

Noble Energy SHL-6D-HS Gyro+MWD 0' to 9111' MD 30Jul12 Survey Report

(Def Survey)

Report Date: July 30, 2012 - 11:51 AM
 Client: Noble Energy
 Field: WV Marshall County (NAD 27)
 Structure / Slot: CNX/Noble Energy SHL-6D-HS / SHL-6D-HS
 Well: SHL-6D-HS
 Borehole: Original Borehole
 UWI / AP# : Unknown / Unknown
 Survey Name: Noble Energy SHL-6D-HS Gyro+MWD 0' to 9111' MD 30Jul12
 Survey Date: July 11, 2012
 Tort / AHD / DDI / ERD Ratio: 213.652' / 3334.162 ft / 6.019 / 0.537
 Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet
 Location Lat / Long: N 39° 57' 22.07832", W 80° 34' 32.18577"
 Location Grid N/E / Y/X: N 532188.680 HUS, E 1698474.080 HUS
 CRS Grid Convergence Angle: -0.8860°
 Grid Scale Factor: 0.99965731

Survey / DLS Computation: Minimum Curvature / Lubinski
 Vertical Section Azimuth: 148.897° (Grid North)
 Vertical Section Origin: 0.000 ft, 0.000 ft
 TVD Reference Datum: KB
 TVD Reference Elevation: 854.290 ft above MSL
 Seabed / Ground Elevation: 831.020 ft above MSL
 Magnetic Declination: -8.882°
 Total Gravity Field Strength: 1000.0860 mgm (9.8 based)
 Total Magnetic Field Strength: 52832.226 nT
 Magnetic Dip Angle: 67.490°
 Declination Date: July 11, 2012
 Magnetic Declination Model: BGGM 2012
 North Reference: Grid North
 Grid Convergence Used: -0.8860°
 Total Corr Mag North->Grid North: -7.9861°
 Local Coord Referenced To: Well Head

