

51-01642



Noble Energy SHL13FHS Gyro+MWD 0ft to 14408ft MD Survey Report



(Def Survey)

Report Date: December 06, 2013 - 11:16 AM
Client: Noble Energy
Field: WV Marshall County (NAD 27)
Structure / Slot: Noble Energy SHL13 Pad/SHL13FHS
Well: SHL13FHS
Borehole: Original Borehole
UWI / API#: Unknown / Unknown
Survey Name: Noble Energy SHL13FHS Gyro+MWD 0ft to 14408ft MD
November 10, 2013
Tort / AHD / DDI / ERD Ratio: 306.667' / 842.057' R / 6.740' / 1.243
Coordinate Reference System: NAD27 West Virginia State Plane Northern Zone, US Feet
Location Lat / Long: N 40° 0' 14.4105" W 80° 32' 8.91345"
Location Grid N.E. Yrk: N 549481 890 N.J.S. E 1709831 287 N.J.S
CRS Grid Convergence Angle: -0.6606 °
Grid Scale Factor: 0.99996247
Varian / Patch: 2.7.998.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 315.888 ° (Grid North)
Vertical Section Origin: 0 000 ft, 0 000 ft
TVD Reference Datum: KB
TVD Reference Elevation: 1300.420 ft above MSL
Sealed / Ground Elevation: 1281.910 ft above MSL
Magnetic Declination: -8.432 °
Total Gravity Field Strength: 989.340mgm (0.80665 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 53109.080 nT
Magnetic Dip Angle: 67.577 °
Declination Date: November 10, 2013
Magnetic Declination Model: HDGM 2013
North Reference: Grid North
Grid Convergence Used: -0.6606 °
Total Corr Mag North-Grid North: -7.7712 °
Local Coord Referenced To: Well Head

Table with columns: 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 (ft), Easting (ft), Latitude (N/S ° ' ''), Longitude (E/W ° ' ''), Directional Difficulty Index. The table contains multiple rows of survey data points.

