

Apache Corporation
303 Veterans Airpark Lane, #3000
Midland, TX 79705
Cedar Lake Federal 10A 951H
Crow-Federal-Com-#051H
Eddy County, New Mexico

API # 30-015-43327

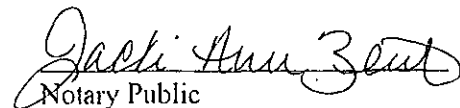
Sec. 9 T17S R31E
1070 FNL, 515 FWL

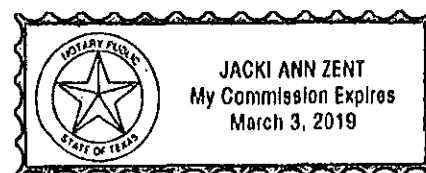
255	2.55	0.50	0.88	2.23	2.23
579	3.24	0.70	1.23	3.97	6.20
915	3.36	0.30	0.53	1.76	7.96
1214	2.99	1.50	2.63	7.85	15.81
1470	2.56	2.20	3.85	9.86	25.67
1726	2.56	1.70	2.98	7.62	33.29
1975	2.49	0.70	1.23	3.05	36.34
2232	2.57	0.40	0.70	1.80	38.13
2485	2.53	0.30	0.53	1.33	39.46
2708	2.23	0.40	0.70	1.56	41.02
2964	2.56	0.70	1.23	3.14	44.16
3213	2.49	0.60	1.05	2.61	46.77
3460	2.47	0.20	0.35	0.86	47.64
3536	0.76	0.10	0.18	0.13	47.77
3880	3.44	0.20	0.35	1.20	48.98
4136	2.56	0.50	0.88	2.24	51.22
4392	2.56	0.80	1.40	3.58	54.80
4648	2.56	0.60	1.05	2.69	57.49
4859	2.11	0.60	1.05	2.22	59.70
5004	1.45	0.80	1.40	2.03	61.73



Archie Brown - General Manager

The attached instrument was acknowledged before me on the 2nd day of November, 2015
by Archie Brown - General Manager, CapStar Drilling, Inc.


Notary Public



Apache Corporation

Eddy County, NM (NAD27 NME)

Grow-Federal

#51H—

Cedar Lake Federal CA 957H

OH / 1514486

Design: Surveys (Capstar 114)

Standard Survey Report

27 October, 2015

Phoenix Technology Services LP

Survey Report

Company: Apache Corporation
 Project: Eddy County, NM (NAD27 NME)
 Site: Crow Federal
 Well: #51H
 Wellbore: OH / 1514486
 Design: Surveys (Capstar 114)

Local Coordinate Reference: Well #51H
 TVD Reference: KB @ 3887.00usft (Capstar 114)
 MD Reference: KB @ 3887.00usft (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)
 Geo Datum: NAD 1927 (NADCON CONUS)
 Map Zone: New Mexico East 3001

System Datum: Mean Sea Level

Site: Crow Federal

Site Position: Northing: 671,130.90 usft Latitude: 32° 50' 38.92796 N
 From: Map Easting: 643,906.80 usft Longitude: 103° 51' 53.16689 W
 Position Uncertainty: 0.00 usft Slot Radius: 13-3/16 " Grid Convergence: 0.25 °

Well: #51H

Well Position: +N/-S 0.00 usft Northing: 674,426.60 usft Latitude: 32° 51' 11.75629 N
 +E/-W 0.00 usft Easting: 638,871.70 usft Longitude: 103° 52' 52.01984 W
 Position Uncertainty: 0.00 usft Wellhead Elevation: usft Ground Level: 3,876.00 usft

Wellbore: OH / 1514486

Magnetics: Model Name: Sample Date: Declination: Dip Angle: Field Strength:
 HDGM 10/14/2015 7.60 60.80 48,571

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 81.96

Survey Program: Date: 10/27/2015

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	4,893.00	Scientific Gyro Surveys (OH / 1514486)	NS-GYRO-MS	North sensing gyrocompassing nvs
4,893.00	9,906.00	Phoenix MWD Surveys (OH / 1514486)	PHX+MWD+HDGM	PHX+OWSG MWD + HDGM

