

**GW - 21**

**APPROVALS**

**YEAR(S)**

**2009**

## Hansen, Edward J., EMNRD

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**From:** Hansen, Edward J., EMNRD  
**Sent:** Wednesday, June 17, 2009 4:00 PM  
**To:** 'Persaud, Terry'; Dennis\_Newman@oxy.com  
**Cc:** Caudill, Ted L.; Kurki, Vijay K.; alan.reed@arcadis-us.com; Lowe, Leonard, EMNRD; David\_Edwards@oxy.com; Mark\_Treesh@oxy.com; Peacock, Paul  
**Subject:** RE: GW-21 Plugging Report Approval

Dear Mr. Persaud:

The OCD is now anticipating the submittal of the 2009 annual groundwater report by July 31, 2009.

Edward J. Hansen  
Hydrologist  
Environmental Bureau

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**From:** Persaud, Terry [mailto:tcpersaud@marathonoil.com]  
**Sent:** Wednesday, June 17, 2009 2:54 PM  
**To:** Dennis\_Newman@oxy.com  
**Cc:** Caudill, Ted L.; Kurki, Vijay K.; alan.reed@arcadis-us.com; Lowe, Leonard, EMNRD; David\_Edwards@oxy.com; Mark\_Treesh@oxy.com; Hansen, Edward J., EMNRD; Peacock, Paul  
**Subject:** RE: GW-21 Plugging Report Approval

Ed,  
As discussed a few minutes ago, the 2009 annual groundwater monitoring report for remaining 15 monitoring wells will be submitted by July 31, 2009.

thanks  
Terry

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**From:** Dennis\_Newman@oxy.com [mailto:Dennis\_Newman@oxy.com]  
**Sent:** Wednesday, June 17, 2009 3:05 PM  
**To:** edwardj.hansen@state.nm.us; Persaud, Terry  
**Cc:** Caudill, Ted L.; Kurki, Vijay K.; alan.reed@arcadis-us.com; Leonard.Lowe@state.nm.us; David\_Edwards@oxy.com; Mark\_Treesh@oxy.com  
**Subject:** RE: GW-21 Plugging Report Approval

Ed -  
Thanks for copying me on the email. I have talked to Terry Persaud (Marathon) and Marathon will be submitting the 2009 Annual Groundwater Monitoring Report, since the groundwater field work was completed under Marathon's direction.  
Regards,  
Dennis Newman  
713-366-5485

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**From:** Hansen, Edward J., EMNRD [mailto:edwardj.hansen@state.nm.us]  
**Sent:** Wednesday, June 17, 2009 12:42 PM  
**To:** Persaud, Terry  
**Cc:** Caudill, Ted L.; Kurki, Vijay K.; Newman, Dennis (Houston); alan.reed@arcadis-us.com; Lowe, Leonard, EMNRD  
**Subject:** GW-21 Plugging Report Approval

**RE: "Indian Basin Remediation Project Monitoring Well Plugging Report"**

**for the Marathon's (now OXY's)  
Indian Basin Gas Plant (GW-21)  
Unit Letter G, Section 23, T21S, R23E, NMPM, Eddy County, New Mexico  
Plugging Report Approval**

Dear Mr. Persaud:

The New Mexico Oil Conservation Division (OCD) has received the groundwater monitoring well plugging report for the Indian Basin Gas Plant (GW-21), dated June 11, 2009, and has conducted a review of the report. The plugging report, submitted for the above-referenced site, indicates that Marathon has met the plugging requirements. Therefore, the OCD hereby approves the plugging report. However, the OCD is anticipating the 2009 annual groundwater monitoring report for the remaining 15 monitoring wells this month.

Please be advised that OCD approval of this report does not relieve the owner/operator of responsibility should operations pose a threat to ground water, surface water, human health or the environment. In addition, OCD approval does not relieve the owner/operator of responsibility for compliance with any OCD, federal, state, or local laws and/or regulations.

If you have any questions regarding this matter, please contact me at 505-476-3489.

