

# **Energen Resources**

**Tiffany**

**Navajo Lake 32-5**

**Navajo Lake 32-5 #21-2**

**Wellbore #1**

**Plan: Plan #2**

## **Standard Planning Report**

**08 December, 2011**

# Energen

## Planning Report

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

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

<b>Site</b>	Navajo Lake 32-5			
<b>Site Position:</b>		<b>Northing:</b>	2,189,881.52 usft	<b>Latitude:</b> 37° 0' 44.604 N
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,300,897.63 usft	<b>Longitude:</b> 107° 24' 46.404 W
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b> -0.70 °

<b>Well</b>	Navajo Lake 32-5 #21-2			
<b>Well Position</b>	<b>+N/-S</b>	-881.1 usft	<b>Northing:</b>	2,189,007.22 usft
	<b>+E/-W</b>	-554.8 usft	<b>Easting:</b>	1,300,332.09 usft
<b>Position Uncertainty</b>	0.0 usft	<b>Wellhead Elevation:</b>		<b>Ground Level:</b> 6,139.0 usft

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

<b>Design</b>	Plan #2			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PLAN	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>
	0.0	-881.1	-554.8	113.31

<b>Plan Sections</b>										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	-881.1	-554.8	0.00	0.00	0.00	0.00	
600.0	0.00	0.00	600.0	-881.1	-554.8	0.00	0.00	0.00	0.00	
3,588.5	86.30	145.70	2,580.0	-2,414.5	491.2	2.89	2.89	0.00	145.70	
3,890.5	86.30	145.70	2,599.5	-2,663.4	661.0	0.00	0.00	0.00	0.00	
4,706.8	90.00	105.00	2,627.0	-3,125.2	1,312.5	5.00	0.45	-4.99	-85.71	
4,997.8	90.00	96.27	2,627.0	-3,178.9	1,598.3	3.00	0.00	-3.00	-90.00	
9,292.1	90.00	96.27	2,627.0	-3,647.8	5,866.9	0.00	0.00	0.00	0.00	21-2 BHL

