



NM OIL CONSERVATION
ARTESIA DISTRICT
APR 25 2016

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Apache Corporation

Eddy County, NM (NAD27 NME)

~~NFE Federal~~

30-015-42903

I-6-175-31E

2090' FSL & 200' FEL

Cedar Lake

Federal CA #643H#43H

OH / Job #1513994

Design: Surveys (Capstar 119)

Standard Survey Report

12 August, 2015



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #43H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3769.00usft (Capstar 119)
Site:	NFE Federal	MD Reference:	KB @ 3769.00usft (Capstar 119)
Well:	#43H	North Reference:	Grid
Wellbore:	OH / Job #1513994	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	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	NFE Federal		
Site Position:	Northings:	673,264.70 usft	Latitude: 32° 51' 0.49036 N
From: Map	Easting:	633,303.50 usft	Longitude: 103° 53' 57.34966 W
Position Uncertainty:	0.00 usft	Slot Radius: 13-3/16 "	Grid Convergence: 0.24 °

Well	#43H		
Well Position	+N/-S	0.00 usft	Northings: 677,543.30 usft
	+E/-W	0.00 usft	Easting: 632,859.20 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
			Ground Level: 3,758.00 usft

Wellbore	OH / Job #1513994		
Magnetics	Model Name	Sample Date	Declination (°)
	HDGM	7/29/2015	7.65
			Dip Angle (°)
			60.80
			Field Strength (nT)
			48,584

Design	Surveys (Capstar 119)		
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 (°)
			89.60

Survey Program	Date 8/12/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
100.00	4,680.00	Phoenix Gyro Survey (OH / Job #1513994)	PHX_SPT_GTD
4,773.00	10,237.00	Phoenix MWD Survey (OH / Job #1513994)	PHX+MWD+HDGM
			Description
			PHX Continuous north-seeking gyro
			PHX+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	0.15	230.79	100.00	-0.08	-0.10	-0.10	0.15	0.15	0.00
200.00	0.16	177.58	200.00	-0.31	-0.20	-0.20	0.14	0.01	-53.21
300.00	0.47	50.55	300.00	-0.18	0.13	0.12	0.58	0.31	-127.03
400.00	0.57	134.90	400.00	-0.27	0.79	0.79	0.70	0.10	84.35
500.00	0.51	157.67	499.99	-1.04	1.32	1.31	0.22	-0.06	22.77
600.00	0.50	164.83	599.99	-1.87	1.60	1.59	0.06	-0.01	7.16
700.00	0.39	67.09	699.99	-2.16	2.03	2.01	0.67	-0.11	-97.74
800.00	0.47	170.19	799.98	-2.43	2.41	2.39	0.68	0.08	103.10
900.00	0.22	206.89	899.98	-3.01	2.39	2.37	0.32	-0.25	36.70

