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ARCADIS
Infrastructure, environment, buildings

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

Mr. Edward J. Hansen
New Mexico Energy, Minerals & Natural Resources Department
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

ENVIRONMENTAL

Subject:
Submittal of 2011 Annual Groundwater Monitoring Report
Indian Basin Gas Plant
Eddy County, New Mexico

Date:
November 1, 2011

Mr. Hansen:

On behalf of OXY USA WTP Limited Partnership, ARCADIS is submitting the attached Annual Groundwater Monitoring Report for the Indian Basin Gas Plant (site) located in Eddy County, New Mexico. The New Mexico Oil Conservation Division (OCD) requires groundwater monitoring of 15 wells at the site and submittal of an annual report documenting the groundwater monitoring activities.

If you should have any questions, please contact me at (432) 687-5400.

Sincerely,

ARCADIS U.S., Inc.

Hank McConnell
Associate Project Manager

Steven P. Tischer
Site Evaluation & Remediation Department Manager

Contact:
Hank McConnell

Phone:
(432) 687-5400

Email:
hank.mcconnell@arcadis-us.com

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Copies: Sandy Ballard, HES Superintendent, OXY USA WTP Limited Partnership
Tom Bernal, IBGP Production Coordination, OXY USA WTP Limited Partnership

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2011 Annual Groundwater Monitoring Report

Indian Basin Gas Plant
Eddy County, New Mexico

Hank W. McConnell
Associate Project Manager

David B. Vance
Technical Expert

Steven P. Tischer
Site Evaluation & Remediation Department Manager

Prepared for:
OXY USA WTP Limited Partnership

Prepared by:
ARCADIS U.S., Inc.
1004 N. Big Spring
Suite 300
Midland
Texas 79701
Tel 432.687.5400
Fax 432.687.5401

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Date:
30 August 2011

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Executive Summary

The Indian Basin Gas Plant (site) is located approximately 20 miles northwest of Carlsbad in Eddy County, New Mexico. Remediation efforts at the site, collectively known as the Indian Basin Remediation Project (IBRP), were initiated in April 1991 to recover free-phase petroleum hydrocarbons related to the release of a liquid by-product of natural gas production known as "condensate". The subsurface at the site includes two distinct geologic zones referred to as the "Shallow Zone" and the "Lower Queen". Both of these zones contain saturated and unsaturated strata. Prior to March 2003, there were a total of 150 wells and two shallow sumps present at the site related to the IBRP. However, with New Mexico Oil Conservation District (NMOCD) approval, 39 Shallow Zone wells were plugged and abandoned in March 2003, reducing the well total to 111 wells and two sumps. The remaining wells and two sumps were used for a combination of groundwater monitoring, groundwater and condensate recovery, treated groundwater infiltration and condensate vapor extraction.

In May 2008, a report titled *Evaluation of Natural Attenuation, Indian Basin Remediation Project, Eddy County, New Mexico* was submitted to the NMOCD. The report described the natural attenuation processes occurring at the site and recommended closure of the IBRP. A letter with the reference title *Proposed Indian Basin Remediation Project Well Plugging Program* was subsequently submitted to the NMOCD in February 2009. The NMOCD responded to the May 2008 report and February 2009 plugging program letter in correspondence dated February 20, 2009. In the February 20, 2009 correspondence, the NMOCD stated that the report and well plugging request were substantially acceptable, and conditionally approved the discontinuance of active remediation at the site. However, the NMOCD required at least annual groundwater monitoring for benzene, toluene, ethylbenzene and xylenes (BTEX), total dissolved solids (TDS) and chloride for a total of 15 wells, and semi-annual gauging of depth to groundwater and non-aqueous phase liquid thickness. In addition, an annual groundwater monitoring report must be submitted to the NMOCD.

In March and April 2009, a total of 95 wells (including the two shallow sumps) were plugged and abandoned. Three water supply wells (SW-1, SW-2 and SW-3) originally included in the proposed plugging program were not plugged, because they are needed to supply water for site operations. A report documenting the well plugging activities was submitted to the NMOCD in June 2009. The NMOCD approved the plugging report through email correspondence dated June 17, 2009.

On December 28, 2010, semi-annual gauging of depth to groundwater and non-aqueous phase liquid thickness of 15 monitoring wells (seven in the Shallow Zone and

eight in the Lower Queen) was conducted. The 2011 annual groundwater monitoring event was conducted from June 30, 2011 through July 1, 2011, and included the gauging of depth to groundwater and non-aqueous phase liquid thickness of 15 monitoring wells (seven in the Shallow Zone and eight in the Lower Queen) and sampling of monitoring wells for BTEX, TDS and chloride. This report documents the results from the December 2010 semi-annual gauging event and the June 2011 annual groundwater monitoring event and provides historical groundwater monitoring documentation.

Liquid-level measurements obtained from each well in December 2010 and June 2011 and the surveyed well elevations were used to calculate groundwater elevations, with density corrections to the water level where condensate was present. The resulting elevation data were used to generate groundwater piezometric contour maps for the Shallow Zone and Lower Queen aquifers. Review of these maps and the elevation data indicate Shallow Zone and Lower Queen groundwater flow was generally consistent with patterns observed in previous years. Flow in the Shallow Zone is to the southeast at an approximate gradient of 0.0147 ft/ft, and flow in the Lower Queen is generally to the northwest at an approximate gradient of 0.0003 ft/ft.

On June 30, 2011 and July 1, 2011, groundwater samples were collected from four Shallow Zone monitoring wells (MW-45, MW-49, MW-77 and MW-106) and five Lower Queen monitoring wells (MW-66, MW-70, MW-88, MW-111 and MW-127). Samples were not collected from Shallow Zone monitoring wells MW-14 and MW-46, because they did not contain an adequate volume of water to obtain a proper sample. Shallow Zone monitoring well MW-126 and the Lower Queen monitoring wells MW-58, MW-81 and MW-113 were not sampled, because they contained condensate. The analytical results indicate that BTEX concentrations in the sampled Shallow Zone monitoring wells were below NMOCD regulatory limits with the exception of benzene in MW-49. The 48 ug/L benzene concentration in MW-49 was within historical levels. In addition, BTEX concentrations in all five of the sampled Lower Queen wells were below NMOCD regulatory limits. In general, TDS and chloride concentrations in the sampled Shallow Zone monitoring wells were within historical levels, and TDS concentrations in MW-77 and MW-106 and chloride concentrations in MW-45, MW-77 and MW-106 were below NMOCD regulatory limits. The TDS and chloride concentrations in the sampled Lower Queen wells were all below NMOCD regulatory limits.

Groundwater monitoring at the site will continue and be conducted according to the requirements outlined in the February 20, 2009 NMOCD letter. Based on the current program schedule, the annual groundwater monitoring event will be conducted in June and the semi-annual groundwater gauging event will be conducted in December.

Annual reports will be prepared at the conclusion of each annual groundwater monitoring event and will be submitted to the NMOCD. The current purging and sampling techniques utilize low-flow procedures that were approved and implemented in 2003.

1. Introduction

ARCADIS has prepared this Annual Groundwater Monitoring report on behalf of OXY USA WTP Limited Partnership (Oxy). This report presents the results of the semi-annual groundwater gauging event conducted in December 2010 and the annual groundwater monitoring event conducted in June 2011, and includes historical groundwater monitoring data from the Indian Basin Remediation Project (IBRP) at the Indian Basin Gas Plant located in Eddy County, New Mexico. This report has been prepared in accordance with the groundwater monitoring requirements outlined in correspondence by the New Mexico Energy, Minerals, and Natural Resources Department, Oil Conservation Division (NMOCD) to Marathon Oil Company dated February 20, 2009 prior to Oxy operating the facility.

The following section presents a brief summary of the project background. The remaining sections discuss results from the December 2010 semi-annual groundwater gauging event and the June 2010 annual groundwater monitoring event and the continuing groundwater monitoring program.

2. Background

The Indian Basin Gas Plant (site) is located approximately 20 miles northwest of Carlsbad, New Mexico, as shown on Figure 1. The site is situated in Township 21 South, Eddy County, and occupies portions of Range 23 East (Sections 13, 23, 24, 25, and 26) and Range 24 East (Sections 19 and 30). Remediation efforts at the site were initiated in April 1991 and were designed to remove separate-phase petroleum hydrocarbons present in the subsurface, primarily condensate, the liquid by-product of natural gas production.

The geology underlying the site is comprised of two distinct zones, both with saturated and unsaturated strata. The geologic units are referred to as the Shallow Zone and the Lower Queen. Prior to March 2003, there were a total of 150 wells (78 Shallow Zone and 72 Lower Queen) and two shallow sumps present at the site related to the IBRP. However, with New Mexico Oil Conservation District (NMOCD) approval, 39 Shallow Zone wells were plugged and abandoned in March 2003, reducing the well total to 111 wells and two shallow sumps. The remaining wells and two sumps were used for a combination of groundwater monitoring, groundwater and condensate recovery, treated groundwater infiltration and condensate vapor extraction.

In May 2008, a report titled *Evaluation of Natural Attenuation, Indian Basin Remediation Project, Eddy County, New Mexico* was submitted to the NMOCD. The report described the natural attenuation processes occurring at the site and recommended

closure of the IBRP. In addition, a letter with the reference title *Proposed Indian Basin Remediation Project Well Plugging Program* was submitted to the NMOCD in February 2009. The NMOCD responded to the May 2008 report and February 2009 plugging program letter in correspondence dated February 20, 2009. In the February 20, 2009 correspondence, the NMOCD stated that the report and well plugging request were substantially acceptable, and conditionally approved the discontinuance of active remediation at the site. However, the NMOCD required at least annual groundwater monitoring for BTEX, TDS and chloride for a total of 15 wells, and semi-annual gauging of depth to groundwater and non-aqueous phase liquid thickness. In addition, the NMOCD required that an annual groundwater monitoring report must be submitted. A copy of the NMOCD correspondence is included in Appendix D.

In March and April 2009, a total of 95 wells (including the two shallow sumps) were plugged and abandoned. Three water supply wells (SW-1, SW-2 and SW-3) originally included in the proposed plugging program were not plugged, because they are needed to supply water for site operations. A report documenting the well plugging activities was submitted to the NMOCD in June 2009. The NMOCD approved the plugging report through email correspondence dated June 17, 2009 (Appendix D).

Table 1 lists the 15 wells remaining in the groundwater monitoring program and monitoring requirements. Figure 2 depicts the site layout, including the locations of remaining Shallow Zone and Lower Queen wells. Additional details regarding local and regional geology and hydrogeology are presented in the report titled *Comprehensive Site Characterization Report for the IBRP*, submitted to the OCD in December 1998.

3. Groundwater and Condensate Gauging

Groundwater gauging was conducted in December 2010 and June 2011. The gauging events consisted of collecting liquid-level measurements from the wells listed in Table 1 for both the Shallow Zone and Lower Queen. The results of the gauging events as well as precipitation recharge (rainfall) are discussed in the following sections. A summary of the December 2010 groundwater gauging results is provided in Table 2. The June 2011 groundwater gauging results are summarized in Table 3. Historical groundwater gauging data for the remaining monitoring wells at the site are presented in Appendix A.

3.1 Shallow Zone Aquifer

The seven monitoring wells completed in the Shallow Zone were gauged during the December 2010 and June 2011 gauging events. The liquid-level measurements and the top of casing elevations for the wells were then used to calculate the groundwater

elevation at each well. Density corrections to the water level were made as required where condensate was present.

Overall, groundwater levels (including density corrections for condensate if present) increased in all of the Shallow Zone wells (0.20 feet in MW-77 up to 4.52 feet in MW-126) in December 2010 compared with measurements collected in June 2010. Groundwater levels declined from December 2010 to June 2011 (with the exception of MW-45 which increased 0.58 feet) to levels that were slightly higher than the June 2010 levels. During the December 2010 and June 2011 gauging events, measurable condensate was detected in Shallow Zone monitoring well MW-126. The condensate thickness measured in MW-126 was 0.41 feet in December 2010, and 0.33 feet in June 2011. Historically, the condensate thickness in MW-126 has ranged between 0 and 3.96 feet.

Groundwater elevation contour maps were prepared based on the December 2010 and June 2011 groundwater elevation measurements (Figures 3 and 5). As shown on Figures 3 and 5, the observed groundwater flow direction in the Shallow Zone is to the southeast at an approximate gradient of 0.0147 ft/ft. The flow direction and gradient are generally consistent with historical patterns.

3.2 Lower Queen Aquifer

The eight monitoring wells completed in the Lower Queen were gauged during the December 2010 and June 2011 gauging events. The liquid-level measurements and the top of casing elevations for the wells were then used to calculate the groundwater elevation at each well. Density corrections to the water level were made as required where condensate was present.

During the December 2010 and June 2011 gauging events, condensate was observed in Lower Queen monitoring wells MW-58, MW-81 and MW-113. The condensate thickness measured in MW-58 was approximately 0.40 feet in December 2010 and approximately 2.29 feet in June 2011. Historically, condensate has been frequently observed in MW-58 ranging between 0 and 5.26 feet. The condensate thickness measured in MW-81 was approximately 0.26 feet in December 2010 and approximately 1.23 feet in June 2011. Historically, the condensate thickness in MW-81 has ranged between 0 and 12.08 feet. The condensate thickness measured in MW-113 was approximately 0.04 feet in December 2010 and approximately 0.05 feet in June 2010. Historically, MW-113 has contained between 0 and 0.88 feet of condensate.

Groundwater elevation contour maps were prepared based on the December 2010 and June 2011 groundwater elevation measurements (Figures 4 and 7). As shown on

Figures 4 and 7, the observed groundwater flow direction in the Lower Queen is generally to the northwest at an approximate gradient of 0.0003 ft/ft. The flow direction and gradient are generally consistent with historical patterns.

3.3 Precipitation Recharge

Table 4 summarizes monthly rainfall for the area during 2010 along with historical precipitation since 1994. From 1994 through 2006, the precipitation records are from the Indian Basin Gas Plant. For 2007 through 2010, the precipitation records are from Carlsbad, New Mexico. The site has historically received the highest amounts of precipitation between the months of June and October. Precipitation generally followed a similar trend during the 2010 calendar year. The average annual rainfall measured over the past five years is approximately 15.04 inches, which is slightly higher than the long-term average for the area of approximately 14 inches per year. During 2010, data from the Carlsbad gauge indicate that the highest amount of precipitation was received in July (7.36 inches) with a total of 17.32 inches reported for the year. The above normal rainfall total in 2010 (mainly occurring from June through September) contributed to the higher static water levels observed in the seven Shallow Zone wells and eight Lower Queen wells in December 2010 compared with June 2010 data.

4. Groundwater Sampling and Analysis

As a condition of the discontinuance of active remediation at the site, the NMOCD required at least annual groundwater monitoring for BTEX, TDS and chloride for seven Shallow Zone and eight Lower Queen monitoring wells. ARCADIS personnel conducted the 2011 annual groundwater sampling event at the site from June 30, 2011 through July 1, 2011. All samples were collected using low-flow purging and sampling techniques. Trip blanks were collected for this event and submitted for analysis of BTEX. Table 5 summarizes the BTEX, chloride and TDS analytical results for the June 2011 event. Summaries of historical BTEX, TDS and chloride analytical data are presented in Appendix B. The complete laboratory analytical reports for the annual groundwater sampling event in 2011 are presented on a CD-Rom (Appendix C).

The groundwater monitoring analytical results for both the Shallow Zone and Lower Queen are discussed in the following sections.

4.1 Shallow Zone Aquifer

4.1.1 BTEX Analysis

Groundwater samples were collected from four Shallow Zone monitoring wells (MW-45, MW-49, MW-77 and MW-106). The samples were collected from June 30, 2011 through July 1, 2011. Samples were not collected from MW-14 and MW-46, because there the wells did not contain an adequate volume of water to obtain a proper sample. MW-126 was not sampled, because it contained condensate. It is important to note that a peristaltic pump was required to purge and sample MW-45. The peristaltic pump was necessary, because the well had a bend in the casing that prevented access for sample collection by a bladder pump or bailer. The results of the BTEX laboratory analysis of the four Shallow Zone groundwater samples are summarized as follows:

- Monitoring well MW-49 was the only well containing benzene above the NMOCD regulatory limits at a concentration of 48 ug/L. The benzene concentration in MW-49 is consistent with historical data; and
- Toluene, ethylbenzene and total xylenes were not detected above the laboratory detection limits or the NMOCD regulatory limits in any of the sampled wells.

Figure 6 illustrates the distribution of dissolved BTEX compounds in the Shallow Zone aquifer in June 2011. As indicated by the historical data in Appendix B, BTEX concentrations in this water-bearing zone have generally remained stable or declined over time.

4.1.2 Wet Chemistry Analysis

In addition to BTEX analysis, groundwater samples collected on June 30, 2011 and July 1, 2011 from the Shallow Zone monitoring wells MW-45, MW-49, MW-77 and MW-106 were analyzed for wet chemistry (TDS and chloride). The results of the wet chemistry laboratory analysis of the Shallow Zone monitoring wells are summarized as follows:

- TDS concentrations were detected above the NMOCD standard in both MW-45 and MW-49. The TDS concentration in MW-45 (3,630 mg/L) was lower than in 2010, and within the historical TDS (ranging from 2,540 to 5,440 mg/L) recorded for this well. The TDS concentration in MW-49 (3,250 mg/L) was higher than in 2010, but within the historical TDS (ranging from 2,600 to 3,960 mg/L) recorded for this well;

- TDS concentrations in both MW-77 and MW-106 were below the NMOCD standard and were within historical ranges. The TDS in MW-77 was 467mg/L, and the TDS in MW-106 was 368 mg/L;

- Chloride concentrations were detected above the NMOCD standard in MW-49 (347 mg/L), but the concentrations were within historical ranges reported in the historical database (Appendix B); and

- Chloride concentrations in MW-45, MW-77 and MW-106 were below the NMOCD standard. The chloride in MW-45 was 208 mg/L, which is the second lowest chloride concentration measured to date in this well. The chloride concentration in MW-77 (26.9 mg/L) and MW-106 (2.3 mg/L) were the lowest chloride concentrations measured to date in these wells.

A summary of the wet chemistry laboratory analysis is provided in Table 5. Copies of the analytical laboratory reports are included in Appendix C. Figure 6 shows TDS and chlorides in the wells sampled in June 2011.

4.2 Lower Queen Aquifer

4.2.1 BTEX Analysis

Groundwater samples were collected from five Lower Queen monitoring wells (MW-66, MW-70, MW-88, MW-111 and MW-127) on June 30, 2011 and July 1, 2011. Samples were not collected from MW-58, MW-81 and MW-113, because they contained condensate. BTEX concentrations in all five of the sampled Lower Queen wells were below laboratory detection limits and NMOCD regulatory limits. Figure 8 illustrates the distribution of dissolved BTEX compounds in the Lower Queen in June 2011.

4.2.2 Wet Chemistry Analysis

In addition to BTEX analysis, groundwater samples were collected on June 30, 2011 and July 1, 2011 from the Lower Queen monitoring wells MW-66, MW-70, MW-88, MW-111 and MW-127 and analyzed for wet chemistry (TDS and chlorides). The results of the wet chemistry laboratory analysis of the Lower Queen monitoring wells are summarized as follows:

- TDS concentrations were below the NMOCD standard of 1,000 mg/L in all five sampled wells in the Lower Queen. TDS concentrations ranged from 426 mg/L in MW-70 to 946 mg/l in MW-88; and

- Chloride concentrations were below the NMOCD standard of 250 mg/L in all five sampled wells in the Lower Queen. The chloride concentrations ranged from 8.6 mg/L in MW-66 to 92.8 mg/L in MW-111.

A summary of the wet chemistry laboratory analysis is provided in Table 5. Copies of the analytical laboratory reports are included in Appendix C. Figure 8 shows TDS and chlorides in the wells sampled in June 2011.

5. Summary

5.1 Groundwater Monitoring Summary

Results from the groundwater gauging event conducted in December 2010 and the annual groundwater monitoring event conducted in June indicated similar groundwater conditions at the site as previous reports. Precipitation in 2010 was above normal, and contributed to groundwater recharge in the area that resulted in generally higher water levels in both the Shallow Zone and Lower Queen aquifers in December 2010 compared with water levels measured in June 2010. Water levels generally declined between December 2010 and June 2011 to levels similar to those observed in June 2010. Wells containing measurable condensate in December 2010 and June 2011 were consistent with historical results, and analytical results for BTEX, chloride and TDS were similar to historical data for the sampled wells.

5.2 Groundwater Monitoring Plan

Groundwater monitoring will continue at the Indian Basin Gas Plant in accordance with the requirements outlined in the February 20, 2009 NMOCD letter including at least annual groundwater monitoring for BTEX, TDS and chloride for the seven Shallow Zone and eight Lower Queen monitoring wells at the site, and semi-annual gauging of depth to groundwater and non-aqueous phase liquid thickness. In addition, an annual groundwater monitoring report will be submitted to the NMOCD. Based on the current program schedule, the annual groundwater monitoring event will be conducted in June and the semi-annual groundwater gauging event will be conducted in December. Annual reports will be prepared at the conclusion of each annual groundwater monitoring event.

The current purging and sampling techniques utilize low-flow procedures that were approved and implemented in 2003. A copy of the March 1998 USEPA low-flow procedures is included in Appendix E.

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Table 1. Groundwater Monitoring Plan
OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico.

Shallow Zone

	Sampling Schedule				
Well ID	Date Spring	annual	Analytical Paramenters annual	Date Fall	semi-annual
MW-14	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-45	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-46	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-49	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-77	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-106	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-126	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging

Lower Queen

	Sampling Schedule				
Well ID	Date Spring	annual	Analytical Paramenters annual	Date Fall	semi-annual
MW-58	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-66	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-70	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-81	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-88	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-111	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-113	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging
MW-127	X	Groundwater Gauging	BTEX, Chloride, TDS	X	Groundwater Gauging

Notes:
TDS Total Dissolved Solids

Table 2. Summary of Groundwater Gauging Results, December 2010 Semi-Annual Groundwater Gauging Event
OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico.

