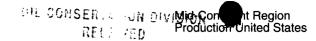
# 2R - 22

## REPORTS

DATE:

March 3. 1995





95 6P 77 8 52 P.O. Box 552 Midland, TX 79702-0552 Telephone 915/682-1626

April 10, 1995

Mr. William C. Olson Hydrogeologist Oil Conservation Division 2040 Pacheco St. Santa Fe, New Mexico 87501

RE: Indian Basin Remediation Project

Transmittal of Vapor Extraction Pilot Test Report

Dear Mr. Olson:

Enclosed is the final report for vapor extraction field activities conducted at the Indian Basin remediation project site in December 1994 and January 1995. The report prepared by Groundwater Technology, Inc. in Albuquerque, New Mexico is being submitted to your office per Marathon's proposed workplan dated November 22, 1994 which was approved by the Oil Conservation Division (OCD) in your letter dated November 22, 1994.

Please call if you have any questions regarding the report or project.

Sincerely,

Robert J. Menzie, Jr.

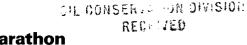
Robert & Mary

Production Environmental Representative

Attachment

c: C. K. Curlee







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

March 31, 1995

Mr. William C. Olson Hydrogeologist Oil Conservation Division 2040 Pacheco St. Santa Fe, New Mexico 87501

RE: Indian Basin Remediation Project

Transmittal of Drilling Investigation Report

Dear Mr. Olson:

Enclosed is the final report for field activities conducted at the Indian Basin remediation project site between November 28, 1994 and December 15, 1994. The letter report prepared by Groundwater Technology, Inc. in Albuquerque, New Mexico is being submitted to your office per Marathon's proposed workplan dated November 22, 1994 which was approved by the Oil Conservation Division (OCD) in your letter dated November 22, 1994.

Thank you again for the OCD's immediate approval of our workplan. If you have any questions regarding this transmittal, please call me.

Sincerely,

Robert J. Menzie, Jr.

Production Environmental Representative

Attachment

C. K. Curlee c:



Groundwater Technology, Inc.

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

March 3, 1995

RECEIVED

Project No. 023350052

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

APR 03 1995

Environmental Bureau
Oil Conservation Division

RE:

Transmittal of Drilling Logs for Monitor Wells MW-73 through MW-80, Marathon Oil Company (MOC) Indian Basin Gas Plant (IBGP), Indian Basin, Carlsbad, New Mexico.

Dear Mr. Menzie:

Please find the enclosed drilling logs for monitor wells MW-73 through MW-80 installed by Groundwater Technology, Inc. (Groundwater Technology) at the above-referenced site from November 29 through December 15, 1994. A site plan illustrating well locations is also enclosed.

All drilling activities were performed using a Failing 1500 air rotary drill rig. During drilling activities air monitoring was performed by Groundwater Technology personnel using a photoionization detector (PID) for organic vapors, and a Tri-Level meter for percent oxygen and presence of hydrogen sulfide in and around the breathing zone. PID readings ranged from 0 to 18.5 parts per million (ppm) in the breathing zone and 0 to 354 ppm at the boring opening. Percent oxygen (%0<sub>2</sub>) readings ranged from 19.9 to 21.4% at the boring opening and drill rig floor. In addition to vapor monitoring by Groundwater Technology personnel, field personnel were outfitted with Hydrogen Sulfide monitors during drilling activities. Hydrogen sulfide was not detected during drilling activities.

Monitor wells MW-73 through MW-76 were drilled to approximately 220 feet below grade, into the Lower Queen aquifer. Monitor wells MW-77 through MW-80 were completed in the shallow aquifer, to total depths ranging from approximately 80 to 90 feet below grade. Upon completion of the borehole, the top portion of the borehole (minimum of 5 feet below grade) was reamed to 12 1/4-inches in diameter and a 8 5/8- inch steel surface casing (CSG) was installed in each monitor well from approximately 3 feet above-grade to a minimum of 5 feet into competent bedrock (depths ranging from 5.5 to 16.8 feet below grade). From the bottom of the CSG (5.5 to 16.8 feet below grade) each borehole remains open to the total depth (TD) of the well (80-90 feet below grade in the shallow aquifer wells, and approximately 220 feet below grade in the deep aquifer wells).

Monitor wells MW-73 through MW-76 were developed by pumping for approximately 8 hours per well. Monitor wells MW-77 through MW-80 were dry upon completion, and therefore no development was performed.

Mark in 1999 Enrichman in the Cartesty Robert J. Menzie, Jr. March 3, 1995

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

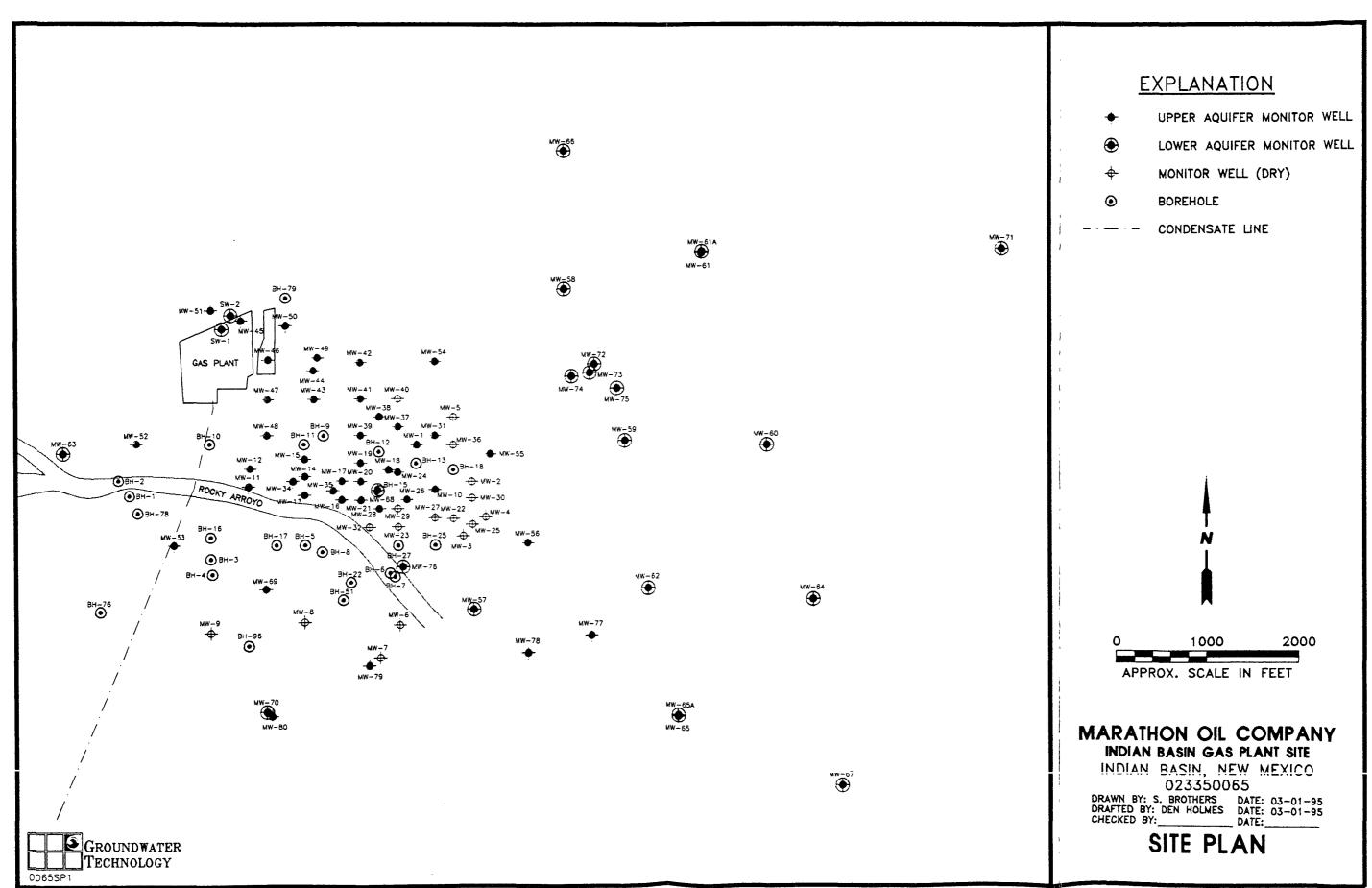
Sincerely,

Groundwater Technology, Inc.

Sara C. Brothers Project Manager

Operations Manager, New Mexico

c: Project File



Site plan of Marathon Oil Company's Indian Basin Gas Plant, Indian Basin, New Mexico.



