



NM OIL CONSERVATION
ARTESIA DISTRICT

AUG 21 2015

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Apache Corporation

Eddy County, NM (NAD27 NME)

Hummingbird Federal Com

#2H

WB1/Job #1410362

Design: Surveys (Capstar 114)

Standard Survey Report

21 April, 2015



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 4014.00usft (Capstar 114)
Site:	Hummingbird Federal Com	MD Reference:	KB @ 4014.00usft (Capstar 114)
Well:	#2H	North Reference:	Grid
Wellbore:	WB1/Job #1410362	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:	Map	Northing:	677,262.80 usft
From:		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:	#2H		
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' 40.03477 N
		Longitude:	103° 49' 51.21461 W
		Ground Level:	4,003.00 usft

Wellbore:	WB1/Job #1410362		
Magnetics	Model Name	Sample Date	Declination
			(°)
	HDGM	4/7/2015	7.53
			Dip Angle
			(°)
			Field Strength
			(nT)
			60.87
			48,622

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
			Direction
			(°)
			89.60

Survey Program	Date: 4/21/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
117.00	5,100.00	Phoenix Gyro Survey (WB1/Job #1410362)	NS-GYRO-MS
5,328.00	10,607.00	Phoenix MWD Survey (WB1/Job #141036)	PHX+MWD+HDGM
			Description
			North sensing gyrocompassing m/s
			PHX+MWD+HDGM

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
117.00	0.34	45.11	117.00	0.24	0.25	0.25	0.29	0.29	0.00
209.00	0.51	298.25	209.00	0.63	0.08	0.08	0.75	0.18	-116.15
309.00	0.41	296.61	308.99	1.00	-0.63	-0.63	0.10	-0.10	-1.64
395.00	0.24	278.86	394.99	1.17	-1.09	-1.08	0.23	-0.20	-20.64
480.00	0.28	242.26	479.99	1.10	-1.45	-1.44	0.20	0.05	-43.06
565.00	0.41	231.68	564.99	0.81	-1.87	-1.86	0.17	0.15	-12.45
650.00	0.43	234.85	649.99	0.44	-2.37	-2.36	0.04	0.02	3.73
736.00	0.55	226.56	735.99	-0.03	-2.93	-2.93	0.16	0.14	-9.64
821.00	0.53	243.40	820.98	-0.48	-3.58	-3.58	0.19	-0.02	19.81