Well Number	Well Diameter (in)	Northing NAD 27 Con	Easting hddd,mm',ss.s"	Total Depth From TOC (ft)	Top of Casing (ft amsl)	Top of Casing Stickup (ft agl)	DTW (feet)	DTP (feet)	PT (feet)	PT x 0.73 (feet)	ADJ DTW (feet)	WL Elev (ft amsl)	Comments
Shallow Zone													
MW-14	4	32 27 44.3	104 34 00.9	24.35	3803.61	2.08	22.31					3781.30	
MW-45	2	32 28 01.1	104 34 08.7	26.44	3808.68	1.60	20.05					3788.63	
MW-46	4	32 27 56.7	104 34 05.8	19.88	3805.54	1.90	18.27					3787.27	
MW-49	2	32 27 57.6	104 33 59.9	26.51	3805.61	1.90	20.92					3784.69	
MW-77	7.875	32 27 27.3	104 33 25.0	84.20	3775.48	2.38	80.37					3695.11	
MW-106	4	32 26 57.0	104 32 26.4	94.25	3721.97	2.61	89.47					3632.50	
MW-126	4	32 27 48.2	104 33 49.9	78.10	3796.28	3.33	66.12	65.56	0.56	0.41	65.71	3730.57	condensate, confirmed with bailer
Lower Queen													
MW-58	7.875	32 28 04.5	104 33 28.5	219.50	3824.07	3.48	200.71	200.31	0.40	0.29	200.42	3623.65	condensate, confirmed with bailer
MW-66	4	32 28 19.1	104 33 28.5	232.55	3828.98	2.60	206.46					3622.52	
MW-70	4	32 27 18.8	104 34 05.5	224.70	3822.57	2.71	199.13					3623.44	
MW-81	7.875	32 28 04.3	104 33 19.5	229.00	3817.03	3.98	193.88	193.62	0.26	0.19	193.69	3623.34	condensate, confirmed with bailer
MW-88	4	32 28 25.3	104 32 55.6	177.77	3789.70	2.71	166.92					3622.78	
MW-111	4	32 28 15.9	104 34 06.1	231.90	3824.44	1.85	202.48					3621.96	
MW-113	7.875	32 27 16..3	104 33 32.1	201.80	3772.67	1.82	149.09	149.05	0.04	0.03	149.06	3623.61	condensate, confirmed with bailer
MW-127	8.25	32 28 00.8	104 33 58.8	247.67	3825.17	2.63	202.88					3622.29	

Table 3. Summary of Groundwater Gauging Results, June 2011 Annual Groundwater Sampling Event
OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico.

Well Number	Well Diameter (in)	Northing NAD 27 Con	Easting hddd,mm',ss.s"	Total Depth From TOC (ft)	Top of Casing (ft amsl)	Top of Casing Stickup (ft agl)	DTW (feet)	DTP (feet)	PT (feet)	PT x 0.73 (feet)	ADJ DTW (feet)	WL Elev (ft amsl)	Comments
Shallow Zone													
MW-14	4	32 27 44.3	104 34 00.9	24.30	3803.61	2.08	24.00					3779.61	
MW-45	2	32 28 01.1	104 34 08.7	26.35	3808.68	1.60	19.47					3789.21	
MW-46	4	32 27 56.7	104 34 05.8	19.90	3805.54	1.90	19.54					3786.00	
MW-49	2	32 27 57.6	104 33 59.9	26.30	3805.61	1.90	21.95					3783.66	
MW-77	7.875	32 27 27.3	104 33 25.0	82.15	3775.48	2.38	80.47					3695.01	
MW-106	4	32 26 57.0	104 32 26.4	94.27	3721.97	2.61	89.93					3632.04	
MW-126	4	32 27 48.2	104 33 49.9	78.10	3796.28	3.33	69.55	69.10	0.45	0.33	69.22	3727.06	condensate, confirmed with bailer
Lower Queen													
MW-58	7.875	32 28 04.5	104 33 28.5	219.48	3824.07	3.48	198.01	195.72	2.29	1.67	196.34	3627.73	condensate, confirmed with bailer
MW-66	4	32 28 19.1	104 33 28.5	235.30	3828.98	2.60	206.94					3622.04	
MW-70	4	32 27 18.8	104 34 05.5	224.25	3822.57	2.71	199.75					3622.82	
MW-81	7.875	32 28 04.3	104 33 19.5	228.98	3817.03	3.98	194.10	192.87	1.23	0.90	193.20	3623.83	condensate, confirmed with bailer
MW-88	4	32 28 25.3	104 32 55.6	177.85	3789.70	2.71	167.45					3622.25	
MW-111	4	32 28 15.9	104 34 06.1	226.90	3824.44	1.85	202.94					3621.50	
MW-113	7.875	32 27 16..3	104 33 32.1	201.82	3772.67	1.82	149.55	149.50	0.05	0.04	149.51	3623.16	condensate, confirmed with bailer
MW-127	8.25	32 28 00.8	104 33 58.8	242.90	3825.17	2.63	203.27					3621.90	

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Table 4. Summary of Historical Rainfall with Monthly Rainfall During 2010
OXY USA WTP Limited Partnership, Indian Basin Gas Plant
Eddy County, New Mexico.

Historical Rainfall

Year	Rainfall (inches)
1994	9.31
1995	7.84
1996	16.60
1997	10.65
1998	3.95
1999	4.70
2000	9.75
2001	6.02
2002	12.70
2003	7.58
2004	26.96
2005	11.16
2006	17.49
2007	19.02*
2008	9.39*
2009	11.96*
2010	17.32*

Monthly Rainfall During 2010

Month	Rainfall (inches)
January	0.98
February	1.34
March	0.41
April	0.61
May	0.86
June	1.24
July	7.36
August	1.00
September	3.41
October	0.10
November	0.00
December	0.01
2009 Annual Total	17.32

Source: Rain gauge at Indian Basin Gas Plant
* Taken from Carlsbad, NM Station

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Table 5. Summary of Analytical Results, June 2011 Annual Groundwater Sampling Event
OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico.

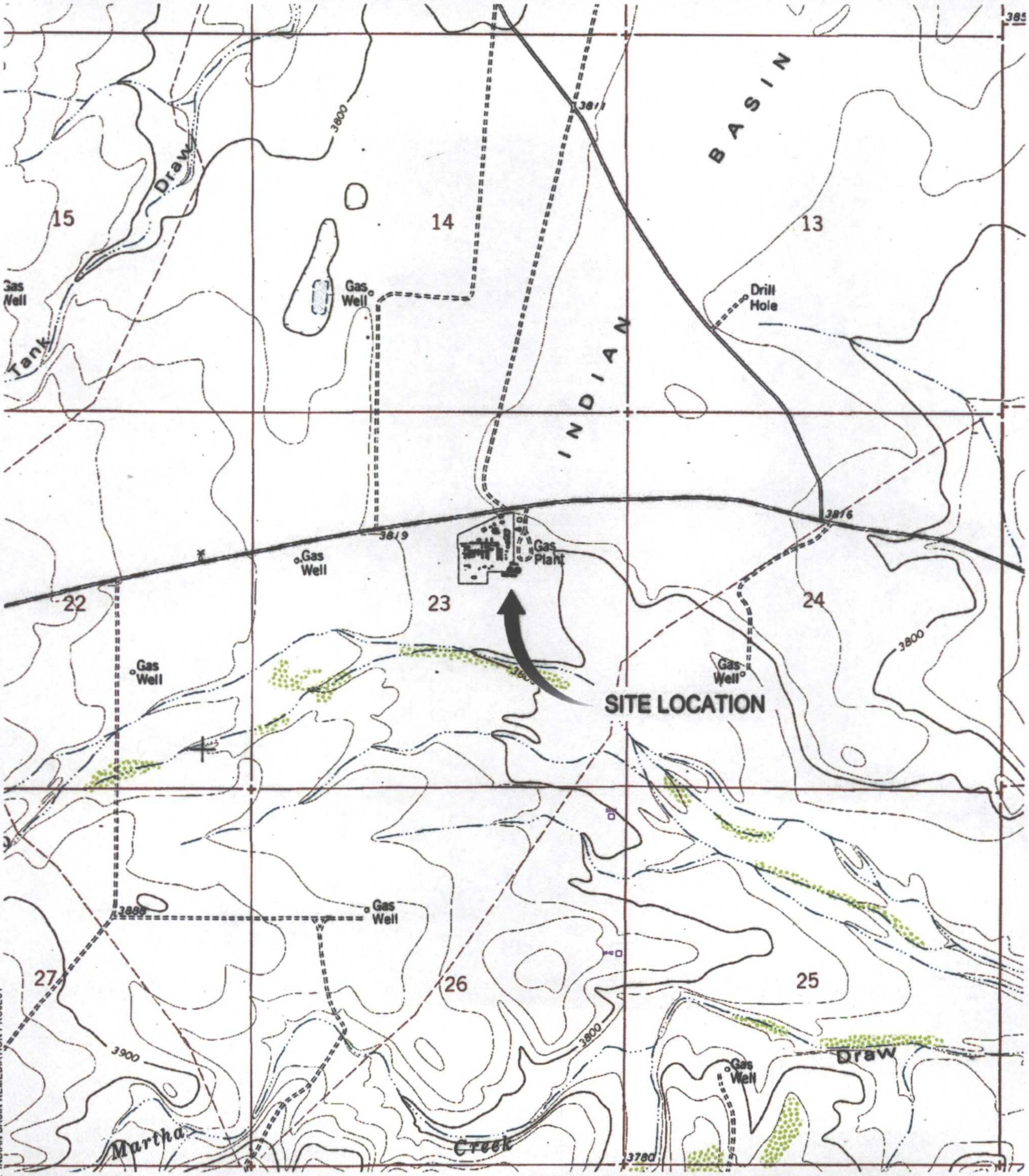
Well ID	Sample Date	Analytical Parameters						
		Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Xylenes (ug/L)	Total BTEX (ug/L)	TDS (mg/L)	Chloride (mg/L)
Shallow Zone Wells								
MW-14	---	Not Sampled - not enough water to collect sample						
MW-45	7/1/2011	<1	<1	<1	<3	<1	3,630	208
MW-46	---	Not Sampled - not enough water to collect sample						
MW-49	7/1/2011	48	<1	<1	<3	48	3,250	347
MW-77	6/30/2011	<1	<1	<1	<3	<1	467	26.9
MW-106	6/30/2011	<1	<1	<1	<3	<1	368	2.3
MW-126	---	Not Sampled - well contained condensate						
Lower Queen Wells								
MW-58	---	Not Sampled - well contained condensate						
MW-66	6/30/2011	<1	<1	<1	<3	<1	817	8.6
MW-70	6/30/2011	<1	<1	<1	<3	<1	426	9.5
MW-81	---	Not Sampled - well contained condensate						
MW-88	6/30/2011	<1	<1	<1	<3	<1	946	41.1
MW-111	6/30/2011	<1	<1	<1	<3	<1	798	92.8
MW-113	---	Not Sampled - well contained condensate						
MW-127	7/1/2011	<1	<1	<1	<3	<1	715	42.3

Notes:

ug/L	Micrograms per liter
<5	Compound detected below the detection limit - limit indicated
---	Not Sampled
6	Indicates result above the detection limit and below the OCD standard
16	Indicates result at/above OCD standard

OCD Cleanup Goals/Regulatory Limits

Benzene	10 ug/L
Toluene	750 ug/L
Ethylbenzene	750 ug/L
Total Xylenes	620 ug/L
Total Diss. Solids	1,000 mg/L
Chloride	250 mg/L



SOURCE: U.S. GEOLOGICAL SURVEY 7½ MINUTE TOPOGRAPHIC SERIES, MARTHA CREEK, NEW MEXICO QUADRANGLE, PUBLISHED 1978.

0 2000' 4000'

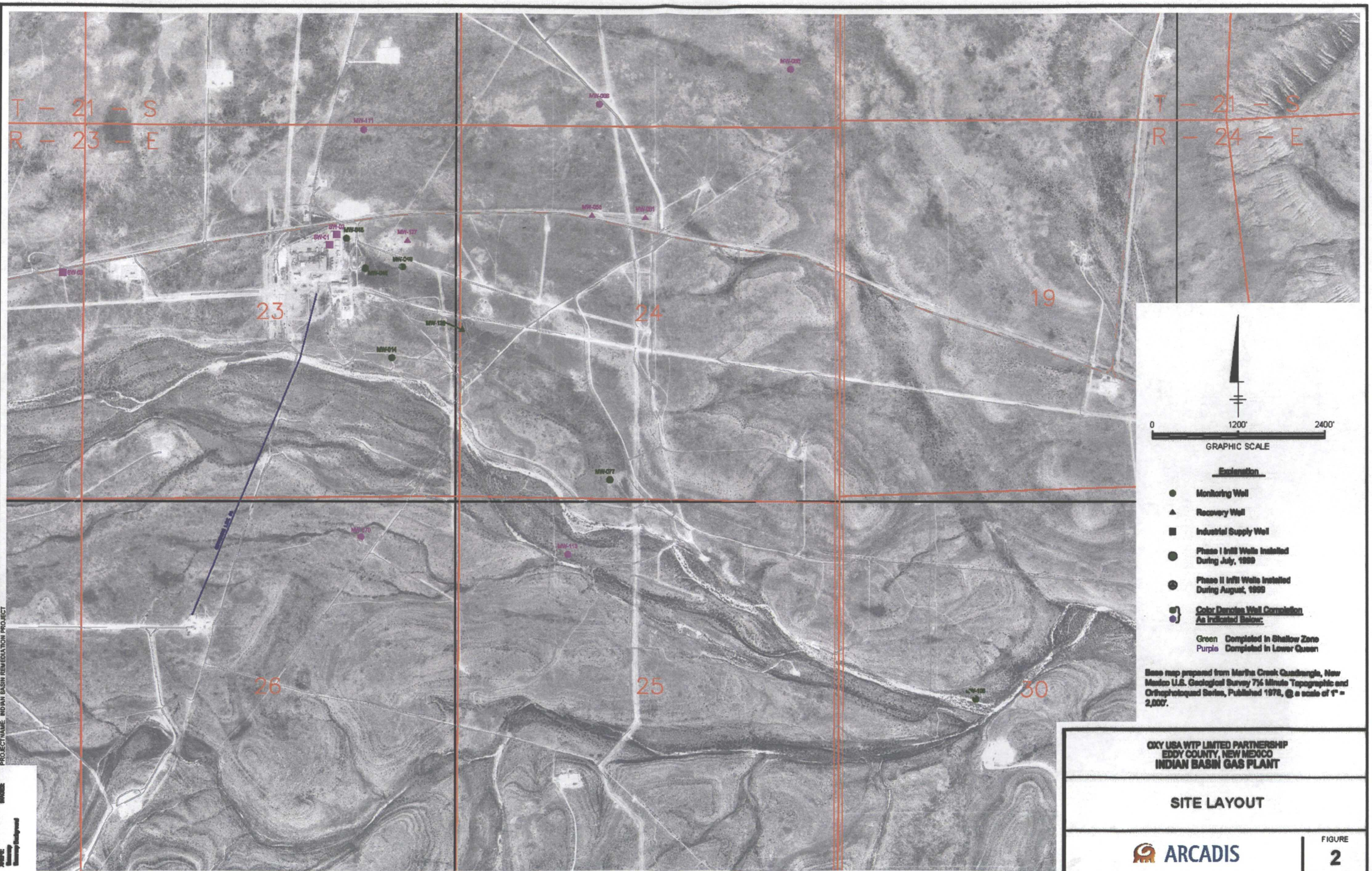
APPROXIMATE SCALE: 1" = 2000'

MARATHON OIL COMPANY
EDDY COUNTY, NEW MEXICO
INDIAN BASIN REMEDIATION PROJECT

SITE LOCATION MAP

ARCADIS

FIGURE
1

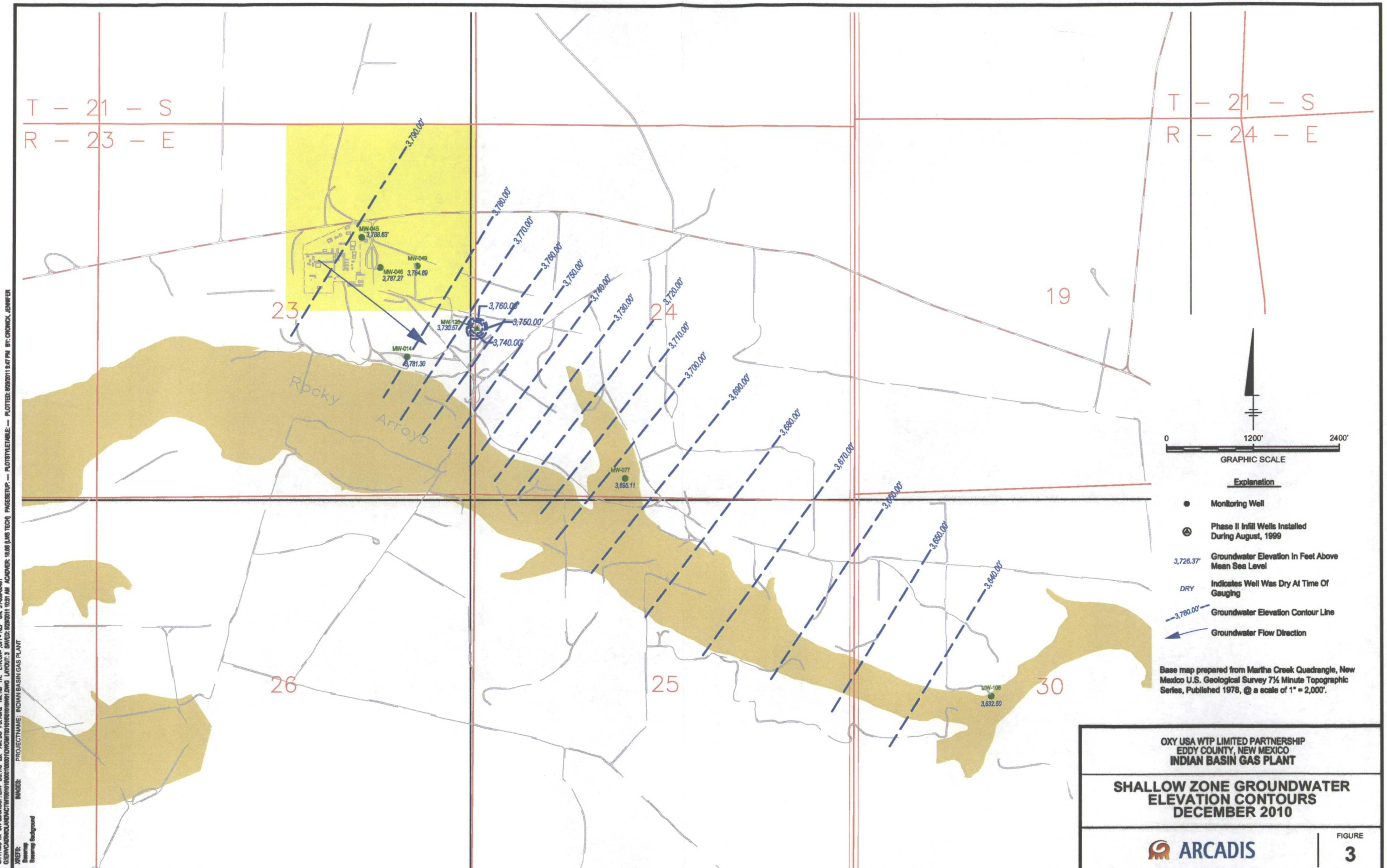

T – 21 – S
R – 23 – E
T – 21 – S
R – 24 – E
23
24
19
26
25
30
MW-111
MW-014
MW-077
MW-113
0
1200'
2400'
GRAPHIC SCALE
Explanation
Monitoring Well
Recovery Well
Industrial Supply Well
Phase I Infill Wells Installed During July, 1999
Phase II Infill Wells Installed During August, 1999
Color Denotes Well Completion As Indicated Below:
Green Completed in Shallow Zone
Purple Completed in Lower Queen
Base map prepared from Martha Creek Quadrangle, New Mexico U.S. Geological Survey 7½ Minute Topographic and Orthophotoquad Series, Published 1978, @ a scale of 1" = 2,000'.
PROJECTNAME: INDIAN BASIN REMEDIATION PROJECT

OXY USA WTP LIMITED PARTNERSHIP
EDDY COUNTY, NEW MEXICO
INDIAN BASIN GAS PLANT

SITE LAYOUT

ARCADIS

FIGURE 2

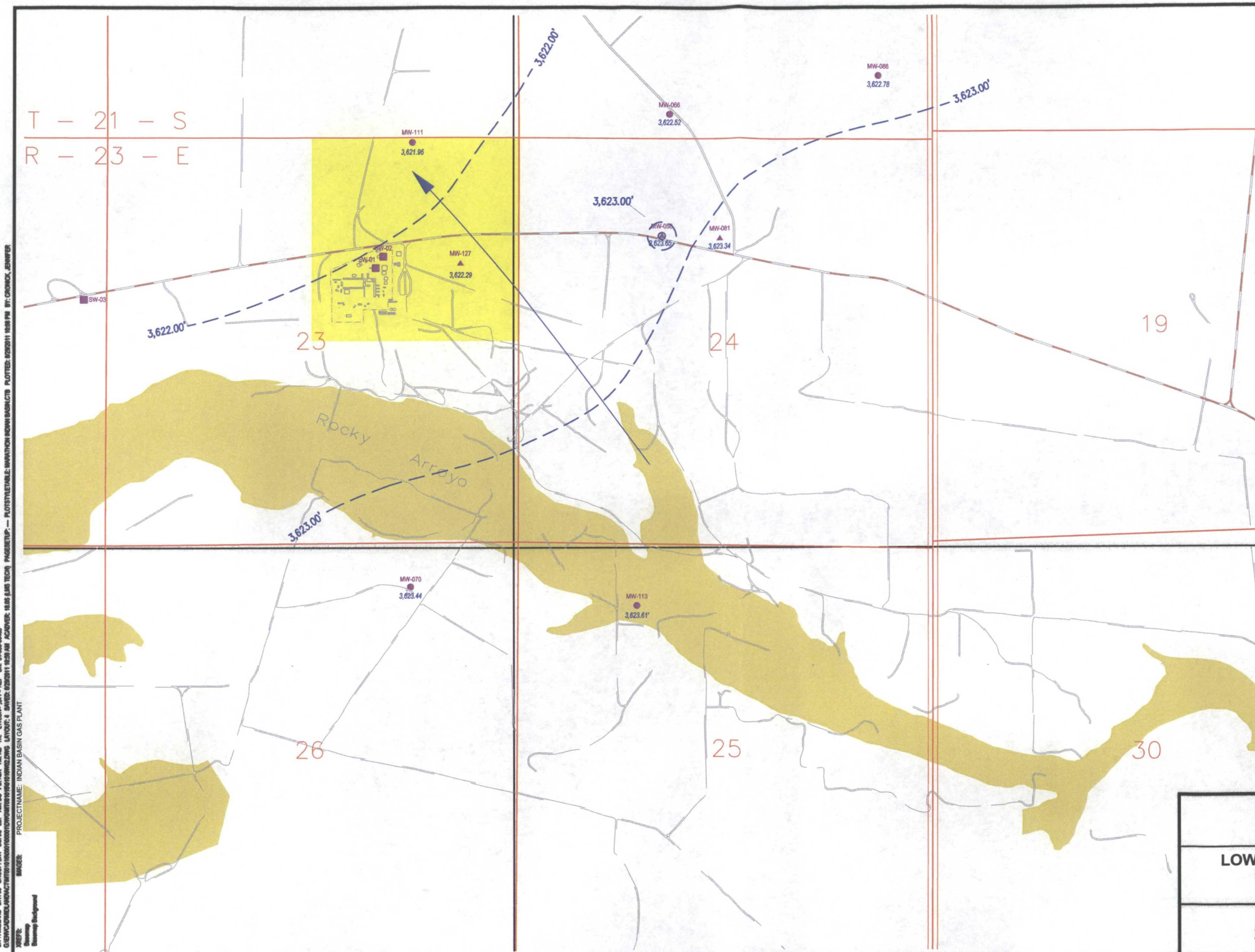

T - 21 - S
R - 23 - E
T - 21 - S
R - 24 - E
23
24
19
26
25
30
Rocky Arroyo
MW-045
3,788.63'
MW-046
3,787.27
MW-049
3,784.89
MW-014
3,781.30
MW-120
3,730.57
MW-077
3,695.11
MW-108
3,632.50
3,790.00'
3,780.00'
3,770.00'
3,760.00'
3,750.00'
3,740.00'
3,730.00'
3,720.00'
3,710.00'
3,700.00'
3,690.00'
3,680.00'
3,670.00'
3,660.00'
3,650.00'
3,640.00'
0
1200'
2400'
GRAPHIC SCALE
Explanation
Monitoring Well
Phase II Infill Wells Installed During August, 1999
3,726.37' Groundwater Elevation In Feet Above Mean Sea Level
DRY Indicates Well Was Dry At Time Of Gauging
3,780.00' Groundwater Elevation Contour Line
Groundwater Flow Direction
Base map prepared from Martha Creek Quadrangle, New Mexico U.S. Geological Survey 7½ Minute Topographic Series, Published 1978, @ a scale of 1" = 2,000'.