### Monitoring Well MW-73

Project ∆	MOC/Indian Basin Ga	as Plan	ı t		Owne	r <u>Má</u>	arathon Oil Company	See Site Map For Boring Location							
	Indian Basin, Carls						Proj. No. <u>023350052</u>	Tor Boring Education							
Surface (	Elev To	COMMENTS:													
Top of C	asing Wa														
Screen: ໂ	Dia Lei	Well located 100 feet S of MW-72. Set 10													
Casing: D	)ia <u>8.625 in.                                    </u>	feet 8 5/8 " surface CSG to 7 feet below grade after reaming hole to 12 1/4" to a													
Fill Mater	ial	depth of 7 feet. From 7 feet to 220 feet is open borehole.													
Drill Co. 🕹	rill Co. WT Water Well Service Method Air Rotary  riller Dave Gano Log By Bob Davis Date 11/29-30/94 Permit #														
Driller <i>Di</i>	riller <u>Dave Gann</u> Log By <u>Bob Davis</u> Date <u>11/29-30/94</u> Permit # hecked By ! W.C. MOJOJNVILL License No														
Checked	hecked By ! Was Margnoville License No														
Depth (ft.)	Well Completion	OId (mdd)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Descrip (Color, Texture Trace < 10%, Little 10% to 20%, Some	, Structure)							
3 _ Not to _ scale	П						SPUD 0800 11/29/94 About 1 ft. alluvium before e Rate of penetration about 3								
- 0 - 2 -	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7				7,7 7,7 7,7		<b>0-10 ft:</b> DOLOMITE, medium interbedded with calcareous 5/2), soft, friable.	light gray (N8), hard, s, SANDSTONE, pale olive (5 yr							
- 4 - - 4 -	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \						Rate of penetration about 3	30 ft/hr (0'+ 20')							
- 6 - 8 -															
- - 10 -		С			7/7		10-20 ft: Delomitic SANDSTO	DNE, light aray (N7),							
- 12 -							ii moderately soft, moderate	riable, dry, slightly calcareous , gray (10 yr 6/1), very hard,							
- 14 - 															
- 16 - 							Rate of penetration = 30 ft	/hr.							
- 18 -  - 20 -		0													
- - 22 -		0			77 77 77		(N7), moderately soft, friab	al DOLOMITE, medium light grav							
- 24							Rate of penetration = 30 ft	/hr.							



#### Monitoring Well MW-73

\_ Owner <u>Marathon Oil Company</u> Project MOC/Indian Basin Gas Plant Location Indian Basin, Carlsbad NM Proj. No. 023350052 Class. X Recovery Blow Count/ Graphic Log Description Depth (ft.) Sample 1 Well Completion SCS (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50% 24 0905-0930 = 25 minutes ty change Subs, bit & connect next 30' stand. Continue drilling at 0930, depth 30 feet. 26 28 30 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, 32 conchoidal fractures. 34 36 Rate of penetration = 30 ft/hr. 38 40 0 40-50 ft: Sandy DO\_OMITE, very light gray (N8), moderately hard, dry, non-calcareous. 42 44 Rate of penetration about 30 ft/hr. 46 48 - 50 0 50-80 ft: SANDSTONE, light gray (N7), fine grained, moderately soft, friable, non-calcareous interbedded with sandy DOLOMITE, very light gray (N8), moderately hard, 52 dry, non-calcareous. - 54 Rate of penetration about 20 ft/hr. 56



#### Monitoring Well MW-73

Project MOC/Indian Basin Gas Plant \_\_ Owner <u>Marathon Oil Compa</u>ny Location Indian Basin, Carlsbad NM Proj. No. <u>023350052</u> Class. Sample ID X Recovery Graphic Log Description PID (ppm) Well Completion SCS (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50% 56 58 60 0 **80-70 ft:** Dolomitic SANDSTONE, light gray (N7), fine grained, moderately hard, dry noncalcareous interbedded with sandy DOLOMITE, medium light gray (N5), hard, 62 crystalline. 64 Rate of penetration about 38 ft/hr. 66 68 70 0 70-80 ft: Sandy DOLOMITE as above interbedded with dolomite, light gray, (N7), hard, brittle, conchoidal fractures, dry. 72 74 Rate of penetration about 30 ft/hr. 76 78 80 80-90 ft: DOLOMITE, light brownish gray (5 yr 6/1) very nard, crystalline, conchoidal fractures. 82 84 Rate of penetration about 18 ft/hr. 86

## 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

Location	Indian Basin, Carlst	bad NI	1		OWITCH		Proj. No. <u>023350052</u>
Depth (ft.)	Well Completion	(mdd)	Sample ID Blow Count/	X Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
- 88 -					Z_Z		
- 90 –		0			77 77 77		<b>90–100 ft:</b> Sandy DOLOMITE, light gray (N7), modertely
- 92 -					分子		hard, crystalline, minor fine grained sand, conchoidal fractures, dry. <b>Note:</b> Cuttings are predominately powder (98%).
-94-					<del>//</del> //		Drilled 45 minutes with only 8 feet penetration.
- 96 -					7/7 7/7 7/7		
- 98 - -					分子		
-100- 		0			777 777 77		100-110 ft: DOLOMITE, light brownish gray (5 yr 6/) very hard, conchoidal fractures, interbedded sandy dolomite,
-102- 					/ / 7/1 7/1		light gray (N7), moderately hard, moderately hydrocarbon cdor (PID = 0.0 ppm).
-104-  -106-							: 1345-1430 Rig down — replaced JAWS gripping KB worn out. Downtime of 45 minutes. 1430 resumed drilling.
-108-					<del>7</del>		Rate of penetration about 13 ft/hr.
- 110 - -		0			77 77 77		110-120 ft: Sandy DOLOMITE, as above.
- 112 - 					77 77 77		
- 114 - - 116 -	:				<del>//</del> //		Rate of penetration about 20 ft/hr.
- 118 -					<del>//</del> //		
-120-		0			#		



#### Monitoring Well MW-73

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

Location	Indian Basin, Carls.	Dag IVI	М				Proj. No. <u>023350052</u>
Depth (ft.)	Well Completion	PID (mdd)	Sample ID	Blow Count/ X 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			7,7		120-130 ft: Sandy DOLOMITE, as above, interbedded with
-122-					7		light brownish gray (5 yr 6/1), very hard, conchoidal fractures, moderate hydrocarbon odor, cuttings predominately "rock flour."
-124-					7,7		Rate of penetration about 15 ft/hr.
126					Ź		
- -128-					7		
-							
-130-		16.4			<del>/</del>		130-140 ft; Sandy DOLOMITE, interbedded with dolomite, as above.
-132-					77		
-134-					<del>7</del>		
- -136-					分		Rate of penetration 15 ft/hr.
-					分		
-138-					<i>1</i> /2		
-140-		0					<b>140-150 ft:</b> DOLOMITE, as above.
-142-					差		Rate of penetration 40 ft/hr.
- -144-					<del>/</del> /		Rig shutdown for the day at 1700 hours.
- 1							11/30/94 Began setting up at 0645 hours, drilling at 0655. Found water in the hole.
-146-					<del>/</del>		0710 - Water in fuel filter - trying to fix problem -
-148-					另		shutdown — had to go to town for new filters. <u>Rig down for 2 hours 5 minutes.</u>
-150-		0					0915 - Resume drilling. Rate of penetration 40 ft/hr.  150-180 ft: Dolomitic SANDSTONE, very light gray (N8), fine
- -152-							grained, moderately hard, non-calcareous, no hydrocarbon odor.
1 102		lj ]			7		



## Monitoring Well MW-73

Project MOC/Indian Basin Gas Plant

Location Indian Basin, Carlsbad NM

Owner Marathon Oil Company

Proj. No. 023350052

Location	ocation Indian Basin, Carlsbad NM					OWITE	Proj. No. <u>023350052</u>	
Depth (ft.)	Well Completion	OId (mdd)	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				<i>I,I</i>		180-170 ft: Dolomitic SANDSTONE as above, with
- -162-						// // //		occassional sandy DOLOMITE, light gray (N7) moderately hard, non-calcareous, no hydrocarbon odor.
- -164-						7-7 7-7 7-7		
- -166-								Rate of penetration about 9 ft/hr.
- -168-			No.			7/7 7/7 7/7		
-170 <i>-</i>		0				<i>7</i>		
- -172-		U				<del>//</del> //		170—180 ft: Lithology, as above, with minor dolomite, light brownish gray (5 yr 6/1), hard, brittle, conchoidal fractures, no hydrocarbon odor.
-								
-174-								
-176- 								
-178- 						1/7 1/1 1/1		
-180 <i>-</i>		0				7		<b>180–190 ft:</b> DOLOMITE, light brownish gray (5 yr 6/1), very hard, microcrystalline, conchoidal fractures, no hydrocarbon odor, slightly calcareous (effervescent with
-182- -								10% HCL).
-184-								