10/31/2014

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Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVD88 (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
	6938.00	62.64	249.43	6507.98	6307.84	-49.20	-705.51	-562.82	7.53	1.49	8.38	548775.41	1709248.69	N 40° 07' 45" W	80 32 18.29	5.09
	6971.00	63.60	252.23	6528.34	6272.92	-51.02	-718.68	-620.52	8.87	1.79	8.22	548781.25	1709250.80	N 40° 07' 32" W	80 32 18.78	5.11
	7017.00	63.82	258.84	6548.78	6248.34	-30.02	-726.87	-660.23	9.01	1.00	10.02	548782.55	1709171.06	N 40° 07' 21" W	80 32 17.29	5.15
	7050.00	64.06	261.24	6567.85	6267.23	-7.78	-737.01	-698.15	9.21	0.80	10.23	548744.91	1709133.17	N 40° 07' 13" W	80 32 17.77	5.18
	7107.00	64.78	264.43	6588.32	6287.90	18.75	-742.27	-740.02	9.53	-0.68	9.79	548739.65	1709091.29	N 40° 07' 07" W	80 32 18.31	5.21
	7160.00	64.69	267.73	6607.02	6306.60	44.76	-744.92	-778.65	7.24	2.18	7.67	548737.00	1709052.67	N 40° 07' 04" W	80 32 18.81	5.23
	7187.00	65.30	271.10	6626.52	6326.10	75.27	-745.34	-821.40	7.37	3.43	7.17	548736.58	1709009.82	N 40° 07' 03" W	80 32 19.38	5.26
	7239.00	68.11	274.27	6642.79	6342.37	104.40	-743.52	-860.07	8.18	4.31	7.55	548738.40	1708971.25	N 40° 07' 05" W	80 32 19.85	5.29
	7288.00	69.70	278.15	6659.29	6359.29	139.10	-738.77	-893.65	8.41	3.38	8.26	548743.15	1708927.67	N 40° 07' 00" W	80 32 20.41	5.32
	7329.00	71.05	282.08	6674.10	6373.74	172.78	-731.66	-943.51	9.18	2.14	9.14	548763.24	1708887.81	N 40° 07' 15" W	80 32 20.93	5.34
	7378.00	72.14	286.25	6688.01	6388.59	211.48	-720.74	-988.74	6.73	3.32	8.87	548781.18	1708844.59	N 40° 07' 20" W	80 32 21.49	5.37
	7424.00	73.39	290.87	6703.23	6402.61	252.91	-708.15	-1030.18	9.55	2.60	9.63	548775.77	1708801.15	N 40° 07' 40" W	80 32 22.05	5.40
	7465.00	74.47	294.48	6714.59	6414.17	289.83	-690.97	-1080.53	8.82	2.63	8.76	548790.05	1708764.80	N 40° 07' 54" W	80 32 22.51	5.42
	7508.00	75.53	297.99	6725.72	6425.30	329.20	-672.61	-1103.78	8.30	2.47	8.21	548809.30	1708727.55	N 40° 07' 72" W	80 32 23.00	5.45
	7555.00	77.86	301.94	6736.54	6436.12	373.56	-649.77	-1143.39	9.58	4.86	8.40	548832.15	1708687.94	N 40° 07' 04" W	80 32 23.51	5.47
	7598.00	81.69	305.21	6744.21	6443.79	415.20	-626.37	-1178.63	11.45	8.87	7.90	548855.54	1708652.71	N 40° 07' 10" W	80 32 23.98	5.50
	7644.00	84.29	308.19	6749.86	6449.44	460.48	-599.09	-1215.22	8.71	5.87	6.48	548882.82	1708616.12	N 40° 08' 43" W	80 32 24.44	5.52
	7687.00	89.94	311.04	6753.15	6452.73	503.23	-571.76	-1248.24	9.04	6.16	6.83	548910.66	1708583.10	N 40° 08' 47" W	80 32 24.87	5.54
	7733.00	63.97	315.45	6764.79	6454.37	549.18	-540.27	-1281.70	10.55	4.41	9.50	548941.64	1708549.82	N 40° 09' 01" W	80 32 25.30	5.57
	7777.00	68.28	319.25	6765.85	6455.43	593.08	-507.92	-1311.51	8.78	-1.57	8.64	548973.99	1708519.83	N 40° 09' 32" W	80 32 25.69	5.59
