



EXPLORING WHAT'S POSSIBLE

M Sec. 3 T17S. R31E 930 FSL + 557 FWL

API 3001542140

Apache Corporation

Eddy County, NM (NAD27 NME)

Crow Federal

#35H

WB1/Job 1410849

Design: Surveys (Capstar 114)

Standard Survey Report

03 June, 2014

NM OIL CONSERVATION
ARTESIA DISTRICT

JAN 16 2015

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PHOENIX
TECHNOLOGY SERVICES

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #35H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3938.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3938.00usft (Capstar 114)
Well:	#35H	North Reference:	Grid
Wellbore:	WB1/Job 1410849	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR DB

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

Well	#35H		
Well Position	+N/-S	0.00 usft	Northing: 676,463.90 usft
	+E/-W	0.00 usft	Easting: 644,184.10 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 51' 31.68608 N
		Longitude:	103° 51' 49.63866 W
		Ground Level:	3,927.00 usft

Wellbore	WB1/Job 1410849				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	05/19/14	7.41	60.65	48,669

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)	Direction (°)	
	0.00	0.00	0.00	89.61	

Survey Program	Date	06/03/14			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	4,700.00	Gyrodata Gyro Survey (WB1/Job 1410849)	NS-GYRO-MS	North sensing gyrocompassing m/s	
4,871.00	9,461.00	Phoenix MWD Surveys (WB1/Job 141084)	MWD	MWD - Standard	

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	0.17	84.74	100.00	0.01	0.15	0.15	0.17	0.17	0.00	
200.00	0.30	130.52	200.00	-0.14	0.49	0.49	0.22	0.13	45.78	
300.00	0.37	143.47	300.00	-0.57	0.89	0.88	0.10	0.07	12.95	
400.00	0.42	145.45	399.99	-1.13	1.29	1.28	0.05	0.05	1.98	
500.00	0.46	147.53	499.99	-1.77	1.71	1.70	0.04	0.04	2.08	
600.00	0.42	149.63	599.99	-2.43	2.11	2.09	0.04	-0.04	2.10	
700.00	0.42	148.83	699.99	-3.06	2.48	2.46	0.01	0.00	-0.80	
800.00	0.39	159.39	799.98	-3.69	2.79	2.77	0.08	-0.03	10.56	
900.00	0.14	161.48	899.98	-4.13	2.95	2.92	0.25	-0.25	2.09	

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Well: #35H	North Reference: Grid	
Wellbore: WB1/Job 1410849	Survey Calculation Method: Minimum Curvature	
Design: Surveys (Capstar 114)	Database: GCR DB	

