

Noble Energy SHL-26C-HS Surveys 0ft to 15748ft MD Survey Geodetic Report
(Def Survey)

Report Date: December 30, 2013 - 10:12 AM
 Client: Noble Energy
 Field: WV Marshall County (NAD 27)
 Structure / Slot: Noble Energy SHL-26C Pad / SHL-26C-r10
 Well: SHL-26C-HS
 Borehole: Original Borehole
 UW / API#: Unknown / Unknown
 Survey Name: Noble Energy SHL-26C-HS Surveys 0ft to 15748ft MD
 Survey Date: December 10, 2013
 Torn / AHD / DBI / ERD Ratio: 256 869 / 10249 765 ft / 6.792 / 1.532
 Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet
 Location Lat / Long: N 39° 58' 23.46670", W 80° 32' 54.25832"
 Location Grid NE Y/X: N 538289 639 RUS, E 1706171 797 RUS
 CRS Grid Convergence Angle: -0.66881°
 Grid Scale Factor: 0.99995905
 Version / Patch: 2.7 998 U

Survey / DLS Computation: Minimum Curvature / Lubinski
 Vertical Section Azimuth: 335.325° (Grid North)
 Vertical Section Origin: 0 000 ft, 0 000 ft
 TVD Reference Datum: MB
 TVD Reference Elevation: 1331 610 ft above MSL
 Seabed / Ground Elevation: 1309 180 ft above MSL
 Magnetic Declination: -8.414°
 Total Gravity Field Strength: 998.3454mgals (9.80665 Based)
 Gravity Model: GARM
 Total Magnetic Field Strength: 53128 106 nT
 Magnetic Dip Angle: 67.511°
 Declination Date: December 10, 2013
 Magnetic Declination Model: HDGM 2013
 North Reference: Grid North
 Total Corr Mag North→Grid North: -0.0080'
 Total Corr Mag→Grid North: -7.7450'
 Local Coord Referenced To: Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	HS (ft)	EW (ft)	DLS (ft/100ft)	RR (ft/100ft)	TR (ft/100ft)	Northing (RUS)	Eastings (RUS)	Latitude (N/S °'")	Longitude (E/W °'")	Directional Difficulty Index
SHL	0.00	0.00	0.00	0.00	-1331.61	0.00	0.00	0.00	N/A	N/A	N/A	538289.64	1706171.80	N 39 58 23.47	W 80 32 54.26	0.00
	123.00	0.84	141.50	123.00	-1208.61	0.88	0.71	0.58	0.68	0.69	0.00	538288.93	1706172.35	N 39 58 23.46	W 80 32 54.25	0.00
	223.00	0.76	131.52	222.99	-1108.62	-2.20	-1.73	1.51	0.17	-0.08	-10.38	538287.91	1706173.30	N 39 58 23.45	W 80 32 54.24	0.36
	323.00	0.76	125.05	322.98	-1008.63	-3.38	-2.55	2.54	0.09	0.00	-0.47	538287.60	1706174.34	N 39 58 23.44	W 80 32 54.23	0.00
	423.00	0.94	112.21	422.97	-908.64	-4.55	-3.24	3.85	0.20	0.10	-12.64	538286.40	1706175.64	N 39 58 23.44	W 80 32 54.21	0.84
	523.00	0.29	62.61	522.96	-808.65	-5.13	-3.43	4.83	0.78	-0.65	-49.60	538286.21	1706176.63	N 39 58 23.43	W 80 32 54.20	1.12
	623.00	0.84	358.80	622.96	-708.65	-4.45	-2.58	5.04	0.76	0.55	-63.75	538287.06	1706176.84	N 39 58 23.44	W 80 32 54.19	1.31
	723.00	1.15	347.24	722.94	-608.67	-2.61	-0.89	4.81	0.35	0.29	-11.62	538288.75	1706176.61	N 39 58 23.46	W 80 32 54.20	1.45
	823.00	0.47	346.85	822.93	-508.68	-1.45	0.47	4.50	0.60	-0.66	-0.39	538290.11	1706176.29	N 39 58 23.47	W 80 32 54.20	1.60
	923.00	0.39	343.53	922.93	-408.68	-0.71	1.20	4.31	0.09	-0.08	-3.32	538290.04	1706176.10	N 39 58 23.48	W 80 32 54.20	1.64
	1023.00	0.15	307.76	1022.93	-308.68	-0.25	1.01	4.11	0.28	-0.24	-35.77	538291.25	1706175.90	N 39 58 23.48	W 80 32 54.21	1.69
	1123.00	0.10	287.41	1122.93	-208.68	-0.08	1.21	3.02	0.07	-0.05	-20.35	538291.35	1706175.72	N 39 58 23.48	W 80 32 54.21	1.70
	1178.00	0.06	237.83	1177.93	-153.68	0.05	1.71	3.85	0.14	-0.07	-00.15	538291.35	1706175.65	N 39 58 23.48	W 80 32 54.21	1.71