## Monitoring Well MW-73

ProjectMOC/Indian Basin Gas PlantOwnerMarathon Oil CompanyLocationIndian Basin, Carlsbad NMProj. No. 023350052

Depth (ft.)	Well Completion	OId (bpm)	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-								nate of penetration about a right.
-188-								
190-		0						<b>190-200 ft:</b> DOLOMITE, as above, moderate-strong
-192								hydrocarbon odor.
-194-			di di di					
-196-		354 0						
198								Rate of penetration about 40 ft/hr.
200-		6				V_V		200-210 ft: DOLOMITE, as above, moderate-strong
- -202-						V V V V V V		hydrocarbon odor, saturated, interbedded with dolomit.c LIMESTONE, light gray (N7) chalky.
-204-						V V V V V V		
-206-								¥ Water at 205 feet.
- -208-						V V V V V V		Rate of penetration about 27 ft/hr.
-210-		0				V V V V		CIO COO (II Deleville LIMECTONS (CELL - CANS)
-212-		-				H		<b>210–220 ft:</b> Dolomitic LIMESTONE, light gray (N7), chalky, saturated moderate hydrocarbon odor.
- -214-						臣		
- -216-						臣		

### 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	OIA (ppm)	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
-222-						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.
-224-						
-226-						
-228-						
-230-						
-232-	į.					
-234-						
-236-						•
-238-						
-240-						
-242-						
-244-						
-246-					Windows and the second	
-248-						



### Monitoring Well MW-74

							arathon Oil Company Proj. No. 023350052	See Site Map For Boring Location		
Surface Top of C Screen: I Casing: E Fill Mater Drill Co. 2	Elev To Casing Wa Dia Le Dia <u>8.625 in.</u> Le rial WT Water Well Service	ital Ho iter Le ngth _ ngth <u>s</u> <u>ee</u> Me	le Dep vel Ini 0.5 ft. ethod Bob Da	th <u>220</u>	Rig/C	_ D _ S _ T _ T ore	iameter 7.875 in. Itatic	COMMENTS:  MW-74 located approximately 200 It 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 (mdd)	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 — — O —							SPUD 1600 hours 11/30/94 Rate of penetration about 4  0-0.5 ft: Approximately 4-6			
- 2 - - 2 - - 4 -	2						high effervescence with 10%	6/4), hard, brittle, conchoidador and SANDSTONE, pale		
- 6 - 8 - - 8 -							Rate of penetration about 4	0 ft/hr.		
- 10 - - 12 - - 14 -		0					10-20 ft: SANDSTONE/LIMES	STONE/DOLOMITE, as above.		
- 16 - - 18 -							Shutdown Rig at 1700 hours 1 Resume drilling at 0645 12/01 0715-0830 Rig shutdown - c	/94.		
- 20 - - 22 - - 22 -		0			Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y		1.25 hours.  20-30 ft: Dolomitic SANDSTO fine grained, hard, non-caica	ONE, yellowish gray (5 yr 8/1). areous.		
-24-					<i>12.2.2.2.</i>					



## Monitoring Well MW-74

Project MOC/Indian Basin Gas Plant

Location Indian Basin, Carlsbad, New Mexico

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (mdd)	 	* 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 -							Change bit at 30 feet, resume drilling at 0935.
- 28 -							Repack Kelley swivel, change filters and pull down. 0.75 hours down.  Rate of penetration 60 ft/hr.
- 30 - -		0					<b>30-40 ft:</b> Dolomitic SANDSTONE, as above, interbedded with sandstone, yellowish gray (5 yr 8/1), fine grained, moderately hard, non-calcareous, dry.
- 32 -							
- 34 - - 36 -							Rate of penetration about 24 ft/hr.
- 38 -							
- - 40 -		0					<b>40-50 ft:</b> SANDSTONE, yellowish gray (5 yr 8/1), very fine
42 -							grained, moderately soft, moderately friable, dry interbedded with sandy sandy dolomite, very light gray (N8), moderately hard, microcrystalline, conchoidal fractures.
- 44 - -							
- 46 - -							Rate of penetration 20 ft/hr.
- 48 - - 							
- 50 - - 52 -		0					50-80 ft: SANDSTONE, as above.
- 54 -							Rate of penetration about 30 ft/hr.
- - 56 -							



### Monitoring Well MW-74

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

	Indian Basin, Carisi		,		,	ass.	Proj. No. <u>0233300052</u>
Depth (ft.)	Well Completion	PIO (mdd)	ample I	Blow Count/ % Recovery	Graphic Log	CB	Description (Color Taxtura Structura)
۵	Completion		Sam	B S S S S S S S S S S S S S S S S S S S	97.9	nscs	(Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
<b>-</b> 56 <b>-</b>							
- 58 -							
- 60 -		0			7.7		<b>60-70 ft:</b> Sandy DOLOMITE, very light gray (N8),
-					17		moderately hard to hard, microcrystalline, interbedded with
- 62 -					7,7		minor SANDSTONE, yellowish gray (5 yr 8/1), moderately soft, moderately friable, dry, non-calcareous, no
<b> </b>					77		hydrocarbon odor.
64-					77		
<u> </u>					77		
- 66 -					77		Rate of penetration about 24 ft/hr.
- 68 -					77		
					$Z_{J}$		
70 -		0			77		
					Ź		<b>70—80 ft:</b> Sandy DOLOMITE, very light gray (N8), hard, brittle, microcrystalline, dry, no hydrocarbon ador.
<b>-</b> 72 <b>-</b>					77		
-					<del>//</del>		
-74-					7		
}					$\frac{1}{2}$		Rate of penetration about 17 ft/hr.
<del>-</del> 76 -					#		
7.0					#		
<del>-</del> 78 -					$\mathcal{Z}$		
80-					77		
		0			<del>Ź</del>		<b>80-90 ft:</b> DOLOMITE, light brownish gray (5 yr 6/1), hard. brittle microcrystalline, conchoidal fractures, dry, no
- 82 -					$\Xi$		nydrocarbon odor.
-					7		
-84-					#		
<b>}</b> -					<del>7</del>		Rate of penetration about 17 ft/hr.
- 86 -	1				艺		
					#		
- 88 -		1					



#### Monitoring Well MW-74

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052

Location	Indian Basin, Carlst	Jau, IV	EW MEXICO			Proj. No. <u>023350052</u>
Depth (ft.)	Well Completion	(mdd)	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 -				7.7 7.7		
- 90 -		0		分子		<b>90–100 ft:</b> DOLOMITE interbedded with sandy dolomite, very light gray (N8), hard, brittle, dry, no hydrocarbon
- 92 -				<del>//</del>		odor.
-94-				77		
- 96 -				<del>7</del>		
- 98 -				77		
-100-		0	Company of Company and the State of Company	// // //		100-110 ft: DOLOMITE, light brownish gray (5 yr 6/1) to
-102-				// // //		very light gray (N8), hard, microcrystalline, conchoidal fractures, d y, faint hydrocarbon odor.
-104						
-106-						Rate of penetration about 30 ft/hr.
- -108-				7.7 7.7 7.7		
- - 110 -		0		1,7 1,7 1,7		110-120 ft: DOLOMITE, as above, with minor sandy dolomite.
- - 112 -				7/7 7/7		light gray (N7), moderately hard, microcrystalline, saturated, no hydrocarbon odor.
- 114 -						
- 116 -		0		<del>/</del> /		♥ Water at 115 feet with moderate-strong hydrocarbon odor; PID=0.0 ppm.
- 118 -				<del>7</del>		Rate of penetration about 12 ft/hr.
-						Mate of penetration about 12 ((/III.
-120-		0				



#### Monitoring Well MW-74

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

Owner Marathon Oil Company

Proj. No. 023350052

Location	Indian Basin, Carls.	<i>D</i>	<del></del>		,	Proj. No. <u>023330052</u>
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		<b>7</b>		120-130 ft: DOLOMITE and sandy dolomite, as above.
-122-  -124-						Rate of penetration about 30 ft/hr.
-126-  -128-						
-130- -132- -134-		0				130-140 ft: DOLOMITE, light brown:sh gray (5 yr 6/1) to very light gray (N8), hard, microcrystalline, conchoidal fractures, no hydrocarbon odor.  At 132 feet driller had to add water to system to remove cuttings.  Abundant sand, fine grained, quartz, non-calcareous.
 -136-  -138-						Rate of penetration about 15 ft/hr.
-140-  -142- 		О				<b>140-150 ft:</b> DOLOMITE/SAND, as above, no hydrocarbon odor.
						Rate of penetration about 30 ft/hr.
-150-  -152-		0				150-180 ft: Abundant SAND with minor DOLOMITE.



