

85-10012



Noble Energy PENS1BHS Gyro+MWD 0ft to 14074ft MD Survey Report



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(Def Survey)

Report Date: November 11, 2013 - 08:15 AM
Client: Noble Energy
Field: WV Ritchie County (NAD27)
Structure / Slot: Noble Energy PENS1 Pad / PENS1BHS
Well: PENS1BHS
Borehole: Original Borehole
UWI / AP##: Unknown / Unknown
Survey Name: Noble Energy PENS1BHS Gyro+MWD 0ft to 14074ft MD
Survey Date: October 31, 2013
Tort / AHD / DDI / ERD Ratio: 224.012 / 8297.894 ft / 6.612 / 1.298
Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet
Location Lat / Long: N 39° 20' 5.99706", W 80° 57' 34.41619"
Location Grid NE YX: N 307632.072 RUS, E 1577745.692 RUS
CRS Grid Convergence Angle: -0.9521 *
Grid Scale Factor: 0.99995357
Version / Patch: 2.7.998.0

Vertical / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 133.044 * (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 R
TVD Reference Datum: KB
Seabed / Ground Elevation: 1138.060 ft above MSL
Magnetic Declination: -7.799 *
Total Gravity Field Strength: 959.3062mg (g.80665 Based)
Gravily Model: GARM
Total Magnetic Field Strength: 52305.492 nT
Magnetic Dip Angle: 66.885 *
Declination Date: October 31, 2013
Magnetic Declination Model: HDGM 2013
North Reference: Grid North
Grid Convergence Used: -0.9521 *
Total Corr Mag North+Grid: -6.8467 *
Local Coord Referenced To: Well Head

Table with columns: Comments, MD (ft), Incl (°), Azim Grid (°), TVD (ft), TVDSS (ft), VSEC (ft), NS (ft), EW (ft), DLS (ft/100ft), BR (ft/100ft), TR (ft/100ft), Northing (RUS), Easting (RUS), Latitude (N/S °'"), Longitude (E/W °'"), and Difficulty Index. The table contains multiple rows of survey data points.

