

Apache Corporation
303 Veterans Airpark Lane, #3000
Midland, TX 79705

Crow Federal #018H API# 30-015-40992
Eddy County, New Mexico SL: 1805' FSL & 110' FWL, W. L. 09-17S-31E

235
470

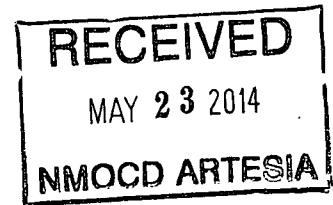
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4.70

0.25
0.10

0.44
0.18

1.03
0.82

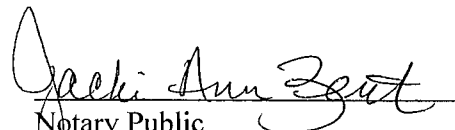
1.03
0.82



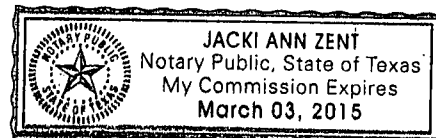


Archie Brown - General Manager

The attached instrument was acknowledged before me on the 21st day of November, 2013 by
Archie Brown - General Manager, CapStar Drilling, Inc.



Notary Public





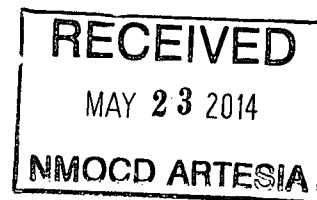
Apache Corporation

Eddy County, NM (NAD27 NME)

Crow Federal

#18H AP#30-015-40992

WB1/Job #1311163



Survey: Phoenix MWD Surveys

Phoenix Final Survey Report

07 November, 2013



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #18H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3849.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3849.00usft (Capstar 114)
Well:	#18H	North Reference:	Grid
Wellbore:	WB1/Job #1311163	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	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	Crow Federal		
Site Position:		Northing:	671,130.90 usft
From:	Map	Easting:	643,906.80 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	#18H		
Well Position	+N-S	0.00 usft	Northing: 672,017.60 usft
	+E-W	0.00 usft	Easting: 638,480.40 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 50' 47.93560 N
		Longitude:	103° 52' 56.72745 W
		Ground Level:	3,838.00 usft

Wellbore	WB1/Job #1311163		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2010_14	09/04/13	7.50
			Dip Angle (°) 60.65
			Field Strength (nT) 48,731

Design	Surveys (Capstar 114)		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)
	0.00	0.00	0.00
		Direction (°)	86.13

Survey Program	Date: 11/07/13		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
532.00	10,795.00	Phoenix MWD Surveys (WB1/Job #131116)	MWD
			Description MWD - Standard

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	D Leg. (°/100usft)	
450.00	0.10	2.43	450.00	0.55	-0.08	-0.04	0.00	
Tie-on to Gyro								
532.00	0.00	241.80	532.00	0.62	-0.07	-0.03	0.12	
First Phoenix MWD Survey								
651.00	0.40	15.80	651.00	1.02	0.04	0.11	0.34	
737.00	1.50	354.90	736.99	2.43	0.02	0.19	1.32	
822.00	2.80	2.30	821.92	5.61	0.01	0.38	1.56	
908.00	4.30	358.90	907.76	10.94	0.03	0.77	1.76	
993.00	4.70	0.90	992.49	17.60	0.02	1.21	0.51	
1,081.00	4.80	9.80	1,080.19	24.84	0.71	2.38	0.84	
1,166.00	4.20	13.70	1,164.93	31.37	2.05	4.16	0.79	
1,252.00	4.10	16.40	1,250.71	37.37	3.66	6.18	0.26	



Phoenix Technology Services

Phoenix Final Survey Report



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Site:	Crow Federal	MD Reference:	KB @ 3849.00usft (Capstar 114)
Well:	#18H	North Reference:	Grid
Wellbore:	WB1/Job #1311163	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR DB

