PATHFINDER

noble energy

Noble Energy SHL-26B-HS Gyro+MWD 0ft to 14627ft MD Survey Report

(Def Survey)

Report Date:	February 10, 2014 - 09:17 AM	Survey / DLS Computation:	Minimum Curvature / Lubinski
Client:	Noble Energy	Vertical Section Azimuth:	331.229 ° (Grid North)
Field:	WV Marshall County (NAD 27)	Vertical Section Origin:	0.000 ft, 0.000 ft
Structure / Slot:	Noble Energy SHL-26 Pad / SHL-26B-HS	TVD Reference Datum:	KB
Well:	SHL-26B-HS	TVD Reference Elevation:	1332.180 ft above MSL
Borehole:	Original Borehole	Seabed / Ground Elevation:	1302.180 ft above MSL
UWI / API#:	Unknown / Unknown	Magnetic Declination:	-8.418 °
Survey Name:	Noble Energy SHL-26B-HS Gyro+MWD 0ft to 14627ft MD	Total Gravity Field Strength:	999.3453mgn (9.80665 Based)
Survey Date:	January 22, 2014	Gravity Model:	GARM
Tort / AHD / DDI / ERD Ratio:	220.442 ° / 8574.489 ft / 6.018 / 1.262	Total Magnetic Field Strength:	53112.508 nT
Coordinate Reference System:	NAD27 West Virginia State Plane, Northern Zone, US Feet	Magnetic Dip Angle:	67.500 °
Location Lat / Long:	N 39° 58' 23.31726", W 80° 32' 54.23833"	Declination Date:	January 22, 2014
Location Grid N/E Y/X:	N 538274.492 ftUS, E 1706173.176 ftUS	Magnetic Declination Model:	HDGM 2013
CRS Grid Convergence Angle:	-0.6686 °	North Reference:	Grid North
Grid Scale Factor:	0.99995999	Grid Convergence Used:	-0.6686 °
Version / Patch:	2.7.1043.0	Total Corr Mag North->Grid North:	-7.7489 °
		Local Coord Referenced To:	Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Directional Difficulty Index
SHL	0.00	0.00	0.00	0.00	-1332.18	0.00	0.00	0.00	N/A	N/A	N/A	538274.49	1706173.18	N 39 58 23.32	W 80 32 54.24	0.00
	123.00	0.13	288.51	123.00	-1209.18	0.10	0.04	-0.13	0.11	0.11	0.00	538274.54	1706173.04	N 39 58 23.32	W 80 32 54.24	0.00
	223.00	0.08	304.42	223.00	-1109.18	0.25	0.12	-0.30	0.06	-0.05	15.91	538274.61	1706172.88	N 39 58 23.32	W 80 32 54.24	0.00
	323.00	0.06	247.40	323.00	-1009.18	0.32	0.14	-0.40	0.07	-0.02	-57.02	538274.63	1706172.77	N 39 58 23.32	W 80 32 54.24	0.00
	423.00	0.15	203.72	423.00	-909.18	0.24	0.00	-0.50	0.11	0.09	-43.68	538274.49	1706172.67	N 39 58 23.32	W 80 32 54.24	0.00
	523.00	0.24	224.29	523.00	-809.18	0.10	-0.27	-0.70	0.11	0.09	20.57	538274.22	1706172.47	N 39 58 23.31	W 80 32 54.25	0.00
	623.00	0.17	213.73	623.00	-709.18	-0.03	-0.54	-0.93	0.08	-0.07	-10.56	538273.95	1706172.24	N 39 58 23.31	W 80 32 54.25	0.00
	723.00	0.24	205.58	723.00	-609.18	-0.22	-0.86	-1.10	0.08	0.07	-8.15	538273.64	1706172.07	N 39 58 23.31	W 80 32 54.25	0.03
	823.00	0.14	251.58	823.00	-509.18	-0.32	-1.08	-1.31	0.17	-0.10	46.00	538273.41	1706171.86	N 39 58 23.31	W 80 32 54.26	0.21
	923.00	0.06	245.72	923.00	-409.18	-0.29	-1.14	-1.47	0.08	-0.08	-5.86	538273.35	1706171.70	N 39 58 23.31	W 80 32 54.26	0.28
	1023.00	0.05	239.29	1023.00	-309.18	-0.29	-1.19	-1.56	0.01	-0.01	-6.43	538273.30	1706171.62	N 39 58 23.31	W 80 32 54.26	0.31
	1123.00	0.08	211.29	1123.00	-209.18	-0.35	-1.27	-1.63	0.04	0.03	-28.00	538273.22	1706171.54	N 39 58 23.30	W 80 32 54.26	0.35
	1158.00	0.04	204.12	1158.00	-174.18	-0.35	-1.30	-1.65	0.12	-0.11	-20.23	538273.19	1706171.52	N 39 58 23.30	W 80 32 54.26	0.37
	1241.00	0.59	1.68	1241.00	-91.18	0.00	-0.00	-1.05	0.70	0.60	189.83	538273.59	1706171.53	N 39 58 23.31	W 80 32 54.26	0.68
	1273.00	0.70	10.12	1272.99	-59.19	0.30	-0.54	-1.01	0.45	0.34	26.38	538273.95	1706171.56	N 39 58 23.31	W 80 32 54.26	0.75
	1305.00	0.95	30.65	1304.99	-27.19	0.59	-0.12	-1.44	1.20	0.78	64.16	538274.37	1706171.73	N 39 58 23.32	W 80 32 54.26	0.89
	1336.00	1.46	46.03	1335.98	3.80	0.82	0.37	-1.03	1.53	1.65	49.61	538274.86	1706172.15	N 39 58 23.32	W 80 32 54.25	1.07
	1366.00	2.07	54.66	1367.97	35.79	0.99	0.89	-0.26	2.07	1.91	28.97	538275.46	1706172.91	N 39 58 23.33	W 80 32 54.24	1.25
	1399.00	2.72	58.36	1398.94	66.76	1.09	1.70	0.82	2.15	2.10	11.94	538276.19	1706174.00	N 39 58 23.33	W 80 32 54.23	1.43
	1431.00	3.31	60.98	1430.90	98.72	1.14	2.55	2.26	1.89	1.84	8.19	538277.04	1706175.45	N 39 58 23.34	W 80 32 54.21	1.59
	1462.00	3.94	62.33	1461.84	129.66	1.17	3.44	3.93	1.10	1.00	4.35	538277.93	1706177.11	N 39 58 23.35	W 80 32 54.19	1.75
	1526.00	5.03	74.71	1525.60	193.48	0.43	5.12	8.44	2.01	2.17	19.34	538279.61	1706181.61	N 39 58 23.37	W 80 32 54.13	2.00
	1620.00	5.32	81.86	1619.27	267.09	-2.07	6.82	16.72	0.75	0.31	7.61	538281.32	1706189.90	N 39 58 23.39	W 80 32 54.02	2.24
	1715.00	4.08	82.23	1713.91	361.73	-5.01	7.97	24.92	0.67	-0.67	0.39	538282.46	1706198.10	N 39 58 23.40	W 80 32 53.92	2.41
	1810.00	4.33	88.62	1808.82	476.44	-8.05	8.58	32.35	0.64	-0.37	6.73	538283.07	1706205.52	N 39 58 23.41	W 80 32 53.82	2.53
	1938.00	3.25	84.65	1936.34	604.10	-11.71	9.04	40.79	0.87	-0.84	-3.10	538283.53	1706213.97	N 39 58 23.41	W 80 32 53.72	2.67
	2035.00	2.06	95.48	2031.23	699.05	-13.74	9.12	45.17	1.35	-1.25	11.40	538283.62	1706218.35	N 39 58 23.41	W 80 32 53.66	2.76
	2128.00	0.81	109.27	2126.20	794.02	-15.20	8.74	47.51	1.36	-1.32	14.82	538283.23	1706220.68	N 39 58 23.41	W 80 32 53.63	2.83
	2222.00	0.87	122.81	2220.19	888.01	-16.33	8.13	48.73	0.22	0.06	14.40	538282.63	1706221.91	N 39 58 23.40	W 80 32 53.61	2.84
	2317.00	0.40	260.93	2315.19	983.01	-16.85	7.60	49.01	1.26	-0.49	145.39	538282.18	1706222.19	N 39 58 23.40	W 80 32 53.61	2.89
	2412.00	0.49	271.86	2410.19	1078.01	-16.53	7.65	48.28	0.13	0.09	11.51	538282.14	1706221.45	N 39 58 23.40	W 80 32 53.62	2.90
	2506.00	0.76	240.20	2504.18	1172.00	-16.34	7.35	47.34	0.48	0.29	-33.68	538281.85	1706220.51	N 39 58 23.40	W 80 32 53.63	2.92
	2601.00	0.42	267.47	2599.18	1267.00	-16.19	7.03	46.44	0.45	-0.36	28.71	538281.52	1706219.62	N 39 58 23.39	W 80 32 53.64	2.94
	2695.00	0.82	237.44	2693.17	1360.99	-16.08	6.74	45.67	0.55	0.21	-31.95	538281.23	1706218.84	N 39 58 23.39	W 80 32 53.65	2.96
	2790.00	0.60	238.92	2788.17	1455.99	-16.13	6.18	44.77	0.05	0.04	1.56	538280.67	1706217.94	N 39 58 23.38	W 80 32 53.66	2.98
	2885.00	0.81	239.68	2883.16	1550.98	-16.17	5.56	43.72	0.18	0.16	0.80	538280.05	1706216.89	N 39 58 23.38	W 80 32 53.68	2.98
	2978.00	0.91	261.42	2976.15	1643.97	-15.93	5.11	42.42	0.36	0.11	23.38	538279.61	1706215.60	N 39 58 23.37	W 80 32 53.69	3.00
	3073.00	1.19	248.77	3071.13	1738.95	-15.54	4.65	40.76	0.38	0.29	-13.32	538279.14	1706213.93	N 39 58 23.37	W 80 32 53.72	3.02
	3167.00	1.23	246.34	3165.11	1832.93	-15.33	3.89	38.92	0.07	0.04	-2.59	538278.38	1706212.10	N 39 58 23.36	W 80 32 53.74	3.03

