



NM OIL CONSERVATION

ARTESIA DISTRICT

APR 25 2016

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Cedar Lake Federal CA 642H

Apache Corporation

Eddy County, NM (NAD27 NME)

NFE Federal

#42H

30 015 42902

OH / Job #1513886

Design: Surveys (Capstar 119)

Standard Survey Report

28 July, 2015





Phoenix Technology Services LP

Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #42H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3769.00usft (Capstar 119)
Site:	NFE Federal	MD Reference:	KB @ 3769.00usft (Capstar 119)
Well:	#42H	North Reference:	Grid
Wellbore:	OH / Job #1513886	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	#42H		
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' 42.59816 N
		Longitude:	103° 54' 2.35121 W
		Ground Level:	3,758.00 usft

Wellbore	OH / Job #1513886		
Magnetics	Model Name	Sample Date	Declination
			(°)
	HDGM	7/2/2015	7.65
			Dip Angle
			(°)
			60.80
			Field Strength
			(nT)
			48,592

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
			(°)
			269.62

Survey Program	Date 7/28/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.00	4,662.00	Phoenix Gyro Surveys (OH / Job #151388	PHX_SPT_GTD
4,753.00	9,510.00	Phoenix MWD Survey (OH / Job #1513886	PHX+MWD+HDGM
			Description
			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	0.32	66.54	100.00	0.11	0.26	-0.26	0.32	0.32	0.00
200.00	0.20	137.48	200.00	0.09	0.63	-0.63	0.32	-0.12	70.94
300.00	0.56	340.10	300.00	0.42	0.58	-0.58	0.75	0.36	-157.38
400.00	0.50	242.09	399.99	0.68	0.03	-0.03	0.80	-0.06	-98.01
500.00	0.73	90.58	499.99	0.47	0.28	-0.28	1.19	0.23	-151.51
600.00	0.67	206.44	599.99	-0.06	0.66	-0.66	1.19	-0.06	115.86
700.00	0.79	275.11	699.98	-0.52	-0.29	0.29	0.83	0.12	68.67
800.00	0.63	49.81	799.98	-0.11	-0.56	0.56	1.31	-0.16	134.70
900.00	0.62	163.74	899.98	-0.27	0.02	-0.01	1.05	-0.01	113.93

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Site:	NFE Federal	MD Reference:	KB @ 3769.00usft (Capstar 119)
Well:	#42H	North Reference:	Grid
Wellbore:	OH / Job #1513886	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	0.62	71.31	999.97	-0.62	0.68	-0.68	0.90	0.00	-92.43
1,100.00	0.51	60.74	1,099.97	-0.23	1.58	-1.58	0.15	-0.11	-10.57
1,200.00	0.80	130.01	1,199.96	-0.46	2.50	-2.50	0.78	0.29	69.27
1,300.00	0.60	171.12	1,299.95	-1.42	3.12	-3.11	0.53	-0.20	41.11
1,400.00	0.90	77.60	1,399.95	-1.77	3.97	-3.96	1.11	0.30	-93.52
1,500.00	0.77	96.43	1,499.94	-1.68	5.40	-5.39	0.30	-0.13	18.83
1,600.00	0.68	232.38	1,599.93	-2.12	5.60	-5.59	1.34	-0.09	135.95
1,700.00	0.41	191.49	1,699.93	-2.83	5.06	-5.04	0.46	-0.27	-40.89
1,800.00	0.33	92.65	1,799.93	-3.19	5.27	-5.25	0.56	-0.08	-98.84
1,900.00	0.27	138.22	1,899.93	-3.38	5.72	-5.70	0.24	-0.06	45.57
2,000.00	0.09	146.05	1,999.93	-3.62	5.92	-5.90	0.18	-0.18	7.83
2,100.00	0.18	284.99	2,099.93	-3.65	5.81	-5.79	0.25	0.09	138.94
2,200.00	0.23	2.28	2,199.93	-3.41	5.67	-5.65	0.26	0.05	77.29
2,300.00	0.45	90.26	2,299.93	-3.21	6.07	-6.05	0.50	0.22	87.98
2,400.00	0.41	14.40	2,399.92	-2.86	6.55	-6.53	0.53	-0.04	-75.86
2,500.00	0.24	271.67	2,499.92	-2.51	6.43	-6.41	0.52	-0.17	-102.73
2,600.00	0.41	262.33	2,599.92	-2.55	5.87	-5.85	0.18	0.17	-9.34
2,700.00	0.27	342.97	2,699.92	-2.37	5.44	-5.43	0.45	-0.14	80.64
2,800.00	0.48	285.69	2,799.92	-2.04	4.97	-4.96	0.40	0.21	-57.28
2,900.00	0.37	221.28	2,899.92	-2.17	4.35	-4.34	0.46	-0.11	-64.41
3,000.00	0.38	345.65	2,999.91	-2.09	4.06	-4.05	0.66	0.01	124.37
3,100.00	0.19	263.23	3,099.91	-1.79	3.81	-3.80	0.40	-0.19	-82.42
3,200.00	0.25	301.38	3,199.91	-1.69	3.46	-3.45	0.15	0.06	38.15
3,300.00	0.24	347.67	3,299.91	-1.37	3.23	-3.22	0.19	-0.01	46.29
3,400.00	0.13	99.02	3,399.91	-1.19	3.30	-3.29	0.31	-0.11	111.35
3,500.00	0.12	190.37	3,499.91	-1.31	3.39	-3.38	0.18	-0.01	91.35
3,600.00	0.11	184.18	3,599.91	-1.51	3.37	-3.36	0.02	-0.01	-6.19
3,700.00	0.22	310.42	3,699.91	-1.48	3.21	-3.20	0.30	0.11	126.24
3,800.00	0.21	57.75	3,799.91	-1.25	3.22	-3.21	0.35	-0.01	107.33
3,900.00	0.32	155.49	3,899.91	-1.41	3.49	-3.48	0.41	0.11	97.74
4,000.00	0.29	320.45	3,999.91	-1.47	3.45	-3.44	0.60	-0.03	164.96
4,100.00	0.39	265.94	4,099.91	-1.30	2.95	-2.94	0.32	0.10	-54.51
4,200.00	0.49	3.52	4,199.91	-0.90	2.63	-2.63	0.67	0.10	97.58
4,300.00	0.47	88.80	4,299.90	-0.46	3.07	-3.07	0.65	-0.02	85.28
4,400.00	0.10	318.62	4,399.90	-0.39	3.42	-3.42	0.54	-0.37	-130.18
4,500.00	0.41	355.38	4,499.90	0.04	3.33	-3.33	0.34	0.31	36.76
4,600.00	0.84	327.42	4,599.90	1.01	2.91	-2.92	0.52	0.43	-27.96
4,662.00	0.81	340.65	4,661.89	1.81	2.52	-2.53	0.31	-0.05	21.34
Tie-on to Phoenix Gyro Survey									
4,753.00	1.00	323.40	4,752.88	3.05	1.83	-1.85	0.36	0.21	-18.96
First Phoenix MWD Survey									
4,795.00	4.80	281.50	4,794.82	3.70	-0.11	0.08	9.79	9.05	-99.76
4,838.00	10.90	277.00	4,837.40	4.55	-5.91	5.88	14.25	14.19	-10.47

