



NM OIL CONSERVATION
ARTESIA DISTRICT

FEB 11 2016

RECEIVED

Apache Corporation

Eddy County, NM (NAD27 NME)

NFE Federal 30-015-43250
#61H

I-8-175-31E
1795' FSL + 25' FEL

OH / Job #1514083

Design: Surveys (Capstar 119)

Standard Survey Report

29 September, 2015

Provide signature page for Survey



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #61H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3848.00usft (Capstar 119)
Site:	NFE Federal	MD Reference:	KB @ 3848.00usft (Capstar 119)
Well:	#61H	North Reference:	Grid
Wellbore:	OH / Job #1514083	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	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	NFE Federal		
Site Position:		Northing:	673,264.70 usft
From:	Map	Easting:	633,303.50 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 51' 0.49036 N
		Longitude:	103° 53' 57.34966 W
		Grid Convergence:	0.24 °

Well	#61H		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 50' 47.83443 N
		Longitude:	103° 52' 58.30925 W
		Ground Level:	3,837.00 usft

Wellbore	OH / Job #1514083		
Magnetics	Model Name	Sample Date	Declination
			(°)
	HDGM	9/23/2015	7.62
			Dip Angle
			(°)
			Field Strength
			(nT)
			60.80
			48,576

Design	Surveys (Capstar 119)		
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
			(°)
			269.60