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Site:	Hummingbird Federal Com	MD Reference:	KB @ 4014.00usft (Capstar 114)
Well:	#2H	North Reference:	Grid
Wellbore:	WB1/Job #1410362	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)
906.00	0.61	238.74	905.98	-0.90	-4.32	-4.32	0.11	0.09	-5.48
992.00	0.62	221.49	991.97	-1.48	-5.02	-5.03	0.21	0.01	-20.06
1,077.00	0.43	241.19	1,076.97	-1.98	-5.60	-5.61	0.31	-0.22	23.18
1,248.00	0.32	255.05	1,247.97	-2.41	-6.62	-6.64	0.08	-0.06	8.11
1,332.00	0.23	254.93	1,331.96	-2.52	-7.01	-7.03	0.11	-0.11	-0.14
1,418.00	0.18	276.19	1,417.96	-2.55	-7.32	-7.33	0.10	-0.06	24.72
1,504.00	0.25	1.82	1,503.96	-2.35	-7.44	-7.46	0.35	0.08	99.57
1,589.00	0.36	2.93	1,588.96	-1.89	-7.42	-7.44	0.13	0.13	1.31
1,675.00	0.45	4.14	1,674.96	-1.29	-7.39	-7.39	0.11	0.10	1.41
1,760.00	0.72	41.60	1,759.96	-0.55	-7.01	-7.01	0.53	0.32	44.07
1,846.00	0.83	46.23	1,845.95	0.28	-6.20	-6.20	0.15	0.13	5.38
1,932.00	0.85	64.94	1,931.94	0.98	-5.17	-5.16	0.32	0.02	21.76
2,017.00	0.82	81.49	2,016.93	1.34	-4.00	-3.99	0.28	-0.04	19.47
2,103.00	0.87	90.71	2,102.92	1.42	-2.74	-2.73	0.17	0.06	10.72
2,274.00	0.68	110.81	2,273.91	1.05	-0.49	-0.48	0.19	-0.11	11.75
2,359.00	0.53	118.97	2,358.90	0.68	0.33	0.33	0.20	-0.18	9.60
2,445.00	0.52	117.53	2,444.90	0.30	1.02	1.02	0.02	-0.01	-1.67
2,530.00	0.38	121.08	2,529.89	-0.02	1.60	1.60	0.17	-0.16	4.18
2,616.00	0.19	127.92	2,615.89	-0.26	1.96	1.96	0.22	-0.22	7.95
2,702.00	0.07	90.75	2,701.89	-0.34	2.12	2.12	0.16	-0.14	-43.22
2,787.00	0.11	313.17	2,786.89	-0.29	2.12	2.11	0.20	0.05	-161.86
2,873.00	0.26	318.92	2,872.89	-0.09	1.93	1.93	0.18	0.17	6.69
2,961.00	0.41	315.30	2,960.89	0.29	1.58	1.58	0.17	0.17	-4.11
3,047.00	0.52	315.60	3,046.89	0.79	1.09	1.09	0.13	0.13	0.35
3,132.00	0.64	323.10	3,131.88	1.44	0.53	0.54	0.17	0.14	8.82
3,218.00	0.76	326.12	3,217.88	2.30	-0.07	-0.06	0.15	0.14	3.51
3,303.00	1.06	321.86	3,302.87	3.39	-0.87	-0.85	0.36	0.35	-5.01
3,389.00	1.02	319.68	3,388.85	4.59	-1.86	-1.83	0.07	-0.05	-2.53
3,474.00	0.96	312.01	3,473.84	5.65	-2.88	-2.84	0.17	-0.07	-9.02
3,559.00	0.91	310.88	3,558.83	6.57	-3.92	-3.87	0.06	-0.06	-1.33
3,645.00	0.74	303.75	3,644.82	7.32	-4.90	-4.85	0.23	-0.20	-8.29
3,730.00	0.68	295.81	3,729.81	7.85	-5.81	-5.75	0.14	-0.07	-9.34
3,816.00	0.76	283.60	3,815.81	8.20	-6.82	-6.76	0.20	0.09	-14.20
3,901.00	1.05	276.93	3,900.80	8.43	-8.14	-8.08	0.36	0.34	-7.85
3,986.00	1.30	276.81	3,985.78	8.64	-9.87	-9.81	0.29	0.29	-0.14
4,072.00	1.24	274.71	4,071.76	8.83	-11.77	-11.71	0.09	-0.07	-2.44
4,161.00	1.36	279.99	4,160.73	9.09	-13.77	-13.71	0.19	0.13	5.93
4,245.00	1.29	285.93	4,244.71	9.52	-15.66	-15.59	0.18	-0.08	7.07
4,330.00	1.57	294.95	4,329.68	10.28	-17.64	-17.56	0.42	0.33	10.61
4,415.00	2.02	301.43	4,414.64	11.55	-19.97	-19.89	0.58	0.53	7.62
4,589.00	2.33	310.73	4,588.52	15.46	-25.27	-25.16	0.27	0.18	5.34
4,673.00	2.32	313.87	4,672.45	17.75	-27.79	-27.66	0.15	-0.01	3.74
4,758.00	2.37	314.68	4,757.38	20.18	-30.28	-30.14	0.07	0.06	0.95