OXY USA WTP LIMITED PARTNERSHIP
EDDY COUNTY, NEW MEXICO
INDIAN BASIN GAS PLANT

SHALLOW ZONE GROUNDWATER ELEVATION CONTOURS DECEMBER 2010

ARCADIS

FIGURE
3



0 1200' 2400'
GRAPHIC SCALE

Explanation

- ● Monitoring Well
- ▲ Recovery Well
- ■ Industrial Supply Well
- Phase I Infill Wells Installed During July, 1999
- Phase II Infill Wells Installed During August, 1999
- 3,622.07' Groundwater Elevation In Feet Above Mean Sea Level
- 3,622.00' Groundwater Elevation Contour Line
- Groundwater Flow Direction

Base map prepared from Martha Creek Quadrangle, New Mexico U.S. Geological Survey 7½ Minute Topographic Series, Published 1978, @ a scale of 1" = 2,000'.

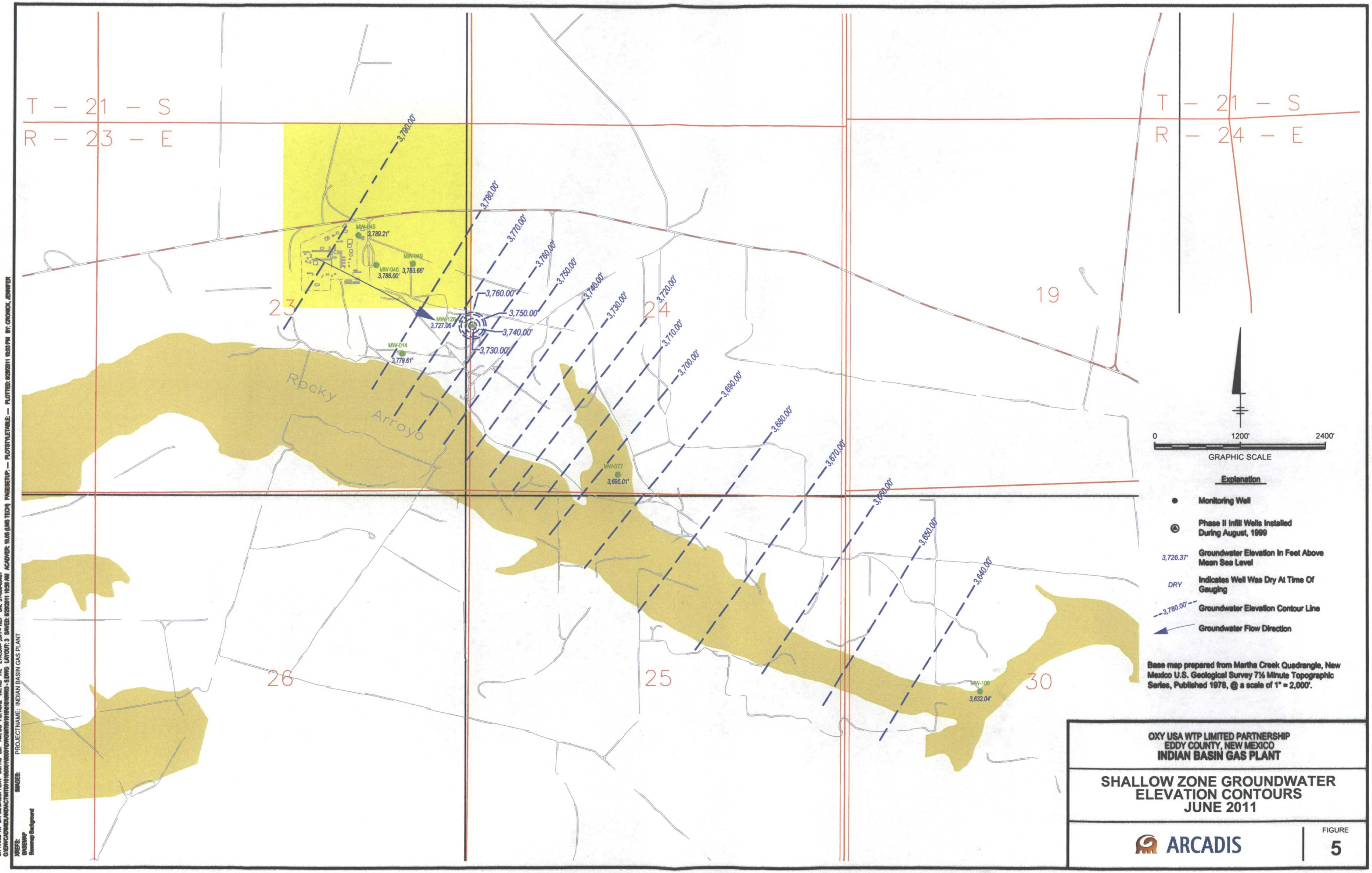
OXY USA WTP LIMITED PARTNERSHIP
EDDY COUNTY, NEW MEXICO
INDIAN BASIN GAS PLANT

LOWER QUEEN GROUNDWATER ELEVATION CONTOURS DECEMBER 2010

ARCADIS

FIGURE 4

PROJECTNAME: INDIAN BASIN GAS PLANT


T - 21 - S
R - 23 - E
T - 21 - S
R - 24 - E
23
24
19
26
25
30
Rocky Arroyo
MW-045
3,789.21'
MW-046
3,786.00'
MW-049
3,783.66'
MW-125
3,727.06'
MW-014
3,779.61'
MW-077
3,695.01'
MW-106
3,632.04'
3,790.00'
3,780.00'
3,770.00'
3,760.00'
3,750.00'
3,740.00'
3,730.00'
3,720.00'
3,710.00'
3,700.00'
3,690.00'
3,680.00'
3,670.00'
3,660.00'
3,650.00'
3,640.00'
0
1200'
2400'
GRAPHIC SCALE
Explanation
Monitoring Well
Phase II Infill Wells Installed During August, 1999
3,726.37' Groundwater Elevation In Feet Above Mean Sea Level
DRY Indicates Well Was Dry At Time Of Gauging
3,780.00' Groundwater Elevation Contour Line
Groundwater Flow Direction
Base map prepared from Martha Creek Quadrangle, New Mexico U.S. Geological Survey 7½ Minute Topographic Series, Published 1978, @ a scale of 1" = 2,000'.

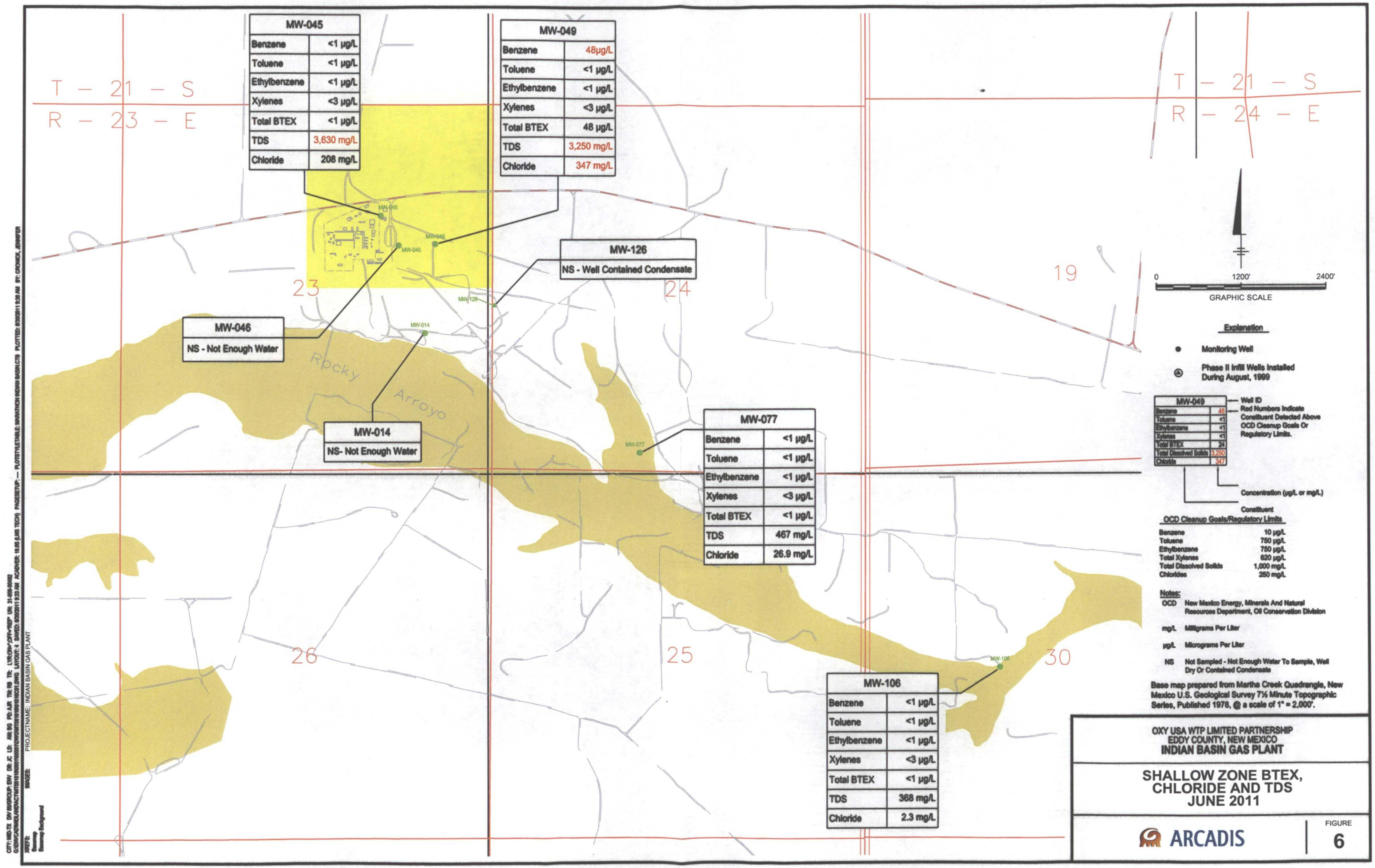
OXY USA WTP LIMITED PARTNERSHIP
EDDY COUNTY, NEW MEXICO
INDIAN BASIN GAS PLANT

SHALLOW ZONE GROUNDWATER ELEVATION CONTOURS JUNE 2011

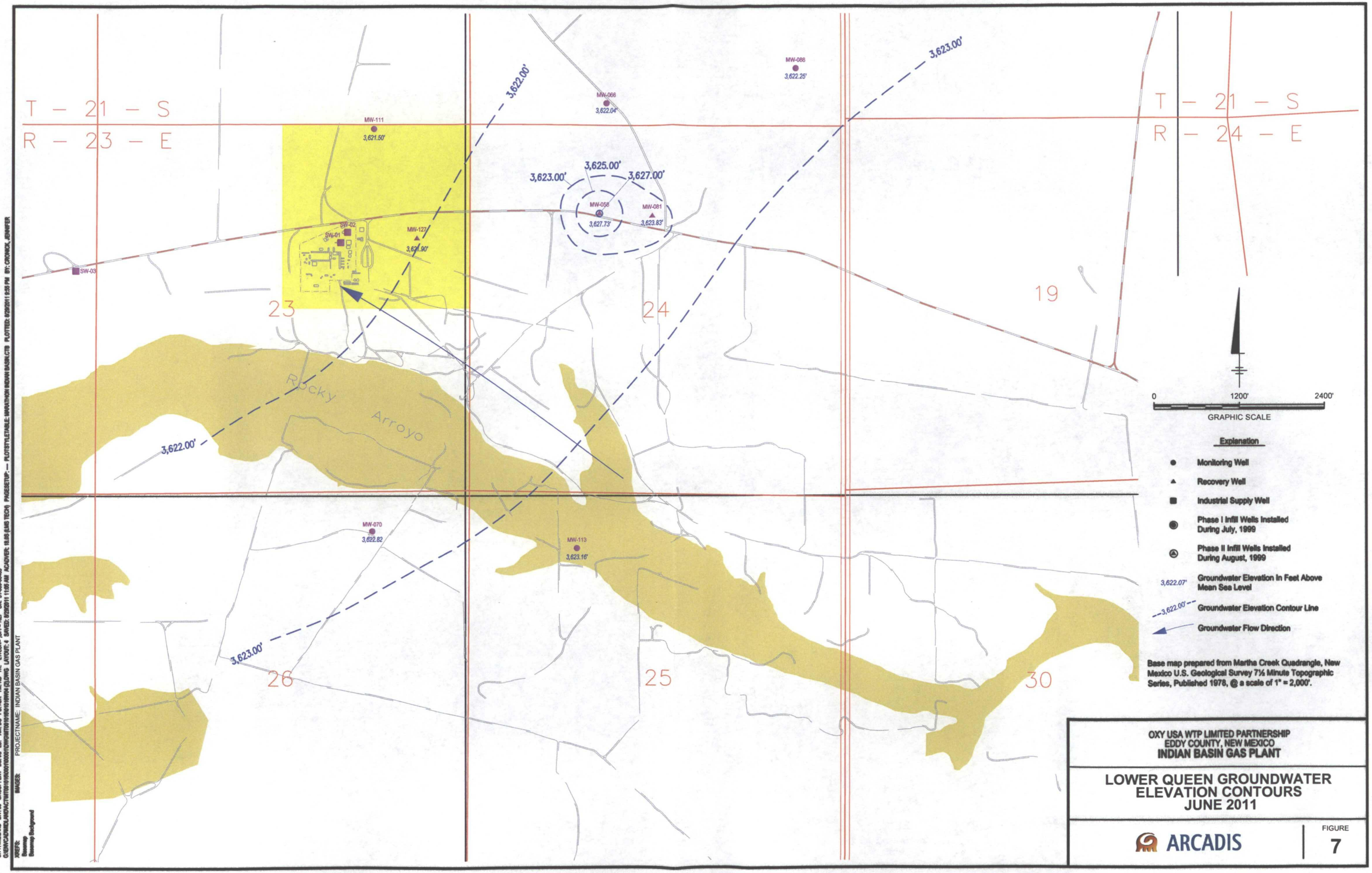
ARCADIS

FIGURE 5

PROJECTNAME: INDIAN BASIN GAS PLANT



T - 21 - S
R - 23 - E
T - 21 - S
R - 24 - E
MW-045
Benzene <1 µg/L
Toluene <1 µg/L
Ethylbenzene <1 µg/L
Xylenes <3 µg/L
Total BTEX <1 µg/L
TDS 3,630 mg/L
Chloride 208 mg/L
MW-049
Benzene 48µg/L
Toluene <1 µg/L
Ethylbenzene <1 µg/L
Xylenes <3 µg/L
Total BTEX 48 µg/L
TDS 3,250 mg/L
Chloride 347 mg/L
MW-126
NS - Well Contained Condensate
MW-046
NS - Not Enough Water
MW-014
NS- Not Enough Water
MW-077
Benzene <1 µg/L
Toluene <1 µg/L
Ethylbenzene <1 µg/L
Xylenes <3 µg/L
Total BTEX <1 µg/L
TDS 467 mg/L
Chloride 26.9 mg/L
MW-106
Benzene <1 µg/L
Toluene <1 µg/L
Ethylbenzene <1 µg/L
Xylenes <3 µg/L
Total BTEX <1 µg/L
TDS 368 mg/L
Chloride 2.3 mg/L
Rocky Arroyo
23
24
19
26
25
30
0
1200'
2400'
GRAPHIC SCALE
Explanation
Monitoring Well
Phase II Infill Wells Installed During August, 1999
Well ID
Red Numbers Indicate Constituent Detected Above OCD Cleanup Goals Or Regulatory Limits.
Concentration (µg/L or mg/L)
Constituent
OCD Cleanup Goals/Regulatory Limits
Benzene 10 µg/L
Toluene 750 µg/L
Ethylbenzene 750 µg/L
Total Xylenes 620 µg/L
Total Dissolved Solids 1,000 mg/L
Chlorides 250 mg/L
Notes:
OCD New Mexico Energy, Minerals And Natural Resources Department, Oil Conservation Division
mg/L Milligrams Per Liter
µg/L Micrograms Per Liter
NS Not Sampled - Not Enough Water To Sample, Well Dry Or Contained Condensate
Base map prepared from Martha Creek Quadrangle, New Mexico U.S. Geological Survey 7½ Minute Topographic Series, Published 1978, @ a scale of 1" = 2,000'.
OXY USA WTP LIMITED PARTNERSHIP
EDDY COUNTY, NEW MEXICO
INDIAN BASIN GAS PLANT
SHALLOW ZONE BTEX, CHLORIDE AND TDS
JUNE 2011
ARCADIS
FIGURE
6
PROJECTNAME: INDIAN BASIN GAS PLANT


T - 21 - S
R - 23 - E
T - 21 - S
R - 24 - E
23
24
19
26
25
30
MW-111
3,621.50'
MW-066
3,622.04'
MW-088
3,622.25'
MW-058
3,627.73'
MW-081
3,623.83'
MW-127
SW-01
SW-02
SW-03
MW-070
3,622.82
MW-113
3,623.16'
3,622.00'
3,623.00'
3,625.00'
3,627.00'
Rocky Arroyo
0
1200'
2400'
GRAPHIC SCALE
Explanation
Monitoring Well
Recovery Well
Industrial Supply Well
Phase I Infill Wells Installed During July, 1999
Phase II Infill Wells Installed During August, 1999
3,622.07' Groundwater Elevation In Feet Above Mean Sea Level
3,622.00' Groundwater Elevation Contour Line
Groundwater Flow Direction
Base map prepared from Martha Creek Quadrangle, New Mexico U.S. Geological Survey 7½ Minute Topographic Series, Published 1978, @ a scale of 1" = 2,000'.
PROJECTNAME: INDIAN BASIN GAS PLANT

OXY USA WTP LIMITED PARTNERSHIP
EDDY COUNTY, NEW MEXICO
INDIAN BASIN GAS PLANT

LOWER QUEEN GROUNDWATER ELEVATION CONTOURS JUNE 2011

ARCADIS

FIGURE 7

MW-111	
Benzene	<1 µg/L
Toluene	<1 µg/L
Ethylbenzene	<1 µg/L
Xylenes	<3 µg/L
Total BTEX	<1 µg/L
TDS	798 mg/L
Chloride	92.8 mg/L

MW-058
NS - Well Contained Condensate

MW-066	
Benzene	<1 µg/L
Toluene	<1 µg/L
Ethylbenzene	<1 µg/L
Xylenes	<3 µg/L
Total BTEX	<1 µg/L
TDS	817 mg/L
Chloride	8.6 mg/L

MW-088	
Benzene	<1 µg/L
Toluene	<1 µg/L
Ethylbenzene	<1 µg/L
Xylenes	<3 µg/L
Total BTEX	<1 µg/L
TDS	946 mg/L
Chloride	81.1 mg/L

MW-127	
Benzene	<1 µg/L
Toluene	<1 µg/L
Ethylbenzene	<1 µg/L
Xylenes	<3 µg/L
Total BTEX	<1 µg/L
TDS	715 mg/L
Chloride	42.3 mg/L

MW-081
NS - Well Contained Condensate

MW-070	
Benzene	<1 µg/L
Toluene	<1 µg/L
Ethylbenzene	<1 µg/L
Xylenes	<3 µg/L
Total BTEX	<1 µg/L
TDS	426 mg/L
Chloride	9.5 mg/L

MW-113
NS - Well Contained Condensate

0 1200' 2400'
GRAPHIC SCALE

Explanation

- ● Monitoring Well
- ▲ Recovery Well
- ■ Industrial Supply Well
- ◉ Phase I Infill Wells Installed During July, 1999
- ◬ Phase II Infill Wells Installed During August, 1999

MW-066	
Benzene	<1
Toluene	<1
Ethylbenzene	<1
Xylenes	<3
Total BTEX	<1
Total Dissolved Solids	817
Chloride	8.6

Well ID
Concentration (µg/L or mg/L)
Constituent

OCD Cleanup Goals/Regulatory Limits

Benzene	10 µg/L
Toluene	750 µg/L
Ethylbenzene	750 µg/L
Total Xylenes	620 µg/L
Total Dissolved Solids	1,000 mg/L
Chlorides	250 mg/L

Notes:

OCD	New Mexico Energy, Minerals And Natural Resources Department, Oil Conservation Division
mg/L	Milligrams Per Liter
µg/L	Micrograms Per Liter
NS	Not Sampled - Well Contained Condensate

Base map prepared from Martha Creek Quadrangle, New Mexico U.S. Geological Survey 7½ Minute Topographic Series, Published 1978, @ a scale of 1" = 2,000'.