Survey									
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)		
1,337.00	4.00	8.90	1,335.49	43.22	4.98	7.88	0.63		
1,423.00	4.30	11.30	1,421.27	49.34	6.07	9.39	0.40		
1,508.00	3.60	358.50	1,506.07	55.14	6.63	10.33	1.32		
1,594.00	3.70	354.40	1,591.89	60.60	6.29	10.36	0.32		
1,679.00	3.70	359.70	1,676.72	66.07	6.01	10.45	0.40		
1,765.00	3.80	359.50	1,762.53	71.69	5.97	10.79	0.12		
1,851.00	3.70	4.30	1,848.35	77.31	6.15	11.35	0.38		
1,936.00	3.70	3.20	1,933.17	82.78	6.51	12.08	0.08		
2,022.00	3.60	7.30	2,019.00	88.23	7.01	12.94	0.32		
2,107.00	4.00	349.90	2,103.81	93.80	6.82	13.14	1.43		
2,193.00	4.00	344.00	2,189.60	99.63	5.47	12.18	0.48		
2,279.00	3.80	354.30	2,275.41	105.35	4.36	11.46	0.85		
2,364.00	3.60	358.00	2,360.23	110.82	3.99	11.46	0.37		
2,450.00	3.70	357.20	2,446.05	116.29	3.76	11.60	0.13		
2,535.00	3.60	359.90	2,530.88	121.70	3.62	11.83	0.23		
2,621.00	3.60	357.20	2,616.71	127.10	3.48	12.05	0.20		
2,707.00	3.40	0.50	2,702.55	132.35	3.37	12.30	0.33		
2,792.00	3.60	359.40	2,787.39	137.53	3.37	12.64	0.25		
2,877.00	3.50	358.60	2,872.23	142.80	3.28	12.91	0.13		
2,966.00	3.50	359.70	2,961.06	148.23	3.20	13.19	0.08		
3,052.00	3.40	1.10	3,046.91	153.40	3.23	13.58	0.15		
3,137.00	3.60	3.80	3,131.75	158.59	3.46	14.15	0.30		
3,219.00	3.80	5.60	3,213.58	163.86	3.89	14.94	0.28		
3,305.00	3.90	3.60	3,299.38	169.61	4.35	15.79	0.19		
3,390.00	4.10	5.90	3,384.18	175.52	4.85	16.68	0.30		
3,463.00	4.10	6.20	3,456.99	180.71	5.40	17.58	0.03		
3,559.00	4.10	5.70	3,552.75	187.54	6.11	18.75	0.04		
3,644.00	4.00	2.60	3,637.53	193.52	6.55	19.59	0.28		
3,730.00	4.00	2.30	3,723.32	199.52	6.80	20.25	0.02		
3,815.00	4.00	2.10	3,808.12	205.44	7.03	20.88	0.02		
3,901.00	3.90	3.30	3,893.91	211.36	7.31	21.56	0.15		
3,987.00	3.60	4.40	3,979.73	216.97	7.68	22.31	0.36		
4,072.00	4.40	4.70	4,064.52	222.88	8.16	23.18	0.94		
4,158.00	4.40	3.00	4,150.27	229.46	8.60	24.07	0.15		
4,243.00	4.30	2.50	4,235.02	235.90	8.91	24.81	0.13		
4,329.00	4.10	1.00	4,320.79	242.20	9.10	25.43	0.27		
4,415.00	3.90	1.00	4,406.58	248.20	9.21	25.94	0.23		
4,503.00	3.90	2.90	4,494.38	254.18	9.41	26.55	0.15		
4,589.00	3.90	1.40	4,580.18	260.02	9.63	27.16	0.12		
4,674.00	3.90	358.90	4,664.98	265.80	9.65	27.56	0.20		
4,763.00	4.30	348.80	4,753.75	272.10	8.94	27.28	0.93		
4,851.00	4.40	346.70	4,841.50	278.62	7.52	26.31	0.21		
4,940.00	3.60	343.60	4,930.28	284.63	5.95	25.14	0.93		
5,026.00	3.80	343.60	5,016.10	289.95	4.38	23.94	0.23		
5,111.00	2.90	341.40	5,100.96	294.69	2.90	22.78	1.07		

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Site:	Crow Federal	MD Reference:	KB @ 3849.00usft (Capstar 114)
Well:	#18H	North Reference:	Grid
Wellbore:	WB1/Job #1311163	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR DB