## Monitoring Well MW-74

Project MOC/Indian Basin Gas Plant

Owner Marathon Oil Company

ocation	Indian Basin,	Carlsbad, New Mexico	Proj. No.	023350052

Depth (ft.)	Well Completion	OId (mdd)	Sample ID	Blow Count/	X Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-152-						<i>I , I</i>		
-154-								
-156-								
-158-						75 77		·
-160-		0						<b>180–170 ft:</b> SANDSTONE, yellowish gray (5 yr 7/2), fine
- -162-								grained, quartz grains, noncalcareous, interbedded with DOLOMITE, pale yellowish brown (10 yr 6/2), hard, cherty, conchoidal fractures, no hydrocarbon odor.
- -164-								
- -166-						77 77 77		
- -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						170-180 ft: DOLOMITE, pale yellowish brown (!C yr 6/2) hard, cherty, microcrystalline, conchoidal fractures, no
-172-								hydrocarbon odor.
- -174-								
-176-						<del>分</del>		Rate of penetration about 15 ft/hr.
- -178-						<del>//</del>		
-180-		0				<del>7</del> 7		<b>180-190 ft:</b> DOLOMITE, as above.
-182-						<del>//</del>		
- -184-						77		



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#### 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 (mdd)	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-				77		D to 1 (1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
-186-				<del>/</del>		Rate of penetration 15 ft/hr.
400				分		
-188- 				艺		
-190-		0		7		<b>190-200 ft:</b> DOLOMITE, as above.
-192-				7		1400 hours at 192 feet, hydraulic pump failed. Rig down
104				7		until pump can be replaced. Resumed drilling at 1615 hours on 12/06/94.
-194- 				77		
-196-				77		Rate of penetration about 20 ft/hr.
-198-				7/7		Rate of penetration about 20 Tt/M.
- -200-				7		
-200		0		V V		200–210 ft: DOLOMITE, as above, interbedded with LIMESTONE, light gray (N7), hard, crystalline, high effervescence with 10% HCL, no hydrocarbon odor.
-202-				V V V V		errervescence with 10% rice, no riyarocarbon odor.
-204-						
-206-				V V V V		Rate of penetration about 30 ft/hr.
200				VV		
-208-				V V V V		
-210-		0		V V Z Z		<b>210-220 ft:</b> SANDSTONE, yellowish gray (5 yr 7/2), fine
-212-						grained, moderately hard, brittle, calcareous, quartz grains, no hydrocarbon odor, interbedded with DOLOMITE, as above.
-214-				77		Rate of penetration about 40 ft/hr.
-216-				777		



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Monitoring Well MW-74

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

Owner Marathon Oil Company

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (ppm)	 Blow Count/	Graphic Log	USCS Class.	Description  (Color, Texture, Structure)  Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-216-				Z Z		
-218 -						
-220-		0		1		Total depth at 1800 hours on 12/06/94. TD = 220 feet.
-222-						
-224-						
-226-						
-228-						
-230-						
-232-						
-234-		A COLOR OF THE PROPERTY OF THE				
-236-						
-238-						
-240-						
-242-		And the state of t				
-244-						
-246-						
-248-						



## Monitoring Well MW-75

								See Site Map For Boring Location
Surface Top of C Screen: I Casing: C Fill Mater Drill Co. 3	Elev.       To         casing       Wa         Dia       Le         Dia       8.625 in.       Le         rial       WT Water Well Service	tal Holliter Le ngth _ ngth _	vel I	pth nitia	220 1 <u>85</u> r Ro	ft.  ft.  Rig/C	_ 0 _ 1 _ 1 core	COMMENTS:  Static  Type/Size  Type Steel  Failing 1500  A00 ft Southwest of MW-73. 8 5/8" surface CSG set to 10 feet below grade. Surface CSG is 27" above grade. From the feet to 220 feet is open borehole.  A10 ft Southwest of MW-73. 8 5/8" surface CSG set to 10 feet below grade. From the feet to 220 feet is open borehole.
Depth (ft.)	Well Completion	PID (mdd)	Sample ID	Blow Count/	% Recovery	Graphic Log	USCS Class.	Uescription (Color Texture Structure)
-2.25 Not to scale								SPUD 12/02/94 0935 hours  O-4 ft: Alluvium, silty SAND, pale yellowish brown, (10 yr 6/2), fine grained, soft, friable, dry.
- 2 - 4 -	7							Rate of penetration about 40 ft/hr.  4-10 ft: Silty SAND, pale yellowish brown (10 yr 6/2), fine
- 6 - - 8 - - 8 -	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7					Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y		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/!), very hard, crystalline, conchoidal fractures, dry.
- 10 - 12 - - 14 -		O						10-20 ft: Sandy DOLOMITE, light gray (N7), fine to medium quartz grains, hard, conchoidal fractures, dry.
- 16 - - 18 -								Rate of penetration about 30 ft/hr.
- 20 - - 22 -		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.
- 24 -		1						





### Monitoring Well MW-75

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

Proj. No. 023350052

Depth (ft.)	Well Completion	PID (mdd)	Sample ID	Blow Count/	x Recovery	Graphic Log	JSCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
- 24 -					`	ZZ		
- 26 -								Rate of penetrationabout 24 ft/hr.
- 28 -						7/2 1/2 1/4		
- 30 - 		0				77 77 77 77		<b>30-40 ft:</b> SANDSTONE, light gray (N7) to light brownish gray (5 yr 6/I), fine grained, moderately hard to soft, friable, dry, noncalcareous, with minor sandy DOLOMITE, as
- 32 - 								above.
- 34 - - - 36 -						// // //,		Rate of penetration about 30 ft/hr.
 - 38			A - Careta					
- - 40 -		0						40-50 ft: SANDSTONE/sandy DOLOMITE, as above.
42-								Change jaws on kelly. Down 55 minutes (1130—1225).
- 44 -						// // //		
- 46 - -								
- 48 - 						// // //		
- 50 -  - 52 -		0						<b>50-80 ft:</b> SANDSTONE, pale yellowish brown (10 yr 6/2) to light gray (N7), very fine grained, soft, friable, dry, noncalcareous, no hydrocarbon odor.
- 54 –								
- - 56 -								Rate of penetration about 30 ft/hr.



#### 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 (mdd)	Sample ID	% 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			7		<b>80-70 ft:</b> With sandy DOLOMITE, light gray (N7) fine grained quartz, very hard, conchoidal fractures, dry, no
- 62 -							hydrocarbon odor.
-64-					<i>7</i>		Rate of penetration about 30 ft/hr.
- 66 -					7/ 7/ 7/		
- 68 -					7/7 7/7		
70-		0			Ż		70-80 ft: SANDSTONE, as above.
72 -							
74-							
- 76 -							Rate of penetration about 24 ft/hr.
- 78 -							
- 80 –		0			<i>T</i> . <i>T</i>		80-90 ft: SANDSTONE interbedded with DOLOMITE, light
- - 82 -					7/ 7/ 7/ 7/		brownish gray (5 yr 6/I), very hard, microcrystalline, conchoidal fractures, and sandy DOLOMITE, light gray (N7) fine grained quartz, very hard conchoidal fractures,
- 84 –					7/7 7/7 7/7		saturated, no hydrocarbon odor.
- 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.  ■ The state of the state
- 88 -							



#### Monitoring Well MW-75

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company Location Indian Basin, Carlsbad, New Mexico Proj. No. <u>023350052</u> Class. Blow Count/ Recovery Graphic Log Description Sample Well Completion (Color, Texture, Structure) SCS 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 Rate of penetration about 30 ft/hr. 96 - 98 -100 100-110 ft: DOLOMITE, grayish orange (10 yr 7/4), hard, crystalline (many rhomdohedral crystals visable with hand lens), conchoidal fractures, saturated, no hydrocarbon 102 odor. -104 -106 Pulled out of hole to set surface CSG - 8 5/8" CSG to 10 feet BG. Grout with I sack bentonite, 7 sacks reedy mix -108 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, occassionally cherty, conchoidal fractures, saturated, no 112 hydrocarbon odor. - 114 Rate of penetration about 12 ft/hr. 0 - 116

0

118

120





#### 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	OId (bpm)		Blow Count/	 Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-120-		0			7.7. 7.7. 7.7.		120-130 ft: DOLOMITE, as above, interbedded with SANDSTONE, pale yellowish brown (10 yr 6/2), very fine grained quartz, occassionally silty, soft, friable, saturated, non-calcareous.
-122-  -124-							non-calcareous.
- -126-							Black liquid (hydrocarbons ?) observed mixed with water, hydrocarbon odor but no PID readings.
-128 <i>-</i>							Rate of penetration about 15 ft/hr.
-130- - -132-		0	Andrews of the second		<i>7</i> ,		130-140 ft: DOLOMITE as above.
-134-							
-136-					<del>7</del>		
-138-							
-140-  -142-		0					Black sheen on water, moderate hydrocarbon odor, PID = 0.0 ppm.  140-150 ft: DOLOMITE, light brownish gray (5 yr 6/1), hard,
- -144-					分子		microcrystalline, occassionally cherty, conchoidal fractures, saturated, no hydrocarbon odor.
-146-					<i>7</i>		Rate of penetration about 15 ft/hr.
-148-  -150-					分子		
-152-		0					<b>150-180 ft:</b> 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.