# Energen

## Planning Report

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

Planned 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)
0.0	0.00	0.00	0.0	-881.1	-554.8	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	-881.1	-554.8	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	-881.1	-554.8	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	-881.1	-554.8	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	-881.1	-554.8	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	-881.1	-554.8	0.0	0.00	0.00	0.00
9 5/8"									
600.0	0.00	0.00	600.0	-881.1	-554.8	0.0	0.00	0.00	0.00
612.0	0.35	145.70	612.0	-881.2	-554.8	0.0	2.89	2.89	0.00
Nacimiento									
700.0	2.89	145.70	700.0	-883.2	-553.4	2.1	2.89	2.89	0.00
800.0	5.78	145.70	799.7	-889.5	-549.1	8.5	2.89	2.89	0.00
900.0	8.66	145.70	898.9	-899.8	-542.0	19.1	2.89	2.89	0.00
1,000.0	11.55	145.70	997.3	-914.3	-532.2	33.9	2.89	2.89	0.00
1,100.0	14.44	145.70	1,094.7	-932.9	-519.5	52.9	2.89	2.89	0.00
1,200.0	17.33	145.70	1,190.9	-955.5	-504.1	76.0	2.89	2.89	0.00
1,300.0	20.21	145.70	1,285.6	-982.1	-485.9	103.2	2.89	2.89	0.00
1,400.0	23.10	145.70	1,378.5	-1,012.6	-465.1	134.3	2.89	2.89	0.00
1,500.0	25.99	145.70	1,469.5	-1,046.9	-441.7	169.4	2.89	2.89	0.00
1,600.0	28.88	145.70	1,558.2	-1,085.0	-415.8	208.3	2.89	2.89	0.00
1,700.0	31.76	145.70	1,644.5	-1,126.7	-387.3	250.9	2.89	2.89	0.00
1,800.0	34.65	145.70	1,728.2	-1,171.9	-356.5	297.2	2.89	2.89	0.00
1,892.5	37.32	145.70	1,803.0	-1,216.8	-325.8	343.1	2.89	2.89	0.00
Ojo Alamo									
1,900.0	37.54	145.70	1,809.0	-1,220.6	-323.3	346.9	2.89	2.89	0.00
2,000.0	40.43	145.70	1,886.7	-1,272.5	-287.8	400.0	2.89	2.89	0.00
2,046.9	41.78	145.70	1,922.0	-1,298.0	-270.5	426.0	2.89	2.89	0.00
Kirtland									
2,100.0	43.32	145.70	1,961.1	-1,327.7	-250.2	456.4	2.89	2.89	0.00
2,200.0	46.20	145.70	2,032.1	-1,385.8	-210.5	515.8	2.89	2.89	0.00
2,300.0	49.09	145.70	2,099.5	-1,446.9	-168.9	578.2	2.89	2.89	0.00
2,400.0	51.98	145.70	2,163.1	-1,510.6	-125.4	643.4	2.89	2.89	0.00
2,500.0	54.87	145.70	2,222.6	-1,577.0	-80.2	711.2	2.89	2.89	0.00
2,600.0	57.75	145.70	2,278.1	-1,645.7	-33.3	781.5	2.89	2.89	0.00
2,700.0	60.64	145.70	2,329.3	-1,716.6	15.1	854.0	2.89	2.89	0.00
2,800.0	63.53	145.70	2,376.1	-1,789.6	64.9	928.6	2.89	2.89	0.00
2,900.0	66.42	145.70	2,418.4	-1,864.5	116.0	1,005.1	2.89	2.89	0.00
3,000.0	69.30	145.70	2,456.1	-1,941.0	168.2	1,083.3	2.89	2.89	0.00
3,043.4	70.56	145.70	2,471.0	-1,974.7	191.1	1,117.7	2.89	2.89	0.00
Fruitland									
3,100.0	72.19	145.70	2,489.1	-2,019.0	221.4	1,163.0	2.89	2.89	0.00
3,200.0	75.08	145.70	2,517.2	-2,098.2	275.4	1,244.0	2.89	2.89	0.00
3,300.0	77.97	145.70	2,540.5	-2,178.5	330.2	1,326.1	2.89	2.89	0.00
3,400.0	80.86	145.70	2,558.9	-2,259.7	385.6	1,409.1	2.89	2.89	0.00
3,500.0	83.74	145.70	2,572.3	-2,341.6	441.4	1,492.8	2.89	2.89	0.00
3,588.5	86.30	145.70	2,580.0	-2,414.5	491.2	1,567.2	2.89	2.89	0.00
3,600.0	86.30	145.70	2,580.7	-2,423.9	497.6	1,576.9	0.00	0.00	0.00
3,700.0	86.30	145.70	2,587.2	-2,506.3	553.8	1,661.2	0.00	0.00	0.00
3,751.1	86.30	145.70	2,590.5	-2,548.5	582.6	1,704.3	0.00	0.00	0.00
21-2 EP									
3,800.0	86.30	145.70	2,593.6	-2,588.8	610.1	1,745.4	0.00	0.00	0.00
3,890.5	86.30	145.70	2,599.5	-2,663.4	661.0	1,821.7	0.00	0.00	0.00
3,900.0	86.34	145.23	2,600.1	-2,671.2	666.3	1,829.7	5.00	0.38	-5.00