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Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Directional Difficulty Index
	3190.00	1.33	242.85	3188.11	1855.93	-15.30	3.67	38.46	0.55	0.43	-15.17	538278.16	1706211.63	N 39 58 23.36	W 80 32 53.74	3.04
	3290.00	1.06	215.74	3288.08	1955.90	-16.66	2.39	36.69	0.62	-0.27	-27.11	538276.88	1706210.08	N 39 58 23.35	W 80 32 53.76	3.07
	3385.00	1.44	113.17	3383.07	2050.89	-16.98	1.20	37.47	2.07	0.40	-107.97	538275.89	1706210.64	N 39 58 23.33	W 80 32 53.76	3.13
	3479.00	1.88	98.46	3477.03	2144.85	-18.83	0.51	40.06	0.63	0.45	-15.05	538275.01	1706213.24	N 39 58 23.33	W 80 32 53.72	3.16
	3574.00	1.51	92.56	3571.99	2239.81	-20.42	0.23	42.84	0.41	-0.37	-0.21	538274.72	1706216.01	N 39 58 23.32	W 80 32 53.69	3.18
	3668.00	0.98	93.43	3665.97	2333.79	-21.49	0.13	44.68	0.58	-0.56	0.93	538274.62	1706218.05	N 39 58 23.32	W 80 32 53.66	3.20
	3763.00	0.93	83.17	3760.96	2428.78	-22.21	0.17	46.40	0.19	-0.05	-10.80	538274.66	1706219.63	N 39 58 23.32	W 80 32 53.64	3.22
	3858.00	0.87	89.50	3855.94	2523.76	-22.84	0.27	47.94	0.12	-0.06	0.06	538274.76	1706221.12	N 39 58 23.33	W 80 32 53.62	3.23
	3952.00	0.80	75.05	3949.93	2617.75	-23.34	0.44	49.29	0.24	-0.07	-15.37	538274.94	1706222.46	N 39 58 23.33	W 80 32 53.61	3.24
	4047.00	0.60	43.01	4044.93	2712.75	-23.31	1.03	50.32	0.45	-0.12	-33.73	538275.53	1706223.50	N 39 58 23.33	W 80 32 53.59	3.25
	4142.00	0.59	26.46	4139.92	2807.74	-22.88	1.89	50.93	0.22	-0.11	-17.42	538276.38	1706224.10	N 39 58 23.34	W 80 32 53.58	3.26
	4237.00	0.29	4.29	4234.92	2902.74	-22.38	2.57	51.17	0.36	-0.32	-23.34	538277.08	1706224.34	N 39 58 23.35	W 80 32 53.58	3.27
	4331.00	0.21	352.03	4328.92	2996.74	-22.02	2.97	51.16	0.10	-0.09	-13.04	538277.47	1706224.33	N 39 58 23.35	W 80 32 53.58	3.28
	4426.00	0.34	314.44	4423.92	3091.74	-21.58	3.34	50.93	0.23	0.14	-39.57	538277.84	1706224.11	N 39 58 23.36	W 80 32 53.58	3.28
	4520.00	0.29	309.25	4517.91	3185.73	-21.10	3.69	50.55	0.06	-0.05	-5.52	538278.18	1706223.72	N 39 58 23.36	W 80 32 53.59	3.29
	4615.00	0.45	291.71	4612.91	3280.73	-20.59	3.98	50.02	0.20	0.17	-18.46	538278.47	1706223.19	N 39 58 23.36	W 80 32 53.60	3.29
	4709.00	0.42	280.07	4706.91	3374.73	-20.08	4.18	49.34	0.10	-0.03	-12.38	538278.67	1706222.51	N 39 58 23.36	W 80 32 53.61	3.30
	4804.00	0.52	258.29	4801.91	3469.73	-19.75	4.14	48.57	0.23	0.11	-25.03	538278.63	1706221.75	N 39 58 23.36	W 80 32 53.62	3.31
	4899.00	0.30	240.37	4896.90	3564.72	-19.65	3.91	47.94	0.26	-0.23	-18.78	538278.40	1706221.11	N 39 58 23.36	W 80 32 53.62	3.32
	4993.00	0.19	214.66	4990.90	3658.72	-19.72	3.60	47.64	0.16	-0.12	-27.35	538278.15	1706220.81	N 39 58 23.36	W 80 32 53.63	3.32
	5088.00	0.19	232.70	5085.00	3753.72	-19.81	3.44	47.42	0.06	0.00	18.99	538277.93	1706220.60	N 39 58 23.36	W 80 32 53.63	3.32
	5182.00	0.17	256.09	5179.90	3847.72	-19.80	3.31	47.16	0.08	-0.02	24.88	538277.80	1706220.34	N 39 58 23.36	W 80 32 53.63	3.33
	5277.00	0.28	269.50	5274.90	3942.72	-19.65	3.27	46.79	0.13	0.12	14.12	538277.76	1706219.97	N 39 58 23.35	W 80 32 53.64	3.33
	5372.00	0.28	251.80	5369.90	4037.72	-19.50	3.20	46.34	0.09	0.00	-18.63	538277.69	1706219.52	N 39 58 23.35	W 80 32 53.64	3.33
	5466.00	0.21	248.63	5463.90	4131.72	-19.44	3.06	45.96	0.08	-0.07	-3.37	538277.55	1706219.14	N 39 58 23.35	W 80 32 53.65	3.34
	5561.00	0.21	211.39	5558.90	4226.72	-19.50	2.85	45.71	0.14	0.00	-39.20	538277.34	1706218.88	N 39 58 23.35	W 80 32 53.65	3.34
	5645.00	0.22	241.35	5642.90	4310.72	-19.58	2.64	45.49	0.13	0.01	35.67	538277.13	1706218.66	N 39 58 23.35	W 80 32 53.65	3.34
	5704.00	0.10	46.60	5701.90	4369.72	-19.56	2.62	45.43	0.54	-0.20	280.08	538277.12	1706218.60	N 39 58 23.35	W 80 32 53.66	3.35
	5751.00	3.88	71.54	5748.86	4416.68	-19.84	3.16	46.96	8.06	8.04	53.06	538277.65	1706220.14	N 39 58 23.35	W 80 32 53.64	3.42
	5798.00	8.81	72.40	5795.56	4463.38	-20.82	4.75	51.91	10.49	10.49	1.83	538279.24	1706225.08	N 39 58 23.37	W 80 32 53.57	3.52
	5846.00	12.31	72.43	5842.74	4510.56	-22.53	7.40	60.29	7.29	7.29	0.06	538281.90	1706233.46	N 39 58 23.40	W 80 32 53.47	3.60
