

51.01638



Noble Energy SHL13AHS Gyro+MWD Off to 12320ft MD Survey Report

(Def Survey)

Report Date: January 24, 2014 - 10:27 AM
Client: Noble Energy
Field: WV Marshall County (NAD 27)
Structure / Slot: Noble Energy SHL13 Pad / SHL13AHS
Well: SHL13AHS
Original Borehole: Unknown / Unknown
UWI / API#: 0.99996248
Survey Name: Noble Energy SHL13AHS Gyro+MWD Off to 12320ft MD
Survey Date: December 17, 2013
Tort / AHD / DDI / ERD Ratio: 245.151' / 5293.127' / 116.444' / 0.921
Coordinate Reference System: NAD22 West Virginia State Plane, Northern Zone, US Feet
Location Lat / Long: N 40° 0' 14.38105", W 80° 32' 8.84345"
Location Grid N.E. Y.C.: N 549531.405 N.E.S. E 1709837.305 N.E.S.
CRS Grid Convergence Angle: -0.5600 °
Grid Scale Factor: 0.99996248
Version / Patch: 2.7.1043.D

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 151.757 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: KB
TVD Reference Elevation: 1300.410 ft above MSL
Seabed / Ground Elevation: 1291.010 ft above MSL
Magnetic Declination: -8.454 °
Total Gravity Field Strength: 989.348mgm (9.80665 Easou)
Gravity Model: GARM
Total Magnetic Field Strength: 53165.819 nT
Magnetic Dip Angle: 67.565 °
Declination Date: December 17, 2013
Magnetic Declination Model: HOGM 2013
North Reference: Grid North
Grid Convergence Used: -0.6606 °
Total Corr Mag North->Grid North: -7.7739 °
Well Head

Table with columns: Comments, MD (ft), Incl (°), Azim (ft), TVD (ft), TVDSS (ft), VSEC (ft), NS (ft), EW (ft), DLS (ft/100ft), DR (ft/100ft), TR (ft/100ft), Northing (ft), Easting (ft), Latitude (N/S/E/W), Longitude (E/W), Directional Difficulty Index. Rows include SHL, Final Gyro, and various depth intervals.