#### Monitoring Well MW-75

Owner Marathon Oil Company Project MOC/Indian Basin Gas Plant Proj. No. 023350052 Location Indian Basin, Carlsbad, New Mexico Class. X Recovery Blow Count, Description Sample 1 Graphic Log Depth (ft.) PID (ppm) Well Completion SCS (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50% -152 -154 -156 -158 -160· 0 180-170 ft: DOLOMITE with minor sandstone, as above, no hydrocarbon odor. -162 -164 Rate of penetration about II ft/hr. -166 168 -170 0 170-180 ft: DOLOMITE, pale yellowish brown (10 yr 6/2), hard, microcrystalline, cherty, conchoidal fractures, interbedded with dolomitic SANDSTONE, fine quartz grains, -172 very hard, non-calcareous, saturated, no hydrocarbon odor. -174 Rate of penetration about 10 ft/hr. -176 -178 -180 0 180-190 ft: DOLOMITE, as above, no hydrocarbon odor. 182

184





#### Monitoring Well MW-75

Project $\underline{M}$	IOC/Indian Basin Ga Indian Basin, Carlst	s Plan bad, N	t ew Mexic	0	Owner	<u>Mā</u>	prathon Oil Company Proj. No. <u>023350052</u>
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-  -186-					7.7 7.7 7.7		Rate of penetration about II ft/hr.
- -188-							
-190-  -192-		0			// // // //		190-200 ft: DOLOMITE, as above, moderately strong hydrocarbon odor.
-194-							Rate of penetration about 11 ft/hr.
-196 -  -198 -							
- -200-		75.1			<del>7</del>		<b>200-210 ft:</b> DOLOMITE, as above, strong hydrocarbon odor.
-202-  -204-					<b>夕</b> <b>夕</b>		
-206- -208-					// // // //		Rate of penetration about 30 ft/hr.
-210-		709					210-220 ft: SANDSTONE, pale yellowish brown, (10 yr 6/2),
-212 							fine quartz grains, moderately soft, moderately friable, occassional rugs of secondary euhedral quartz crystals, calcareous cement, saturated, moderate hydrocarbon odor, minor DOLOMITE, as above, LIMESTONE, light gray (N7), hard, microcrystalline, massive.
-214-  -216-							Drill break at 211 feet and approximately 8 inches, possible small sandstone stringer.



## Monitoring Well MW-75

Project <u>MOC/Indian Basin Gas Plant</u> Location <u>Indian Basin, Carlsbad, New Mexico</u> Owner Marathon Oil Company Proj. No. <u>023350052</u> Class. Blow Count/ X Recovery Graphic Log Description PID (ppm) Sample Well Completion (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50% -216 -218-Well TD at 220 ft. at 1100 hours 12/08/94. -220-3.2 -222 -224 -226--228--230--232--234--236--238--240 -242--244 -246 248





## Monitoring Well **MW-76**

							arathon Oil Company	See Site Map For Boring Location
Location	<u>Indian Basin, Carlsi</u>	bad, N	ew Me	xico			Proj. No. <u>023350052</u>	- John G Location
Surface	Elev To	tal Hol	e Dep	oth <u>220</u>	9 ft.	. Di	lameter <u>7.875 in.</u>	COMMENTS:
							tatic	
Screen:	Dia <u>NA in.                                    </u>	ngth _				_ T	ype/Size	Replacement well for MW-68 set 8 5/8" surface CSG to 6 ft. below grade on
Casing: [	Dia <u>8.625 in.         </u> Lei	ngth 🚊	9 ft			_ T	ype <u>Steel</u>	12/7/94. From 6 feet to 220 feet is open borehole.
Fill Mate	rial				Rig/C	ore	Failing 1500	os. choic.
Drill Co.	WT Water Well Service	<u>е</u> ме	ethod	AIF HO	itary		12/07-12/04 5	
Driller #	By Duku Ma	NU NO D	7 <b>7</b> (),	dvis		υat	e <u>12/07-12/94</u> Permit #	
Checked	By IZWALL I W	11			: NU		D .	
		_	£	Blow Count/ % Recovery	ပ္	ass.	Descrip	tion
Depth (ft.)	Well	PID (ppm)	<u>5</u>	S Co	무	ᄗ		
8~	Completion	g G	ample	N O	Graphic Log	SCS	(Color, Texture, Trace < 10%, Little 10% to 20%, Some	
<u> </u>	<u> </u>		S	<u>й</u> ж	<u> </u>	S	Trace < NA, Little 10% to 20%, Some	20% to 35%, Airt 35% to 30%
3-								
Not to							COUR well for surface CCC a	4 0700 h avez 40/07/04
scale							SPUD well for surface CSG a	1700 nours 12/07/94.
- 0 -					7,7		0-8 ft: Encountered bedroc	k about 0.5 ft below grade
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				7,7		DOLOMITE, light brownish gra	ay (5 yr 6/1), hard,
- 2 -	K7 K7				77		microcrystalline, cherty, con	coidal fractures, dry.
	in in				77			
t -	< ,		-		17			
- 4 -					77		Drilled to 6 feet.	
					7		Resume drilling at 0625 hours	s on 12/09/94.
[					7,7			
<del> </del> 6 -	5940 <b>8</b> 89999				7,7		6-10 ft: DOLOMITE, pale yell	owish brown (10 yr 6/2) to
-					7,7		light gray (N7), hard, microc	rystalline, occassionally cherty,
- 8 -					77		conchoidal fractures, dry, no	hydrocarbon odor.
					1,74			
-					77			
<b>-</b> 10 <b>-</b>		0			ZZ		10-20 ft: DOLOMITE, as abo	WO.
L .					Z,Z		10-20 It. DOLOMITE, as abo	ve.
1					7,7			ļ
- 12 -	1				77			
<u> </u>					<del>//</del>			
- 14 -	#				7			
L					77	1	Rate of penatration about 7	5 ft/br
[ <sup>-</sup>					7,7		Rate of penetration about 7	.J 1(/III.
<del>-</del> 16 -	1				7,7	}		
					7			
10					<del>7</del>			
<b>-</b> 18 -					,,,,			
<u></u>	1				7			
- 20 -	4	0					00 00 (1) 501 01/75 11 11	(17)
L	j				7		<b>20-30 ft:</b> DOLOMITE, light gi (N6), very hard, microcrysta	ray (N7) to medium light gray
					7,7		odor.	
- 22 -	1				7,7			
<b>Ի</b> -	-				<del>, , ,</del>			
- 24 -			}					



#### Monitoring Well MW-76

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company Proj. No. <u>023350052</u> Location Indian Basin, Carlsbad, New Mexico Class. Blow Count/ Recovery Graphic Log Description PIO (mdd) Depth (ft.) Well Completion SCS (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 32 hydrocarbon odor. 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, 42 light gray (N7), hard, crystalline, effervescence with 10% HCL. No hydrocarbon odor. 44 Rate of penetration about 15 ft/hr. 46 48 50 50-80 ft: SANDSTONE, DOLOMITE, LIMESTONE, as above, with moderate hydrocarbon odor, moist. 52 54 56