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 (ftUS)	Easting (ftUS)	Latitude (NS° ' ")	Longitude (EW° ' ")	Directional Difficulty Index
SHL	0.00	0.00	0.00	0.00	-654.29	0.00	0.00	0.00	N/A	N/A	N/A	532188.68	1698474.08	N 39 57 22.08 W	80 34 32.19	0.00
	100.00	0.31	316.32	100.00	-754.29	-0.26	0.19	-0.19	0.31	0.01	-0.01	532188.77	1698473.89	N 39 57 22.08 W	80 34 32.19	0.00
	200.00	0.30	289.01	200.00	-654.29	-0.73	0.47	-0.47	0.31	0.01	0.00	532188.65	1698473.45	N 39 57 22.08 W	80 34 32.19	0.00
	300.00	0.36	229.31	300.00	-554.29	-0.88	0.35	-1.11	0.33	0.06	-0.50	532188.03	1698472.97	N 39 57 22.08 W	80 34 32.20	0.01
	400.00	0.22	30.20	400.00	-454.29	-0.92	0.31	-1.28	0.57	-0.14	160.89	532188.60	1698472.82	N 39 57 22.08 W	80 34 32.20	0.34
	500.00	0.42	247.18	500.00	-354.29	-1.08	0.34	-1.50	0.22	0.20	-143.04	532189.02	1698472.58	N 39 57 22.08 W	80 34 32.21	0.58
	600.00	0.41	216.24	599.99	-254.30	-0.97	-0.10	-2.05	0.25	0.20	-30.82	532188.58	1698472.03	N 39 57 22.08 W	80 34 32.21	0.77
	700.00	0.32	179.34	699.99	-154.30	-0.80	-0.69	-2.25	0.25	-0.09	-38.89	532188.02	1698471.83	N 39 57 22.07 W	80 34 32.21	1.45
	800.00	0.30	313.97	799.99	-54.30	-0.81	-0.78	-2.44	0.57	-0.02	134.63	532187.92	1698471.61	N 39 57 22.07 W	80 34 32.21	1.90
	900.00	0.48	19.64	899.99	45.70	-1.13	-0.10	-2.49	0.45	0.18	65.87	532188.50	1698471.59	N 39 57 22.08 W	80 34 32.22	1.18
	1000.00	0.22	290.48	999.99	145.70	-1.54	0.28	-2.53	0.53	-0.28	-68.18	532188.86	1698471.55	N 39 57 22.08 W	80 34 32.22	1.28
	1100.00	0.36	333.95	1099.99	245.70	-2.01	0.63	-2.84	0.25	0.14	-80.14	532189.31	1698471.24	N 39 57 22.08 W	80 34 32.22	1.78
	1200.00	0.42	119.89	1199.98	345.69	-2.00	0.73	-2.68	0.75	0.08	145.84	532189.41	1698471.42	N 39 57 22.08 W	80 34 32.22	1.34
	1300.00	0.38	339.27	1299.98	445.69	-2.01	0.86	-2.47	0.76	-0.03	-140.82	532189.54	1698471.61	N 39 57 22.09 W	80 34 32.22	1.54
	1400.00	0.31	287.05	1399.98	545.69	-2.55	1.26	-2.85	0.32	-0.08	-52.22	532189.94	1698471.23	N 39 57 22.09 W	80 34 32.22	1.60
	1500.00	0.59	20.25	1499.98	645.69	-3.07	1.82	-2.93	0.68	0.28	93.20	532170.50	1698471.15	N 39 57 22.10 W	80 34 32.22	1.89
	1600.00	0.37	342.00	1599.98	745.69	-3.71	2.61	-2.85	0.38	-0.22	-38.25	532171.29	1698471.29	N 39 57 22.10 W	80 34 32.22	1.89
	1700.00	0.42	119.89	1699.98	845.69	-4.11	3.39	-3.08	0.28	-0.20	-44.40	532171.67	1698471.00	N 39 57 22.11 W	80 34 32.23	1.80
	1800.00	0.60	40.38	1799.97	945.68	-4.44	4.38	-2.87	0.68	0.43	102.76	532172.14	1698471.21	N 39 57 22.11 W	80 34 32.22	1.89
	1900.00	0.34	278.79	1899.97	1045.68	-4.80	5.00	-2.83	0.63	-0.26	-121.57	532172.58	1698471.25	N 39 57 22.12 W	80 34 32.22	1.93
	2000.00	0.50	67.85	1999.97	1145.68	-4.82	4.11	-2.71	0.81	0.16	148.16	532172.79	1698471.37	N 39 57 22.12 W	80 34 32.22	1.79
	2100.00	0.21	235.02	2099.97	1245.68	-4.94	4.17	-2.46	0.71	-0.29	167.07	532172.85	1698471.62	N 39 57 22.12 W	80 34 32.22	2.04
	2200.00	0.41	140.71	2199.97	1345.68	-4.47	3.79	-2.38	0.47	0.20	-94.31	532172.47	1698471.70	N 39 57 22.12 W	80 34 32.22	2.07
	2300.00	0.49	86.31	2299.97	1445.68	-3.92	3.54	-2.42	0.42	0.08	-54.40	532172.22	1698472.36	N 39 57 22.11 W	80 34 32.21	2.12
	2400.00	0.37	128.49	2399.96	1545.67	-3.42	3.38	-1.05	0.33	-0.12	42.18	532172.04	1698473.03	N 39 57 22.11 W	80 34 32.20	2.16
	2500.00	0.45	131.78	2499.96	1645.67	-2.74	2.90	-0.51	0.08	0.08	3.27	532171.58	1698473.57	N 39 57 22.11 W	80 34 32.19	2.18
	2600.00	0.54	99.69	2599.96	1745.67	-2.06	2.56	0.25	0.29	0.09	-32.07	532171.24	1698474.33	N 39 57 22.10 W	80 34 32.18	2.22
	2700.00	0.40	287.05	2699.95	1845.66	-1.92	2.52	0.45	0.05	0.05	1.98	532171.20	1698474.54	N 39 57 22.10 W	80 34 32.18	2.23
	2800.00	0.48	17.89	2799.95	1945.66	-1.85	2.89	1.20	0.49	0.10	-84.41	532171.57	1698475.28	N 39 57 22.11 W	80 34 32.17	2.28
