



30-015-41942

Apache Corporation

Eddy County, NM (NAD27 NME)
Crow Federal
#26H

WB1/Job #1311119

Design: Surveys (Capstar 114)

Standard Survey Report

14 April, 2014

NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 12 2015

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PHOENIX
TECHNOLOGY SERVICES



Phoenix Technology Services Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #26H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3952.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3952.00usft (Capstar 114)
Well:	#26H	North Reference:	Grid
Wellbore:	WB1/Job #1311119	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR DB

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

Site:	Crow Federal		
Site Position:		Northing:	671,130.90 usft
From:	Map	Easting:	643,808.80 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 50' 38.92796 N
		Longitude:	103° 51' 53.16689 W
		Grid Convergence:	0.25 "

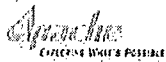
Well:	#26H		
Well Position:	+N-S	0.00 usft	Northing:
	+E-W	0.00 usft	Easting:
Position Uncertainty:	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 51' 6.26282 N
		Longitude:	103° 50' 58.10525 W
		Ground Level:	3,941.00 usft

Wellbore:	WB1/Job #1311119		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010_14	03/28/14	7.42
		Dip Angle	60.65
		Field Strength	48,681

Design:	Surveys (Capstar 114)		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
Vertical Section:	Depth From (TVD)	+N-S	+E-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
		Direction	269.61
		(°)	

Survey Program	Date	04/14/14		
From	To	Survey (Wellbore)	Tool Name	Description
100.00	688.00	Gyro Survey (WB1/Job #1311119)	CB-GYRO-MS	Camera based gyro mullshot
608.00	10,251.00	Phoenix MWD Survey (WB1/Job #1311119)	MWD	MWD - Standard

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
100.00	0.20	105.98	100.00	-0.05	0.17	-0.17	0.20	0.20	0.00
200.00	0.28	98.31	200.00	-0.12	0.58	-0.58	0.09	0.08	-9.65
300.00	0.39	99.08	300.00	-0.20	1.16	-1.16	0.11	0.11	2.75
400.00	0.55	95.89	399.89	-0.31	1.97	-1.97	0.18	0.16	-3.07
500.00	0.48	98.98	499.89	-0.41	2.88	-2.88	0.07	-0.07	0.99
600.00	0.39	108.05	599.89	-0.58	3.60	-3.60	0.12	-0.09	11.07
688.00	0.29	247.65	687.99	-0.74	3.60	-3.68	0.73	-0.11	158.64
Tie-on to Gyro Survey									
808.00	0.30	260.30	807.98	-0.91	3.09	-3.05	0.05	0.01	10.54



Phoenix Technology Services Survey Report



Company: Apache Corporation
Project: Eddy County, NM (NAD27 NME)
Site: Crow Federal
Well: #26H
Wellbore: WB1/Job #1311119
Design: Surveys (Capstar 114)

Local Co-ordinate Reference: Well #26H
TVD Reference: KB @ 3952.00usft (Capstar 114)
MD Reference: KB @ 3952.00usft (Capstar 114)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: GCR DB