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
100.00	0.29	287.61	100.00	0.08	-0.24	-0.23	0.29	0.29	0.00
200.00	0.39	269.89	200.00	0.15	-0.82	-0.79	0.14	0.10	-17.72
300.00	0.71	274.82	299.99	0.20	-1.78	-1.73	0.32	0.32	4.93
400.00	0.95	293.94	399.98	0.59	-3.16	-3.04	0.36	0.24	19.12
500.00	0.96	290.12	499.97	1.22	-4.70	-4.48	0.06	0.01	-3.82
600.00	0.74	288.26	599.96	1.71	-6.10	-5.80	0.22	-0.22	-1.86
700.00	0.63	284.43	699.95	2.05	-7.25	-6.89	0.12	-0.11	-3.83
800.00	0.38	303.34	799.95	2.37	-8.05	-7.64	0.30	-0.25	18.91
900.00	0.26	326.46	899.95	2.74	-8.46	-7.99	0.17	-0.12	23.12

Phoenix Technology Services LP

Survey Report

Company: Apache Corporation
 Project: Eddy County, NM (NAD27 NME)
 Site: Crow Federal
 Well: #51H
 Wellbore: OH / 1514485
 Design: Surveys (Capstar 114)

Local Co-ordinate Reference: Well #51H
 TVD Reference: KB @ 3887.00usft (Capstar 114)
 MD Reference: KB @ 3887.00usft (Capstar 114)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: Compass 5000 GCR

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	N/S (usft)	E/W/L (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,000.00	0.29	101.51	999.94	2.88	-8.33	-7.85	0.51	0.03	135.05
1,100.00	0.44	100.51	1,099.94	2.76	-7.71	-7.25	0.15	0.15	-1.00
1,200.00	1.04	90.46	1,199.93	2.68	-6.42	-5.99	0.61	0.60	-10.05
1,300.00	1.66	89.83	1,299.91	2.68	-4.07	-3.65	0.62	0.62	-0.63
1,400.00	1.85	83.26	1,399.86	2.87	-1.02	-0.61	0.28	0.19	-6.57
1,500.00	1.89	84.16	1,499.81	3.23	2.23	2.66	0.05	0.04	0.90
1,600.00	1.88	87.82	1,599.75	3.46	5.51	5.94	0.12	-0.01	3.66
1,700.00	1.89	85.57	1,699.70	3.65	8.79	9.21	0.07	0.01	-2.25
1,800.00	1.41	87.75	1,799.66	3.82	11.66	12.08	0.48	-0.48	2.18
1,900.00	1.14	83.88	1,899.63	3.98	13.88	14.30	0.28	-0.27	-3.87
2,000.00	0.72	79.07	1,999.62	4.20	15.49	15.92	0.43	-0.42	-4.81
2,100.00	0.54	79.54	2,099.61	4.41	16.57	17.02	0.18	-0.18	0.47