OXY USA WTP LIMITED PARTNERSHIP
EDDY COUNTY, NEW MEXICO
INDIAN BASIN GAS PLANT

LOWER QUEEN BTEX, CHLORIDE AND TDS JUNE 2011

ARCADIS

FIGURE
8

CITY: MID-TX DIV 85/GROUP: ENV DB: JC LD: AM: BG PD: AJR TM: RB TR: LYR:ON=*;OFF=*REF* UR: 31-009-00484
G:\ENVCAD\MIDLAND\ACT\MT001010\0000\10000\DWG\MT001010B016C02.DWG LAYOUT: 8 SAVED: 8/29/2011 11:18 AM ACADVER: 18.0S (LMS TECH) PAGESETUP: — PLOTSTYLETABLE: MARATHON INDIAN BASIN.CTB PLOTTED: 8/29/2011 9:31 PM BY: CRONICK, JENNIFER
XREFS: BASEMAP Basemap Background
IMAGES:
PROJECTNAME: INDIAN BASIN GAS PLANT

ARCADIS

Appendix A

Historical Fluid Level Data

Appendix A
Historic Fluid Level Data, May 1991 - June 2011
OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
Shallow Zone Wells					
MW-14	12/01/91	3803.61	9.68	0	3793.93
MW-14	10/01/93	3803.61	22.55	0	3781.06
MW-14	01/01/94	3803.61	22.78	0	3780.83
MW-14	01/27/98	3803.61	22.36	0	3781.25
MW-14	06/16/98	3803.61	22.88	0	3780.73
MW-14	04/19/99	3803.61	23.74	0.24	3780.05
MW-14	01/05/00	3803.61	22.22	0	3781.39
MW-14	04/26/00	3803.61	22.74	0.03	3780.89
MW-14	09/27/00	3803.61	23.40	0.09	3780.28
MW-14	04/16/01	3803.61	22.15	0.01	3781.47
MW-14	10/29/01	3803.61	21.98	0.08	3781.69
MW-14	04/15/02	3803.61	22.81	0	3780.80
MW-14	10/14/02	3803.61	18.17	0	3785.44
MW-14	04/15/03	3803.61	21.87	0	3781.74
MW-14	10/14/03	3803.61	22.19	0	3781.42
MW-14	04/05/04	3803.61	23.45	0.01	3780.17
MW-14	10/05/04	3803.61	18.36	0	3785.25
MW-14	04/19/05	3803.61	21.55	0	3782.06
MW-14	10/24/05	3803.61	20.69	0	3782.92
MW-14	04/18/06	3803.61	22.69	0	3780.92
MW-14	10/11/06	3803.61	19.20	0	3784.41
MW-14	04/16/07	3803.61	22.1	0	3781.51
MW-14	10/22/07	3803.61	21.15	0	3782.46
MW-14	05/27/09	3803.61	23.75	0	3779.86
MW-14	06/21/10	3803.61	24.04	0	3779.57
MW-14	12/28/10	3803.61	22.31	0	3781.30
MW-14	06/30/11	3803.61	24.00	0	3779.61
MW-45	12/01/91	3808.68	13.91	0	3794.77
MW-45	07/01/93	3808.68	21.49	0	3787.19
MW-45	10/01/93	3808.68	21.47	0	3787.21
MW-45	01/01/94	3808.68	21.54	0	3787.14
MW-45	04/01/94	3808.68	22.64	0	3786.04
MW-45	07/01/94	3808.68	21.85	0	3786.83
MW-45	10/01/94	3808.68	21.52	0	3787.16
MW-45	01/01/95	3808.68	21.78	0	3786.90
MW-45	04/01/95	3808.68	22.13	0	3786.55
MW-45	07/01/95	3808.68	22.13	0	3786.55
MW-45	01/05/00	3808.68	18.88	0	3789.80
MW-45	04/26/00	3808.68	19.19	0	3789.49
MW-45	09/27/00	3808.68	19.19	0	3789.49
MW-45	04/16/01	3808.68	18.39	0	3790.29
MW-45	10/29/01	3808.68	18.53	0	3790.15
MW-45	04/15/02	3808.68	18.75	0	3789.93
MW-45	10/14/02	3808.68	18.39	0	3790.29
MW-45	04/15/2003	3808.68	21.36	0	3787.32
MW-45	10/14/2003	3808.68	21.35	0	3787.33
MW-45	04/05/04	3808.68	21.69	0	3786.99
MW-45	10/05/04	3808.68	14.09	0	3794.59
MW-45	04/19/05	3808.68	16.94	0	3791.74
MW-45	10/24/05	3808.68	20.09	0	3788.59
MW-45	04/18/06	3808.68	20.72	0	3787.96
MW-45	10/11/06	3808.68	16.40	0	3792.28
MW-45	04/16/07	3808.68	19.98	0	3788.70
MW-45	10/22/07	3808.68	15.95	0	3792.73
MW-45	05/27/09	3808.68	21.56	0	3787.12
MW-45	06/21/10	3808.68	21.52	0	3787.16
MW-45	12/28/10	3808.68	20.05	0	3788.63
MW-45	06/30/11	3808.68	19.47	0	3789.21
MW-46	10/01/93	3805.54	19.87	0	3785.67
MW-46	01/01/94	3805.54	19.42	0	3786.12
MW-46	04/01/94	3805.54	19.59	0	3785.95
MW-46	10/01/94	3805.54	19.20	0	3786.34
MW-46	04/01/95	3805.54	19.55	0	3785.99
MW-46	07/01/95	3805.54	19.55	0	3785.99
MW-46	01/16/96	3805.54	19.48	0	3786.06
MW-46	04/19/96	3805.54	19.52	0	3786.02
MW-46	07/15/96	3805.54	19.41	0	3786.13
MW-46	10/13/96	3805.54	15.73	0	3789.81
MW-46	02/04/97	3805.54	18.22	0	3787.32
MW-46	04/28/97	3805.54	16.93	0	3788.61
MW-46	07/14/97	3805.54	17.15	0	3788.39
MW-46	10/13/97	3805.54	18.01	0	3787.53
MW-46	01/27/98	3805.54	17.54	0	3788.00
MW-46	04/27/98	3805.54	18.34	0	3787.20
MW-46	06/16/98	3805.54	18.69	0	3786.85
MW-46	10/10/98	3805.54	17.82	0	3787.72
MW-46	01/27/99	3805.54	16.91	0	3788.63
MW-46	04/19/99	3805.54	17.44	0	3788.10
MW-46	01/05/00	3805.54	16.76	0	3788.78
MW-46	04/26/00	3805.54	17.17	0	3788.37
MW-46	09/27/00	3805.54	17.42	0	3788.12

D = Dry
NA = Not Available
NG = Not Gauged
NR = No Record

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-46	04/16/01	3805.54	16.68	0	3788.86
MW-46	10/29/01	3805.54	16.79	0	3788.75
MW-46	04/15/02	3805.54	17.49	0	3788.05
MW-46	10/14/02	3805.54	17.83	0	3787.71
MW-46	04/15/03	3805.54	19.38	0	3786.16
MW-46	10/14/03	3805.54	19.62	0	3785.92
MW-46	04/05/04	3805.54	19.63	0	3785.91
MW-46	10/05/04	3805.54	13.05	0	3792.49
MW-46	04/19/05	3805.54	16.27	0	3789.27
MW-46	10/24/05	3805.54	19.38	0	3786.16
MW-46	04/18/06	3805.54	19.35	0	3786.19
MW-46	10/11/06	3805.54	15.74	0	3789.80
MW-46	04/16/07	3805.54	19.34	0	3786.20
MW-46	10/22/07	3805.54	15.67	0	3789.87
MW-46	05/27/09	3805.54	19.38	0	3786.16
MW-46	06/21/10	3805.54	19.42	0	3786.12
MW-46	12/28/10	3805.54	18.27	0	3787.27
MW-46	06/30/11	3805.54	19.54	0	3786.00
MW-49	12/01/91	3805.61	16.60	0	3789.01
MW-49	07/01/93	3805.61	21.98	0	3783.63
MW-49	10/01/93	3805.61	21.93	0	3783.68
MW-49	01/01/94	3805.61	22.27	0	3783.34
MW-49	04/01/94	3805.61	22.64	0	3782.97
MW-49	07/01/94	3805.61	22.73	0	3782.88
MW-49	10/01/94	3805.61	22.30	0	3783.31
MW-49	01/01/95	3805.61	22.56	0	3783.05
MW-49	04/01/95	3805.61	22.94	0	3782.67
MW-49	07/01/95	3805.61	22.94	0	3782.67
MW-49	10/01/95	3805.61	22.68	0	3782.93
MW-49	01/16/96	3805.61	22.55	0	3783.06
MW-49	04/19/96	3805.61	22.59	0	3783.02
MW-49	07/15/96	3805.61	22.76	0	3782.85
MW-49	10/13/96	3805.61	19.54	0	3786.07
MW-49	02/03/97	3805.61	20.66	0	3784.95
MW-49	03/18/97	3805.61	20.99	0	3784.62
MW-49	04/28/97	3805.61	20.70	0	3784.91
MW-49	07/14/97	3805.61	20.31	0	3785.30
MW-49	10/13/97	3805.61	21.01	0	3784.60
MW-49	01/27/98	3805.61	21.08	0	3784.53
MW-49	04/27/98	3805.61	21.34	0	3784.27
MW-49	06/16/98	3805.61	21.35	0	3784.26
MW-49	10/09/98	3805.61	22.52	0	3783.09
MW-49	01/27/99	3805.61	20.50	0	3785.11
MW-49	04/19/99	3805.61	20.81	0	3784.80
MW-49	01/05/00	3805.61	20.07	0	3785.54
MW-49	04/26/00	3805.61	20.30	0	3785.31
MW-49	09/27/00	3805.61	20.52	0	3785.09
MW-49	04/16/01	3805.61	20.03	0	3785.58
MW-49	10/29/01	3805.61	19.96	0	3785.65
MW-49	04/15/02	3805.61	19.76	0	3785.85
MW-49	10/14/02	3805.61	20.56	0	3785.05
MW-49	04/15/03	3805.61	22.08	0	3783.53
MW-49	10/14/03	3805.61	22.52	0	3783.09
MW-49	04/05/04	3805.61	22.79	0	3782.82
MW-49	10/05/04	3805.61	18.33	0	3787.28
MW-49	04/19/05	3805.61	18.23	0	3787.38
MW-49	10/24/05	3805.61	21.01	0	3784.60
MW-49	04/18/06	3805.61	22.29	0	3783.32
MW-49	10/11/06	3805.61	20.49	0	3785.12
MW-49	04/16/07	3805.61	21.43	0	3784.18
MW-49	10/22/07	3805.61	18.81	0	3786.80
MW-49	05/27/09	3805.61	22.35	0	3783.26
MW-49	06/21/10	3805.61	22.33	0	3783.28
MW-49	12/28/10	3805.61	20.92	0	3784.69
MW-49	06/30/11	3805.61	21.95	0	3783.66
MW-77	01/01/95	3775.48	80.03	0	3695.45
MW-77	04/01/95	3775.48	80.04	0	3695.44
MW-77	07/01/95	3775.48	80.04	0	3695.44
MW-77	10/01/95	3775.48	79.70	0	3695.78
MW-77	01/16/96	3775.48	79.84	0	3695.64
MW-77	04/17/96	3775.48	78.95	0	3696.53
MW-77	07/16/96	3775.48	79.42	0	3696.06
MW-77	10/14/96	3775.48	80.02	0	3695.46
MW-77	02/04/97	3775.48	D	0	--
MW-77	04/29/97	3775.48	80.35	0	3695.13
MW-77	07/15/97	3775.48	80.31	0	3695.17
MW-77	10/14/97	3775.48	78.92	0	3696.56
MW-77	01/28/98	3775.48	77.00	0	3698.48
MW-77	04/27/98	3775.48	78.48	0	3697.00
MW-77	06/16/98	3775.48	75.30	0	3700.18
MW-77	10/10/98	3775.48	79.84	0	3695.64
MW-77	01/27/99	3775.48	76.41	0	3699.07

D = Dry
NA = Not Available
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NR = No Record

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-77	04/19/99	3775.48	77.50	0	3697.98
MW-77	01/05/00	3775.48	79.36	0	3696.12
MW-77	04/26/00	3775.48	78.57	0	3696.91
MW-77	09/27/00	3775.48	78.86	0	3696.62
MW-77	04/16/01	3775.48	79.91	0	3695.57
MW-77	10/29/01	3775.48	79.72	0	3695.76
MW-77	04/15/02	3775.48	80.42	0	3695.06
MW-77*	10/14/02	3775.48	57.95	0	3717.53
MW-77	04/15/03	3775.48	69.95	0	3705.53
MW-77	10/14/03	3775.48	73.98	0	3701.50
MW-77	04/05/04	3775.48	79.88	0	3695.60
MW-77	10/05/04	3775.48	63.37	0	3712.11
MW-77	04/19/05	3775.48	67.06	0	3708.42
MW-77	10/24/05	3775.48	63.89	0	3711.59
MW-77	04/18/06	3775.48	80.43	0	3695.05
MW-77	10/11/06	3775.48	78.89	0	3696.59
MW-77	04/17/07	3775.48	76.32	0	3699.16
MW-77	10/22/07	3775.48	73.36	0	3702.12
MW-77	05/27/09	3775.48	D	0	--
MW-77	06/21/10	3775.48	80.57	0	3694.91
MW-77	12/28/10	3775.48	80.37	0	3695.11
MW-77	06/30/11	3775.48	80.47	0	3695.01
MW-106	02/04/97	3721.97	87.97	0	3634.00
MW-106	04/28/97	3721.97	87.59	0	3634.38
MW-106	07/15/97	3721.97	87.63	0	3634.34
MW-106	10/13/97	3721.97	88.75	0	3633.22
MW-106	01/28/98	3721.97	88.97	0	3633.00
MW-106	04/27/98	3721.97	89.36	0	3632.61
MW-106	06/15/98	3721.97	89.63	0	3632.34
MW-106	10/10/98	3721.97	89.61	0	3632.36
MW-106	01/27/99	3721.97	86.55	0	3635.42
MW-106	04/19/99	3721.97	89.58	0	3632.39
MW-106	01/05/00	3721.97	89.05	0	3632.92
MW-106	04/26/00	3721.97	89.31	0	3632.66
MW-106	09/27/00	3721.97	87.98	0	3633.99
MW-106	04/16/01	3721.97	88.81	0	3633.16
MW-106	10/29/01	3721.97	89.05	0	3632.92
MW-106	04/15/02	3721.97	89.05	0	3632.92
MW-106	10/14/02	3721.97	87.40	0	3634.57
MW-106	04/15/03	3721.97	88.91	0	3633.06
MW-106	10/14/03	3721.97	89.94	0	3632.03
MW-106	04/05/04	3721.97	89.34	0	3632.63
MW-106	10/05/04	3721.97	75.78	0	3646.19
MW-106	04/19/05	3721.97	88.54	0	3633.43
MW-106	10/24/05	3721.97	88.47	0	3633.50
MW-106	04/18/06	3721.97	89.71	0	3632.26
MW-106	10/11/06	3721.97	87.09	0	3634.88
MW-106	04/17/07	3721.97	89.4	0	3632.57
MW-106	10/22/07	3721.97	88.64	0	3633.33
MW-106	05/27/09	3721.97	D	--	--
MW-106	06/21/10	3721.97	90.06	0	3631.91
MW-106	12/28/10	3721.97	89.47	0	3632.50
MW-106	06/30/11	3721.97	89.93	0	3632.04
MW-126	01/05/00	3795.58	53.08	0	3742.50
MW-126	04/26/00	3795.58	54.03	0	3741.55
MW-126	09/27/00	3795.58	60.29	0	3735.29
MW-126	04/16/01	3795.58	54.25	0.52	3741.71
MW-126	10/29/01	3795.58	57.82	2.1	3739.29
MW-126	04/15/02	3795.58	56.95	2.23	3740.26
MW-126	10/14/02	3795.58	54.03	2.57	3743.43
MW-126	04/15/03	3796.28	63.65	3.96	3735.52
MW-126	10/14/03	3796.28	68.01	0	3728.27
MW-126	04/05/04	3796.28	70.04	0	3726.24
MW-126	10/05/04	3796.28	48.01	0.01	3748.28
MW-126	04/19/05	3796.28	50.63	0.25	3745.83
MW-126	10/24/05	3796.28	51.78	0	3744.50
MW-126	04/18/06	3796.28	66.79	0	3729.49
MW-126	10/11/06	3796.28	51.76	0.08	3744.58
MW-126	04/17/07	3796.28	62.92	0.6	3732.92
MW-126	10/22/07	3796.28	56.30	0	3739.98
MW-126	05/27/09	3796.28	69.95	0.05	3726.37
MW-126	06/21/10	3796.28	70.40	0.23	3726.05
MW-126	12/28/10	3796.28	66.12	0.56	3730.57
MW-126	06/30/11	3796.28	69.55	0.45	3727.06

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Appendix A
Historic Fluid Level Data, May 1991 - June 2011
OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
Lower Queen Wells					
MW-58	07/16/91	3824.07	197.91	0	3626.16
MW-58	08/21/91	3824.07	193.76	0	3630.31
MW-58	09/18/91	3824.07	193.26	0	3630.81
MW-58	10/22/91	3824.07	194.45	0	3629.62
MW-58	11/15/91	3824.07	194.77	0	3629.30
MW-58	01/16/96	3824.07	D	--	--
MW-58	07/16/96	3824.07	D	--	--
MW-58	10/14/96	3824.07	196.01	0.01	3628.06
MW-58	02/04/97	3824.07	203.00	0	3621.07
MW-58	04/28/97	3824.07	204.14	0	3619.93
MW-58	07/15/97	3824.07	197.66	0	3626.41
MW-58	10/01/97	3824.07	199.20	0.3	3625.08
MW-58	10/09/97	3824.07	199.52	0.67	3625.03
MW-58	10/14/97	3824.07	196.10	0	3627.97
MW-58	01/28/98	3824.07	198.55	0	3625.52
MW-58	05/28/98	3824.07	205.14	0	3618.93
MW-58	10/11/98	3824.07	200.48	0	3623.59
MW-58	01/27/99	3824.07	D	--	--
MW-58	04/19/99	3824.07	217.17	0	3606.90
MW-58	01/05/00	3824.07	210.57	0	3613.50
MW-58	04/26/00	3824.07	223.51	0	3600.56
MW-58	09/27/00	3824.07	220.18	0	3603.89
MW-58	04/16/01	3824.07	114.83	0	3709.24
MW-58	10/29/01	3824.07	177.31	0	3644.41
MW-58	04/15/02	3824.07	201.92	0	3622.15
MW-58	10/14/02	3824.07	199.69	0	3624.38
MW-58	02/13/03	3824.07	201.08	0	3622.99
MW-58	03/10/03	3824.07	202.20	0	3621.87
MW-58	04/15/03	3824.07	201.17	0	3622.90
MW-58	05/15/03	3824.07	201.82	0	3622.25
MW-58	06/24/03	3824.07	201.71	0	3622.36
MW-58	07/15/03	3824.07	202.89	0	3621.18
MW-58	08/08/03	3824.07	201.98	0	3622.09
MW-58	09/12/05	3824.07	202.20	0	3621.87
MW-58	10/14/03	3824.07	202.19	0	3621.88
MW-58	11/07/03	3824.07	202.29	0	3621.78
MW-58	12/04/03	3824.07	202.26	0	3621.81
MW-58	01/08/04	3824.07	202.38	0.1	3621.76
MW-58	02/12/04	3824.07	202.47	0	3621.60
MW-58	03/25/04	3824.07	202.49	0	3621.58
MW-58	04/05/04	3824.07	202.32	0	3621.75
MW-58	05/27/04	3824.07	201.37	0.01	3622.71
MW-58	06/17/04	3824.07	202.00	0	3622.07
MW-58	07/15/04	3824.07	202.08	0	3621.99
MW-58	08/19/04	3824.07	202.98	0.06	3621.13
MW-58	09/09/04	3824.07	201.74	0	3622.33
MW-58	10/05/04	3824.07	198.82	0	3625.25
MW-58	11/19/04	3824.07	199.30	0.28	3624.97
MW-58	12/07/04	3824.07	202.14		3621.93
MW-58	01/11/05	3824.07	200.70	0.58	3623.79
MW-58	02/08/05	3824.07	200.56	0	3623.51
MW-58	03/08/05	3824.07	200.87	0	3623.20
MW-58	04/19/05	3824.07	207.19	0	3616.88
MW-58	05/09/05	3824.07	207.19	0	3616.88
MW-58	06/21/05	3824.07	200.04	0	3624.03
MW-58	07/19/05	3824.07	199.94	0	3624.13
MW-58	08/08/05	3824.07	200.03	0	3624.04
MW-58	09/20/05	3824.07	199.02	0	3625.05
MW-58	10/24/05	3824.07	199.84	0.46	3624.57
MW-58	04/18/06	3824.07	200.05	0	3624.02
MW-58	10/11/06	3824.07	199.04	0.2	3625.18
MW-58	04/16/07	3824.07	200.49	0.52	3623.20
MW-58	10/22/07	3824.07	199.65	0	3624.42
MW-58	05/27/09	3824.07	200.73	5.26	3627.18
MW-58	06/21/10	3824.07	200.74	0.11	3623.41
MW-58	12/28/10	3824.07	200.71	0.40	3623.65
MW-58	06/30/11	3824.07	198.01	2.29	3627.73
MW-66	08/21/91	3828.98	196.77	0	3632.21
MW-66	09/18/91	3828.98	198.73	0	3630.25
MW-66	10/22/91	3828.98	199.70	0	3629.28
MW-66	11/15/91	3828.98	199.88	0	3629.10
MW-66	03/01/92	3828.98	200.37	0	3628.61
MW-66	04/01/92	3828.98	200.25	0	3628.73
MW-66	05/01/92	3828.98	195.25	0	3633.73
MW-66	06/01/92	3828.98	196.08	0	3632.90
MW-66	07/01/92	3828.98	197.35	0	3631.63
MW-66	08/01/92	3828.98	197.77	0	3631.21
MW-66	09/01/92	3828.98	198.17	0	3630.81
MW-66	10/01/92	3828.98	198.40	0	3630.58
MW-66	11/01/92	3828.98	198.76	0	3630.22
MW-66	12/01/92	3828.98	198.98	0	3630.00

