



NM OIL CONSERVATION
ARTESIA DISTRICT
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Apache Corporation

Eddy County, NM (NAD27 NME)

Tony Federal

#48

WB1/Job #1410652

Survey: Phoenix MWD Survey

Survey Report

16 May, 2014



PHOENIX
TECHNOLOGY SERVICES

Company: Apache Corporation
Project: Eddy County, NM (NAD27 NME)
Site: Tony Federal
Well: #48
Wellbore: WB1/Job #1410652
Design: Surveys (Capstar 118)

Local Co-ordinate Reference: Well #48
TVD Reference: KB @ 3771.00usft (Capstar 118)
MD Reference: KB @ 3771.00usft (Capstar 118)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: GCR DB v5000

Project: Eddy County, NM (NAD27 NME)

Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001

System Datum: Mean Sea Level

Site: Tony Federal

Site Position:	From: Map	Position Uncertainty: 0.00 usft	Northing: 666,516.20 usft	Easting: 628,898.80 usft	Slot Radius: 13-3/16 "	Latitude: 32° 49' 53.88921 N	Longitude: 103° 54' 49.29675 W	Grid Convergence: 0.23 °
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Well: #48

Well Position	+N/-S	0.00 usft	Northing: 666,516.20 usft	Latitude: 32° 49' 53.88921 N
	+E/-W	0.00 usft	Easting: 628,898.80 usft	Longitude: 103° 54' 49.29675 W
Position Uncertainty		0.00 usft	Wellhead Elevation: usft	Ground Level: 3,760.00 usft

Wellbore: WB1/Job #1410652

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2013	2014/04/15	7.56	60.61	48,634

Design: Surveys (Capstar 118)

Audit Notes:

Version: 1.0	Phase: ACTUAL	Tie On Depth: 0.00
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Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	89.67

Survey Program: Date 2014/05/16

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
371.02	6,416.00	Phoenix MWD Survey (WB1/Job #141065	MWD	MWD - Standard



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Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
0.00	0.00	0.00	-3,771.00	0.00	0.00	0.00	0.00	0.00	666,516.20	628,898.80	
371.02	1.20	238.50	-3,400.01	370.99	-2.03	-3.31	-3.32	0.32	666,514.17	628,895.49	
First Phoenix MWD Survey											
400.62	1.40	241.00	-3,370.41	400.59	-2.37	-3.89	-3.91	0.70	666,513.83	628,894.91	
430.23	1.20	218.50	-3,340.81	430.19	-2.79	-4.40	-4.42	1.84	666,513.41	628,894.40	
457.65	1.60	207.60	-3,313.40	457.60	-3.35	-4.76	-4.78	1.75	666,512.85	628,894.04	
487.13	1.60	199.20	-3,283.93	487.07	-4.10	-5.08	-5.11	0.79	666,512.10	628,893.72	
515.33	1.80	199.50	-3,255.74	515.26	-4.89	-5.36	-5.39	0.71	666,511.31	628,893.44	
542.45	1.90	191.40	-3,228.64	542.36	-5.73	-5.59	-5.63	1.03	666,510.47	628,893.21	
573.35	1.10	197.40	-3,197.75	573.25	-6.52	-5.78	-5.82	2.63	666,509.68	628,893.02	
615.79	0.90	184.80	-3,155.32	615.68	-7.24	-5.93	-5.97	0.70	666,508.96	628,892.87	
658.54	0.70	187.90	-3,112.57	658.43	-7.83	-6.00	-6.04	0.48	666,508.37	628,892.80	
701.26	0.70	117.60	-3,069.85	701.15	-8.21	-5.80	-5.85	1.89	666,507.99	628,893.00	
744.05	1.40	92.60	-3,027.07	743.93	-8.36	-5.05	-5.10	1.92	666,507.84	628,893.75	
786.77	1.80	93.70	-2,984.37	786.63	-8.42	-3.86	-3.91	0.94	666,507.78	628,894.94	
829.55	2.10	86.00	-2,941.61	829.39	-8.41	-2.40	-2.45	0.93	666,507.79	628,896.40	
872.29	2.60	88.10	-2,898.91	872.09	-8.33	-0.65	-0.70	1.19	666,507.87	628,898.15	
915.02	2.50	80.70	-2,856.22	914.78	-8.14	1.23	1.19	0.80	666,508.06	628,900.03	
957.77	1.90	80.70	-2,813.50	957.50	-7.88	2.85	2.81	1.40	666,508.32	628,901.65	
1,000.52	2.30	76.80	-2,770.78	1,000.22	-7.57	4.39	4.34	0.99	666,508.63	628,903.19	
1,043.25	1.90	90.90	-2,728.08	1,042.92	-7.38	5.93	5.89	1.52	666,508.82	628,904.73	
1,085.88	1.60	105.70	-2,685.47	1,085.53	-7.56	7.21	7.17	1.27	666,508.64	628,906.01	
1,128.59	1.60	108.10	-2,642.77	1,128.23	-7.90	8.35	8.31	0.16	666,508.30	628,907.15	
1,171.30	1.80	89.50	-2,600.08	1,170.92	-8.08	9.59	9.54	1.37	666,508.12	628,908.39	
1,214.04	2.10	63.80	-2,557.37	1,213.63	-7.73	10.96	10.92	2.14	666,508.47	628,909.76	
1,256.76	2.30	65.60	-2,514.68	1,256.32	-7.03	12.45	12.41	0.50	666,509.17	628,911.25	
1,299.50	2.50	59.60	-2,471.98	1,299.02	-6.20	14.03	14.00	0.75	666,510.00	628,912.83	