2,200.00	0.45	67.74	2,199.61	4.64	17.39	17.87	0.14	-0.09	-11.80
2,300.00	0.28	14.33	2,299.61	5.03	17.82	18.35	0.36	-0.17	-53.41
2,400.00	0.32	332.02	2,399.60	5.51	17.75	18.34	0.22	0.04	-42.31
2,500.00	0.46	340.74	2,499.60	6.13	17.48	18.17	0.15	0.14	8.72
2,600.00	0.45	333.55	2,599.60	6.87	17.18	17.97	0.06	-0.01	-7.19
2,700.00	0.50	328.70	2,699.60	7.59	16.78	17.67	0.06	0.05	-4.85
2,800.00	0.52	330.91	2,799.59	8.36	16.33	17.34	0.03	0.02	2.21
2,900.00	0.50	335.65	2,899.59	9.15	15.93	17.05	0.05	-0.02	4.74
3,000.00	0.50	316.61	2,999.58	9.87	15.45	16.68	0.17	0.00	-19.04
3,100.00	0.47	335.33	3,099.58	10.56	14.98	16.31	0.16	-0.03	18.72
3,200.00	0.53	327.38	3,199.58	11.32	14.56	16.00	0.09	0.06	-7.95
3,300.00	0.49	321.40	3,299.57	12.04	14.04	15.59	0.07	-0.04	-5.98
3,400.00	0.50	320.35	3,399.57	12.71	13.50	15.14	0.01	0.01	-1.05
3,500.00	0.31	326.71	3,499.57	13.28	13.07	14.80	0.19	-0.19	6.36
3,600.00	0.47	318.30	3,599.56	13.81	12.65	14.45	0.17	0.16	-8.41
3,700.00	0.51	326.22	3,699.56	14.48	12.13	14.03	0.08	0.04	7.92
3,800.00	0.51	331.02	3,799.56	15.24	11.66	13.68	0.04	0.00	4.80
3,900.00	0.44	326.26	3,899.55	15.95	11.24	13.36	0.08	-0.07	-4.76
4,000.00	0.45	329.16	3,999.55	16.61	10.82	13.04	0.02	0.01	2.90
4,100.00	0.51	351.97	4,099.55	17.39	10.56	12.89	0.20	0.06	22.81
4,200.00	0.62	336.15	4,199.54	18.32	10.28	12.74	0.18	0.11	-15.82
4,300.00	0.71	339.27	4,299.54	19.40	9.84	12.45	0.10	0.09	3.12
4,400.00	0.71	344.14	4,399.53	20.57	9.45	12.23	0.06	0.00	4.87
4,500.00	0.83	342.24	4,499.52	21.86	9.06	12.03	0.12	0.12	-1.90
4,600.00	0.74	338.65	4,599.51	23.15	8.60	11.76	0.10	-0.09	-3.59
4,700.00	0.63	356.06	4,699.50	24.30	8.33	11.65	0.23	-0.11	17.41
4,800.00	0.61	14.95	4,799.50	25.36	8.43	11.89	0.20	-0.02	18.89
4,893.00	0.70	27.33	4,892.49	26.34	8.82	12.42	0.18	0.10	13.31
Tie In to Scientific Gyro									
5,076.00	3.20	56.40	5,075.37	30.16	13.59	17.67	1.43	1.37	15.89
First Phoenix MWD Survey									