#### Monitoring Well MW-76

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052

Well Completion	OId (mdd)	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%
					7.7		
	0						Water noted at 60 foot connection (probably from 35 ft.).  81-84 ft: Drilling break - SANDSTONE, pale yellowish orange (10 yr 8/6), fine grained, hard, calcareous cement, damp. Faint hydrocarbon odor.
							Rate of penetration about 30 ft/hr (60-70 interval).
							<b>84-70 ft:</b> GYPSUM, pale olive. (10 yr 6/2) very soft, friable, platy, moist, interbedded with minor SANDSTONE and DOLOMITE, as above. No hydrocarbon odor.
							Rate of penetration about 20 ft/hr.
	O						<b>70-80 ft:</b> LIMESTONE, very light gray (N8), moderately soft to hard, chalky, interbedded with DOLOMITE, as above. Moist, fair hydrocarbon odor.
					V V V V V V V V V V V V V V V V V V V		
	U						<b>80-90 ft:</b> 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.
		0			0		



#### Monitoring Well MW-76

Owner Marathon Oil Company Project MOC/Indian Basin Gas Plant Proj. No. <u>023350052</u> Location Indian Basin, Carlsbad, New Mexico Class. Recovery Graphic Log Description PIO (ppm) Depth (ft.) Sample Well Completion SCS (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. Occassional 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, microcrstalline, cherty. conchoidal fractures, no hydrocarbon odor, interbedded -102 with SANDSTONE, as above (see 90 ft.). -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 - 112 hydrocarbon odor. - 114 - 116 - 118 120





Monitoring Well MW-76

Project A	IOC/Indian Basin Ga Indian Basin, Carlst	as Plan bad, N	t ew Me.	xico	Owner	r <u>M</u> ā	prathon Oil Company Proj. No. <u>023350052</u>
Depth (ft.)	Well Completion	PID (mdd)	Sample ID	K 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			V V		120-130 ft: LIMESTONE/DOLOMITE, as above. Down for routine maintenance (tighten clutch, etc.).
-122-					V V V		Toutine maintenance (tighten clutch, etc.).
-124-					Y Y V Y V V		
-126-					V V V V V V V V V V V V V V V V V V V		
128	ia.				V V V V		
-130-		0			V V V V V V		130-140 ft; LIMESTONE/DOLOMITE, as above, no hydrocarbon odor.
-132-					V V V V		nydrocarbon odor.
-134-					V V V V		
136-					V V V V		Rate of penetration about 40 ft/hr.
-138-					Y Y Y		
-140-		0			V V V Z Z		<b>140–150 ft:</b> SANDSTONE, grayish orange (10 yr 7/4), very
-142-							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
-144-							DOLOMITE.
- -146-							Rate of penetration 60 ft/hr.
- -148-							
- -150-		0					150-180 ft: SANDSTONE, Limey SANDSTONE, minor
-152-							DOLOMITE, as above, no hydrocarbon odor.





#### Monitoring Well MW-76

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052

Location	<u>Indian Basin, Carlst</u>	Jau, IV	EW INC	, AIC				Proj. No. <u>023350052</u>
Depth (ft.)	Well Completion	OId (bpm)		$\overline{}$	% Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-152- -						<i>I, I</i>		
-154- 								Rate of penetration about 40 ft/hr.
-156-								
-158-								
-160-		0				27		<b>180-170 ft:</b> SANDSTONE, grayish orange (10 yr 7/4), very fine quartz grains, moderately hard, well cemented,
-162-								non-calcareous, no hydrocarbon odor.
-164-								Rate of penetration about 40 ft/hr.
166-								nate of penetration about 40 Tonic.
-168-								
-170-		0						170-180 ft: Dolomitic SANDSTONE, grayish orange (10 yr
-172-								7/4), fine grained, 95% loose grains in cuttings, calcareous cement, minor LIMESTONE.
-174-								
-176-								Rate of penetration about 80 ft/hr.
-178-								
-180-		0						<b>180-190 ft:</b> DOLOMITE, paly yellowish brown (10 yr 6/2)
- -182-						V V V V V V		very hard, microcrystaline, interbedded with LIMESTONE, pale yellowish brown (10 yr 6/2), moderately hard, microcrystalline. Effervescence with 10% HCL, no
- -184-						V V V V		hydrocarbon odor.



#### Monitoring Well MW-76

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

Depth (ft.)	Well Completion	OId (mdd)	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-					V V V V		Rate of penetration about 80 ft/hr.
-186-					V V V V		
-188-					V V V V V V V V V V V V V V V V V V V		
-190-		0			V V V V V V		<b>190-200 ft:</b> LIMESTONE, as above, with DOLOMITE,
- -192					V V V V		fractures in dolomite filled with calcareous cement, no hydrocarbon odor.
- -194-					V V V V		Soap added to water to bring up cuttings.
-					V V V V V V		
-196- 					V V V V		
-198- 							
-200- -		0			7		<b>200—210 ft:</b> SANDSTONE, pale yellowish brown (10 yr 6/2), fine grained, moderately hard, calcareous, no hydrocarbon
-202-							odor.
-204-							
-206-							
-208-							
- -210-		0					210-212 ft: SANDSTONE, grayish red (5yr 4/2), very fine
- -212-							grained, moderately hard, noncalcareous, no hydrocarbon odor.
- -214 <i>-</i> -							213-220 ft: SANDSTONE, pale yellowish brown (10 yr 6/2), fine grained, moderately hard, very calcareous, no
-216 <i>-</i>							hydrocarbon odor.



Monitoring Well MW-76

Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052

Location	<u>Indian Basin, Carlst</u>	Jau, IVI	ew 14	exic	<u> </u>			Proj. No. <u>023350052</u>
Depth (ft.)	Well Completion	PID (ppm)		Blow Count/		Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-216-								
-218-								Well TD at 1335 hrs. 12/12/94.
-220-		0						NCII 12 CC 1888 (II 8). 12/12/18
-222-								
-224-								
-226-								
-228-					!			
-230-								
-232-								
-234-								
-236-								
- -238-								
-240-								
-242-								
-244-								
-246-								
- -248-								



	MOC/Indian Basin Indian Basin, Car					Owner	<u>M</u> a	arathon Oil Company  Proj. No. 023350052  See Site Map For Boring Location
Surface Top of C Screen: Casing: C Fill Mater	Elev 1 Casing W Dia <u>NA in.</u> L Dia <u>8.625 in.</u> L rial WT Water Well Serv	iameter 7.875 in.  tatic						
Depth (ft.)	Well Completion	OIA (mdd)	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 for surface casing at 0815 on 12/07/94.
- 0 - - 2 - - 4 - - 6 - - 8 -	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7						Well spud in silty alluvium. Alluvium to a depth of 10 feet.  O-10 ft: SILTSTONE, moderate yellowish brown (10 yr 4/2), very soft, friable, dry.
- 10 - - 12 - - 14 -	27.27.2	0				(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)		10-11 ft: LIMESTONE, light gray (N7), hard, crystalline, dry with subangular dolomitic gravel (1/2 inch to 3 inches), occassional SANDSTONE, light gray (N7), fine grained quartz, moderately soft, moderately friable, dry.
- 16 - - 18 -								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.
- 20 - - 22 - - 24 -		2.2						20-25 ft: DOLOMITE, as above, no hydrocarbon odor, minor LIMESTONE.  Rate of penetration about 15 ft/hr.

# GROUNDWATER TECHNOLOGY

#### **Drilling Log**

#### Monitoring Well MW-77

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

Owner Marathon Oil Company

Proj. No. 023350052

Location	<u>Indian Basin, Carlsi</u>	<i>500, 71</i>			<u> </u>			Proj. No. <u>023350052</u>
Depth (ft.)	Well Completion	OId (mdd)	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 -						V V		
- 26 -		0						<b>25-30 ft:</b> DOLOMITE and minor LIMESTONE with minor SILTSTONE, sandy, pale yellowish brown (10 yr 6/2), moderately hard, dry.
- 28 -						V V V V		**Change filters in air system – downtime 20 minutes**
-						V V V V		Rate of penetration 15 ft/hr.
- 30 -		0				Ź		<b>30-35 ft:</b> DOLOMITE, as above, with occassional SILTSTONE, dark yellowish orange (10 yr 6/6), (hematite stained), sandy, slightly calcareous, dry, no hydrocarbon
- 32 - -						層		odor.
- 34 -								Rate of penetration 20 ft/hr.
- 36 -		0				<del>Ź</del>		<b>35-40 ft:</b> DOLOMITE, dry, moderate hydrocarbon odor.
- 38 -						艺 子		Rate of penetration about 15 ft/hr.
- 40 -		14.8				<del>Ź</del>		40-45 ft: DOLOMITE, as above, interbedded with
- 42 –						<del>//</del> //		sandstone, medium dark gray (N4), fine-medium quartz grains-round to subrounded, poorly sorted, very hard, non-calcareous, dry, no hydrocarbon odor.
-44-						分子		
- 46 -		0						<b>45-50 ft:</b> Dolomite, interbedded with minor SANDSTONE, dry, no hydrocarbon odor.
- 48 -								Rate of penetration about 15 ft/hr.
- 50 -		4.6						
- 52 -								<b>50-55 ft:</b> As above, dry, no hydrocarbon odor.
- -54-								
- - 56 -		23.0				<b>5</b>		<b>55-80 ft:</b> DOLOMITE, as above, with minor SILTSTONE, dark yellowish orange (10 yr 6/6), hemitite stained,