Edward J. Hansen  
Hydrologist  
Environmental Bureau

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This inbound email has been scanned by the MessageLabs Email Security System.

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**Hansen, Edward J., EMNRD**

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**From:** Hansen, Edward J., EMNRD  
**Sent:** Wednesday, June 17, 2009 11:42 AM  
**To:** Persaud, Terry  
**Cc:** Caudill, Ted L.; 'Kurki, Vijay K.'; 'Dennis Newman'; 'alan.reed@arcadis-us.com'; Lowe, Leonard, EMNRD  
**Subject:** GW-21 Plugging Report Approval

**RE: "Indian Basin Remediation Project Monitoring Well Plugging Report"  
for the Marathon's (now OXY's)  
Indian Basin Gas Plant (GW-21)  
Unit Letter G, Section 23, T21S, R23E, NMPM, Eddy County, New Mexico  
Plugging Report Approval**

Dear Mr. Persaud:

The New Mexico Oil Conservation Division (OCD) has received the groundwater monitoring well plugging report for the Indian Basin Gas Plant (GW-21), dated June 11, 2009, and has conducted a review of the report. The plugging report, submitted for the above-referenced site, indicates that Marathon has met the plugging requirements. Therefore, the OCD hereby approves the plugging report. However, the OCD is anticipating the 2009 annual groundwater monitoring report for the remaining 15 monitoring wells this month.

Please be advised that OCD approval of this report does not relieve the owner/operator of responsibility should operations pose a threat to ground water, surface water, human health or the environment. In addition, OCD approval does not relieve the owner/operator of responsibility for compliance with any OCD, federal, state, or local laws and/or regulations.

If you have any questions regarding this matter, please contact me at 505-476-3489.

Edward J. Hansen  
Hydrologist  
Environmental Bureau



# New Mexico Energy, Minerals and Natural Resources Department

**Bill Richardson**  
Governor

**Joanna Prukop**  
Cabinet Secretary  
**Reese Fullerton**  
Deputy Cabinet Secretary

**Mark Fesmire**  
Division Director  
**Oil Conservation Division**



February 20, 2009

M. Paul Peacock  
Marathon Oil Company  
P.O. Box 3128  
Houston, TX 77253-3128

**RE: Indian Basin Remediation Project Report and Proposed Well Plugging Request  
for the Marathon's Indian Basin Gas Plant (GW-21)  
Eddy County, New Mexico**

Dear Mr. Peacock:

The New Mexico Oil Conservation Division (OCD) has reviewed Marathon's report, Evaluation of Natural Attenuation, Indian Basin Remediation Project [IBRP], Eddy County, New Mexico, dated May 12, 2008, and Proposed IBRP Well Plugging Program [Request], dated February 5, 2009. The report and request are substantially acceptable to the OCD. Therefore, the OCD hereby conditionally approves the discontinuance of active remediation at the above-referenced site.

However, at least annual groundwater monitoring for BTEX, TDS and chloride at the 13 proposed wells as specified in the Well Plugging Request plus at an additional two groundwater monitoring wells, MW-81 and MW-113, for a total of 15 wells must continue unless otherwise approved by the OCD. Also, at least semi-annually gauging of depth to groundwater and non-aqueous phase liquid thickness at these 15 wells must continue unless otherwise approved by the OCD. Marathon must continue to submit an annual groundwater monitoring report to the OCD unless otherwise approved by the OCD.

In addition, the material used to plug the 98 (the 100 proposed minus the 2 rejected) groundwater monitoring wells as specified in the Request must be a cement grout with 1% to 3% bentonite. Please submit to the OCD a final plugging report within 180 days of receipt of this letter.

Oil Conservation Division \* 1220 South St. Francis Drive

\* Santa Fe, New Mexico 87505

\* Phone: (505) 476-3440 \* Fax (505) 476-3462\* <http://www.emnrd.state.nm.us>



M. Paul Peacock  
GW-21  
February 20, 2009  
Page 2

Please be advised that OCD approval of this report and request does not relieve the owner/operator of responsibility should operations pose a threat to ground water, surface water, human health or the environment. In addition, OCD approval does not relieve the owner/operator of responsibility for compliance with any OCD, federal, state, or local laws and/or regulations.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Edward Hansen of my staff at 505-476-3489 or [edwardj.hansen@state.nm.us](mailto:edwardj.hansen@state.nm.us).