D = Dry
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Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-66	01/01/93	3828.98	199.10	0	3629.88
MW-66	02/01/93	3828.98	199.23	0	3629.75
MW-66	03/01/93	3828.98	199.49	0	3629.49
MW-66	04/01/93	3828.98	199.38	0	3629.60
MW-66	05/01/93	3828.98	199.63	0	3629.35
MW-66	06/01/93	3828.98	199.59	0	3629.39
MW-66	07/01/93	3828.98	199.82	0	3629.16
MW-66	08/01/93	3828.98	199.78	0	3629.20
MW-66	09/01/93	3828.98	200.01	0	3628.97
MW-66	10/01/93	3828.98	200.09	0	3628.89
MW-66	11/01/93	3828.98	200.35	0	3628.63
MW-66	12/01/93	3828.98	200.42	0	3628.56
MW-66	01/01/94	3828.98	200.33	0	3628.65
MW-66	02/01/94	3828.98	201.39	0	3627.59
MW-66	03/01/94	3828.98	201.44	0	3627.54
MW-66	04/01/94	3828.98	201.36	0	3627.62
MW-66	05/01/94	3828.98	201.26	0	3627.72
MW-66	07/01/94	3828.98	200.91	0	3628.07
MW-66	08/01/94	3828.98	199.86	0	3629.12
MW-66	09/01/94	3828.98	200.66	0	3628.32
MW-66	10/01/94	3828.98	200.83	0	3628.15
MW-66	12/01/94	3828.98	201.96	0	3627.02
MW-66	01/01/95	3828.98	201.04	0	3627.94
MW-66	04/01/95	3828.98	202.26	0	3626.72
MW-66	07/01/95	3828.98	201.59	0	3627.39
MW-66	10/01/95	3828.98	201.62	0	3627.36
MW-66	01/16/96	3828.98	200.89	0	3628.09
MW-66	04/17/96	3828.98	202.29	0	3626.69
MW-66	07/16/96	3828.98	202.45	0	3626.53
MW-66	10/13/96	3828.98	200.80	0	3628.18
MW-66	02/04/97	3828.98	202.60	0	3626.38
MW-66	04/28/97	3828.98	202.84	0	3626.14
MW-66	07/14/97	3828.98	202.72	0	3626.26
MW-66	09/30/97	3828.98	204.00	0	3624.98
MW-66	10/09/97	3828.98	204.20	0	3624.78
MW-66	10/13/97	3828.98	203.77	0	3625.21
MW-66	01/27/98	3828.98	203.79	0	3625.19
MW-66	04/27/98	3828.98	204.09	0	3624.89
MW-66	05/28/98	3828.98	204.18	0	3624.80
MW-66	06/15/98	3828.98	204.37	0	3624.61
MW-66	10/10/98	3828.98	204.86	0	3624.12
MW-66	01/27/99	3828.98	205.05	0	3623.93
MW-66	04/19/99	3828.98	205.10	0	3623.88
MW-66	01/05/99	3828.98	205.13	0	3623.85
MW-66	04/26/00	3828.98	205.41	0	3623.57
MW-66	09/27/00	3828.98	205.78	0	3623.20
MW-66	04/16/01	3828.98	205.59	0	3623.39
MW-66	10/29/01	3828.98	206.04	0	3622.94
MW-66	04/15/02	3828.98	205.98	0	3623.00
MW-66	10/14/02	3828.98	199.87	0	3629.11
MW-66	04/15/03	3828.98	205.39	0	3623.59
MW-66	10/14/03	3828.98	206.41	0	3622.57
MW-66	04/05/04	3828.98	206.65	0	3622.33
MW-66	10/05/04	3828.98	203.05	0	3625.93
MW-66	04/19/05	3828.98	205.48	0	3623.50
MW-66	10/24/05	3828.98	204.97	0	3624.01
MW-66	04/18/06	3828.98	205.44	0	3623.54
MW-66	10/11/06	3828.98	204.64	0	3624.34
MW-66	04/16/07	3828.98	205.51	0	3623.47
MW-66	10/22/07	3828.98	205.29	0	3623.69
MW-66	05/27/09	3828.98	206.47	0	3622.51
MW-66	06/21/10	3828.98	206.82	0	3622.16
MW-66	12/28/10	3828.98	206.46	0	3622.52
MW-66	06/30/11	3828.98	206.94	0	3622.04
MW-70	09/18/91	3822.57	191.59	0	3630.98
MW-70	10/22/91	3822.57	191.68	0	3630.89
MW-70	11/15/91	3822.57	192.20	0	3630.37
MW-70	03/01/92	3822.57	192.74	0	3629.83
MW-70	04/01/92	3822.57	192.62	0	3629.95
MW-70	05/01/92	3822.57	189.97	0	3632.60
MW-70	06/01/92	3822.57	188.42	0	3634.15
MW-70	07/01/92	3822.57	188.87	0	3633.70
MW-70	08/01/92	3822.57	189.54	0	3633.03
MW-70	09/01/92	3822.57	190.02	0	3632.55
MW-70	10/01/92	3822.57	190.48	0	3632.09
MW-70	11/01/92	3822.57	190.86	0	3631.71
MW-70	12/01/92	3822.57	191.17	0	3631.40
MW-70	01/01/93	3822.57	191.39	0	3631.18
MW-70	02/01/93	3822.57	191.54	0	3631.03
MW-70	03/01/93	3822.57	191.77	0	3630.80
MW-70	04/01/93	3822.57	191.80	0	3630.77
MW-70	05/01/93	3822.57	192.09	0	3630.48

D = Dry
NA = Not Available
NG = Not Gauged
NR = No Record

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-70	06/01/93	3822.57	192.18	0	3630.39
MW-70	07/01/93	3822.57	192.32	0	3630.25
MW-70	08/01/93	3822.57	192.30	0	3630.27
MW-70	09/01/93	3822.57	192.53	0	3630.04
MW-70	10/01/93	3822.57	192.65	0	3629.92
MW-70	11/01/93	3822.57	192.91	0	3629.66
MW-70	12/01/93	3822.57	192.96	0	3629.61
MW-70	01/01/94	3822.57	192.99	0	3629.58
MW-70	02/01/94	3822.57	194.02	0	3628.55
MW-70	03/01/94	3822.57	194.00	0	3628.57
MW-70	04/01/94	3822.57	193.19	0	3629.38
MW-70	05/01/94	3822.57	193.86	0	3628.71
MW-70	07/01/94	3822.57	193.59	0	3628.98
MW-70	08/01/94	3822.57	193.09	0	3629.48
MW-70	09/01/94	3822.57	193.17	0	3629.40
MW-70	10/01/94	3822.57	193.38	0	3629.19
MW-70	12/01/94	3822.57	194.58	0	3627.99
MW-70	01/01/95	3822.57	192.83	0	3629.74
MW-70	04/01/95	3822.57	194.11	0	3628.46
MW-70	07/01/95	3822.57	194.19	0	3628.38
MW-70	10/01/95	3822.57	194.19	0	3628.38
MW-70	01/16/96	3822.57	194.68	0	3627.89
MW-70	04/17/96	3822.57	194.94	0	3627.63
MW-70	07/15/96	3822.57	194.70	0	3627.87
MW-70	10/13/96	3822.57	193.98	0	3628.59
MW-70	02/03/97	3822.57	194.47	0	3628.10
MW-70	04/28/97	3822.57	195.01	0	3627.56
MW-70	07/14/97	3822.57	195.44	0	3627.13
MW-70	10/01/97	3822.57	196.20	0	3626.37
MW-70	10/13/97	3822.57	196.05	0	3626.52
MW-70	10/29/97	3822.57	196.24	0.01	3626.33
MW-70	11/04/97	3822.57	196.35	0	3626.22
MW-70	11/12/97	3822.57	196.34	0	3626.23
MW-70	11/19/97	3822.57	196.36	0.01	3626.21
MW-70	11/24/97	3822.57	196.36	0	3626.21
MW-70	12/10/97	3822.57	196.47	0	3626.10
MW-70	01/27/98	3822.57	196.22	0	3626.35
MW-70	02/25/98	3822.57	196.45	0	3626.12
MW-70	04/27/98	3822.57	196.48	0	3626.09
MW-70	05/28/98	3822.57	196.91	0	3625.66
MW-70	06/15/98	3822.57	196.74	0	3625.83
MW-70	10/09/98	3822.57	197.27	0	3625.30
MW-70	01/27/99	3822.57	199.24	0	3623.33
MW-70	04/19/99	3822.57	197.40	0	3625.17
MW-70	01/05/00	3822.57	197.73	0	3624.84
MW-70	04/26/00	3822.57	197.71	0	3624.86
MW-70	09/27/00	3822.57	198.02	0	3624.55
MW-70	04/16/01	3822.57	198.34	0	3624.23
MW-70	10/29/01	3822.57	198.30	0	3624.27
MW-70	04/15/02	3822.57	198.85	0	3623.72
MW-70	10/14/02	3822.57	196.95	0	3625.62
MW-70	04/15/03	3822.57	198.12	0	3624.45
MW-70	10/14/03	3822.57	199.14	0	3623.43
MW-70	04/05/04	3822.57	199.41	0	3623.16
MW-70	10/05/04	3822.57	197.30	0	3625.27
MW-70	04/19/05	3822.57	197.70	0	3624.87
MW-70	10/24/05	3822.57	197.24	0	3625.33
MW-70	04/18/06	3822.57	198.46	0	3624.11
MW-70	10/11/06	3822.57	196.99	0	3625.58
MW-70	04/17/07	3822.57	198.51	0	3624.06
MW-70	10/22/07	3822.57	198.03	0	3624.54
MW-70	05/27/09	3822.57	199.45	0	3623.12
MW-70	06/21/10	3822.57	199.54	0	3623.03
MW-70	12/28/10	3822.57	199.13	0	3623.44
MW-70	06/30/11	3822.57	199.75	0	3622.82
MW-81	10/01/95	3817.03	195.77	2.74	3623.26
MW-81	01/16/96	3817.03	199.04	4.29	3621.12
MW-81	04/17/96	3817.03	204.35	9.95	3619.94
MW-81	07/16/96	3817.03	204.26	9.37	3619.61
MW-81	10/13/96	3817.03	202.11	8.49	3621.11
MW-81	02/04/97	3817.03	197.25	2.11	3621.32
MW-81	04/28/97	3817.03	204.40	9.15	3619.30
MW-81	07/14/97	3817.03	196.19	1.45	3621.89
MW-81	10/09/97	3817.03	200.02	0.02	3617.02
MW-81	10/14/97	3817.03	200.96	0.06	3616.11
MW-81	10/29/97	3817.03	202.44	1.44	3615.64
MW-81	11/04/97	3817.03	200.92	0	3616.11
MW-81	11/12/97	3817.03	200.95	0.25	3616.26
MW-81	11/19/97	3817.03	200.94	0.01	3616.09
MW-81	11/24/97	3817.03	200.81	0	3616.22
MW-81	12/10/97	3817.03	200.85	0	3616.18
MW-81	01/06/98	3817.03	199.35	0	3617.68

D = Dry
NA = Not Available
NG = Not Gauged
NR = No Record

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-81	01/15/98	3817.03	199.30	0	3617.73
MW-81	01/20/98	3817.03	200.89	0.79	3616.71
MW-81	01/27/98	3817.03	200.14	0.89	3617.53
MW-81	02/03/98	3817.03	200.88	0.58	3616.57
MW-81	02/10/98	3817.03	206.74	1.64	3611.48
MW-81	02/17/98	3817.03	218.70	12.08	3607.14
MW-81	02/25/98	3817.03	217.41	11.41	3607.94
MW-81	04/27/98	3817.03	197.05	0	3619.98
MW-81	05/28/98	3817.03	192.28	0	3624.75
MW-81	06/15/98	3817.03	197.58	0	3619.45
MW-81	10/11/98	3817.03	193.23	0	3623.80
MW-81	01/27/99	3817.03	200.12	0	3616.91
MW-81	04/19/99	3817.03	200.84	0	3616.19
MW-81	01/05/00	3817.03	199.38	0	3617.65
MW-81	04/26/00	3817.03	201.35	0	3615.68
MW-81	09/27/00	3817.03	202.99	0	3614.04
MW-81	04/16/01	3817.03	201.94	0	3615.09
MW-81	10/29/01	3817.03	204.69	0	3609.04
MW-81	04/15/02	3817.03	193.94	0	3623.09
MW-81	10/14/02	3817.03	192.80	0	3624.23
MW-81	04/15/03	3817.03	193.41	0	3623.62
MW-81	10/14/03	3817.03	194.42	0	3622.61
MW-81	04/05/04	3817.03	194.58	0	3622.45
MW-81	10/05/04	3817.03	192.67	2.96	3626.52
MW-81	04/19/05	3817.03	193.75	0	3623.28
MW-81	10/24/05	3817.03	192.46	0	3624.57
MW-81	04/18/06	3817.03	192.78	0	3624.25
MW-81	10/11/06	3817.03	194.15	2.56	3624.75
MW-81	04/16/07	3817.03	198.12	6.32	3614.30
MW-81	10/22/07	3817.03	189.54	0	3627.49
MW-81	05/27/09	3817.03	193.97	0.10	3623.13
MW-81	06/21/10	3817.03	194.21	0.22	3622.98
MW-81	12/28/10	3817.03	193.88	0.26	3623.34
MW-81	06/30/11	3817.03	194.10	1.23	3623.83
MW-88	08/01/96	3789.70	163.59	0	3626.11
MW-88	10/13/96	3789.70	162.22	0	3627.48
MW-88	02/04/97	3789.70	163.38	0	3626.32
MW-88	04/28/97	3789.70	163.54	0	3626.16
MW-88	07/14/97	3789.70	163.84	0	3625.86
MW-88	10/01/97	3789.70	164.40	0	3625.30
MW-88	10/09/97	3789.70	164.38	0	3625.32
MW-88	10/13/97	3789.70	164.34	0	3625.36
MW-88	01/27/98	3789.70	164.41	0	3625.29
MW-88	04/27/98	3789.70	164.84	0	3624.86
MW-88	05/28/98	3789.70	164.00	0	3625.70
MW-88	06/15/98	3789.70	164.87	0	3624.83
MW-88	10/10/98	3789.70	165.38	0	3624.32
MW-88	01/27/99	3789.70	165.49	0	3624.21
MW-88	04/19/99	3789.70	165.54	0	3624.16
MW-88	01/05/00	3789.70	165.62	0	3624.08
MW-88	04/26/00	3789.70	165.87	0	3623.83
MW-88	09/27/00	3789.70	166.25	0	3623.45
MW-88	04/16/01	3789.70	166.21	0	3623.49
MW-88	10/29/01	3789.70	166.49	0	3623.21
MW-88	04/15/02	3789.70	166.53	0	3623.17
MW-88	10/14/02	3789.70	165.52	0	3624.18
MW-88	04/15/03	3789.70	165.98	0	3623.72
MW-88	10/14/03	3789.70	166.89	0	3622.81
MW-88	04/05/04	3789.70	167.15	0	3622.55
MW-88	10/05/04	3789.70	163.52	0	3626.18
MW-88	04/19/05	3789.70	166.38	0	3623.32
MW-88	10/24/05	3789.70	165.67	0	3624.03
MW-88	04/18/06	3789.70	166.15	0	3623.55
MW-88	10/11/06	3789.70	165.49	0	3624.21
MW-88	04/16/07	3789.7	166.11	0	3623.59
MW-88	10/22/07	3789.70	165.92	0	3623.78
MW-88	05/27/09	3789.70	166.91	0	3622.79
MW-88	06/21/10	3789.70	167.28	0	3622.42
MW-88	12/28/10	3789.70	166.92	0	3622.78
MW-88	06/30/11	3789.70	167.45	0	3622.25

D = Dry
NA = Not Available
NG = Not Gauged
NR = No Record

Appendix A
Historic Fluid Level Data, May 1991 - June 2011
OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-111	06/19/98	3824.44	200.24	0	3624.20
MW-111	10/10/98	3824.44	200.89	0	3623.55
MW-111	01/27/99	3824.44	201.24	0	3623.20
MW-111	04/19/99	3824.44	201.26	0	3623.18
MW-111	01/05/00	3824.44	201.21	0	3623.23
MW-111	04/26/00	3824.44	201.48	0	3622.96
MW-111	09/27/00	3824.44	201.66	0	3622.78
MW-111	04/16/01	3824.44	201.74	0	3622.70
MW-111	10/29/01	3824.44	201.64	0	3622.80
MW-111	04/15/02	3824.44	201.83	0	3622.61
MW-111	10/14/02	3824.44	200.52	0	3623.92
MW-111	04/15/03	3824.44	201.21	0	3623.23
MW-111	10/14/03	3824.44	202.50	0	3621.94
MW-111	04/05/04	3824.44	202.54	0	3621.90
MW-111	10/05/04	3824.44	200.25	0	3624.19
MW-111	04/19/05	3824.44	201.09	0	3623.35
MW-111	10/24/05	3824.44	200.61	0	3623.83
MW-111	04/18/06	3824.44	201.17	0	3623.27
MW-111	10/11/06	3824.44	200.06	0	3624.38
MW-111	04/16/07	3824.44	201.28	0	3623.16
MW-111	10/22/07	3824.44	201.24	0	3623.20
MW-111	05/27/09	3824.44	202.50	0	3621.94
MW-111	06/21/10	3824.44	202.92	0	3621.52
MW-111	12/28/10	3824.44	202.48	0	3621.96
MW-111	06/30/11	3824.44	202.94	0	3621.50
MW-113	01/05/00	3772.67	147.43	0	3625.24
MW-113	04/26/00	3772.67	148.28	0.88	3625.03
MW-113	09/27/00	3772.67	147.72	0	3624.95
MW-113	04/16/01	3772.67	148.11	0.13	3624.65
MW-113	10/29/01	3772.67	148.95	0.2	3623.87
MW-113	04/15/02	3772.67	148.72	0.14	3624.05
MW-113	10/14/02	3772.67	147.33	0	3625.34
MW-113	04/15/03	3772.67	148.69	0.53	3624.37
MW-113	10/14/03	3772.67	149.24	0.21	3623.58
MW-113	04/05/04	3772.67	142.42	0.2	3630.40
MW-113	10/05/04	3772.67	144.58	0	3628.09
MW-113	04/19/05	3772.67	147.90	0	3624.77
MW-113	10/24/05	3772.67	147.51	0	3625.16
MW-113	04/18/06	3772.67	148.21	0	3624.46
MW-113	10/11/06	3772.67	147.29	0	3625.38
MW-113	04/17/07	3772.67	148.61	0.31	3623.83
MW-113	10/22/07	3772.67	NA	--	--
MW-113	05/27/09	3772.67	149.10	T	3623.57
MW-113	06/21/10	3772.67	149.47	0.05	3623.16
MW-113	12/28/10	3772.67	149.09	0.04	3623.55
MW-113	06/30/11	3772.67	149.55	0.05	3623.08
MW-127	01/05/00	3825.17	202.12	0	3623.05
MW-127	04/26/00	3825.17	202.34	0.46	3623.17
MW-127	09/27/00	3825.17	202.00	0	3623.17
MW-127	04/16/01	3825.17	202.70	0.07	3622.52
MW-127	10/29/01	3825.17	202.51	0.03	3622.68
MW-127	04/15/02	3825.17	202.74	0	3622.43
MW-127	10/14/02	3825.17	200.92	0	3624.25
MW-127	04/15/03	3825.17	202.50	0	3622.67
MW-127	10/14/03	3825.17	202.99	0	3622.18
MW-127	04/05/04	3825.17	203.15	0	3622.02
MW-127	10/05/04	3825.17	200.48	0	3624.69
MW-127	04/19/05	3825.17	201.81	0	3623.36
MW-127	10/24/05	3825.17	201.00	0	3624.17
MW-127	04/18/06	3825.17	201.80	0	3623.37
MW-127	10/11/06	3825.17	200.66	0	3624.51
MW-127	04/17/07	3825.17	202.3	0	3622.87
MW-127	10/22/07	3825.17	201.97	0	3623.20
MW-127	05/27/09	3825.17	203.10	0	3622.07
MW-127	06/21/10	3825.17	203.46	0	3621.71
MW-127	12/28/10	3825.17	202.88	0	3622.29
MW-127	06/30/11	3825.17	203.27	0	3621.90

Notes:
* MW-77 DTW does not agree with historical data.