	1368.00	1.35	52.80	1367.91	-34.30	0.42	3.00	5.53	0.75	0.09	93.07	538292.64	1706177.33	N 39 58 23.50	W 80 32 54.19	1.90
	1413.00	2.67	58.98	1412.89	81.28	0.66	3.80	6.68	1.55	1.53	8.89	538293.43	1706178.46	N 39 58 23.51	W 80 32 54.17	2.00
	1461.00	2.69	61.46	1460.85	129.24	0.86	4.81	8.40	1.35	1.29	9.33	538294.44	1706180.20	N 39 58 23.52	W 80 32 54.16	2.09
	1508.00	3.43	64.71	1507.78	176.17	0.95	5.93	10.64	1.62	1.57	6.91	538295.57	1706182.44	N 39 58 23.53	W 80 32 54.12	2.19
	1555.00	4.26	71.27	1554.67	223.06	0.79	7.10	13.57	2.03	1.81	13.06	538296.74	1706185.07	N 39 58 23.54	W 80 32 54.00	2.31
	1602.00	4.65	69.41	1601.53	269.92	0.47	8.33	17.02	0.85	0.79	-3.96	538297.97	1706188.81	N 39 58 23.55	W 80 32 54.04	2.39
	1650.00	5.29	70.55	1649.35	317.74	0.13	9.75	20.93	1.35	1.30	-2.38	538299.30	1706192.72	N 39 58 23.57	W 80 32 53.99	2.48
	1697.00	5.85	68.85	1696.13	364.57	-0.21	11.34	25.20	1.24	1.19	-3.62	538300.98	1706197.00	N 39 58 23.58	W 80 32 53.94	2.57
	1745.00	6.16	68.97	1743.86	412.25	-0.53	13.14	29.89	0.65	0.65	0.25	538302.78	1706201.68	N 39 58 23.60	W 80 32 53.88	2.64
	1850.00	5.45	65.73	1837.38	506.77	-0.88	16.79	38.66	0.83	-0.76	-3.45	538306.43	1706210.40	N 39 58 23.64	W 80 32 53.76	2.76
	1934.00	4.52	62.45	1932.02	600.41	-0.72	20.37	46.10	1.02	-0.98	-3.45	538310.01	1706217.89	N 39 58 23.67	W 80 32 53.67	2.86
	2029.00	3.79	69.87	2026.77	695.16	-0.76	23.19	52.36	0.95	-0.77	7.01	538312.82	1706224.16	N 39 58 23.70	W 80 32 53.58	2.94
	2123.00	2.30	66.93	2120.84	789.03	-1.08	25.00	57.02	1.59	-1.59	-3.13	538314.03	1706229.81	N 39 58 23.72	W 80 32 53.53	3.02
	2217.00	1.40	96.97	2214.59	882.98	-0.90	28.30	59.71	1.01	-0.90	-10.60	538316.00	1706231.51	N 39 58 23.73	W 80 32 53.50	3.07
	2312.00	0.79	98.11	2309.57	977.96	-0.80	27.28	61.29	0.67	-0.64	9.62	538319.90	1706233.08	N 39 58 23.74	W 80 32 53.48	3.09
	2407.00	0.93	69.13	2404.56	1072.95	-0.73	27.92	62.55	0.18	0.15	-7.35	538317.56	1706234.74	N 39 58 23.75	W 80 32 53.46	3.11
	2501.00	1.16	58.58	2496.54	1166.93	-0.54	28.81	64.01	0.24	0.24	-0.29	538318.44	1706235.61	N 39 58 23.76	W 80 32 53.44	3.12
	2596.00	0.80	55.58	2593.53	1261.92	-0.33	29.62	65.28	0.53	-0.53	-3.15	538319.25	1706237.00	N 39 58 23.77	W 80 32 53.42	3.14
	2691.00	0.65	63.35	2688.52	1356.91	-0.22	30.17	66.22	0.09	-0.01	8.20	538319.81	1706238.01	N 39 58 23.77	W 80 32 53.41	3.15
	2785.00	0.71	52.85	2782.52	1450.91	-0.07	30.76	67.16	0.15	0.06	-11.17	538320.40	1706238.95	N 39 58 23.76	W 80 32 53.40	3.16
	2880.00	0.83	50.18	2877.51	1545.90	0.23	31.55	68.16	0.13	0.13	-2.81	538321.19	1706239.95	N 39 58 23.79	W 80 32 53.39	3.17
	2975.00	0.99	48.82	2972.50	1640.89	0.65	32.54	69.30	0.17	0.17	-1.43	538322.17	1706241.10	N 39 58 23.80	W 80 32 53.37	3.18
	3069.00	1.19	47.21	3066.48	1734.87	1.18	33.73	70.63	0.22	0.21	-1.71	538323.37	1706242.42	N 39 58 23.81	W 80 32 53.36	3.20
	3164.00	1.30	44.85	3161.46	1829.85	1.67	35.17	72.11	0.13	0.12	-2.48	538324.81	1706243.91	N 39 58 23.82	W 80 32 53.34	3.21
	3259.00	1.16	46.07	3254.43	1924.82	2.79	37.14	74.18	0.12	-0.11	2.42	538326.77	1706245.97	N 39 58 23.84	W 80 32 53.31	3.23
	3354.00	0.22	255.47	3351.42	2019.81	3.11	37.73	74.71	1.45	-1.00	-162.34	538327.30	1706248.51	N 39 58 23.85	W 80 32 53.30	3.26

