

Navajo Lake 14-1 UL Field Surveys 4342'-8394' Survey Report

Report Date	July 11, 2007	Survey / DLS Computation Method	Minimum Curvature / Lubinski
Client	Energen Resources	Vertical Section Azimuth	106 870°
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	Upper Lateral	Sea Bed / Ground Level Elevation	6182.000 ft relative to MSL
UWI/API#		Magnetic Declination	10 318°
Survey Name / Date	Navajo Lake 14-1 UL Field Surveys 4342'-8394' / July 5, 2007	Total Field Strength	51324 780 nT
Tort / AHD / DDI / ERD ratio	219 108° / 6822 39 ft / 6 654 / 2 450	Magnetic Dip	63 863°
Grid Coordinate System	NAD83 New Mexico State Planes, Western Zone, US Feet	Declination Date	July 05, 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	+10 318°
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 Motherbore	4342.00	66.57	110.69	-3525.64	2671.36	1729.49	-2245.85	1126.21	0.82	2178361.28	2839808.76	N 36 59 8.418	W 107 26 1.335
Begin Upper Lateral	4398.00	72.30	111.00	-3505.98	2691.02	1781.78	-2264.50	1175.19	10.25	2178342.83	2839857.81	N 36 59 8.234	W 107 26 0.732
MWD Surveys	4434.00	75.92	112.00	-3496.12	2700.88	1816.28	-2277.19	1207.40	10.40	2178330.27	2839890.07	N 36 59 8.108	W 107 26 0.335
	4462.11	79.10	112.41	-3490.05	2706.95	1843.60	-2287.56	1232.80	11.40	2178320.01	2839915.51	N 36 59 8.006	W 107 26 0.022
	4498.00	83.41	112.58	-3484.59	2712.41	1878.90	-2301.13	1265.57	12.02	2178306.58	2839948.33	N 36 59 7.871	W 107 25 59.618
	4527.00	86.38	112.76	-3482.01	2714.99	1907.63	-2312.26	1292.22	10.26	2178295.56	2839975.03	N 36 59 7.761	W 107 25 59.289
	4590.00	91.03	115.01	-3480.59	2716.41	1970.12	-2337.76	1349.79	8.20	2178270.30	2840032.70	N 36 59 7.509	W 107 25 58.580
	4653.06	90.83	114.32	-3481.61	2715.39	2032.59	-2364.07	1407.09	1.14	2178244.23	2840090.10	N 36 59 7.249	W 107 25 57.874
	4720.00	90.72	113.64	-3482.52	2714.48	2099.01	-2391.27	1468.24	1.03	2178217.29	2840151.37	N 36 59 6.980	W 107 25 57.120
	4783.00	90.41	112.77	-3483.14	2713.86	2161.62	-2416.09	1526.14	1.47	2178192.71	2840209.37	N 36 59 6.735	W 107 25 56.406
	4845.15	91.24	111.84	-3484.03	2712.97	2223.48	-2439.68	1583.64	2.01	2178169.36	2840266.95	N 36 59 6.501	W 107 25 55.698
	4908.00	91.17	111.04	-3485.35	2711.65	2286.12	-2462.65	1642.12	1.28	2178146.64	2840325.53	N 36 59 6.274	W 107 25 54.977
	4971.00	91.34	110.34	-3486.73	2710.27	2348.97	-2484.90	1701.05	1.14	2178124.63	2840384.54	N 36 59 6.054	W 107 25 54.251
	5034.00	91.27	109.90	-3488.17	2708.83	2411.85	-2506.57	1760.19	0.71	2178103.21	2840443.77	N 36 59 5.840	W 107 25 53.522
	5097.00	91.00	108.87	-3489.42	2707.58	2474.77	-2527.47	1819.60	1.69	2178082.56	2840503.26	N 36 59 5.633	W 107 25 52.790
	5161.00	90.69	108.96	-3490.36	2706.64	2538.73	-2548.22	1880.14	0.50	2178062.07	2840563.88	N 36 59 5.428	W 107 25 52.043
	5226.00	90.93	109.09	-3491.28	2705.72	2603.67	-2569.40	1941.58	0.42	2178041.14	2840625.41	N 36 59 5.219	W 107 25 51.286
	5289.00	90.31	109.03	-3491.96	2705.04	2666.62	-2589.98	2001.13	0.99	2178020.81	2840685.03	N 36 59 5.015	W 107 25 50.552
	5353.00	89.35	108.52	-3491.77	2705.23	2730.59	-2610.57	2061.72	1.70	2178000.47	2840745.71	N 36 59 4.811	W 107 25 49.806
	5417.00	88.62	108.13	-3490.64	2706.36	2794.56	-2630.69	2122.46	1.29	2177980.60	2840806.53	N 36 59 4.612	W 107 25 49.057
	5481.00	88.28	108.36	-3488.91	2708.09	2858.51	-2650.72	2183.22	0.64	2177960.83	2840867.37	N 36 59 4.414	W 107 25 48.308
	5544.00	87.62	108.25	-3486.65	2710.35	2921.45	-2670.50	2243.00	1.06	2177941.30	2840927.22	N 36 59 4.219	W 107 25 47.571