D = Dry
NA = Not Available
NG = Not Gauged
NR = No Record

ARCADIS

Appendix B

Historical Analytical Data

Appendix B

Historical BTEX Analytical Data, May 1991 - June 2011
OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico

Well ID	Sample Date	Analytical Results			
		Benzene	Toluene	Ethylbenzene	Total Xylenes
MW-14	09/01/91	5100	--	--	--
MW-14	06/22/98	820	<10	840	<10
MW-14	04/18/02	116	9	<5	<5
MW-14	10/16/02	23	<5	5	<5
MW-14	04/09/03	<5	<5	<5	<5
MW-14	10/24/03	330	<5	<5	<5
MW-14	Not Sampled - Condensate Present				
MW-14	04/25/05	174	<5	<5	<15
MW-14	04/27/06	31.9	<2.74	<2.03	<5.81
MW-14	04/20/07	30	<5	<5	<15
MW-14	05/27/09	1.1	<1	1.1	17
MW-14	06/23/10	1.1	<1	2.9	19.4
MW-14	06/30/11	Not Sampled - not enough water to collect sample			
MW-45	06/01/91	<1	--	--	--
MW-45	06/22/91	--	<1	<1	<1
MW-45	09/01/91	<1	--	--	--
MW-45	12/01/91	<1	<1	<1	<1
MW-45	07/15/93	<3	6	7	4
MW-45	10/14/93	<3	3	<3	3
MW-45	01/13/94	<0.5	<0.5	<0.5	<0.5
MW-45	04/06/94	<0.5	<0.5	<0.5	<0.5
MW-45	07/20/94	<0.5	<0.5	<0.5	<0.5
MW-45	05/29/09	<1	<1	<1	1.7
MW-45	06/23/10	<1	<1	<1	<1
MW-45	07/01/11	<1	<1	<1	<3
MW-46	06/01/91	3200	--	--	--
MW-46	06/22/91	--	<50	900	<50
MW-46	07/01/91	300	--	--	--
MW-46	07/19/91	--	<50	250	--
MW-46	07/30/91	--	--	--	250
MW-46	09/01/91	140	--	--	--
MW-46	10/01/96	900	33	440	59
MW-46	02/11/97	3300	550	1000	1400
MW-46	05/29/97	5000	1200	230	<100
MW-46	07/18/97	6100	1900	270	130
MW-46	04/30/98	1600	41	140	290
MW-46	07/01/98	1700	<5	97	120
MW-46	04/20/99	210	<5	11	20
MW-46	12/08/99	50	43	34	129
MW-46	04/28/00	17	<1	<1	<1
MW-46	10/02/00	12	39	19	128
MW-46	04/19/01	<5	<5	<5	<10
MW-46	10/31/01	<100	<100	<100	<200
MW-46	04/17/02	<5	<5	<5	<5
MW-46	10/16/02	14	<5	<5	<5
MW-46	04/09/03	<5	<5	<5	<5
MW-46	Not Sampled - Dry				
MW-46	04/08/04	10	<5	<5	<5
MW-46	04/27/05	<5	<5	<5	<15
MW-46	Not Sampled - Dry				
MW-46	04/23/07	81.4	<5	<5	<15

Notes:
Concentrations listed in micrograms per liter (ug/L)
<5 Constituent not detected above noted laboratory detection limit
-- Indicates parameter was not analyzed

Appendix B

Historical BTEX Analytical Data, May 1991 - June 2011

OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico

Well ID	Sample Date	Analytical Results			
		Benzene	Toluene	Ethylbenzene	Total Xylenes
MW-46	05/27/09	<1	<1	<1	1.1
MW-46	06/23/10	<1	<1	<1	<1
MW-46	06/30/11	Not Sampled - not enough water to collect sample			
MW-49	06/01/91	60	--	--	--
MW-49	06/22/91	--	<10	60	40
MW-49	09/01/91	35	--	--	--
MW-49	07/15/93	210	27	42	30
MW-49	10/14/93	68	26	9	20
MW-49	01/13/94	13	<5	15	110
MW-49	04/06/94	82	<0.5	11	10
MW-49	07/20/94	150	<5	32	27
MW-49	10/05/94	78	49	40	300
MW-49	01/11/95	220	<5	46	97
MW-49	04/06/95	120	<0.5	24	26
MW-49	07/21/95	17	<0.5	3.5	3.4
MW-49	10/12/95	240	<50	59	130
MW-49	01/20/96	160	130	120	570
MW-49	04/19/96	87	23	18	32
MW-49	07/01/96	370	220	190	630
MW-49	10/01/96	95	16	36	12
MW-49	02/07/97	79	66	45	160
MW-49	07/18/97	130	<1	35	9.8
MW-49	04/30/98	130	39	41	69
MW-49	07/01/98	78	<1	15	<1
MW-49	04/20/99	81	<5	32	<10
MW-49	12/08/99	32	68	58	380
MW-49	04/27/00	24	<1	12	<1
MW-49	10/02/00	35	38	18	107
MW-49	04/17/01	21	36	16	117
MW-49	10/31/01	21	<5	<5	<10
MW-49	04/17/02	19	<5	<5	<5
MW-49	10/16/02	31	<5	<5	<5
MW-49	04/08/03	71	<5	<5	<5
MW-49	10/28/03	97	<5	<5	<5
MW-49	04/08/04	76	<5	<5	<5
MW-49	04/25/05	<5	<5	<5	<15
MW-49	04/26/06	23	<2.74	<2.03	<5.81
MW-49	04/20/07	26	<5	<5	<15
MW-49	05/28/09	37	<1	<1	1.2
MW-49	06/23/10	24	<1	<1	<1
MW-49	07/01/11	48	<1	<1	<3
MW-58	09/01/91	40	--	--	--
MW-58	12/01/91	90	40	20	80
MW-58	04/01/92	203	32	56	68
MW-58	07/01/92	178	58	32	44
MW-58	10/01/92	190	49	26	57
MW-58	01/01/93	192	30	23	39
MW-58	04/13/93	55	16	31	9
MW-58	07/13/93	25	42	14	13
MW-58	10/13/93	50	21	212	555
MW-58	04/05/94	<2.5	<2.5	7.4	27

Notes:

Concentrations listed in micrograms per liter (ug/L)

<5 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

Appendix B

Historical BTEX Analytical Data, May 1991 - June 2011

OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico

Well ID	Sample Date	Analytical Results			
		Benzene	Toluene	Ethylbenzene	Total Xylenes
MW-58	07/19/94	2	29	4.5	27
MW-58	10/06/94	6.7	<5	15	39
MW-58	04/08/95	2.2	<0.5	2.1	6.8
MW-58	10/01/96	110	320	940	10000
MW-58	01/30/98	350	23	42	96
MW-58	06/22/98	22	<1	28	35
MW-66	09/01/91	<1	--	--	--
MW-66	12/01/91	<1	<1	<1	<1
MW-66	04/01/92	4	7	<3	4
MW-66	07/01/92	8	25	7	11
MW-66	10/01/92	12	36	<3	34
MW-66	01/01/93	3	6	3	20
MW-66	04/13/93	<3	5	5	<3
MW-66	07/13/93	8	4	<3	<3
MW-66	10/12/93	13	60	4	29
MW-66	11/10/93	<4	<4	<4	<4
MW-66	01/11/94	<0.5	<0.5	<0.5	0.6
MW-66	04/07/94	<0.5	<0.5	<0.5	<0.5
MW-66	07/19/94	<0.5	0.6	<0.5	0.8
MW-66	10/04/94	<0.5	3	1.5	17
MW-66	01/09/95	<0.5	<0.5	<0.5	<0.5
MW-66	04/11/95	<0.5	<0.5	<0.5	<0.5
MW-66	07/19/95	<0.5	0.9	<0.5	<0.5
MW-66	10/10/95	<0.5	<0.5	<0.5	3.5
MW-66	01/19/96	<0.5	<0.5	<0.5	<0.5
MW-66	04/17/96	<0.5	0.8	<0.5	1
MW-66	07/01/96	<0.5	<0.5	<0.5	0.5
MW-66	10/01/96	<0.5	<0.5	<0.5	<0.5
MW-66	02/05/97	<0.5	<0.5	<0.5	<0.5
MW-66	05/06/97	<0.5	<0.5	<0.5	<0.5
MW-66	07/16/97	<0.5	<0.5	<0.5	<0.5
MW-66	10/15/97	<0.5	<0.5	<0.5	<0.5
MW-66	01/29/98	<0.5	<0.5	<0.5	<0.5
MW-66	04/28/98	<0.5	<0.5	<0.5	<0.5
MW-66	06/17/98	<1	1.6	<1	<1
MW-66	10/11/98	<0.5	<0.5	<0.5	<0.5
MW-66	02/01/99	<0.5	<0.5	<0.5	<0.5
MW-66	04/21/99	<5	<5	<5	<10
MW-66	12/10/99	<5	<5	<5	<10
MW-66	04/27/00	<1	<1	<1	<1
MW-66	10/05/00	<5	<5	<5	<10
MW-66	04/18/01	<5	<5	<5	<15
MW-66	11/01/01	<5	<5	<5	<10
MW-66	04/19/02	<5	<5	<5	<5
MW-66	10/16/02	<5	<5	<5	<5
MW-66	04/08/03	<5	<5	<5	<5
MW-66	10/22/03	<5	<5	<5	<5
MW-66	04/06/04	<5	<5	<5	<5
MW-66	04/21/05	<5	<5	<5	<15
MW-66	04/19/06	<2.57	<2.74	<2.03	<5.81
MW-66	04/18/07	<5	<5	<5	<15

Notes:

Concentrations listed in micrograms per liter (ug/L)

<5 Constituent not detected above noted laboratory detection limit

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Appendix B

Historical BTEX Analytical Data, May 1991 - June 2011

OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico

Well ID	Sample Date	Analytical Results			
		Benzene	Toluene	Ethylbenzene	Total Xylenes
MW-66	05/27/09	<1	<1	<1	<1
MW-66	06/22/10	<1	<1	<1	<1
MW-66	06/30/11	<1	<1	<1	<3
MW-70	09/01/91	<1	--	--	--
MW-70	12/01/91	<1	<1	<1	<1
MW-70	04/01/92	3	17	<3	8
MW-70	07/01/92	<1	3	1	13
MW-70	10/01/92	11	40	63	60
MW-70	01/01/93	<3	<3	8	5
MW-70	04/14/93	9	20	<3	4
MW-70	07/13/93	<1	11	3	<3
MW-70	10/12/93	25	19	19	18
MW-70	11/10/93	<4	<4	<4	40
MW-70	01/11/94	<0.5	0.6	<0.5	<0.5
MW-70	04/06/94	<0.5	<0.5	<0.5	<0.5
MW-70	07/18/94	<0.5	<0.5	<0.5	<0.5
MW-70	10/04/94	1.2	4.3	1.3	12
MW-70	01/09/95	<0.5	2.3	<0.5	2.4
MW-70	04/05/95	<0.5	<0.5	<0.5	1.1
MW-70	07/18/95	<0.5	0.8	<0.5	<0.5
MW-70	10/10/95	<0.5	<0.5	<0.5	<0.5
MW-70	01/18/96	<0.5	<0.5	<0.5	<0.5
MW-70	04/17/96	<0.5	<0.5	<0.5	<0.5
MW-70	07/01/96	<0.5	<0.5	<0.5	<0.5
MW-70	10/01/96	<0.5	<0.5	<0.5	<0.5
MW-70	02/05/97	<0.5	<0.5	<0.5	<0.5
MW-70	10/15/97	<0.5	<0.5	<0.5	<0.5
MW-70	06/16/98	<1	<1	<1	<1
MW-70	04/22/99	<5	<5	<5	<10
MW-70	04/28/00	<1	<1	<1	<1
MW-70	10/03/00	<5	<5	<5	<10
MW-70	04/24/01	<5	<5	<5	<15
MW-70	04/18/02	<5	<5	<5	<5
MW-70	04/06/03	<5	<5	<5	<5
MW-70	04/12/04	<5	<5	<5	<5
MW-70	04/26/05	<5	<5	<5	<15
MW-70	04/20/06	<2.57	<2.74	<2.03	<5.81
MW-70	04/24/07	<5	<5	<5	<15
MW-70	05/27/09	<1	<1	<1	<1
MW-70	06/23/10	<1	<1	<1	<1
MW-70	06/30/11	<1	<1	<1	<3
MW-77	07/21/95	<0.5	<0.5	1.9	2.8
MW-77	01/20/96	<0.5	3.1	<0.5	7.1
MW-77	04/19/96	<0.5	3.8	0.8	2.5
MW-77	07/01/96	8	14	19	35
MW-77	10/01/96	160	320	150	1000
MW-77	05/07/97	8.4	70	8.3	52
MW-77	07/18/97	14	30	11	71
MW-77	12/09/99	<5	<5	<5	<10
MW-77	10/03/00	<5	<5	<5	24
MW-77	Not Sampled - Condensate Present				

Notes:

Concentrations listed in micrograms per liter (ug/L)

<5 Constituent not detected above noted laboratory detection limit

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Appendix B

Historical BTEX Analytical Data, May 1991 - June 2011

OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico

Well ID	Sample Date	Analytical Results			
		Benzene	Toluene	Ethylbenzene	Total Xylenes
MW-77		Not Sampled - Dry			
MW-77	10/21/02	<5	<5	<5	<5
MW-77	04/10/03	<5	<5	<5	<5
MW-77	10/24/03	<5	<5	<5	<5
MW-77	04/07/04	<5	<5	<5	<5
MW-77	04/27/05	<5	<5	<5	<15
MW-77	04/26/06	<2.57	<2.74	<2.03	<5.81
MW-77	04/18/07	<5	<5	<5	<15
MW-77	06/23/10	<1	<1	<1	<1
MW-77	06/30/11	<1	<1	<1	<3
MW-81	06/29/98	<1	<1	<1	1.5
MW-88	08/01/96	<0.5	1.1	0.5	1
MW-88	10/01/96	<0.5	<0.5	<0.5	<0.5
MW-88	02/05/97	<0.5	<0.5	<0.5	<0.5
MW-88	04/30/97	<0.5	<0.5	<0.5	<0.5
MW-88	10/15/97	<0.5	<0.5	<0.5	<0.5
MW-88	01/29/98	<0.5	<0.5	<0.5	<0.5
MW-88	04/28/98	<0.5	<0.5	<0.5	<0.5
MW-88	06/27/98	<1	<1	<1	<1
MW-88	10/11/98	<0.5	<0.5	<0.5	<0.5
MW-88	02/01/99	1.6	1.8	1.6	4.8
MW-88	04/21/99	<5	<5	<5	<10
MW-88	12/10/99	<5	<5	<5	<10
MW-88	04/28/00	<1	<1	<1	<1
MW-88	10/02/00	<5	<5	<5	<5
MW-88	04/17/01	<5	<5	<5	<15
MW-88	10/31/01	<5	<5	<5	<10
MW-88	04/19/02	<5	<5	<5	<5
MW-88	10/16/02	<5	<5	<5	<5
MW-88	04/08/03	<5	<5	<5	<5
MW-88	10/21/03	<5	<5	<5	<5
MW-88	04/06/04	<5	<5	<5	<5
MW-88	04/21/05	<5	<5	<5	<15
MW-88	04/20/06	<2.57	<2.74	<2.03	<5.81
MW-88	04/19/07	<5	<5	<5	<15
MW-88	05/27/09	<1	<1	<1	<1
MW-88	06/22/10	<1	<1	<1	<1
MW-88	06/30/11	<1	<1	<1	<3
MW-106	02/11/97	<0.5	<0.5	<0.5	<0.5
MW-106	05/07/97	<0.5	<0.5	<0.5	<0.5
MW-106	07/18/97	<0.5	<0.5	<0.5	<0.5
MW-106	04/30/98	<0.5	<0.5	<0.5	<0.5
MW-106	06/28/98	<1	<1	<1	<1
MW-106	04/29/99	<5	<5	<5	<10
MW-106	12/08/99	<5	<5	<5	<10
MW-106	05/01/00	<1	<1	<1	<1
MW-106	10/02/00	<5	<5	<5	<10
MW-106	04/18/01	<5	9.4	<5	<15
MW-106	10/31/01	<5	<5	<5	<10
MW-106	04/17/02	<5	<5	<5	<5
MW-106	10/16/02	<5	7	<5	<5

Notes:

Concentrations listed in micrograms per liter (ug/L)

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Appendix B

Historical BTEX Analytical Data, May 1991 - June 2011

OXY USA WTP Limited Partnership, Indian Basin Gas Plant, Eddy County, New Mexico

Well ID	Sample Date	Analytical Results			
		Benzene	Toluene	Ethylbenzene	Total Xylenes
MW-106	04/09/03	<5	<5	<5	<5
MW-106	10/21/03	<5	<5	<5	<5
MW-106	04/05/04	<5	<5	<5	<5
MW-106	04/20/05	<5	<5	<5	<15
MW-106	04/19/06	<2.57	<2.74	<2.03	<5.81
MW-106	04/18/07	<5	<5	<5	<15
MW-106	06/23/10	<1	<1	<1	<1
MW-106	06/30/11	<1	<1	<1	<3
MW-111	06/29/98	<1	<1	<1	<1
MW-111	10/11/98	<0.5	<0.5	<0.5	<0.5
MW-111	02/01/99	<0.5	0.8	<0.5	<0.5
MW-111	04/21/99	<5	<5	<5	<10
MW-111	12/13/99	<5	<5	<5	<10
MW-111	04/27/00	<1	<1	<1	<1
MW-111	10/05/00	<5	<5	<5	<10
MW-111	04/18/01	<5	<5	<5	<15
MW-111	11/02/01	<5	<5	<5	<10
MW-111	04/19/02	<5	<5	<5	<5
MW-111	10/16/02	<5	<5	<5	<5
MW-111	04/07/03	<5	<5	<5	6
MW-111	10/22/03	<5	<5	<5	<5
MW-111	04/07/04	<5	<5	<5	5
MW-111	04/21/05	<5	<5	<5	<15
MW-111	04/19/06	<2.57	<2.74	<2.03	<5.81
MW-111	04/18/07	<5	<5	<5	<15
MW-111	05/27/09	<1	<1	<1	<1
MW-111	06/22/10	<1	<1	<1	<1
MW-111	06/30/11	<1	<1	<1	<3
MW-113	08/11/99	140	<5	59	390
MW-127	12/28/99	190	7.1	38	16
MW-127	05/28/09	<1	<1	<1	1.4
MW-127	06/23/10	<1	<1	<1	2.2
MW-127	07/01/11	<1	<1	<1	<3

Notes:

Concentrations listed in micrograms per liter (ug/L)

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Appendix B
Summary of Analytical Results for All Sampling Events
1991 through 2011
Wet Chemistry

		Wet Chemistry Analytical Data (mg/L)	
	Constituent	Total Dissolved Solids (TDS)	Chloride
	New Mexico Standards	1,000	250
Station or Well Name	Sample Collection Date		
MW-014	6/22/1998	1,400	330
MW-014	4/18/2002	1,200	300
MW-014	10/24/2003	1,100	150
MW-014 (Dup 1)	10/24/2003	1,000	140
MW-014	4/25/2005	1,130	230
MW-014 (Dup 1)	4/25/2005	1,100	232
MW-014	4/27/2006	1,110	209
MW-014 (Dup 1)	4/27/2006	1,110	207
MW-014	4/20/2007	1,060	196
MW-014 (Dup 1)	4/20/2007	1,010	194
MW-045	6/1/1991	5,440	507
MW-045	9/1/1991	3,920	NA
MW-045	12/1/1991	NA	354
MW-045	7/15/1993	NA	434
MW-045	10/14/1993	NA	408
MW-045	1/13/1994	NA	440
MW-045	4/6/1994	NA	430
MW-045	7/20/1994	NA	429
MW-045	5/29/2009	2,540	174
MW-045	6/23/2010	4,190	473
MW-045	7/1/2011	3,630	208
MW-046	6/1/1991	1,220	152
MW-046	7/1/1991	NA	45
MW-046	10/1/1996	NA	170
MW-046	2/11/1997	NA	220
MW-046	5/29/1997	1,300	132
MW-046	7/18/1997	NA	180
MW-046	6/21/1998	940	140
MW-046	4/20/1999	580	31
MW-046	4/28/2000	565	25.8
MW-046	4/19/2001	570	47
MW-046	4/17/2002	490	37
MW-046	4/8/2004	2,300	340
MW-046	4/27/2005	1,090	116
MW-046	4/23/2007	1,770	132
MW-049	6/1/1991	3,910	365
MW-049	6/25/1991	NA	NA
MW-049	7/15/1993	NA	399
MW-049	10/14/1993	NA	397
MW-049	1/13/1994	NA	400
MW-049	4/6/1994	NA	380
MW-049	7/20/1994	NA	368
MW-049	10/5/1994	NA	380
MW-049	1/11/1995	NA	389
MW-049	4/6/1995	NA	390
MW-049	7/21/1995	NA	380

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Appendix B
Summary of Analytical Results for All Sampling Events
1991 through 2011
Wet Chemistry

		Wet Chemistry Analytical Data (mg/L)	
	Constituent	Total Dissolved Solids (TDS)	Chloride
	New Mexico Standards	1,000	250
MW-049	10/12/1995	NA	350
MW-049	1/20/1996	NA	410
MW-049	4/19/1996	NA	400
MW-049	7/1/1996	NA	360
MW-049	10/1/1996	NA	36
MW-049	2/7/1997	NA	410
MW-049	3/20/1997	3,100	NA
MW-049	7/18/1997	NA	350
MW-049	6/21/1998	2,800	630
MW-049	4/20/1999	3,000	410
MW-049	4/27/2000	3,320	379
MW-049	4/17/2001	3,100	350
MW-049	4/17/2002	2,600	450
MW-049	10/28/2003	2,900	570
MW-049	4/9/2004	2,900	440
MW-049 (Dup-1)	4/9/2004	3,000	410
MW-049	4/25/2005	3,960	345
MW-049	4/26/2006	3,400	318
MW-049	4/20/2007	2,990	325
MW-049	5/28/2009	3,090	370
MW-049	6/23/2010	2,650	408
MW-049	7/1/2011	3,250	347
MW-058	12/1/1991	NA	124
MW-058	4/1/1992	NA	156
MW-058	7/1/1992	NA	149
MW-058	10/1/1992	NA	155
MW-058	1/1/1993	NA	175
MW-058	4/13/1993	NA	133
MW-058	7/13/1993	NA	133
MW-058	10/13/1993	NA	59
MW-058	4/5/1994	NA	48
MW-058	7/19/1994	NA	38
MW-058	10/6/1994	NA	36
MW-058	1/11/1995	NA	26
MW-058	4/8/1995	NA	39
MW-058	4/18/1996	NA	29
MW-058	10/1/1996	NA	38
MW-058	6/22/1998	760	42
MW-058	12/1/1991	NA	124
MW-058	4/1/1992	NA	156
MW-058	7/1/1992	NA	149
MW-058	10/1/1992	NA	155
MW-058	1/1/1993	NA	175
MW-058	4/13/1993	NA	133
MW-058	7/13/1993	NA	133
MW-058	10/13/1993	NA	59
MW-058	4/5/1994	NA	48
MW-058	7/19/1994	NA	38