12/05/2014

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Comments	MD (ft)	Incl (°)	Asm Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLB (ft/100ft)	BR (ft/100ft)	TR (ft/100ft)	Northing (MUS)	Easting (MUS)	Latitude (N/S ° ' '')	Longitude (E/W ° ' '')	Directional Difficulty Index
	7036.00	83.00	128.07	6357.33	5219.27	649.73	174.56	1052.07	9.77	5.23	6.32	30780.63	1578707.71	N 39 20 7.82 W	80 50 21.07	5.33
	7085.00	86.38	132.34	6361.49	5223.43	606.48	143.05	1089.34	10.05	5.06	6.71	307775.12	1578834.08	N 39 20 7.56 W	80 50 20.56	5.38
	7131.00	88.11	135.20	6363.70	5225.64	744.42	111.27	1122.51	7.26	3.78	6.22	307743.34	1578868.15	N 39 20 7.28 W	80 50 20.18	5.41
	7226.00	91.24	139.22	6364.24	5226.18	839.13	41.58	1187.03	5.36	3.29	4.23	307673.65	1578932.66	N 39 20 6.60 W	80 50 19.32	5.45
	7321.00	90.58	140.29	6362.73	5224.67	933.47	-30.92	1248.39	1.32	-0.69	1.13	307601.15	1578994.02	N 39 20 5.90 W	80 50 18.52	5.49
	7417.00	88.87	141.75	6363.10	5225.13	1028.53	-105.54	1306.78	2.34	-1.78	1.52	307526.54	1579054.41	N 39 20 5.17 W	80 50 17.74	5.53
	7513.00	88.80	142.46	6365.14	5227.08	1123.31	-181.28	1367.73	0.74	-0.07	0.74	307450.80	1579113.35	N 39 20 4.43 W	80 50 16.97	5.58
	7608.00	88.80	142.28	6367.13	5229.07	1217.04	-256.50	1429.72	0.19	0.00	-0.19	307375.58	1579171.34	N 39 20 3.70 W	80 50 16.22	5.59
	7704.00	89.28	139.21	6368.74	5230.68	1312.15	-330.82	1488.45	3.24	0.50	-3.20	307301.27	1579232.07	N 39 20 2.97 W	80 50 15.43	5.62
	7800.00	89.78	139.70	6369.54	5231.48	1407.62	-403.27	1549.43	0.68	0.50	-0.44	307228.82	1579295.05	N 39 20 2.27 W	80 50 14.61	5.65
	7895.00	90.00	139.62	6369.74	5231.68	1502.07	-475.19	1611.50	0.91	0.25	0.87	307156.81	1579357.11	N 39 20 1.57 W	80 50 13.81	5.68
	7991.00	90.24	140.30	6369.54	5231.48	1597.37	-548.73	1674.20	0.84	0.25	0.80	307083.37	1579418.81	N 39 20 0.87 W	80 50 13.01	5.71
	8086.00	90.34	140.78	6369.06	5231.00	1691.54	-622.13	1733.52	0.42	0.11	0.41	307009.98	1579479.12	N 39 20 0.13 W	80 50 12.23	5.73
	8181.00	90.34	140.81	6368.50	5230.44	1785.67	-695.74	1793.56	0.03	0.00	0.03	306936.37	1579530.17	N 39 19 59.42 W	80 50 11.45	5.75
	8276.00	90.24	140.84	6368.02	5229.96	1879.80	-769.38	1853.57	0.11	-0.11	0.03	306862.73	1579580.18	N 39 19 58.70 W	80 50 10.67	5.77
	8372.00	90.31	140.82	6367.56	5229.50	1974.63	-843.70	1914.34	0.24	0.07	-0.23	306788.41	1579639.94	N 39 19 57.97 W	80 50 9.88	5.80
	8468.00	90.00	140.17	6367.30	5229.24	2070.14	-917.67	1975.54	0.57	-0.32	-0.47	306714.45	1579721.13	N 39 19 57.25 W	80 50 9.08	5.82
	8564.00	90.28	140.53	6367.06	5229.00	2165.36	-991.58	2036.70	0.48	0.29	0.38	306640.54	1579782.39	N 39 19 56.53 W	80 50 8.28	5.84
	8660.00	89.93	140.47	6366.80	5228.83	2260.55	-1065.66	2097.86	0.37	-0.38	-0.06	306566.47	1579843.45	N 39 19 55.81 W	80 50 7.50	5.86
