

Energen Resources

Tiffany

Navajo Lake 32-5

Navajo Lake 32-5 #21-2

Wellbore #1

Plan: Design #1

APD Report

04 May, 2011

Energen
APD Report

Company:	Energen Resources	Local Co-ordinate Reference:	Site Navajo Lake 32-5
Project:	Tiffany	TVD Reference:	WELL @ 6157.0usft (Original Well Elev)
Site:	Navajo Lake 32-5	MD Reference:	WELL @ 6157.0usft (Original Well Elev)
Well:	Navajo Lake 32-5 #21-2	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Design #1	Database:	EDM 5000.1 Single User Db

Project	Tiffany		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Central Zone		

Site	Navajo Lake 32-5		
Site Position:		Northing:	2,189,007.22 usft
From:	Lat/Long	Easting:	1,300,332.09 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	37° 0' 35.892 N
		Longitude:	107° 24' 53.244 W
		Grid Convergence:	-0.70 °

Well		Navajo Lake 32-5 #21-2				
Well Position	+N/-S	0.0 usft	Northing:	2,189,007.22 usft	Latitude:	37° 0' 35.892 N
	+E/-W	0.0 usft	Easting:	1,300,332.09 usft	Longitude:	107° 24' 53.244 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	6,139.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	5/4/2011	9.78	63.78	50,984

Design	Design #1			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	118.53

Survey Tool Program	Date	5/4/2011		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	9,286.5	Design #1 (Wellbore #1)	MWD	MWD - Standard

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Design #1	Database:	EDM 5000.1 Single User Db

Planned Survey							
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00
9 5/8"							
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00
612.0	0.34	145.61	612.0	0.0	0.0	0.0	2.84
Nacimiento							
700.0	2.84	145.61	700.0	2.2	-2.0	1.4	2.84
800.0	5.68	145.61	799.7	8.8	-8.2	5.6	2.84
900.0	8.52	145.61	898.9	19.8	-18.4	12.6	2.84
1,000.0	11.36	145.61	997.4	35.2	-32.6	22.3	2.84
1,100.0	14.19	145.61	1,094.9	54.9	-50.8	34.8	2.84
1,200.0	17.03	145.61	1,191.2	78.8	-73.1	50.0	2.84
1,300.0	19.87	145.61	1,286.1	107.0	-99.2	67.9	2.84
1,400.0	22.71	145.61	1,379.2	139.3	-129.1	88.4	2.84
1,500.0	25.55	145.61	1,470.5	175.7	-162.9	111.5	2.84
1,600.0	28.39	145.61	1,559.6	216.1	-200.3	137.1	2.84
1,700.0	31.23	145.61	1,646.3	260.4	-241.3	165.2	2.84
1,800.0	34.07	145.61	1,730.5	308.4	-285.8	195.6	2.84
1,888.8	36.59	145.61	1,803.0	354.1	-328.2	224.6	2.84
Ojo Alamo							
1,900.0	36.90	145.61	1,812.0	360.1	-333.7	228.4	2.84
2,000.0	39.74	145.61	1,890.4	415.3	-384.9	263.4	2.84
2,041.5	40.92	145.61	1,922.0	439.2	-407.0	278.6	2.84
Kirtland							
2,100.0	42.58	145.61	1,965.7	473.9	-439.2	300.6	2.84
2,200.0	45.42	145.61	2,037.6	535.7	-496.5	339.8	2.84
2,300.0	48.26	145.61	2,106.0	600.6	-556.7	381.0	2.84
2,400.0	51.10	145.61	2,170.7	668.5	-619.6	424.1	2.84

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Design:	Design #1	Database:	EDM 5000.1 Single User Db

