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NM OIL CONSERVATION

ARTESIA DISTRICT

JAN 04 2015

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Apache Corporation

Eddy County, NM (NAD27 NME)

NFE Federal

#54H

OH / Job #1513593

Design: Surveys (Capstar 114)

Standard Survey Report

07 June, 2015



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #54H
Project:	Eddy County, NM (NAD27.NME)	TVD Reference:	KB @ 3780.00usft (Capstar 114)
Site:	NFE Federal	MD Reference:	KB @ 3780.00usft (Capstar 114)
Well:	#54H	North Reference:	Grid
Wellbore:	OH / Job #1513593	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	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:	Northing:	673,264.70 usft	Latitude: 32° 51' 0.49036 N
From: Map	Easting:	633,303.50 usft	Longitude: 103° 53' 57.34986 W
Position Uncertainty:	0.00 usft	Slot Radius: 13-3/16 "	Grid Convergence: 0.24 °

Well	#54H		
Well Position	+N/-S	0.00 usft	Northing: 680,307.20 usft
	+E/-W	0.00 usft	Easting: 632,018.90 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
			Ground Level: 3,769.00 usft

Wellbore	OH / Job #1513593		
Magnetics:	Model Name	Sample Date	Declination (°)
	HDGM	5/19/2015	7.67
			Dip Angle (°)
			60.82
			Field Strength (nT)
			48,570

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 (°)
			269.61

Survey Program:	Date 6/7/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
74.73	4,686.12	Phoenix Gyro Survey (OH / Job #1513593)	PHX_SPT_GTD
4,768.00	8,647.00	Phoenix MWD Survey (OH / Job #1513593)	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
74.73	0.35	280.26	74.73	0.04	-0.22	0.22	0.47	0.47	0.00
161.74	0.36	278.13	161.74	0.13	-0.76	0.76	0.02	0.01	-2.45
248.75	0.44	172.01	248.75	-0.17	-0.98	0.98	0.74	0.09	-121.96
335.76	0.69	161.82	335.75	-0.99	-0.77	0.78	0.31	0.29	-11.71
422.76	0.63	172.35	422.75	-1.97	-0.54	0.56	0.16	-0.07	12.10
509.77	0.62	168.60	509.75	-2.90	-0.39	0.41	0.05	-0.01	-4.31
596.78	0.62	164.49	596.76	-3.82	-0.17	0.19	0.05	0.00	-4.72
683.78	0.47	162.97	683.75	-4.61	0.06	-0.03	0.17	-0.17	-1.75
770.79	0.41	144.53	770.76	-5.21	0.35	-0.31	0.18	-0.07	-21.19