	5893.00	15.42	70.57	5888.36	4550.18	-24.52	11.00	70.96	6.68	6.62	-3.96	538285.49	1706244.14	N 39 58 23.43	W 80 32 53.33	3.68
	5940.00	18.82	68.82	5933.27	4601.09	-26.53	15.82	83.93	7.32	7.23	-3.72	538290.31	1706257.10	N 39 58 23.48	W 80 32 53.16	3.70
	5987.00	22.28	71.10	5977.28	4645.10	-29.06	21.44	99.43	7.55	7.36	4.85	538295.93	1706272.60	N 39 58 23.54	W 80 32 52.96	3.64
	6035.00	26.20	70.57	6021.02	4688.84	-32.35	27.93	118.07	8.37	8.35	-1.10	538302.42	1706291.24	N 39 58 23.61	W 80 32 52.73	3.93
	6082.00	30.40	70.35	6062.38	4730.20	-35.92	35.39	139.10	8.75	8.74	-0.47	538309.88	1706312.27	N 39 58 23.68	W 80 32 52.46	4.02
	6129.00	34.71	71.10	6101.98	4769.80	-40.11	43.73	162.97	9.21	9.17	1.60	538318.22	1706336.14	N 39 58 23.77	W 80 32 52.15	4.11
	6176.00	39.09	72.26	6139.56	4807.38	-45.24	52.58	189.75	9.44	9.32	2.47	538327.07	1706362.92	N 39 58 23.86	W 80 32 51.81	4.19
	6224.00	44.00	72.36	6175.47	4843.29	-51.36	62.25	220.07	10.23	10.23	0.21	538336.74	1706393.24	N 39 58 23.96	W 80 32 51.42	4.28
	6271.00	48.99	71.42	6207.82	4875.64	-57.65	72.86	252.40	10.72	10.62	-2.00	538347.35	1706425.62	N 39 58 24.07	W 80 32 51.01	4.38
	6319.00	50.84	65.50	6238.74	4906.56	-62.24	86.35	286.56	10.19	3.85	-12.33	538360.84	1706459.74	N 39 58 24.20	W 80 32 50.57	4.44
	6366.00	49.60	57.89	6268.84	4936.66	-62.56	103.44	318.35	12.72	-2.64	-16.19	538377.93	1706491.51	N 39 58 24.38	W 80 32 50.17	4.52
	6413.00	48.77	51.06	6299.58	4967.40	-58.39	124.07	347.27	11.14	-1.77	-14.53	538398.56	1706520.44	N 39 58 24.58	W 80 32 49.80	4.58
	6460.00	48.79	45.24	6330.57	4998.39	-50.40	147.64	373.60	9.31	0.04	-12.38	538422.13	1706546.75	N 39 58 24.82	W 80 32 49.46	4.64
	6508.00	49.42	40.01	6362.00	5029.82	-38.82	174.33	398.14	8.34	1.31	-10.90	538448.81	1706571.30	N 39 58 25.00	W 80 32 49.15	4.69
	6555.00	50.78	35.68	6392.16	5059.98	-24.50	202.79	420.24	7.64	2.89	-9.21	538477.28	1706593.40	N 39 58 25.37	W 80 32 48.87	4.74
	6603.00	52.52	30.71	6421.95	5089.77	-6.61	234.20	440.82	8.69	3.63	-10.35	538508.77	1706613.08	N 39 58 25.68	W 80 32 48.61	4.79
	6650.00	54.98	26.11	6449.75	5117.57	13.75	267.62	458.82	8.47	5.23	-9.79	538542.10	1706631.08	N 39 58 26.01	W 80 32 48.39	4.84
	6697.00	56.35	22.16	6476.27	5144.09	37.15	303.03	474.67	7.53	2.91	-8.40	538577.51	1706647.83	N 39 58 26.37	W 80 32 48.19	4.88
	6744.00	58.12	18.09	6501.71	5169.53	63.14	340.13	488.25	8.20	3.77	-8.66	538614.61	1706661.41	N 39 58 26.73	W 80 32 48.02	4.92
	6792.00	60.03	14.76	6526.17	5193.99	92.25	378.74	499.92	7.04	5.23	-6.94	538654.22	1706673.07	N 39 58 27.13	W 80 32 47.87	4.96
	6839.00	63.54	10.79	6546.17	5215.99	123.33	420.23	509.08	9.70	6.19	-8.45	538694.71	1706682.23	N 39 58 27.53	W 80 32 47.76	5.00
	6887.00	66.25	7.14	6568.54	5236.36	157.70	463.18	515.63	8.90	5.65	-7.60	538737.63	1706688.99	N 39 58 27.95	W 80 32 47.68	5.04
	6934.00	67.78	3.46	6586.90	5254.72	193.54	506.23	519.82	7.91	3.26	-7.83	538780.70	1706692.97	N 39 58 28.38	W 80 32 47.64	5.08
	6982.00	69.61	359.50	6604.35	5272.17	232.16	550.92	520.97	8.58	3.81	-8.25	538825.39	1706694.12	N 39 58 28.82	W 80 32 47.63	5.12
	7029.00	71.61	355.34	6619.96	5287.78	271.94	595.20	518.96	9.37	4.26	-8.85	538869.66	1706692.11	N 39 58 29.26	W 80 32 47.66	5.15
	7076.00	72.34	351.08	6634.50	5302.32	313.37	639.56	513.67	8.76	1.55	-9.06	538914.03	1706686.83	N 39 58 29.70	W 80 32 47.74	5.19
	7123.00	72.22	346.73	6648.82	5316.64	356.02	683.48	505.06	8.82	-0.26	-9.26	538957.95	1706678.22	N 39 58 30.13	W 80 32 47.85	5.22
	7171.00	75.12	342.61	6662.32	5330.14	400.60	727.89	492.88	10.21	6.04	-8.58	539002.35	1706666.03	N 39 58 30.57	W 80 32 48.02	5.26
	7218.00	79.04	338.74	6672.83	5340.65	445.98	771.10	477.71	11.57	8.34	-8.23	539045.56	1706650.87	N 39 58 30.99	W 80 32 48.22	5.29
	7265.00	81.83	334.71	6680.64	5348.46	492.10	813.65	459.40	10.33	5.94	-8.57	539088.11	1706632.56	N 39 58 31.41	W 80 32 48.46	5.32
	7312.00	84.18	329.98	6686.37	5354.19	538.72	854.95	437.74	11.21	5.00	-10.11	539129.41	1706610.00	N 39 58 31.82	W 80 32 48.74	5.36

