



30-015-41990

Apache Corporation

Eddy County, NM (NAD27 NME)

Tony Federal

#51

WB1/Job #1410678

Design: Surveys (Capstar 118)

Standard Survey Report

12 May, 2014



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #51
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3761.00usft (Capstar 118)
Site:	Tony Federal	MD Reference:	KB @ 3761.00usft (Capstar 118)
Well:	#51	North Reference:	Grid
Wellbore:	WB1/Job #1410678	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 118)	Database:	GCR DB

Project	Eddy County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site		Tony Federal			
Site Position:		Northing:	666,516.20 usft	Latitude:	32° 49' 53.88921 N
From:	Map	Easting:	628,898.80 usft	Longitude:	103° 54' 49.29676 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.23 °

Well	#51					
Well Position	+N/-S	0.00 usft	Northing:	666,215.00 usft	Latitude:	32° 49' 50.85266 N
	+E/-W	0.00 usft	Easting:	630,319.50 usft	Longitude:	103° 54' 32.66061 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,750.00 usft

Wellbore	WB1/Job #1410678				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2013	04/15/14	7.56	60.61	48,634

Design	Surveys (Capstar 118)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	181.46	

Survey Program	Date	05/12/14			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
50.00	300.00	Gyro Survey (WB1/Job #1410678)	MWD	MWD - Standard	
338.73	6,405.00	Phoenix MWD Survey (WB1/Job #141067)	MWD	MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
50.00	0.51	354.08	50.00	0.22	-0.02	-0.22	1.02	1.02	0.00	
100.00	0.67	10.50	100.00	0.73	0.01	-0.73	0.46	0.32	32.84	
150.00	0.93	3.03	149.99	1.42	0.08	-1.42	0.56	0.52	-14.94	
200.00	1.72	340.39	199.98	2.53	-0.15	-2.53	1.87	1.58	-45.28	
250.00	2.75	334.91	249.94	4.33	-0.91	-4.30	2.10	2.06	-10.96	
300.00	3.36	332.40	299.87	6.71	-2.10	-6.66	1.25	1.22	-5.02	
Tie-on to Gyro Survey										
338.73	3.80	329.90	338.52	8.83	-3.27	-8.74	1.21	1.14	-6.45	

