



30-015-41909

Apache Corporation

Eddy County, NM (NAD27 NME)

Crow Federal

#19H

WB1/Job #1311214

Survey: Phoenix MWD Surveys

NM OIL CONSERVATION
ARTESIA DISTRICT
JAN 16 2015

RECEIVED

Phoenix Final Survey Report

26 February, 2014



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #19H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3936.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3936.00usft (Capstar 114)
Well:	#19H	North Reference:	Grid
Wellbore:	WB1/Job #1311214	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	#19H		
Well Position	+N/-S	0.00 usft	Northing: 672,562.90 usft
	+E/-W	0.00 usft	Easting: 648,559.10 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 50' 52.89016 N
		Longitude:	103° 50' 58.55879 W
		Ground Level:	3,925.00 usft

Wellbore	WB1/Job #1311214				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	02/07/14	7.44	60.65	48,692

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	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	269.56

Survey Program	Date	02/26/14		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
832.00	9,813.00	Phoenix MWD Surveys (WB1/Job #131121)	MWD	MWD - Standard

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
600.00	0.57	59.82	599.98	2.24	3.63	-3.64	0.00	
Tie-on to Gyro Survey								
832.00	0.40	44.20	831.97	3.40	5.19	-5.21	0.09	
Last Phoenix MWD Survey								
961.00	0.20	55.00	960.97	3.85	5.69	-5.72	0.16	
1,089.00	0.50	176.30	1,088.97	3.42	5.91	-5.93	0.49	
1,217.00	0.50	181.30	1,216.97	2.31	5.93	-5.95	0.03	
1,345.00	0.30	195.80	1,344.96	1.42	5.83	-5.84	0.17	
1,474.00	0.30	158.40	1,473.96	0.79	5.86	-5.86	0.15	
1,602.00	0.40	148.60	1,601.96	0.09	6.21	-6.21	0.09	
1,730.00	0.80	149.20	1,729.95	-1.06	6.90	-6.90	0.31	
1,862.00	0.60	171.60	1,861.94	-2.53	7.48	-7.46	0.25	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #19H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3936.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3936.00usft (Capstar 114)
Well:	#19H	North Reference:	Grid
Wellbore:	WB1/Job #1311214	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR DB

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
1,993.00	0.70	175.50	1,992.93	-4.01	7.64	-7.61	0.08	
2,121.00	0.70	188.60	2,120.92	-5.56	7.58	-7.54	0.12	
2,249.00	0.90	202.60	2,248.91	-7.26	7.08	-7.03	0.22	
2,377.00	0.90	201.90	2,376.90	-9.12	6.32	-6.25	0.01	
2,505.00	0.70	201.00	2,504.88	-10.78	5.66	-5.58	0.16	
2,633.00	0.90	217.80	2,632.87	-12.31	4.77	-4.67	0.24	
2,762.00	0.20	284.00	2,761.86	-13.06	3.93	-3.83	0.65	
2,890.00	0.30	256.80	2,889.86	-13.08	3.39	-3.29	0.12	
3,019.00	0.50	280.90	3,018.86	-13.05	2.50	-2.40	0.20	
3,147.00	0.60	284.10	3,146.85	-12.78	1.31	-1.21	0.08	
3,278.00	0.70	272.70	3,277.85	-12.57	-0.16	0.25	0.12	
3,406.00	0.80	276.00	3,405.84	-12.44	-1.83	1.92	0.09	
3,449.00	0.80	277.50	3,448.83	-12.37	-2.42	2.52	0.05	
3,536.00	0.50	285.10	3,535.83	-12.20	-3.39	3.49	0.36	
3,665.00	0.30	309.10	3,664.82	-11.84	-4.20	4.29	0.20	
3,793.00	0.30	262.50	3,792.82	-11.67	-4.79	4.88	0.19	
3,921.00	0.40	179.40	3,920.82	-12.16	-5.12	5.21	0.37	
4,049.00	1.70	25.10	4,048.80	-10.89	-4.31	4.39	1.62	
4,181.00	0.20	161.90	4,180.79	-9.33	-3.41	3.48	1.40	
4,309.00	0.20	62.60	4,308.78	-9.44	-3.14	3.21	0.24	
4,440.00	0.40	135.90	4,439.78	-9.66	-2.62	2.69	0.30	
4,569.00	0.40	115.40	4,568.78	-10.18	-1.90	1.97	0.11	
4,700.00	0.30	126.30	4,699.78	-10.58	-1.21	1.29	0.09	
4,828.00	0.40	69.70	4,827.78	-10.62	-0.52	0.60	0.27	
4,892.00	0.40	86.40	4,891.77	-10.53	-0.09	0.17	0.18	
4,934.00	0.30	85.00	4,933.77	-10.51	0.17	-0.09	0.24	
KOP → 4,977.00	2.50	268.60	4,976.76	-10.53	-0.66	0.74	6.51	
5,020.00	6.30	271.90	5,019.63	-10.47	-3.95	4.03	8.85	
5,063.00	10.00	276.10	5,062.19	-10.00	-10.02	10.10	8.71	
5,105.00	14.20	277.10	5,103.24	-8.97	-18.77	18.83	10.01	
5,151.00	19.30	274.90	5,147.28	-7.62	-31.95	32.01	11.17	
5,193.00	24.20	273.00	5,186.28	-6.58	-47.47	47.52	11.79	
5,236.00	29.10	272.20	5,224.70	-5.72	-66.73	66.77	11.43	
5,278.00	34.20	271.50	5,260.44	-5.02	-88.75	88.79	12.17	
5,321.00	40.90	270.70	5,294.51	-4.53	-114.94	114.97	15.62	
5,364.00	48.30	270.30	5,325.11	-4.27	-145.11	145.14	17.22	
5,407.00	54.50	270.50	5,351.92	-4.03	-178.70	178.72	14.42	
5,449.00	59.60	270.10	5,374.76	-3.85	-213.93	213.95	12.17	
5,492.00	65.40	267.20	5,394.61	-4.78	-252.04	252.07	14.75	
5,535.00	71.60	265.90	5,410.36	-7.19	-291.95	292.00	14.69	
5,578.00	75.90	266.20	5,422.39	-10.03	-333.13	333.19	10.02	
5,623.00	80.60	266.80	5,431.55	-12.72	-377.09	377.17	10.53	
5,666.00	86.20	268.00	5,436.49	-14.65	-419.74	419.84	13.31	
5,709.00	89.10	268.10	5,438.25	-16.12	-462.68	462.79	6.75	
5,752.00	90.70	268.70	5,438.33	-17.32	-505.66	505.77	3.97	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #19H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3936.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3936.00usft (Capstar 114)
Well:	#19H	North Reference:	Grid
Wellbore:	WB1/Job #1311214	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR DB