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Well:	#42H	North Reference:	Grid
Wellbore:	OH / Job #1513886	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)
4,880.00	17.70	276.90	4,878.07	5.80	-16.20	16.16	16.19	16.19	-0.24
4,923.00	24.40	276.50	4,918.18	7.60	-31.53	31.48	15.58	15.58	-0.93
4,966.00	28.50	276.00	4,956.67	9.67	-50.57	50.50	9.55	9.53	-1.16
5,008.00	30.80	275.50	4,993.17	11.75	-71.24	71.16	5.51	5.48	-1.19
5,051.00	33.50	272.80	5,029.57	13.39	-94.06	93.97	7.11	6.28	-6.28
5,094.00	38.00	268.50	5,064.47	13.62	-119.16	119.07	11.98	10.47	-10.00
5,136.00	42.10	265.20	5,096.61	12.10	-146.13	146.04	10.99	9.76	-7.86
5,179.00	45.90	263.50	5,127.54	9.15	-175.84	175.78	9.25	8.84	-3.95
5,221.00	48.60	263.40	5,156.05	5.63	-206.48	206.44	6.43	6.43	-0.24
5,264.00	52.30	264.80	5,183.42	2.23	-239.45	239.43	8.96	8.60	3.26
5,306.00	57.30	265.70	5,207.63	-0.60	-273.65	273.64	12.03	11.90	2.14
5,349.00	63.90	266.80	5,228.72	-3.04	-311.01	311.02	15.51	15.35	2.56
5,391.00	68.40	267.10	5,245.70	-5.08	-349.36	349.38	10.73	10.71	0.71
5,434.00	75.30	267.30	5,259.09	-7.07	-390.14	390.18	16.05	16.05	0.47
5,476.00	80.10	267.70	5,268.03	-8.86	-431.13	431.18	11.47	11.43	0.95
5,503.00	84.00	268.50	5,271.77	-9.74	-457.85	457.90	14.74	14.44	2.96
5,545.00	88.80	270.50	5,274.40	-10.11	-499.75	499.81	12.38	11.43	4.76
5,673.00	89.10	271.00	5,276.75	-8.43	-627.72	627.76	0.46	0.23	0.39
5,801.00	91.40	270.30	5,276.19	-6.98	-755.70	755.73	1.88	1.80	-0.55
5,928.00	92.00	270.30	5,272.42	-6.32	-882.64	882.66	0.47	0.47	0.00
6,056.00	92.00	270.20	5,267.96	-5.76	-1,010.56	1,010.58	0.08	0.00	-0.08
6,184.00	90.10	269.90	5,265.61	-5.65	-1,138.53	1,138.55	1.50	-1.48	-0.23
6,312.00	90.70	270.10	5,264.72	-5.65	-1,266.53	1,266.54	0.49	0.47	0.16
6,440.00	91.40	270.70	5,262.37	-4.75	-1,394.50	1,394.50	0.72	0.55	0.47
6,567.00	90.70	269.80	5,260.05	-4.20	-1,521.48	1,521.47	0.90	-0.55	-0.71
6,695.00	90.60	269.30	5,258.59	-5.20	-1,649.47	1,649.46	0.40	-0.08	-0.39
6,823.00	91.40	269.10	5,256.36	-6.99	-1,777.43	1,777.44	0.64	0.63	-0.16
6,951.00	91.70	269.00	5,252.90	-9.11	-1,905.37	1,905.39	0.25	0.23	-0.08
7,078.00	92.00	268.90	5,248.80	-11.44	-2,032.28	2,032.31	0.25	0.24	-0.08
7,206.00	90.30	268.60	5,246.23	-14.23	-2,160.22	2,160.27	1.35	-1.33	-0.23
7,333.00	90.90	268.60	5,244.90	-17.33	-2,287.17	2,287.24	0.47	0.47	0.00
7,461.00	89.30	269.90	5,244.67	-19.01	-2,415.16	2,415.23	1.61	-1.25	1.02
7,589.00	89.30	269.70	5,246.24	-19.46	-2,543.15	2,543.22	0.16	0.00	-0.16
7,717.00	89.60	270.00	5,247.47	-19.79	-2,671.14	2,671.21	0.33	0.23	0.23
7,845.00	90.40	270.00	5,247.47	-19.79	-2,799.14	2,799.21	0.63	0.63	0.00
7,973.00	90.20	270.10	5,246.80	-19.68	-2,927.14	2,927.20	0.17	-0.16	0.08
8,101.00	90.60	270.50	5,245.90	-19.01	-3,055.13	3,055.19	0.44	0.31	0.31
8,229.00	91.30	271.20	5,243.78	-17.11	-3,183.10	3,183.14	0.77	0.55	0.55
8,356.00	91.10	270.00	5,241.12	-15.78	-3,310.06	3,310.09	0.96	-0.16	-0.94
8,484.00	90.80	269.70	5,239.00	-16.12	-3,438.04	3,438.07	0.33	-0.23	-0.23
8,612.00	90.70	269.50	5,237.32	-17.01	-3,566.03	3,566.06	0.17	-0.08	-0.16
8,740.00	90.20	269.50	5,236.32	-18.13	-3,694.02	3,694.06	0.39	-0.39	0.00
8,868.00	91.00	270.00	5,234.98	-18.68	-3,822.01	3,822.05	0.74	0.63	0.39
8,995.00	90.60	270.10	5,233.20	-18.57	-3,949.00	3,949.03	0.32	-0.31	0.08



