

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

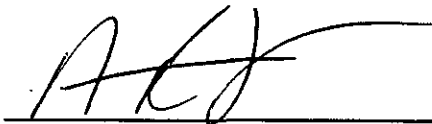
Crow Federal #041H
Eddy County, New Mexico

API # 30-015-42763

L-03-175-31E

2233 FSL + 10 FWL

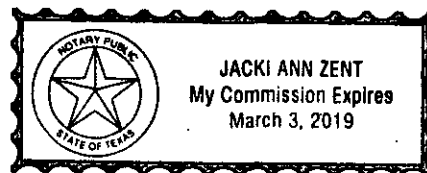
250	2.50	0.50	0.88	2.19	2.19
504	2.54	0.50	0.88	2.22	4.41
650	1.46	0.50	0.88	1.28	5.69



Archie Brown - General Manager

The attached instrument was acknowledged before me on the 17th day of March, 2015 by
Archie Brown - General Manager, CapStar Drilling, Inc.


Notary Public





Apache Corporation

Eddy County, NM (NAD27 NME)

Crow Federal

#41H

WB1 / Job #1512793

Design: Surveys (Capstar 114)

Standard Survey Report

09 March, 2015





Phoenix Survey Report



Company: Apache Corporation
Project: Eddy County, NM (NAD27 NME)
Site: Crow Federal
Well: #41H
Wellbore: WB1 / Job #1512793
Design: Surveys (Capstar 114)

Local Co-ordinate Reference: Well #41H
TVD Reference: KB @ 3950.00usft (Capstar 114)
MD Reference: KB @ 3950.00usft (Capstar 114)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass 5000 GCR

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' 38.92798 N
		Longitude:	103° 51' 53.16689 W
		Grid Convergence:	0.25 °

Well	#41H		
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' 44.56411 N
		Longitude:	103° 51' 56.07997 W
		Ground Level:	3,939.00 usft

Wellbore	WB1 / Job #1512793				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	BGGM2014	2/26/2015	(°)	(°)	(nT)
			7.50	60.63	48,541

Design	Surveys (Capstar 114)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(usft)	(usft)	(usft)	(°)	
	0.00	0.00	0.00	89.61	

Survey Program	Date 3/9/2015				
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
100.00	650.00	Gyrodata Surveys (WB1 / Job #1512793)	NS-GYRO-MS	North sensing gyrocompassing m/s	
793.00	9,966.00	Phoenix MWD Surveys (WB1 / Job #1512)	PHX+MWD+BGGM	PHX+MWD+BGGM v3: standard declination	

Survey										
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate	
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.50	103.30	100.00	-0.10	0.42	0.42	0.50	0.50	0.00	
200.00	0.62	101.05	199.99	-0.30	1.38	1.38	0.12	0.12	-2.25	
300.00	0.78	105.54	299.99	-0.59	2.57	2.56	0.17	0.16	4.49	
400.00	0.90	86.61	399.98	-0.73	4.01	4.00	0.30	0.12	-18.93	
500.00	0.89	66.49	499.96	-0.37	5.50	5.50	0.31	-0.01	-20.12	
600.00	1.05	61.88	599.95	0.37	7.02	7.03	0.16	0.16	-4.63	
650.00	1.06	70.34	649.94	0.74	7.88	7.87	0.31	0.02	16.96	
Tie-In to Gyrodata										
793.00	1.00	72.00	792.92	1.57	10.29	10.31	0.05	-0.04	1.16	