Survey Program	Date 9/29/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		Description
100.00	4,534.00	Phoenix Gyro Survey (OH / Job #1514083)	PHX_SPT_GTD
4,606.00	9,849.00	Phoenix MWD Surveys (OH / Job #151408)	PHX+MWD+HDGM
			PHX Continuous north-seeking gyro
			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)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.76	128.89	100.00	-0.42	0.52	-0.51	0.76	0.76	0.00	
200.00	0.76	139.32	199.99	-1.34	1.46	-1.46	0.14	0.00	10.43	
300.00	0.82	118.67	299.98	-2.18	2.52	-2.51	0.29	0.06	-20.65	
400.00	0.93	141.73	399.97	-3.16	3.66	-3.63	0.37	0.11	23.06	
500.00	0.63	140.68	499.96	-4.22	4.51	-4.48	0.30	-0.30	-1.05	
600.00	0.55	56.45	599.95	-4.38	5.25	-5.22	0.79	-0.08	-84.23	
700.00	0.56	164.37	699.95	-4.59	5.79	-5.75	0.90	0.01	107.92	
800.00	0.50	356.20	799.95	-4.63	5.89	-5.86	1.05	-0.06	-168.17	
900.00	0.54	218.97	899.95	-4.56	5.56	-5.53	0.97	0.04	-137.23	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #61H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3848.00usft (Capstar 119)
Site:	NFE Federal	MD Reference:	KB @ 3848.00usft (Capstar 119)
Well:	#61H	North Reference:	Grid
Wellbore:	OH / Job #1514083	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	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)
1,000.00	0.51	232.47	999.94	-5.19	4.91	-4.88	0.13	-0.03	13.50
1,100.00	0.58	335.93	1,099.94	-5.00	4.36	-4.32	0.86	0.07	103.46
1,200.00	1.06	104.84	1,199.94	-4.78	5.04	-5.01	1.49	0.48	128.91
1,300.00	1.36	94.48	1,299.91	-5.11	7.12	-7.08	0.37	0.30	-10.36
1,400.00	1.47	99.45	1,399.88	-5.41	9.57	-9.53	0.16	0.11	4.97
1,500.00	1.42	101.35	1,499.85	-5.87	12.05	-12.01	0.07	-0.05	1.90
1,600.00	1.15	110.81	1,599.83	-6.47	14.20	-14.16	0.34	-0.27	9.46
1,700.00	1.07	115.65	1,699.81	-7.23	15.98	-15.93	0.12	-0.08	4.84
1,800.00	0.77	127.87	1,799.80	-8.04	17.35	-17.30	0.36	-0.30	12.22
1,900.00	0.66	139.35	1,899.79	-8.89	18.26	-18.20	0.18	-0.11	11.48
2,000.00	0.43	249.97	1,999.78	-9.46	18.28	-18.22	0.91	-0.23	110.62
2,100.00	0.29	169.27	2,099.78	-9.83	17.98	-17.91	0.48	-0.14	-80.70
2,200.00	0.16	212.60	2,199.78	-10.20	17.95	-17.88	0.21	-0.13	43.33
2,300.00	0.23	148.34	2,299.78	-10.49	17.98	-17.90	0.22	0.07	-64.26
2,400.00	0.49	266.10	2,399.78	-10.69	17.66	-17.58	0.63	0.26	117.76
2,500.00	0.46	37.41	2,499.78	-10.40	17.47	-17.40	0.87	-0.03	131.31
2,600.00	0.45	135.08	2,599.78	-10.36	18.00	-17.92	0.69	-0.01	97.67
2,700.00	0.62	39.18	2,699.77	-10.22	18.61	-18.54	0.80	0.17	-95.90
2,800.00	0.62	285.13	2,799.77	-9.66	18.43	-18.37	1.04	0.00	-114.05
2,900.00	0.52	98.56	2,899.77	-9.58	18.36	-18.29	1.14	-0.10	173.43
3,000.00	0.58	286.98	2,999.77	-9.50	18.32	-18.26	1.10	0.06	-171.58
3,100.00	0.50	254.45	3,099.76	-9.47	17.42	-17.35	0.31	-0.08	-32.53
3,200.00	0.63	168.28	3,199.76	-10.13	17.11	-17.04	0.78	0.13	-86.17
3,300.00	0.63	282.72	3,299.76	-10.54	16.69	-16.61	1.06	0.00	114.44
3,400.00	0.43	265.18	3,399.75	-10.46	15.78	-15.70	0.26	-0.20	-17.54
3,500.00	0.33	21.57	3,499.75	-10.22	15.51	-15.44	0.65	-0.10	116.39
3,600.00	0.30	290.51	3,599.75	-9.86	15.37	-15.30	0.45	-0.03	-91.06
3,700.00	0.34	162.97	3,699.75	-10.05	15.21	-15.14	0.57	0.04	-127.54
3,800.00	0.23	166.70	3,799.75	-10.53	15.34	-15.27	0.11	-0.11	3.73
3,900.00	0.30	282.63	3,899.75	-10.67	15.14	-15.06	0.45	0.07	115.93
4,000.00	0.32	0.48	3,999.75	-10.33	14.88	-14.81	0.39	0.02	77.85
4,100.00	0.30	177.33	4,099.75	-10.31	14.90	-14.82	0.62	-0.02	176.85
4,200.00	0.34	77.21	4,199.75	-10.51	15.20	-15.12	0.49	0.04	-100.12
4,300.00	0.42	112.71	4,299.74	-10.59	15.83	-15.75	0.24	0.08	35.50
4,400.00	0.22	147.03	4,399.74	-10.89	16.27	-16.19	0.27	-0.20	34.32
4,500.00	0.13	80.15	4,499.74	-11.03	16.48	-16.41	0.21	-0.09	-66.88
4,534.00	0.02	4.63	4,533.74	-11.02	16.52	-16.45	0.37	-0.32	-222.12
Tie-on to Phoenix Gyro Survey									
4,606.00	0.50	267.40	4,605.74	-11.02	16.21	-16.13	0.70	0.67	-135.04
First Phoenix MWD Survey									
4,648.00	3.70	264.50	4,647.71	-11.16	14.68	-14.60	7.62	7.62	-6.90
4,691.00	8.20	262.10	4,690.46	-11.71	10.26	-10.17	10.48	10.47	-5.58
4,733.00	12.50	263.60	4,731.77	-12.63	2.77	-2.68	10.26	10.24	3.57