#### Monitoring Well MW-77

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Project MOC/Indian Basin Gas Plant Owner Marathon Oil Company

Location Indian Basin, Carlsbad, New Mexico Proj. No. 023350052

Location	<u>Indian Basin, Carlst</u>	oau, ive	ew Mexico			Proj. No. <u>023350052</u>
Depth (ft.)	Well Completion	GIA (mdd)	Sample ID Blow Count/ X Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
- 56 -						moderately soft, non-calcareous, dry, faint hydrocarbon
- 58 -						odor.
-60-		8.1				Rate of penetration about 15 ft/hr.  60-65 ft: DOLOMITE, as above, with SANDSTONE, dark
- 62 -						yellowish orange (10 yr 6/6), very fine quartz grains, well rounded, hard, noncalcareous, well cemented, dry, no hydrocarbon odor.
64-				77 77		Rate of penetration about 12 ft/hr.
66 –		0				<b>85–70 ft:</b> DOLOMITE and SANDSTONE, as above, dry, no hydrocarbon odor.
- 68 -				// // //		Rate of penetration about 30 ft/hr.
- 70 - -		0				<b>70-75 ft:</b> DOLOMITE and SANDSTONE, as above, dry, no hydrocarbon odor.
- 72 - 						Rate of penetration about 20 ft/hr.
-74 - -		1.2		77		75-80 ft: DOLOMITE and SANDSTONE, as above, with minor
- 76 - -						LIMESTONE, light gray (N7), hard, microcrystalline, dry, faint hydrocarbon odor.
- 78 - -						
- 80 -		13.1		1		Well Total Depth = 80 feet at 1115 hours on (12/13/94)
- 82 -						
-84-						
- 86 -						
- 88 -						



							arathon Oil Company	See Site Map For Boring Location
							Proj. No. <u>023350052</u> meter <u>7.875 in.</u>	COMPANIE
				-			tatic	COMMENTS:
	Dia Lei	Located on North side of arroyo						
Casing: N	ia <i>8.625 in</i> . Lei	nath /	3.08	ft.		- '. T\	vne Steel	approximately 800 feet east of MW-57. 8 5/8" surface casing was set II feet below
-ill Mater	ial	·9··· -			Ria/C	- ': nre	ype <u>Steel</u> Failing 1500	grade. Surface casing sticks up 25
niii Co	NT Water Well Servic	e Ma	ethoc	Air R	otarv	uc.		surface casing is 13 feet I inch. From 11
Triller Ro	y Spruill In	feet to 80 feet is open barehale.						
Checked	by Spruill Log By DWILL Man							
Depth (ft.)	Well Completion	PID (ppm)		Blow Count/ X Recovery	- 11	tion , Structure) 20% to 35%, And 35% to 50%		
2.1- Not to scale						כ	Well spud for surface casing	at 1505 12/12/94.
- 0 -	73						0-8 ft: Alluvium, SILTSTONE	, moderate yellowish brown (10
	ζ '						yr 4/2) loose, dry.	,
_ 2 _	\ \ \ \							
-	, r,							
- 1	< ','							
- 4 -	< Υ < Υ							
	£ 6.							
- 6 -	< \			•-				
- 4	γ. <b>ν</b>							ish gray (5 yr 8/1), silty, very
0	7.7						fine grained, moderately har	d, noncalcareous, dry, no
- 8 -	, r						hydrocarbon odor.	
·								
- 10 -								
, ,		0					10-15 ft: SANDSTONE, as ab	
	9262M <b>2532</b> 2				1,1,		DOLOMITE, pale yellowish br microcrystalline, fractures, c	
- 12 -					777		staining.	iry, occassional hematite
					77		j j	
1					77			
<b>⊢</b> 14 <b>-</b> ∤					I'I		Rate of penetration about 2	O ft/hr.
					7, 7			
16		'			,,,		15-20 ft: DOLOMITE, dark ye	ellowish orange (10 yr 6/6),
- 16 -					17		dry, no hydrocarbon odor.	cherty, conchoidal fractures,
- 4					7		3. ,,, 2. 333. 33 330	
- 18 -					77		Rate of penetration 20 ft/h	
10 7					7.7		nate of penetration 20 11/18	·
† 4					7,7			
- 20 -		0			7,7		20 25 11 201 2175	
					77		20-25 ft: DOLOMITE, as abo	ove, dry, no hydrocarbon odor, 6/2) to dark yellowish orange
					17		(10 yr 6/6).	o, e, to dark yenomon orange
- 22 -					1,7			· · · · · · · · · · · · · · · · · · ·
- 4					77		·	
24					77			}
-24 -		1 1						i



#### Monitoring Well MW-78

 Project
 MOC/Indian Basin Gas Plant
 Owner
 Marathon Oil Company

 Location
 Indian Basin, Carlsbad, New Mexico
 Proj. No. 023350052

Location	n <u>Indian Basin, Carlsbad, New Mexico</u>					Proj. No. <u>023350052</u>				
Depth (ft.)	Well Completion	OId (mdd)	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 -					77					
- 26 -		0			力		<b>25-30 ft:</b> DOLOMITE, as above.			
- 28 - - 28 -							Rate of penetration about 12 ft/hr.			
- 30 - - 32 -		О					<b>30-35 ft:</b> 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 -					77 77		Rate of penetration about 15 ft/hr.			
- 36 -		9.9					<b>35–40 ft:</b> 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 - - - 42 -		9.9			7,7 7,7 7,7 7,7		<b>40-45 ft:</b> DOLOMITE, brownish gray (5 yr 4/1), hard, microcrystalline, cherty, conchoidal fractures, dry, no hydrocarbon odors.			
-44-					<del>/</del>		Rate of penetration about 15 ft/hr.			
46-		12.9			<del>女</del>		<b>45-50 ft:</b> Sandy DOLOMITE, grayish black (N2) and DOLOMITE, as above.			
- 48 - -					7/ 7/ 7/ 7/ 7/		Rate of penetration about 15 ft/hr.			
- 50 - - 52 -		0					<b>50-55 ft;</b> 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					<b>55-80 ft:</b> SANDSTONE, grayish orange (10 yr 7/4) to dark yellowish brown (10 yr 4/2), very fine grained, hard, well			



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

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/	X Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
- 56 - 								cemented, calcareous, in fractures, dry, no hydrocarbon odor, interbedded with DOŁOMITE, pale yellowish brown (10
- 58 -								yr 6/2), hard, microcrystalline, cherty, conchoidal fractures. Rate of penetration about 15 ft/hr.
- 60 -  - 62 -		3.2						<b>80-85 ft:</b> 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 - - 66 -		0						<b>85-70 ft:</b> SANDSTONE, as above, with interbedded DOLOMITE.
- 68 - - 70 -								Rate of penetrtion about 30 ft/hr.
- 72 -		0						<b>70-75 ft:</b> 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 hydrocaron odor.
-74-		40				// // //		Rate of penetration about 15 ft/hr.  75-80 ft: Sandy DOLOMITE, as above. Dry, no
- 76 - -						// // //		hydrocarbon odor.
- 78 -						7/7 7/7 7/7		Rate of penetration about 10 ft/hr.
- 80 - - 82 -		0				<del>//</del> // //		<b>80-85 ft:</b> 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 -		0				<del>//</del>		TD 6 95 th 1610 has 12/12/04
- 86 -  - 88 -								TD @ 85 ft. 1610 hrs. 12/13/94.



						arathon Oil Company Proj. No. <u>023350052</u>	See Site Map For Boring Location
Surface I Top of C Screen: [ Casing: D Fill Mater Drill Co	Elev. To lasing Waing Waing Ler	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	OId (mdd)	Sample ID Blow Count/ * Recovery	Graphic Log	USCS Class.	Descrip (Color, Texture, Trace < 10%, Little 10% to 20%, Some	Structure)
2.5- Not to scale 0 2	7					O-1 ft: Alluvium, SILT, modera loose, unconsolidated.  1-5 ft: DOLOMITE, grayish or microcrystalline, cherty, con	ate yellowish brown (10 yr 5/4), range (10 yr 7/4), hard, choidal fractures, dry.
- 4 - - 6 - - 8 -	× 4	0				Rate of penetration about 2  5-10 ft: DOLOMITE, grayish of yellowish brown (10 yr 6/2),  Rate of penetration about 12	orange (10 yr 7/4) to pale as above.
- 10 - - 12 - - 12 - - 14 -		0				<b>10-15 ft:</b> DOLOMITE, as above  Rate of penetration about 15	
- 16 - - 18 - - 18 - - 20 -		0					
- 22 - - 22 -  - 24 -							y, conchoidal fractures, dry, no