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	0.11	180.16	999.98	-4.34	2.99	2.96	0.05	-0.03	18.68
1,100.00	0.08	154.82	1,099.98	-4.50	3.02	2.99	0.05	-0.03	-25.34
1,200.00	0.07	171.28	1,199.98	-4.62	3.06	3.03	0.02	-0.01	16.46
1,300.00	0.09	23.10	1,299.98	-4.61	3.10	3.07	0.15	0.02	-148.18
1,400.00	0.63	31.15	1,399.98	-4.07	3.42	3.39	0.54	0.54	8.05
1,500.00	1.11	51.24	1,499.97	-2.99	4.45	4.43	0.56	0.48	20.09
1,600.00	1.19	57.92	1,599.95	-1.83	6.09	6.08	0.16	0.08	6.68
1,700.00	1.25	67.95	1,699.93	-0.87	7.98	7.97	0.22	0.06	10.03
1,800.00	1.20	74.24	1,799.90	-0.18	10.00	10.00	0.14	-0.05	6.29
1,900.00	0.81	77.95	1,899.89	0.26	11.70	11.70	0.40	-0.39	3.71
2,000.00	0.57	84.14	1,999.88	0.45	12.88	12.89	0.25	-0.24	6.19
2,100.00	0.32	82.00	2,099.88	0.54	13.66	13.66	0.25	-0.25	-2.14
2,200.00	0.14	68.32	2,199.88	0.63	14.05	14.05	0.19	-0.18	-13.68
2,300.00	0.06	25.44	2,299.88	0.72	14.18	14.19	0.10	-0.08	-42.88
2,400.00	0.01	351.81	2,399.88	0.78	14.20	14.21	0.05	-0.05	-33.63
2,500.00	0.23	308.36	2,499.88	0.91	14.04	14.05	0.22	0.22	-43.45
2,600.00	0.18	263.32	2,599.88	1.02	13.73	13.74	0.16	-0.05	-45.04
2,700.00	0.32	275.18	2,699.87	1.02	13.30	13.30	0.15	0.14	11.86
2,800.00	0.52	278.41	2,799.87	1.11	12.57	12.58	0.20	0.20	3.23
2,900.00	0.27	262.37	2,899.87	1.15	11.89	11.90	0.27	-0.25	-16.04
3,000.00	0.39	257.81	2,999.87	1.05	11.32	11.33	0.12	0.12	-4.56
3,100.00	0.42	253.33	3,099.86	0.87	10.64	10.64	0.04	0.03	-4.48
3,200.00	0.34	256.23	3,199.86	0.69	10.00	10.00	0.08	-0.08	2.90
3,300.00	0.41	263.92	3,299.86	0.59	9.35	9.36	0.09	0.07	7.69
3,400.00	0.38	259.36	3,399.86	0.49	8.67	8.68	0.04	-0.03	-4.56
3,500.00	0.29	281.00	3,499.86	0.47	8.10	8.10	0.15	-0.09	21.64
3,600.00	0.11	261.71	3,599.86	0.51	7.76	7.76	0.19	-0.18	-19.29
3,700.00	0.13	180.50	3,699.86	0.38	7.66	7.66	0.16	0.02	-81.21
3,800.00	0.65	122.54	3,799.85	-0.04	8.14	8.14	0.59	0.52	-57.96
3,900.00	0.61	122.29	3,899.85	-0.63	9.06	9.06	0.04	-0.04	-0.25
4,000.00	0.58	127.55	3,999.84	-1.22	9.92	9.91	0.06	-0.03	5.26
4,100.00	0.44	101.36	4,099.84	-1.60	10.69	10.68	0.27	-0.14	-26.19
4,200.00	0.47	95.76	4,199.83	-1.72	11.48	11.47	0.05	0.03	-5.60
4,300.00	0.27	84.89	4,299.83	-1.74	12.12	12.11	0.21	-0.20	-10.87
4,400.00	0.30	87.22	4,399.83	-1.71	12.62	12.61	0.03	0.03	2.33
4,500.00	0.25	103.15	4,499.83	-1.74	13.09	13.08	0.09	-0.05	15.93
4,600.00	0.15	187.11	4,599.83	-1.92	13.29	13.27	0.28	-0.10	83.96
4,700.00	0.17	246.81	4,699.83	-2.11	13.13	13.12	0.16	0.02	59.70
Tie-on to Gyrodata Gyro Survey									
4,871.00	5.10	87.90	4,870.61	-1.93	20.50	20.49	3.08	2.88	-92.93
First Phoenix MWD Survey									
4,914.00	10.70	89.90	4,913.19	-1.86	26.41	26.40	13.04	13.02	4.65
4,957.00	17.10	91.80	4,954.90	-2.05	36.73	36.71	14.92	14.88	4.42