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Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Directional Difficulty Index
	7360.00	88.90	326.50	6689.26	5357.09	588.55	895.67	412.52	12.18	9.83	-7.21	539170.12	1706585.68	N 39 58 32.22	W 80 32 49.07	5.39
	7389.00	89.90	325.33	6689.57	5357.39	615.42	919.68	396.27	5.31	3.45	-4.03	539194.14	1706569.43	N 39 58 32.45	W 80 32 49.29	5.41
	7455.00	90.58	324.82	6689.29	5357.11	681.04	973.80	356.49	1.29	1.03	-0.77	539248.25	1706531.65	N 39 58 32.98	W 80 32 49.78	5.43
	7550.00	90.93	325.27	6688.04	5356.86	775.48	1051.65	304.06	0.60	0.37	0.47	539326.10	1706477.23	N 39 58 33.74	W 80 32 50.49	5.47
	7646.00	90.88	325.97	6686.55	5354.37	870.01	1130.05	260.43	0.74	-0.07	0.74	539404.49	1706423.59	N 39 58 34.51	W 80 32 51.19	5.50
	7739.00	90.55	326.39	6685.40	5353.22	963.64	1208.13	198.11	0.56	-0.33	0.45	539482.57	1706371.28	N 39 58 35.26	W 80 32 51.87	5.54
	7833.00	90.38	325.45	6684.63	5352.45	1057.23	1285.99	145.44	1.02	-0.18	-1.00	539560.42	1706318.61	N 39 58 36.04	W 80 32 52.56	5.57
	7928.00	90.45	325.97	6683.95	5351.77	1151.79	1364.47	91.92	0.55	0.07	0.55	539638.91	1706265.09	N 39 58 36.81	W 80 32 53.26	5.60
	8023.00	90.41	325.53	6683.23	5351.05	1246.35	1443.00	38.46	0.47	-0.04	-0.46	539717.43	1706211.63	N 39 58 37.58	W 80 32 53.96	5.63
	8118.00	90.68	326.78	6682.41	5350.23	1340.97	1521.89	-14.45	1.33	0.18	1.32	539796.32	1706158.73	N 39 58 38.35	W 80 32 54.65	5.65
	8212.00	90.41	325.75	6681.60	5349.42	1434.62	1600.06	-66.65	1.11	-0.18	-1.10	539874.49	1706106.53	N 39 58 39.12	W 80 32 55.33	5.68
	8306.00	90.38	326.64	6680.95	5348.77	1528.25	1678.17	-118.95	0.95	-0.03	0.95	539952.59	1706054.23	N 39 58 39.89	W 80 32 56.02	5.71
	8401.00	90.58	324.24	6680.16	5347.98	1622.76	1756.40	-172.83	2.53	0.21	-2.53	540030.81	1706000.35	N 39 58 40.65	W 80 32 56.72	5.74
	8496.00	90.48	325.15	6679.28	5347.10	1717.13	1833.92	-227.73	0.96	-0.11	0.96	540108.33	1705945.45	N 39 58 41.41	W 80 32 57.44	5.76
	8590.00	90.52	325.16	6678.46	5346.28	1810.60	1911.06	-281.44	0.04	0.04	0.01	540185.47	1705891.75	N 39 58 42.17	W 80 32 58.14	5.78
	8685.00	90.38	324.29	6677.71	5345.53	1904.99	1988.62	-336.30	0.03	-0.15	-0.92	540263.02	1705836.89	N 39 58 42.93	W 80 32 58.86	5.81
	8779.00	90.45	324.26	6677.03	5344.85	1998.29	2064.93	-391.18	0.08	0.07	-0.03	540339.33	1705782.01	N 39 58 43.68	W 80 32 59.57	5.83
	8874.00	90.48	324.65	6676.26	5344.08	2092.03	2142.22	-446.41	0.41	0.03	0.41	540416.62	1705726.79	N 39 58 44.43	W 80 33 0.29	5.85
	8969.00	90.58	324.69	6675.38	5343.20	2187.02	2219.82	-501.21	0.27	0.11	0.25	540494.21	1705671.99	N 39 58 45.20	W 80 33 1.01	5.87
	9064.00	90.62	324.95	6674.39	5342.21	2281.44	2297.56	-555.60	0.08	0.04	0.06	540571.95	1705617.40	N 39 58 45.96	W 80 33 1.72	5.89
	9158.00	90.62	324.85	6673.45	5341.27	2374.86	2374.46	-609.85	0.15	-0.11	-0.11	540648.85	1705563.35	N 39 58 46.71	W 80 33 2.43	5.90
	9253.00	90.45	324.67	6672.65	5340.47	2469.27	2452.14	-664.53	0.08	-0.07	0.02	540726.53	1705508.67	N 39 58 47.47	W 80 33 3.14	5.92
	9348.00	90.45	325.10	6671.90	5339.72	2563.70	2529.94	-719.04	0.24	0.00	0.24	540804.33	1705454.17	N 39 58 48.23	W 80 33 3.85	5.94
	9442.00	90.69	325.11	6670.97	5338.79	2657.16	2607.04	-772.81	0.26	0.26	0.01	540881.42	1705400.40	N 39 58 48.99	W 80 33 4.56	5.96
	9537.00	90.55	325.56	6669.94	5337.76	2751.68	2685.17	-826.84	0.50	-0.15	0.47	540959.55	1705346.37	N 39 58 49.76	W 80 33 5.20	5.97
	9632.00	90.55	325.05	6669.03	5336.85	2846.14	2763.28	-880.91	0.54	0.00	-0.54	541037.65	1705292.30	N 39 58 50.52	W 80 33 5.97	5.99
	9726.00	90.45	324.38	6668.20	5336.02	2939.53	2840.00	-935.21	0.72	-0.11	-0.71	541114.37	1705239.01	N 39 58 51.27	W 80 33 6.68	6.01
	9821.00	90.52	324.03	6667.40	5335.22	3033.88	2917.35	-990.37	0.27	0.07	0.26	541191.71	1705182.85	N 39 58 52.03	W 80 33 7.40	6.02
	9916.00	90.45	322.90	6666.60	5334.42	3128.06	2993.97	-1046.52	1.82	-0.07	-1.82	541268.33	1705126.70	N 39 58 52.78	W 80 33 8.13	6.04
	10010.00	90.48	324.48	6665.83	5333.65	3221.25	3069.71	-1102.18	1.68	0.03	1.68	541344.07	1705071.05	N 39 58 53.52	W 80 33 8.86	6.06
	10105.00	90.52	323.56	6665.00	5332.82	3315.49	3146.58	-1157.09	0.97	0.04	-0.97	541420.94	1705015.24	N 39 58 54.28	W 80 33 9.58	6.08