	7823.00	87.63	321.65	6767.49	6457.07	638.75	-472.48	-1340.78	5.40	-1.41	5.22	549006.43	1708486.59	N 40° 09' 67" W	80 32 26.07	5.61
	7866.00	88.07	325.92	6768.11	6458.69	681.09	-437.90	-1369.27	9.12	1.02	9.07	549044.01	1708465.07	N 40° 09' 10" W	80 32 26.40	5.63
	7913.00	91.61	329.34	6768.24	6459.82	727.05	-398.97	-1392.59	7.72	7.53	1.68	549082.94	1708436.75	N 40° 09' 10" W	80 32 26.75	5.65
	7956.00	91.89	329.42	6767.92	6457.50	769.01	-363.18	-1416.39	0.68	0.65	0.19	549119.73	1708414.96	N 40° 09' 17" W	80 32 27.06	5.67
	8003.00	90.62	326.06	6758.80	6455.38	803.74	-282.56	-1470.28	1.30	-1.31	-0.37	549169.35	1708381.07	N 40° 09' 10.54" W	80 32 27.70	5.70
	8142.00	89.70	324.29	6755.50	6456.06	951.02	-209.50	-1521.10	2.21	-0.97	-1.99	549272.40	1708310.25	N 40° 09' 12.25" W	80 32 28.43	5.72
	8212.00	90.17	326.68	6755.56	6456.14	1039.17	-152.98	-1572.10	2.87	0.43	2.83	549346.39	1708259.24	N 40° 09' 12.97" W	80 32 29.09	5.75
	8321.00	90.38	329.62	6753.13	6454.71	1125.86	-40.98	-1620.98	0.25	0.24	0.07	549420.81	1708210.37	N 40° 09' 13.70" W	80 32 29.73	5.77
	8411.00	90.17	325.67	6754.70	6454.28	1213.89	13.80	-1671.05	1.19	-0.23	-1.17	549495.69	1708160.30	N 40° 09' 14.44" W	80 32 30.39	5.80
	8500.00	90.31	325.18	6754.33	6453.91	1301.09	87.06	-1721.56	0.07	0.16	-0.55	549568.87	1708109.90	N 40° 09' 15.15" W	80 32 31.05	5.82
	8594.00	90.24	324.69	6753.20	6453.42	1389.42	169.75	-1773.26	0.51	-0.08	-0.24	549642.53	1708058.29	N 40° 09' 15.68" W	80 32 31.72	5.84
	8680.00	90.24	324.31	6753.52	6453.10	1477.88	234.02	-1825.53	0.42	0.00	-0.42	549715.90	1708005.82	N 40° 09' 16.59" W	80 32 32.40	5.86
	8769.00	90.31	324.55	6753.09	6452.67	1565.30	306.41	-1877.30	0.28	0.08	0.27	549788.29	1707954.07	N 40° 09' 17.30" W	80 32 33.08	5.88
	8859.00	90.31	324.34	6752.60	6452.16	1653.85	379.63	-1929.63	0.23	0.00	-0.23	549861.50	1707901.74	N 40° 09' 18.02" W	80 32 33.70	5.90
	8948.00	90.21	324.73	6752.20	6451.72	1743.32	452.12	-1981.27	0.45	-0.11	-0.45	549935.28	1707849.12	N 40° 09' 18.73" W	80 32 34.44	5.92
	9038.00	90.24	324.29	6751.85	6451.43	1829.78	525.29	-2033.52	0.49	0.03	-0.49	550007.26	1707797.65	N 40° 09' 19.45" W	80 32 35.12	5.93
	9127.00	90.21	324.80	6751.50	6451.08	1917.22	597.95	-2085.06	0.72	-0.03	0.72	550079.82	1707746.31	N 40° 09' 20.16" W	80 32 35.79	5.95
	9217.00	90.17	325.13	6751.20	6450.78	2005.53	671.70	-2136.64	0.23	-0.04	0.22	550153.50	1707694.73	N 40° 09' 20.88" W	80 32 36.47	5.97
	9307.00	90.38	324.16	6750.77	6450.35	2093.94	745.10	-2188.72	1.10	0.23	-1.08	550226.86	1707642.86	N 40° 09' 21.60" W	80 32 37.15	5.99
	9398.00	90.21	324.57	6750.31	6449.89	2181.48	817.43	-2240.57	0.50	-0.19	0.40	550299.29	1707590.91	N 40° 09' 22.31" W	80 32 37.82	6.00