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Database: GCR DB v5000

Survey											
MD (usft)	Inc. (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (%/100usft)	Northing (usft)	Easting (usft)	
1,342.90	2.30	49.00	-2,428.61	1,342.39	-5.15	15.50	15.47	1.12	666,511.05	628,914.30	
1,384.91	1.80	49.40	-2,386.63	1,384.37	-4.17	16.64	16.62	1.19	666,512.03	628,915.44	
1,427.63	1.80	46.20	-2,343.93	1,427.07	-3.27	17.64	17.62	0.24	666,512.93	628,916.44	
1,470.35	1.80	55.70	-2,301.23	1,469.77	-2.43	18.67	18.66	0.70	666,513.77	628,917.47	
1,513.06	1.40	64.90	-2,258.54	1,512.46	-1.83	19.70	19.69	1.11	666,514.37	628,918.50	
1,598.49	1.40	69.40	-2,173.14	1,597.86	-1.02	21.62	21.62	0.13	666,515.18	628,920.42	
1,683.73	1.60	76.80	-2,087.92	1,683.08	-0.38	23.76	23.75	0.33	666,515.82	628,922.56	
1,769.19	1.90	77.90	-2,002.50	1,768.50	0.19	26.30	26.30	0.35	666,516.39	628,925.10	
1,854.66	2.10	93.00	-1,917.09	1,853.91	0.40	29.25	29.25	0.66	666,516.60	628,928.05	
1,897.36	2.10	95.40	-1,874.41	1,896.59	0.29	30.81	30.81	0.21	666,516.49	628,929.61	
1,982.75	1.60	98.60	-1,789.07	1,981.93	-0.04	33.55	33.55	0.60	666,516.16	628,932.35	
2,025.45	1.80	89.10	-1,746.39	2,024.61	-0.11	34.81	34.81	0.81	666,516.09	628,933.61	
2,110.81	1.90	87.00	-1,661.07	2,109.93	-0.02	37.56	37.56	0.14	666,516.18	628,936.36	
2,196.15	1.80	88.10	-1,575.78	2,195.22	0.10	40.31	40.31	0.12	666,516.30	628,939.11	
2,281.58	2.30	83.20	-1,490.40	2,280.60	0.35	43.36	43.36	0.62	666,516.55	628,942.16	
2,367.03	2.10	99.70	-1,405.01	2,365.99	0.29	46.60	46.60	0.77	666,516.49	628,945.40	
2,452.40	1.80	95.10	-1,319.69	2,451.31	-0.10	49.48	49.48	0.40	666,516.10	628,948.28	
2,537.76	1.80	104.20	-1,234.38	2,536.62	-0.55	52.12	52.11	0.33	666,515.65	628,950.92	
2,623.26	1.80	86.00	-1,148.92	2,622.08	-0.78	54.76	54.75	0.67	666,515.42	628,953.56	
2,708.61	1.80	95.10	-1,063.61	2,707.39	-0.81	57.43	57.42	0.33	666,515.39	628,956.23	
2,794.04	2.10	84.60	-978.23	2,792.77	-0.78	60.32	60.32	0.54	666,515.42	628,959.12	
2,879.44	2.30	83.20	-892.89	2,878.11	-0.43	63.58	63.58	0.24	666,515.77	628,962.38	
2,964.97	2.10	76.50	-807.42	2,963.58	0.14	66.81	66.81	0.38	666,516.34	628,965.61	
3,050.41	2.50	93.00	-722.05	3,048.95	0.41	70.19	70.20	0.90	666,516.61	628,968.99	
3,135.81	2.50	87.70	-636.73	3,134.27	0.39	73.92	73.92	0.27	666,516.59	628,972.72	
3,221.27	2.50	85.60	-551.35	3,219.65	0.60	77.64	77.64	0.11	666,516.80	628,976.44	
3,306.81	2.10	88.80	-465.88	3,305.12	0.78	81.06	81.07	0.49	666,516.98	628,979.86	