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Database: Compass 5000 GCR

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									
879.00	1.10	78.40	878.90	1.97	11.82	11.83	0.18	0.12	7.44
965.00	1.50	75.20	964.88	2.43	13.71	13.73	0.47	0.47	-3.72
1,050.00	1.80	77.20	1,049.85	3.01	16.09	16.11	0.36	0.35	2.35
1,178.00	2.40	78.20	1,177.76	4.00	20.68	20.70	0.47	0.47	0.78
1,309.00	2.60	84.10	1,308.63	4.87	26.32	26.35	0.25	0.15	4.50
1,438.00	2.20	67.60	1,437.52	6.11	31.52	31.56	0.62	-0.31	-12.79
1,566.00	2.80	68.60	1,565.40	8.19	36.70	36.75	0.47	0.47	0.78
1,694.00	1.50	92.70	1,693.31	9.25	41.28	41.34	1.22	-1.02	18.83
1,822.00	1.40	115.80	1,821.27	8.49	44.36	44.42	0.46	-0.08	18.05
1,951.00	1.30	121.70	1,950.23	7.03	47.03	47.07	0.13	-0.08	4.57
2,078.00	1.00	127.30	2,077.21	5.61	49.13	49.17	0.25	-0.24	4.41
2,207.00	1.00	123.30	2,206.19	4.31	50.97	51.00	0.05	0.00	-3.10
2,334.00	0.80	115.60	2,333.17	3.31	52.70	52.72	0.18	-0.16	-6.06
2,462.00	0.60	129.70	2,461.16	2.50	54.02	54.03	0.21	-0.16	11.02
2,590.00	0.40	156.90	2,589.16	1.66	54.71	54.72	0.24	-0.16	21.25
2,725.00	0.50	217.60	2,724.16	0.78	54.53	54.54	0.34	0.07	44.96
2,851.00	0.70	238.10	2,850.15	-0.08	53.55	53.54	0.23	0.16	16.27
2,980.00	0.80	251.50	2,979.14	-0.78	52.02	52.02	0.16	0.08	10.39
3,107.00	0.80	260.80	3,106.13	-1.21	50.31	50.30	0.10	0.00	7.32
3,233.00	0.90	270.60	3,232.11	-1.34	48.45	48.44	0.14	0.08	7.78
3,362.00	1.00	272.80	3,361.09	-1.27	46.31	46.30	0.08	0.08	1.71
3,447.00	0.90	273.00	3,446.08	-1.20	44.90	44.90	0.12	-0.12	0.24
3,573.00	0.70	276.60	3,572.07	-1.06	43.15	43.14	0.16	-0.16	2.86
3,702.00	0.80	268.30	3,701.06	-1.00	41.47	41.46	0.11	0.08	-6.43
3,830.00	0.90	261.00	3,829.04	-1.18	39.58	39.57	0.12	0.08	-5.70
3,959.00	1.00	265.30	3,958.03	-1.43	37.46	37.45	0.10	0.08	3.33
4,087.00	1.00	256.00	4,086.01	-1.79	35.26	35.25	0.13	0.00	-7.27
4,215.00	0.90	260.90	4,213.99	-2.22	33.19	33.17	0.10	-0.08	3.83
4,344.00	0.90	256.10	4,342.97	-2.63	31.20	31.18	0.06	0.00	-3.72
4,472.00	1.00	254.60	4,470.96	-3.16	29.15	29.13	0.08	0.08	-1.17
4,600.00	0.80	249.10	4,598.94	-3.78	27.24	27.21	0.17	-0.16	-4.30
4,714.00	1.00	250.30	4,712.93	-4.40	25.56	25.53	0.18	0.18	1.05
4,748.00	0.90	282.70	4,746.92	-4.53	25.01	24.98	0.67	-0.29	36.47
4,791.00	1.60	58.00	4,789.92	-4.28	25.16	25.13	5.46	1.40	361.16
4,833.00	5.80	74.40	4,831.82	-3.41	27.67	27.64	10.43	10.24	39.05
4,876.00	9.90	81.40	4,874.41	-2.28	33.42	33.40	9.77	9.53	16.28
4,919.00	14.30	82.30	4,916.45	-1.01	42.34	42.33	10.24	10.23	2.09
4,962.00	19.30	82.70	4,957.60	0.60	54.66	54.66	11.63	11.63	0.93
5,005.00	24.20	83.10	4,997.53	2.57	70.47	70.48	11.40	11.40	0.93
5,047.00	29.10	86.50	5,035.05	4.23	89.22	89.25	12.21	11.67	8.10
5,090.00	34.00	89.80	5,071.69	4.91	111.69	111.72	12.08	11.40	7.67
5,133.00	39.30	92.50	5,106.18	4.35	137.34	137.37	12.88	12.33	6.28