10/31/2014

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Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLB (ft/100ft)	BR (ft/100ft)	TR (ft/100ft)	Northing (ft)	Easting (ft)	Latitude (N/S)	Longitude (E/W)	Directional Difficulty Index
	7337.00	89.76	144.90	6773.46	5473.07	633.08	-831.82	-210.31	2.36	0.39	-2.35	548659.82	1702627.03	N 40 0 8.74 W	80 32 11.42	5.32
	7426.00	90.27	144.81	6773.45	5473.04	721.44	-804.39	-159.08	0.58	0.57	-0.10	548627.05	1702678.23	N 40 0 8.03 W	80 32 8.16	5.35
	7516.00	87.49	143.63	6775.21	5474.80	810.64	-977.38	-109.48	3.36	-3.09	-1.31	548554.00	1702730.83	N 40 0 5.31 W	80 32 10.07	5.40
	7805.00	83.62	148.00	6777.46	5477.05	899.11	-1050.96	-58.50	5.46	2.39	4.91	548480.48	1702780.81	N 40 0 4.59 W	80 32 9.41	6.44
	7895.00	80.27	147.97	6777.54	5477.13	988.91	-1121.27	-8.79	0.72	0.72	-0.03	548404.18	1702828.52	N 40 0 3.94 W	80 32 8.79	5.47
	7784.00	90.00	146.10	6777.33	5476.92	1077.61	-1201.85	39.62	2.09	-0.30	-2.07	548329.50	1702878.92	N 40 0 3.28 W	80 32 8.16	5.50
	7874.00	89.28	146.06	6777.90	5477.49	1167.17	-1278.85	89.82	0.80	-0.80	-0.08	548254.81	1702927.12	N 40 0 2.38 W	80 32 7.50	5.53
	7963.00	89.38	146.55	6778.94	5478.53	1255.76	-1350.69	139.19	0.56	0.11	0.55	548180.77	1702976.49	N 40 0 1.65 W	80 32 6.85	5.56
	8053.00	89.25	147.31	6779.94	5479.53	1345.43	-1426.11	188.30	0.85	-0.43	0.84	548105.35	1703025.59	N 40 0 0.91 W	80 32 6.21	5.59
	8143.00	89.09	147.59	6780.69	5480.28	1435.17	-1501.97	232.72	0.49	0.38	0.31	548029.50	1703074.01	N 40 0 0.17 W	80 32 5.58	5.61
	8232.00	89.78	148.43	6781.10	5480.69	1523.96	-1577.45	283.87	0.95	0.11	0.84	547954.02	1703121.10	N 39 59 56.43 W	80 32 4.90	5.64
	8321.00	89.69	148.99	6781.50	5481.09	1612.85	-1653.50	330.09	0.64	0.11	0.63	547877.97	1703167.38	N 39 59 58.68 W	80 32 4.30	5.66
	8411.00	90.52	148.90	6781.33	5480.92	1702.65	-1729.78	377.85	2.50	-0.92	-2.32	547801.70	1703215.14	N 39 59 57.93 W	80 32 3.70	5.69
	8501.00	89.11	142.68	6781.82	5481.21	1791.98	-1803.29	429.73	4.94	-1.57	-4.69	547726.18	1703262.02	N 39 59 57.21 W	80 32 3.05	5.72
	8590.00	89.00	142.59	6783.00	5482.69	1879.82	-1874.02	483.74	0.10	-0.12	-0.10	547657.46	1703312.02	N 39 59 56.52 W	80 32 2.35	5.74
	8680.00	88.59	141.51	6784.99	5484.58	1968.51	-1944.97	539.07	1.28	-1.28	-1.20	547586.51	1703378.35	N 39 59 55.02 W	80 32 1.63	5.76
	8769.00	89.69	143.57	6786.32	5485.91	2056.35	-2015.60	593.19	2.82	1.24	2.31	547515.68	1703430.47	N 39 59 56.10 W	80 32 0.92	5.79
	8859.00	89.69	146.10	6786.81	5486.40	2145.09	-2089.20	644.98	2.28	0.00	2.68	547442.29	1703482.26	N 39 59 54.68 W	80 32 0.25	5.81
	8948.00	89.73	148.14	6787.26	5486.85	2234.40	-2163.96	693.26	2.62	0.04	2.22	547367.53	1703530.53	N 39 59 53.61 W	80 31 59.62	5.84