Sincerely,



Wayne Price  
Environmental Bureau Chief

WP:EJH:ejh

cc: OCD; Artesia District Office  
Terry Persaud, P.E., Marathon Oil Company, P.O. Box 3128, Houston, TX 77253-3128



Infrastructure, environment, facilities

RECEIVED

2009 FEB 12 AM 11 33

Mr. Terry Persaud, P.E.  
Marathon Oil Company  
P.O. Box 3487  
Mail Stop 32:07  
Houston, Texas 77253-3487

ARCADIS U.S., Inc.  
1004 North Big Spring Street  
Suite 300  
Midland,  
Texas 79701  
Tel 432 687 5400  
Fax 432 687 5401  
www.arcadis-us.com

Subject:

Proposed Indian Basin Remediation Project Well Plugging Program

ENVIRONMENTAL

Dear Mr. Persaud:

Based on the recent meeting between Marathon Oil Company (MOC) and the New Mexico Oil Conservation Division (NMOCD) representatives, it is understood that the NMOCD has reviewed the report titled "Evaluation of Natural Attenuation, Indian Basin Remediation Project, Eddy County, New Mexico" dated May 12, 2008 and agreed with the conclusions of the report. As a follow-up to the meeting between MOC and the NMOCD and the recommendations in the natural attenuation report, ARCADIS has prepared a list of wells that will be included in the Indian Basin Gas Plant discharge plan. The remaining wells will be plugged and abandoned. The wells recommended to retain are listed in Table 1. The wells recommended to be plugged and abandoned are listed in Table 2. The well locations in the Shallow Zone are identified on the attached Figure 1, and the well locations in the Lower Queen are identified on the attached Figure 2.

Date:

5 February 2009

Contact:

Alan Reed

Phone: Ext 162

432.687.5400

Email:

alan.reed@arcadis-us.com

Our ref:

ARCADIS has reviewed the groundwater sampling data available through 2007 and groundwater fluid level measurement data available through 2008 for currently active monitor wells in order to select the wells that will be retained, and the wells that will be plugged and abandoned. The wells selected to retain are strategically located to monitor potential downgradient migration and provide a reasonable distribution of wells for future monitoring should it be required by the NMOCD. In addition, at least one upgradient monitor well was selected.

#### Shallow Zone Monitor Wells

The groundwater hydraulic gradient in the Shallow Zone is to the southeast. A total of 7 wells are recommended to be retained in the Shallow Zone. The wells include MW-14, MW-45, MW-46, MW-49, MW-77, MW-106 and MW-126.

#### Lower Queen Monitor Wells

The groundwater gradient in the Lower Queen is generally to the north. A total of 6 wells are recommended to be retained in the Lower Queen. The wells include MW-58, MW-66, MW-70, MW-88, MW-111 and MW-127.

Imagine the result

**ARCADIS**

Mr. Terry Persaud  
5 February 2009

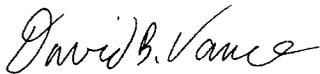
If you have any questions regarding the selection of the monitor wells to be retained in the Indian Basin Gas Plant discharge plan, please contact us.

Very truly yours,

ARCADIS U.S., Inc.