	2857.00	0.62	17.89	2856.95	2002.66	-2.36	3.59	1.38	0.11	0.08	8.42	532172.27	1698475.48	N 39 57 22.11 W	80 34 32.17	2.30
	2952.00	0.88	12.82	2951.95	2097.66	-2.99	4.47	1.62	0.16	0.15	-6.23	532173.15	1698475.70	N 39 57 22.12 W	80 34 32.17	2.33
	3048.00	0.62	12.00	3045.94	2191.65	-3.73	5.47	1.84	0.01	0.00	-0.98	532174.15	1698475.92	N 39 57 22.13 W	80 34 32.17	2.36
	3141.00	0.62	355.39	3140.93	2286.64	-4.58	6.48	1.91	0.19	-0.00	-17.48	532175.16	1698476.59	N 39 57 22.14 W	80 34 32.16	2.39
	3236.00	0.79	2.20	3236.93	2381.64	-5.57	7.65	1.89	0.20	0.18	7.17	532176.33	1698476.97	N 39 57 22.15 W	80 34 32.16	2.42
	3331.00	0.88	31.81	3330.92	2476.63	-6.45	8.92	2.30	0.46	0.09	31.27	532177.60	1698476.38	N 39 57 22.17 W	80 34 32.16	2.47
	3426.00	1.19	37.00	3425.90	2571.61	-7.15	10.33	3.28	0.34	0.33	5.36	532178.01	1698477.36	N 39 57 22.18 W	80 34 32.15	2.51
	3521.00	0.88	39.60	3520.89	2666.60	-7.76	11.68	4.34	0.33	-0.33	2.74	532180.36	1698478.42	N 39 57 22.19 W	80 34 32.08	2.67
	3616.00	1.10	38.50	3616.87	2761.58	-8.32	12.95	5.37	0.23	0.23	-1.18	532181.63	1698479.45	N 39 57 22.21 W	80 34 32.12	2.68
	3709.00	1.01	48.38	3708.85	2854.57	-8.78	14.20	6.54	0.22	-0.10	10.63	532182.88	1698480.76	N 39 57 22.22 W	80 34 32.12	2.55
	3804.00	0.22	58.20	3803.85	2949.56	-9.93	14.85	7.32	0.84	-0.83	11.38	532183.53	1698481.40	N 39 57 22.23 W	80 34 32.09	2.66
	3899.00	0.40	33.00	3898.85	3044.56	-9.07	15.22	7.68	0.24	0.19	-27.58	532183.80	1698481.74	N 39 57 22.23 W	80 34 32.09	2.67
	3994.00	0.88	29.49	3993.84	3139.55	-9.56	16.13	8.20	0.51	0.51	-1.69	532184.81	1698482.14	N 39 57 22.24 W	80 34 32.08	2.70
	4087.00	1.19	40.30	4086.83	3234.54	-10.24	17.49	9.17	0.39	0.33	11.82	532186.17	1698483.25	N 39 57 22.25 W	80 34 32.07	2.73
	4182.00	0.40	50.10	4181.82	3329.53	-10.60	18.46	10.07	0.84	-0.83	10.32	532187.13	1698484.15	N 39 57 22.26 W	80 34 32.06	2.77
	4277.00	0.79	67.18	4276.81	3424.52	-10.96	18.92	10.93	0.45	0.41	17.99	532187.80	1698485.00	N 39 57 22.27 W	80 34 32.05	2.79
	4371.00	1.41	79.41	4370.80	3519.51	-10.06	19.38	12.66	0.70	0.68	13.00	532188.06	1698486.74	N 39 57 22.27 W	80 34 32.03	2.83
	4466.00	0.68	104.99	4465.78	3614.49	-9.12	19.41	14.51	0.78	-0.56	26.93	532188.09	1698488.58	N 39 57 22.27 W	80 34 32.00	2.87
	4561.00	1.41	105.21	4560.76	3709.47	-7.75	18.92	16.36	0.66	0.56	0.23	532187.59	1698490.42	N 39 57 22.27 W	80 34 31.98	2.90
	4656.00	0.62	109.21	4655.74	3804.45	-6.51	18.44	17.96	0.83	-0.83	4.21	532187.12	1698492.04	N 39 57 22.28 W	80 34 31.96	2.94
	4750.00	0.70	331.79	4749.74	3899.45	-5.61	18.76	18.17	1.31	0.09	-148.19	532187.46	1698492.25	N 39 57 22.27 W	80 34 31.96	2.97
	4844.00	1.32	345.10	4843.72	3989.43	-8.31	20.33	17.62	0.70	0.66	14.16	532188.01	1698491.70	N 39 57 22.28 W	80 34 31.96	3.00
	4939.00	0.48	356.71	4938.71	4084.42	-8.71	21.79	17.31	0.90	-0.88	12.22	532190.46	1698491.39	N 39 57 22.30 W	80 34 31.97	3.03
	5034.00	0.40	37.09	5033.71	4179.42	-10.18	22.45	17.46	0.33	-0.00	42.51	532191.13	1698491.57	N 39 57 22.30 W	80 34 31.96	3.04
	5129.00	0.62	31.42	5128.71	4274.42	-10.54	23.15	17.68	0.23	-5.87	0.23	532191.83	1698492.04	N 39 57 22.31 W	80 34 31.96	3.05
	5223.00	0.79	22.11	5222.70	4368.41	-11.17	24.18	18.47	0.22	0.10	-9.00	532192.86	1698492.55	N 39 57 22.32 W	80 34 31.95	3.07
	5298.00	0.88	18.99	5298.60	4414.40	-11.58	24.81	18.70	0.22	0.20	-6.78	532193.49	1698492.78	N 39 57 22.33 W	80 34 31.95	3.07
	5322.00	1.00	32.25	5321.98	4467.40	-12.05	25.69	18.08	0.47	0.20	25.02	532194.27	1698493.16	N 39 57 22.33 W	80 34 31.94	3.09
	5354.00	0.07	249.37	5353.68	4499.39	-12.18	25.62	19.21	3.30	-2.81	-446.50	532194.50	1698493.29	N 39 57 22.34 W	80 34 31.94	3.11
	5386.00	0.45	208.56	5385.66	4531.39	-12.12	25.70	19.13	1.25	0.19	-127.53	532				