	8755.00	90.00	140.48	6366.54	5228.63	2354.54	-1138.94	2158.32	0.07	0.07	0.01	306493.19	1579903.90	N 39 19 55.10 W	80 50 6.71	5.88
	8851.00	90.31	139.65	6366.68	5228.62	2450.03	-1212.54	2219.94	0.92	0.32	-0.86	306419.50	1579965.52	N 39 19 54.38 W	80 50 5.91	5.90
	8946.00	90.34	139.74	6366.15	5228.09	2544.39	-1284.99	2281.39	0.10	0.03	0.09	306347.14	1580028.97	N 39 19 53.67 W	80 50 5.12	5.92
	9042.00	90.07	139.78	6365.80	5227.74	2639.73	-1358.27	2343.40	0.28	-0.28	0.04	306273.87	1580098.98	N 39 19 52.96 W	80 50 4.31	5.94
	9138.00	89.83	139.86	6365.89	5227.83	2735.08	-1431.62	2405.34	0.26	-0.25	0.08	306200.52	1580159.92	N 39 19 52.24 W	80 50 3.51	5.95
	9233.00	89.72	140.28	6366.26	5228.20	2829.35	-1504.47	2466.32	0.48	-0.12	0.44	306127.68	1580211.89	N 39 19 51.53 W	80 50 2.72	5.97
	9329.00	89.90	140.32	6366.58	5228.52	2924.58	-1578.33	2527.64	0.10	0.19	0.04	306053.82	1580273.21	N 39 19 50.81 W	80 50 1.92	5.99
	9425.00	89.93	141.03	6366.72	5228.86	3019.62	-1653.08	2587.89	1.88	0.03	1.68	305979.00	1580333.48	N 39 19 50.08 W	80 50 1.14	6.01
	9520.00	89.83	140.73	6366.92	5228.86	3113.63	-1727.23	2647.25	1.27	-0.11	-1.26	305904.92	1580392.81	N 39 19 49.36 W	80 50 0.37	6.03
	9616.00	89.97	142.15	6367.09	5229.03	3208.60	-1802.30	2707.09	1.49	0.15	1.48	305829.86	1580452.65	N 39 19 48.63 W	80 50 50.56	6.04
	9711.00	89.97	139.20	6367.14	5229.08	3302.74	-1875.78	2767.28	3.11	0.00	-3.11	305756.38	1580512.84	N 39 19 47.91 W	80 50 58.81	6.07
	9807.00	90.10	138.82	6367.08	5229.02	3396.24	-1948.13	2830.38	0.82	0.14	-0.60	305684.03	1580573.03	N 39 19 47.21 W	80 50 57.99	6.08
	9901.00	89.89	138.06	6367.25	5229.19	3491.92	-2017.78	2893.53	1.82	-0.44	-1.77	305610.42	1580633.08	N 39 19 46.53 W	80 50 57.17	6.10
	9997.00	89.79	137.04	6367.68	5229.62	3587.69	-2087.96	2959.00	0.13	0.10	0.08	305544.21	1580694.55	N 39 19 45.85 W	80 50 56.32	6.11
	10092.00	89.78	137.91	6368.06	5230.00	3682.40	-2157.98	3023.21	0.92	-0.03	0.92	305474.20	1580758.76	N 39 19 45.17 W	80 50 55.40	6.13
	10188.00	89.79	138.06	6368.43	5230.37	3778.04	-2229.31	3087.45	0.18	0.03	0.18	305402.87	1580823.00	N 39 19 44.47 W	80 50 54.68	6.14
	10283.00	89.83	137.98	6368.75	5230.69	3872.68	-2299.94	3150.98	0.11	0.04	-0.11	305332.24	1580889.52	N 39 19 43.78 W	80 50 53.84	6.16
	10379.00	89.78	139.87	6369.13	5231.07	3968.17	-2372.31	3214.96	1.97	-0.11	1.87	305260.88	1580959.59	N 39 19 43.08 W	80 50 53.02	6.18
	10474.00	89.88	139.95	6369.48	5231.42	4062.49	-2444.99	3275.23	0.17	0.15	0.08	305187.20	1581020.77	N 39 19 42.37 W	80 50 52.23	6.19
	10569.00	89.52	139.64	6369.90	5231.93	4156.83	-2517.54	3336.56	0.48	-0.38	-0.33	305114.65	1581082.09	N 39 19 41.66 W	80 50 51.43	6.20
	10668.00	89.38	139.98	6370.92	5232.86	4253.15	-2591.84	3399.15	0.38	-0.14	0.35	305040.58	1581144.68	N 39 19 40.94 W	80 50 50.62	6.22
