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Apache Corporation

Eddy County, NM (NAD27 NME)

Hummingbird Federal Com

#1H

WB1/Job #1410314

Survey: Phoenix MWD Surveys ✓

Standard Survey Report

06 April, 2015

Provide signature page for Survey

NM OIL CONSERVATION
ARTESIA DISTRICT
AUG 17 2015
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Company:	Apache Corporation	Local Co-ordinate Reference:	Well #1H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 4013.00usft (Capstar 114)
Site:	Hummingbird Federal Com	MD Reference:	KB @ 4013.00usft (Capstar 114)
Well:	#1H	North Reference:	Grid
Wellbore:	WB1/Job #1410314	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	Hummingbird Federal Com		
Site Position:		Northing:	677,262.80 usft
From:	Map	Easting:	655,481.80 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 51' 39.07462 N
		Longitude:	103° 49' 37.14798 W
		Grid Convergence:	0.27 °

Well:	#1H		
Well Position	+N/-S	0.00 usft	Northing: 677,254.20 usft
	+E/-W	0.00 usft	Easting: 654,282.00 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 51' 39.04624 N
		Longitude:	103° 49' 51.21432 W
		Ground Level:	4,002.00 usft

Wellbore	WB1/Job #1410314		
Magnetics	Model Name	Sample Date	Declination
	HDGM	4/2/2015	7.55
			60.87
			48,623

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
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			89.31

Survey Program	Date: 4/6/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
83.00	4,454.00	Phoenix Gyro Survey (WB1/Job #1410314)	NS-GYRO-MS
4,543.00	10,174.00	Phoenix MWD Surveys (WB1/Job #14103)	PHX+MWD+HDGM
			North sensing gyrocompassing m/s
			PHX+MWD+HDGM

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)
4,454.00	0.17	264.93	4,453.56	-8.90	-2.57	-2.67	0.00	0.00	0.00
Tie-on to Phoenix Gyro Survey									
4,543.00	0.20	277.10	4,542.56	-8.89	-2.85	-2.96	0.06	0.03	13.67
First Phoenix MWD Survey									
4,800.00	0.50	246.10	4,799.55	-9.29	-4.32	-4.43	0.13	0.12	-12.06
4,971.00	0.40	251.50	4,970.55	-9.78	-5.57	-5.69	0.06	-0.06	3.16
5,013.00	0.60	261.80	5,012.55	-9.86	-5.93	-6.05	0.52	0.48	24.52
5,056.00	1.70	63.90	5,055.54	-9.61	-5.58	-5.69	5.30	2.56	376.98
5,099.00	6.40	70.80	5,098.42	-8.54	-2.74	-2.84	10.97	10.93	16.05