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #61H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3848.00usft (Capstar 119)
Site:	NFE Federal	MD Reference:	KB @ 3848.00usft (Capstar 119)
Well:	#61H	North Reference:	Grid
Wellbore:	OH / Job #1514083	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	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)
4,776.00	17.60	267.10	4,773.28	-13.48	-8.36	8.45	12.04	11.86	8.14
4,819.00	23.20	269.60	4,813.57	-13.87	-23.33	23.43	13.18	13.02	5.81
4,861.00	28.60	270.80	4,851.34	-13.79	-41.67	41.76	12.92	12.86	2.86
4,904.00	33.00	270.40	4,888.27	-13.56	-63.68	63.77	10.24	10.23	-0.93
4,946.00	36.40	270.30	4,922.79	-13.41	-87.58	87.68	8.10	8.10	-0.24
4,989.00	40.70	270.60	4,956.41	-13.20	-114.37	114.46	10.01	10.00	0.70
5,032.00	45.70	271.40	4,987.75	-12.68	-143.80	143.88	11.70	11.63	1.86
5,074.00	51.40	271.00	5,015.54	-12.02	-175.26	175.34	13.59	13.57	-0.95
5,117.00	55.90	269.70	5,041.02	-11.82	-209.88	209.96	10.74	10.47	-3.02
5,160.00	60.70	269.50	5,063.61	-12.08	-246.45	246.53	11.17	11.16	-0.47
5,202.00	65.00	269.10	5,082.77	-12.54	-283.81	283.89	10.27	10.24	-0.95
5,245.00	70.30	269.30	5,099.11	-13.09	-323.56	323.65	12.33	12.33	0.47
5,287.00	76.30	269.40	5,111.18	-13.55	-363.77	363.86	14.29	14.29	0.24
5,330.00	82.40	270.90	5,119.12	-13.43	-406.01	406.09	14.59	14.19	3.49
5,373.00	86.70	273.40	5,123.21	-11.82	-448.77	448.84	11.55	10.00	5.81
5,415.00	87.90	273.70	5,125.18	-9.23	-490.64	490.70	2.94	2.86	0.71
5,543.00	90.40	271.70	5,127.08	-3.20	-618.47	618.48	2.50	1.95	-1.56
5,671.00	91.90	270.30	5,124.51	-0.96	-746.42	746.41	1.60	1.17	-1.09
5,798.00	93.00	269.40	5,119.09	-1.30	-873.30	873.29	1.12	0.87	-0.71
5,926.00	91.30	269.70	5,114.28	-2.30	-1,001.20	1,001.19	1.35	-1.33	0.23
6,054.00	92.50	269.50	5,110.04	-3.19	-1,129.12	1,129.12	0.95	0.94	-0.16
6,181.00	90.90	269.90	5,106.27	-3.86	-1,256.06	1,256.06	1.30	-1.26	0.31
6,309.00	91.90	270.20	5,103.14	-3.75	-1,384.02	1,384.01	0.82	0.78	0.23
6,437.00	91.80	269.90	5,099.01	-3.64	-1,511.95	1,511.94	0.25	-0.08	-0.23
6,565.00	91.00	269.80	5,095.89	-3.97	-1,639.91	1,639.90	0.63	-0.63	-0.08
6,693.00	89.80	269.00	5,094.99	-5.31	-1,767.90	1,767.90	1.13	-0.94	-0.63
6,821.00	90.70	268.50	5,094.43	-8.10	-1,895.87	1,895.88	0.80	0.70	-0.39
6,949.00	90.70	267.40	5,092.87	-12.68	-2,023.77	2,023.81	0.86	0.00	-0.86
7,077.00	92.80	268.80	5,088.96	-16.92	-2,151.63	2,151.70	1.97	1.64	1.09
7,205.00	91.80	269.50	5,083.82	-18.82	-2,279.51	2,279.59	0.95	-0.78	0.55
7,332.00	92.20	268.80	5,079.39	-20.70	-2,406.42	2,406.51	0.63	0.31	-0.55
7,460.00	93.30	268.80	5,073.25	-23.38	-2,534.24	2,534.35	0.86	0.86	0.00
7,588.00	92.30	271.30	5,067.00	-23.27	-2,662.08	2,662.18	2.10	-0.78	1.95
7,716.00	91.50	272.00	5,062.75	-19.58	-2,789.95	2,790.02	0.83	-0.63	0.55
7,844.00	88.80	271.00	5,062.42	-16.23	-2,917.90	2,917.94	2.25	-2.11	-0.78
7,972.00	88.90	269.80	5,064.99	-15.34	-3,045.87	3,045.90	0.94	0.08	-0.94
8,099.00	90.80	269.10	5,065.32	-16.56	-3,172.85	3,172.89	1.59	1.50	-0.55
8,228.00	92.10	269.10	5,062.05	-18.59	-3,301.79	3,301.84	1.01	1.01	0.00
8,355.00	93.40	268.70	5,055.96	-21.02	-3,428.62	3,428.68	1.07	1.02	-0.31
8,483.00	92.30	270.30	5,049.60	-22.14	-3,556.45	3,556.52	1.52	-0.86	1.25
8,611.00	91.70	270.70	5,045.13	-21.02	-3,684.37	3,684.42	0.56	-0.47	0.31
8,739.00	90.90	270.10	5,042.23	-20.13	-3,812.33	3,812.38	0.78	-0.63	-0.47
8,867.00	90.10	268.40	5,041.11	-21.80	-3,940.31	3,940.36	1.47	-0.63	-1.33
8,995.00	91.10	268.20	5,039.77	-25.60	-4,068.24	4,068.32	0.80	0.78	-0.16