Alan J. Reed, Jr., P.E.  
Project Manager



David B. Vance  
Principal Scientist



Steven P. Tischer  
Associate Vice President

Table 1

Wells Recommended to Retain  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Well ID	Well Type	Measuring Point Elevation (feet amsl)	Total Depth (feet btoc)	Top of Screen/ Open Hole Interval (feet btoc)	Screen/Open Hole Depth (feet)	Casing Diameter (inches)
Shallow Zone MW-14	monitoring	3803.61	22.00	12.00	10.00	4
Shallow Zone MW-45	monitoring	3808.68	24.00	9.50	14.50	2
Shallow Zone MW-46	monitoring	3805.54	18.00	8.00	10.00	4
Shallow Zone MW-49	monitoring	3805.61	24.00	14.00	10.00	2
Shallow Zone MW-77	monitoring	3775.48	80.00	17.50	62.50	8
Shallow Zone MW-106	monitoring	3721.97	92.00	12.50	79.5	4
Shallow Zone MW-126	phase II infill	3795.58	70.00	30.00	40.00	7
Lower Queen MW-58	recovery	3824.07	216.00	191.00	25.00	4
Lower Queen MW-66	monitoring	3828.98	232.50	182.00	50.50	4
Lower Queen MW-70	monitoring	3822.57	222.00	172.00	50.00	4
Lower Queen MW-88	monitoring	3789.7	175.00	142.50	32.50	8
Lower Queen MW-111	monitoring	3824.44	230.00	190.00	40.00	4
Lower Queen MW-127	phase II infill	3825.17	245.00	195.00	50.00	4

## Notes:

feet amsl

Feet above mean sea level

feet btoc

Feet below top of casing

Table 2

Wells Recommended to be Plugged and Abandoned  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Well ID	Well Type	Measuring Point Elevation (feet amsl)	Total Depth (feet btoc)	Top of Screen/ OpenHole Interval (feet btoc)	Screen/Open Hole Depth (feet)	Casing Diameter (inches)
Shallow Zone MW-4	monitoring	3785.88	17.00	8.00	9.00	2
Shallow Zone MW-10	monitoring	3790.78	17.00	7.00	10.00	4
Shallow Zone MW-11	monitoring	3806.96	22.00	12.00	10.00	4
Shallow Zone MW-12	monitoring	3809.86	23.00	13.00	10.00	2
Shallow Zone MW-13	monitoring	3801.58	20.00	10.00	10.00	2
Shallow Zone MW-16	monitoring	3801.04	20.00	10.00	10.00	4
Shallow Zone MW-17	monitoring	3799.55	18.00	8.00	10.00	2
Shallow Zone MW-19	monitoring	3797.21	17.00	7.00	10.00	4
Shallow Zone MW-22	monitoring	3799.20	16.00	6.00	10.00	2
Shallow Zone MW-24	monitoring	3794.09	11.00	6.00	5.00	2
Shallow Zone MW-26	monitoring	3793.01	19.00	9.00	10.00	2
Shallow Zone MW-32	monitoring	3797.47	14.00	9.00	5.00	2
Shallow Zone MW-41	monitoring	3799.04	22.00	12.00	10.00	4
Shallow Zone MW-43	monitoring	3802.05	22.00	12.00	10.00	4
Shallow Zone MW-47	monitoring	3805.09	19.00	9.00	10.00	2
Shallow Zone MW-48	monitoring	3806.18	18.00	8.00	10.00	2
Shallow Zone MW-50	monitoring	3813.35	35.00	20.00	15.00	2
Shallow Zone MW-51	infiltration	3810.86	18.00	8.00	10.00	2
Shallow Zone MW-54	monitoring	3823.86	76.00	41.00	35.00	4
Shallow Zone MW-55	monitoring	3794.40	65.00	20.00	45.00	4
Shallow Zone MW-56	monitoring	3782.45	42.00	27.00	15.00	4
Shallow Zone MW-61	monitoring	3816.20	55.00	45.00	10.00	4
Shallow Zone MW-65	monitoring	3763.31	55.00	35.00	20.00	4
Shallow Zone MW-69	recovery	3805.11	48.00	13.00	35.00	4
Shallow Zone MW-78	monitoring	3785.82	85.00	13.00	72.00	8
Shallow Zone MW-79	monitoring	3788.39	80.00	8.00	72.00	8
Shallow Zone MW-90	monitoring	3781.73	60.00	12.50	47.50	4
Shallow Zone MW-91	monitoring	3783.07	70.00	12.50	57.50	4
Shallow Zone MW-100	monitoring	3773.31	70.00	12.50	57.50	4
Shallow Zone MW-105	monitoring	3736.93	80.00	12.50	67.5	4
Shallow Zone MW-109	monitoring	3809.53	--	--	--	--
Shallow Zone MW-117	phase II infill	3807.86	47.00	17.00	30.00	4
Shallow Zone Sump A10	monitoring	3800.99	--	--	--	--
Shallow Zone Sump 16A	monitoring	3785.14	--	--	--	--
Lower Queen MW-57	monitoring	3787.70	175.00	155.00	20.00	4
Lower Queen MW-59	monitoring	3819.59	--	--	--	--
Lower Queen MW-60	monitoring	3815.28	220.00	170.00	50.00	4
Lower Queen MW-61A	monitoring	3819.97	214.00	173.50	40.50	4
Lower Queen MW-62	monitoring	3819.90	223.00	177.00	46.00	4
Lower Queen MW-63	monitoring	3826.16	220.00	174.00	46.00	4
Lower Queen MW-64	monitoring	3798.57	200.00	154.00	46.00	4
Lower Queen MW-65A	recovery	3763.26	166.00	115.00	51.00	4