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									
936.00	0.30	255.70	935.98	-1.05	2.44	-2.43	0.02	0.00	-3.50
1,067.00	0.30	265.10	1,066.88	-1.16	1.78	-1.75	0.04	0.00	7.18
1,198.00	0.20	22.20	1,195.98	-0.98	1.51	-1.50	0.33	-0.08	80.78
1,324.00	0.30	47.70	1,323.98	-0.55	1.84	-1.84	0.12	0.08	10.02
1,452.00	0.80	15.80	1,451.98	0.32	2.27	-2.28	0.30	0.23	-24.92
1,581.00	0.50	39.20	1,580.97	1.41	2.81	-2.82	0.19	-0.08	18.14
1,709.00	0.80	55.60	1,708.98	2.41	3.09	-4.01	0.35	0.31	12.73
1,838.00	1.00	65.40	1,837.94	3.45	5.85	-5.88	-0.15	0.08	7.67
1,968.00	0.80	23.80	1,965.93	4.73	7.23	-7.26	0.52	-0.18	-32.50
2,094.00	1.40	328.50	2,093.91	6.85	6.73	-6.77	0.92	0.47	-44.77
2,223.00	2.70	308.00	2,222.82	10.04	3.46	-3.53	1.12	1.01	-14.34
2,354.00	3.80	298.40	2,353.61	14.00	-2.79	2.69	-0.83	0.84	-7.33
2,482.00	3.00	283.00	2,481.32	17.72	-10.53	10.40	0.29	0.08	-4.22
2,611.00	2.20	290.70	2,610.14	20.31	-16.88	16.74	1.32	-1.32	-1.78
2,739.00	2.10	288.80	2,738.05	21.93	-21.40	21.25	-0.10	-0.08	-1.64
2,867.00	2.20	286.50	2,865.95	23.37	-25.90	25.82	0.10	0.08	-1.64
2,996.00	2.10	278.40	2,994.88	24.42	-30.69	30.52	-0.25	-0.08	-8.28
3,124.00	1.80	289.20	3,122.80	24.74	-34.80	34.63	0.45	-0.39	-7.18
3,252.00	1.40	284.50	3,250.75	24.66	-36.14	37.97	0.19	-0.16	-3.67
3,381.00	1.40	271.90	3,379.72	24.47	-41.29	41.12	0.14	0.00	5.74
3,448.00	1.30	263.90	3,446.70	24.41	-42.66	42.69	-0.32	-0.15	-11.94
3,587.00	1.40	251.20	3,585.66	23.70	-48.03	46.87	0.23	0.07	-9.14
3,716.00	1.00	183.20	3,713.64	22.08	-47.58	47.43	1.08	-0.31	-53.13
3,844.00	1.40	129.10	3,842.61	19.88	-48.42	48.28	0.89	0.31	-41.84
3,972.00	1.20	116.70	3,970.58	18.39	-44.00	43.87	0.28	-0.16	-10.47
4,100.00	1.40	121.70	4,098.55	16.89	-41.46	41.34	0.19	0.16	4.69
4,232.00	1.00	121.20	4,230.62	15.55	-39.10	38.99	0.30	-0.30	-0.38
4,360.00	1.00	117.30	4,358.60	14.45	-37.15	37.05	0.05	0.00	-3.05
4,489.00	1.10	110.20	4,487.48	13.51	-34.99	34.90	0.13	0.08	-5.50
4,617.00	1.00	122.00	4,615.45	12.49	-32.89	32.80	0.19	-0.08	9.22
4,745.00	0.70	51.80	4,743.44	12.39	-31.33	31.24	0.78	-0.23	-54.77
4,873.00	0.80	52.30	4,871.43	13.41	-30.01	29.91	0.08	0.08	0.31
5,005.00	1.00	358.80	5,003.42	15.13	-29.30	29.20	0.63	0.15	-40.53
5,133.00	1.20	358.00	5,131.30	17.59	-29.37	29.25	0.16	0.16	-0.63
5,261.00	1.30	2.20	5,259.38	20.38	-29.30	29.22	0.11	0.08	3.28
5,329.00	1.40	3.00	5,327.34	21.98	-29.29	29.14	0.15	0.15	1.18
5,395.00	2.20	303.70	5,393.32	23.48	-30.30	30.14	2.90	1.21	-89.85
5,438.00	6.70	272.00	5,436.18	24.07	-33.49	33.33	11.49	10.47	-71.63
5,480.00	11.30	270.00	5,477.65	24.19	-40.08	39.89	11.00	10.95	-8.80
5,523.00	15.40	268.20	5,519.48	24.01	-49.88	49.82	9.58	9.53	-4.19
5,566.00	20.50	265.50	5,560.30	23.24	-63.20	63.05	12.01	11.86	-6.28
5,609.00	25.00	263.60	5,599.88	21.61	-80.00	79.91	12.68	12.56	-4.42



Phoenix Technology Services
Survey Report

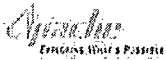


Company: Apache Corporation
Project: Eddy County, NM (NAD27 NME)
Site: Crow Federal
Well: #26H
Wellbore: WB1/Job #1311119
Design: Surveys (Capstar 114)

Local Co-ordinate Reference: Well #26H
TVD Reference: KB @ 3952.00usft (Capstar 114)
MD Reference: KB @ 3952.00usft (Capstar 114)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: GCR DB

