



Apache Corporation (873) E-8-175-31E

Eddy County, NM (NAD27 NME)

NFE Federal #26H 30-015-40462 2128' FDL + 220' FDL

Wellbore #1 / Job #1310211

Survey: Phoenix MWD Survey

Phoenix Final Survey Report

18 March, 2013

NM OIL CONSERVATION
ARTESIA DISTRICT
JUL 14 2015
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Phoenix Technology Services
Phoenix Final Survey Report



Company: Apache Corporation	Local Co-ordinate Reference:
Project: Eddy County, NM (NAD27 NME)	Well #26H
Site: NFE Federal	RF @ 3740.00usft (Basic 44)
Well: #26H	RF @ 3740.00usft (Basic 44)
Wellbore: Wellbore #1 / Job #1310211	Grid
Design: Surveys (Basic 44)	Minimum Curvature
	GCR DB

Project: Eddy County, NM (NAD27 NME)	System Datum:	Mean Sea Level
Map System: US State Plane 1927 (Exact solution)		
Geo Datum: NAD 1927 (NADCON CONUS)		
Map Zone: New Mexico East 3001		

Site: NFE Federal		
Site Position:	Northings: 673,264.70 usft	Latitude: 32° 51' 1.133543 N
From: Map	Easting: 633,303.50 usft	Longitude: 103° 53' 57.346661 W
Position Uncertainty: 0.00 usft	Slot Radius: 13-3/16 "	Grid Convergence: 0.24 °

Well: #26H			
Well Position	+N/S 0.00 usft	Northings: 673,329.70 usft	Latitude: 32° 51' 1.133543 N
	+E/W 0.00 usft	Easting: 633,303.50 usft	Longitude: 103° 53' 57.346530 W
Position Uncertainty	0.00 usft	Wellhead Elevation: 13.00 usft	Ground Level: 3,727.00 usft

Wellbore	Wellbore #1 / Job #1310211				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	02/20/13	7.58	60.67	48,786

Design	Surveys (Basic 44)			
Audit Notes:				
Version: 1.0	Phase: ACTUAL	Tie On Depth: 0.00		
Vertical Section:	Depth From (TVD)	+N/S (usft)	+E/W (usft)	Direction (°)
	0.00	0.00	0.00	89.60

Survey Program	Date 03/18/13			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
459.00	9,871.00	Phoenix MWD Survey (Wellbore #1 / Job #	MWD	MWD - Standard



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Design: Surveys (Basic 44)

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:
Well #26H
RF @ 3740.00usft (Basic 44)
RF @ 3740.00usft (Basic 44)
Grid
Minimum Curvature
GCR DB

Survey	MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	EW (usft)	V. Sec (usft)	D Leg (°/100usft)	Northing (usft)	Easting (usft)
Phoenix First MWD Survey											
	0.00	0.00	0.00	3,740.00	0.00	0.00	0.00	0.00	0.00	673,329.70	633,303.50
	459.00	4.10	245.00	3,281.39	458.61	-6.94	-14.88	-14.93	0.89	673,322.76	633,288.62
	517.00	4.00	246.30	3,223.54	516.46	-8.63	-18.61	-18.67	0.23	673,321.07	633,284.89
	601.00	3.60	243.50	3,139.72	600.28	-10.98	-23.65	-23.73	0.52	673,318.72	633,279.85
	685.00	3.30	242.90	3,055.87	684.13	-13.26	-28.16	-28.26	0.36	673,316.44	633,275.34
	769.00	2.60	233.30	2,971.98	768.02	-15.50	-31.84	-31.95	1.02	673,314.20	633,271.66
	851.00	1.80	222.30	2,890.05	849.95	-17.56	-34.20	-34.32	1.10	673,312.14	633,269.30
	935.00	0.50	141.20	2,806.06	933.94	-18.82	-34.86	-34.99	2.13	673,310.88	633,268.64
	1,018.00	4.20	77.90	2,723.14	1,016.86	-18.47	-31.66	-31.79	4.82	673,311.23	633,271.84
	1,101.00	6.70	74.60	2,640.52	1,099.48	-16.55	-24.02	-24.13	3.03	673,313.15	633,279.48
	1,185.00	8.00	73.70	2,557.21	1,182.79	-13.60	-13.68	-13.78	1.55	673,316.10	633,289.82
	1,268.00	7.40	76.60	2,474.96	1,265.04	-10.75	-2.94	-3.02	0.86	673,318.95	633,300.56
	1,352.00	8.00	77.50	2,391.72	1,348.28	-8.23	8.03	7.97	0.73	673,321.47	633,311.53
	1,435.00	6.40	82.40	2,309.38	1,430.62	-6.36	18.25	18.21	2.06	673,323.34	633,321.75
	1,519.00	5.20	84.00	2,225.81	1,514.19	-5.35	26.68	26.64	1.44	673,324.35	633,330.18
	1,602.00	4.50	83.70	2,143.11	1,596.89	-4.60	33.66	33.62	0.84	673,325.10	633,337.16
	1,686.00	3.90	81.60	2,059.33	1,680.67	-3.82	39.76	39.73	0.74	673,325.88	633,343.26
	1,770.00	3.00	83.10	1,975.48	1,764.52	-3.14	44.77	44.74	1.08	673,326.56	633,348.27
	1,853.00	2.80	83.30	1,892.59	1,847.41	-2.64	48.94	48.92	0.24	673,327.06	633,352.44
	1,937.00	1.80	81.40	1,808.66	1,931.34	-2.20	52.28	52.26	1.19	673,327.50	633,355.78
	2,020.00	1.10	83.40	1,725.69	2,014.31	-1.92	54.36	54.34	0.85	673,327.78	633,357.86
	2,104.00	0.20	83.30	1,641.69	2,098.31	-1.81	55.30	55.29	1.07	673,327.89	633,358.80
	2,187.00	0.10	33.60	1,558.69	2,181.31	-1.73	55.49	55.48	0.19	673,327.97	633,358.99
	2,271.00	0.50	17.90	1,474.69	2,265.31	-1.32	55.64	55.63	0.48	673,328.38	633,359.14
	2,355.00	0.30	10.70	1,390.70	2,349.30	-0.75	55.80	55.79	0.25	673,328.95	633,359.30
	2,438.00	0.70	9.30	1,307.70	2,432.30	-0.04	55.92	55.92	0.48	673,329.66	633,359.42