Table 2 Wells Recommended to be Plugged and Abandoned  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Well ID	Well Type	Measuring Point Elevation (feet amsl)	Total Depth (feet btoc)	Top of Screen/ OpenHole Interval (feet btoc)	Screen/Open Hole Depth (feet)	Casing Diameter (inches)
Lower Queen MW-67	monitoring	3765.87	163.00	112.00	51.00	4
Lower Queen MW-68	recovery	3797.83	200.00	149.00	51.00	4
Lower Queen MW-71	monitoring	3778.05	233.00	165.00	68.00	4
Lower Queen MW-72	dual recovery	3819.32	241.50	181.50	60.00	6
Lower Queen MW-73	monitoring	3820.09	220.00	10.00	210.00	8
Lower Queen MW-74	monitoring	3820.82	220.00	170.00	50.00	6
Lower Queen MW-75	dual recovery	3816.12	220.00	170.00	50.00	6
Lower Queen MW-76	recovery	3796.01	220.00	9.00	211.00	8
Lower Queen MW-81	dual recovery	3817.03	225.00	71.00	154.00	8
Lower Queen MW-82	recovery	3825.07	250.00	67.50	182.50	6
Lower Queen MW-83	recovery	3794.12	202.00	152.00	50.00	6
Lower Queen MW-84	recovery	3759.60	170.00	120.00	50.00	6
Lower Queen MW-85	dual recovery	3824.93	235.00	162.00	73.00	6
Lower Queen MW-86	recovery	3823.99	225.00	185.00	40.00	6
Lower Queen MW-87	monitoring	3740.50	170.00	145.00	25.00	4
Lower Queen MW-87A	monitoring	3739.53	130.00	10.00	120.00	8
Lower Queen MW-89	monitoring	3827.68	232.00	188.50	43.50	4
Lower Queen MW-94	recovery	3821.48	230.00	65.00	165.00	8
Lower Queen MW-95	monitoring	3746.26	145.00	111.00	34.00	4
Lower Queen MW-96	monitoring	3739.80	135.00	97.50	37.50	4
Lower Queen MW-97	monitoring	3750.16	148.00	107.50	40.50	4
Lower Queen MW-98	monitoring	3770.15	165.00	127.50	37.50	4
Lower Queen MW-104	monitoring	3793.64	220.00	145.00	75.00	6
Lower Queen MW-108	monitoring	3747.13	--	--	--	--
Lower Queen MW-110	recovery	3812.61	235.00	175.00	60.00	6
Lower Queen MW-112	phase I infill	3780.11	211.00	140.00	71.00	6
Lower Queen MW-113	phase I infill	3772.67	200.00	125.00	75.00	6
Lower Queen MW-114	phase I infill	3805.32	220.00	111.00	109.00	8
Lower Queen MW-115	phase I infill	3804.69	224.00	35.00	189.00	8
Lower Queen MW-116	phase I infill	3792.11	220.00	150.00	70.00	6
Lower Queen MW-117A	phase II infill	3808.24	225.00	46.00	179.00	8
Lower Queen MW-118	phase II infill	3762.88	202.00	112.00	90.00	4
Lower Queen MW-119	phase II infill	3824.74	245.00	185.00	60.00	4
Lower Queen MW-120	phase II infill	3820.65	240.00	180.00	60.00	4
Lower Queen MW-121	phase II infill	3820.88	225.00	175.00	50.00	4
Lower Queen MW-122	phase II infill	3822.79	225.00	36.00	189.00	7
Lower Queen MW-123	phase II infill	3768.77	225.00	125.00	100.00	4
Lower Queen MW-124	phase II infill	3777.83	225.00	17.00	208.00	7
Lower Queen MW-125	phase II infill	3790.61	225.00	130.00	95.00	4
Lower Queen MW-128	phase II infill	3786.08	225.00	37.50	187.50	7
Lower Queen MW-129	phase II infill	3800.82	245.00	155.00	90.00	4
Lower Queen MW-130	phase II infill	3775.54	225.00	145.00	80.00	4
Lower Queen MW-131	phase II infill	3784.23	245.00	145.00	100.00	4

