

Navajo Lake 14-1 LL Field Surveys MWD 4678' to 7646' Survey Report

Report Date:	July 11, 2007	Survey / DLS Computation Method:	Minimum Curvature / Lubinski
Client:	Energen Resources	Vertical Section Azimuth:	106 730°
Field:	NM, San Juan County (NAD 83 WZ) 2005-2007	Vertical Section Origin:	N 0 000 ft, E 0 000 ft
Structure / Slot:	Energen 10-32N-06W (Navajo Lake 14-1) / Navajo Lake 14-1	TVD Reference Datum:	Rotary Table
Well:	Navajo Lake 14-1	TVD Reference Elevation:	6197.0 ft relative to MSL
Borehole:	Lower Lateral	Sea Bed / Ground Level Elevation:	6182 000 ft relative to MSL
UWI/API#:		Magnetic Declination:	10.319°
Survey Name / Date:	Navajo Lake 14-1 LL Field Surveys MWD 4678' to 7646' / July 2, 2007	Total Field Strength:	51325 673 nT
Tort / AHD / DDI / ERD ratio:	217 686° / 6115 47 ft / 6 559 / 2.161	Magnetic Dip:	63 864°
Grid Coordinate System:	NAD83 New Mexico State Planes, Western Zone, US Feet	Declination Date:	July 02, 2007
Location Lat/Long:	N 36 59 30 624, W 107 26 15 216	Magnetic Declination Model:	BGGM 2007
Location Grid N/E Y/X:	N 2180602 268 ftUS, E 2838673 300 ftUS	North Reference:	True North
Grid Convergence Angle:	+0 23813977°	Total Corr Mag North -> True North:	+10 319°
Grid Scale Factor:	0.99993195	Local Coordinates Referenced To:	Well Head