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Wellbore:	WB1/Job #1410362	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)
4,843.00	2.37	310.51	4,842.30	22.56	-32.86	-32.70	0.20	0.00	-4.91
4,929.00	2.20	312.31	4,928.24	24.82	-35.44	-35.26	0.21	-0.20	2.09
5,014.00	2.26	318.92	5,013.17	27.18	-37.74	-37.55	0.31	0.07	7.78
5,100.00	2.20	313.33	5,099.11	29.59	-40.06	-39.85	0.26	-0.07	-6.50
Tie-on to Phoenix Gyro Survey									
5,328.00	3.00	333.10	5,326.88	37.92	-45.94	-45.67	0.52	0.35	8.67
First Phoenix MWD Survey									
5,371.00	3.00	335.10	5,369.82	39.94	-46.92	-46.64	0.24	0.00	4.65
5,414.00	3.00	341.90	5,412.76	42.03	-47.75	-47.45	0.83	0.00	15.81
5,456.00	2.30	42.20	5,454.72	43.70	-47.52	-47.22	6.50	-1.67	143.57
5,499.00	5.00	93.00	5,497.64	44.24	-45.07	-44.76	9.23	6.28	118.14
5,542.00	10.10	95.50	5,540.25	43.78	-39.44	-39.14	11.88	11.86	5.81
5,584.00	16.50	98.70	5,581.10	42.53	-29.87	-29.57	15.33	15.24	7.62
5,627.00	22.50	100.90	5,621.62	40.05	-15.74	-15.46	14.06	13.95	5.12
5,670.00	29.20	100.30	5,660.29	36.61	2.68	2.93	15.59	15.58	-1.40
5,712.00	35.00	97.70	5,695.86	33.16	24.71	24.95	14.19	13.81	-6.19
5,755.00	41.10	93.50	5,729.71	30.64	51.07	51.28	15.40	14.19	-9.77
5,798.00	47.30	92.20	5,760.52	29.17	81.00	81.20	14.57	14.42	-3.02
5,840.00	51.40	92.80	5,787.88	27.78	112.83	113.02	9.82	9.76	1.43
5,883.00	56.80	92.80	5,813.08	26.08	147.60	147.78	12.56	12.56	0.00
5,926.00	60.70	92.40	5,835.39	24.41	184.32	184.48	9.10	9.07	-0.93
5,969.00	67.00	92.30	5,854.33	22.83	222.87	223.02	14.65	14.65	-0.23
6,012.00	70.80	92.40	5,869.81	21.19	262.94	263.08	8.84	8.84	0.23
6,054.00	73.80	92.90	5,882.57	19.33	302.91	303.03	7.23	7.14	1.19
6,097.00	77.40	93.00	5,893.27	17.19	344.49	344.60	8.38	8.37	0.23
6,140.00	81.40	93.40	5,901.17	14.83	386.68	386.78	9.35	9.30	0.93
6,183.00	87.90	92.10	5,905.18	12.78	429.42	429.50	15.41	15.12	-3.02
6,226.00	91.20	90.60	5,905.52	11.77	472.40	472.47	8.43	7.67	-3.49
6,268.00	89.70	89.70	5,905.19	11.66	514.40	514.47	4.16	-3.57	-2.14
6,354.00	88.20	88.80	5,906.76	12.78	600.38	600.45	2.03	-1.74	-1.05
6,482.00	89.60	89.90	5,909.22	14.24	728.34	728.42	1.39	1.09	0.86
6,613.00	91.80	89.20	5,907.62	15.26	859.32	859.40	1.76	1.68	-0.53
6,742.00	90.50	90.80	5,905.03	15.26	988.28	988.37	1.60	-1.01	1.24
6,873.00	89.80	91.60	5,904.69	12.52	1,119.25	1,119.31	0.81	-0.53	0.61
7,004.00	88.70	90.50	5,906.40	10.12	1,250.21	1,250.25	1.19	-0.84	-0.84
7,132.00	89.90	90.10	5,907.97	9.45	1,378.20	1,378.23	0.99	0.94	-0.31
7,260.00	88.80	89.70	5,909.42	9.67	1,506.19	1,506.22	0.91	-0.86	-0.31
7,388.00	89.40	88.70	5,911.43	11.46	1,634.16	1,634.20	0.91	0.47	-0.78
7,517.00	88.00	88.70	5,914.36	14.39	1,763.09	1,763.15	1.09	-1.09	0.00
7,645.00	89.30	88.40	5,917.37	17.62	1,891.01	1,891.09	1.04	1.02	-0.23
7,776.00	89.30	90.40	5,918.97	19.00	2,021.99	2,022.07	1.53	0.00	1.53
7,904.00	91.00	90.90	5,918.64	17.54	2,149.97	2,150.04	1.38	1.33	0.39
8,033.00	90.40	89.70	5,917.06	16.87	2,278.96	2,279.02	1.04	-0.47	-0.93
8,161.00	90.30	89.60	5,916.28	17.65	2,406.95	2,407.02	0.11	-0.08	-0.08