Phoenix Technology Services LP
Survey Report



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Site:	NFE Federal	MD Reference:	KB @ 3769.00usft (Capstar 119)
Well:	#42H	North Reference:	Grid
Wellbore:	OH / Job #1513886	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)
9,123.00	92.90	269.80	5,229.30	-18.69	-4,076.93	4,076.96	1.81	1.80	-0.23
9,251.00	92.10	269.50	5,223.71	-19.47	-4,204.80	4,204.84	0.67	-0.63	-0.23
9,379.00	92.50	269.50	5,218.58	-20.58	-4,332.69	4,332.74	0.31	0.31	0.00
9,431.00	92.90	269.80	5,216.13	-20.90	-4,384.64	4,384.68	0.96	0.77	0.58
Last Phoenix MWD Survey									
9,510.00	92.90	269.80	5,212.13	-21.18	-4,463.53	4,463.58	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)	
4,662.00	4,661.89	1.81	2.52	Tie-on to Phoenix Gyro Survey
4,753.00	4,752.88	3.05	1.83	First Phoenix MWD Survey
9,431.00	5,216.13	-20.90	-4,384.64	Last Phoenix MWD Survey
9,510.00	5,212.13	-21.18	-4,463.53	Projection to TD

Checked By: _____ Approved By: _____ Date: _____

5545	88.8	270.5	1505.4	5274.4	-10.11	-499.75	677508.19	632359.65	32° 51' 42.52 N	103° 54' 8.21 W	499.81	12.38
5673	89.1	271	1507.75	5276.75	-8.43	-627.72	677509.87	632231.68	32° 51' 42.54 N	103° 54' 9.71 W	627.76	0.46
5801	91.4	270.3	1507.19	5276.19	-6.98	-755.7	677511.32	632103.7	32° 51' 42.56 N	103° 54' 11.21 W	755.73	1.88
5928	92	270.3	1503.42	5272.42	-6.32	-882.64	677511.98	631976.76	32° 51' 42.57 N	103° 54' 12.70 W	882.66	0.47
6056	92	270.2	1498.96	5267.96	-5.76	-1010.56	677512.54	631848.84	32° 51' 42.58 N	103° 54' 14.20 W	1010.58	0.08
6184	90.1	269.9	1496.61	5265.61	-5.65	-1138.53	677512.65	631720.87	32° 51' 42.59 N	103° 54' 15.70 W	1138.55	1.5
6312	90.7	270.1	1495.72	5264.72	-5.65	-1266.53	677512.65	631592.87	32° 51' 42.59 N	103° 54' 17.20 W	1266.54	0.49
6440	91.4	270.7	1493.37	5262.37	-4.75	-1394.5	677513.55	631464.9	32° 51' 42.61 N	103° 54' 18.70 W	1394.5	0.72
6567	90.7	269.8	1491.05	5260.05	-4.2	-1521.48	677514.1	631337.92	32° 51' 42.62 N	103° 54' 20.19 W	1521.47	0.9
6695	90.6	269.3	1489.59	5258.59	-5.2	-1649.47	677513.1	631209.93	32° 51' 42.61 N	103° 54' 21.69 W	1649.46	0.4
6823	91.4	269.1	1487.36	5256.36	-6.99	-1777.43	677511.31	631081.97	32° 51' 42.60 N	103° 54' 23.19 W	1777.44	0.64
6951	91.7	269	1483.9	5252.9	-9.11	-1905.37	677509.19	630954.03	32° 51' 42.58 N	103° 54' 24.69 W	1905.39	0.25
7078	92	268.9	1479.8	5248.8	-11.44	-2032.28	677506.86	630827.12	32° 51' 42.57 N	103° 54' 26.18 W	2032.31	0.25
7206	90.3	268.6	1477.23	5246.23	-14.23	-2160.22	677504.07	630699.18	32° 51' 42.54 N	103° 54' 27.68 W	2160.27	1.35
7333	90.9	268.6	1475.9	5244.9	-17.33	-2287.17	677500.97	630572.23	32° 51' 42.52 N	103° 54' 29.17 W	2287.24	0.47
7461	89.3	269.9	1475.67	5244.67	-19.01	-2415.16	677499.29	630444.24	32° 51' 42.51 N	103° 54' 30.67 W	2415.23	1.61
7589	89.3	269.7	1477.24	5246.24	-19.46	-2543.15	677498.84	630316.25	32° 51' 42.51 N	103° 54' 32.17 W	2543.22	0.16
7717	89.6	270	1478.47	5247.47	-19.79	-2671.14	677498.51	630188.26	32° 51' 42.51 N	103° 54' 33.67 W	2671.21	0.33
7845	90.4	270	1478.47	5247.47	-19.79	-2799.14	677498.51	630060.26	32° 51' 42.51 N	103° 54' 35.17 W	2799.21	0.62
7973	90.2	270.1	1477.8	5246.8	-19.68	-2927.14	677498.52	629932.26	32° 51' 42.52 N	103° 54' 36.67 W	2927.2	0.17
8101	90.6	270.5	1476.9	5245.9	-19.01	-3055.13	677499.29	629804.27	32° 51' 42.53 N	103° 54' 38.17 W	3055.19	0.44
8229	91.3	271.2	1474.78	5243.78	-17.11	-3183.1	677501.19	629676.3	32° 51' 42.56 N	103° 54' 39.67 W	3183.14	0.77
8356	91.1	270	1472.12	5241.12	-15.78	-3310.06	677502.52	629549.34	32° 51' 42.57 N	103° 54' 41.16 W	3310.09	0.96
8484	90.8	269.7	1470	5239	-16.12	-3438.04	677502.18	629421.36	32° 51' 42.58 N	103° 54' 42.66 W	3438.07	0.33
8612	90.7	269.5	1468.32	5237.32	-17.01	-3566.03	677501.29	629293.37	32° 51' 42.57 N	103° 54' 44.16 W	3566.06	0.17
8740	90.2	269.5	1467.32	5236.32	-18.13	-3694.02	677500.17	629165.38	32° 51' 42.57 N	103° 54' 45.66 W	3694.06	0.39
8868	91	270	1465.98	5234.98	-18.68	-3822.01	677499.62	629037.39	32° 51' 42.57 N	103° 54' 47.16 W	3822.05	0.74
8995	90.6	270.1	1464.2	5233.2	-18.57	-3949	677499.73	628910.4	32° 51' 42.57 N	103° 54' 48.65 W	3949.03	0.32
9123	92.9	269.8	1460.3	5229.3	-18.69	-4076.93	677499.61	628782.47	32° 51' 42.58 N	103° 54' 50.15 W	4076.96	1.81
9251	92.1	269.5	1454.71	5223.71	-19.47	-4204.8	677498.83	628654.6	32° 51' 42.57 N	103° 54' 51.65 W	4204.84	0.67
9379	92.5	269.5	1449.58	5218.58	-20.58	-4332.69	677497.72	628526.71	32° 51' 42.57 N	103° 54' 53.15 W	4332.74	0.31
9431	92.9	269.8	1447.13	5216.13	-20.9	-4384.64	677497.4	628474.76	32° 51' 42.57 N	103° 54' 53.76 W	4384.68	0.96
9510	92.9	269.8	1443.13	5212.13	-21.18	-4463.53	677497.12	628395.87	32° 51' 42.57 N	103° 54' 54.68 W	4463.58	0

