

51-01609



Noble Energy SHL17JHS Gyro+MWD 0ft to 17610ft MD Survey Report

(Def Survey)

Report Date: September 04, 2013 - 10:18 AM
Client: Noble Energy
Field: WV Marshall County (H&A) 277
Structure / Slot: Noble Energy SHL17 Pad / SHL17JHS
Well: SHL17JHS
Borehole: Original Borehole
UWI / ANF: Unknown / Unknown
Survey Name: Noble Energy SHL17JHS Gyro+MWD 0ft to 17610ft MD
Survey Date: August 23, 2013
Tort / AHD / DDI / ERD Ratio: 231.788 * / 12282.224 ft / 6.838 / 1.842
Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet
Location Lat / Long: N 39° 58' 38.9085", W 80° 31' 46.09250"
Location Grid N/E W/E: N 530702.222 N/E, E 1711408.218 W/E
CRS Grid Convergence Angle: -0.8595 *
Grid Scale Factor: 0.99999501

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 314.614 * (Grid North)
Vertical Section Origin: 0.000 0.000 0
TVD Reference Datum: KB
TVD Reference Elevation: 1250.500 ft above MSL
Sunset / Ground Elevation: 1272.500 ft above MSL
Magnetic Declination: -8.472 *
Total Gravity Field Strength: 939.30600m (9.82655 Gauss)
Total Magnetic Field Strength: 51179.300 nT
Magnetic Dip Angle: 67.535 *
Declination Date: August 23, 2013
Magnetic Declination Model: IGM13 2013
Magnetic Reference: Grid North
Grid Convergence Used: -0.8595 *
Total Corr Mag North+Grid North: -7.6153 *
Local Coord Referenced To: Well Head

Table with columns: Comments, MD (ft), Incl (°), Azim Grid (°), TVD (ft), TVD88 (ft), VSECC (ft), NS (ft), EW (ft), DLS (ft/100ft), DR (ft/100ft), TR (ft/100ft), Heading (RUS), Easting (RUS), Latitude (N/S * °), Longitude (E/W * °), Directional Difficulty Index. The table contains multiple rows of survey data points.

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Table with columns: Comments, MD (ft), Incl (°), Azim Grid (°), TYD (ft), TVDBS (ft), VBE (ft), NB (ft), EW (ft), DLS (ft), BR (ft), TR (ft), Northing (ft), Easting (ft), Latitude (N), Longitude (E), Directional Difficulty. Contains data for various well paths from MD 42.58 to 1493.00.