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	D Leg (°/100usft)
5,197.00	1.20	350.60	5,186.90	297.64	2.06	22.14	2.01
5,282.00	1.40	357.30	5,271.88	299.56	1.86	22.08	0.30
5,368.00	1.40	354.60	5,357.85	301.65	1.72	22.07	0.08
5,453.00	1.30	350.60	5,442.83	303.64	1.46	21.95	0.16
5,539.00	0.20	68.00	5,528.82	304.66	1.44	22.00	1.48
5,625.00	0.20	80.80	5,614.82	304.74	1.73	22.29	0.05
5,668.00	0.20	87.60	5,657.82	304.75	1.88	22.44	0.06
5,711.00	3.60	97.30	5,700.79	304.58	3.29	23.84	7.91
5,754.00	8.60	95.20	5,743.53	304.12	7.84	28.34	11.64
5,796.00	13.60	91.10	5,784.74	303.74	15.91	36.37	12.04
5,839.00	18.40	90.10	5,826.06	303.63	27.75	48.18	11.18
5,882.00	23.40	90.50	5,866.22	303.54	43.09	63.48	11.63
5,925.00	28.80	91.90	5,904.82	303.13	61.99	82.31	12.64
5,967.00	34.50	92.90	5,940.56	302.19	84.00	104.21	13.63
6,010.00	39.60	92.80	5,974.86	300.90	109.87	129.93	11.86
6,053.00	44.70	92.50	6,006.73	299.57	138.68	158.59	11.87
6,096.00	49.70	92.10	6,035.94	298.31	170.20	189.95	11.65
6,138.00	54.60	91.30	6,061.70	297.33	203.34	222.94	11.76
6,181.00	60.40	90.60	6,084.80	296.74	239.58	259.07	13.56
6,224.00	65.00	90.10	6,104.51	296.51	277.78	297.16	10.75
6,267.00	68.90	90.30	6,121.35	296.37	317.34	336.62	9.08
6,310.00	75.00	90.10	6,134.66	296.23	358.21	377.38	14.19
6,352.00	80.90	89.70	6,143.43	296.30	399.26	418.35	14.08
6,396.00	86.80	88.90	6,148.14	296.84	442.99	462.01	13.53
6,438.00	88.40	88.70	6,149.90	297.72	484.94	503.93	3.84
6,481.00	89.50	89.30	6,150.69	298.47	527.92	546.87	2.91
6,567.00	89.60	89.20	6,151.36	299.59	613.91	632.74	0.16
6,652.00	88.30	87.20	6,152.92	302.26	698.85	717.66	2.81
6,738.00	88.90	88.70	6,155.02	305.34	784.77	803.59	1.88
6,824.00	90.30	90.70	6,155.62	305.79	870.76	889.41	2.84
6,909.00	90.00	89.40	6,155.40	305.71	955.76	974.21	1.57
6,995.00	90.50	89.30	6,155.02	306.69	1,041.75	1,060.07	0.59
7,080.00	89.20	90.00	6,155.25	307.21	1,126.75	1,144.91	1.74
7,166.00	87.60	90.20	6,157.65	307.06	1,212.71	1,230.67	1.87
7,251.00	87.50	89.60	6,161.28	307.21	1,297.63	1,315.41	0.71
7,337.00	87.00	89.40	6,165.41	307.96	1,383.53	1,401.16	0.63
7,423.00	87.50	88.80	6,169.53	309.31	1,469.42	1,486.94	0.91
7,508.00	87.80	89.00	6,173.02	310.94	1,554.33	1,571.77	0.42
7,594.00	87.80	88.90	6,176.32	312.51	1,640.25	1,657.61	0.12
7,679.00	87.20	90.30	6,180.03	313.10	1,725.17	1,742.37	1.79
7,765.00	87.40	90.10	6,184.08	312.80	1,811.07	1,828.05	0.33
7,850.00	87.70	89.80	6,187.71	312.88	1,895.99	1,912.79	0.50
7,936.00	87.60	89.10	6,191.24	313.70	1,981.92	1,998.57	0.82
8,022.00	87.50	88.90	6,194.92	315.20	2,067.83	2,084.38	0.26