Table 2

Wells Recommended to be Plugged and Abandoned  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Well ID	Well Type	Measuring Point Elevation (feet amsl)	Total Depth (feet btoc)	Top of Screen/ Open Hole Interval (feet btoc)	Screen/Open Hole Depth (feet)	Casing Diameter (inches)
Lower Queen IW-1	infiltration	3808.55	230.00	73.00	157.00	12
Lower Queen IW-2	infiltration	3835.86	300.00	159.00	141.00	12
Lower Queen SW-1	monitoring	3808.19	--	--	--	--
Lower Queen SW-2	monitoring	3808.79	--	--	--	--
Lower Queen SW-3	monitoring	3842.29	230.00	81.50	148.50	8
Lower Queen VE-1	vapor extraction	--	214.00	80.00	134.00	8
Lower Queen VE-2	vapor extraction	--	210.00	75.00	135.00	8
Lower Queen VE-3	vapor extraction	--	202.00	75.00	127.00	8
Lower Queen VE-4	vapor extraction	--	183.00	60.00	123.00	8
Lower Queen VE-5	vapor extraction	--	168.00	60.00	108.00	8
Lower Queen VE-16	vapor extraction	3750.96	150.00	42.50	107.50	8
Lower Queen VE-17	vapor extraction	3756.73	130.00	40.00	90.00	8
Lower Queen VE-18	vapor extraction	3756.82	163.00	37.50	125.50	8
Lower Queen VE-19	vapor extraction	3761.18	150.00	115.00	35.00	6
Lower Queen VE-20	vapor extraction	3768.41	160.00	37.50	122.50	8