Planned Survey							
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)
2,500.0	53.94	145.61	2,231.5	739.2	-685.1	468.9	2.84
2,600.0	56.78	145.61	2,288.4	812.4	-753.0	515.4	2.84
2,700.0	59.62	145.61	2,341.1	888.1	-823.1	563.4	2.84
2,800.0	62.45	145.61	2,389.5	966.0	-895.3	612.8	2.84
2,900.0	65.29	145.61	2,433.5	1,045.9	-969.4	663.5	2.84
2,994.5	67.98	145.61	2,471.0	1,123.1	-1,041.0	712.5	2.84
Fruitland							
3,000.0	68.13	145.61	2,473.1	1,127.7	-1,045.2	715.4	2.84
3,100.0	70.97	145.61	2,508.0	1,211.1	-1,122.5	768.3	2.84
3,200.0	73.81	145.61	2,538.2	1,295.9	-1,201.1	822.1	2.84
3,300.0	76.65	145.61	2,563.7	1,382.0	-1,280.9	876.7	2.84
3,400.0	79.49	145.61	2,584.4	1,469.1	-1,361.6	932.0	2.84
3,500.0	82.33	145.61	2,600.2	1,557.0	-1,443.1	987.8	2.84
3,600.0	85.17	145.61	2,611.1	1,645.5	-1,525.1	1,043.9	2.84
3,698.4	87.96	145.61	2,617.0	1,733.0	-1,606.2	1,099.4	2.84
Coal Top							
3,700.0	87.96	145.55	2,617.1	1,734.4	-1,607.5	1,100.3	3.73
3,769.1	88.07	142.98	2,619.4	1,796.6	-1,663.5	1,140.6	3.73
21-2 EP							
3,800.0	88.12	141.83	2,620.5	1,824.8	-1,688.0	1,159.4	3.73
3,900.0	88.29	138.11	2,623.6	1,917.9	-1,764.5	1,223.7	3.73
4,000.0	88.47	134.38	2,626.4	2,013.1	-1,836.7	1,292.8	3.73
4,100.0	88.65	130.66	2,628.9	2,110.1	-1,904.3	1,366.5	3.73
4,200.0	88.84	126.94	2,631.1	2,208.4	-1,966.9	1,444.4	3.73
4,242.0	88.92	125.38	2,631.9	2,250.0	-1,991.7	1,478.3	3.73
7"							
4,295.5	89.03	123.39	2,632.9	2,303.3	-2,021.9	1,522.5	3.73
21-2 CP							

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Planned Survey							
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)
4,300.0	89.04	123.22	2,633.0	2,307.7	-2,024.4	1,526.2	3.73
4,400.0	89.23	119.50	2,634.5	2,407.6	-2,076.4	1,611.6	3.73
4,500.0	89.44	115.78	2,635.6	2,507.5	-2,122.8	1,700.1	3.73
4,600.0	89.64	112.06	2,636.4	2,607.2	-2,163.3	1,791.5	3.73
4,700.0	89.84	108.34	2,636.9	2,706.1	-2,197.8	1,885.4	3.73
4,775.8	90.00	105.52	2,637.0	2,780.4	-2,219.9	1,957.9	3.73
Coal Base							
4,800.0	90.00	105.52	2,637.0	2,803.9	-2,226.4	1,981.2	0.00
4,900.0	90.00	105.52	2,637.0	2,901.4	-2,253.1	2,077.6	0.00
5,000.0	90.00	105.52	2,637.0	2,998.8	-2,279.9	2,173.9	0.00
5,100.0	90.00	105.52	2,637.0	3,096.2	-2,306.6	2,270.3	0.00
5,200.0	90.00	105.52	2,637.0	3,193.7	-2,333.4	2,366.6	0.00
5,300.0	90.00	105.52	2,637.0	3,291.1	-2,360.2	2,463.0	0.00
5,400.0	90.00	105.52	2,637.0	3,388.5	-2,386.9	2,559.3	0.00
5,500.0	90.00	105.52	2,637.0	3,486.0	-2,413.7	2,655.7	0.00
5,600.0	90.00	105.52	2,637.0	3,583.4	-2,440.4	2,752.0	0.00
5,700.0	90.00	105.52	2,637.0	3,680.8	-2,467.2	2,848.4	0.00
5,800.0	90.00	105.52	2,637.0	3,778.3	-2,493.9	2,944.7	0.00
5,900.0	90.00	105.52	2,637.0	3,875.7	-2,520.7	3,041.1	0.00
6,000.0	90.00	105.52	2,637.0	3,973.1	-2,547.5	3,137.4	0.00
6,100.0	90.00	105.52	2,637.0	4,070.6	-2,574.2	3,233.8	0.00
6,200.0	90.00	105.52	2,637.0	4,168.0	-2,601.0	3,330.2	0.00
6,300.0	90.00	105.52	2,637.0	4,265.4	-2,627.7	3,426.5	0.00
6,400.0	90.00	105.52	2,637.0	4,362.9	-2,654.5	3,522.9	0.00
6,500.0	90.00	105.52	2,637.0	4,460.3	-2,681.3	3,619.2	0.00
6,600.0	90.00	105.52	2,637.0	4,557.7	-2,708.0	3,715.6	0.00
6,700.0	90.00	105.52	2,637.0	4,655.2	-2,734.8	3,811.9	0.00