	10200.00	90.52	323.84	6664.14	5331.96	3409.67	3223.14	-1214.23	0.29	0.00	0.29	541497.50	1704959.00	N 39 58 55.03	W 80 33 10.32	6.09
	10294.00	90.58	324.09	6663.24	5331.06	3502.91	3299.15	-1269.52	0.27	0.06	0.27	541573.50	1704903.71	N 39 58 55.77	W 80 33 11.04	6.11
	10389.00	90.55	323.93	6662.30	5330.12	3597.15	3376.02	-1325.34	0.17	-0.03	-0.17	541650.36	1704847.89	N 39 58 56.53	W 80 33 11.77	6.12
	10483.00	90.48	323.68	6661.46	5329.28	3690.38	3451.97	-1380.72	0.09	-0.07	-0.05	541726.31	1704792.52	N 39 58 57.27	W 80 33 12.49	6.14
	10578.00	90.45	323.47	6660.69	5328.51	3784.55	3528.50	-1436.99	0.43	-0.03	-0.43	541802.65	1704736.24	N 39 58 58.02	W 80 33 13.23	6.15
	10672.00	90.58	323.39	6659.84	5327.66	3877.68	3604.00	-1493.00	0.16	0.14	-0.09	541878.33	1704680.24	N 39 58 58.76	W 80 33 13.96	6.16
	10767.00	90.48	324.70	6658.96	5326.78	3971.93	3680.89	-1548.77	1.38	-0.11	1.38	541955.23	1704624.47	N 39 58 59.51	W 80 33 14.68	6.18
	10861.00	90.48	325.73	6658.18	5326.00	4065.40	3758.09	-1602.40	1.10	0.00	1.10	542032.42	1704570.65	N 39 59 0.27	W 80 33 15.38	6.19
	10956.00	90.45	325.51	6657.41	5325.23	4159.95	3836.49	-1656.04	0.23	-0.03	-0.23	542110.82	1704517.21	N 39 59 1.04	W 80 33 16.00	6.21
	11050.00	90.48	325.54	6656.64	5324.46	4253.48	3913.08	-1709.25	0.05	0.03	0.03	542188.30	1704464.00	N 39 59 1.80	W 80 33 16.78	6.22
	11145.00	90.41	324.97	6655.90	5323.72	4347.06	3992.04	-1763.39	0.60	-0.07	-0.60	542266.36	1704409.87	N 39 59 2.56	W 80 33 17.49	6.23
	11239.00	90.45	324.87	6655.20	5323.02	4441.39	4068.06	-1817.41	0.11	0.04	-0.11	542343.28	1704355.85	N 39 59 3.32	W 80 33 18.19	6.24
	11334.00	90.52	325.06	6654.39	5322.21	4535.82	4146.74	-1871.94	0.21	0.07	0.20	542421.06	1704301.31	N 39 59 4.08	W 80 33 18.91	6.26
	11428.00	90.48	324.89	6653.57	5321.39	4630.25	4224.54	-1926.47	0.18	-0.04	-0.18	542498.65	1704246.70	N 39 59 4.84	W 80 33 19.62	6.27
	11523.00	90.45	325.51	6652.80	5320.62	4723.72	4301.72	-1980.11	0.66	-0.03	0.66	542578.03	1704193.15	N 39 59 5.60	W 80 33 20.32	6.28
	11618.00	90.52	324.49	6652.00	5319.82	4818.16	4379.54	-2034.60	1.08	0.07	-1.07	542653.84	1704138.67	N 39 59 6.36	W 80 33 21.03	6.29
	11712.00	90.41	324.72	6651.24	5319.06	4911.53	4456.16	-2089.04	0.27	-0.12	0.24	542730.46	1704084.22	N 39 59 7.11	W 80 33 21.74	6.30
	11807.00	90.38	325.08	6650.58	5318.40	5005.95	4533.88	-2143.67	0.38	-0.03	0.38	542808.18	1704029.60	N 39 59 7.87	W 80 33 22.45	6.32
	11901.00	90.52	325.74	6649.84	5317.66	5099.46	4611.27	-2197.03	0.72	0.15	0.70	542885.56	1703976.24	N 39 59 8.63	W 80 33 23.15	6.33
	11996.00	90.55	325.84	6648.96	5316.78	5194.03	4689.83	-2250.44	0.11	0.03	0.11	542964.12	1703922.84	N 39 59 9.40	W 80 33 23.85	6.34
	12091.00	90.55	325.62	6648.04	5315.86	5288.59	4768.33	-2303.93	0.23	0.00	-0.23	543042.62	1703869.35	N 39 59 10.17	W 80 33 24.55	6.35
	12185.00	90.34	325.57	6647.31	5315.13	5382.13	4845.88	-2357.04	0.23	-0.22	-0.05	543120.17	1703816.24	N 39 59 10.93	W 80 33 25.24	6.36
	12280.00	90.45	325.24	6646.66	5314.48	5476.64	4924.08	-2410.98	0.37	0.12	-0.35	543198.36	1703762.30	N 39 59 11.70	W 80 33 25.95	6.37
	12375.00	90.34	325.39	6646.00	5313.82	5571.13	5002.20	-2465.04	0.20	-0.12	0.16	543276.48	1703708.24	N 39 59 12.46	W 80 33 26.65	6.38
	12469.00	90.38	324.92	6645.41	5313.23	5664.60	5078.34	-2518.74	0.50	0.04	-0.50	543353.62	1703654.54	N 39 59 13.22	W 80 33 27.36	6.39
	12564.00	90.38	325.26	6644.78	5312.60	5759.05	5157.25	-2573.11	0.36	0.00	0.36	543431.52	1703600.18	N 39 59 13.98	W 80 33 28.07	6.40
	12659.00	90.89	325.32	6643.73	5311.55	5853.53	5235.34	-2627.20	0.54	0.54	0.06	543509.60	1703546.09	N 39 59 14.75	W 80 33 28.77	6.41
	12753.00	91.13	325.49	6642.07	5309.89	5947.03	5312.70	-2680.56	0.31	0.26	0.18	543588.97	1703492.73	N 39 59 15.51	W 80 33 29.47	6.42
	12848.00	91.00	325.79	6640.31	5308.13	6041.57	5391.11	-2734.17	0.34	-0.14	0.32	543665.37	1703439.12	N 39 59 16.27	W 80 33 30.17	6.43
	12943.00	90.79	325.13	6638.82	5306.64	6136.07	5469.36	-2788.03	0.73	-0.22	-0.69	543743.61	1703385.27	N 39 59 17.04	W 80 33 30.87	6.44
	13037.00	90.93	325.72	6637.41	5305.23	6229.58	5546.75	-2841.36	0.65	0.15	0.63	543821.00	1703331.93	N 39 59 17.80	W 80 33 31.57	6.45
	13132.00	90.90	325.63	6635.85	5303.67	6324.12	5625.19	-2894.93	0.10	0.03	-0.09	543899.44	1703278.37	N 39 59 18.57	W 80 33 32.27	6.46