## Notes:

feet amsl

Feet above mean sea level

feet btoc

Feet below top of casing

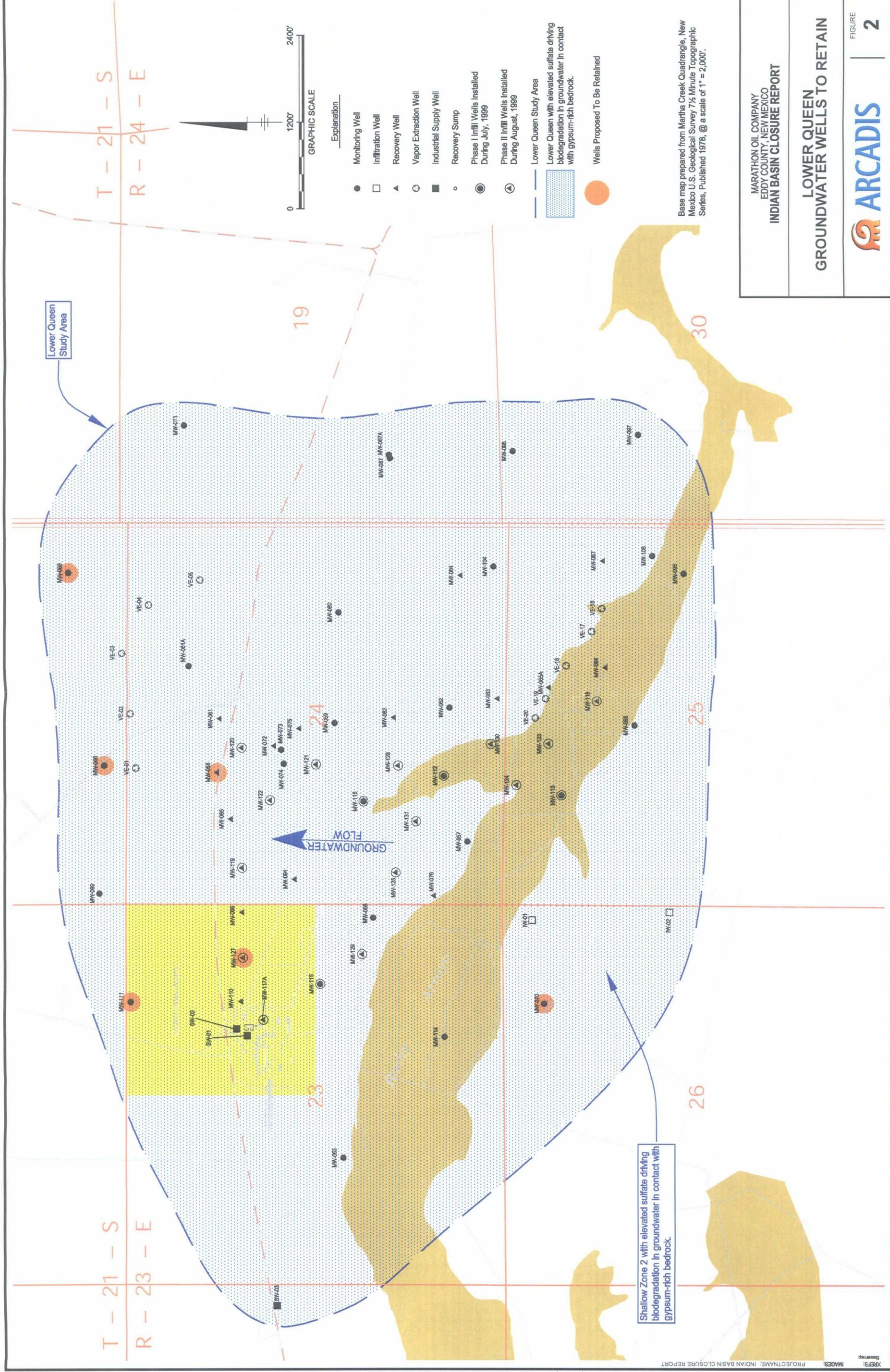
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Data not available









Lower Queen Study Area

Shallow Zone 2 with elevated sulfate driving biodegradation in groundwater in contact with gypsum-rich bedrock.

GROUNDWATER FLOW



- Explanation
- Monitoring Well
  - Infiltration Well
  - ▲ Recovery Well
  - ⊙ Vapor Extraction Well
  - Industrial Supply Well
  - Recovery Sump
  - ⊙ Phase I Infill Wells Installed During July, 1999
  - ⊙ Phase II Infill Wells Installed During August, 1999
  - Lower Queen Study Area
  - Lower Queen with elevated sulfate driving biodegradation in groundwater in contact with gypsum-rich bedrock.
  - Wells Proposed To Be Retained

Base map prepared from Martha Creek Quadrangle, New Mexico U.S. Geological Survey 7 1/2 Minute Topographic Series, Published 1978, @ a scale of 1" = 2,000'.

MARATHON OIL COMPANY  
 EDDY COUNTY, NEW MEXICO  
 INDIAN BASIN CLOSURE REPORT

LOWER QUEEN  
 GROUNDWATER WELLS TO RETAIN