0.96 Last Phoenix MWD Survey
0 Projection to TD

All data are in feet unless otherwise stated. Directions and coordinates are relative to Grid North.
Vertical depths are relative to KB. Northings and Eastings are relative to Well.

The Dogleg Severity is in Degrees per 100 feet.
Vertical Section is from Slot and calculated along an Azimuth of 269.620° (Grid).

Coordinate System is NAD 1927 (NADCON CONUS) US State Plane 1927 (Exact solution), New Mexico East 3001.
Grid Convergence at Surface is 0.235°.

Based upon Minimum Curvature type calculations, at a Measured Depth of 9510.00ft.,
the Bottom Hole Displacement is 4463.58ft., in the Direction of 269.620° (Grid).

SURVEY CERTIFICATION FORM



3610 Elkins Road Midland, TX 79705 t:432-684-0057 f:432-686-7964

Company: Apache

Job #: 1513998

Well Name: NFE Federal # 42H

County/State: Eddy Co., New Mexico

Survey Instrument Type: North Seek Rate Gyro

API # 30-015-42902

TIE-IN DATA

Measure Depth (ft)	Vertical Depth (ft)	Inclination (°)	Azimuth (°)	N-S Coordinates	E-W Coordinates	Data Source
0	0	0	0	0	0	Surface

First Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)
2015-07-22	0	0	0

Last Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)
2015-07-22	4662	0.81	340.65

Projected TD Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)	Grid Correction
0	0	0	0	0.23

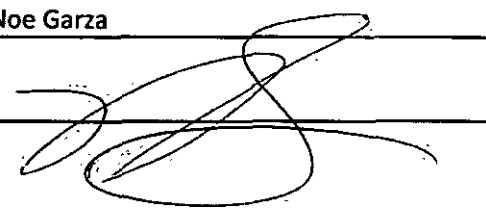
Gyro Operator: Phoenix Technology Services USA Ltd

Gyro Supervisor: Jaime Stephenson

To the best of my knowledge I certify this survey data to be correct and true

Date: 7-22-15

Print Name: Noe Garza

Signature: 



Company: Apache
Well: NFE Federal # 42H
Location: Eddy Co, New Mexico
Rig: Capstar 119

Job Number: 1513998
Grid Corr.: 0.23
Lat: 32.86
Long: -103.90
Calculation Method: Proposed Azimuth
RKB - MSL in feet
Tie Into: 11 Feet
Minimum Curvature

Survey Tool Type	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
							N/S (ft)	E/W (ft)	Distance (ft)	Angle (deg)			
Field Copy Non Definitive													