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)
5,652.00	31.70	262.60	5,637.55	19.14	-100.62	100.48	13.52	13.49	-1.86
5,694.00	37.80	263.50	5,672.04	16.30	-124.37	124.26	14.55	14.52	1.67
5,737.00	43.60	268.40	5,704.03	13.87	-152.29	152.19	14.18	13.49	6.74
5,780.00	48.70	268.30	5,734.41	12.46	-183.26	183.17	12.28	11.86	4.42
5,823.00	52.90	267.80	5,761.58	11.32	-216.55	216.47	9.81	9.77	-1.16
5,865.00	57.40	267.40	5,785.58	9.88	-250.98	260.91	10.74	10.71	-0.95
5,908.00	62.70	267.60	5,807.04	8.25	-288.19	288.13	12.33	12.33	0.47
5,953.00	67.30	267.90	5,828.05	6.66	-328.93	328.88	10.24	10.22	0.67
5,998.00	72.80	268.40	5,840.72	4.64	-369.28	369.24	13.20	12.70	-3.49
6,039.00	75.80	268.70	5,852.42	2.15	-410.68	410.55	6.55	6.51	0.70
6,082.00	80.80	267.30	5,861.10	-0.05	-452.60	452.59	12.40	12.33	1.40
6,124.00	86.80	267.80	5,865.84	-1.84	-494.31	494.31	14.33	14.29	1.19
6,167.00	91.30	268.70	5,868.31	-3.15	-537.27	537.28	10.44	10.23	2.09
6,295.00	92.00	268.60	5,882.83	-6.16	-666.18	666.21	0.55	0.55	-0.08
6,424.00	92.00	268.50	5,898.13	-9.42	-794.08	794.11	0.08	0.00	-0.08
6,552.00	91.20	268.30	5,854.55	-11.98	-921.99	922.05	0.88	-0.63	0.83
6,680.00	92.00	269.10	5,850.98	-13.67	-1,049.92	1,049.99	0.64	0.63	-0.16
6,808.00	90.20	270.00	5,848.52	-14.67	-1,177.89	1,177.96	1.57	-1.41	0.70
6,936.00	90.30	268.60	5,847.88	-16.24	-1,305.88	1,305.90	1.10	0.08	-1.09
7,064.00	90.20	270.60	5,847.40	-17.13	-1,433.87	1,433.95	1.56	-0.08	1.58
7,192.00	90.60	270.40	5,848.51	-16.01	-1,561.86	1,561.93	0.35	0.31	-0.16
7,323.00	91.00	270.70	5,844.68	-14.75	-1,692.84	1,692.90	0.38	0.31	-0.23
7,451.00	91.20	270.90	5,842.22	-12.87	-1,820.80	1,820.85	0.22	0.16	0.16
7,579.00	89.80	270.20	5,838.88	-11.74	-1,948.77	1,948.81	0.59	-0.23	-0.55
7,707.00	90.00	269.40	5,830.87	-12.19	-2,076.77	2,076.80	0.94	-0.70	-0.63
7,836.00	90.30	269.40	5,838.54	-13.54	-2,205.76	2,205.80	0.23	0.23	0.00
7,967.00	91.00	269.00	5,837.05	-15.37	-2,336.74	2,336.79	0.62	0.53	-0.31
8,095.00	90.80	268.50	5,834.93	-16.16	-2,464.69	2,464.75	0.40	-0.08	-0.39
8,223.00	90.80	269.10	5,832.92	-20.84	-2,592.64	2,592.73	0.47	0.00	0.47
8,355.00	91.40	269.00	5,830.27	-23.03	-2,724.60	2,724.69	0.39	0.38	-0.08
8,483.00	91.50	269.00	5,827.03	-25.26	-2,852.54	2,852.64	0.08	0.08	0.00
8,612.00	91.30	269.10	5,823.68	-27.40	-2,981.48	2,981.60	0.17	-0.16	0.08
8,740.00	90.80	270.00	5,821.42	-28.40	-3,109.45	3,109.67	0.77	-0.31	0.70
8,869.00	91.40	270.20	5,818.83	-26.16	-3,239.43	3,239.54	0.42	0.39	0.16
9,000.00	91.10	270.80	5,815.97	-27.03	-3,369.39	3,369.49	0.51	-0.23	0.46
9,128.00	91.30	271.10	5,813.29	-24.91	-3,497.34	3,497.43	0.28	-0.16	0.23
9,256.00	91.10	271.80	5,810.61	-21.87	-3,625.27	3,625.34	0.57	-0.16	0.55
9,385.00	90.60	270.80	5,808.70	-16.75	-3,754.22	3,754.26	0.67	-0.39	-0.76
9,513.00	90.80	270.70	5,807.13	-17.07	-3,882.20	3,882.23	0.17	0.16	-0.08
9,642.00	90.60	269.80	5,805.56	-16.51	-4,011.19	4,011.21	0.71	-0.16	-0.70
9,770.00	91.30	269.60	5,803.44	-17.18	-4,139.17	4,139.19	0.67	0.55	-0.16
9,898.00	90.80	269.50	5,801.09	-18.19	-4,267.14	4,267.17	0.40	-0.39	-0.08
10,027.00	89.00	268.80	5,800.30	-19.99	-4,396.13	4,396.18	0.84	-0.70	-0.47
10,155.00	90.40	268.10	5,790.07	-23.34	-4,524.08	4,524.14	0.74	0.39	-0.63



Phoenix Technology Services
Survey Report



Company: Apache Corporation
Project: Eddy County, NM (NAD27 NME)
Site: Crow Federal
Well: #28H
Wellbore: WB1/Job #1311110
Design: Surveys (Capstar 114)

Local Co-ordinate Reference: Well #28H
TVD Reference: KB @ 3952.00usft (Capstar 114)
MD Reference: KB @ 3952.00usft (Capstar 114)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: GCR DB

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)
10,181.00	90.60	269.10	5,799.74	-23.97	-4,550.07	4,550.13	3.92	0.77	3.85
Last Phoenix MWD Survey									
10,251.00	90.60	269.10	5,799.01	-25.07	-4,620.06	4,620.12	0.00	0.00	0.00
Projection to TD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N-S (usft)	+E-W (usft)	
688.00	687.99	-0.74	3.68	Tile-on to Gyro Survey
808.00	807.98	-0.81	3.09	First Phoenix MWD Survey
10,181.00	5,799.74	-23.97	-4,550.07	Last Phoenix MWD Survey
10,251.00	5,799.01	-25.07	-4,620.06	Projection to TD

Checked By: _____ Approved By: _____ Date: _____