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Well:	#2H	North Reference:	Grid
Wellbore:	WB1/Job #1410362	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)
8,289.00	91.80	90.30	5,913.93	17.76	2,534.93	2,534.99	1.29	1.17	0.55
8,417.00	91.50	90.20	5,910.25	17.20	2,662.87	2,662.93	0.25	-0.23	-0.08
8,545.00	90.10	89.10	5,908.46	17.99	2,790.85	2,790.91	1.39	-1.09	-0.86
8,674.00	90.50	88.80	5,907.79	20.35	2,919.83	2,919.90	0.39	0.31	-0.23
8,802.00	88.90	89.30	5,908.46	22.47	3,047.81	3,047.89	1.31	-1.25	0.39
8,930.00	89.70	88.60	5,910.02	24.82	3,175.77	3,175.87	0.83	0.63	-0.55
9,059.00	90.40	87.20	5,909.91	29.54	3,304.68	3,304.81	1.21	0.54	-1.09
9,185.00	89.00	88.80	5,910.57	33.94	3,430.60	3,430.75	1.69	-1.11	1.27
9,313.00	90.10	91.10	5,911.57	34.05	3,558.58	3,558.73	1.99	0.86	1.80
9,441.00	92.20	91.90	5,909.00	30.70	3,686.50	3,686.63	1.76	1.64	0.63
9,569.00	91.00	90.20	5,905.43	28.36	3,814.43	3,814.53	1.63	-0.94	-1.33
9,698.00	90.80	90.50	5,903.40	27.57	3,943.41	3,943.50	0.28	-0.16	0.23
9,829.00	89.80	90.30	5,902.72	26.66	4,074.40	4,074.49	0.78	-0.76	-0.15
9,957.00	90.60	89.00	5,902.27	27.44	4,202.39	4,202.48	1.19	0.63	-1.02
10,086.00	89.90	90.40	5,901.71	28.11	4,331.39	4,331.48	1.21	-0.54	1.09
10,214.00	91.00	89.60	5,900.70	28.11	4,459.38	4,459.47	1.06	0.86	-0.63
10,341.00	88.90	88.10	5,900.81	30.66	4,586.34	4,586.45	2.03	-1.65	-1.18
10,472.00	91.00	88.60	5,900.93	34.43	4,717.28	4,717.41	1.65	1.60	0.38
10,535.00	91.50	87.90	5,899.55	36.36	4,780.24	4,780.37	1.37	0.79	-1.11
Last Phoenix MWD Survey									
10,607.00	91.50	87.90	5,897.67	39.00	4,852.16	4,852.32	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)	
5,100.00	5,099.11	29.59	-40.06	Tie-on to Phoenix Gyro Survey
5,328.00	5,326.88	37.92	-45.94	First Phoenix MWD Survey
10,535.00	5,899.55	36.36	4,780.24	Last Phoenix MWD Survey
10,607.00	5,897.67	39.00	4,852.16	Projection to TD

Checked By: _____ Approved By: _____ Date: _____