Enter Tie-In Survey on Line 10

TIE IN	0	0.00	0	0	0	0	0	0	0				
Gyro	100.00	0.32	66.54	100	100.00	0.11	0.11 N	0.26 E	0.28	66.54	0.32	0.32	66.54
	200.00	0.20	137.48	100	200.00	0.09	0.09 N	0.63 E	0.64	81.54	0.32	-0.12	70.94
	300.00	0.56	340.10	100	300.00	0.42	0.42 N	0.58 E	0.72	53.88	0.75	0.36	202.62
	400.00	0.50	242.09	100	399.99	0.68	0.68 N	0.03 E	0.68	2.53	0.80	-0.06	-98.01
	500.00	0.73	90.58	100	499.99	0.47	0.47 N	0.28 E	0.55	30.96	1.19	0.23	-151.51
	600.00	0.67	206.44	100	599.99	-0.06	0.06 S	0.66 E	0.66	95.28	1.19	-0.06	115.86
	700.00	0.79	275.11	100	699.98	-0.52	0.52 S	0.29 W	0.60	208.92	0.83	0.12	68.67
	800.00	0.63	49.81	100	799.98	-0.11	0.11 S	0.56 W	0.57	259.12	1.31	-0.16	-225.30
	900.00	0.62	163.74	100	899.98	-0.27	0.27 S	0.02 E	0.27	176.65	1.05	-0.01	113.93
	1000.00	0.62	71.31	100	999.97	-0.62	0.62 S	0.68 E	0.92	132.24	0.90	0.00	-92.43
	1100.00	0.51	60.74	100	1099.97	-0.23	0.23 S	1.58 E	1.60	98.15	0.15	-0.11	-10.57
	1200.00	0.80	130.01	100	1199.96	-0.46	0.46 S	2.50 E	2.55	100.36	0.78	0.29	69.27
	1300.00	0.60	171.12	100	1299.95	-1.42	1.42 S	3.12 E	3.43	114.54	0.53	-0.20	41.11
	1400.00	0.90	77.60	100	1399.95	-1.77	1.77 S	3.97 E	4.35	114.08	1.11	0.30	-93.52
	1500.00	0.77	96.43	100	1499.94	-1.68	1.68 S	5.40 E	5.66	107.27	0.30	-0.13	18.83
	1600.00	0.68	232.38	100	1599.93	-2.12	2.12 S	5.60 E	5.99	110.71	1.34	-0.09	135.95
	1700.00	0.41	191.49	100	1699.93	-2.83	2.83 S	5.06 E	5.80	119.22	0.46	-0.27	-40.89
	1800.00	0.33	92.65	100	1799.93	-3.19	3.19 S	5.27 E	6.17	121.19	0.56	-0.08	-98.84
	1900.00	0.27	138.22	100	1899.93	-3.38	3.38 S	5.72 E	6.64	120.60	0.24	-0.06	45.57
	2000.00	0.09	146.05	100	1999.93	-3.62	3.62 S	5.92 E	6.94	121.47	0.18	-0.18	7.83
	2100.00	0.18	284.99	100	2099.93	-3.65	3.65 S	5.81 E	6.86	122.11	0.25	0.09	138.94
	2200.00	0.23	2.28	100	2199.93	-3.41	3.41 S	5.67 E	6.61	121.01	0.26	0.05	-282.71
	2300.00	0.45	90.26	100	2299.93	-3.21	3.21 S	6.07 E	6.86	117.86	0.50	0.22	87.98
	2400.00	0.41	14.40	100	2399.92	-2.86	2.86 S	6.55 E	7.15	113.61	0.53	-0.04	-75.86
	2500.00	0.24	271.67	100	2499.92	-2.51	2.51 S	6.43 E	6.90	111.33	0.52	-0.17	257.27

PHOENIX

TECHNOLOGY SERVICES

