

NM OIL CONSERVATION
ARTESIA DISTRICT
JUN 06 2016
RECEIVED

Apache Corporation

Eddy County, NM (NAD27 NME)

~~Crow Federal~~
#50H

Cedar Lake Federal/CA 950H

OH / Job #1514409

Survey: Phoenix MWD Surveys

Standard Survey Report

12 October, 2015

API #: 30-015-43326

SEA 17S-31E

1100 FNL 515 FWL

Phoenix Technology Services LP

Survey Report

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #50H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3886.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3886.00usft (Capstar 114)
Well:	#50H	North Reference:	Grid
Wellbore:	OH / Job #1514409	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		Crow Federal			
Site Position:		Northing:	671,130.90 usft	Latitude:	32° 50' 38.92796 N
From:	Map	Easting:	643,906.80 usft	Longitude:	103° 51' 53.16689 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.25 °

Well	#50H					
Well Position	+N/-S	0.00 usft	Northing:	674,396.60 usft	Latitude:	32° 51' 11.45943 N
	+E/-W	0.00 usft	Easting:	638,871.80 usft	Longitude:	103° 52' 52.02018 W
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft	Ground Level:	3,875.00 usft

Wellbore	OH / Job #1514409				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	9/29/2015	7.60	60.80	48,576

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	82.08	

Survey Program	Date 10/12/2015				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
89.38	4,526.38	Gyrodata Surveys (OH / Job #1514409)	NS-GYRO-MS	North sensing gyrocompassing m/s	
4,619.00	9,472.00	Phoenix MWD Surveys (OH / Job #1514409)	PHX+MWD+HDGM	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)
4,526.38	0.26	306.94	4,526.21	4.77	7.04	7.63	0.00	0.00	0.00
Tie In to Gyrodata Gyro Surveys									
4,619.00	3.10	50.10	4,618.78	6.50	8.79	9.60	3.42	3.07	111.38
First Phoenix MWD Survey									
4,662.00	7.60	53.30	4,661.59	8.95	11.96	13.08	10.48	10.47	7.44
4,705.00	12.50	53.60	4,703.91	13.41	17.99	19.67	11.40	11.40	0.70
4,747.00	17.20	54.50	4,744.50	19.72	26.71	29.17	11.20	11.19	2.14
4,790.00	21.40	55.50	4,785.07	27.86	38.36	41.83	9.80	9.77	2.33
4,833.00	25.60	58.50	4,824.50	37.16	52.75	57.37	10.15	9.77	6.98