Phoenix Technology Services LP

Survey Report

Company: Apache Corporation
 Project: Eddy County, NM (NAD27 NME)
 Site: Crow Federal
 Well: #51H
 Wellbore: OH / 1514486
 Design: Surveys (Capstar 114)

Local Co-ordinate Reference: Well #51H
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 MD Reference: KB @ 3887.00usft (Capstar 114)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 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)
5,119.00	7.40	52.00	5,118.18	32.53	16.77	21.16	9.81	9.77	-10.23
5,162.00	12.10	48.40	5,160.55	37.23	22.33	27.31	11.02	10.93	-8.37
5,205.00	17.00	47.80	5,202.15	44.45	30.36	38.28	11.40	11.40	-1.40
5,247.00	22.40	50.00	5,241.68	53.73	41.04	48.16	12.98	12.86	5.24
5,290.00	27.90	51.10	5,280.59	65.32	55.16	63.75	12.84	12.79	2.56
5,332.00	33.30	52.00	5,316.73	78.60	71.91	82.19	12.90	12.86	2.14
5,375.00	38.70	53.50	5,351.50	93.88	92.03	104.25	12.72	12.56	3.49
5,418.00	43.40	54.50	5,383.92	110.46	114.87	129.19	11.04	10.93	2.33
5,460.00	48.00	55.80	5,413.25	127.62	139.54	156.02	11.17	10.95	3.10
5,503.00	52.30	57.20	5,440.80	145.82	167.07	185.82	10.31	10.00	3.26
5,546.00	57.80	57.30	5,465.42	164.88	196.70	217.83	12.79	12.79	0.23
5,589.00	62.60	57.30	5,486.79	185.04	228.09	251.73	11.16	11.16	0.00
5,631.00	67.00	57.40	5,504.66	205.53	260.08	286.27	10.48	10.48	0.24
5,674.00	71.30	57.90	5,519.96	227.03	294.02	322.89	10.06	10.00	1.16
5,717.00	75.30	58.90	5,532.32	248.60	329.10	360.63	9.57	9.30	2.33
5,759.00	79.70	59.40	5,541.41	269.62	364.29	398.42	10.54	10.48	1.19
5,803.00	83.80	59.80	5,547.72	291.65	401.84	438.68	9.36	9.32	0.91
5,846.00	87.80	59.00	5,550.87	313.48	438.75	478.28	9.49	9.30	-1.86
5,888.00	88.70	59.10	5,552.15	335.07	474.75	516.95	2.16	2.14	0.24
6,017.00	88.90	61.50	5,554.85	398.96	586.77	636.80	1.87	0.16	1.86
6,144.00	88.80	64.10	5,557.40	457.00	699.69	756.73	2.05	-0.08	2.05
6,272.00	87.50	67.90	5,561.54	509.02	816.54	879.71	3.14	-1.02	2.97
6,400.00	86.90	72.20	5,567.79	552.63	936.69	1,004.77	3.39	-0.47	3.36
6,528.00	87.00	76.40	5,574.61	587.21	1,059.71	1,131.42	3.28	0.08	3.28
6,656.00	88.30	81.40	5,579.86	611.83	1,185.17	1,259.09	4.03	1.02	3.91
6,784.00	90.20	85.60	5,581.53	626.09	1,312.32	1,386.99	3.74	1.48	3.44
6,911.00	90.30	90.00	5,580.96	630.74	1,439.21	1,513.28	3.31	0.06	3.31
7,039.00	90.60	91.50	5,579.97	629.06	1,567.19	1,639.77	1.20	0.23	1.17
7,167.00	89.70	91.80	5,579.64	625.38	1,695.13	1,765.94	0.74	-0.70	0.23
7,295.00	88.80	92.20	5,581.31	620.91	1,823.04	1,891.97	0.77	-0.70	0.31
7,423.00	87.10	91.10	5,585.89	617.23	1,950.90	2,018.05	1.58	-1.33	-0.86
7,551.00	86.90	90.80	5,582.59	615.11	2,078.71	2,144.31	0.28	-0.16	-0.23
7,679.00	86.80	89.10	5,599.63	615.22	2,206.51	2,270.87	1.33	-0.08	-1.33
7,807.00	89.00	88.80	5,604.32	617.56	2,334.39	2,397.82	1.73	1.72	-0.23
7,936.00	89.60	89.40	5,605.89	619.59	2,463.37	2,525.81	0.66	0.47	0.47
8,064.00	89.80	89.60	5,606.56	620.71	2,591.36	2,652.70	0.22	0.16	0.16
8,192.00	88.50	89.60	5,608.46	621.60	2,719.34	2,779.55	1.02	-1.02	0.00
8,320.00	88.60	90.10	5,611.70	621.94	2,847.30	2,906.30	0.40	0.08	0.39
8,448.00	88.90	90.50	5,614.49	621.27	2,975.27	3,032.91	0.39	0.23	0.31
8,577.00	88.70	89.50	5,617.19	621.27	3,104.24	3,160.62	0.79	-0.16	-0.78
8,705.00	88.90	89.90	5,619.87	621.94	3,232.21	3,287.42	0.35	0.16	0.31
8,832.00	89.10	90.30	5,622.09	621.71	3,359.19	3,413.12	0.35	0.16	0.31
8,960.00	89.60	90.90	5,623.54	620.37	3,487.17	3,539.66	0.61	0.39	0.47
9,088.00	89.70	90.80	5,624.32	618.48	3,615.15	3,666.12	0.11	0.08	-0.08

Phoenix Technology Services LP

Survey Report

Company: Apache Corporation
 Project: Eddy County, NM (NAD27 NME)
 Site: Crow Federal
 Well: #51H
 Wellbore: OH / 1514486
 Design: Surveys (Capstar 114)