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Phoenix Final Survey Report



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Wellbore: Wellbore #1 / Job #1310211
Design: Surveys (Basic 44)

Local Co-ordinate Reference:
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MD Reference:
North Reference:
Survey Calculation Method:
Database:
Well #26H
RF @ 3740.00usft (Basic 44)
RF @ 3740.00usft (Basic 44)
Grid
Minimum Curvature
GCR DB

Survey	MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	EW (usft)	V. Sec (usft)	Dleg (°/100usft)	Northing (usft)	Easting (usft)
	2,522.00	0.80	345.30	1,223.71	2,516.29	1.03	55.85	55.86	0.39	673,330.73	633,359.35
	2,605.00	0.70	346.40	1,140.71	2,599.29	2.09	55.59	55.60	0.12	673,331.79	633,359.09
	2,689.00	0.80	332.90	1,056.72	2,683.28	3.17	55.16	55.19	0.33	673,332.87	633,358.66
	2,773.00	1.30	327.90	972.74	2,767.26	4.57	54.36	54.39	0.49	673,334.27	633,357.86
	2,856.00	1.20	318.00	889.76	2,850.24	6.01	53.28	53.32	0.29	673,335.71	633,356.78
	2,940.00	1.40	322.10	805.78	2,934.22	7.47	52.06	52.11	0.26	673,337.17	633,355.56
	3,024.00	1.40	315.50	721.80	3,018.20	9.02	50.71	50.77	0.19	673,338.72	633,354.21
	3,109.00	1.50	317.50	636.83	3,103.17	10.58	49.23	49.30	0.13	673,340.28	633,352.73
	3,192.00	1.30	332.60	553.86	3,186.14	12.21	48.06	48.14	0.50	673,341.91	633,351.56
	3,276.00	1.10	332.60	469.87	3,270.13	13.78	47.25	47.35	0.24	673,343.48	633,350.75
	3,359.00	1.30	324.50	386.89	3,353.11	15.25	46.34	46.44	0.32	673,344.95	633,349.84
	3,423.00	1.10	318.90	322.91	3,417.09	16.30	45.51	45.62	0.36	673,346.00	633,349.01
	3,540.00	1.30	331.10	205.93	3,534.07	18.31	44.13	44.26	0.28	673,348.01	633,347.63
	3,624.00	0.90	345.30	121.95	3,618.05	19.78	43.50	43.64	0.57	673,349.48	633,347.00
	3,666.00	0.70	345.80	79.95	3,660.05	20.35	43.36	43.50	0.48	673,350.05	633,346.86
	3,750.00	0.70	142.80	-4.05	3,744.05	20.44	43.54	43.68	1.63	673,350.14	633,347.04
	3,834.00	1.30	150.10	-88.03	3,828.03	19.21	44.33	44.46	0.73	673,348.91	633,347.83
	3,918.00	1.00	146.30	-172.02	3,912.02	17.77	45.21	45.33	0.37	673,347.47	633,348.71
	4,002.00	1.00	154.20	-256.00	3,996.00	16.50	45.93	46.05	0.16	673,346.20	633,349.43
	4,085.00	1.20	157.60	-338.99	4,078.99	15.04	46.58	46.69	0.25	673,344.74	633,350.08
	4,169.00	1.10	157.80	-422.97	4,162.97	13.48	47.22	47.31	0.12	673,343.18	633,350.72
	4,253.00	1.00	163.00	-506.96	4,246.96	12.04	47.74	47.82	0.16	673,341.74	633,351.24
	4,337.00	1.00	166.50	-590.94	4,330.94	10.62	48.13	48.20	0.07	673,340.32	633,351.63
	4,414.00	1.00	168.80	-667.93	4,407.93	9.31	48.41	48.48	0.05	673,339.01	633,351.91
	4,497.00	1.10	168.90	-750.92	4,490.92	7.82	48.71	48.76	0.12	673,337.52	633,352.21
	4,581.00	1.00	167.10	-834.90	4,574.90	6.31	49.03	49.07	0.13	673,336.01	633,352.53
	4,665.00	1.00	173.50	-918.89	4,658.89	4.87	49.27	49.31	0.13	673,334.57	633,352.77