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (RUS)	Easting (RUS)	Latitude (N/S ° ' '')	Longitude (E/W ° ' '')	Directional Difficulty Index
	6522.00	79.08	146.85	6189.27	5334.98	566.60	-622.15	65.62	9.10	8.25	-3.94	531540.56	1698539.69	N 39 57 15.94 W	80 34 31.26	5.08
	6533.00	81.38	144.99	6194.53	5340.24	587.11	-647.45	82.74	9.49	7.42	-6.00	531521.26	1698556.81	N 39 57 15.69 W	80 34 31.02	5.08
	6585.00	83.75	142.88	6198.67	5344.38	626.72	-673.11	101.39	9.68	7.41	-6.28	531495.60	1698575.47	N 39 57 15.44 W	80 34 30.78	5.11
	6627.00	87.90	140.99	6201.73	5347.44	670.29	-706.10	127.18	10.95	9.88	-4.74	531462.81	1698601.26	N 39 57 15.12 W	80 34 30.44	5.15
	6648.00	89.97	141.23	6202.12	5347.83	691.09	-722.44	140.37	9.92	9.86	-1.14	531448.27	1698614.44	N 39 57 14.96 W	80 34 30.27	5.17
	6743.00	89.93	140.07	6202.20	5347.91	785.11	-795.90	200.60	1.22	-0.04	-1.22	531372.81	1698674.07	N 39 57 14.24 W	80 34 29.49	5.22
	6837.00	90.45	143.17	6201.69	5347.60	878.34	-869.58	258.95	3.34	0.55	3.30	531299.14	1698733.02	N 39 57 13.52 W	80 34 28.73	5.28
	6932.00	90.96	142.36	6200.72	5346.43	972.70	-945.21	316.43	1.01	0.54	-0.85	531223.51	1698790.50	N 39 57 12.78 W	80 34 27.98	5.32
	7027.00	89.90	142.87	6200.01	5345.72	1067.21	-1020.69	374.11	1.24	-1.12	0.54	531148.03	1698846.17	N 39 57 12.04 W	80 34 27.23	5.36
	7121.00	89.59	143.62	6200.43	5346.14	1190.77	-1096.10	430.23	1.06	-0.33	1.01	531072.63	1698904.29	N 39 57 11.30 W	80 34 26.49	5.40
	7216.00	88.73	140.85	6201.92	5347.53	1265.13	-1171.29	486.26	3.25	-0.91	-3.13	530997.45	1698962.32	N 39 57 10.56 W	80 34 25.74	5.45
	7310.00	88.24	141.29	6203.48	5349.19	1348.24	-1244.40	547.32	0.72	0.47	0.47	530924.34	1699021.38	N 39 57 9.85 W	80 34 24.97	5.48
	7405.00	89.31	143.71	6204.69	5350.40	1442.63	-1319.75	605.14	2.55	0.07	2.55	530848.08	1699079.20	N 39 57 9.11 W	80 34 24.21	5.52
	7500.00	86.70	145.65	6206.34	5352.05	1537.35	-1397.25	660.06	2.14	-0.64	2.04	530771.49	1699134.11	N 39 57 8.35 W	80 34 23.50	5.60
	7594.00	86.73	146.67	6208.44	5354.15	1631.22	-1475.31	712.39	1.09	0.03	1.09	530693.44	1699186.44	N 39 57 7.58 W	80 34 22.81	5.69
	7689.00	86.73	140.86	6209.72	5355.43	1725.70	-1551.69	768.51	6.21	1.05	-6.12	530616.86	1699242.56	N 39 57 6.83 W	80 34 22.08	5.78
	7784.00	90.48	138.41	6209.55	5355.26	1819.54	-1624.27	830.04	2.70	0.79	-2.68	530544.48	1699304.06	N 39 57 6.13 W	80 34 21.28	5.86
	7878.00	90.03	143.32	6209.13	5354.84	1912.59	-1697.16	889.34	5.25	-0.48	5.22	530471.60	1699363.39	N 39 57 5.41 W	80 34 20.51	5.70