Local Co-ordinate Reference: Well #51H
 TVD Reference: KB @ 3887.00usft (Capstar 114)
 MD Reference: KB @ 3887.00usft (Capstar 114)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 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)
9,216.00	88.30	89.70	5,626.56	617.92	3,743.13	3,792.76	1.39	-1.09	-0.86
9,344.00	88.40	89.70	5,630.24	618.59	3,871.07	3,919.54	0.08	0.08	0.00
9,472.00	88.30	90.00	5,633.93	618.92	3,999.02	4,046.28	0.25	-0.08	0.23
9,600.00	89.20	90.10	5,636.72	618.81	4,126.99	4,172.97	0.71	0.70	0.08
9,728.00	90.50	90.00	5,637.06	618.70	4,254.98	4,299.69	1.02	1.02	-0.08
Final Phoenix MWD Survey									
9,906.00	90.50	90.00	5,635.50	618.70	4,432.98	4,475.94	0.00	0.00	0.00
Projection to TD									

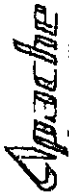
Design Annotations

Measured Depth, (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		N-S (usft)	E-W (usft)	
4,893.00	4,892.49	26.34	8.82	Tie In to Scientific Gyro
5,076.00	5,075.37	30.16	13.59	First Phoenix MWD Survey
9,728.00	5,637.06	618.70	4,254.98	Final Phoenix MWD Survey
9,906.00	5,635.50	618.70	4,432.98	Projection to TD

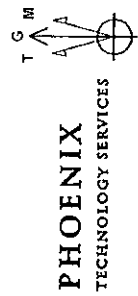
Checked By: _____

Approved By: _____

Date: _____



Project: Eddy County, NM (NAD27 NME)
Site: Crow Federal
Well: #51H
Wellbore: OH / 1514486
Design: Plan #4 10-22-15
Rig: Capstar 114



Asymmetry to Grid North
True North: 2.35°
Magnetic North: 2.35°
Magnetic Field
Strength: 4827.25 nT
Magnetic Declination:
Date: 10/14/2015
Model: HOCM

1514486 (Capstar 114)
Crown Level: 3071.00

WELL DETAILS				
Wellbore	OH / 1514486	Well	#51H	
Design	Plan #4 10-22-15	Rig	Capstar 114	

SECTION DETAILS				
Sec	MD	Inc	Act	TVD
1	4831.00	5.10	37.30	4802.40
2	4831.00	5.10	37.30	4802.40
3	4831.00	5.10	37.30	4802.40
4	4831.00	5.10	37.30	4802.40
5	4831.00	5.10	37.30	4802.40

DESIGN TARGET DETAILS				
Name	TVD	AN/S	AN/HP	AN/HP
1514486 (Capstar 114)	5088.00	670.78	2351.07	6705.33
1514486 (Capstar 114)	5088.00	670.78	2351.07	6705.33

FORMATION TOP DETAILS				
Formation	Perforation	Depth	Depth	Depth
1514486 (Capstar 114)	OH / 1514486	5088.00	5088.00	5088.00

LEGEND				
1514486 (Capstar 114)	OH / 1514486	5088.00	5088.00	5088.00

Map System: US State Plane 1227 (Exact solution)
Datum: NAD 1983 (NAD83 CONUS)
Zone Name: New Mexico East 3001
Local Origin: West #51H, Grid North
Latitude: 32° 51' 11.75229 N
Longitude: 103° 52' 52.07864 W
Grid East: 628871.70
Grid North: 674426.60
Scale Factor: 1.000
Geographic Meridian: HOCM
Sample Date: 14-Oct-15
Magnetic Declination: 7.60°
Due Angle from Horizontal: 60.80°
Magnetic Field Strength: 4827.1

To convert a Magnetic Direction to a Grid Direction, Add 7.30°
To convert a Magnetic Direction to a True Direction, Add 7.60° East
To convert a True Direction to a Grid Direction, Subtract 7.30°