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RF @ 3740.00usft (Basic 44)
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Survey	MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	EW (usft)	V. Sec (usft)	D Lag (°/100usft)	Northing (usft)	Easting (usft)
	4,749.00	0.80	176.80	-1,002.88	4,742.88	3.56	49.39	49.41	0.25	673,333.26	633,352.89
	4,829.00	0.90	174.10	-1,082.87	4,822.87	2.37	49.48	49.50	0.13	673,332.07	633,352.98
	4,925.00	0.30	154.70	-1,178.87	4,918.87	1.40	49.67	49.68	0.65	673,331.10	633,353.17
	4,957.00	1.20	98.70	-1,210.86	4,950.86	1.27	50.04	50.04	3.32	673,330.97	633,353.54
	4,989.00	5.30	93.50	-1,242.81	4,982.81	1.13	51.84	51.85	12.83	673,330.83	633,355.34
	5,022.00	8.70	93.00	-1,275.55	5,015.55	0.91	55.86	55.86	10.30	673,330.61	633,359.36
	5,054.00	11.90	93.40	-1,307.03	5,047.03	0.58	61.57	61.57	10.00	673,330.28	633,365.07
	5,086.00	16.30	91.10	-1,338.06	5,078.06	0.30	69.36	69.36	13.86	673,330.00	633,372.86
	5,118.00	21.10	89.50	-1,368.37	5,108.37	0.26	79.61	79.61	15.08	673,329.96	633,383.11
	5,150.00	26.00	88.50	-1,397.69	5,137.69	0.50	92.39	92.39	15.36	673,330.20	633,395.89
	5,182.00	30.80	87.80	-1,425.83	5,165.83	1.00	107.60	107.60	15.04	673,330.70	633,411.10
	5,214.00	35.70	88.60	-1,452.58	5,192.58	1.54	125.13	125.14	15.37	673,331.24	633,428.63
	5,246.00	40.80	89.40	-1,477.69	5,217.69	1.88	144.95	144.96	16.32	673,331.58	633,448.45
	5,278.00	45.80	90.90	-1,500.93	5,240.93	1.81	166.93	166.94	15.95	673,331.51	633,470.43
	5,310.00	50.60	93.10	-1,522.24	5,262.24	0.96	190.78	190.78	15.56	673,330.66	633,494.28
	5,343.00	54.70	93.60	-1,542.25	5,282.25	-0.58	216.96	216.95	12.48	673,329.12	633,520.46
	5,375.00	59.60	93.20	-1,559.61	5,299.61	-2.17	243.79	243.77	15.35	673,327.53	633,547.29
	5,407.00	64.50	92.10	-1,574.60	5,314.60	-3.47	272.02	271.99	15.61	673,326.23	633,575.52
	5,439.00	69.80	91.40	-1,587.02	5,327.02	-4.37	301.48	301.45	16.68	673,325.33	633,604.98
	5,471.00	75.10	91.20	-1,596.67	5,336.67	-5.06	331.98	331.93	16.57	673,324.64	633,635.48
	5,503.00	80.70	91.60	-1,603.37	5,343.37	-5.82	363.24	363.19	17.54	673,323.88	633,666.74
	5,556.00	89.90	90.30	-1,607.71	5,347.71	-6.69	416.00	415.94	17.53	673,323.01	633,719.50
	5,588.00	91.30	89.30	-1,607.38	5,347.38	-6.58	448.00	447.94	5.38	673,323.12	633,751.50
	5,653.00	91.80	87.60	-1,605.62	5,345.62	-4.82	512.95	512.90	2.73	673,324.88	633,816.45
	5,749.00	90.00	89.40	-1,604.11	5,344.11	-2.31	608.89	608.86	2.65	673,327.39	633,912.39
	5,845.00	90.10	88.60	-1,604.03	5,344.03	-0.64	704.88	704.86	0.84	673,329.06	634,008.38
	5,942.00	89.60	87.90	-1,604.11	5,344.11	2.33	801.83	801.83	0.79	673,332.03	634,105.33