	9038.00	89.66	148.50	6787.74	5487.33	2324.24	-2240.59	740.48	0.51	-0.08	0.50	547290.81	1703577.74	N 39 59 52.92 W	80 31 59.00	5.85
	9127.00	89.69	148.61	6788.24	5487.83	2413.10	-2318.55	788.83	0.04	0.03	0.02	547214.84	1703624.10	N 39 59 52.16 W	80 31 58.39	5.87
	9217.00	89.38	147.52	6788.97	5488.56	2502.81	-2392.23	834.43	1.26	-0.34	-1.21	547138.57	1703671.71	N 39 59 51.43 W	80 31 57.77	5.89
	9307.00	89.52	146.14	6789.84	5489.43	2592.57	-2468.28	883.67	1.54	0.16	-1.53	547063.25	1703719.94	N 39 59 50.69 W	80 31 57.12	5.91
	9396.00	89.62	146.15	6790.51	5490.10	2681.14	-2542.17	933.25	0.11	0.11	0.01	546989.34	1703770.52	N 39 59 49.97 W	80 31 56.48	5.93
	9486.00	89.76	145.91	6790.99	5490.58	2770.69	-2616.80	983.54	0.31	0.16	-0.27	546914.70	1703820.80	N 39 59 49.23 W	80 31 55.82	5.94
	9575.00	90.17	146.25	6791.05	5490.64	2859.26	-2690.67	1033.18	0.52	0.46	0.42	546840.84	1703870.45	N 39 59 48.51 W	80 31 55.17	5.96
	9664.00	90.31	143.27	6790.87	5490.26	2947.59	-2763.36	1084.51	3.39	0.16	-3.39	546766.15	1703921.77	N 39 59 47.80 W	80 31 54.50	5.98
	9754.00	90.79	139.61	6789.81	5489.40	3036.11	-2833.73	1140.60	4.10	0.53	-4.07	546697.70	1703973.96	N 39 59 47.11 W	80 31 53.77	6.00
	9843.00	90.41	137.15	6788.88	5488.47	3122.69	-2900.25	1199.70	2.80	-0.43	-2.76	546631.27	1710336.06	N 39 59 46.46 W	80 31 53.00	6.02
	9933.00	89.90	136.19	6788.23	5488.22	3209.98	-2966.78	1266.21	1.29	-0.57	1.18	546564.74	1710397.56	N 39 59 45.81 W	80 31 52.21	6.04
	10022.00	89.86	140.08	6788.82	5488.61	3297.70	-3034.83	1332.20	2.08	-0.04	2.08	546498.69	1710458.48	N 39 59 45.14 W	80 31 51.45	6.06
	10112.00	89.76	142.25	6789.12	5488.71	3385.27	-3104.15	1395.02	2.48	-0.11	2.48	546427.38	1710521.27	N 39 59 44.46 W	80 31 50.72	6.08
	10202.00	89.78	143.62	6789.47	5489.06	3474.20	-3175.86	1459.27	1.52	0.03	1.52	546355.67	1710586.51	N 39 59 43.78 W	80 31 50.01	6.09
	10291.00	89.35	141.10	6790.14	5489.73	3562.00	-3246.43	1523.01	2.87	-0.49	-2.83	546285.11	1710653.06	N 39 59 43.07 W	80 31 49.30	6.11
	10381.00	89.42	139.14	6791.11	5490.70	3650.14	-3318.48	1581.11	2.18	0.58	-2.18	546218.05	1710720.55	N 39 59 42.39 W	80 31 48.55	6.13
	10470.00	89.24	140.40	6792.15	5491.74	3737.19	-3393.43	1639.79	1.43	-0.20	1.42	546148.11	1710788.03	N 39 59 41.73 W	80 31 47.80	6.14
	10560.00	89.11	141.21	6793.44	5493.03	3825.54	-3463.17	1693.68	0.91	-0.14	0.90	546078.27	1710857.90	N 39 59 41.05 W	80 31 47.06	6.16
	10649.00	89.28	143.27	6794.69	5494.28	3913.30	-3523.52	1710.15	2.32	0.19	2.31	546008.02	1710929.39	N 39 59 40.38 W	80 31 46.35	6.18
	10739.00	89.31	145.83	6795.80	5495.39	4002.56	-3588.82	1762.34	2.84	0.03	2.84	545934.72	1711006.58	N 39 59 39.84 W	80 31 45.67	6.19
	10829.00	89.31	146.04	6796.68	5496.47	4092.25	-3672.24	1811.44	2.48	0.00	2.48	545865.50	1711084.87	N 39 59 39.00 W	80 31 45.03	6.21