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Well:	#54H	North Reference:	Grid
Wellbore:	OH / Job #1513593	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	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)	
857.80	0.34	152.21	857.77	-5.69	0.65	-0.61	0.10	-0.08	8.83	
944.81	0.34	106.15	944.78	-5.99	1.02	-0.98	0.31	0.00	-52.94	
1,031.81	0.56	92.83	1,031.77	-6.08	1.69	-1.65	0.28	0.25	-15.31	
1,118.82	0.78	96.25	1,118.78	-6.17	2.70	-2.66	0.26	0.25	3.93	
1,205.83	0.74	90.15	1,205.78	-6.23	3.85	-3.81	0.10	-0.05	-7.01	
1,292.84	0.96	98.38	1,292.78	-6.34	5.14	-5.09	0.29	0.25	9.46	
1,379.84	1.02	106.82	1,379.77	-6.67	6.60	-6.55	0.18	0.07	9.70	
1,466.85	0.91	110.77	1,466.77	-7.14	7.99	-7.94	0.15	-0.13	4.54	
1,553.86	0.77	104.34	1,553.77	-7.53	9.20	-9.15	0.19	-0.16	-7.39	
1,640.86	0.77	103.42	1,640.76	-7.81	10.33	-10.28	0.01	0.00	-1.06	
1,727.87	0.69	116.51	1,727.78	-8.18	11.37	-11.31	0.21	-0.09	15.04	
1,814.88	0.58	103.94	1,814.77	-8.52	12.27	-12.21	0.20	-0.13	-14.45	
1,901.89	0.31	105.39	1,901.77	-8.69	12.92	-12.86	0.31	-0.31	1.67	
1,988.89	0.18	100.80	1,988.77	-8.78	13.28	-13.22	0.15	-0.15	-5.28	
2,075.90	0.09	326.28	2,075.78	-8.74	13.38	-13.32	0.29	-0.10	-154.60	
2,162.91	0.19	331.94	2,162.79	-8.56	13.27	-13.21	0.12	0.11	6.50	
2,249.92	0.15	262.51	2,249.80	-8.45	13.09	-13.03	0.23	-0.05	-79.80	
2,336.92	0.14	324.61	2,336.80	-8.38	12.92	-12.86	0.17	-0.01	71.38	
2,423.93	0.08	254.07	2,423.81	-8.31	12.80	-12.74	0.16	-0.07	-81.07	
2,510.94	0.12	127.73	2,510.82	-8.38	12.81	-12.75	0.21	0.05	-145.20	
2,597.95	0.13	222.46	2,597.83	-8.51	12.82	-12.76	0.21	0.01	108.87	
2,684.95	0.08	242.47	2,684.83	-8.61	12.70	-12.64	0.07	-0.06	23.00	
2,771.96	0.27	343.85	2,771.84	-8.44	12.59	-12.53	0.34	0.22	116.52	
2,858.97	0.22	7.04	2,858.85	-8.08	12.55	-12.49	0.13	-0.06	26.65	
2,945.97	0.22	11.72	2,945.85	-7.75	12.60	-12.55	0.02	0.00	5.38	
3,032.98	0.22	331.56	3,032.86	-7.44	12.56	-12.51	0.17	0.00	-46.16	
3,119.99	0.17	337.56	3,119.87	-7.17	12.43	-12.38	0.06	-0.06	6.90	
3,207.00	0.17	323.33	3,206.88	-6.95	12.30	-12.26	0.05	0.00	-16.35	
3,294.00	0.05	245.44	3,293.88	-6.86	12.19	-12.14	0.19	-0.14	-89.53	
3,381.01	0.05	245.32	3,380.89	-6.89	12.12	-12.07	0.00	0.00	-0.14	
3,468.02	0.15	185.94	3,467.90	-7.02	12.08	-12.03	0.15	0.11	-68.25	
3,555.03	0.15	181.13	3,554.91	-7.25	12.06	-12.01	0.01	0.00	-5.53	
3,642.03	0.25	173.47	3,641.91	-7.55	12.08	-12.03	0.12	0.11	-8.80	
3,729.04	0.34	181.33	3,728.92	-8.00	12.10	-12.04	0.11	0.10	9.03	
3,816.05	0.41	207.67	3,815.92	-8.53	11.95	-11.89	0.21	0.08	30.27	
3,903.05	0.45	232.39	3,902.92	-9.02	11.53	-11.47	0.22	0.05	28.41	
3,990.06	0.34	238.49	3,989.93	-9.36	11.04	-10.98	0.14	-0.13	7.01	
4,077.07	0.25	243.63	4,076.94	-9.58	10.65	-10.58	0.11	-0.10	5.91	
4,164.08	0.18	256.81	4,163.95	-9.69	10.35	-10.28	0.10	-0.08	15.15	
4,251.08	0.29	227.40	4,250.95	-9.87	10.05	-9.98	0.18	0.13	-33.80	
4,338.09	0.32	233.14	4,337.96	-10.17	9.70	-9.63	0.05	0.03	6.60	
4,425.10	0.40	206.06	4,424.96	-10.59	9.37	-9.30	0.21	0.09	-31.12	
4,512.11	0.45	200.48	4,511.97	-11.18	9.11	-9.04	0.07	0.06	-6.41	