PHOENIX
 COMMERCIAL INSURANCE

Company:	Apache Corporation	Well #26H
Project:	Eddy County, NM (NAD27 NME)	RF @ 3740.00ust (Basic 44)
Site:	NFE Federal	RF @ 3740.00ust (Basic 44)
Well:	#26H	Grid
Wellbore:	Wellbore #1 / Job #1310211	Minimum Curvature
Design:	Surveys (Basic 44)	GCR DB
	Local Co-ordinate Reference:	
	TYD Reference:	
	MD Reference:	
	North Reference:	
	Survey Calculation Method:	
	Database:	

Survey	Survey Data											
	MD (ustf)	Inc (°)	Azi (azimuth) (°)	TVDSS (ustf)	TVD (ustf)	N/S (ustf)	E/W (ustf)	V. Sec (ustf)	Dleg (°/100ustf)	Northing (ustf)	Eastng (ustf)	
	6,038.00	90.30	88.70	-1,604.03	5,344.03	5.17	897.79	897.80	0.98	673,334.87	634,201.29	
	6,134.00	89.90	87.60	-1,603.86	5,343.86	8.27	993.74	993.77	1.22	673,337.97	634,297.24	
	6,231.00	88.80	87.20	-1,604.96	5,344.96	12.67	1,090.63	1,090.69	1.21	673,342.37	634,394.13	
	6,327.00	88.40	88.70	-1,607.31	5,347.31	16.11	1,186.54	1,186.62	1.62	673,345.81	634,490.04	
	6,423.00	87.20	89.80	-1,610.99	5,350.99	17.36	1,282.45	1,282.54	1.70	673,347.06	634,585.95	
	6,520.00	89.20	91.60	-1,614.04	5,354.04	16.18	1,379.39	1,379.47	2.77	673,345.88	634,682.89	
	6,616.00	88.10	91.20	-1,616.30	5,356.30	13.83	1,475.33	1,475.39	1.22	673,343.53	634,778.83	
	6,712.00	90.40	91.70	-1,617.56	5,357.56	11.40	1,571.29	1,571.33	2.45	673,341.10	634,874.79	
	6,809.00	90.20	91.50	-1,617.05	5,357.05	8.69	1,668.25	1,668.27	0.29	673,338.39	634,971.75	
	6,905.00	89.40	91.00	-1,617.38	5,357.38	6.60	1,764.22	1,764.23	0.98	673,336.30	635,067.72	
	7,001.00	89.10	90.80	-1,618.64	5,358.64	5.09	1,860.20	1,860.19	0.38	673,334.79	635,163.70	
	7,098.00	88.50	91.20	-1,620.67	5,360.67	3.40	1,957.17	1,957.14	0.74	673,333.10	635,260.67	
	7,194.00	87.90	90.60	-1,623.69	5,363.69	1.89	2,053.11	2,053.07	0.88	673,331.59	635,356.61	
	7,290.00	86.90	89.50	-1,628.04	5,368.04	1.81	2,149.00	2,148.96	1.55	673,331.51	635,452.50	
	7,387.00	88.50	89.30	-1,631.93	5,371.93	2.82	2,245.92	2,245.88	1.66	673,332.52	635,548.42	
	7,483.00	90.10	89.40	-1,633.11	5,373.11	3.91	2,341.90	2,341.87	1.67	673,333.61	635,645.40	
	7,579.00	90.50	89.30	-1,632.80	5,372.80	5.00	2,437.89	2,437.87	0.43	673,334.70	635,741.39	
	7,676.00	89.80	88.60	-1,632.35	5,372.35	6.78	2,534.88	2,534.86	1.02	673,336.48	635,836.38	
	7,772.00	88.50	87.90	-1,633.77	5,373.77	9.71	2,630.82	2,630.82	1.54	673,339.41	635,934.32	
	7,868.00	89.60	88.30	-1,635.37	5,375.37	12.89	2,726.75	2,726.77	1.22	673,342.59	636,030.25	
	7,965.00	90.50	88.30	-1,635.28	5,375.28	15.77	2,823.71	2,823.75	0.93	673,345.47	636,127.21	
	8,061.00	90.30	88.00	-1,634.61	5,374.61	18.87	2,919.65	2,919.71	0.38	673,348.57	636,223.15	
	8,157.00	89.80	88.20	-1,634.53	5,374.53	22.05	3,015.60	3,015.68	0.56	673,351.75	636,319.10	
	8,254.00	89.30	89.10	-1,635.29	5,375.29	24.34	3,112.57	3,112.66	1.06	673,354.04	636,416.07	
	8,350.00	88.20	89.60	-1,637.36	5,377.38	25.43	3,208.54	3,208.64	1.26	673,355.13	636,512.04	
	8,446.00	87.30	89.50	-1,641.15	5,381.15	26.18	3,304.46	3,304.56	0.94	673,355.88	636,607.96	
	8,543.00	90.30	89.50	-1,643.18	5,383.18	27.03	3,401.42	3,401.53	3.09	673,356.73	636,704.92	