Comments	MD (ft)	Incl (°)	Azim Ori (°)	TYD (ft)	TYD\$6 (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLB (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ft)	Easting (ft)	Latitude (N/S)	Longitude (E/W)	Directional Difficulty Index
	15020.00	90.03	325.25	6643.43	6352.08	6270.15	6400.04	-8200.04	0.86	0.11	-0.86	545250.83	1706207.84	N 39 59 32.10 W	80 33 0.53	6.66
	15128.00	90.27	324.03	6643.19	6352.60	6267.70	5553.22	-8232.14	1.40	0.27	-1.37	545323.21	1705240.34	N 39 59 32.87 W	80 33 7.20	6.69
	15218.00	90.21	324.38	6642.82	6352.32	6446.53	5636.21	-8304.80	0.37	-0.07	0.37	545396.19	1705170.80	N 39 59 33.58 W	80 33 7.89	6.69
	15307.00	90.86	324.87	6641.99	6351.40	8534.17	6708.77	-8368.33	0.93	0.73	0.57	546496.76	1705142.16	N 39 59 34.29 W	80 33 8.86	6.70
	15397.00	90.86	324.50	6640.04	6350.14	8622.77	6782.22	-8408.31	0.34	0.00	-0.34	546542.20	1705050.18	N 39 59 35.01 W	80 33 9.24	6.71
	15486.00	90.93	324.71	6639.24	6348.74	8710.40	6854.70	-8469.82	0.18	0.08	0.17	546614.77	1704958.88	N 39 59 35.79 W	80 33 9.91	6.71
	15576.00	90.66	324.17	6638.08	6347.68	8789.08	6928.00	-8512.15	0.73	-0.42	-0.00	545687.87	1704868.34	N 39 59 36.44 W	80 33 10.80	6.72
	15665.00	90.17	324.02	6637.52	6347.02	8868.86	8000.09	-8564.34	0.46	-0.43	-0.17	545790.00	1704834.16	N 39 59 37.15 W	80 33 11.28	6.73
	15756.00	90.38	323.40	6637.00	6346.60	8976.70	6073.48	-8618.15	0.83	0.23	-0.66	545833.44	1704800.35	N 39 59 37.87 W	80 33 11.88	6.74
	15846.00	90.31	323.48	6636.54	6346.08	9065.63	6145.81	-8671.70	0.08	-0.06	-0.01	545903.77	1704732.80	N 39 59 38.58 W	80 33 12.68	6.74
	15935.00	90.38	323.87	6636.01	6345.51	9153.52	6217.40	-8724.45	0.20	0.06	0.36	545977.45	1704774.05	N 39 59 39.29 W	80 33 13.27	6.75
	16025.00	90.10	323.90	6635.83	6345.19	9242.34	6290.20	-8777.49	0.25	-0.31	0.16	546030.18	1704721.02	N 39 59 39.99 W	80 33 14.06	6.76
	16114.00	90.03	323.17	6635.53	6345.03	9330.26	6361.80	-8830.35	0.89	-0.89	0.89	546121.70	1704608.18	N 39 59 40.69 W	80 33 14.76	6.76
	16204.00	90.14	323.75	6635.40	6344.90	9419.10	6434.11	-8883.33	0.86	0.12	0.04	546194.00	1704614.56	N 39 59 41.40 W	80 33 15.45	6.77
	16294.00	90.21	324.57	6635.04	6344.54	9507.94	6507.07	-8936.83	0.83	0.10	0.01	546267.02	1704561.89	N 39 59 42.11 W	80 33 16.14	6.78
	16384.00	90.17	325.55	6634.07	6344.17	9596.85	6580.03	-8989.80	1.11	-0.10	1.10	546339.87	1704510.92	N 39 59 42.83 W	80 33 16.80	6.78
	16474.00	90.21	326.75	6634.20	6343.80	9685.87	6653.94	-9041.17	1.26	0.16	1.26	546413.88	1704461.35	N 39 59 43.55 W	80 33 17.45	6.79
	16564.00	90.17	326.81	6633.02	6343.42	9770.88	6729.14	-9090.61	0.22	-0.16	-0.16	546489.89	1704411.91	N 39 59 44.28 W	80 33 18.10	6.80
	16654.00	90.21	328.00	6633.63	6343.13	9857.89	6803.58	-9135.40	0.33	0.04	0.23	546565.51	1704363.12	N 39 59 45.02 W	80 33 18.74	6.81
	16744.00	90.17	328.80	6633.33	6342.83	9944.65	6878.13	-9184.00	0.04	-0.04	0.00	546638.00	1704314.52	N 39 59 45.73 W	80 33 19.37	6.81
	16834.00	90.24	328.58	6633.01	6342.51	10031.07	6952.85	-9232.81	0.57	0.08	-0.35	546712.48	1704265.71	N 39 59 46.48 W	80 33 20.01	6.82
	16924.00	89.76	329.04	6633.01	6342.51	10119.82	7027.30	-9282.80	0.89	-0.50	-0.71	546787.32	1704215.73	N 39 59 47.22 W	80 33 20.66	6.83
	17014.00	89.80	324.90	6633.52	6343.02	10207.24	7100.67	-9333.31	1.18	-0.10	-1.17	546860.89	1704165.72	N 39 59 47.93 W	80 33 21.32	6.83
	17104.00	90.41	325.48	6633.62	6343.02	10295.71	7174.80	-9384.00	1.12	0.01	0.84	546934.48	1704113.84	N 39 59 48.60 W	80 33 22.00	6.84
	17194.00	90.21	325.17	6633.04	6342.54	10383.16	7247.75	-9433.32	0.41	-0.22	-0.26	547007.67	1704063.21	N 39 59 49.33 W	80 33 22.68	6.85
	17284.00	90.07	324.85	6632.92	6342.32	10471.88	7321.40	-9483.03	0.39	-0.18	-0.35	547081.40	1704011.00	N 39 59 50.10 W	80 33 23.33	6.85
	17374.00	90.10	324.80	6632.88	6342.18	10560.28	7394.28	-9533.14	0.07	0.03	0.06	547154.10	1703960.40	N 39 59 50.81 W	80 33 24.00	6.86
	17464.00	90.10	325.17	6632.53	6342.03	10647.70	7468.01	-9583.75	0.24	0.00	0.24	547227.92	1703908.70	N 39 59 51.54 W	80 33 24.67	6.87
	17554.00	90.21	324.08	6632.20	6341.70	10735.35	7540.83	-9634.02	0.51	0.12	-0.48	547300.73	1703857.02	N 39 59 52.29 W	80 33 25.34	6.87
Final Survey 00-Base-13	17644.00	90.28	323.07	6632.17	6341.57	10823.90	7613.73	-9684.03	1.42	0.29	1.28	547373.63	1703804.51	N 39 59 53.07 W	80 33 26.01	6.87
Provision to Bit	17734.00	90.28	325.07	6631.90	6341.40	10912.29	7686.06	-9734.22	0.00	0.00	0.00	547446.06	1703752.00	N 39 59 53.82 W	80 33 26.68	6.88