	7973.00	90.34	142.07	6208.82	5354.53	2007.03	-1772.72	949.92	1.36	0.33	-1.32	530396.04	1699420.96	N 39 57 4.67 W	80 34 19.76	5.73
	8068.00	86.73	140.86	6208.76	5354.47	2101.23	-1847.03	1006.10	1.43	-0.64	-1.27	530321.73	1699480.14	N 39 57 3.95 W	80 34 18.96	5.75
	8163.00	90.52	142.19	6208.56	5354.27	2195.45	-1921.40	1065.21	1.63	0.83	1.40	530247.96	1699539.24	N 39 57 3.22 W	80 34 18.21	5.78
	8257.00	90.21	143.21	6207.86	5353.67	2288.88	-1996.18	1122.17	1.13	-0.33	1.09	530172.59	1699596.20	N 39 57 2.48 W	80 34 17.47	5.80
	8352.00	89.86	144.59	6207.60	5353.61	2383.53	-2072.93	1178.14	1.50	-0.37	1.45	530095.84	1699652.17	N 39 57 1.73 W	80 34 16.74	5.83
	8447.00	86.42	147.00	6208.50	5354.21	2478.38	-2151.49	1231.54	2.58	-0.46	2.54	530017.28	1699705.99	N 39 57 0.96 W	80 34 16.04	5.85
	8542.00	89.73	148.98	6209.20	5354.91	2573.36	-2232.04	1281.69	2.11	0.33	2.08	529936.74	1699755.91	N 39 57 0.17 W	80 34 15.36	5.66
	8637.00	89.35	145.88	6209.96	5355.67	2668.32	-2312.09	1333.02	3.29	-0.40	-3.26	529856.69	1699807.05	N 39 56 59.39 W	80 34 14.72	5.80
	8731.00	86.97	146.06	6210.52	5356.23	2762.19	-2389.99	1385.63	0.69	0.66	0.19	529776.80	1699856.65	N 39 56 58.62 W	80 34 14.03	5.92
	8826.00	90.34	141.39	6210.27	5355.98	2856.76	-2468.54	1441.84	4.98	0.39	-4.95	529702.25	1699915.88	N 39 56 57.87 W	80 34 13.29	5.95
	8921.00	89.04	139.65	6210.78	5356.49	2950.75	-2539.85	1502.26	2.26	-1.37	-1.80	529628.95	1699976.27	N 39 56 57.16 W	80 34 12.51	5.97
	9016.00	89.14	141.20	6212.29	5358.00	3044.70	-2613.06	1562.77	1.63	0.11	1.63	529555.74	1700036.78	N 39 56 56.44 W	80 34 11.72	6.00
	9066.00	88.49	144.29	6213.32	5359.03	3094.39	-2652.84	1593.03	6.31	-1.30	6.18	529515.95	1700097.04	N 39 56 56.05 W	80 34 11.33	6.01
	9111.00	88.49	144.29	6214.51	5360.22	3139.23	-2699.37	1619.29	0.00	0.00	0.00	529479.43	1700093.29	N 39 56 55.69 W	80 34 10.98	6.02

Survey Type: Def Survey

Survey Error Model: ISCSWA Rev 0 *** 3-D 85.000% Confidence 2.765 sigma

Survey Program:

Description	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
	0.000	23.270		Act Stns	30.000	SLB_NSG+MSHOT-Depth Only	Original Borehole / Noble Energy SHL-6D-HS Gyro+MWD 0' to 9111' MD 30Jul12
	23.270	2671.000		Act Stns	30.000	SLB_NSG+MSHOT	Original Borehole / Noble Energy SHL-6D-HS Gyro+MWD 0' to 9111' MD 30Jul12
	2671.000	9066.000		Act Stns	30.000	SLB_MWD-STD	Original Borehole / Noble Energy SHL-6D-HS Gyro+MWD 0' to 9111' MD 30Jul12
	9066.000	9111.000		Act Stns	30.000	SLB_BLIND+TREND	Original Borehole / Noble Energy SHL-6D-HS Gyro+MWD 0' to 9111' MD 30Jul12

