

GW - 021

AGWMR

02/05/2009

GW 021



Infrastructure, environment, facilities

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Mr. Terry Persaud, P.E.
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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

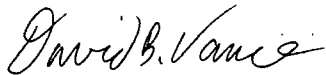
If you have any questions regarding the selection of the monitor wells to be retained in the Indian Basin Gas Plant discharge plan, please contact us.

Very truly yours,

ARCADIS U.S., Inc.



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



David B. Vance
Principal Scientist



Steven P. Fischer
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/ OpenHole 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 btoc

Feet above mean sea level
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/ Open Hole 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/ Open Hole 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

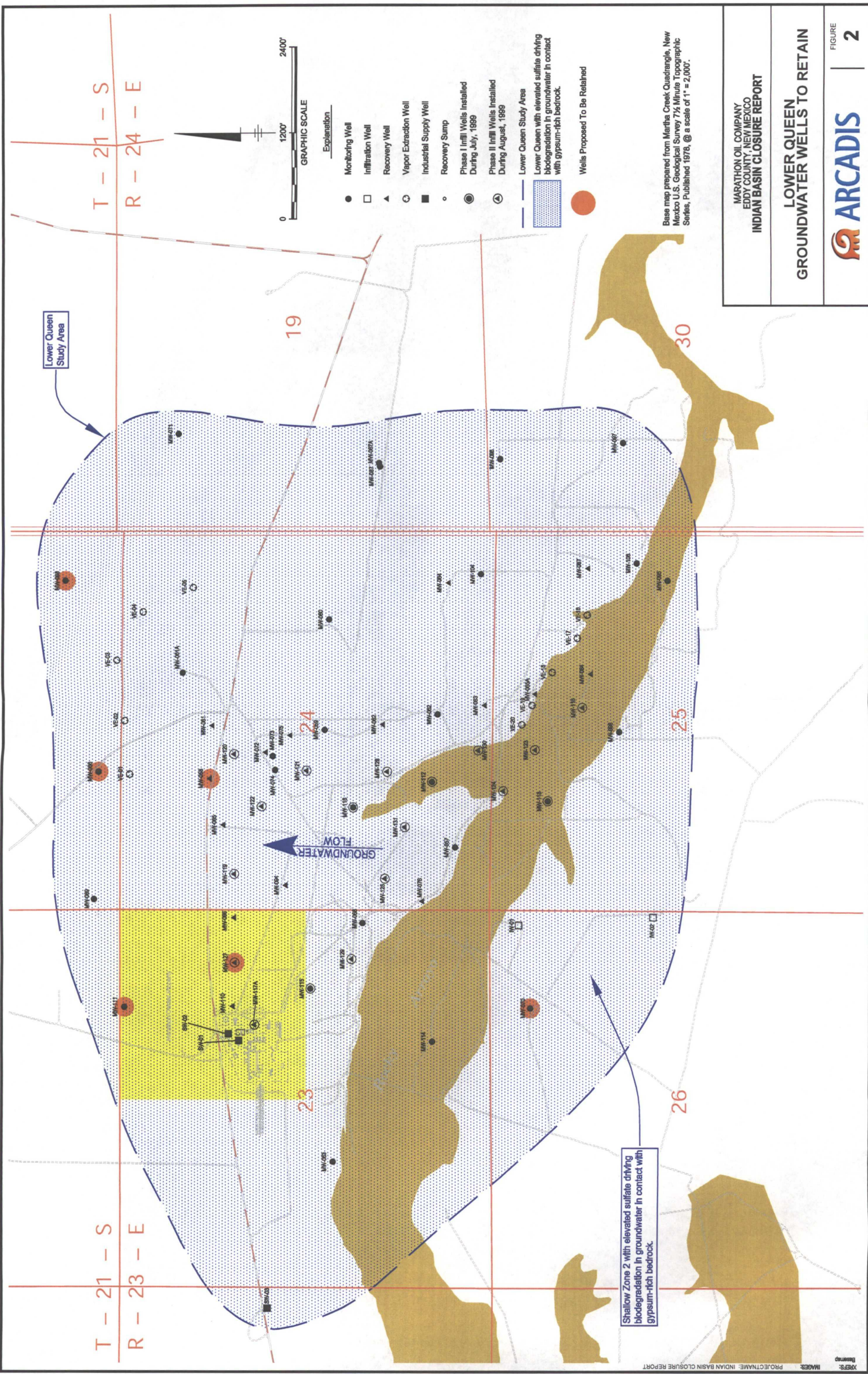
feet btoc

Feet below top of casing

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Data not available





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