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Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Directional Difficulty Index
	13227.00	91.03	325.04	6634.20	5302.02	6418.68	5703.60	-2948.54	0.07	0.07	0.01	543977.85	1703224.76	N 39 59 19.34	W 80 33 32.07	6.47
	13321.00	90.99	326.33	6632.56	5300.38	6512.25	5781.50	-3001.12	0.74	-0.07	0.73	544055.75	1703172.19	N 39 59 20.10	W 80 33 33.68	6.48
	13416.00	90.93	325.34	6631.00	5298.82	6606.61	5860.10	-3054.46	1.04	-0.03	-1.04	544134.34	1703118.85	N 39 59 20.87	W 80 33 34.38	6.49
	13511.00	90.48	325.33	6629.83	5297.65	6701.30	5938.23	-3108.49	0.47	-0.47	-0.01	544212.46	1703064.82	N 39 59 21.64	W 80 33 35.06	6.50
	13605.00	90.41	325.81	6629.10	5296.92	6794.84	6015.76	-3161.64	0.52	-0.07	0.51	544289.99	1703011.68	N 39 59 22.40	W 80 33 35.76	6.51
	13700.00	90.21	325.65	6628.58	5296.40	6889.40	6094.26	-3215.13	0.27	-0.21	-0.17	544368.49	1702958.18	N 39 59 23.17	W 80 33 36.46	6.52
	13795.00	90.00	324.04	6628.41	5296.23	6983.81	6171.93	-3269.83	1.71	-0.22	-1.69	544446.16	1702903.49	N 39 59 23.93	W 80 33 37.17	6.53
	13889.00	89.90	324.16	6628.49	5296.31	7077.08	6248.08	-3324.95	0.17	-0.11	0.13	544522.30	1702848.37	N 39 59 24.67	W 80 33 37.89	6.54
	13984.00	90.03	324.54	6628.55	5296.37	7171.40	6325.27	-3380.32	0.42	0.14	0.40	544599.49	1702793.01	N 39 59 25.43	W 80 33 38.61	6.55
	14079.00	89.93	324.51	6628.58	5296.40	7265.75	6402.64	-3435.45	0.11	-0.11	-0.03	544676.85	1702737.87	N 39 59 20.19	W 80 33 39.33	6.56
	14173.00	89.73	323.65	6628.88	5296.68	7350.02	6478.76	-3490.59	0.94	-0.21	-0.91	544752.97	1702682.73	N 39 59 26.93	W 80 33 40.05	6.57
	14268.00	89.90	324.40	6629.17	5296.99	7453.27	6555.94	-3546.40	0.81	0.18	0.79	544829.85	1702626.93	N 39 59 27.69	W 80 33 40.78	6.58
	14362.00	90.07	324.19	6629.19	5297.01	7546.58	6631.97	-3601.26	0.20	0.18	-0.22	544906.18	1702572.07	N 39 59 28.44	W 80 33 41.50	6.59
	14457.00	90.00	324.08	6629.14	5296.96	7640.85	6708.96	-3656.92	0.14	-0.07	-0.12	544983.16	1702516.42	N 39 59 29.19	W 80 33 42.22	6.59
	14551.00	89.90	324.87	6629.22	5297.04	7734.20	6785.46	-3711.54	0.85	-0.11	0.84	545059.66	1702461.80	N 39 59 29.94	W 80 33 42.94	6.60
Survey 07-Feb-14	14590.00	89.93	322.85	6629.28	5297.10	7772.87	6816.06	-3734.53	5.18	0.08	-5.18	545091.15	1702438.80	N 39 59 30.25	W 80 33 43.24	6.61
PTB	14672.00	89.93	322.85	6629.38	5297.20	7854.00	6882.31	-3784.06	0.00	0.00	0.00	545156.51	1702389.26	N 39 59 30.89	W 80 33 43.88	6.62