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Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
First Phoenix MWD Survey									
367.29	3.70	329.50	367.02	10.44	-4.21	-10.33	0.36	-0.35	-1.40
396.39	3.10	322.70	396.07	11.88	-5.16	-11.74	2.48	-2.06	-23.37
427.27	2.40	310.80	426.91	12.96	-6.16	-12.80	2.91	-2.27	-38.54
457.69	2.20	296.30	457.31	13.64	-7.16	-13.45	2.02	-0.66	-47.67
487.25	1.90	285.70	486.85	14.02	-8.14	-13.81	1.63	-1.01	-35.86
516.86	1.30	274.00	516.45	14.18	-8.95	-13.95	2.30	-2.03	-39.51
559.57	1.00	235.60	559.15	14.00	-9.74	-13.75	1.89	-0.70	-89.91
602.25	1.00	212.70	601.83	13.48	-10.25	-13.21	0.93	0.00	-53.66
687.62	1.00	206.40	687.18	12.18	-10.98	-11.90	0.13	0.00	-7.38
773.02	1.60	160.70	772.56	10.39	-10.92	-10.11	1.35	0.70	-53.51
858.43	2.00	154.40	857.93	7.92	-9.88	-7.67	0.52	0.47	-7.38
943.76	2.20	147.50	943.20	5.20	-8.36	-4.98	0.38	0.23	-8.09
1,029.09	2.40	156.40	1,028.46	2.18	-6.76	-2.01	0.48	0.23	10.43
1,114.55	2.10	177.70	1,113.86	-1.03	-5.98	1.18	1.03	-0.35	24.92
1,199.99	2.30	177.80	1,199.24	-4.30	-5.86	4.45	0.23	0.23	0.12
1,285.52	2.80	178.20	1,284.68	-8.11	-5.72	8.25	0.58	0.58	0.47
1,370.95	3.20	174.70	1,369.99	-12.57	-5.44	12.70	0.51	0.47	-4.10
1,456.26	3.50	173.90	1,455.16	-17.53	-4.94	17.65	0.36	0.35	-0.94
1,541.67	3.90	178.80	1,540.39	-23.02	-4.60	23.13	0.60	0.47	5.74
1,627.12	3.90	180.00	1,625.64	-28.83	-4.54	28.94	0.10	0.00	1.40
1,712.56	4.00	178.90	1,710.88	-34.72	-4.49	34.82	0.15	0.12	-1.29
1,797.87	3.60	182.20	1,796.00	-40.37	-4.53	40.47	0.53	-0.47	3.87
1,883.31	3.60	184.20	1,881.27	-45.73	-4.83	45.83	0.15	0.00	2.34
1,968.73	3.90	183.60	1,966.51	-51.30	-5.21	51.42	0.35	0.35	-0.70
2,054.18	3.80	183.20	2,051.77	-57.03	-5.55	57.15	0.12	-0.12	-0.47
2,139.62	3.50	182.70	2,137.03	-62.46	-5.83	62.59	0.35	-0.35	-0.59
2,224.98	3.60	181.80	2,222.23	-67.74	-6.04	67.87	0.13	0.12	-1.05
2,310.32	3.80	181.60	2,307.39	-73.24	-6.20	73.38	0.23	0.23	-0.23
2,395.81	4.10	181.40	2,392.68	-79.13	-6.36	79.27	0.35	0.35	-0.23
2,481.24	3.70	183.70	2,477.91	-84.94	-6.61	85.08	0.50	-0.47	2.69
2,566.66	3.80	181.30	2,563.15	-90.52	-6.85	90.66	0.22	0.12	-2.81
2,652.00	4.00	179.90	2,648.29	-96.32	-6.91	96.46	0.26	0.23	-1.64
2,737.13	3.90	180.60	2,733.22	-102.18	-6.93	102.33	0.13	-0.12	0.82
2,822.85	4.20	180.60	2,818.73	-108.24	-7.00	108.38	0.35	0.35	0.00
2,908.30	4.00	180.30	2,903.96	-114.35	-7.05	114.49	0.24	-0.23	-0.35
2,993.73	3.70	180.60	2,989.19	-120.08	-7.09	120.22	0.35	-0.35	0.35
3,079.17	4.00	181.20	3,074.44	-125.82	-7.18	125.96	0.35	0.35	0.70
3,164.47	4.40	177.80	3,159.51	-132.06	-7.12	132.20	0.55	0.47	-3.99
3,249.94	4.30	178.60	3,244.74	-138.54	-6.91	138.67	0.14	-0.12	0.94
3,335.46	4.00	177.10	3,330.03	-144.73	-6.69	144.85	0.37	-0.35	-1.75
3,437.00	4.00	178.40	3,431.32	-151.80	-6.41	151.92	0.09	0.00	1.28
3,485.00	4.12	178.46	3,479.20	-155.20	-6.31	155.31	0.25	0.25	0.13