	10919.00	89.79	148.05	6797.50	5497.18	4182.05	-3748.60	1859.07	0.53	0.53	0.01	545792.96	1711169.30	N 39 59 38.15 W	80 31 44.40	6.22
	11008.00	90.14	148.26	6797.85	5497.24	4270.88	-3824.20	1906.03	0.46	0.39	0.24	545727.30	1711254.28	N 39 59 37.41 W	80 31 43.70	6.23
	11098.00	90.17	148.37	6797.40	5496.99	4360.72	-3900.79	1953.30	0.13	0.03	0.12	545650.77	1711340.53	N 39 59 36.66 W	80 31 43.17	6.25
	11187.00	90.07	145.84	6797.22	5496.81	4449.42	-3975.51	2001.63	2.84	0.11	-2.84	545586.05	1711428.86	N 39 59 35.92 W	80 31 42.54	6.26
	11277.00	90.38	148.51	6798.86	5498.45	4538.99	-4050.28	2051.73	0.82	0.34	0.74	545521.29	1711518.95	N 39 59 35.19 W	80 31 41.88	6.27
	11366.00	90.41	146.02	6799.25	5498.84	4627.58	-4124.29	2101.15	0.55	0.03	-0.55	545467.28	1711610.38	N 39 59 34.46 W	80 31 41.24	6.29
	11456.00	90.03	144.06	6799.30	5498.49	4716.95	-4198.04	2152.72	2.22	0.42	-2.18	545403.33	1711703.94	N 39 59 33.74 W	80 31 40.57	6.30
	11545.00	90.07	141.32	6799.82	5498.41	4804.83	-4269.82	2206.66	3.08	0.04	-3.08	545342.75	1711800.88	N 39 59 33.05 W	80 31 39.86	6.32
	11635.00	90.14	140.45	6799.66	5498.25	4893.22	-4338.65	2263.44	0.97	0.08	-0.97	545282.92	1711900.66	N 39 59 32.36 W	80 31 39.12	6.33
	11724.00	90.34	142.14	6799.29	5498.88	4980.73	-4409.10	2319.09	1.91	0.22	1.90	545223.48	1712015.30	N 39 59 31.68 W	80 31 38.40	6.34
	11814.00	89.86	145.40	6799.13	5499.42	5069.85	-4480.89	2372.27	3.86	-0.53	3.82	545165.89	1712139.49	N 39 59 30.97 W	80 31 37.70	6.36
	11903.00	89.93	146.90	6799.29	5499.68	5158.55	-4555.45	2429.54	3.23	0.06	3.23	545109.14	1712273.75	N 39 59 30.24 W	80 31 37.07	6.37
	11993.00	90.07	152.01	6799.29	5499.68	5248.51	-4633.74	2484.92	3.48	0.16	3.40	545053.85	1712420.13	N 39 59 29.57 W	80 31 36.48	6.39
	12082.00	90.03	155.04	6799.22	5499.61	5337.48	-4713.39	2540.59	3.40	-0.04	3.40	544998.20	1712581.80	N 39 59 28.69 W	80 31 35.97	6.41
	12172.00	90.21	153.50	6799.03	5499.62	5427.37	-4794.49	2593.61	1.83	0.20	-1.82	544947.10	1712750.81	N 39 59 27.89 W	80 31 35.46	6.42
	12261.00	91.07	146.95	6799.03	5499.62	5516.33	-4872.51	2646.38	5.29	0.97	-5.20	544896.09	1712923.06	N 39 59 27.12 W	80 31 34.90	6.44
Final Survey 20- Dec-13	12285.00	91.13	147.76	6799.57	5499.18	5540.29	-4892.93	2696.97	4.06	0.25	-4.96	544845.68	1712438.17	N 39 59 26.93 W	80 31 34.73	6.44
PTB	12320.00	91.13	147.76	6792.88	5492.47	5575.19	-4922.53	2617.63	0.00	0.00	0.00	544699.07	1712454.84	N 39 59 26.92 W	80 31 34.49	6.44

Survey Type:

Def Survey

Survey Error Model:
Survey Program:

ISCWSA Rev 0 --- 3-D 95.000% Confidence 2.7956 sigma

Description	Part	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey	
	1	0.000	18.500		Act Sns	30.000	30.000	SLB_NSG+MSHOT-Depth Only	Original Borehole / Noble Energy SHL13AHS Gyro+MWD Off to 12320ft MD
	1	18.500							