Survey Type: Def Survey

Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma

Survey Program:

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	23.000	Act Stns	30.000	30.000	SLB_NSG+MSHOT-Depth Only	Original Borehole / Noble Energy SHL-26B-HS Gyro+MWD 0ft to 14627ft MD
	1	23.000	1158.000	Act Stns	30.000	30.000	SLB_NSG+MSHOT	Original Borehole / Noble Energy SHL-26B-HS Gyro+MWD 0ft to
	1	1158.000	14590.000	Act Stns	30.000	30.000	SLB_MWD-STD	Original Borehole / Noble Energy SHL-26B-HS Gyro+MWD 0ft to
	1	14590.000	14672.000	Act Stns	30.000	30.000	SLB_BLIND+TREND	Original Borehole / Noble Energy SHL-26B-HS Gyro+MWD 0ft to

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PATHFINDER
A Schlumberger Company

Noble Energy

noble energy

Borehole:	Well:	Field:	Structure:
Original Borehole	SHL-26B-HS	WV Marshall County (NAD 27)	Nabors M59

Gravity & Magnetic Parameters

Model:	HDGM 2013	Dip:	67.5°	Date:	23-Jan-2014
MagDec:	-8.418°	FS:	51112.50nT	Gravity FS:	999.246mgn (9.80665 Based)

Surface Location NAD27 West Virginia State Plane, Northern Zone, US Feet

Lat:	N 39 58 23.32	Northing:	530274.492ftUS	Grid Conv:	-0.6669°
Lon:	W 80 32 54.24	Easting:	1704173.176ftUS	Scale Fact:	0.99990906

Miscellaneous

Slot:	SHL-26B-HS	TVD Ref:	KB(1332.18ft above MSL)
Plan:	Noble Energy SHL-26B-HS Gyro+MWD 0ft to 14527ft MD		

Part	Seq	Survey Tool Name	Hole Size (in)	Casing Size (in)	MD From (ft)	MD To (ft)	Survey Frequency	E/W Error (Semi-Major Axis) (ft)	N/S Error (Semi-Minor Axis) (ft)	Comments Company
1	1	B_B_MWD+IFR1+SAG Only	30	30	0	20	Ad Hoc	1.26	1.26	
1	2	B_B_MWD+IFR1+SAG	30	30	20	1158	Ad Hoc	3.17	2.61	
1	3	B_B_MWD+IFR1	30	30	1158	14490	Ad Hoc	31.18	14.42	
1	4	B_B_MWD+IFR2+SAG	30	30	14490	14527	Ad Hoc	33.11	0.0	

