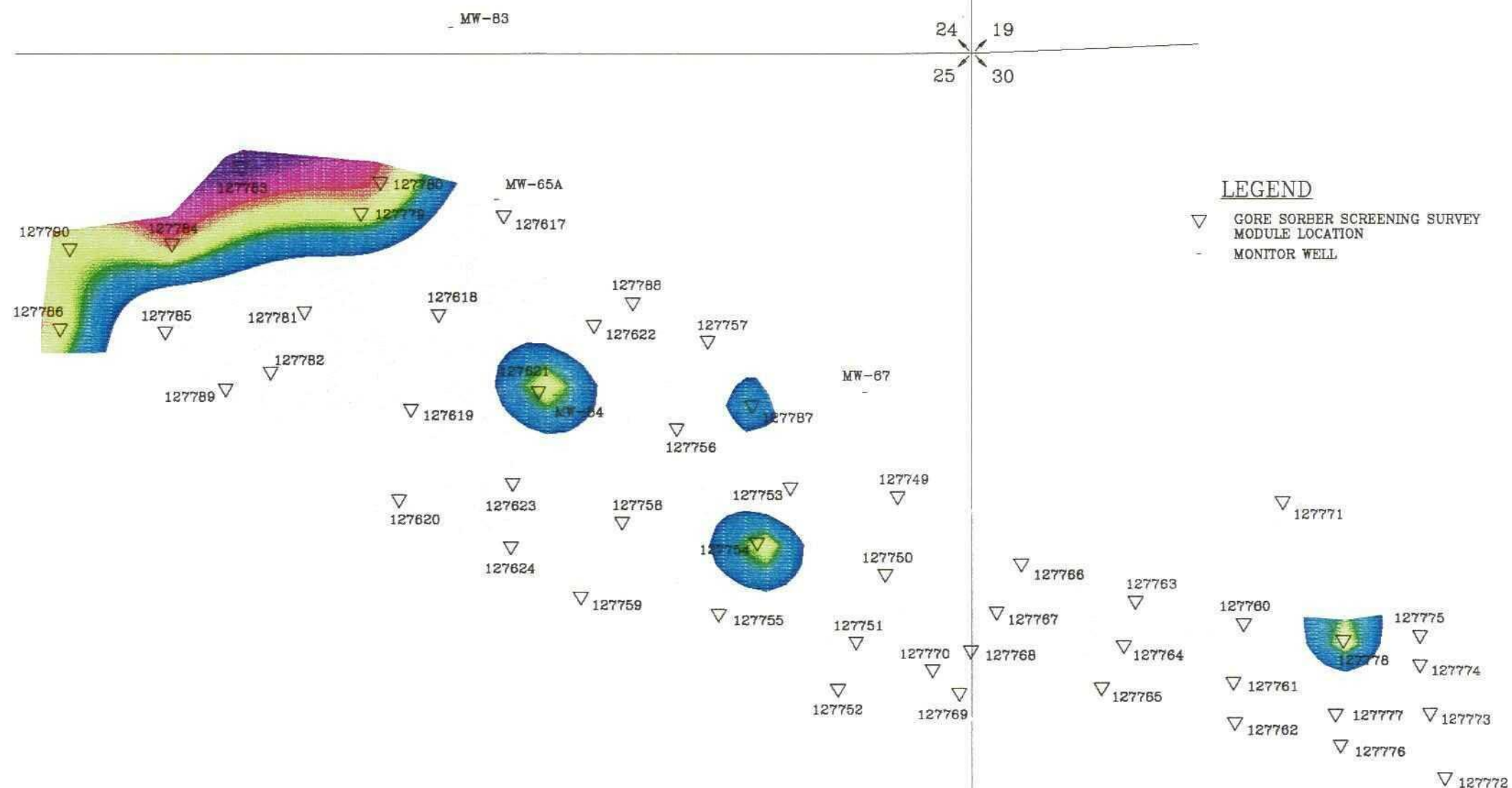
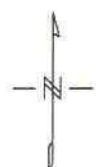
REV. 11/18 10

REV. DATE:

4

GRIDDED BY:	RE/IH	SITE CODE:	TS
-------------	-------	------------	----

GORE-SORBER	ORIG. CAD:	0194GORE
GORE-SORBER SCREENING SURVEY	IS REG. U.S. PAT. & T.M. OFF.	
GORE-SORBER SCREENING MODULE	IS A TRADEMARK OF W.L. GORE & ASSOCIATES	
	IS A TRADEMARK OF W.L. GORE & ASSOCIATES	



Scale 1:6600
250 0 250 500 750
(feet)

NOTE: CONTOUR PLOT REPRESENTS MASS OF COMPOUND DESORBED FROM GORE-SORBER SCREENING MODULES, IDENTIFIED AND QUANTIFIED BY GAS CHROMATOGRAPH MASS SELECTIVE DETECTION.