Appendix B
Summary of Analytical Results for All Sampling Events
1991 through 2011
Wet Chemistry

		Wet Chemistry Analytical Data (mg/L)	
	Constituent	Total Dissolved Solids (TDS)	Chloride
	New Mexico Standards	1,000	250
MW-058	10/6/1994	NA	36
MW-058	1/11/1995	NA	26
MW-058	4/8/1995	NA	39
MW-058	4/18/1996	NA	29
MW-058	10/1/1996	NA	38
MW-058	6/22/1998	760	42
MW-066	12/1/1991	NA	9
MW-066	4/1/1992	NA	8
MW-066	7/1/1991	NA	8
MW-066	10/1/1992	NA	8
MW-066	1/1/1993	NA	12
MW-066	4/13/1993	NA	8
MW-066	7/13/1993	NA	15
MW-066	10/12/1993	NA	7
MW-066	1/1/1994	NA	9
MW-066	4/7/1994	NA	8.7
MW-066	7/19/1994	NA	<5
MW-066	104/94	NA	8.8
MW-066	1/9/1995	NA	6
MW-066	4/11/1995	NA	8.9
MW-066	7/19/1995	NA	8
MW-066	10/10/1995	NA	9
MW-066	1/19/1996	NA	10
MW-066	4/17/1996	NA	9.6
MW-066	7/1/1996	NA	6
MW-066	10/1/1996	NA	7
MW-066	2/5/1997	NA	9
MW-066	5/6/1997	NA	9
MW-066	7/16/1997	NA	8
MW-066	10/15/1997	NA	NA
MW-066	6/17/1998	760	13
MW-066	4/21/1999	730	10
MW-066	4/27/2000	848	8.61
MW-066	4/18/2001	660	9.3
MW-066	4/19/2002	790	8.8
MW-066	10/22/2003	770	8.4
MW-066	4/6/2004	810	8.0
MW-066	4/21/2005	867	10.8
MW-066	4/19/2006	797	11.1
MW-066	4/18/2007	795	10.5
MW-066	5/27/2009	865	8.29
MW-066	6/22/2010	768	9.09
MW-066	6/30/2011	817	8.60
MW-070	12/1/1991	NA	10
MW-070	4/1/1992	NA	8
MW-070	7/1/1992	NA	9.2
MW-070	10/1/1992	NA	17
MW-070	1/1/1993	NA	8

Appendix B
Summary of Analytical Results for All Sampling Events
1991 through 2011
Wet Chemistry

		Wet Chemistry Analytical Data (mg/L)	
	Constituent	Total Dissolved Solids (TDS)	Chloride
	New Mexico Standards	1,000	250
MW-070	4/14/1993	NA	8
MW-070	7/13/1993	NA	8
MW-070	10/12/1993	NA	11
MW-070	1/11/1994	NA	10
MW-070	4/6/1994	NA	9.5
MW-070	7/18/1994	NA	8
MW-070	10/4/1994	NA	9.5
MW-070	1/9/1995	NA	9
MW-070	4/5/1995	NA	9.7
MW-070	7/18/1995	NA	9
MW-070	10/10/1995	NA	10
MW-070	1/18/1996	NA	11
MW-070	4/17/1996	NA	9.7
MW-070	7/1/1996	NA	8
MW-070	10/1/1996	NA	10
MW-070	2/5/1997	NA	10
MW-070	10/15/1997	NA	NA
MW-070	6/16/1998	370	12
MW-070	4/22/1999	310	11
MW-070	4/27/2000	385	8.61
MW-070	4/24/2001	270	9.8
MW-070	4/18/2002	310	15
MW-070	10/23/2003	350	10
MW-070	4/12/2004	420	9.9
MW-070	4/26/2005	336	11.6
MW-070	4/20/2006	328	11.5
MW-070	4/24/2007	1,150	21.9
MW-070	5/27/2009	508	10.2
MW-070	6/23/2010	350	9.96
MW-070	6/30/2011	426	9.5
MW-077	7/21/1995	NA	110
MW-077	1/20/1996	NA	120
MW-077	4/19/1996	NA	120
MW-077	7/1/1996	NA	100
MW-077	10/1/1996	NA	140
MW-077	5/7/1997	NA	150
MW-077	7/18/1997	NA	150
MW-077	10/24/2003	590	57
MW-077	4/7/2004	550	40
MW-077	4/27/2005	1,110	180
MW-077	4/26/2006	521	55
MW-077	6/23/2010	545	48
MW-077	6/30/2011	467	26.9
MW-081	6/29/1998	800	16
MW-088	2/5/1997	970	30
MW-088	4/30/1997	NA	26
MW-088	10/15/1997	NA	NA
MW-088	6/18/1998	840	22

Appendix B
Summary of Analytical Results for All Sampling Events
1991 through 2011
Wet Chemistry

		Wet Chemistry Analytical Data (mg/L)	
	Constituent	Total Dissolved Solids (TDS)	Chloride
	New Mexico Standards	1,000	250
MW-088	4/21/1999	800	24
MW-088	4/28/2000	876	43.1
MW-088	4/17/2001	770	23
MW-088	4/19/2002	750	35
MW-088	10/21/2003	810	22
MW-088	4/6/2004	820	19
MW-088	4/21/2005	945	27.8
MW-088	4/20/2006	780	29.7
MW-088	4/19/2007	861	32.8
MW-088	5/27/2009	937	48.1
MW-088	6/22/2010	919	35.2
MW-088	6/30/2011	946	41.1
MW-106	2/11/1997	430	10
MW-106	5/7/1997	NA	4
MW-106	7/18/1997	NA	5
MW-106	6/18/1998	380	4
MW-106	4/29/1999	NA	12
MW-106	5/1/2000	350	3.45
MW-106	4/18/2001	340	5.6
MW-106	4/17/2002	350	12
MW-106	10/21/2003	350	3.1
MW-106	4/5/2004	540	3.3
MW-106	4/20/2005	405	3.58
MW-106	4/19/2006	371	4.34
MW-106	4/18/2007	396	4.17
MW-106	6/23/2010	349	3.12
MW-106	6/30/2011	368	2.3
MW-111	6/29/1998	900	100
MW-111	4/21/1999	760	120
MW-111	4/27/2000	994	103
MW-111	4/18/2001	800	100
MW-111	4/19/2002	750	100
MW-111	10/22/2003	800	98
MW-111	4/7/2004	790	70
MW-111	4/21/2005	932	101
MW-111	4/19/2006	872	88.6
MW-111	4/18/2007	874	86.4
MW-111	5/27/2009	886	67.9
MW-111	6/22/2010	750	70.2
MW-111	6/30/2011	798	92.8
MW-127	5/28/2009	766	77.1
MW-127	6/23/2010	746	44.4
MW-127	7/1/2011	715	42.3

Notes:

NA	No analysis performed
mg/L	Milligrams per liter
1,100	Indicates result at/above the applicable standard
<5	Indicates the result is below the specified laboratory detection limit

ARCADIS

Appendix C

Laboratory Analytical Reports
(CD-Rom)

June 2011 Groundwater Sampling
Event

Gulf Coast
ACCUTEST
LABORATORIES

07/18/11

Technical Report for

Arcadis

Indian Basin - MT001016.0003

Accutest Job Number: T80469

Sampling Dates: 06/30/11 - 07/01/11

Report to:

Arcadis
1004 N. Big Spring, Suite 300
Midland, TX 79701
alan.reed@arcadis-us.com

ATTN: Alan Reed

Total number of pages in report: 37

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Paul K Canevaro

Paul Canevaro
Laboratory Director

Client Service contact: Georgia Jones 713-271-4700

Certifications: TX (T104704220-10-3) AR (88-0756) FL (E87628) KS (E-10366) LA (85695/04004) OK (9103)

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Test results relate only to samples analyzed.

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Sample Summary

Arcadis

Job No: T80469

Indian Basin - MT001016.0003

Sample Number	Collected Date	Time By	Received	Matrix Code	Matrix Type	Client Sample ID
T80469-1	06/30/11	13:09	07/06/11	AQ	Ground Water	MW-88
T80469-2	06/30/11	14:36	07/06/11	AQ	Ground Water	MW-66
T80469-3	06/30/11	15:50	07/06/11	AQ	Ground Water	MW-111
T80469-4	06/30/11	17:01	07/06/11	AQ	Ground Water	MW-106
T80469-5	06/30/11	18:36	07/06/11	AQ	Ground Water	MW-70
T80469-6	06/30/11	19:56	07/06/11	AQ	Ground Water	MW-77
T80469-7	07/01/11	15:07	07/06/11	AQ	Ground Water	MW-49
T80469-8	07/01/11	16:15	07/06/11	AQ	Ground Water	MW-127
T80469-9	07/01/11	17:16	07/06/11	AQ	Ground Water	MW-45
T80469-10	06/30/11	00:00	07/06/11	AQ	Trip Blank Water	TRIP BLANK

Sample Results

Report of Analysis

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-88		
Lab Sample ID:	T80469-1	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Indian Basin - MT001016.0003		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z018366.D	1	07/13/11	DR	n/a	n/a	VZ3299
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		79-122%
17060-07-0	1,2-Dichloroethane-D4	92%		75-121%
2037-26-5	Toluene-D8	95%		87-119%
460-00-4	4-Bromofluorobenzene	92%		80-133%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-88		
Lab Sample ID:	T80469-1	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
		Percent Solids:	n/a
Project:	Indian Basin - MT001016.0003		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	41.1	2.5	mg/l	5	07/11/11 22:25	ES	EPA 300/SW846 9056
Solids, Total Dissolved	946	10	mg/l	1	07/06/11	BG	SM 2540C

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-66		
Lab Sample ID:	T80469-2	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Indian Basin - MT001016.0003		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z018370.D	1	07/13/11	DR	n/a	n/a	VZ3299
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		79-122%
17060-07-0	1,2-Dichloroethane-D4	94%		75-121%
2037-26-5	Toluene-D8	101%		87-119%
460-00-4	4-Bromofluorobenzene	92%		80-133%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-66		
Lab Sample ID:	T80469-2	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
		Percent Solids:	n/a
Project:	Indian Basin - MT001016.0003		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	8.6	1.0	mg/l	2	07/11/11 22:42	ES	EPA 300/SW846 9056
Solids, Total Dissolved	817	10	mg/l	1	07/06/11	BG	SM 2540C

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-111		
Lab Sample ID:	T80469-3	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Indian Basin - MT001016.0003		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z018356.D	1	07/13/11	DR	n/a	n/a	VZ3299
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		79-122%
17060-07-0	1,2-Dichloroethane-D4	94%		75-121%
2037-26-5	Toluene-D8	104%		87-119%
460-00-4	4-Bromofluorobenzene	91%		80-133%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-111		
Lab Sample ID:	T80469-3	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
		Percent Solids:	n/a
Project:	Indian Basin - MT001016.0003		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	92.8	5.0	mg/l	10	07/11/11 22:59	ES	EPA 300/SW846 9056
Solids, Total Dissolved	798	10	mg/l	1	07/06/11	BG	SM 2540C

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-106		
Lab Sample ID:	T80469-4	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Indian Basin - MT001016.0003		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z018357.D	1	07/13/11	DR	n/a	n/a	VZ3299
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		79-122%
17060-07-0	1,2-Dichloroethane-D4	93%		75-121%
2037-26-5	Toluene-D8	101%		87-119%
460-00-4	4-Bromofluorobenzene	92%		80-133%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-106		
Lab Sample ID:	T80469-4	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
		Percent Solids:	n/a
Project:	Indian Basin - MT001016.0003		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	2.3	0.50	mg/l	1	07/11/11 23:50	ES	EPA 300/SW846 9056
Solids, Total Dissolved	368	10	mg/l	1	07/06/11	BG	SM 2540C

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-70		
Lab Sample ID:	T80469-5	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Indian Basin - MT001016.0003		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z018358.D	1	07/13/11	DR	n/a	n/a	VZ3299
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		79-122%
17060-07-0	1,2-Dichloroethane-D4	93%		75-121%
2037-26-5	Toluene-D8	104%		87-119%
460-00-4	4-Bromofluorobenzene	93%		80-133%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-70		
Lab Sample ID:	T80469-5	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
		Percent Solids:	n/a
Project:	Indian Basin - MT001016.0003		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	9.5	1.0	mg/l	2	07/12/11 00:07	ES	EPA 300/SW846 9056
Solids, Total Dissolved	426	10	mg/l	1	07/06/11	BG	SM 2540C

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-77		
Lab Sample ID:	T80469-6	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Indian Basin - MT001016.0003		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z018359.D	1	07/13/11	DR	n/a	n/a	VZ3299
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		79-122%
17060-07-0	1,2-Dichloroethane-D4	93%		75-121%
2037-26-5	Toluene-D8	104%		87-119%
460-00-4	4-Bromofluorobenzene	93%		80-133%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-77		
Lab Sample ID:	T80469-6	**Date Sampled:**	06/30/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
		Percent Solids:	n/a
Project:	Indian Basin - MT001016.0003		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	26.9	2.5	mg/l	5	07/12/11 00:24	ES	EPA 300/SW846 9056
Solids, Total Dissolved	467	10	mg/l	1	07/06/11	BG	SM 2540C

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-49		
Lab Sample ID:	T80469-7	**Date Sampled:**	07/01/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Indian Basin - MT001016.0003		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z018360.D	1	07/13/11	DR	n/a	n/a	VZ3299
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	48.0	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		79-122%
17060-07-0	1,2-Dichloroethane-D4	90%		75-121%
2037-26-5	Toluene-D8	103%		87-119%
460-00-4	4-Bromofluorobenzene	92%		80-133%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-49		
Lab Sample ID:	T80469-7	**Date Sampled:**	07/01/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
		Percent Solids:	n/a
Project:	Indian Basin - MT001016.0003		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	347	25	mg/l	50	07/12/11 00:41	ES	EPA 300/SW846 9056
Solids, Total Dissolved	3250	20	mg/l	1	07/06/11	BG	SM 2540C

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-127		
Lab Sample ID:	T80469-8	**Date Sampled:**	07/01/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Indian Basin - MT001016.0003		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z018361.D	1	07/13/11	DR	n/a	n/a	VZ3299
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		79-122%
17060-07-0	1,2-Dichloroethane-D4	94%		75-121%
2037-26-5	Toluene-D8	98%		87-119%
460-00-4	4-Bromofluorobenzene	94%		80-133%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-127		
Lab Sample ID:	T80469-8	**Date Sampled:**	07/01/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
		Percent Solids:	n/a
Project:	Indian Basin - MT001016.0003		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	42.3	2.5	mg/l	5	07/12/11 00:58	ES	EPA 300/SW846 9056
Solids, Total Dissolved	715	10	mg/l	1	07/06/11	BG	SM 2540C

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-45		
Lab Sample ID:	T80469-9	**Date Sampled:**	07/01/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Indian Basin - MT001016.0003		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z018362.D	1	07/13/11	DR	n/a	n/a	VZ3299
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		79-122%
17060-07-0	1,2-Dichloroethane-D4	95%		75-121%
2037-26-5	Toluene-D8	104%		87-119%
460-00-4	4-Bromofluorobenzene	92%		80-133%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-45		
Lab Sample ID:	T80469-9	**Date Sampled:**	07/01/11
Matrix:	AQ - Ground Water	**Date Received:**	07/06/11
		Percent Solids:	n/a
Project:	Indian Basin - MT001016.0003		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	208	25	mg/l	50	07/12/11 01:15	ES	EPA 300/SW846 9056
Solids, Total Dissolved	3630	20	mg/l	1	07/06/11	BG	SM 2540C

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	T80469-10	**Date Sampled:**	06/30/11
Matrix:	AQ - Trip Blank Water	**Date Received:**	07/06/11
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Indian Basin - MT001016.0003		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z018365.D	1	07/13/11	DR	n/a	n/a	VZ3299
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	0.52	1.0	0.26	ug/l	J
1330-20-7	Xylene (total)	ND	3.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		79-122%
17060-07-0	1,2-Dichloroethane-D4	93%		75-121%
2037-26-5	Toluene-D8	102%		87-119%
460-00-4	4-Bromofluorobenzene	93%		80-133%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Gulf Coast ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

CHAIN OF CUSTODY

ACCUTEST LABORATORIES
10165 Harwin Dr, Ste 150 Houston, TX 77036
TEL: 713-271-4700 FAX: 713-271-4770
www.accutest.com

FED-EX Tracking #:
Bottle Order Control #:
Accutest Quote #:
Accutest Job #: T80469

Client / Reporting Information

Company Name: ARCADIS
Street Address: 1004 N Big Spring, Ste. 300
City: Midland State: TX Zip: 79701
Project Contact: Alan J Reed Jr E-mail: alan.reed@arcadis-us.com
Phone #: 432-687-5400 Fax #:
Sampler(s) Name(s): Ross Brady/RB Phone #:

Project Information

Project Name: Indian Basin - MT001016.0003
Street:
City: State:
Project #:
Client Purchase Order #:
Project Manager:

Billing Information (If different from Report to)

Company Name:
Street Address:
City: State: Zip:
Attention:

Requested Analyses

Accutest Sample #	Field ID / Point of Collection	Collection: Date	Time	Sampled By	Matrix	# of bottles	HCl	MeOH	ZnAc/NaOH	HNO3	H2SO4	NaOH	DI Water	MEOH	TSP	Na2SO4	ENCORE	OTHER	VOCs by 8260	TDS and Chloride	LAB USE ONLY
1	MW-88	6-30-11	1309	RB	GW	4	3					1							✓	✓	
2	MW-66	6-30-11	1436	RB	GW	4	3					1							✓	✓	
3	MW-111	6-30-11	1550	RB	GW	4	3					1							✓	✓	
4	MW-106	6-30-11	1701	RB	GW	4	3					1							✓	✓	
5	MW-70	6-30-11	1836	RB	GW	4	3					1							✓	✓	
6	MW-77	6-30-11	1956	RB	GW	4	3					1							✓	✓	
7	MW-49	7-1-11	1007	RB	GW	4	3					1							✓	✓	
8	MW-127	7-1-11	1615	RB	GW	4	3					1							✓	✓	
9	MW-45	7-1-11	1716	RB	GW	4	3					1							✓	✓	
10	trip blank	—	—	—	WW	2	2												✓		

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL - Sludge; SED - Sediment; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe; FB - Field Blank; EB - Equipment Blank; RB - Rinse Blank; TB - Trip Blank

Turnaround Time (Business days)

- [x] Standard
- [ ] 8 Day RUSH
- [ ] 4 Day RUSH
- [ ] 3 Day RUSH
- [ ] 2 Day RUSH
- [ ] 1 Day EMERGENCY

Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM) / Date:

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULT1 (Level 3+4)
- [ ] REDT1 (Level 3+4)
- [ ] Commercial "C"
- [ ] TRRP
- [ ] EDD Format
- [ ] Other

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
Commercial "C" = Results + QC & Surrogate Summary

Comments / Special Instructions

watch TDS hold time

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1	RB	7-5-11/1700	FEDEX	FEDEX	7/6/11 915	Belinda Hay
2	Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
3						
4	Relinquished by:	Date Time:	Received By:	Custody Seal #	Intact / Not Intact	Preserved where applicable / On Ice / Cooler Temp.
5						

T80469: Chain of Custody
Page 1 of 5

CHAIN OF CUSTODY

ACCUTEST LABORATORIES
10165 Harwin Dr, Ste 150 Houston, TX 77036
TEL. 713-271-4700 FAX: 713-271-4770
www.accutest.com

FED-EX Tracking #: | Bottle Order Control #:
Accutest Quote #: | Accutest Job #: T80469

Client / Reporting Information

Company Name: ARCADIS
Street Address: 1004 N Big Spring, Ste. 300
City: Midland State: TX Zip: 79701
Project Contact: Alan J Reed Jr E-mail: alan.reed@arcadis-us.com
Phone #: 432-687-5400 Fax #:
Sampler(s) Name(s): Ross Brady/RB Phone #:

Project Information

Project Name: Indian Basin - MT001016.0003
Street:
City: State:
Project #:
Client Purchase Order #:
Project Manager:

Billing Information (if different from Report to)

Company Name:
Street Address:
City: State: Zip:
Attention:

Requested Analyses

Accutest Sample #	Field ID / Point of Collection	Collection: Date	Time	Sampled By	Matrix	# of bottles	Number of preserved Bottles: HCl	NaOH	ZnAcNaOH	HNO3	H2SO4	NONE	DI Water	MEOH	TSP	NaHSO4	ENCORE	OTHER	VOCs by 8260	TDS and Chloride	LAB USE ONLY
1	MW-88	6-30-11	1309	RB	GW	4	3					1							✓	✓	
2	MW-66	6-30-11	1436	RB	GW	4	3					1							✓	✓	
3	MW-111	6-30-11	1550	RB	GW	4	3					1							✓	✓	
4	MW-106	6-30-11	1701	RB	GW	4	3					1							✓	✓	
5	MW-70	6-30-11	1836	RB	GW	4	3					1							✓	✓	
6	MW-77	6-30-11	1956	RB	GW	4	3					1							✓	✓	
7	MW-49	7-1-11	1507	RB	GW	4	3					1							✓	✓	
8	MW-127	7-1-11	1615	RB	GW	4	3					1							✓	✓	
9	MW-45	7-1-11	1716	RB	GW	4	3					1							✓	✓	
10	trip blank	—	—	—	WW	2	2												✓		

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB-Field Blank
EB-Equipment Blank
RB- Rinse Blank
TB-Trip Blank

Turnaround Time (Business days)

- [x] Standard
- [ ] 5 Day RUSH
- [ ] 4 Day RUSH
- [ ] 3 Day RUSH
- [ ] 2 Day RUSH
- [ ] 1 Day EMERGENCY

Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM): / Date:

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULTI (Level 3+4)
- [ ] REDT1 (Level 3+4)
- [ ] Commercial "C"
- [ ] TRRP
- [ ] EDD Format
- [ ] Other

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
Commercial "C" = Results + QC & Surrogate Summary

Comments / Special Instructions

#watch TDS hold time#

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1	RB	7-5-11/1700	FEDEX	FEDEX	7-6-11 915	Melinda Hay
2						
3						
4						
5						

Custody Seal # | Intact | Preserved where applicable | On Ice | Cooler Temp.