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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)
5,141.00	11.80	74.40	5,139.88	-6.61	3.61	3.53	12.92	12.86	8.57
5,184.00	17.60	74.50	5,181.45	-3.69	14.12	14.08	13.49	13.49	0.23
5,226.00	23.30	76.30	5,220.79	-0.03	28.32	28.32	13.65	13.57	4.29
5,269.00	28.30	79.20	5,259.49	3.90	46.61	46.65	11.99	11.63	6.74
5,312.00	33.90	80.40	5,296.30	7.81	68.46	68.55	13.10	13.02	2.79
5,355.00	39.10	81.20	5,330.85	11.89	93.70	93.84	12.14	12.09	1.86
5,397.00	45.00	82.50	5,362.03	15.86	121.54	121.72	14.20	14.05	3.10
5,440.00	48.40	85.10	5,391.52	19.22	152.64	152.86	9.05	7.91	6.05
5,483.00	52.30	85.90	5,418.95	21.81	185.64	185.89	9.18	9.07	1.86
5,526.00	56.00	88.40	5,444.13	23.52	220.44	220.71	9.81	8.60	5.81
5,568.00	62.10	88.80	5,465.72	24.40	256.43	256.71	14.55	14.52	0.95
5,611.00	68.70	88.70	5,483.61	25.25	295.50	295.78	15.35	15.35	-0.23
5,654.00	74.10	87.60	5,497.32	26.57	336.22	336.51	12.79	12.56	-2.56
5,697.00	78.20	87.00	5,507.61	28.54	377.91	378.23	9.63	9.53	-1.40
5,739.00	82.70	86.80	5,514.58	30.78	419.26	419.60	10.72	10.71	-0.48
5,782.00	88.70	85.30	5,517.80	33.74	462.01	462.39	14.38	13.95	-3.49
5,824.00	91.70	84.70	5,517.66	37.40	503.85	504.26	7.28	7.14	-1.43
5,952.00	92.30	85.40	5,513.19	48.43	631.29	631.83	0.72	0.47	0.55
6,080.00	88.70	90.30	5,512.07	53.23	759.14	759.72	4.75	-2.81	3.83
6,209.00	89.50	92.10	5,514.10	50.53	888.09	888.63	1.53	0.62	1.40
6,339.00	88.70	91.90	5,516.14	45.99	1,017.99	1,018.47	0.63	-0.62	-0.15
6,468.00	89.50	91.30	5,518.17	42.39	1,146.92	1,147.35	0.78	0.62	-0.47
6,599.00	89.80	90.50	5,518.97	40.34	1,277.90	1,278.30	0.65	0.23	-0.61
6,727.00	88.00	90.30	5,521.42	39.44	1,405.87	1,406.24	1.41	-1.41	-0.16
6,855.00	90.10	90.30	5,523.55	38.77	1,533.85	1,534.20	1.64	1.64	0.00
6,983.00	91.10	90.70	5,522.21	37.66	1,661.83	1,662.16	0.84	0.78	0.31
7,112.00	89.70	89.80	5,521.30	37.09	1,790.82	1,791.14	1.29	-1.09	-0.70
7,240.00	88.00	89.40	5,523.87	37.99	1,918.79	1,919.11	1.36	-1.33	-0.31
7,371.00	90.20	89.00	5,525.93	39.81	2,049.75	2,050.08	1.71	1.68	-0.31
7,500.00	89.30	89.80	5,526.49	41.17	2,178.74	2,179.08	0.93	-0.70	0.62
7,628.00	87.90	88.80	5,529.62	42.73	2,306.69	2,307.04	1.34	-1.09	-0.78
7,756.00	90.10	88.10	5,531.86	46.19	2,434.61	2,434.99	1.80	1.72	-0.55
7,884.00	89.00	89.80	5,532.86	48.54	2,562.58	2,562.98	1.58	-0.86	1.33
8,012.00	89.70	91.20	5,534.31	47.42	2,690.56	2,690.94	1.22	0.55	1.09
8,139.00	90.70	92.00	5,533.87	43.87	2,817.51	2,817.84	1.01	0.79	0.63
8,267.00	88.90	92.10	5,534.32	39.29	2,945.42	2,945.68	1.41	-1.41	0.08
8,396.00	88.30	89.90	5,537.47	37.04	3,074.36	3,074.58	1.77	-0.47	-1.71
8,524.00	89.70	89.10	5,539.70	38.16	3,202.33	3,202.56	1.26	1.09	-0.63
8,652.00	89.10	89.80	5,541.04	39.39	3,330.31	3,330.55	0.72	-0.47	0.55
8,780.00	87.00	89.60	5,545.40	40.06	3,458.23	3,458.46	1.65	-1.64	-0.16
8,909.00	88.70	89.00	5,550.24	41.63	3,587.12	3,587.37	1.40	1.32	-0.47
9,040.00	91.30	88.70	5,550.24	44.26	3,718.09	3,718.35	2.00	1.98	-0.23
9,168.00	89.80	89.60	5,549.01	46.16	3,846.06	3,846.34	1.37	-1.17	0.70

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9,296.00	92.20	89.30	5,546.77	47.39	3,974.03	3,974.31	1.89	1.88	-0.23	
9,424.00	90.20	90.90	5,544.09	47.17	4,101.99	4,102.26	2.00	-1.56	1.25	
9,553.00	87.00	90.90	5,547.25	45.14	4,230.92	4,231.15	2.48	-2.48	0.00	
9,684.00	87.90	89.60	5,553.07	44.57	4,361.78	4,362.00	1.21	0.69	-0.99	
9,812.00	89.80	89.80	5,555.64	45.24	4,489.75	4,489.97	1.49	1.48	0.16	
9,940.00	91.40	89.40	5,554.30	46.13	4,617.73	4,617.95	1.29	1.25	-0.31	
10,103.00	94.70	89.70	5,545.63	47.41	4,780.48	4,780.70	2.03	2.02	0.18	
Last Phoenix MWD Survey										
10,174.00	94.70	89.70	5,539.81	47.78	4,851.24	4,851.46	0.00	0.00	0.00	
Projection to TD										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
4,454.00	4,453.56	-8.90	-2.57	Tie-on to Phoenix Gyro Survey	
4,543.00	4,542.56	-8.89	-2.85	First Phoenix MWD Survey	
10,103.00	5,545.63	47.41	4,780.48	Last Phoenix MWD Survey	
10,174.00	5,539.81	47.78	4,851.24	Projection to TD	

Checked By: _____ Approved By: _____ Date: _____