Company: Apache
Well: NFE Federal # 42H
Location: Eddy Co., New Mexico
Rig: Capstar 119

Job Number: 1513998
Grid Corr.: 0.23
Lat: 32.86
Long: -103.90

Calculation Method
Proposed Azimuth
RKB - MSL in feet
Tie Info:

Minimum Curvature
11 Feet

Survey Tool Type	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
	2600.00	0.41	262.33	100	2599.92	-2.55	2.55 S	5.87 E	6.40	113.51	0.18	0.17	-9.34
	2700.00	0.27	342.97	100	2699.92	-2.37	2.37 S	5.44 E	5.94	113.57	0.45	-0.14	80.64
	2800.00	0.48	285.69	100	2799.92	-2.04	2.04 S	4.97 E	5.37	112.27	0.40	0.21	-57.28
	2900.00	0.37	221.28	100	2899.92	-2.17	2.17 S	4.35 E	4.86	116.44	0.46	-0.11	-64.41
	3000.00	0.38	345.65	100	2999.91	-2.09	2.09 S	4.06 E	4.56	117.21	0.66	0.01	124.37
	3100.00	0.19	263.23	100	3099.91	-1.79	1.79 S	3.81 E	4.21	115.09	0.40	-0.19	-82.42
	3200.00	0.25	301.38	100	3199.91	-1.69	1.69 S	3.46 E	3.85	116.04	0.15	0.06	38.15
	3300.00	0.24	347.67	100	3299.91	-1.37	1.37 S	3.23 E	3.51	113.02	0.19	-0.01	46.29
	3400.00	0.13	99.02	100	3399.91	-1.19	1.19 S	3.30 E	3.50	109.78	0.31	-0.11	-248.65
	3500.00	0.12	190.37	100	3499.91	-1.31	1.31 S	3.39 E	3.63	111.08	0.18	-0.01	91.35
	3600.00	0.11	184.18	100	3599.91	-1.51	1.51 S	3.37 E	3.69	114.10	0.02	-0.01	-6.19
	3700.00	0.22	310.42	100	3699.91	-1.48	1.48 S	3.21 E	3.54	114.69	0.30	0.11	126.24
	3800.00	0.21	57.75	100	3799.91	-1.25	1.25 S	3.22 E	3.46	111.28	0.35	-0.01	-252.67
	3900.00	0.32	155.49	100	3899.91	-1.41	1.41 S	3.49 E	3.77	112.00	0.41	0.11	97.74
	4000.00	0.29	320.45	100	3999.91	-1.47	1.47 S	3.45 E	3.75	113.10	0.60	-0.03	164.96
	4100.00	0.39	265.94	100	4099.91	-1.30	1.30 S	2.95 E	3.22	113.79	0.32	0.10	-54.51
	4200.00	0.49	3.52	100	4199.91	-0.90	0.90 S	2.63 E	2.78	108.80	0.67	0.10	-262.42
	4300.00	0.47	88.80	100	4299.90	-0.46	0.46 S	3.07 E	3.10	98.54	0.65	-0.02	85.28
	4400.00	0.10	318.62	100	4399.90	-0.39	0.39 S	3.42 E	3.44	96.45	0.54	-0.37	229.82
	4500.00	0.41	355.38	100	4499.90	0.04	0.04 N	3.33 E	3.33	89.39	0.34	0.31	36.76
	4600.00	0.84	327.42	100	4599.89	1.01	1.01 N	2.91 E	3.08	70.87	0.52	0.43	-27.96
	4662.00	0.81	340.65	62	4661.89	1.81	1.81 N	2.52 E	3.10	54.38	0.31	-0.05	21.34