RCVD AUG 9 '07
OIL CONS. DIV.
DIST. 3

Comments	Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	Sub-Sea TVD (ft)	TVD (ft)	Vertical Section (ft)	NS (ft)	EW (ft)	DLS (deg/100 ft)	Northing (ftUS)	Easting (ftUS)	Latitude	Longitude
Tie-Into OH MWD Surveys	4586.00	66.40	108.80	-3428.63	2768.37	1948.69	-2319.88	1337.50	0.46	2178288.13	2840020.33	N 36 59 7.686	W 107 25 58 731
Begin LL MWD Surveys	4678.00	76.70	108.00	-3399.56	2797.44	2035.80	-2347.37	1420.20	11.23	2178260.98	2840103.14	N 36 59 7.414	W 107 25 57 712
	4737.00	84.07	108.00	-3389.71	2807.29	2093.92	-2365.33	1475.48	12.49	2178243.25	2840158.50	N 36 59 7.237	W 107 25 57 031
	4798.00	86.63	107.18	-3384.76	2812.24	2154.71	-2383.71	1533.44	4.41	2178225.12	2840216.52	N 36 59 7.055	W 107 25 56 316
	4829.00	88.59	107.90	-3383.47	2813.53	2185.68	-2393.04	1562.97	6.73	2178215.91	2840246.09	N 36 59 6.963	W 107 25 55 952
	4854.00	85.31	107.68	-3382.14	2814.86	2210.63	-2400.67	1586.74	13.15	2178208.39	2840269.89	N 36 59 6.887	W 107 25 55 659
	4896.00	87.90	106.55	-3379.65	2817.35	2252.55	-2413.00	1626.80	6.73	2178196.22	2840310.00	N 36 59 6.765	W 107 25 55 166
	4918.00	89.28	107.41	-3379.11	2817.89	2274.55	-2419.43	1647.83	7.39	2178189.88	2840331.06	N 36 59 6.702	W 107 25 54 906
	4983.00	89.83	107.46	-3378.61	2818.39	2339.54	-2438.90	1709.85	0.85	2178170.67	2840393.15	N 36 59 6.509	W 107 25 54 142
	5043.00	91.00	109.62	-3379.04	2817.96	2399.50	-2457.98	1766.73	4.09	2178151.83	2840450.10	N 36 59 6.320	W 107 25 53 441
	5107.00	91.17	110.37	-3380.25	2816.75	2463.39	-2479.86	1826.86	1.20	2178130.20	2840510.32	N 36 59 6.104	W 107 25 52 700
	5171.00	90.48	109.95	-3381.18	2815.82	2527.26	-2501.91	1886.93	1.26	2178108.40	2840570.48	N 36 59 5.886	W 107 25 51 960
	5237.00	89.86	109.77	-3381.37	2815.63	2593.17	-2524.33	1949.00	0.98	2178086.23	2840632.64	N 36 59 5.664	W 107 25 51.195
	5300.00	89.28	109.74	-3380.90	2816.10	2656.08	-2545.63	2008.29	0.92	2178065.19	2840692.02	N 36 59 5.454	W 107 25 50 464
	5365.00	89.86	110.13	-3380.41	2816.59	2720.97	-2567.79	2069.40	1.08	2178043.28	2840753.21	N 36 59 5.234	W 107 25 49 711
	5429.00	90.34	109.98	-3380.52	2816.48	2784.86	-2589.73	2129.52	0.79	2178021.59	2840813.41	N 36 59 5.017	W 107 25 48 970
	5489.00	90.38	109.67	-3380.90	2816.10	2844.78	-2610.08	2185.96	0.52	2178001.48	2840869.93	N 36 59 4.816	W 107 25 48 274
	5552.00	90.17	109.59	-3381.20	2815.80	2907.69	-2631.25	2245.30	0.36	2177980.56	2840929.36	N 36 59 4.607	W 107 25 47 543
	5611.00	89.69	109.86	-3381.13	2815.87	2966.61	-2651.16	2300.83	0.93	2177960.88	2840984.97	N 36 59 4.410	W 107 25 46 858
	5676.00	89.79	109.94	-3380.83	2816.17	3031.51	-2673.28	2361.95	0.20	2177939.01	2841046.18	N 36 59 4.191	W 107 25 46 105
	5745.00	89.83	109.96	-3380.61	2816.39	3100.40	-2696.83	2426.81	0.06	2177915.74	2841111.13	N 36 59 3.958	W 107 25 45 306
	5808.00	90.03	110.06	-3380.53	2816.47	3163.30	-2718.38	2486.01	0.35	2177894.43	2841170.41	N 36 59 3.745	W 107 25 44 576
	5871.00	89.93	109.86	-3380.51	2816.49	3226.20	-2739.89	2545.22	0.35	2177873.17	2841229.71	N 36 59 3.532	W 107 25 43 847
	5935.00	89.79	109.78	-3380.35	2816.65	3290.11	-2761.59	2605.43	0.25	2177851.72	2841290.01	N 36 59 3.318	W 107 25 43 104
	5999.00	89.69	109.24	-3380.06	2816.94	3354.03	-2782.96	2665.76	0.86	2177830.60	2841350.41	N 36 59 3.106	W 107 25 42 361
	6063.00	88.52	107.61	-3379.06	2817.94	3417.99	-2803.19	2726.47	3.13	2177810.63	2841411.20	N 36 59 2.906	W 107 25 41.613
	6125.00	88.90	106.80	-3377.66	2819.34	3479.97	-2821.52	2755.68	1.44	2177792.54	2841470.48	N 36 59 2.725	W 107 25 40 883
	6192.00	88.93	106.10	-3376.40	2820.60	3546.96	-2840.49	2849.92	1.05	2177773.84	2841534.80	N 36 59 2.537	W 107 25 40 091
	6254.00	88.69	105.14	-3375.11	2821.89	3608.93	-2857.18	2909.62	1.60	2177757.40	2841594.56	N 36 59 2.372	W 107 25 39 356
	6316.00	89.24	104.73	-3373.99	2823.01	3670.89	-2873.16	2969.51	1.11	2177741.68	2841654.52	N 36 59 2.214	W 107 25 38 617
	6376.00	89.48	104.46	-3373.32	2823.68	3730.85	-2888.28	3027.57	0.60	2177726.80	2841712.64	N 36 59 2.065	W 107 25 37 902
	6441.00	88.97	104.20	-3372.44	2824.56	3795.78	-2904.36	3090.55	0.88	2177710.98	2841775.67	N 36 59 1.906	W 107 25 37 126
	6508.00	89.69	104.92	-3371.66	2825.34	3862.73	-2921.21	3155.39	1.52	2177694.41	2841840.58	N 36 59 1.739	W 107 25 36 327
	6570.00	90.14	106.46	-3371.56	2825.44	3924.72	-2937.97	3215.08	2.59	2177677.89	2841900.33	N 36 59 1.573	W 107 25 35 591
	6635.00	90.41	108.47	-3371.88	2825.12	3989.71	-2957.48	3277.08	3.12	2177658.64	2841962.41	N 36 59 1.380	W 107 25 34 827
	6698.00	90.07	109.92	-3372.14	2824.86	4052.65	-2978.19	3336.57	2.36	2177638.18	2842021.99	N 36 59 1.175	W 107 25 34 094
	6761.00	89.42	109.68	-3371.86	2825.14	4115.56	-2999.53	3395.85	1.10	2177617.09	2842081.34	N 36 59 0.964	W 107 25 33 363
	6818.00	89.97	108.45	-3371.56	2825.44	4172.51	-3018.15	3449.72	2.36	2177598.69	2842135.29	N 36 59 0.780	W 107 25 32 699
	6881.00	90.14	107.82	-3371.62	2825.38	4235.49	-3037.76	3509.59	1.04	2177579.34	2842195.24	N 36 59 0.586	W 107 25 31 961
	6951.00	91.03	107.63	-3372.33	2824.67	4305.47	-3059.07	3576.26	1.30	2177558.30	2842261.99	N 36 59 0.375	W 107 25 31 140
	7014.00	90.58	105.72	-3373.22	2823.78	4368.46	-3077.14	3636.60	3.11	2177540.48	2842322.40	N 36 59 0.197	W 107 25 30 396
	7076.00	89.52	103.66	-3373.27	2823.73	4430.42	-3092.86	3696.57	3.74	2177525.01	2842382.43	N 36 59 0.041	W 107 25 29 657
	7136.00	88.97	102.21	-3372.48	2824.52	4490.28	-3106.29	3755.04	2.58	2177511.83	2842440.96	N 36 58 59.908	W 107 25 28 936
	7211.00	89.04	101.21	-3371.18	2825.82	4564.98	-3121.51	3828.47	1.34	2177496.91	2842514.44	N 36 58 59.758	W 107 25 28 031
	7242.00	89.21	100.72	-3370.70	2826.30	4595.82	-3127.41	3858.90	1.67	2177491.14	2842544.89	N 36 58 59.699	W 107 25 27 656
	7328.00	89.45	100.48	-3369.70	2827.30	4681.32	-3143.23	3943.43	0.39	2177475.68	2842629.48	N 36 58 59.543	W 107 25 26 615
	7391.00	90.00	101.06	-3369.40	2827.60	4743.98	-3155.00	4005.31	1.27	2177464.16	2842691.41	N 36 58 59.426	W 107 25 25 852
	7453.00	89.90	101.27	-3369.34	2827.66	4805.69	-3167.00	4066.14	0.38	2177452.41	2842752.28	N 36 58 59.308	W 107 25 25.102
	7514.00	89.55	100.26	-3369.05	2827.95	4866.36	-3178.40	4126.07	1.75	2177441.27	2842812.25	N 36 58 59.195	W 107 25 24 364
	7585.00	89.66	99.43	-3368.56	2828.44	4936.84	-3190.54	4196.02	1.18	2177429.42	2842882.25	N 36 58 59.075	W 107 25 23 502