3.1

T80469: Chain of Custody
Page 2 of 5

ACCUTEST LABORATORIES

Accutest Laboratories Sample Receipt Summary

3.1

Accutest Job Number: T80469 **Client:** ARCADIS **Project:** INDIAN BASIN-MT001016.0003

Date / Time Received: 7/6/2011 **Delivery Method:** FedEx **Airbill #'s:** 4868-9991-1521

No. Coolers: 1 **Therm ID:** IRGUN4; **Temp Adjustment Factor:** -0.1;

Cooler Temps (initial/Adjusted): #1: (1.4/1.3);

Cooler Security	Y or N		Y or N
1. Custody Seals Present:	☑ ☐	3. COC Present:	☑ ☐
2. Custody Seals Intact:	☑ ☐	4. Smpl Dates/Time OK	☑ ☐

Cooler Temperature	Y or N
1. Temp criteria achieved:	☑ ☐
2. Cooler temp verification:	IR Gun
3. Cooler media:	Ice (Bag)

Quality Control Preservation	Y or N	N/A	WTB	STB
1. Trip Blank present / cooler:	☑ ☐	☐	☑	☐
2. Trip Blank listed on COC:	☑ ☐	☐		
3. Samples preserved properly:	☑ ☐			
4. VOCs headspace free:	☑ ☐	☐		

Sample Integrity - Documentation	Y or N
1. Sample labels present on bottles:	☑ ☐
2. Container labeling complete:	☑ ☐
3. Sample container label / COC agree:	☑ ☐

Sample Integrity - Condition	Y or N
1. Sample recvd within HT:	☑ ☐
2. All containers accounted for:	☑ ☐
3. Condition of sample:	Intact

Sample Integrity - Instructions	Y or N	N/A
1. Analysis requested is clear:	☑ ☐	
2. Bottles received for unspecified tests	☐ ☑	
3. Sufficient volume recvd for analysis:	☑ ☐	
4. Compositing instructions clear:	☐ ☐	☑
5. Filtering instructions clear:	☐ ☐	☑

Comments

7/6/11

Accutest Laboratories
V:713.271.4700

10165 Harwin Drive
F: 713.271.4770

Houston, TX 77038
www.accutest.com

T80469: Chain of Custody
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ACCUTEST LABORATORIES

Sample Receipt Log

3.1

Job #: T80469 **Date / Time Received:** 7/6/2011 9:15:00 AM **Initials:** BG

Client: ARCADIS

Cooler #	Sample ID:	Vol	Bot #	Location	Pres	pH	Therm ID	Initial Temp	Therm CF	Corrected Temp
1	T80469-1	1000 ml	1	3G	N/P	Note #2 - Preservative check not applicable.	IRGUN4	1.4	-0.1	1.3
1	T80469-1	40 ml	2	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-1	40 ml	3	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-1	40 ml	4	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-2	1000 ml	1	3G	N/P	Note #2 - Preservative check not applicable.	IRGUN4	1.4	-0.1	1.3
1	T80469-2	40 ml	2	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-2	40 ml	3	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-2	40 ml	4	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-3	1000 ml	1	3G	N/P	Note #2 - Preservative check not applicable.	IRGUN4	1.4	-0.1	1.3
1	T80469-3	40 ml	2	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-3	40 ml	3	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-3	40 ml	4	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-4	1000 ml	1	3G	N/P	Note #2 - Preservative check not applicable.	IRGUN4	1.4	-0.1	1.3
1	T80469-4	40 ml	2	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-4	40 ml	3	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-4	40 ml	4	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-5	1000 ml	1	3G	N/P	Note #2 - Preservative check not applicable.	IRGUN4	1.4	-0.1	1.3
1	T80469-5	40 ml	2	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-5	40 ml	3	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-5	40 ml	4	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-6	1000 ml	1	3G	N/P	Note #2 - Preservative check not applicable.	IRGUN4	1.4	-0.1	1.3
1	T80469-6	40 ml	2	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-6	40 ml	3	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3

T80469: Chain of Custody
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ACCUTEST LABORATORIES

Sample Receipt Log

3.1

Job #: T80469 **Date / Time Received:** 7/6/2011 9:15:00 AM **Initials:** BG

Client: ARCADIS

Cooler #	Sample ID:	Vol	Bot #	Location	Pres	pH	Therm ID	Initial Temp	Therm CF	Corrected Temp
1	T80469-6	40 ml	4	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-7	1000 ml	1	3G	N/P	Note #2 - Preservative check not applicable.	IRGUN4	1.4	-0.1	1.3
1	T80469-7	40 ml	2	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-7	40 ml	3	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-7	40 ml	4	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-8	1000 ml	1	3G	N/P	Note #2 - Preservative check not applicable.	IRGUN4	1.4	-0.1	1.3
1	T80469-8	40 ml	2	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-8	40 ml	3	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-8	40 ml	4	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-9	1000 ml	1	3G	N/P	Note #2 - Preservative check not applicable.	IRGUN4	1.4	-0.1	1.3
1	T80469-9	40 ml	2	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-9	40 ml	3	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-9	40 ml	4	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-10	40 ml	1	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3
1	T80469-10	40 ml	2	VR	HCL	Note #1 - Preservative to be checked by analyst at the instrument.	IRGUN4	1.4	-0.1	1.3

T80469: Chain of Custody
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Gulf Coast ACCUTEST LABORATORIES

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: T80469
Account: AGMTXM Arcadis
Project: Indian Basin - MT001016.0003

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VZ3299-MB	Z018355.D	1	07/13/11	DR	n/a	n/a	VZ3299

The QC reported here applies to the following samples: **Method:** SW846 8260B

T80469-1, T80469-2, T80469-3, T80469-4, T80469-5, T80469-6, T80469-7, T80469-8, T80469-9, T80469-10

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.71	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	101%	79-122%
17060-07-0	1,2-Dichloroethane-D4	93%	75-121%
2037-26-5	Toluene-D8	109%	87-119%
460-00-4	4-Bromofluorobenzene	92%	80-133%

Blank Spike Summary

Job Number: T80469
Account: AGMTXM Arcadis
Project: Indian Basin - MT001016.0003

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VZ3299-BS	Z018353.D	1	07/13/11	DR	n/a	n/a	VZ3299

The QC reported here applies to the following samples: **Method:** SW846 8260B

T80469-1, T80469-2, T80469-3, T80469-4, T80469-5, T80469-6, T80469-7, T80469-8, T80469-9, T80469-10

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
71-43-2	Benzene	25	25.3	101	76-118
100-41-4	Ethylbenzene	25	23.4	94	75-112
108-88-3	Toluene	25	23.4	94	77-114
1330-20-7	Xylene (total)	75	69.3	92	75-111

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	98%	79-122%
17060-07-0	1,2-Dichloroethane-D4	92%	75-121%
2037-26-5	Toluene-D8	97%	87-119%
460-00-4	4-Bromofluorobenzene	90%	80-133%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: T80469
Account: AGMTXM Arcadis
Project: Indian Basin - MT001016.0003

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
T80469-1MS	Z018367.D	1	07/13/11	DR	n/a	n/a	VZ3299
T80469-1MSD	Z018368.D	1	07/13/11	DR	n/a	n/a	VZ3299
T80469-1	Z018366.D	1	07/13/11	DR	n/a	n/a	VZ3299

The QC reported here applies to the following samples: **Method:** SW846 8260B

T80469-1, T80469-2, T80469-3, T80469-4, T80469-5, T80469-6, T80469-7, T80469-8, T80469-9, T80469-10

CAS No.	Compound	T80469-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	ND		25	26.4	106	24.4	98	8	76-118/16
100-41-4	Ethylbenzene	ND		25	24.3	97	22.9	92	6	75-112/12
108-88-3	Toluene	ND		25	25.0	100	23.4	94	7	77-114/12
1330-20-7	Xylene (total)	ND		75	70.8	94	66.5	89	6	75-111/12

CAS No.	Surrogate Recoveries	MS	MSD	T80469-1	Limits
1868-53-7	Dibromofluoromethane	97%	96%	99%	79-122%
17060-07-0	1,2-Dichloroethane-D4	91%	91%	92%	75-121%
2037-26-5	Toluene-D8	98%	97%	95%	87-119%
460-00-4	4-Bromofluorobenzene	92%	92%	92%	80-133%

Gulf Coast ACCUTEST LABORATORIES

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: T80469
Account: AGMTXM - Arcadis
Project: Indian Basin - MT001016.0003

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chloride	GP13862/GN32911	0.50	0.0	mg/l	10	9.09	90.9	90-110%
Solids, Total Dissolved	GN32711	10	0.0	mg/l	500	488	97.6	80-120%

Associated Samples:
Batch GN32711: T80469-1, T80469-2, T80469-3, T80469-4, T80469-5, T80469-6, T80469-7, T80469-8, T80469-9
Batch GP13862: T80469-1, T80469-2, T80469-3, T80469-4, T80469-5, T80469-6, T80469-7, T80469-8, T80469-9
(*) Outside of QC limits

5.1.5

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: T80469
Account: AGMTXM - Arcadis
Project: Indian Basin - MT001016.0003

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Chloride	GP13862/GN32911	T80014-1	mg/l	148	148	0.0	0-20%
Solids, Total Dissolved	GN32711	T80469-6	mg/l	467	462	1.1	0-5%

Associated Samples:
Batch GN32711: T80469-1, T80469-2, T80469-3, T80469-4, T80469-5, T80469-6, T80469-7, T80469-8, T80469-9
Batch GP13862: T80469-1, T80469-2, T80469-3, T80469-4, T80469-5, T80469-6, T80469-7, T80469-8, T80469-9
(*) Outside of QC limits

5.2
5

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: T80469
Account: AGMTXM - Arcadis
Project: Indian Basin - MT001016.0003

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chloride	GP13862/GN32911	T80014-1	mg/l	148	200	314	83.0	80-120%

Associated Samples:
Batch GP13862: T80469-1, T80469-2, T80469-3, T80469-4, T80469-5, T80469-6, T80469-7, T80469-8, T80469-9
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits

5.3
5

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Appendix D

NMOCD Correspondence

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.

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.

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

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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Appendix E

USEPA Low-flow Purging and Sampling Procedures

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION II

GROUND WATER SAMPLING PROCEDURE
LOW STRESS (Low Flow) PURGING AND SAMPLING

I. SCOPE & APPLICATION

This Low Stress (or Low-Flow) Purging and Sampling Procedure is the EPA Region II standard method for collecting low stress (low flow) ground water samples from monitoring wells. Low stress Purging and Sampling results in collection of ground water samples from monitoring wells that are representative of ground water conditions in the geological formation. This is accomplished by minimizing stress on the geological formation and minimizing disturbance of sediment that has collected in the well. The procedure applies to monitoring wells that have an inner casing with a diameter of 2.0 inches or greater, and maximum screened intervals of ten feet unless multiple intervals are sampled. The procedure is appropriate for collection of ground water samples that will be analyzed for volatile and semi-volatile organic compounds (VOCs and SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and microbiological and other contaminants in association with all EPA programs.

This procedure does not address the collection of light or dense non-aqueous phase liquids (LNAPL or DNAPL) samples, and should be used for aqueous samples only. For sampling NAPLs, the reader is referred to the following EPA publications: DNAPL Site Evaluation (Cohen & Mercer, 1993) and the RCRA Ground-Water Monitoring: Draft Technical Guidance (EPA/530-R-93-001), and references therein.

II. METHOD SUMMARY

The purpose of the low stress purging and sampling procedure is to collect ground water samples from monitoring wells that are representative of ground water conditions in the geological formation. This is accomplished by setting the intake velocity of the sampling pump to a flow rate that limits drawdown inside the well casing.

Sampling at the prescribed (low) flow rate has three primary benefits. First, it minimizes disturbance of sediment in the bottom of the well, thereby producing a sample with low turbidity (i.e., low concentration of suspended particles). Typically, this saves time and analytical costs by eliminating the need for collecting and analyzing an additional filtered sample from the same well. Second, this procedure

minimizes aeration of the ground water during sample collection, which improves the sample quality for VOC analysis. Third, in most cases the procedure significantly reduces the volume of ground water purged from a well and the costs associated with its proper treatment and disposal.

III. ADDRESSING POTENTIAL PROBLEMS

Problems that may be encountered using this technique include a) difficulty in sampling wells with insufficient yield; b) failure of one or more key indicator parameters to stabilize; c) cascading of water and/or formation of air bubbles in the tubing; and d) cross-contamination between wells.

Insufficient Yield

Wells with insufficient yield (i.e., low recharge rate of the well) may dewater during purging. Care should be taken to avoid loss of pressure in the tubing line due to dewatering of the well below the level of the pump's intake. Purging should be interrupted before the water level in the well drops below the top of the pump, as this may induce cascading of the sand pack. Pumping the well dry should therefore be avoided to the extent possible in all cases. Sampling should commence as soon as the volume in the well has recovered sufficiently to allow collection of samples. Alternatively, ground water samples may be obtained with techniques designed for the unsaturated zone, such as lysimeters.

Failure to Stabilize Key Indicator Parameters

If one or more key indicator parameters fails to stabilize after 4 hours, one of three options should be considered: a) continue purging in an attempt to achieve stabilization; b) discontinue purging, do not collect samples, and document attempts to reach stabilization in the log book; c) discontinue purging, collect samples, and document attempts to reach stabilization in the log book; or d) Secure the well, purge and collect samples the next day (preferred). The key indicator parameter for samples to be analyzed for VOCs is dissolved oxygen. The key indicator parameter for all other samples is turbidity.

Cascading

To prevent cascading and/or air bubble formation in the tubing, care should be taken to ensure that the flow rate is sufficient to maintain pump suction. Minimize the length and diameter of tubing (i.e., 1/4

or 3/8 inch ID) to ensure that the tubing remains filled with ground water during sampling.

Cross-Contamination

To prevent cross-contamination between wells, it is strongly recommended that dedicated, in-place pumps be used. As an alternative, the potential for cross-contamination can be reduced by performing the more thorough "daily" decontamination procedures between sampling of each well in addition to the start of each sampling day (see Section VII, below).

Equipment Failure

Adequate equipment should be on-hand so that equipment failures do not adversely impact sampling activities.

IV. PLANNING DOCUMENTATION AND EQUIPMENT

- Approved site-specific Field Sampling Plan/Quality Assurance Project Plan (QAPP). This plan must specify the type of pump and other equipment to be used. The QAPP must also specify the depth to which the pump intake should be lowered in each well. Generally, the target depth will correspond to the mid-point of the most permeable zone in the screened interval. Borehole geologic and geophysical logs can be used to help select the most permeable zone. However, in some cases, other criteria may be used to select the target depth for the pump intake. In all cases, the target depth must be approved by the EPA hydrogeologist or EPA project scientist.

- Well construction data, location map, field data from last sampling event.

- Polyethylene sheeting.

- Flame Ionization Detector (FID) and Photo Ionization Detector (PID).

- Adjustable rate, positive displacement ground water sampling pump (e.g., centrifugal or bladder pumps constructed of stainless steel or Teflon). A peristaltic pump may only be used for inorganic sample collection.

- Interface probe or equivalent device for determining the presence or absence of NAPL.

- Teflon or Teflon-lined polyethylene tubing to collect samples for organic analysis. Teflon or Teflon-lined polyethylene, PVC, Tygon or polyethylene tubing to collect samples for inorganic analysis. Sufficient tubing of the appropriate material must be available so that each well has dedicated tubing.

- Water level measuring device, minimum 0.01 foot accuracy, (electronic preferred for tracking water level drawdown during all pumping operations).

- Flow measurement supplies (e.g., graduated cylinder and stop watch or in-line flow meter).

- Power source (generator, nitrogen tank, etc.).
- Monitoring instruments for indicator parameters. Eh and dissolved oxygen must be monitored in-line using an instrument with a continuous readout display. Specific conductance, pH, and temperature may be monitored either in-line or using separate probes. A nephalometer is used to measure turbidity.

- Decontamination supplies (see Section VII, below).

- Logbook (see Section VIII, below).

- Sample bottles.

- Sample preservation supplies (as required by the analytical methods).

- Sample tags or labels, chain of custody.

V. SAMPLING PROCEDURES

Pre-Sampling Activities

1. Start at the well known or believed to have the least contaminated ground water and proceed systematically to the well with the most contaminated ground water. Check the well, the lock, and the locking cap for damage or evidence of tampering. Record observations.

2. Lay out sheet of polyethylene for placement of monitoring and sampling equipment.

3. Measure VOCs at the rim of the unopened well with a PID and FID instrument and record the reading in the field log book.

4. Remove well cap.

5. Measure VOCs at the rim of the opened well with a PID and an FID instrument and record the reading in the field log book.

6. If the well casing does not have a reference point (usually a V-cut or indelible mark in the well casing), make one. Note that the reference point should be surveyed for correction of ground water elevations to the mean geodesic datum (MSL).

7. Measure and record the depth to water (to 0.01 ft) in all wells to be sampled prior to purging. Care should be taken to minimize disturbance in the water column and dislodging of any particulate matter attached to the sides or settled at the bottom of the well.

8. If desired, measure and record the depth of any NAPLs using an interface probe. Care should be taken to minimize disturbance of any sediment that has accumulated at the bottom of the well. Record the observations in the log book. If LNAPLs and/or DNAPLs are detected, install the pump at this time, as described in step 9, below. Allow the well to sit for several days between the measurement or sampling of any DNAPLs and the low-stress purging and sampling of the ground water.

Sampling Procedures

9. Install Pump: Slowly lower the pump, safety cable, tubing and electrical lines into the well to the depth specified for that well in the EPA-approved QAPP or a depth otherwise approved by the EPA hydrogeologist or EPA project scientist. The pump intake must be kept at least two (2) feet above the bottom of the well to prevent disturbance and resuspension of any sediment or NAPL present in the bottom of the well. Record the depth to which the pump is lowered.

10. Measure Water Level: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.

11. Purge Well: Start pumping the well at 200 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every five minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water

level (drawdown of 0.3 ft or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. As noted above, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.

12. Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, Eh, and DO) approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996):

    ±0.1 for pH
    ±3% for specific conductance (conductivity)
    ±10 mv for redox potential
    ±10% for DO and turbidity

    Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.

13. Collect Samples: Collect samples at a flow rate between 100 and 250 ml/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft. VOC samples must be collected first and directly into sample containers. All sample containers should be filled with minimal turbulence by allowing the ground water to flow from the tubing gently down the inside of the container.

    Ground water samples to be analyzed for volatile organic compounds (VOCs) require pH adjustment. The appropriate EPA Program Guidance should be consulted to determine whether pH adjustment is necessary. If pH adjustment is necessary for VOC sample preservation, the amount of acid to be added to each sample vial prior to sampling should be determined, drop by drop, on a separate and equal volume of water (e.g., 40 ml). Ground water purged from the well prior to sampling can be used for this purpose.

14. Remove Pump and Tubing: After collection of the samples, the tubing, unless permanently installed, must be properly discarded or dedicated to the well for resampling by hanging the tubing inside the well.

15. Measure and record well depth.

16. Close and lock the well.

VI. FIELD QUALITY CONTROL SAMPLES

Quality control samples must be collected to determine if sample collection and handling procedures have adversely affected the quality of the ground water samples. The appropriate EPA Program Guidance should be consulted in preparing the field QC sample requirements of the site-specific QAPP.

All field quality control samples must be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples should be collected during the sampling event:

- Field duplicates
- Trip blanks for VOCs only
- Equipment blank (not necessary if equipment is dedicated to the well)

As noted above, ground water samples should be collected systematically from wells with the lowest level of contamination through to wells with highest level of contamination. The equipment blank should be collected after sampling from the most contaminated well.

VII. DECONTAMINATION

Non-disposable sampling equipment, including the pump and support cable and electrical wires which contact the sample, must be decontaminated thoroughly each day before use ("daily decon") and after each well is sampled ("between-well decon"). Dedicated, in-place pumps and tubing must be thoroughly decontaminated using "daily decon" procedures (see #17, below) prior to their initial use. For centrifugal pumps, it is strongly recommended that non-disposable sampling equipment, including the pump and support cable and electrical wires in contact with the sample, be decontaminated thoroughly each day before use ("daily decon").

EPA's field experience indicates that the life of centrifugal pumps may be extended by removing entrained grit. This also permits inspection and replacement of the cooling water in centrifugal pumps. All non-dedicated sampling equipment (pumps, tubing, etc.) must be

decontaminated after each well is sampled ("between-well decon," see #18 below).

17. **Daily Decon**

A) Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

B) Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

C) Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

D) Disassemble pump.

E) Wash pump parts: Place the disassembled parts of the pump into a deep basin containing 8 to 10 gallons of non-phosphate detergent solution. Scrub all pump parts with a test tube brush.

F) Rinse pump parts with potable water.

G) Rinse the following pump parts with distilled/ deionized water: inlet screen, the shaft, the suction interconnector, the motor lead assembly, and the stator housing.

H) Place impeller assembly in a large glass beaker and rinse with 1% nitric acid (HNO_3).

I) Rinse impeller assembly with potable water.

J) Place impeller assembly in a large glass bleaker and rinse with isopropanol.

K) Rinse impeller assembly with distilled/deionized water.

18. **Between-Well Decon**

A) Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.
B) Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5

minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

C) Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

D) Final Rinse: Operate pump in a deep basin of distilled/deionized water to pump out 1 to 2 gallons of this final rinse water.

VIII. FIELD LOG BOOK

A field log book must be kept each time ground water monitoring activities are conducted in the field. The field log book should document the following:

- Well identification number and physical condition.
- Well depth, and measurement technique.
- Static water level depth, date, time, and measurement technique.
- Presence and thickness of immiscible liquid layers and detection method.
- Collection method for immiscible liquid layers.
- Pumping rate, drawdown, indicator parameters values, and clock time, at three to five minute intervals; calculate or measure total volume pumped.
- Well sampling sequence and time of sample collection.
- Types of sample bottles used and sample identification numbers.
- Preservatives used.
- Parameters requested for analysis.
- Field observations of sampling event.
- Name of sample collector(s).
- Weather conditions.
- QA/QC data for field instruments.

IX. REFERENCES

Cohen, R.M. and J.W. Mercer, 1993, DNAPL Site Evaluation, C.K. Smoley Press, Boca Raton, Florida.

Puls, R.W. and M.J. Barcelona, 1996, Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures, EPA/540/S-95/504.

U.S. EPA, 1993, RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/530-R-93-001.

U.S. EPA Region II, 1989, CERCLA Quality Assurance Manual.