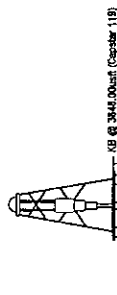
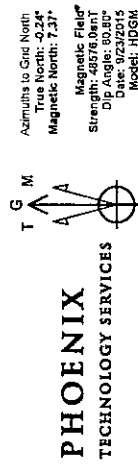
Company:	Apache Corporation	Local Co-ordinate Reference:	Well #61H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3848.00usft (Capstar 119)
Site:	NFE Federal	MD Reference:	KB @ 3848.00usft (Capstar 119)
Well:	#61H	North Reference:	Grid
Wellbore:	OH / Job #1514063	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	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)
9,122.00	92.40	268.30	5,035.89	-29.47	-4,195.12	4,195.23	1.03	1.02	0.08
9,250.00	90.40	269.80	5,032.76	-31.60	-4,323.08	4,323.17	1.95	-1.56	1.17
9,378.00	92.00	269.50	5,030.08	-32.38	-4,451.02	4,451.14	1.27	1.25	-0.23
9,506.00	90.10	270.00	5,027.74	-32.93	-4,578.99	4,579.11	1.53	-1.48	0.39
9,633.00	91.50	269.90	5,025.96	-33.05	-4,705.98	4,706.09	1.11	1.10	-0.08
9,761.00	92.90	269.70	5,021.05	-33.49	-4,833.88	4,833.99	1.10	1.09	-0.16
Last Phoenix MWD Survey									
9,849.00	92.90	269.70	5,016.60	-33.95	-4,921.76	4,921.88	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)	
4,534.00	4,533.74	-11.02	16.52	Tie-on to Phoenix Gyro Survey
4,606.00	4,605.74	-11.02	16.21	First Phoenix MWD Survey
9,761.00	5,021.05	-33.49	-4,833.88	Last Phoenix MWD Survey
9,849.00	5,016.60	-33.95	-4,921.76	Projection to TD

Checked By: _____ Approved By: _____ Date: _____

Project: Eddy County, NM (NAD27 NME)
 Site: NFE Federal
 Well: #61H
 Wellbore: OH / Job #1514083
 Design: Plan #5 09-23-15
 Rig: Capstar 119



WELL DETAILS

Ground Level	3637.00
Existing	68346.50
Northing	672066.80
Easting	672066.80
Latitude	32° 57' 47.83443 N
Longitude	103° 52' 58.30925 W

SECTION DETAILS

Sec	MD	Inc	Adj	TVD	-NLS	-E-W	Northing	Easting	U-Sat	Target	Annotation
1	4534.00	0.02	4.83	4533.14	-11.02	18.52	0.00	0.00	18.45		Top of Wellbore Cyno Survey
2	4648.57	0.02	4.83	4648.31	-10.58	18.53	0.00	0.00	18.45		KOP Begin 11.997100° Build
3	5082.52	91.25	270.80	5128.00	-3.89	-47.84	11.99	-82.83	471.85		LP Begin 37.100° Turn
4	5418.48	91.25	289.80	5123.13	-3.85	-41.60	3.00	-40.07	511.61		LP Begin 91.25° Inc Hold 289.80° Azim
5	5482.34	81.25	288.60	5029.00	-34.80	-4923.30	0.00	0.00	4922.42		BLH/NFE Fed #61H/4 TD at 8882.34' MD

DESIGN TARGET DETAILS

Name	TVD	-NLS	-E-W	Northing	Easting	Latitude	Longitude	Shape
BLH/NFE Fed #61H/4	5029.00	-34.80	-4923.30	671972.20	633422.20	32° 57' 47.83443 N	103° 52' 58.30925 W	Point
MP/NFE Fed #61H/5	5088.00	-21.81	-3087.55	671984.59	633527.85	32° 59' 47.74750 N	103° 53' 34.50175 W	Point
								Point

FORMATION TOP DETAILS

TVD Path	MD Path	Formation	Dip Angle	Dip Dir
4538.00	4843.83	Glarita	0.00	289.80
4933.00	4817.18	Yucca (Padlock)	0.00	289.80

LEGEND

- #16H, OH / Job #1310859, Surveys (Capstar 114) VO
- #16H, OH / Job #1311163, Surveys (Capstar 114) VO
- #17H, OH / Job #1310890, Surveys (Capstar 114) VO
- #61H, OH / Job #1514083, Surveys (Capstar 119) VO
- #60H, OH / Job #1514082, Surveys (Capstar 119) VO
- #7, OH, Surveys VO
- #5H, OH / Job #1514081, Surveys (Capstar 119) VO
- #6, OH, Surveys VO
- Plan #5 09-23-15