Survey Type: Def Survey

Survey Error Model: IBCWSA Rev 0 *** 3-D 06.000% Confidence 2.7055 sigma

Survey Program:

Description	MD From (ft)	MD To (ft)	EDU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
	0.000	18.500		30.000	30.000	SLB_NSG+MSHOT-Daphn Only	Original Borehole / Noble Energy SHL 17JHS Gyro+MWD Off to 176100 MD
	18.500	3086.500		30.000	30.000	SLB_NSG+MSHOT	Original Borehole / Noble Energy SHL 17JHS Gyro+MWD Off to
	3086.500	17670.000		30.000	30.000	SLB_MWD-BTD	Original Borehole / Noble Energy SHL 17JHS Gyro+MWD Off to
	17670.000	17910.000		30.000	30.000	SLB_BLWD+TREN	Original Borehole / Noble Energy SHL 17JHS Gyro+MWD Off to

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Formations	Top TVD	Base TVD	Top MD	Base MD	Fluid
Shale	0	472	0	472	
Pittsburgh Coal	472	533	472	533	
Shale and Sandstone	533	656	533	656	
Gas Sand	656	723	656	723	
Shale	723	769	723	769	
1st Salt Sand	769	788	769	788	
Shale	788	906	788	906	
2nd Salt Sand	906	955	906	955	
Shale	955	989	955	989	
Big Lime	989	1105	989	1105	
Big Injun	1105	1150	1105	1150	
Price	1150	1270	1150	1270	
Murrysville	1270	1305	1270	1305	
Shale	1305	1463	1305	1150	
50' Sand	1150	1270	1150	1270	
Shale	1270	1305	1270	1305	
Gordon	1305	1463	1305	1463	
Shale	1463	1720	1463	1720	
Fifth Sand	1720	1910	1720	1910	
Shale	1910	1962	1910	1962	
Speechley Sand	1962	3197	1962	3197	
Shale	3197	4346	3197	4351	
Warren Sand	4346	4366	4351	4665	
Shale	4632	4703	4665	4748	
Java Shale	4703	4797	4748	4997	
Pipe Creek Shale	4899	5496	4997	5805	
Angola Shale	5496	5528	5805	5848	
Rhinestreet	5528	5762	5848	6154	
Cashaqua	5762	5804	6154	6209	
Middlesex	5804	5869	6209	6295	
West River	5869	5895	6295	6330	
Burkett	5895	5897	6330	6333	
Tully Limestone	5897	5899	6333	6336	
Hamilton	5899	5947	6336	6401	
Marcellus	5947	5952	6401	not encountered	Gas
Onondaga	5952	not encount	not encountered	not encountered	