PHOENIX

TECHNOLOGY SERVICES

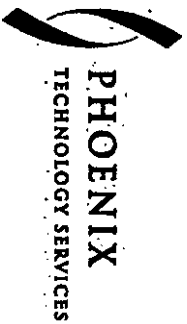
Company: Apache
Well: NFE Federal # 42H
Location: Eddy Co., New Mexico
Rig: Capstar 119

Job Number: 1513998
Grid Corr.: 0.23
Lat: 32.86
Long: -103.90

Calculation Method Minimum Curvature
Proposed Azimuth 11 Feet
RKB - MSL in feet
Tie Into: _____

Survey Tool Type	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
							N/S (ft)	E/W (ft)	Distance (ft)	Angle (deg)			
Enter Tie-In Survey on Line 10													
Field Copy Non Definitive													

TIE IN	0	0.00	0	0	0	0	0	0	0	0			
o	100.00	0.32	66.54	100	100.00	0.11	0.11 N	0.26 E	0.28	66.54	0.32	0.32	66.54
	200.00	0.20	137.48	100	200.00	0.09	0.09 N	0.63 E	0.64	81.54	0.32	-0.12	70.94
	300.00	0.56	340.10	100	300.00	0.42	0.42 N	0.58 E	0.72	53.88	0.75	0.36	202.62
	400.00	0.50	242.09	100	399.99	0.68	0.68 N	0.03 E	0.68	2.53	0.80	-0.06	-98.01
	500.00	0.73	90.58	100	499.99	0.47	0.47 N	0.28 E	0.55	30.96	1.19	0.23	-151.51
	600.00	0.67	206.44	100	599.99	-0.06	0.06 S	0.66 E	0.66	95.28	1.19	-0.06	115.86
	700.00	0.79	275.11	100	699.98	-0.52	0.52 S	0.29 W	0.60	208.92	0.83	0.12	68.67
	800.00	0.63	49.81	100	799.98	-0.11	0.11 S	0.56 W	0.57	259.12	1.31	-0.16	-225.30
	900.00	0.62	163.74	100	899.98	-0.27	0.27 S	0.02 E	0.27	176.65	1.05	-0.01	113.93
	1000.00	0.62	71.31	100	999.97	-0.62	0.62 S	0.68 E	0.92	132.24	0.90	0.00	-92.43
	1100.00	0.51	60.74	100	1099.97	-0.23	0.23 S	1.58 E	1.60	98.15	0.15	-0.11	-10.57
	1200.00	0.80	130.01	100	1199.96	-0.46	0.46 S	2.50 E	2.55	100.36	0.78	0.29	69.27
	1300.00	0.60	171.12	100	1299.95	-1.42	1.42 S	3.12 E	3.43	114.54	0.53	-0.20	41.11
	1400.00	0.90	77.60	100	1399.95	-1.77	1.77 S	3.97 E	4.35	114.08	1.11	0.30	-93.52
	1500.00	0.77	96.43	100	1499.94	-1.68	1.68 S	5.40 E	5.66	107.27	0.30	-0.13	18.83
	1600.00	0.68	232.38	100	1599.93	-2.12	2.12 S	5.60 E	5.99	110.71	1.34	-0.09	135.95
	1700.00	0.41	191.49	100	1699.93	-2.83	2.83 S	5.06 E	5.80	119.22	0.46	-0.27	-40.89
	1800.00	0.33	92.65	100	1799.93	-3.19	3.19 S	5.27 E	6.17	121.19	0.56	-0.08	-98.84
	1900.00	0.27	138.22	100	1899.93	-3.38	3.38 S	5.72 E	6.64	120.60	0.24	-0.06	45.57
	2000.00	0.09	146.05	100	1999.93	-3.62	3.62 S	5.92 E	6.94	121.47	0.18	-0.18	7.83
	2100.00	0.18	284.99	100	2099.93	-3.65	3.65 S	5.81 E	6.86	122.11	0.25	0.09	138.94
	2200.00	0.23	2.28	100	2199.93	-3.41	3.41 S	5.67 E	6.61	121.01	0.26	0.05	-282.71
	2300.00	0.45	90.26	100	2299.93	-3.21	3.21 S	6.07 E	6.86	117.86	0.50	0.22	87.98
	2400.00	0.41	14.40	100	2399.92	-2.86	2.86 S	6.55 E	7.15	113.61	0.53	-0.04	-75.86
	2500.00	0.24	271.67	100	2499.92	-2.51	2.51 S	6.43 E	6.90	111.33	0.52	-0.17	257.27