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Wellbore:	OH / Job #1513994	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	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)
1,000.00	0.30	43.71	999.98	-2.99	2.49	2.47	0.51	0.08	-163.18
1,100.00	0.47	253.82	1,099.98	-2.91	2.27	2.25	0.74	0.17	-149.89
1,200.00	0.54	31.90	1,199.98	-2.63	2.13	2.11	0.94	0.07	-138.08
1,300.00	0.54	88.96	1,299.98	-2.22	2.85	2.83	0.52	0.00	57.06
1,400.00	0.58	96.74	1,399.97	-2.27	3.82	3.81	0.09	0.04	7.78
1,500.00	0.54	173.87	1,499.97	-2.80	4.38	4.36	0.70	-0.04	77.13
1,600.00	0.43	157.36	1,599.96	-3.61	4.57	4.55	0.18	-0.11	-16.51
1,700.00	0.43	165.70	1,699.96	-4.32	4.81	4.78	0.06	0.00	8.34
1,800.00	0.44	8.63	1,799.96	-4.31	4.96	4.93	0.85	0.01	-157.07
1,900.00	0.39	270.66	1,899.96	-3.92	4.68	4.65	0.63	-0.05	-97.97
2,000.00	0.47	25.51	1,999.96	-3.55	4.51	4.49	0.73	0.08	114.85
2,100.00	0.38	236.59	2,099.96	-3.36	4.41	4.39	0.82	-0.09	-148.92
2,200.00	0.32	314.07	2,199.95	-3.35	3.93	3.91	0.44	-0.06	77.48
2,300.00	0.47	356.91	2,299.95	-2.75	3.71	3.69	0.32	0.15	42.84
2,400.00	0.51	211.09	2,399.95	-2.72	3.46	3.44	0.94	0.04	-145.82
2,500.00	0.38	240.60	2,499.95	-3.26	2.94	2.92	0.26	-0.13	-29.51
2,600.00	0.54	284.25	2,599.94	-3.31	2.20	2.17	0.37	0.16	43.65
2,700.00	0.41	236.21	2,699.94	-3.39	1.44	1.42	0.40	-0.13	-48.04
2,800.00	0.39	295.23	2,799.94	-3.44	0.84	0.81	0.39	-0.02	59.02
2,900.00	0.62	250.58	2,899.94	-3.48	0.02	-0.01	0.44	0.23	-44.65
3,000.00	0.57	311.93	2,999.93	-3.33	-0.86	-0.89	0.61	-0.05	61.35
3,100.00	0.50	289.08	3,099.93	-2.85	-1.64	-1.66	0.22	-0.07	-22.85
3,200.00	0.63	218.65	3,199.92	-3.14	-2.40	-2.42	0.66	0.13	-70.43
3,300.00	0.53	270.33	3,299.92	-3.57	-3.21	-3.23	0.51	-0.10	51.68
3,400.00	0.59	299.12	3,399.91	-3.31	-4.12	-4.14	0.28	0.06	28.79
3,500.00	0.67	78.61	3,499.91	-2.95	-3.99	-4.02	1.18	0.08	139.49
3,600.00	0.65	276.47	3,599.91	-2.77	-3.99	-4.00	1.30	-0.02	-162.14
3,700.00	0.62	265.30	3,699.90	-2.75	-5.09	-5.11	0.13	-0.03	-11.17
3,800.00	0.57	199.34	3,799.90	-3.26	-5.79	-5.81	0.65	-0.05	-65.96
3,900.00	0.46	201.87	3,899.89	-4.10	-6.11	-6.13	0.11	-0.11	2.53
4,000.00	0.69	271.99	3,999.89	-4.45	-6.86	-6.89	0.69	0.23	70.12
4,100.00	0.65	288.30	4,099.88	-4.26	-8.00	-8.03	0.19	-0.04	16.31
4,200.00	0.56	283.55	4,199.88	-3.96	-9.01	-9.04	0.10	-0.09	-4.75
4,300.00	0.43	303.22	4,299.87	-3.64	-9.80	-9.83	0.21	-0.13	19.67
4,400.00	0.31	133.71	4,399.87	-3.62	-9.92	-9.94	0.74	-0.12	-169.51
4,500.00	0.68	303.15	4,499.87	-3.49	-10.22	-10.24	0.99	0.37	169.44
4,600.00	0.63	249.84	4,599.87	-3.35	-11.23	-11.26	0.59	-0.05	-53.31
4,680.00	0.71	299.79	4,679.86	-3.26	-12.08	-12.10	0.71	0.10	62.44
Tie-on to Phoenix Gyro Survey									
4,773.00	0.30	349.00	4,772.86	-2.73	-12.62	-12.64	0.60	-0.44	52.91
First Phoenix MWD Survey									
4,816.00	3.60	96.70	4,815.83	-2.78	-11.30	-11.32	8.61	7.67	250.47
4,858.00	8.90	97.10	4,857.57	-3.33	-6.77	-6.79	12.62	12.62	0.95