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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)
5,176.00	44.90	91.40	5,138.07	3.39	168.14	166.16	13.14	13.02	-2.56
5,218.00	50.80	90.20	5,166.24	2.97	197.26	197.28	14.21	14.05	-2.86
5,261.00	56.40	89.40	5,191.75	3.10	231.86	231.87	13.11	13.02	-1.86
5,304.00	60.60	89.00	5,214.21	3.61	268.51	268.53	9.80	9.77	-0.93
5,347.00	65.90	88.90	5,233.56	4.32	306.89	306.91	12.33	12.33	-0.23
5,390.00	72.00	88.40	5,249.00	5.27	346.99	347.02	14.23	14.19	-1.16
5,432.00	78.00	88.60	5,259.86	6.33	387.52	387.56	14.29	14.29	0.48
5,475.00	82.00	88.70	5,267.33	7.32	429.85	429.89	9.31	9.30	0.23
5,514.00	85.70	88.80	5,271.51	8.17	468.61	468.65	9.49	9.49	0.26
5,557.00	86.60	88.60	5,274.39	9.14	511.50	511.55	2.14	2.09	-0.47
5,642.00	87.90	89.70	5,278.47	10.40	596.39	596.45	2.00	1.53	1.29
5,771.00	90.10	89.80	5,280.72	10.96	725.36	725.42	1.71	1.71	0.08
5,898.00	90.20	89.70	5,280.39	11.52	852.36	852.42	0.11	0.08	-0.08
6,026.00	90.20	90.00	5,279.94	11.85	980.36	980.42	0.23	0.00	0.23
6,155.00	89.80	89.90	5,279.94	11.97	1,109.36	1,109.41	0.32	-0.31	-0.08
6,283.00	89.60	89.90	5,280.61	12.19	1,237.36	1,237.41	0.16	-0.16	0.00
6,410.00	89.60	90.20	5,281.50	12.08	1,364.35	1,364.40	0.24	0.00	0.24
6,542.00	89.40	90.20	5,282.65	11.62	1,496.35	1,496.39	0.15	-0.15	0.00
6,672.00	87.90	89.30	5,285.72	12.18	1,626.31	1,626.35	1.35	-1.15	-0.69
6,800.00	88.00	89.20	5,290.29	13.86	1,754.21	1,754.27	0.11	0.08	-0.08
6,928.00	88.20	88.90	5,294.54	15.98	1,882.12	1,882.19	0.28	0.16	-0.23
7,056.00	88.30	88.50	5,298.45	18.88	2,010.03	2,010.11	0.32	0.08	-0.31
7,184.00	88.50	88.00	5,302.02	22.79	2,137.92	2,138.03	0.42	0.16	-0.39
7,312.00	88.80	88.00	5,305.04	27.26	2,265.81	2,265.94	0.23	0.23	0.00
7,441.00	88.00	89.20	5,308.64	30.41	2,394.72	2,394.87	1.12	-0.62	0.93
7,569.00	87.90	88.70	5,313.22	32.75	2,522.81	2,522.78	0.40	-0.08	-0.39
7,697.00	88.40	89.20	5,317.35	35.08	2,650.52	2,650.70	0.55	0.39	0.39
7,831.00	88.90	89.20	5,320.51	36.97	2,784.47	2,784.66	0.37	0.37	0.00
7,960.00	90.70	89.60	5,320.96	38.32	2,913.46	2,913.65	1.43	1.40	0.31
8,088.00	90.30	91.00	5,319.84	37.65	3,041.45	3,041.63	1.14	-0.31	1.09
8,219.00	89.70	91.70	5,319.84	34.56	3,172.41	3,172.57	0.70	-0.46	0.53
8,347.00	89.50	91.90	5,320.73	30.54	3,300.34	3,300.48	0.22	-0.16	0.16
8,475.00	89.00	92.10	5,322.41	26.07	3,428.25	3,428.35	0.42	-0.39	0.16
8,604.00	86.70	91.80	5,327.25	21.69	3,557.08	3,557.15	1.80	-1.78	-0.23
8,732.00	88.30	89.00	5,332.83	20.80	3,684.94	3,684.99	2.52	1.25	-2.19
8,860.00	89.80	87.10	5,334.96	25.15	3,812.64	3,812.92	1.89	1.17	-1.48
8,992.00	88.80	87.00	5,336.57	31.94	3,944.65	3,944.78	0.76	-0.76	-0.08
9,119.00	90.20	87.00	5,337.68	38.59	4,071.47	4,071.64	1.10	1.10	0.00
9,248.00	92.10	88.10	5,335.09	44.10	4,200.32	4,200.52	1.70	1.47	0.85
9,376.00	91.70	88.60	5,330.84	47.79	4,328.19	4,328.42	0.50	-0.31	0.39
9,504.00	92.40	90.70	5,326.26	48.57	4,456.10	4,456.33	1.73	-0.55	1.64
9,632.00	90.60	91.60	5,322.91	46.00	4,584.02	4,584.23	1.57	-1.41	0.70
9,759.00	90.10	91.40	5,322.14	42.68	4,710.98	4,711.16	0.42	-0.39	-0.16
9,895.00	89.80	90.80	5,322.14	39.95	4,846.95	4,847.11	0.40	-0.15	-0.37



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Final Phoenix MWD Survey

9,966.00	89.90	90.90	5,322.26	38.83	4,917.94	4,918.09	0.00	0.00	0.00
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Projection to TD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		
		+N/-S (usft)	+E/-W (usft)	Comment
650.00	649.94	0.74	7.86	Tie-In to Gyrodata
793.00	792.92	1.57	10.29	First Phoenix MWD Survey
9,895.00	5,322.14	39.95	4,846.95	Final Phoenix MWD Survey
9,966.00	5,322.26	38.83	4,917.94	Projection to TD

Checked By: _____ Approved By: _____ Date: _____