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Survey										
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4,555.61	0.59	199.03	4,555.47	-11.55	8.98	-8.90	0.32	0.32	-3.33	
4,642.62	0.50	202.52	4,642.48	-12.33	8.69	-8.61	0.11	-0.10	4.01	
4,686.12	0.50	203.15	4,685.97	-12.68	8.54	-8.46	0.01	0.00	1.45	
Tie-on to Phoenix Gyro Survey										
4,768.00	6.30	262.70	4,767.68	-13.58	3.94	-3.85	7.40	7.08	72.73	
First Phoenix MWD Survey										
4,814.00	13.30	266.60	4,812.98	-14.21	-3.85	3.95	15.28	15.22	8.48	
4,857.00	18.80	270.10	4,854.29	-14.49	-15.73	15.83	12.98	12.79	8.14	
4,899.00	22.30	271.90	4,893.61	-14.22	-30.47	30.56	8.47	8.33	4.29	
4,942.00	26.60	273.60	4,932.75	-13.34	-48.24	48.32	10.13	10.00	3.95	
4,985.00	31.70	274.40	4,970.29	-11.87	-69.12	69.20	11.89	11.86	1.86	
5,027.00	36.30	273.00	5,005.10	-10.37	-92.55	92.62	11.11	10.95	-3.33	
5,070.00	40.30	270.40	5,038.84	-9.61	-119.18	119.24	10.03	9.30	-6.05	
5,113.00	43.70	268.30	5,070.79	-9.95	-147.94	148.01	8.55	7.91	-4.88	
5,155.00	47.70	267.30	5,100.12	-11.11	-177.97	178.05	9.67	9.52	-2.38	
5,198.00	51.60	268.40	5,127.96	-12.33	-210.71	210.79	9.28	9.07	2.56	
5,241.00	55.90	268.90	5,153.38	-13.15	-245.37	245.46	10.04	10.00	1.16	
5,284.00	60.60	269.30	5,176.00	-13.72	-281.92	282.01	10.96	10.93	0.93	
5,327.00	64.40	269.60	5,195.85	-14.08	-320.06	320.14	8.86	8.84	0.70	
5,369.00	70.10	270.00	5,212.09	-14.21	-358.77	358.86	13.60	13.57	0.95	
5,412.00	76.50	269.60	5,224.44	-14.36	-399.94	400.03	14.91	14.88	-0.93	
5,449.00	82.70	269.10	5,231.11	-14.77	-436.31	436.40	16.81	16.76	-1.35	
5,498.00	91.70	268.60	5,233.50	-15.76	-485.19	485.29	18.40	18.37	-1.02	
5,630.00	91.60	270.00	5,229.70	-17.37	-617.12	617.23	1.06	-0.08	1.06	
5,758.00	90.60	271.80	5,227.24	-15.36	-745.08	745.16	1.61	-0.78	1.41	
5,886.00	89.10	268.90	5,227.58	-14.58	-873.06	873.13	2.55	-1.17	-2.27	
6,014.00	90.60	268.70	5,227.91	-17.26	-1,001.02	1,001.12	1.18	1.17	-0.16	
6,142.00	92.50	268.50	5,224.45	-20.38	-1,128.93	1,129.05	1.49	1.48	-0.16	
6,271.00	93.20	269.50	5,218.04	-22.63	-1,257.75	1,257.88	0.95	0.54	0.78	
6,399.00	93.50	270.10	5,210.56	-23.08	-1,385.53	1,385.66	0.52	0.23	0.47	
6,530.00	90.60	271.00	5,205.87	-21.82	-1,516.43	1,516.54	2.32	-2.21	0.69	
6,661.00	91.50	270.80	5,203.47	-19.76	-1,647.39	1,647.48	0.70	0.69	-0.15	
6,789.00	89.40	270.60	5,202.47	-18.20	-1,775.37	1,775.45	1.65	-1.64	-0.16	
6,917.00	91.50	270.10	5,201.46	-17.42	-1,903.35	1,903.43	1.69	1.64	-0.39	
7,052.00	90.20	269.70	5,199.46	-17.65	-2,038.33	2,038.41	1.01	-0.98	-0.30	
7,180.00	90.00	269.70	5,199.24	-18.32	-2,166.33	2,166.41	0.16	-0.16	0.00	
7,308.00	90.60	269.60	5,198.57	-19.10	-2,294.33	2,294.40	0.48	0.47	-0.08	
7,437.00	91.30	269.70	5,196.43	-19.89	-2,423.31	2,423.38	0.55	0.54	0.08	
7,565.00	92.90	270.00	5,191.74	-20.23	-2,551.21	2,551.29	1.27	1.25	0.23	
7,692.00	90.70	270.50	5,187.75	-19.67	-2,678.14	2,678.21	1.78	-1.73	0.39	
7,821.00	90.00	270.80	5,186.96	-18.21	-2,807.13	2,807.19	0.59	-0.54	0.23	
7,949.00	90.20	269.60	5,186.74	-17.76	-2,935.13	2,935.18	0.95	0.16	-0.94	
8,080.00	89.70	270.40	5,186.85	-17.76	-3,066.13	3,066.18	0.72	-0.38	0.61	
8,209.00	92.70	269.90	5,184.15	-17.43	-3,195.08	3,195.13	2.36	2.33	-0.39	

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Site:	NFE Federal	MD Reference:	KB @ 3780.00usft (Capstar 114)
Well:	#54H, 11	North Reference:	Grid
Wellbore:	OH / Job #1513593	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	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)
8,337.00	90.70	268.50	5,180.35	-19.21	-3,323.00	3,323.06	1.91	-1.56	-1.09
8,465.00	90.60	268.50	5,178.90	-22.55	-3,450.95	3,451.03	0.08	-0.08	0.00
8,575.00	91.40	267.70	5,176.98	-26.21	-3,560.87	3,560.97	1.03	0.73	-0.73
Last Phoenix MWD Survey									
8,647.00	91.40	267.70	5,175.22	-29.10	-3,632.79	3,632.91	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	
4,686.12	4,685.97	-12.68	8.54	Tie-on to Phoenix Gyro Survey	
4,768.00	4,767.68	-13.58	3.94	First Phoenix MWD Survey	
8,575.00	5,176.98	-26.21	-3,560.87	Last Phoenix MWD Survey	
8,647.00	5,175.22	-29.10	-3,632.79	Projection to TD	

Checked By: _____ Approved By: _____ Date: _____