PHOENIX
TECHNOLOGY SERVICES

Company: Apache
Well: NFE Federal # 42H
Location: Eddy Co., New Mexico
Rig: Capstar 119

Job Number: 1513998
Grid Corr.: 0.23
Lat: 32.86
Long: -103.90

Calculation Method Minimum Curvature
Proposed Azimuth 11 Feet
RKB - MSL in feet
Tie Into:

Survey Tool Type	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
							N/S (ft)	E/W (ft)	Distance (ft)	Angle (deg)			
	2600.00	0.41	262.33	100	2599.92	-2.55	2.55 S	5.87 E	6.40	113.51	0.18	0.17	-9.34
	2700.00	0.27	342.97	100	2699.92	-2.37	2.37 S	5.44 E	5.94	113.57	0.45	-0.14	80.64
	2800.00	0.48	285.69	100	2799.92	-2.04	2.04 S	4.97 E	5.37	112.27	0.40	0.21	-57.28
	2900.00	0.37	221.28	100	2899.92	-2.17	2.17 S	4.35 E	4.86	116.44	0.46	-0.11	-64.41
	3000.00	0.38	345.65	100	2999.91	-2.09	2.09 S	4.06 E	4.56	117.21	0.66	0.01	124.37
	3100.00	0.19	263.23	100	3099.91	-1.79	1.79 S	3.81 E	4.21	115.09	0.40	-0.19	-82.42
	3200.00	0.25	301.38	100	3199.91	-1.69	1.69 S	3.46 E	3.85	116.04	0.15	0.06	38.15
	3300.00	0.24	347.67	100	3299.91	-1.37	1.37 S	3.23 E	3.51	113.02	0.19	-0.01	46.29
	3400.00	0.13	99.02	100	3399.91	-1.19	1.19 S	3.30 E	3.50	109.78	0.31	-0.11	-248.65
	3500.00	0.12	190.37	100	3499.91	-1.31	1.31 S	3.39 E	3.63	111.08	0.18	-0.01	91.35
	3600.00	0.11	184.18	100	3599.91	-1.51	1.51 S	3.37 E	3.69	114.10	0.02	-0.01	-6.19
	3700.00	0.22	310.42	100	3699.91	-1.48	1.48 S	3.21 E	3.54	114.69	0.30	0.11	126.24
	3800.00	0.21	57.75	100	3799.91	-1.25	1.25 S	3.22 E	3.46	111.28	0.35	-0.01	-252.67
	3900.00	0.32	155.49	100	3899.91	-1.41	1.41 S	3.49 E	3.77	112.00	0.41	0.11	97.74
	4000.00	0.29	320.45	100	3999.91	-1.47	1.47 S	3.45 E	3.75	113.10	0.60	-0.03	164.96
	4100.00	0.39	265.94	100	4099.91	-1.30	1.30 S	2.95 E	3.22	113.79	0.32	0.10	-54.51
	4200.00	0.49	3.52	100	4199.91	-0.90	0.90 S	2.63 E	2.78	108.80	0.67	0.10	-262.42
	4300.00	0.47	88.80	100	4299.90	-0.46	0.46 S	3.07 E	3.10	98.54	0.65	-0.02	85.28
	4400.00	0.10	318.62	100	4399.90	-0.39	0.39 S	3.42 E	3.44	96.45	0.54	-0.37	229.82
	4500.00	0.41	355.38	100	4499.90	0.04	0.04 N	3.33 E	3.33	89.39	0.34	0.31	36.76
	4600.00	0.84	327.42	100	4599.89	1.01	1.01 N	2.91 E	3.08	70.87	0.52	0.43	-27.96
	4662.00	0.81	340.65	62	4661.89	1.81	1.81 N	2.52 E	3.10	54.38	0.31	-0.05	21.34