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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
3,518.79	4.20	178.50	3,512.90	-157.65	-6.25	157.76	0.24	0.24	0.12
3,604.08	2.80	177.80	3,598.03	-162.85	-6.09	162.96	1.64	-1.64	-0.82
3,689.51	2.60	177.10	3,683.37	-166.88	-5.91	166.97	0.24	-0.23	-0.82
3,774.93	2.90	199.90	3,768.69	-170.84	-6.55	170.95	1.32	0.35	26.69
3,860.24	3.10	194.30	3,853.89	-175.11	-7.85	175.25	0.42	0.23	-6.56
3,945.84	4.00	185.00	3,939.32	-180.32	-8.68	180.49	1.24	1.05	-10.86
4,031.29	4.00	184.30	4,024.56	-186.26	-9.17	186.44	0.06	0.00	-0.82
4,116.67	3.50	174.10	4,109.76	-191.83	-9.12	192.00	0.97	-0.59	-11.95
4,202.07	3.60	175.30	4,195.00	-197.09	-8.63	197.25	0.15	0.12	1.41
4,287.46	4.40	184.70	4,280.18	-203.03	-8.68	203.18	1.21	0.94	11.01
4,372.91	4.10	182.50	4,365.39	-209.35	-9.08	209.51	0.40	-0.35	-2.57
4,458.13	4.10	182.90	4,450.40	-215.43	-9.37	215.60	0.03	0.00	0.47
4,543.41	4.10	180.60	4,535.46	-221.53	-9.56	221.70	0.19	0.00	-2.70
4,628.83	4.00	181.40	4,620.66	-227.56	-9.66	227.73	0.13	-0.12	0.94
4,714.26	4.10	183.50	4,705.88	-233.59	-9.92	233.76	0.21	0.12	2.46
4,799.69	4.30	182.10	4,791.08	-239.83	-10.23	240.02	0.26	0.23	-1.64
4,885.09	4.30	179.80	4,876.24	-246.24	-10.33	246.42	0.20	0.00	-2.69
4,970.27	4.30	176.50	4,961.18	-252.62	-10.13	252.79	0.29	0.00	-3.87
5,055.65	4.10	178.10	5,046.33	-258.86	-9.83	259.03	0.27	-0.23	1.87
5,140.67	4.20	179.20	5,131.13	-265.01	-9.68	265.17	0.15	0.12	1.29
5,226.08	3.50	178.80	5,216.35	-270.75	-9.59	270.90	0.82	-0.82	-0.47
5,311.50	3.40	177.20	5,301.61	-275.88	-9.41	276.03	0.16	-0.12	-1.87
5,396.90	3.00	178.70	5,386.88	-280.65	-9.23	280.79	0.48	-0.47	1.76
5,482.30	3.10	183.70	5,472.16	-285.18	-9.33	285.33	0.33	0.12	5.85
5,567.70	4.10	186.70	5,557.39	-290.52	-9.84	290.68	1.19	1.17	3.51
5,653.11	4.30	183.30	5,642.57	-296.75	-10.38	296.92	0.37	0.23	-3.98
5,738.46	4.10	185.50	5,727.69	-302.98	-10.85	303.16	0.30	-0.23	2.58
5,823.76	4.10	185.70	5,812.77	-309.05	-11.45	309.24	0.02	0.00	0.23
5,909.19	4.20	179.20	5,897.98	-315.22	-11.71	315.41	0.56	0.12	-7.61
5,994.61	4.10	179.10	5,983.17	-321.40	-11.62	321.59	0.12	-0.12	-0.12
6,080.06	4.10	179.00	6,068.40	-327.51	-11.52	327.70	0.01	0.00	-0.12
6,165.55	3.90	178.20	6,153.69	-333.47	-11.37	333.65	0.24	-0.23	-0.94
6,250.94	3.50	176.30	6,238.90	-338.97	-11.11	339.15	0.49	-0.47	-2.23
6,360.00	3.30	179.90	6,347.77	-345.43	-10.89	345.60	0.27	-0.18	3.30
Last Phoenix MWD Survey									
6,405.00	3.30	179.90	6,392.69	-348.02	-10.89	348.19	0.00	0.00	0.00
Projection to TD									

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Well:	#51	North Reference:	Grid
Wellbore:	WB1/Job #1410678	Survey Calculation Method:	Minimum Curvature
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Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
300.00	299.87	6.71	-2.10	Tie-on to Gyro Survey
338.73	338.52	8.83	-3.27	First Phoenix MWD Survey
6,360.00	6,347.77	-345.43	-10.89	Last Phoenix MWD Survey
6,405.00	6,392.69	-348.02	-10.89	Projection to TD

Checked By: _____ Approved By: _____ Date: _____