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3,393.24	2.60	94.80	-379.53	3,391.47	0.65	84.60	84.60	0.64	666,516.85	628,983.40	
3,460.00	2.30	87.00	-312.83	3,458.17	0.59	87.45	87.45	0.67	666,516.79	628,986.25	
3,508.00	2.30	88.00	-264.87	3,506.13	0.68	89.37	89.37	0.08	666,516.88	628,988.17	
3,520.30	2.60	88.80	-252.58	3,518.42	0.69	89.90	89.90	2.45	666,516.89	628,988.70	
3,615.71	1.40	88.40	-157.23	3,613.77	0.77	93.23	93.23	1.26	666,516.97	628,992.03	
3,692.07	1.40	91.20	-80.89	3,690.11	0.77	95.09	95.09	0.09	666,516.97	628,993.89	
3,776.38	1.60	90.90	3.39	3,774.39	0.73	97.30	97.30	0.24	666,516.93	628,996.10	
3,861.77	1.80	99.30	88.74	3,859.74	0.50	99.81	99.81	0.37	666,516.70	628,998.61	
3,947.18	1.90	67.70	174.11	3,945.11	0.82	102.45	102.45	1.18	666,517.02	629,001.25	
4,075.29	1.10	86.70	302.18	4,073.18	1.70	105.64	105.65	0.73	666,517.90	629,004.44	
4,160.63	1.60	95.80	387.49	4,158.49	1.62	107.64	107.65	0.64	666,517.82	629,006.44	
4,245.80	1.40	95.10	472.63	4,243.63	1.41	109.86	109.87	0.24	666,517.61	629,008.66	
4,331.10	2.30	89.80	557.89	4,328.89	1.32	112.61	112.62	1.07	666,517.52	629,011.41	
4,416.50	2.30	90.90	643.22	4,414.22	1.30	116.04	116.04	0.05	666,517.50	629,014.84	
4,501.91	2.10	92.60	728.57	4,499.57	1.20	119.31	119.32	0.25	666,517.40	629,018.11	
4,587.31	2.50	100.40	813.90	4,584.90	0.80	122.71	122.71	0.59	666,517.00	629,021.51	
4,672.77	1.90	94.40	899.29	4,670.29	0.35	125.96	125.96	0.75	666,516.55	629,024.76	
4,758.22	1.80	87.70	984.70	4,755.70	0.30	128.71	128.71	0.28	666,516.50	629,027.51	
4,886.22	1.90	91.90	1,112.63	4,883.63	0.31	132.84	132.84	0.13	666,516.51	629,031.64	
4,971.49	2.10	90.90	1,197.85	4,968.85	0.24	135.81	135.81	0.24	666,516.44	629,034.61	
5,056.54	2.10	90.20	1,282.84	5,053.84	0.21	138.93	138.93	0.03	666,516.41	629,037.73	
5,141.97	2.30	92.60	1,368.21	5,139.21	0.12	142.21	142.21	0.26	666,516.32	629,041.01	
5,227.38	2.10	89.10	1,453.56	5,224.56	0.07	145.48	145.48	0.28	666,516.27	629,044.28	
5,312.82	2.10	91.60	1,538.94	5,309.94	0.05	148.61	148.61	0.11	666,516.25	629,047.41	
5,398.28	1.90	91.20	1,624.35	5,395.35	-0.02	151.60	151.59	0.23	666,516.18	629,050.40	
5,483.62	1.80	91.60	1,709.64	5,480.64	-0.09	154.35	154.35	0.12	666,516.11	629,053.15	
5,569.07	1.90	94.00	1,795.05	5,566.05	-0.23	157.10	157.10	0.15	666,515.97	629,055.90	

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5,654.50	1.90	75.40	1,880.43	5,651.43	0.03	159.89	159.89	0.72	666,516.23	629,058.69	
5,739.92	2.50	81.00	1,965.79	5,736.79	0.68	163.10	163.10	0.75	666,516.88	629,061.90	
5,825.21	2.60	82.40	2,051.00	5,822.00	1.23	166.85	166.86	0.14	666,517.43	629,065.65	
5,914.63	2.60	96.50	2,140.33	5,911.33	1.27	170.88	170.88	0.71	666,517.47	629,069.68	
5,996.03	2.80	94.40	2,221.63	5,992.63	0.91	174.70	174.70	0.27	666,517.11	629,073.50	
6,081.41	2.80	95.10	2,306.91	6,077.91	0.56	178.85	178.85	0.04	666,516.76	629,077.65	
6,166.85	2.60	91.90	2,392.26	6,163.26	0.31	182.87	182.87	0.29	666,516.51	629,081.67	
6,370.00	2.60	84.90	2,595.20	6,366.20	0.57	192.06	192.06	0.16	666,516.77	629,090.86	
Final Phoenix MWD Survey											
6,416.00	2.60	84.90	2,641.15	6,412.15	0.75	194.14	194.14	0.00	666,516.95	629,092.94	
Projection to TD											

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
371.02	370.99	-2.03	-3.31	First Phoenix MWD Survey
6,370.00	6,366.20	0.57	192.06	Final Phoenix MWD Survey
6,416.00	6,412.15	0.75	194.14	Projection to TD

Checked By: _____ Approved By: _____ Date: _____