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Site: Crow Federal	MD Reference: KB @ 3886.00usft (Capstar 114)
Well: #50H	North Reference: Grid
Wellbore: OH / Job #1514409	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)
4,875.00	29.00	60.70	4,861.82	46.88	69.37	75.17	8.44	8.10	5.24
4,918.00	32.70	59.70	4,898.73	57.85	88.50	95.62	8.69	8.60	-2.33
4,960.00	37.10	57.80	4,933.17	70.33	109.02	117.67	10.79	10.48	-4.52
5,003.00	42.80	57.70	4,966.12	85.06	132.36	142.82	13.26	13.26	-0.23
5,046.00	47.90	58.30	4,996.33	101.26	158.30	170.74	11.90	11.86	1.40
5,089.00	52.90	58.20	5,023.73	118.69	186.46	201.04	11.63	11.63	-0.23
5,131.00	57.90	57.80	5,047.57	137.00	215.77	232.59	11.93	11.90	-0.95
5,174.00	63.20	57.10	5,068.70	157.15	247.32	266.61	12.41	12.33	-1.63
5,217.00	68.30	55.60	5,086.36	178.87	279.94	301.91	12.28	11.86	-3.49
5,259.00	74.30	54.80	5,099.82	201.57	312.59	337.38	14.40	14.29	-1.90
5,302.00	80.40	54.80	5,109.23	225.75	346.86	374.65	14.19	14.19	0.00
5,322.00	83.00	55.00	5,112.12	237.12	363.05	392.26	13.04	13.00	1.00
5,370.00	88.30	56.10	5,115.76	264.19	402.50	435.06	11.28	11.04	2.29
5,498.00	89.40	58.90	5,118.33	332.94	510.42	551.43	2.35	0.86	2.19
5,626.00	89.80	62.40	5,119.22	395.67	621.97	670.56	2.75	0.31	2.73
5,754.00	90.40	65.70	5,119.00	451.67	737.05	792.25	2.62	0.47	2.58
5,882.00	90.20	69.90	5,118.33	500.02	855.53	916.27	3.28	-0.16	3.28
6,010.00	89.80	73.90	5,118.33	539.78	977.17	1,042.23	3.14	-0.31	3.13
6,138.00	89.70	78.60	5,118.88	570.19	1,101.47	1,169.53	3.67	-0.08	3.67
6,266.00	88.80	82.60	5,120.56	591.09	1,227.71	1,297.45	3.20	-0.70	3.13
6,394.00	89.80	86.40	5,122.13	603.36	1,355.09	1,425.30	3.07	0.78	2.97
6,522.00	90.60	89.10	5,121.68	608.38	1,482.98	1,552.66	2.20	0.63	2.11
6,650.00	90.50	90.00	5,120.45	609.39	1,610.96	1,679.57	0.71	-0.08	0.70
6,778.00	90.20	90.00	5,119.67	609.39	1,738.96	1,806.34	0.23	-0.23	0.00
6,906.00	89.10	90.30	5,120.45	609.05	1,866.96	1,933.07	0.89	-0.86	0.23
7,034.00	88.90	90.10	5,122.68	608.61	1,994.94	2,059.77	0.22	-0.16	-0.16
7,162.00	89.20	90.10	5,124.81	608.38	2,122.92	2,186.50	0.23	0.23	0.00
7,290.00	88.30	90.10	5,127.60	608.16	2,250.89	2,313.21	0.70	-0.70	0.00
7,418.00	88.40	90.10	5,131.28	607.94	2,378.83	2,439.91	0.08	0.08	0.00
7,546.00	88.60	89.40	5,134.63	608.50	2,506.79	2,566.72	0.57	0.16	-0.55
7,674.00	89.10	89.80	5,137.20	609.39	2,634.76	2,693.59	0.50	0.39	0.31
7,802.00	89.10	89.90	5,139.21	609.72	2,762.74	2,820.40	0.08	0.00	0.08
7,930.00	89.10	90.10	5,141.22	609.72	2,890.73	2,947.17	0.16	0.00	0.16
8,058.00	87.60	90.20	5,144.91	609.39	3,018.67	3,073.84	1.17	-1.17	0.08
8,186.00	88.30	90.30	5,149.49	608.83	3,146.58	3,200.46	0.55	0.55	0.08
8,314.00	88.80	90.40	5,152.73	608.05	3,274.54	3,327.09	0.40	0.39	0.08
8,442.00	88.60	90.80	5,155.63	606.71	3,402.50	3,453.64	0.35	-0.16	0.31
8,570.00	88.40	89.60	5,158.98	606.26	3,530.45	3,580.32	0.95	-0.16	-0.94
8,698.00	88.90	89.80	5,162.00	606.93	3,658.42	3,707.15	0.42	0.39	0.16
8,826.00	89.20	89.40	5,164.12	607.83	3,786.39	3,834.03	0.39	0.23	-0.31
8,954.00	89.00	88.80	5,166.13	609.84	3,914.36	3,961.05	0.49	-0.16	-0.47
9,082.00	89.50	89.10	5,167.81	612.18	4,042.33	4,088.12	0.46	0.39	0.23
9,210.00	90.20	89.10	5,168.14	614.19	4,170.31	4,215.16	0.55	0.55	0.00

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9,338.00	90.90	89.30	5,166.91	615.98	4,298.29	4,342.17	0.57	0.55	0.16
9,398.00	91.20	89.30	5,165.81	616.71	4,358.28	4,401.68	0.50	0.50	0.00
Final Phoenix MWD Survey									
9,472.00	91.20	89.30	5,164.26	617.62	4,432.26	4,475.08	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	
4,526.38	4,526.21	4.77	7.04	Tie In to Gyrodata Gyro Surveys	
4,619.00	4,618.78	6.50	8.79	First Phoenix MWD Survey	
9,398.00	5,165.81	616.71	4,358.28	Final Phoenix MWD Survey	
9,472.00	5,164.26	617.62	4,432.26	Projection to TD	