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Site: NFE Federal
Well: #26H
Wellbore: Wellbore #1 / Job #131021
Design: Surveys (Basic 44)

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RF @ 3740.00usft (Basic 44)
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Minimum Curvature
GCR DB

MD	Inc	Azi (azimuth)	TVDSS	TVD	N/S	E/W	V. Sec	D Leg	Northing	Easting
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(usft)	(usft)
8,639.00	89.70	90.10	-1,643.18	5,383.18	27.36	3,497.42	3,497.53	0.88	673,357.06	636,800.92
8,735.00	88.90	90.10	-1,644.36	5,384.36	27.19	3,593.42	3,593.52	0.83	673,356.89	636,896.92
8,832.00	89.50	90.40	-1,645.71	5,385.71	26.77	3,690.40	3,690.50	0.69	673,356.47	636,993.90
8,928.00	91.00	90.80	-1,645.29	5,385.29	25.76	3,786.40	3,786.48	1.62	673,355.46	637,089.90
9,024.00	90.50	90.90	-1,644.04	5,384.04	24.34	3,882.38	3,882.45	0.53	673,354.04	637,185.88
9,120.00	90.30	91.20	-1,643.37	5,383.37	22.58	3,978.36	3,978.42	0.38	673,352.28	637,281.86
9,217.00	90.10	92.30	-1,643.03	5,383.03	18.62	4,075.31	4,075.35	1.15	673,349.32	637,378.81
9,313.00	89.70	90.40	-1,643.19	5,383.19	17.36	4,171.28	4,171.30	2.02	673,347.06	637,474.78
9,409.00	89.00	91.00	-1,644.28	5,384.28	16.18	4,267.26	4,267.27	0.96	673,345.88	637,570.76
9,506.00	90.80	90.30	-1,644.45	5,384.45	15.08	4,364.25	4,364.25	1.99	673,344.78	637,667.75
9,602.00	88.30	87.00	-1,645.21	5,385.21	17.34	4,460.20	4,460.22	4.31	673,347.04	637,763.70
9,698.00	88.00	86.20	-1,648.31	5,386.31	21.36	4,556.07	4,556.10	1.29	673,351.06	637,859.57
9,795.00	87.60	90.10	-1,652.03	5,392.03	22.80	4,652.98	4,653.03	2.00	673,352.50	637,956.48
9,815.00	87.40	90.00	-1,652.90	5,392.90	22.78	4,672.96	4,673.01	1.12	673,352.48	637,976.46
Phoenix Last MWD Survey										
9,871.00	87.40	90.00	-1,655.44	5,395.44	22.78	4,728.90	4,728.95	0.00	673,352.48	638,032.40
Projection to Bit										

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/S (usft)	+E/W (usft)	
459.00	458.61	-6.94	-14.88	Phoenix First MWD Survey
9,815.00	5,392.90	22.78	4,672.96	Phoenix Last MWD Survey
9,871.00	5,395.44	22.78	4,728.90	Projection to Bit

Checked By: _____ Approved By: _____ Date: _____