	10761.00	89.68	141.70	6371.72	5233.66	4347.25	-2665.34	3459.08	1.93	0.29	1.91	304968.86	1581204.50	N 39 19 40.22 W	80 50 49.84	6.23
	10856.00	89.21	141.00	6372.65	5234.50	4441.24	-2739.57	3518.35	0.96	-0.47	-0.83	304892.63	1581263.87	N 39 19 39.50 W	80 50 49.07	6.25
	10953.00	90.00	141.52	6373.32	5235.26	4537.24	-2815.23	3579.05	0.98	0.81	0.54	304816.08	1581324.57	N 39 19 38.76 W	80 50 48.28	6.26
	11048.00	90.38	142.17	6373.01	5234.95	4631.12	-2889.83	3637.74	0.79	0.40	0.68	304742.28	1581383.28	N 39 19 38.03 W	80 50 47.52	6.27
	11144.00	90.00	141.32	6372.69	5234.63	4726.01	-2965.32	3697.18	0.97	-0.40	-0.80	304668.50	1581442.29	N 39 19 37.29 W	80 50 46.75	6.29
	11240.00	89.83	142.02	6372.83	5234.77	4820.93	-3040.82	3756.72	0.75	-0.18	0.73	304591.60	1581502.23	N 39 19 36.56 W	80 50 45.97	6.30
	11336.00	89.04	142.38	6373.78	5235.72	4915.70	-3116.47	3815.55	0.90	-0.82	0.38	304515.75	1581561.06	N 39 19 35.82 W	80 50 45.21	6.31
	11431.00	88.73	142.19	6375.63	5237.57	5009.45	-3191.81	3873.66	0.38	-0.33	-0.20	304440.62	1581619.16	N 39 19 35.08 W	80 50 44.46	6.32
	11527.00	89.07	141.72	6377.47	5239.41	5104.27	-3267.20	3933.81	0.69	0.35	-0.48	304365.03	1581678.31	N 39 19 34.35 W	80 50 43.69	6.34
	11626.00	89.00	139.00	6370.14	5241.08	5202.43	-3343.47	3995.89	2.68	0.07	-2.66	304288.77	1581741.39	N 39 19 33.61 W	80 50 42.87	6.35
	11717.00	89.28	139.53	6380.50	5242.44	5292.88	-3412.46	4056.21	0.57	0.31	0.48	304219.78	1581800.71	N 39 19 32.94 W	80 50 42.10	6.36
	11813.00	89.48	139.42	6381.54	5243.48	5386.27	-3485.43	4117.50	0.24	0.21	-0.11	304146.81	1581863.08	N 39 19 32.23 W	80 50 41.29	6.37
	11909.00	89.69	138.78	6382.24	5244.18	5483.73	-3557.99	4178.44	0.70	0.22	-0.67	304074.26	1581923.93	N 39 19 31.52 W	80 50 40.48	6.39
	12004.00	89.78	139.47	6382.60	5244.63	5578.19	-3629.82	4242.61	0.73	0.07	0.73	304002.43	1581988.10	N 39 19 30.82 W	80 50 39.67	6.40
	12099.00	89.86	139.74	6382.00	5244.93	5668.60	-3699.12	4301.58	0.32	0.11	0.30	303933.13	1582047.07	N 39 19 30.14 W	80 50 38.90	6.41
	12191.00	89.90	139.22	6383.20	5245.14	5753.99	-3772.10	4363.96	0.54	0.04	-0.54	303860.15	1582109.44	N 39 19 29.43 W	80 50 38.10	6.42
	12291.00	89.86	139.29	6383.40	5245.34	5843.41	-3847.86	4429.22	0.08	0.04	0.07	303784.40	1582174.70	N 39 19 28.69 W	80 50 37.25	6.43
	12387.00	89.28	139.32	6384.13	5246.07	5938.83	-3929.85	4491.82	0.80	-0.60	0.03	303711.62	1582237.29	N 39 19 27.99 W	80 50 36.44	6.44
	12483.00	89.38	139.13	6385.25	5247.19	6034.26	-3993.34	4554.51	0.22	0.10	-0.20	303638.93	1582299.98	N 39 19 27.28 W	80 50 35.62	6.45
	12577.00	89.55	139.35	6386.13	5248.07	6147.71	-4064.54	4615.88	0.30	0.18	0.23	303565.73	1582361.35	N 39 19 26.58 W	80 50 34.83	6.46
	12673.00	89.69	139.60	6386.76	5248.70	6243.										