THIS DRAWING AND ANY ATTACHMENTS HAVE BEEN PRODUCED FOR THE SOLE USE OF THE RECIPIENT AND MUST NOT BE USED, REUSED, REPRODUCED, MODIFIED OR COPIED IN ANY MANNER WITHOUT THE PROPER WRITTEN APPROVAL OF W.L. GORE & ASSOCIATES. THIS DRAWING MAY CONTAIN CONFIDENTIAL AND PROPRIETARY INFORMATION OF W.L. GORE & ASSOCIATES. ANY UNAUTHORIZED USE OF THIS DRAWING IS STRICTLY PROHIBITED.

GORE-SORBER
GORE-SORBER SCREENING SURVEY
GORE-SORBER SCREENING MODULE

ORIG. CAD: 0194GORE
IS REG. U.S. PAT. & T.M. OFF.
IS A SERVICE MARK OF W.L. GORE & ASSOCIATES
IS A TRADEMARK OF W.L. GORE & ASSOCIATES

GORE-SORBER SCREENING SURVEY



W.L. GORE & ASSOCIATES, INC.

P.O. BOX 1100
101 LEWISVILLE ROAD
ELKTON, MD 21922-1100
(410) 392-3300

MARATHON OIL COMPANY, INDIAN BASIN, NM

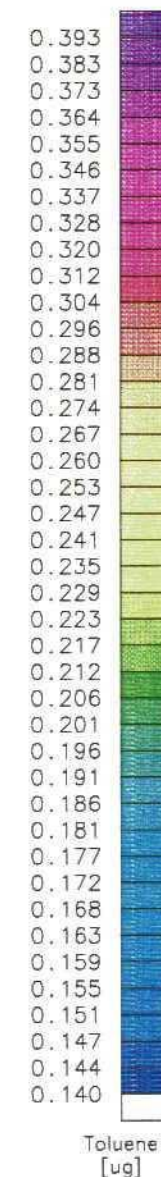
BTEX

FLUOR DANIEL GTI, ALBUQUERQUE, NM

REV. #: 0

REV. DATE:

DATE DRAWN	OCTOBER 11, 1996	GRID FILE:	BT01.GRD
DRAWN BY:	RF/JH	PLOT FILE:	BTC.PLT
DATE GRIDDED:	OCTOBER 28, 1996	PROJECT NUMBER:	070079
GRIDDED BY:	RF/JH	SITE CODE:	TS



THIS DRAWING AND ANY ATTACHMENTS HAVE BEEN PRODUCED FOR THE SOLE USE OF THE RECIPIENT AND MUST NOT BE USED, REUSED, REPRODUCED, MODIFIED OR COPIED IN ANY MANNER WITHOUT THE PROPER WRITTEN APPROVAL OF W. L. GORE & ASSOCIATES. THIS DRAWING MAY CONTAIN CONFIDENTIAL AND PROPRIETARY INFORMATION OF W. L. GORE & ASSOCIATES, ANY UNAUTHORIZED USE OF THIS DRAWING IS STRICTLY PROHIBITED.

GORE-SORBER
GORE-SORBER SCREENING SURVEY
GORE-SORBER SCREENING MODULE

GORE-SORBER SCREENING SURVEY  GORE Creative Technologies Worldwide W.L. GORE & ASSOCIATES, INC. P. O. BOX 1100 101 LEWISVILLE ROAD ELKTON, MD 21922-1100 (410) 392-3300			
MARATHON OIL COMPANY, INDIAN BASIN, NM		REV. #: 0	
TOLUENE		REV. DATE:	
FLUOR DANIEL GTI, ALBUQUERQUE, NM			
DATE DRAWN:	OCTOBER 11, 1996	GRID FILE:	T001.GRD
DRAWN BY:	RF/JH	PLOT FILE:	T0C.PLT
DATE GRIDDED:	OCTOBER 28, 1996	PROJECT NUMBER:	G70079
GRIDDED BY:	RF/JH	SITE CODE:	TS