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Survey									
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5,000.00	23.90	94.00	4,995.16	-2.86	51.76	51.74	15.91	15.81	5.12
5,043.00	30.40	94.60	5,033.40	-4.34	71.31	71.28	15.13	15.12	1.40
5,085.00	36.00	94.50	5,068.53	-6.16	94.23	94.18	13.33	13.33	-0.24
5,128.00	39.80	94.50	5,102.45	-8.23	120.55	120.50	8.84	8.84	0.00
5,171.00	43.70	93.30	5,134.53	-10.17	149.12	149.04	9.26	9.07	-2.79
5,214.00	47.40	91.80	5,164.64	-11.52	179.77	179.69	8.96	8.60	-3.49
5,257.00	51.10	91.50	5,192.70	-12.46	212.33	212.24	8.62	8.60	-0.70
5,299.00	56.10	91.30	5,217.62	-13.28	246.12	246.02	11.91	11.90	-0.48
5,342.00	62.50	90.60	5,239.56	-13.88	283.06	282.96	14.95	14.88	-1.63
5,385.00	69.00	89.80	5,257.21	-14.01	322.25	322.15	15.21	15.12	-1.86
5,428.00	74.20	89.10	5,270.78	-13.62	363.03	362.93	12.19	12.09	-1.63
5,470.00	78.20	89.60	5,280.80	-13.16	403.81	403.71	9.59	9.52	1.19
5,513.00	81.20	89.70	5,288.48	-12.90	446.11	446.01	6.98	6.98	0.23
5,556.00	85.90	89.90	5,293.31	-12.75	488.83	488.73	10.94	10.93	0.47
5,599.00	87.40	88.20	5,295.83	-12.04	531.75	531.65	5.27	3.49	-3.95
5,727.00	87.90	87.60	5,301.07	-7.35	659.55	659.49	0.61	0.39	-0.47
5,859.00	86.90	86.20	5,307.06	-0.22	791.22	791.20	1.30	-0.76	-1.06
5,987.00	87.40	87.00	5,313.43	7.36	918.83	918.86	0.74	0.39	0.63
6,115.00	88.50	87.20	5,318.01	13.83	1,046.58	1,046.65	0.87	0.86	0.16
6,243.00	90.90	89.70	5,318.68	17.29	1,174.52	1,174.61	2.71	1.88	1.95
6,372.00	90.70	89.20	5,316.87	18.53	1,303.50	1,303.59	0.42	-0.16	-0.39
6,500.00	91.30	90.30	5,314.64	19.09	1,431.47	1,431.57	0.98	0.47	0.86
6,628.00	90.30	90.60	5,312.85	18.08	1,559.46	1,559.54	0.82	-0.78	0.23
6,756.00	89.40	90.70	5,313.19	16.63	1,687.45	1,687.52	0.71	-0.70	0.08
6,888.00	89.00	90.10	5,315.03	15.71	1,819.43	1,819.49	0.55	-0.30	-0.45
7,016.00	89.80	90.00	5,316.37	15.60	1,947.42	1,947.48	0.63	0.63	-0.08
7,144.00	88.80	89.40	5,317.94	16.27	2,075.41	2,075.47	0.91	-0.78	-0.47
7,272.00	87.80	88.70	5,321.73	18.39	2,203.33	2,203.41	0.95	-0.78	-0.55
7,400.00	89.00	89.20	5,325.31	20.73	2,331.26	2,331.34	1.02	0.94	0.39
7,528.00	88.70	89.40	5,327.88	22.30	2,459.22	2,459.32	0.28	-0.23	0.16
7,656.00	89.20	89.20	5,330.22	23.86	2,587.19	2,587.29	0.42	0.39	-0.16
7,785.00	89.50	89.90	5,331.68	24.87	2,716.18	2,716.28	0.59	0.23	0.54
7,913.00	88.90	90.70	5,333.47	24.20	2,844.16	2,844.26	0.78	-0.47	0.63
8,041.00	90.10	91.30	5,334.59	21.97	2,972.13	2,972.21	1.05	0.94	0.47
8,170.00	88.00	90.50	5,336.73	19.94	3,101.09	3,101.16	1.74	-1.63	-0.62
8,298.00	88.80	90.20	5,340.30	19.16	3,229.04	3,229.09	0.67	0.63	-0.23
8,426.00	90.20	90.40	5,341.42	18.49	3,357.03	3,357.08	1.10	1.09	0.16
8,555.00	90.90	91.00	5,340.18	16.92	3,486.01	3,486.05	0.71	0.54	0.47
8,683.00	88.30	89.50	5,341.07	16.36	3,613.99	3,614.02	2.34	-2.03	-1.17
8,812.00	89.10	89.10	5,344.00	17.93	3,742.95	3,742.98	0.69	0.62	-0.31
8,940.00	89.70	88.60	5,345.34	20.50	3,870.91	3,870.96	0.61	0.47	-0.39
9,069.00	88.50	89.00	5,347.37	23.20	3,999.87	3,999.93	0.98	-0.93	0.31
9,197.00	87.90	88.70	5,351.39	25.77	4,127.78	4,127.86	0.52	-0.47	-0.23
9,325.00	88.60	88.60	5,355.30	28.79	4,255.68	4,255.78	0.55	0.55	-0.08

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Site:	Crow Federal	MD Reference:	KB @ 3938.00usft (Capstar 114)
Well:	#35H	North Reference:	Grid
Wellbore:	WB1/Job 1410849	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR DB

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)
9,396.00	89.20	88.40	5,356.66	30.64	4,326.64	4,326.75	0.89	0.85	-0.28
Last Phoenix MWD Survey									
9,461.00	89.20	88.40	5,357.57	32.46	4,391.61	4,391.73	0.00	0.00	0.00
Projection to Bit									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,700.00	4,699.83	-2.11	13.13	Tie-on to Gyrodata Gyro Survey
4,871.00	4,870.61	-1.93	20.50	First Phoenix MWD Survey
9,396.00	5,356.66	30.64	4,326.64	Last Phoenix MWD Survey
9,461.00	5,357.57	32.46	4,391.61	Projection to Bit

Checked By: _____ Approved By: _____ Date: _____