	9488.00	90.21	324.99	6749.98	6449.56	2269.84	890.96	-2292.47	0.47	0.00	0.47	550372.81	1707538.90	N 40° 09' 23.03" W	80 32 38.50	6.02
	9575.00	90.07	324.26	6749.70	6449.34	2357.28	963.33	-2344.00	0.64	-0.16	-0.82	550445.38	1707487.38	N 40° 09' 23.74" W	80 32 39.18	6.04
	9664.00	90.24	323.32	6749.52	6449.10	2444.95	1035.34	-2395.57	1.07	0.19	-1.08	550517.18	1707434.81	N 40° 09' 24.45" W	80 32 39.86	6.05
	9754.00	90.82	324.01	6748.85	6448.43	2533.84	1107.83	-2449.90	0.88	0.42	0.77	550589.88	1707381.49	N 40° 09' 25.16" W	80 32 40.56	6.07
	9843.00	90.89	325.20	6747.67	6447.25	2621.08	1180.38	-2501.44	1.37	0.30	1.34	550662.22	1707329.94	N 40° 09' 25.87" W	80 32 41.23	6.09
	9933.00	90.69	324.94	6746.43	6446.01	2709.36	1254.16	-2552.97	0.36	-0.22	-0.29	550736.00	1707278.42	N 40° 09' 26.59" W	80 32 41.90	6.10
	10023.00	90.79	325.26	6745.27	6444.85	2797.83	1327.96	-2604.46	0.37	0.11	0.38	550809.80	1707226.93	N 40° 09' 27.32" W	80 32 42.58	6.12
	10112.00	89.90	321.92	6744.73	6444.31	2885.35	1399.58	-2657.28	0.86	-1.00	-3.75	550881.41	1707174.12	N 40° 09' 28.02" W	80 32 43.27	6.14
	10202.00	90.31	322.43	6744.57	6444.15	2974.41	1470.67	-2712.47	0.73	0.48	0.57	550952.50	1707118.93	N 40° 09' 28.71" W	80 32 43.99	6.15
	10291.00	90.85	322.03	6743.82	6443.40	3062.46	1541.02	-2768.98	0.59	0.36	-0.45	551022.85	1707064.42	N 40° 09' 29.40" W	80 32 44.70	6.16
	10381.00	90.17	324.32	6743.18	6442.76	3151.27	1613.05	-2820.92	2.67	-0.53	2.54	551094.88	1707010.48	N 40° 09' 30.11" W	80 32 45.40	6.18
	10470.00	90.14	323.78	6742.94	6442.52	3238.27	1686.86	-2873.62	3.80	-0.03	3.87	551166.88	1706959.78	N 40° 09' 30.83" W	80 32 46.05	6.20
	10560.00	90.38	326.01	6742.53	6442.11	3325.96	1762.24	-2919.79	1.98	0.27	-1.94	551244.06	1706911.81	N 40° 09' 31.57" W	80 32 46.80	6.22
	10649.00	89.83	327.40	6742.29	6441.87	3412.74	1838.63	-2968.65	1.64	-0.51	1.56	551316.44	1706862.76	N 40° 09' 32.30" W	80 32 47.33	6.23
	10738.00	90.58	329.47	6741.80	6441.47	3499.84	1913.31	-3018.75	2.41	0.72	2.30	551391.12	1706815.65	N 40° 09' 33.05" W	80 32 47.95	6.25
	10829.00	90.28	327.07	6741.21	6440.79	3587.01	1989.85	-3069.66	2.69	-0.33	-0.87	551471.88	1706768.33	N 40° 09' 33.80" W	80 32 48.57	6.26
	10918.00	90.78	324.51	6741.18	6440.78	3674.09	2063.44	-3113.12	2.94	-0.28	-0.69	551548.25	1706718.29	N 40° 09' 34.52" W	80 32 49.22	6.28
	11008.00	90.21	326.00	6741.21	6440.79	3762.33	2137.39	-3164.41	1.73	0.50	1.60	551619.20	1706667.00	N 40° 09' 35.25" W	80 32 49.89	6.29
	11098.00	90.68	327.88	6740.58	6440.16	3849.98	2212.85	-3213.44	2.24	0.41	2.20	551694.86	1706617.98	N 40° 09' 35.99" W	80 32 50.53	6.31
	11187.00	89.78	326.40	6740.32	6439.90	3936.22	2288.49	-3260.25	1.54	-0.92	0.47	551770.29	1706571.07	N 40° 09' 36.73" W	80 32 51.15	6.32
	11277.00															