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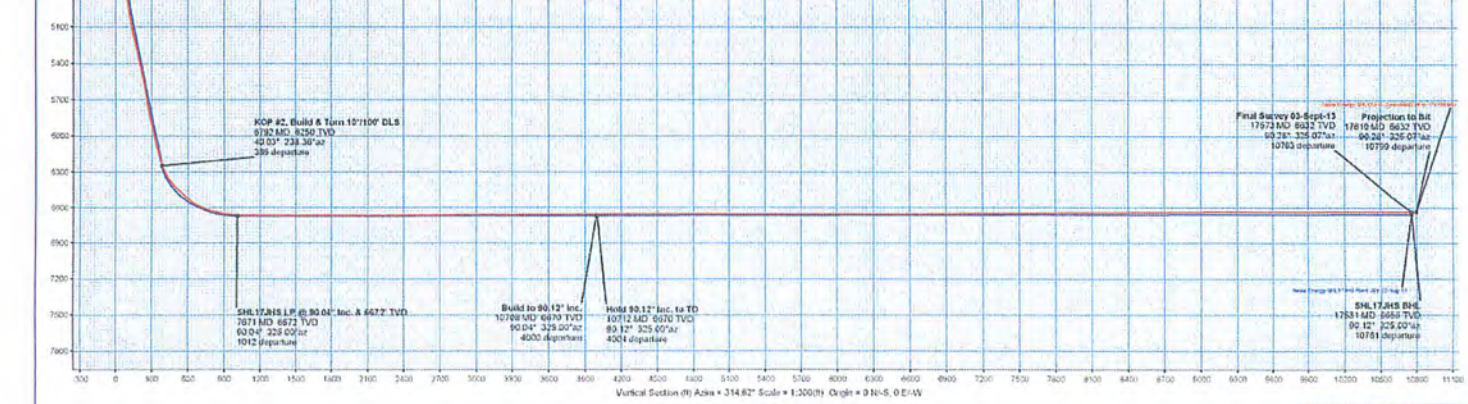
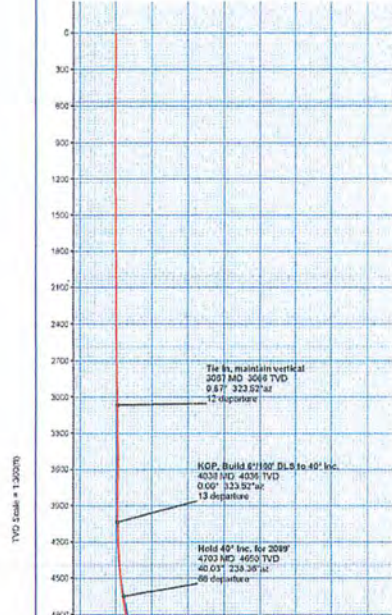
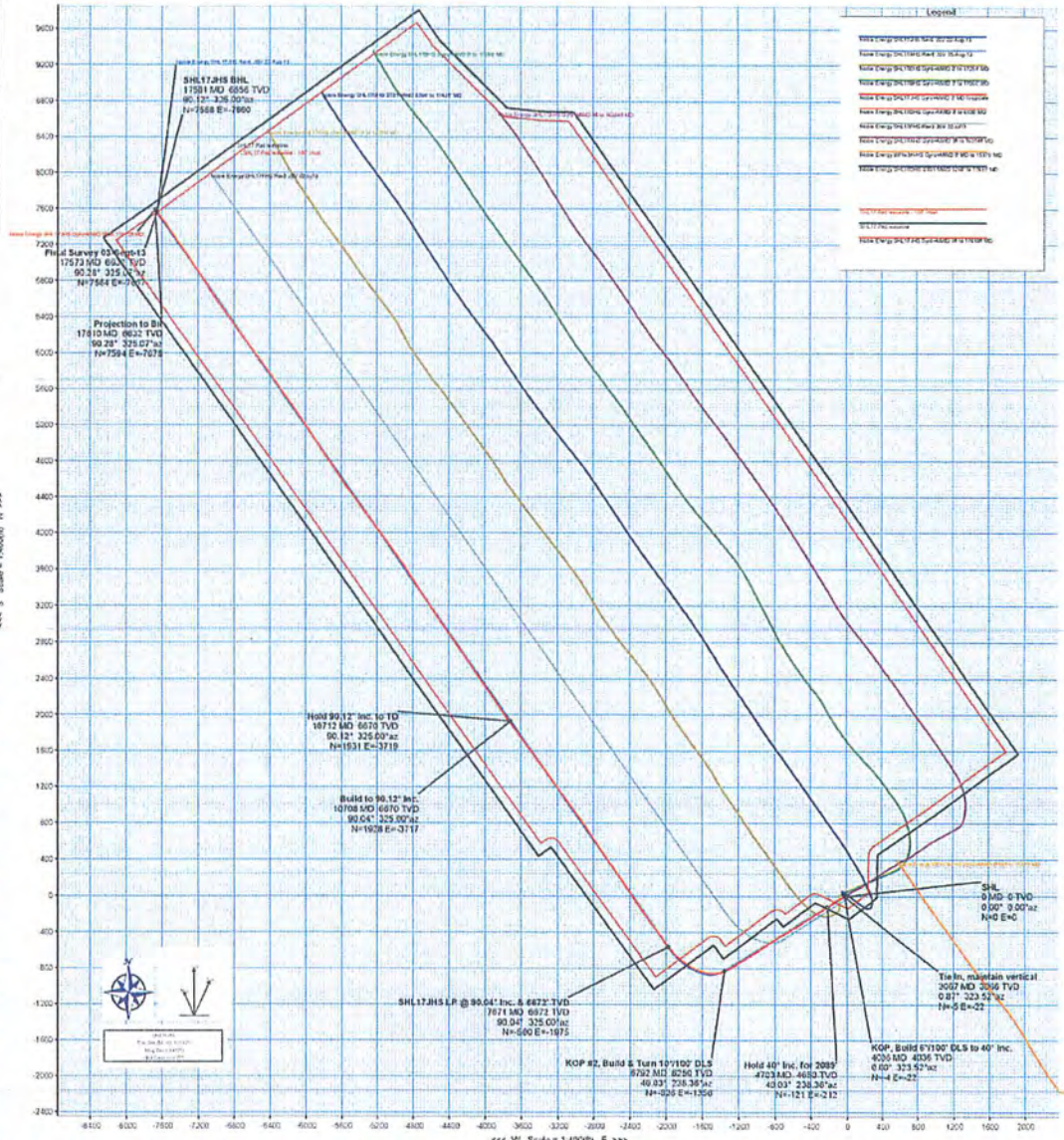


WELL	SHL17JHS	FIELD	WV Marshall County (NAD 27)	STANDARD	Precision 543
Maple Pattern	None	Maple	None	None	None
Mod.	None	None	None	None	None

Well Name	Well ID	Well Type	Well Status	Well Depth	Well Diameter	Well Completion
SHL17JHS BHL	17581 MD 6556 TVD	Oil	Active	6556'	4 1/2"	None
SHL17JHS L.P.	17581 MD 6672 TVD	Oil	Active	6672'	4 1/2"	None

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SHL17JHS BHL	17581 MD 6556 TVD	Oil	Active	6556'	4 1/2"	None
SHL17JHS L.P.	17581 MD 6672 TVD	Oil	Active	6672'	4 1/2"	None

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SHL17JHS BHL	17581 MD 6556 TVD	Oil	Active	6556'	4 1/2"	None
SHL17JHS L.P.	17581 MD 6672 TVD	Oil	Active	6672'	4 1/2"	None



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