# Energen

## Planning Report

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

Planned 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)	
4,000.0	86.73	140.23	2,606.2	-2,750.6	726.8	1,916.6	5.00	0.39	-5.00	
4,100.0	87.14	135.24	2,611.5	-2,824.5	793.9	2,007.5	5.00	0.42	-4.99	
4,200.0	87.58	130.25	2,616.1	-2,892.3	867.2	2,101.7	5.00	0.44	-4.99	
4,221.4	87.67	129.18	2,617.0	-2,905.9	883.7	2,122.2	5.00	0.45	-4.99	
<b>Coal Top</b>										
4,227.0	87.70	128.90	2,617.2	-2,909.4	888.0	2,127.6	5.00	0.45	-4.99	
<b>7"</b>										
4,300.0	88.03	125.26	2,619.9	-2,953.4	946.2	2,198.4	5.00	0.46	-4.99	
4,319.9	88.13	124.27	2,620.6	-2,964.8	962.6	2,217.9	5.00	0.46	-4.98	
<b>21-2 CP</b>										
4,400.0	88.50	120.28	2,623.0	-3,007.5	1,030.2	2,297.0	5.00	0.47	-4.98	
4,500.0	88.98	115.30	2,625.2	-3,054.1	1,118.7	2,396.6	5.00	0.48	-4.98	
4,600.0	89.47	110.32	2,626.5	-3,092.8	1,210.8	2,496.6	5.00	0.49	-4.98	
4,700.0	89.97	105.34	2,627.0	-3,123.4	1,306.0	2,596.1	5.00	0.49	-4.98	
4,706.8	90.00	105.00	2,627.0	-3,125.2	1,312.5	2,602.8	5.00	0.49	-4.98	
4,800.0	90.00	102.20	2,627.0	-3,147.1	1,403.1	2,694.7	3.00	0.00	-3.00	
4,900.0	90.00	99.20	2,627.0	-3,165.7	1,501.4	2,792.3	3.00	0.00	-3.00	
4,997.8	90.00	96.27	2,627.0	-3,178.9	1,598.3	2,886.5	3.00	0.00	-3.00	
5,000.0	90.00	96.27	2,627.0	-3,179.1	1,600.5	2,888.6	0.00	0.00	0.00	
5,100.0	90.00	96.27	2,627.0	-3,190.0	1,699.9	2,984.2	0.00	0.00	0.00	
5,200.0	90.00	96.27	2,627.0	-3,200.9	1,799.3	3,079.8	0.00	0.00	0.00	
5,300.0	90.00	96.27	2,627.0	-3,211.9	1,898.7	3,175.4	0.00	0.00	0.00	
5,400.0	90.00	96.27	2,627.0	-3,222.8	1,998.1	3,271.0	0.00	0.00	0.00	
5,500.0	90.00	96.27	2,627.0	-3,233.7	2,097.5	3,366.6	0.00	0.00	0.00	
5,600.0	90.00	96.27	2,627.0	-3,244.6	2,196.9	3,462.2	0.00	0.00	0.00	
5,700.0	90.00	96.27	2,627.0	-3,255.5	2,296.3	3,557.8	0.00	0.00	0.00	
5,800.0	90.00	96.27	2,627.0	-3,266.5	2,395.7	3,653.5	0.00	0.00	0.00	
5,900.0	90.00	96.27	2,627.0	-3,277.4	2,495.1	3,749.1	0.00	0.00	0.00	
6,000.0	90.00	96.27	2,627.0	-3,288.3	2,594.5	3,844.7	0.00	0.00	0.00	
6,100.0	90.00	96.27	2,627.0	-3,299.2	2,693.9	3,940.3	0.00	0.00	0.00	
6,200.0	90.00	96.27	2,627.0	-3,310.1	2,793.3	4,035.9	0.00	0.00	0.00	
6,300.0	90.00	96.27	2,627.0	-3,321.0	2,892.7	4,131.5	0.00	0.00	0.00	
6,400.0	90.00	96.27	2,627.0	-3,332.0	2,992.1	4,227.1	0.00	0.00	0.00	
6,500.0	90.00	96.27	2,627.0	-3,342.9	3,091.5	4,322.7	0.00	0.00	0.00	
6,600.0	90.00	96.27	2,627.0	-3,353.8	3,190.9	4,418.3	0.00	0.00	0.00	
6,700.0	90.00	96.27	2,627.0	-3,364.7	3,290.3	4,514.0	0.00	0.00	0.00	
6,800.0	90.00	96.27	2,627.0	-3,375.6	3,389.7	4,609.6	0.00	0.00	0.00	
6,900.0	90.00	96.27	2,627.0	-3,386.6	3,489.1	4,705.2	0.00	0.00	0.00	
7,000.0	90.00	96.27	2,627.0	-3,397.5	3,588.5	4,800.8	0.00	0.00	0.00	
7,100.0	90.00	96.27	2,627.0	-3,408.4	3,687.9	4,896.4	0.00	0.00	0.00	
7,200.0	90.00	96.27	2,627.0	-3,419.3	3,787.3	4,992.0	0.00	0.00	0.00	
7,300.0	90.00	96.27	2,627.0	-3,430.2	3,886.7	5,087.6	0.00	0.00	0.00	
7,400.0	90.00	96.27	2,627.0	-3,441.2	3,986.1	5,183.2	0.00	0.00	0.00	
7,500.0	90.00	96.27	2,627.0	-3,452.1	4,085.5	5,278.8	0.00	0.00	0.00	
7,600.0	90.00	96.27	2,627.0	-3,463.0	4,184.9	5,374.5	0.00	0.00	0.00	
7,700.0	90.00	96.27	2,627.0	-3,473.9	4,284.3	5,470.1	0.00	0.00	0.00	
7,800.0	90.00	96.27	2,627.0	-3,484.8	4,383.7	5,565.7	0.00	0.00	0.00	
7,900.0	90.00	96.27	2,627.0	-3,495.7	4,483.1	5,661.3	0.00	0.00	0.00	
8,000.0	90.00	96.27	2,627.0	-3,506.7	4,582.5	5,756.9	0.00	0.00	0.00	
8,100.0	90.00	96.27	2,627.0	-3,517.6	4,681.9	5,852.5	0.00	0.00	0.00	
8,200.0	90.00	96.27	2,627.0	-3,528.5	4,781.3	5,948.1	0.00	0.00	0.00	
8,300.0	90.00	96.27	2,627.0	-3,539.4	4,880.7	6,043.7	0.00	0.00	0.00	
8,400.0	90.00	96.27	2,627.0	-3,550.3	4,980.1	6,139.4	0.00	0.00	0.00	