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Survey									
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4,901.00	14.80	92.90	4,899.63	-4.02	2.03	2.00	13.86	13.72	-9.77
4,943.00	19.60	91.10	4,939.74	-4.43	14.44	14.40	11.50	11.43	-4.29
4,986.00	22.30	90.80	4,979.90	-4.68	29.81	29.77	6.28	6.28	-0.70
5,028.00	27.60	89.50	5,017.96	-4.71	47.52	47.48	12.69	12.62	-3.10
5,071.00	31.70	88.40	5,055.32	-4.31	68.78	68.75	9.62	9.53	-2.56
5,114.00	36.70	88.20	5,090.88	-3.59	92.93	92.90	11.63	11.63	-0.47
5,156.00	41.20	89.20	5,123.53	-3.00	119.32	119.30	10.82	10.71	2.38
5,199.00	45.40	90.40	5,154.82	-2.91	148.80	148.78	9.95	9.77	2.79
5,241.00	51.40	92.00	5,182.69	-3.59	180.19	180.16	14.57	14.29	3.81
5,284.00	57.70	91.50	5,207.62	-4.65	215.18	215.14	14.68	14.65	-1.16
5,326.00	61.60	90.70	5,228.84	-5.34	251.41	251.37	9.43	9.29	-1.90
5,369.00	67.00	91.00	5,247.48	-5.92	290.14	290.09	12.57	12.56	0.70
5,411.00	70.10	90.60	5,262.84	-6.46	329.22	329.17	7.43	7.38	-0.95
5,454.00	74.50	90.40	5,275.91	-6.82	370.17	370.12	10.24	10.23	-0.47
5,497.00	78.30	89.80	5,286.02	-6.89	411.96	411.90	8.94	8.84	-1.40
5,539.00	82.00	88.90	5,293.20	-6.42	453.33	453.27	9.06	8.81	-2.14
5,560.00	84.30	88.60	5,295.70	-5.96	474.17	474.12	11.04	10.95	-1.43
5,602.00	89.40	86.70	5,298.01	-4.24	516.06	516.02	12.96	12.14	-4.52
5,645.00	90.40	86.30	5,298.09	-1.62	558.98	558.95	2.50	2.33	-0.93
5,687.00	90.60	86.60	5,297.72	0.98	600.90	600.89	0.86	0.48	0.71
5,815.00	89.10	87.60	5,298.06	7.46	728.73	728.76	1.41	-1.17	0.78
5,943.00	87.80	89.30	5,301.52	10.92	856.63	856.68	1.67	-1.02	1.33
6,071.00	89.50	90.10	5,304.53	11.59	984.58	984.64	1.47	1.33	0.63
6,199.00	88.20	90.10	5,307.10	11.37	1,112.55	1,112.61	1.02	-1.02	0.00
6,327.00	84.90	90.20	5,314.80	11.03	1,240.30	1,240.35	2.58	-2.58	0.08
6,455.00	85.60	89.50	5,325.40	11.37	1,367.86	1,367.91	0.77	0.55	-0.55
6,583.00	87.80	88.70	5,332.77	13.37	1,495.62	1,495.68	1.83	1.72	-0.63
6,710.00	89.00	89.90	5,336.32	14.93	1,622.56	1,622.63	1.34	0.94	0.94
6,838.00	90.50	89.90	5,336.88	15.15	1,750.56	1,750.62	1.17	1.17	0.00
6,966.00	87.10	89.70	5,339.56	15.59	1,878.51	1,878.57	2.66	-2.66	-0.16
7,094.00	88.80	89.40	5,344.14	16.60	2,006.42	2,006.48	1.35	1.33	-0.23
7,222.00	89.60	89.30	5,345.92	18.05	2,134.40	2,134.47	0.63	0.63	-0.08
7,350.00	87.80	89.60	5,348.83	19.28	2,262.35	2,262.43	1.43	-1.41	0.23
7,478.00	89.30	90.20	5,352.07	19.50	2,390.31	2,390.38	1.26	1.17	0.47
7,606.00	90.80	89.60	5,351.95	19.73	2,518.30	2,518.38	1.26	1.17	-0.47
7,734.00	89.10	89.30	5,352.07	20.96	2,646.29	2,646.37	1.35	-1.33	-0.23
7,862.00	90.10	89.70	5,352.96	22.07	2,774.28	2,774.37	0.84	0.78	0.31
7,990.00	90.80	89.80	5,351.95	22.63	2,902.28	2,902.36	0.55	0.55	0.08
8,117.00	90.10	89.90	5,350.96	22.96	3,029.27	3,029.36	0.56	-0.55	0.08
8,245.00	89.90	91.40	5,350.96	21.51	3,157.26	3,157.33	1.18	-0.16	1.17
8,373.00	89.00	92.60	5,352.18	17.04	3,285.17	3,285.21	1.17	-0.70	0.94
8,500.00	88.20	90.40	5,355.29	13.72	3,412.08	3,412.09	1.84	-0.63	-1.73
8,628.00	87.90	88.40	5,359.64	15.06	3,539.99	3,540.01	1.58	-0.23	-1.56
8,756.00	88.70	88.70	5,363.44	18.30	3,667.89	3,667.93	0.67	0.63	0.23

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Well:	#43H	North Reference:	Grid
Wellbore:	OH / Job #1513994	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	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)
8,883.00	89.70	89.20	5,365.21	20.62	3,794.86	3,794.91	0.88	0.79	0.39
9,011.00	90.90	89.20	5,364.54	22.41	3,922.84	3,922.90	0.94	0.94	0.00
9,139.00	89.60	87.60	5,363.99	25.99	4,050.78	4,050.87	1.61	-1.02	-1.25
9,267.00	88.00	88.60	5,366.67	30.23	4,178.68	4,178.79	1.47	-1.25	0.78
9,395.00	89.20	89.00	5,369.79	32.91	4,306.61	4,306.74	0.99	0.94	0.31
9,522.00	89.10	89.30	5,371.68	34.79	4,433.58	4,433.72	0.25	-0.08	0.24
9,650.00	89.60	89.10	5,373.13	36.58	4,561.56	4,561.71	0.42	0.39	-0.16
9,778.00	90.20	89.00	5,373.35	38.70	4,689.54	4,689.70	0.48	0.47	-0.08
9,906.00	89.20	89.90	5,374.02	39.93	4,817.53	4,817.69	1.05	-0.78	0.70
10,034.00	88.90	89.30	5,376.15	40.82	4,945.51	4,945.68	0.52	-0.23	-0.47
10,162.00	90.10	88.60	5,377.26	43.17	5,073.48	5,073.66	1.09	0.94	-0.55
Last Phoenix MWD Survey									
10,237.00	90.10	88.60	5,377.13	45.00	5,148.46	5,148.65	0.00	0.00	0.00
Projection to TD									

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
4,680.00	4,679.86	-3.26	-12.08	Tie-on to Phoenix Gyro Survey	
4,773.00	4,772.86	-2.73	-12.62	First Phoenix MWD Survey	
10,162.00	5,377.26	43.17	5,073.48	Last Phoenix MWD Survey	
10,237.00	5,377.13	45.00	5,148.46	Projection to TD	

Checked By: _____	Approved By: _____	Date: _____
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