Survey							
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
5,877.00	92.20	270.10	5,435.17	-18.63	-630.60	630.73	1.64
6,005.00	92.50	270.00	5,429.92	-18.51	-758.50	758.62	0.25
6,134.00	91.70	270.20	5,425.19	-18.29	-887.41	887.52	0.64
6,262.00	92.60	270.20	5,420.39	-17.84	-1,015.32	1,015.42	0.70
6,390.00	90.70	270.60	5,416.70	-16.95	-1,143.25	1,143.35	1.52
6,518.00	90.30	270.50	5,415.59	-15.72	-1,271.24	1,271.33	0.32
6,647.00	92.50	270.40	5,412.43	-14.71	-1,400.19	1,400.26	1.71
6,775.00	91.90	270.40	5,407.52	-13.81	-1,528.09	1,528.15	0.47
6,903.00	91.10	270.60	5,404.17	-12.70	-1,656.04	1,656.09	0.64
7,031.00	90.10	270.20	5,402.83	-11.80	-1,784.03	1,784.07	0.84
7,159.00	91.80	270.60	5,400.71	-10.91	-1,912.01	1,912.03	1.36
7,288.00	91.10	270.20	5,397.44	-10.01	-2,040.96	2,040.98	0.62
7,416.00	91.00	268.80	5,395.10	-11.13	-2,168.93	2,168.95	1.10
7,545.00	91.40	269.10	5,392.40	-13.49	-2,297.88	2,297.92	0.39
7,673.00	92.30	269.30	5,388.26	-15.28	-2,425.80	2,425.85	0.72
7,801.00	91.50	268.90	5,384.02	-17.29	-2,553.71	2,553.77	0.70
7,930.00	92.30	268.80	5,379.74	-19.87	-2,682.61	2,682.69	0.62
8,058.00	92.50	269.20	5,374.38	-22.11	-2,810.48	2,810.57	0.35
8,186.00	92.20	269.20	5,369.13	-23.89	-2,938.36	2,938.46	0.23
8,315.00	91.60	269.10	5,364.86	-25.80	-3,067.28	3,067.38	0.47
8,443.00	91.10	269.90	5,361.84	-26.92	-3,195.23	3,195.35	0.74
8,571.00	90.70	270.20	5,359.83	-26.81	-3,323.22	3,323.33	0.39
8,700.00	90.50	270.50	5,358.48	-26.02	-3,452.21	3,452.31	0.28
8,828.00	89.80	270.60	5,358.14	-24.79	-3,580.20	3,580.29	0.55
8,956.00	89.90	269.40	5,358.48	-24.79	-3,708.20	3,708.28	0.94
9,085.00	90.60	269.20	5,357.92	-26.37	-3,837.19	3,837.28	0.56
9,213.00	90.60	268.70	5,356.58	-28.71	-3,965.16	3,965.26	0.39
9,341.00	92.10	269.20	5,353.56	-31.06	-4,093.10	4,093.21	1.24
9,470.00	91.60	268.90	5,349.40	-33.20	-4,222.01	4,222.14	0.45
9,598.00	91.20	268.60	5,346.27	-35.99	-4,349.94	4,350.09	0.39
9,726.00	92.20	269.00	5,342.47	-38.67	-4,477.86	4,478.02	0.84
9,752.00	92.20	269.10	5,341.47	-39.10	-4,503.83	4,504.00	0.38
First Phoenix MWD Survey							
9,813.00	92.20	269.10	5,339.13	-40.06	-4,564.78	4,564.95	0.00
Projection to TD							



Phoenix Technology Services

Phoenix Final Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #19H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3936.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3936.00usft (Capstar 114)
Well:	#19H	North Reference:	Grid
Wellbore:	WB1/Job #1311214	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR DB

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
600.00	599.98	2.24	3.63	Tie-on to Gyro Survey	
832.00	831.97	3.40	5.19	Last Phoenix MWD Survey	
9,752.00	5,341.47	-39.10	-4,503.83	First Phoenix MWD Survey	
9,813.00	5,339.13	-40.06	-4,564.78	Projection to TD	

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------