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Planned Survey								
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6,800.0	90.00	105.52	2,637.0	4,752.6	-2,761.5	3,908.3	0.00	
6,900.0	90.00	105.52	2,637.0	4,850.1	-2,788.3	4,004.6	0.00	
7,000.0	90.00	105.52	2,637.0	4,947.5	-2,815.0	4,101.0	0.00	
7,100.0	90.00	105.52	2,637.0	5,044.9	-2,841.8	4,197.3	0.00	
7,200.0	90.00	105.52	2,637.0	5,142.4	-2,868.6	4,293.7	0.00	
7,300.0	90.00	105.52	2,637.0	5,239.8	-2,895.3	4,390.0	0.00	
7,400.0	90.00	105.52	2,637.0	5,337.2	-2,922.1	4,486.4	0.00	
7,500.0	90.00	105.52	2,637.0	5,434.7	-2,948.8	4,582.7	0.00	
7,600.0	90.00	105.52	2,637.0	5,532.1	-2,975.6	4,679.1	0.00	
7,700.0	90.00	105.52	2,637.0	5,629.5	-3,002.3	4,775.5	0.00	
7,800.0	90.00	105.52	2,637.0	5,727.0	-3,029.1	4,871.8	0.00	
7,900.0	90.00	105.52	2,637.0	5,824.4	-3,055.9	4,968.2	0.00	
8,000.0	90.00	105.52	2,637.0	5,921.8	-3,082.6	5,064.5	0.00	
8,100.0	90.00	105.52	2,637.0	6,019.3	-3,109.4	5,160.9	0.00	
8,200.0	90.00	105.52	2,637.0	6,116.7	-3,136.1	5,257.2	0.00	
8,300.0	90.00	105.52	2,637.0	6,214.1	-3,162.9	5,353.6	0.00	
8,400.0	90.00	105.52	2,637.0	6,311.6	-3,189.6	5,449.9	0.00	
8,500.0	90.00	105.52	2,637.0	6,409.0	-3,216.4	5,546.3	0.00	
8,600.0	90.00	105.52	2,637.0	6,506.4	-3,243.2	5,642.6	0.00	
8,700.0	90.00	105.52	2,637.0	6,603.9	-3,269.9	5,739.0	0.00	
8,800.0	90.00	105.52	2,637.0	6,701.3	-3,296.7	5,835.3	0.00	
8,900.0	90.00	105.52	2,637.0	6,798.7	-3,323.4	5,931.7	0.00	
9,000.0	90.00	105.52	2,637.0	6,896.2	-3,350.2	6,028.1	0.00	
9,100.0	90.00	105.52	2,637.0	6,993.6	-3,376.9	6,124.4	0.00	
9,200.0	90.00	105.52	2,637.0	7,091.0	-3,403.7	6,220.8	0.00	
9,286.0	90.00	105.52	2,637.0	7,174.8	-3,426.7	6,303.6	0.00	
4 1/2" - 21-2 BHL								

Energen
APD Report

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Planned Survey								
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9,286.5	90.00	105.52	2,637.0	7,175.3	-3,426.8	6,304.1	0.00	

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
500.0	500.0	9 5/8"	9-5/8	12-1/4	
4,242.0	2,631.9	7"	7	8-3/4	
9,286.0	2,637.0	4 1/2"	4-1/2	6-1/4	

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
2,041.5	1,922.0	Kirtland	shale	0.00		
2,041.5	1,922.0	Kirtland	Shale	0.00		
612.0	612.0	Nacimiento	shale	0.00		
612.0	612.0	Nacimiento	Shale	0.00		
4,775.8	2,637.0	Coal Base	coal	0.00		
4,775.8	2,637.0	Coal Base	Coal	0.00		
3,698.4	2,617.0	Coal Top	coal	0.00		
3,698.4	2,617.0	Coal Top	Coal	0.00		
1,888.8	1,803.0	Ojo Alamo	sandstone	0.00		
1,888.8	1,803.0	Ojo Alamo	Sandstone	0.00		
2,994.5	2,471.0	Fruitland	sandstone	0.00		
2,994.5	2,471.0	Fruitland	Sandstone	0.00		

Checked By: _____	Approved By: _____	Date: _____
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