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Site:	Crow Federal	MD Reference:	KB @ 3849.00usft (Capstar 114)
Well:	#18H	North Reference:	Grid
Wellbore:	WB1/Job #1311163	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR DB

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (%/100usft)
8,107.00	89.10	90.00	6,197.44	316.02	2,152.78	2,169.20	2.28
8,193.00	89.10	89.40	6,198.79	316.47	2,238.77	2,255.02	0.70
8,278.00	89.30	89.00	6,199.97	317.65	2,323.75	2,339.89	0.53
8,364.00	89.40	88.60	6,200.95	319.46	2,409.73	2,425.79	0.48
8,449.00	89.20	89.60	6,201.99	320.79	2,494.71	2,510.67	1.20
8,535.00	90.00	89.60	6,202.59	321.39	2,580.70	2,596.51	0.93
8,620.00	88.70	90.10	6,203.55	321.61	2,665.70	2,681.32	1.64
8,704.00	89.00	90.60	6,205.24	321.10	2,749.68	2,765.08	0.69
8,789.00	89.50	91.00	6,206.35	319.91	2,834.66	2,849.79	0.75
8,877.00	89.70	90.90	6,206.97	318.46	2,922.65	2,937.48	0.25
8,966.00	90.30	90.80	6,206.97	317.13	3,011.64	3,026.17	0.68
9,051.00	88.50	90.50	6,207.86	316.17	3,096.62	3,110.90	2.15
9,137.00	88.20	90.10	6,210.33	315.72	3,182.59	3,196.64	0.58
9,225.00	88.30	89.60	6,213.02	315.95	3,270.54	3,284.41	0.58
9,310.00	88.00	89.50	6,215.76	316.62	3,355.50	3,369.21	0.37
9,396.00	88.30	89.30	6,218.54	317.52	3,441.45	3,455.03	0.42
9,482.00	88.60	89.10	6,220.87	318.72	3,527.41	3,540.87	0.42
9,568.00	88.50	90.30	6,223.04	319.17	3,613.38	3,626.68	1.40
9,653.00	88.80	90.60	6,225.05	318.50	3,698.35	3,711.41	0.50
9,739.00	88.70	90.20	6,226.92	317.90	3,784.33	3,797.15	0.48
9,828.00	89.00	89.30	6,228.71	318.29	3,873.31	3,885.96	1.07
9,916.00	89.20	88.20	6,230.09	320.21	3,961.27	3,973.85	1.27
10,002.00	88.20	89.30	6,232.04	322.08	4,047.23	4,059.74	1.73
10,087.00	88.00	89.10	6,234.86	323.27	4,132.17	4,144.57	0.33
10,173.00	88.00	88.80	6,237.86	324.85	4,218.11	4,230.41	0.35
10,258.00	88.40	88.40	6,240.53	326.92	4,303.04	4,315.29	0.67
10,343.00	88.40	88.40	6,242.90	329.29	4,387.97	4,400.19	0.00
10,430.00	88.40	87.70	6,245.33	332.25	4,474.89	4,487.11	0.80
10,514.00	88.60	87.90	6,247.53	335.48	4,558.80	4,571.04	0.34
10,603.00	88.70	87.70	6,249.63	338.89	4,647.71	4,659.98	0.25
10,690.00	88.90	87.60	6,251.45	342.46	4,734.62	4,746.93	0.26
10,742.00	88.90	87.50	6,252.45	344.68	4,786.56	4,798.91	0.19
Last Phoenix MWD Survey							
10,795.00	88.90	87.50	6,253.47	346.99	4,839.50	4,851.88	0.00
Projection to Bit							

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Well:	#18H	North Reference:	Grid
Wellbore:	WB1/Job #1311163	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR DB

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
450.00	450.00	0.55	-0.08	Tie-on to Gyro
532.00	532.00	0.62	-0.07	First Phoenix MWD Survey
10,742.00	6,252.45	344.68	4,786.56	Last Phoenix MWD Survey
10,795.00	6,253.47	346.99	4,839.50	Projection to Bit

Checked By: _____	Approved By: _____	Date: _____
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