	5607.00	86.83	107.80	-3483.60	2713.40	2984.37	-2689.97	2302.83	1.44	2177922.08	2840987.13	N 36 59 4.026	W 107 25 46.834
	5669.00	87.42	107.53	-3480.49	2716.51	3046.28	-2708.76	2361.84	1.05	2177903.54	2841046.21	N 36 59 3.840	W 107 25 46.107
	5733.00	87.07	106.75	-3477.42	2719.58	3110.21	-2727.60	2422.92	1.33	2177884.96	2841107.37	N 36 59 3.654	W 107 25 45.354
	5796.00	86.18	106.39	-3473.71	2723.29	3173.09	-2745.53	2483.20	1.52	2177867.27	2841167.72	N 36 59 3.477	W 107 25 44.611
	5861.00	86.45	105.85	-3469.53	2727.47	3237.95	-2763.54	2545.52	0.93	2177849.52	2841230.10	N 36 59 3.299	W 107 25 43.843
	5924.00	86.83	105.30	-3465.84	2731.16	3300.83	-2780.43	2606.10	1.06	2177832.89	2841290.75	N 36 59 3.132	W 107 25 43.096
	5988.00	86.83	104.59	-3462.30	2734.70	3364.70	-2796.91	2667.84	1.11	2177816.67	2841352.55	N 36 59 2.969	W 107 25 42.335
	6051.00	85.94	103.21	-3458.33	2738.67	3427.48	-2812.01	2728.87	2.60	2177801.82	2841413.64	N 36 59 2.819	W 107 25 41.583
	6114.00	84.80	102.52	-3453.24	2743.76	3490.12	-2825.99	2790.09	2.11	2177788.09	2841474.91	N 36 59 2.681	W 107 25 40.829
	6150.00	84.52	102.04	-3449.89	2747.11	3525.85	-2833.62	2825.11	1.54	2177780.61	2841509.96	N 36 59 2.605	W 107 25 40.397
	6211.00	85.08	101.53	-3444.36	2752.64	3586.36	-2846.02	2884.58	1.24	2177768.46	2841569.48	N 36 59 2.483	W 107 25 39.664
	6271.00	86.76	101.54	-3440.09	2756.91	3645.95	-2857.99	2943.21	2.80	2177756.73	2841628.16	N 36 59 2.364	W 107 25 38.942
	6335.00	88.21	101.04	-3437.28	2759.72	3709.58	-2870.51	3005.91	2.40	2177744.48	2841690.91	N 36 59 2.240	W 107 25 38.169
	6396.00	89.69	101.31	-3436.17	2760.83	3770.27	-2882.33	3065.75	2.47	2177732.91	2841750.78	N 36 59 2.124	W 107 25 37.431
	6456.00	91.24	101.10	-3436.65	2760.35	3829.97	-2893.99	3124.60	2.61	2177721.49	2841809.68	N 36 59 2.008	W 107 25 36.706
	6515.00	92.03	100.94	-3438.34	2758.66	3888.64	-2905.26	3182.49	1.37	2177710.46	2841867.61	N 36 59 1.897	W 107 25 35.993
	6575.00	92.03	101.43	-3440.46	2756.54	3948.31	-2916.89	3241.31	0.82	2177699.08	2841926.48	N 36 59 1.782	W 107 25 35.268
	6635.00	91.41	100.98	-3442.26	2754.74	4007.99	-2928.55	3300.14	1.28	2177687.67	2841985.35	N 36 59 1.666	W 107 25 34.543
	6695.00	90.03	101.34	-3443.02	2753.98	4067.68	-2940.16	3359.00	2.38	2177676.30	2842044.25	N 36 59 1.551	W 107 25 33.817
	6756.00	89.86	100.60	-3442.96	2754.04	4128.36	-2951.76	3418.88	1.24	2177664.94	2842104.18	N 36 59 1.437	W 107 25 33.079
	6818.00	89.07	101.11	-3442.38	2754.62	4190.01	-2963.44	3479.77	1.52	2177653.52	2842165.11	N 36 59 1.321	W 107 25 32.329
	6877.00	89.21	100.59	-3441.49	2755.51	4248.68	-2974.55	3537.71	0.91	2177642.66	2842223.09	N 36 59 1.211	W 107 25 31.615
	6937.00	88.90	100.85	-3440.50	2756.50	4308.33	-2985.70	3596.65	0.67	2177631.75	2842282.08	N 36 59 1.101	W 107 25 30.888
	7000.00	89.14	100.24	-3439.43	2757.57	4370.94	-2997.23	3658.58	1.04	2177620.48	2842344.05	N 36 59 0.987	W 107 25 30.125
	7062.00	89.04	100.09	-3438.44	2758.56	4432.50	-3008.17	3719.60	0.29	2177609.79	2842405.11	N 36 59 0.879	W 107 25 29.373
	7122.00	88.86	99.95	-3437.34	2759.66	4492.07	-3018.61	3778.67	0.38	2177599.60	2842464.22	N 36 59 0.775	W 107 25 28.645
	7181.00	89.00	100.16	-3436.24	2760.76	4550.64	-3028.91	3836.76	0.43	2177589.54	2842522.34	N 36 59 0.673	W 107 25 27.929
	7241.00	89.04	99.72	-3435.22	2761.78	4610.19	-3039.26	3895.85	0.74	2177579.43	2842581.47	N 36 59 0.571	W 107 25 27.201