# Energen

## Planning Report

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

Planned 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)	
8,500.0	90.00	96.27	2,627.0	-3,561.3	5,079.5	6,235.0	0.00	0.00	0.00	
8,600.0	90.00	96.27	2,627.0	-3,572.2	5,178.9	6,330.6	0.00	0.00	0.00	
8,700.0	90.00	96.27	2,627.0	-3,583.1	5,278.3	6,426.2	0.00	0.00	0.00	
8,800.0	90.00	96.27	2,627.0	-3,594.0	5,377.7	6,521.8	0.00	0.00	0.00	
8,900.0	90.00	96.27	2,627.0	-3,604.9	5,477.1	6,617.4	0.00	0.00	0.00	
9,000.0	90.00	96.27	2,627.0	-3,615.9	5,576.5	6,713.0	0.00	0.00	0.00	
9,100.0	90.00	96.27	2,627.0	-3,626.8	5,675.9	6,808.6	0.00	0.00	0.00	
9,200.0	90.00	96.27	2,627.0	-3,637.7	5,775.3	6,904.2	0.00	0.00	0.00	
9,206.0	90.00	96.27	2,627.0	-3,638.3	5,781.3	6,910.0	0.00	0.00	0.00	
4 1/2"										
9,292.1	90.00	96.27	2,627.0	-3,647.8	5,866.9	6,992.3	0.00	0.00	0.00	
21-2 BHL										

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
21-2 EP	0.00	0.00	2,617.0	-2,537.2	596.2	2,187,337.26	1,301,462.74	37° 0' 19.519 N	107° 24' 39.055 W	
- plan misses target center by 31.9usft at 3751.1usft MD (2590.5 TVD, -2548.5 N, 582.6 E)										
- Point										
21-2 CP	0.00	0.00	2,620.5	-2,967.5	960.8	2,186,902.49	1,301,822.09	37° 0' 15.264 N	107° 24' 34.560 W	
- plan misses target center by 3.3usft at 4319.9usft MD (2620.6 TVD, -2964.8 N, 962.6 E)										
- Point										
21-2 BHL	0.00	0.00	2,627.0	-3,647.8	5,866.9	2,186,162.35	1,306,719.55	37° 0' 8.532 N	107° 23' 34.080 W	
- plan hits target center										
- Point										

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		
4,227.0	2,617.2	7"	7	8-3/4		
9,206.0	2,627.0	4 1/2"	4-1/2	6-1/4		

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
612.0	612.0	Nacimiento	Shale	0.00		
1,892.5	1,803.0	Ojo Alamo	Sandstone	0.00		
2,046.9	1,922.0	Kirtland	Shale	0.00		
3,043.4	2,471.0	Fruitland	Sandstone	0.00		
4,221.4	2,617.0	Coal Top	Coal	0.00		