#### Monitoring Well MW-79

Owner Marathon Oil Company Project MOC/Indian Basin Gas Plant Proj. No. <u>023350052</u> Location Indian Basin, Carlsbad, New Mexico Class. Blow Count/ Recovery Graphic Log Description PID (mdd) Depth (ft.) Sample Well Completion (Color, Texture, Structure) SCS Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50% 24 Rate of penetration about 10 ft/hr. 0 25-30 ft: DOLOMITE, as above, with minor dolomitic 26 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 28 caving. Rate of penetration 20 ft/hr. 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 32 yellowish orange (10 yr 6/6), fine grained, occasionally silty, moderately soft, minor hematite staining, dry, no hydrocarbon odor. 34 Rate of penetration about 15 ft/hr. 0 35-40 ft: DOLOMITE, as above, dry, no hydrocarbon odor. 36 38 Rate of penetration about 15 ft/hr. 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, occassional hematite staining, with minor 42 DOLOMITE, as above. Dry, no hydrocarbon odor. 44 Rate of penetration about 15 ft/hr. 0 45-50 ft: SANDSTONE, as above, interbedded with 46 dolomitic sandstone, medium dark gray (N4), moderatley hard, fine grained, well cemented, non-calcareous and DOLOMITE, dark yellowish brown (10 yr 6/2), hard, microcrystalline, conchoidal fractures, dry, no hydrocarbon 48 odor. Rate of penetration about 15 ft/hr. 50 0 50-55 ft: DOLOMITE and SANDSTONE, as above, dry, faint hydrocarbon odor. 52 54 Rate of penetration about 12 ft/hr (with connection). 20.4 56



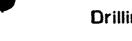
#### Monitoring Well MW-79

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

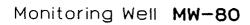
Owner Marathon Oil Company

Proj. No. 023350052

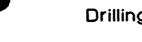
Depth (ft.)	Well Completion	PID (mdd)	Sample ID	Blow Count/	 Graphic Log	USCS Class.	Description  (Color, Texture, Structure)  Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
- 56 - 58 -					7.7. 7.7. 7.7. 7.7.		<b>55–80 ft:</b> DOLOMITE, pale yellow brown (10 yr 6/2), hard, microcrystalline, 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.
-60-		17.2			7/Z 7/Z 7/Z		<b>80-85 ft:</b> DOLOMITE and dolomitic SANDSTONE, as above, dry, moderate hydrocarbon odor.
- 62 -	i				7,7 7,7 7,7		
-64-					77		Rate of penetration about 12 ft/hr.
66 -		53.1					<b>85-70 ft:</b> 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.
- 68 <b>-</b>							isioderate riyaroediborrodor.
- 70 - -		7.1					70-75 ft: Lithology, as above, dry, no hydrocarbon odor.
- 72 - -							
- 74 - -		O					75 00 the Litheless are above day moderate hydrocarbas
- 76 - -							<b>75–80 ft:</b> Lithology, as above, dry, moderate hydrocarbon odor.
- 78 - 							
- 80 -		34.4					Well TD @ 80 ft., 1955 hrs. 12/14/94.
- 82 - -							
- 84 - 							
- 86 -							
- 88 -							



GROUNDWATER TECHNOLOGY



						rathon Oil CompanyProj. No. <u>023350052</u>	See Site Map For Boring Location
Surface ( Top of C Screen: ( Casing: D Fill Mater Drill Co. <u>L</u>	Elev To asing Wa Dia Le bia <u>8.625 in.</u> Le bial WT Water Well Service	tal Hole ter Lev ngth ngth e Me	e Depth <u>90</u> vel Initial 3.92 ft.	ft.  Rig/C	_ Di _ St _ T) _ T) ore .	ameter 7.875 in.  tatic  ype/Size  ype Steel  Failing 1500  e 12/14-15/94 Permit #	Located approximately 80 feet East of
Depth (ft.)	Well Completion	(wdd)	Sample ID	Graphic Log	88.	Descrip (Color, Texture, Trace < 10%, Little 10% to 20%, Some	Structure)
-2.25 Not to _ scale						Spud well 1005 hours, 12/14/9	94.
- 0 - - 2 - - 4 - - 6 - - 8 - - 10 - - 12 -		0				<b>0-5 ft:</b> Alluvium continues.	on odor.  e, with minor cherty, dark
- 14 - - 16 - - 18 - - 20 - - 22 -	, , , , , , , , , , , , , , , , , , ,	0				dry, no hydrocarbon odor.  Rate of penetration about 20  20–25 ft: SANDSTONE, dark fine grained, silty, moderatel Sandy DOLOMITE, dark yello fine quartz grains. Minor DOI	microcrystalline, hard, dded with thin beds of brown (10 yr 6/6), soft, friable, of the first of the decision





GROUNDWATER TECHNOLOGY

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

Depth (ft.)	Well Completion	(wdd) 0	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 -				77		Rate of penetration about 10 ft/hr.
- 26 - - 28 -		0				<b>25–30 ft:</b> Predominantely DOLOMITE, as above, with minor SANDSTONE and sandy dolomite.
- 30 -						Rate of penetration about 8 ft/hr (with connection).
- 32 -		0		<del>//</del> <del>//</del> <del>//</del>		<b>30-35 ft:</b> 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.
- 34 -	:			77 77		Rate of penetration about 15 ft/hr.
- 36 - -		0		7-72 7-72 7-72 7-72		<b>35-40 ft:</b> DOLOMITE, as above, interbedded with SANDSTONE, dark yellowish brown (10 yr 4/2), fine grained, well cemented, dolomitic, dry, no hydrocarbon odor.
- 38 -						Rate of penetration about 20 ft/hr. · ·
- 40 - - 42 - 42 -		0				<b>40-45 ft:</b> DOLOMITE, as above, interbedded with minor thin beds of SANDSTONE, brownish gray (5 yr 4/1), moderate soft, fine grained, dry, no hydrocarbon odor.
- 44 -  - 46 -	:	О				<b>45-50 ft:</b> DOLOMITE and SANDSTONE, as above, with sandy DOLOMITE, light gray (N7), hard, fine quartz grains, microcrystalline, non-calcareous, dry, no hydrocarbon odor.
- 48 - - 50 - - 50		0				<b>50–55 ft:</b> Lithology, as above, dry, no hydrocarbon odor.
- 52 - - 54 - - 56 -		0				Rate of penetration about 15 ft/hr.







\_ Owner Marathon Oil Company Project MOC/Indian Basin Gas Plant Proj. No. <u>023350052</u> Location Indian Basin, Carlsbad, New Mexico Class. Graphic Log Description (mdd) Sample Depth (ft.) Well Completion SCS (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50% 56 55-80 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, 58 conchoidal fractures. Dry, moderate hydrocarbron odor. Rate of penetration about 15 ft/hr. 60 89.0 80-85 ft: DOLOMITE, pale yellowish brown (10 yr 6/2) to dark yellowish orange (10 yr 6/6), as above, dry, no hydrocarbon odor. 62 64 Rate of penetration about 12 ft/hr. 19.6 65-70 ft: DOLOMITE, pale yellowish brown (10 yr 6/2), as above, dry, moderate hydrocarbon odor. 66 68 Rate of penetration about 15 ft/hr. · 70 · 68.8 70-75 ft: DOLOMITE, as above. 72 74 Rate of penetration about 15 ft/hr. 4.5 75-80 ft: DOLOMITE, as above, interbedded with minor SANDSTONE, dark yellowish orange (10 yr 6/6), fine to 76 medium grained, poorly sorted, round to subrounded, calcareous, well cemented. - 78 Rate of penetration about 12 ft/hr. 80 80-85 ft: DOLOMITE and SANDSTONE, as above. 82 84 Rate of penetration about 15 ft/hr. 85-90 ft: DOLOMITE and SANDSTONE, as above. 86

88





Monitoring Well MW-80

GROUNDWATER TECHNOLOGY

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

Proj. No. 023350052

Depth (ft.)	Well Completion	(mdd) 0	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		77		Well TD @ 90 ft. below grade.
92 -						
- 94 –						
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- 114 -						
- 116 -						
- 118 -						
-120-						