Lateral origin 738°N 760°W
Lateral B.H.L. 1798°N 722°E } Sec 14

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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
	7301.00	88.90	100.49	-3434.14	2762.86	4669.76	-3049.79	3954.91	1.30	2177569.15	2842640.57	N 36 59 0 467	W 107 25 26 473
	7361.00	88.66	100.61	-3432.86	2764.14	4729.39	-3060.77	4013.88	0.45	2177558.42	2842699.58	N 36 59 0 358	W 107 25 25 746
	7422.00	88.62	101.29	-3431.41	2765.59	4790.04	-3072.36	4073.75	1.12	2177547.08	2842759.50	N 36 59 0 243	W 107 25 25.008
	7484.00	88.73	101.56	-3429.98	2767.02	4851.75	-3084.64	4134.51	0.47	2177535.06	2842820.30	N 36 59 0 122	W 107 25 24.260
	7543.00	88.83	101.85	-3428.72	2768.28	4910.49	-3096.60	4192.27	0.52	2177523.33	2842878.11	N 36 59 0 004	W 107 25 23 548
	7602.00	88.93	102.12	-3427.57	2769.43	4969.27	-3108.85	4249.97	0.49	2177511.32	2842935.86	N 36 58 59 882	W 107 25 22 837
	7663.00	88.76	102.71	-3426.34	2770.66	5030.07	-3121.96	4309.53	1.01	2177498.46	2842995.47	N 36 58 59 753	W 107 25 22.102
	7723.00	88.93	103.70	-3425.13	2771.87	5089.93	-3135.67	4367.93	1.67	2177485.00	2843053.92	N 36 58 59 617	W 107 25 21.383
	7782.00	88.80	104.46	-3423.96	2773.04	5148.85	-3150.02	4425.15	1.31	2177470.89	2843111.19	N 36 58 59 475	W 107 25 20 678
	7845.00	88.80	105.18	-3422.64	2774.36	5211.80	-3166.13	4486.04	1.14	2177455.03	2843172.14	N 36 58 59 316	W 107 25 19 927
	7908.00	88.62	106.40	-3421.22	2775.78	5274.77	-3183.27	4546.64	1.96	2177438.15	2843232.82	N 36 58 59 146	W 107 25 19.180
	7973.00	89.00	106.74	-3419.87	2777.13	5339.75	-3201.80	4608.93	0.78	2177419.88	2843295.18	N 36 58 58 963	W 107 25 18 413
	8037.00	89.07	107.47	-3418.79	2778.21	5403.74	-3220.62	4670.09	1.15	2177401.31	2843356.41	N 36 58 58 777	W 107 25 17 659
	8100.00	88.97	107.43	-3417.72	2779.28	5466.73	-3239.51	4730.18	0.17	2177382.67	2843416.57	N 36 58 58 590	W 107 25 16.918
	8163.00	88.93	107.85	-3416.56	2780.44	5529.72	-3258.60	4790.21	0.67	2177363.84	2843476.68	N 36 58 58 401	W 107 25 16.179
	8226.00	88.90	108.58	-3415.37	2781.63	5592.69	-3278.29	4850.04	1.16	2177344.40	2843536.59	N 36 58 58 206	W 107 25 15 441
	8287.00	88.93	108.85	-3414.21	2782.79	5653.64	-3297.86	4907.81	0.45	2177325.07	2843594.43	N 36 58 58 012	W 107 25 14 729
	8333.00	89.14	109.57	-3413.44	2783.56	5699.60	-3312.99	4951.24	1.63	2177310.12	2843637.92	N 36 58 57 863	W 107 25 14 194
Final UL MWD Survey	8394.00	89.10	110.00	-3412.50	2784.50	5760.51	-3333.63	5008.63	0.71	2177289.71	2843695.39	N 36 58 57 659	W 107 25 13 487

Survey Type: Definitive 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	4342.00	Act-Stns	SLB_MWD-STD
4342.00	4434.00	Act-Stns	SLB_MWD-INC_ONLY
4434.00	4462.11	Act-Stns	SLB_MWD-STD
4462.11	4498.00	Act-Stns	SLB_MWD-INC_ONLY
4498.00	8394.00	Act-Stns	SLB_MWD-STD

Borehole -> Survey

Mother Bore Hole -> Navajo Lake 14-1 MBH MWD 0' to 4856' - TN Azimuth
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Upper Lateral -> Navajo Lake 14-1 UL Field Surveys 4342'-8394'
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