Lateral origin: 812/N 996/W Sec 14

Lateral BHL: 1673/N 1416/E Sec 14

Comments	Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	Sub-Sea TVD (ft)	TVD (ft)	Vertical Section (ft)	NS (ft)	EW (ft)	DLS (deg/100 ft)	Northing (ftUS)	Easting (ftUS)	Latitude	Longitude
Final LL MWD Survey	7646 00	89 17	98 61	-3367.94	2829 06	4997 29	-3200 10	4256 26	1.57	2177420 11	2842942 53	N 36 58 58 980	W 107 25 22.759
Projection to LL TD	7705 00	89 17	98 61	-3367.08	2829 92	5055 69	-3208 93	4314 59	0.00	2177411 52	2843000 89	N 36 58 58 893	W 107 25 22 040

Survey Type: Non-Def Survey

Survey Error Model: SLB ISCWSA version 24 *** 3-D 95.00% Confidence 2.7955 sigma

Surveying Prog:

MD From (ft)	MD To (ft)	EOU Freq	Survey Tool Type
0 00	15 00		Act-Stns SLB_BLIND-Depth Only
15 00	444.47		Act-Stns SLB_BLIND
444 47	1290 00		Act-Stns SLB_MWD-INC_ONLY
1290 00	4586.00		Act-Stns SLB_MWD-STD
4586 00	4737 00		Act-Stns SLB_MWD-INC_ONLY
4737 00	7646.00		Act-Stns SLB_MWD-STD
7646 00	7705 00		Act-Stns SLB_BLIND+TREND

Borehole -> Survey

Mother Bore Hole -> Navajo Lake 14-1 MBH MWD 0' to 4856' - TN Azimuth
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Lower Lateral -> Navajo Lake 14-1 LL Field Surveys MWD 4678' to 7646'
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