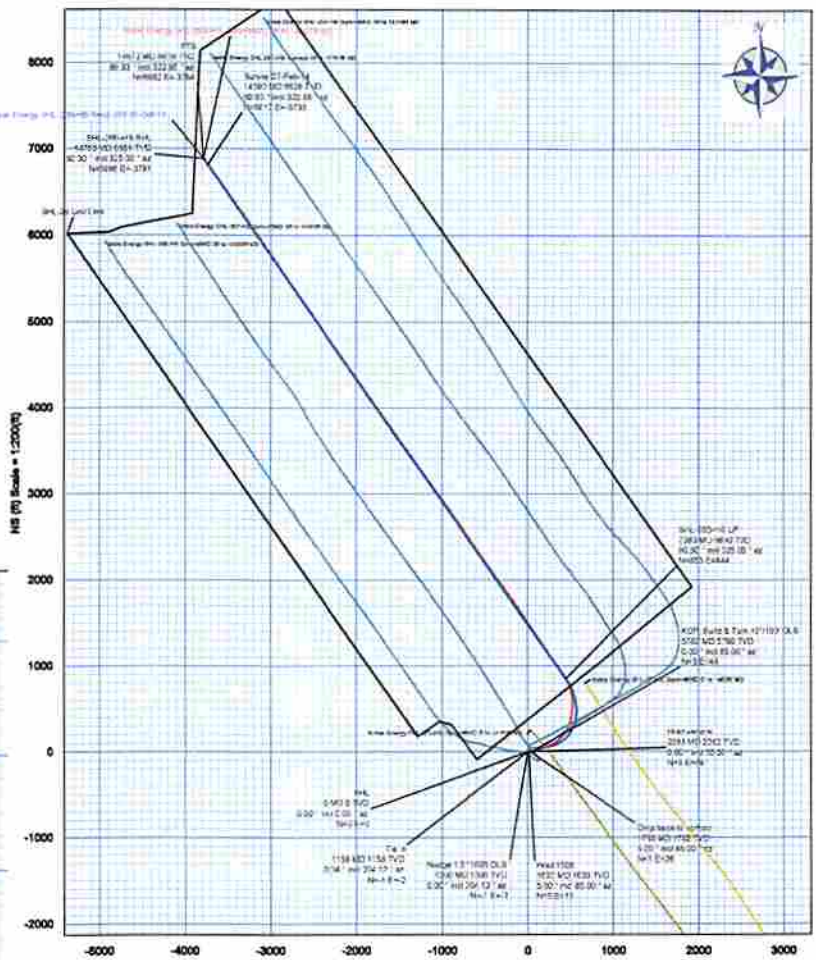
Critical Points

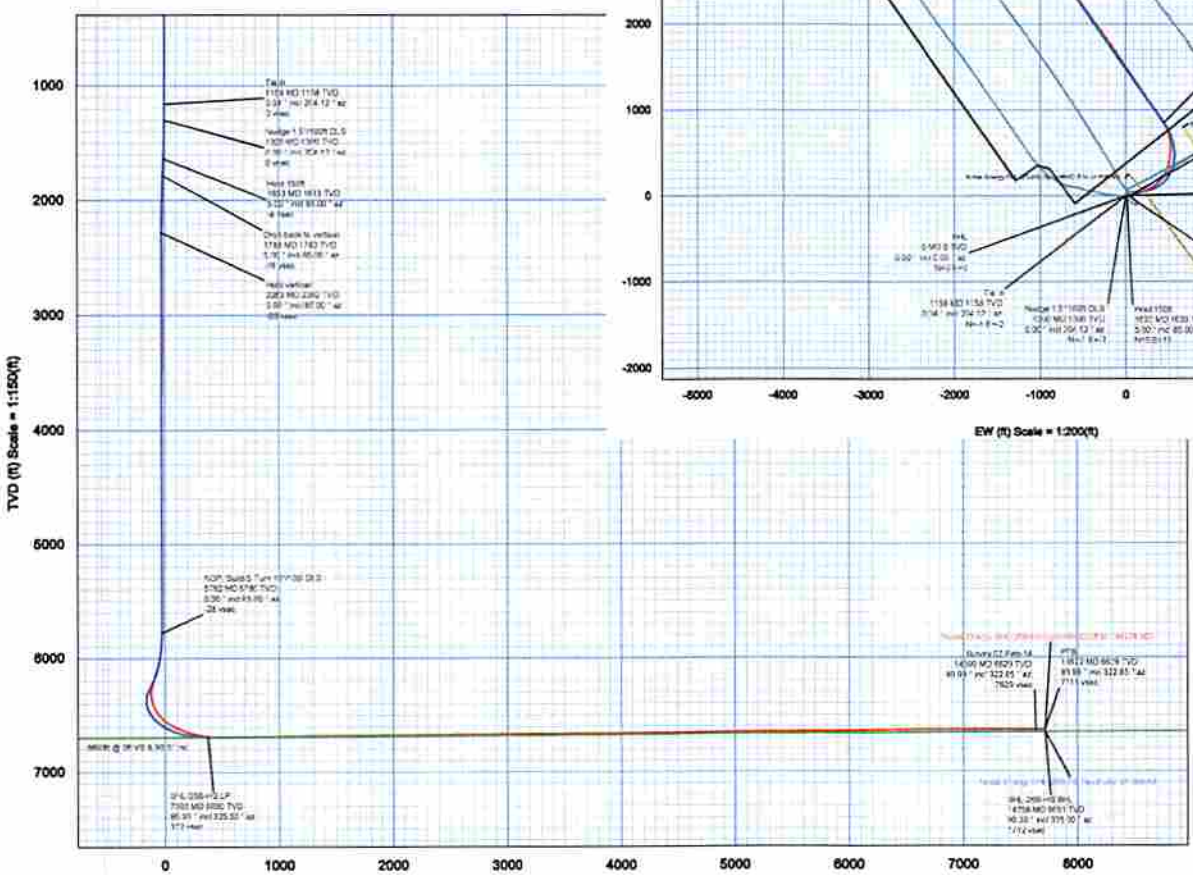
Critical Point	MD	INCL	AZIM	TVD	VSEC	NorthSy	EastSy	DLS
BHL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Survey 27 Feb 14	14490.00	89.93	322.84	6629.28	7711.87	4818.46	-3134.34	0.19
PTB	14472.84	89.93	322.84	6629.28	7694.68	4806.31	-3124.34	0.00

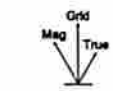
Surface Location

Northing: 530274.492 Easting: 1704173.176 Latitude: N 39 58 23.32 Longitude: W 80 32 54.24 Plan Azimuth: 320.254

Target Description			Grid Coord				Local Coord	
Target Name	Shape	Dimension	Latitude	Longitude	Northing	Easting	TVD	VSec	N/+S(-)	E/+W(-)
SHL_26 Grid Line - 100 Well	Polyline	N/A	N 39 58 23.32	W 80 32 54.24	530274.41	1704173.53	1332.18	0.00	0.11	-0.05
SHL_26 Grid Line	Polyline	N/A	N 39 58 23.32	W 80 32 54.24	530274.41	1704173.53	1332.18	0.05	0.11	-0.05
SHL_26 Grid Line - 50' Well	Polyline	N/A	N 39 58 23.32	W 80 32 54.24	530274.41	1704173.53	1332.18	0.03	0.11	-0.04
SHL_26B-HS BHL	Point	N/A	N 39 58 31.02	W 80 33 43.84	540134.98	1702350.00	6601.00	7663.34	9598.96	-2706.74
SHL_26B-HS LP	Point	N/A	N 39 58 31.79	W 80 32 48.67	530137.07	1706890.00	6600.00	5312.53	9012.0	4413.00
Weight @ 26 HS & 90.0° inc	Plane	N/A	N 39 58 23.32	W 80 32 54.24	530274.41	1704173.18	6600.00	0.00	0.00	0.00







Grid North
Tot Corr (M->G -7.749°)
Mag Dec (-8.418°)
Grid Corr (-0.669°)

09/19/2014