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Noble Energy



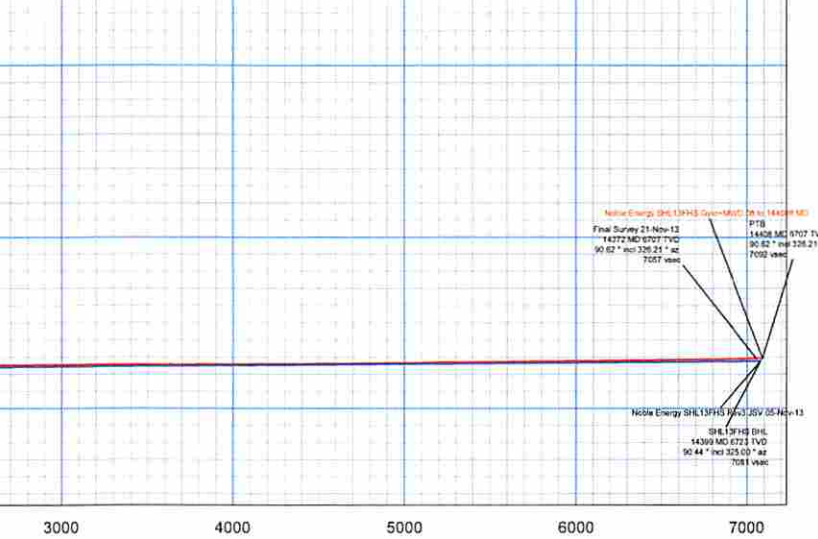
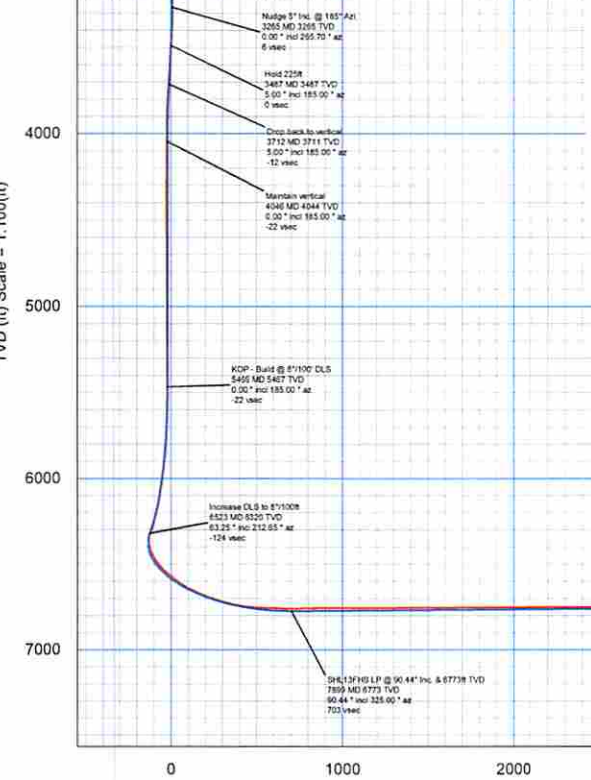
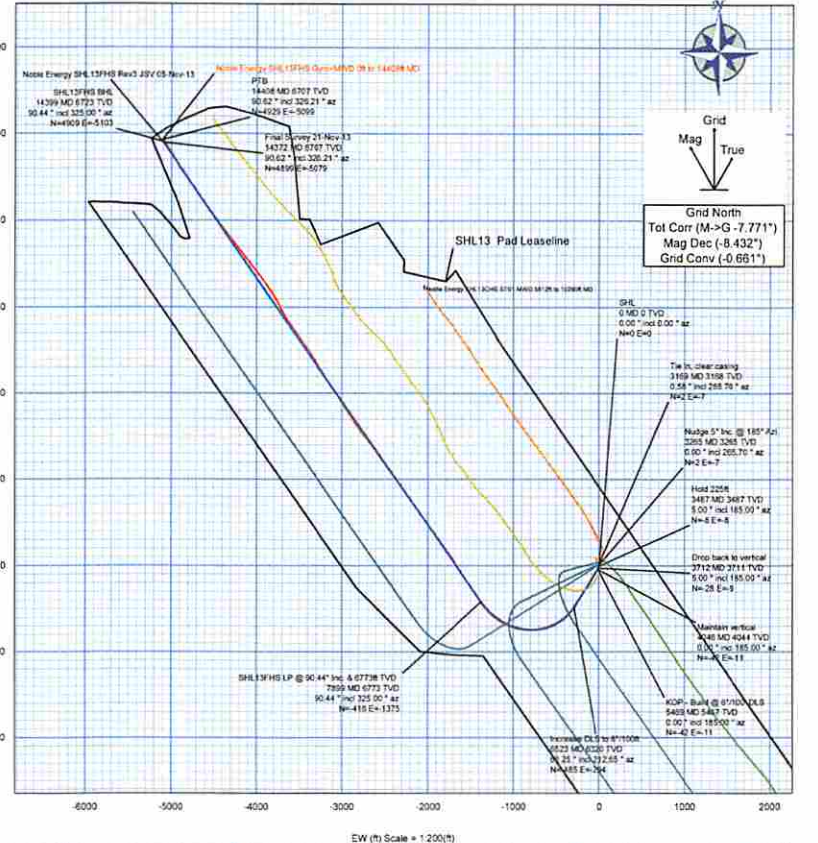
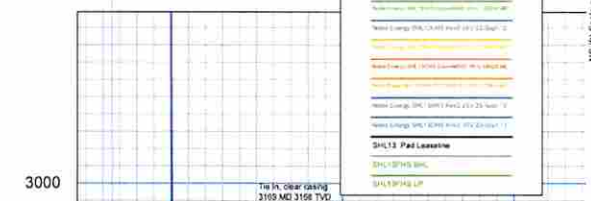
Borehole: Original Borehole	Well: SHL13FHS	Field: WV Marshall County (NAD 27)	Structure: Precision 543
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Gravity & Magnetic Parameters	Surface Location	Miscellaneous
Model: HDGM 2013 MagDec: -8.432°	Dip: 67.577° Date: 11/10/2013 999.35mg (9.80645 Based)	NAD27 West Virginia State Plane, Northern Zone, US Feet Lat: N 43 0 14.43 Lon: W 82 32 8.91 Northing: 549481.897HUS Easting: 1799831.287HUS Scale Fact: 1
		Miscellaneous Slot: SHL13FHS TVD Ref: KB(1300.42ft above MSL) Plan: Noble Energy SHL13FHS Gyro-MWD Off to 14408ft MD

Northings	Eastings	Surface Location	Well	Depth	MD	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB
549481.897	1799831.287	N 43 0 14.43 W 82 32 8.91	SHL13FHS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Well	Surf	Survey Tool	Frequency	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB
1	SHL13FHS	Surf	30	30	8	18.91	Act	Stk	1.25	1.25										
2	SHL13FHS	Surf	30	30	18.91	2168.9	Act	Stk	4.22	3.16										
3	SHL13FHS	Surf	30	30	2168.9	14273	Act	Stk	198.1	13.1										
4	SHL13FHS	Surf	30	30	14273	14028	Act	Stk	202.41	13.62										

Well	Surf	Survey Tool	Frequency	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB	WOB
SHL13FHS	Surf	Surf	30	30	8	18.91	Act	Stk	1.25	1.25										



Vertical Section (ft) Azim = 313.888° Scale = 1:100(ft) Origin = 0N/-S, 0E/-W