51-01660

Comments	MD (ft)	Incl (°)	Azim (°)	Grid (ft)	TVD (ft)	TVSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	OLS (ft)	BR (ft)	TR (ft)	Northing (ft)	Easting (ft)	Latitude (N/S)	Longitude (E/W)	Directional Difficulty Index	
	3491.00	0.45	293.15		3468.42	2156.61	3.43	37.83	74.17	0.31	0.23	37.68	538327.47	1706245.66	N	39 56 23.65 W	80 32 53.31	3.27
	3580.00	0.03	281.87		3577.42	2245.81	3.68	38.07	73.37	0.23	0.20	-12.67	538327.71	1706245.16	N	39 56 23.85 W	80 32 53.32	3.28
	3675.00	0.49	268.85		3672.41	2340.80	4.58	38.30	72.47	0.18	-0.15	5.24	538327.93	1706244.28	N	39 56 23.85 W	80 32 53.33	3.29
	3770.00	0.37	277.81		3767.41	2435.80	5.00	38.48	71.77	0.14	-0.13	-9.52	538328.09	1706243.57	N	39 56 23.88 W	80 32 53.34	3.29
	3864.00	0.39	320.00		3861.41	2529.80	6.47	38.74	71.27	0.29	0.02	44.68	538328.38	1706243.06	N	39 56 23.84 W	80 32 53.35	3.30
	3958.00	0.12	29.87		3955.41	2623.80	5.63	39.07	71.11	0.39	-0.29	74.33	538328.71	1706242.00	N	39 56 23.86 W	80 32 53.35	3.31
	4053.00	0.26	17.46		4050.41	2718.80	6.05	39.37	71.22	0.15	0.15	-13.06	538329.00	1706243.02	N	39 56 23.86 W	80 32 53.35	3.31
	4147.00	0.18	22.02		4144.40	2812.79	0.31	39.71	71.34	0.09	-0.09	4.85	538329.34	1706243.14	N	39 56 23.87 W	80 32 53.35	3.32
	4242.00	0.11	25.73		4239.40	2907.79	6.47	39.03	71.44	0.07	-0.07	3.91	538329.68	1706243.23	N	39 56 23.87 W	80 32 53.35	3.32
	4337.00	0.10	3.79		4334.40	3002.79	6.60	40.09	71.48	0.04	-0.01	-23.09	538329.73	1706243.28	N	39 56 23.87 W	80 32 53.35	3.32
	4431.00	0.08	145.52		4428.40	3096.79	5.88	39.51	71.94	1.13	0.94	150.78	538329.15	1706243.74	N	39 56 23.87 W	80 32 53.34	3.35
	4526.00	7.06	126.36		4523.12	3101.51	-0.04	35.36	77.10	6.46	6.40	-19.96	538326.00	1706248.80	N	39 56 23.83 W	80 32 53.27	3.48
	4573.00	9.47	107.76		4569.64	3203.03	-5.16	32.46	83.10	7.64	5.13	-40.00	538322.10	1706254.00	N	39 56 23.60 W	80 32 53.20	3.56
	4620.00	11.85	90.63		4615.84	3284.23	-9.88	31.22	91.61	8.38	5.06	-36.45	538320.66	1706263.41	N	39 56 23.70 W	80 32 53.09	3.64
	4667.00	14.50	68.20		4661.60	3329.99	-14.20	31.36	102.32	5.78	5.64	-5.17	538320.99	1706274.12	N	39 56 23.70 W	80 32 52.95	3.71
	4715.00	17.36	68.12		4707.75	3376.14	-19.31	31.78	115.49	5.96	5.96	-0.17	538321.42	1706287.28	N	39 56 23.70 W	80 32 52.76	3.78
	4762.00	19.99	81.91		4752.27	3420.66	-24.32	33.14	130.45	7.01	5.60	-13.21	538322.78	1706302.25	N	39 56 23.81 W	80 32 52.59	3.86
	4810.00	22.70	77.18		4796.97	3463.36	-28.57	36.36	147.84	6.79	5.77	-6.85	538323.99	1706319.43	N	39 56 23.84 W	80 32 52.37	3.93
	4857.00	25.12	71.40		4839.93	3508.32	-31.40	41.58	165.96	7.07	5.02	-12.30	538331.20	1706337.75	N	39 56 23.90 W	80 32 52.13	4.01
	4904.00	27.55	66.54		4882.06	3550.45	-32.77	49.07	185.39	6.91	5.17	-10.34	538338.71	1706357.19	N	39 56 23.97 W	80 32 51.88	4.08
	4951.00	29.50	59.55		4923.38	3591.75	-31.84	59.26	205.35	8.22	4.15	-14.87	538348.90	1706377.13	N	39 56 24.06 W	80 32 51.63	4.15
	4999.00	32.01	50.20		4964.61	3633.00	-28.62	72.33	226.11	6.33	5.23	-6.88	538361.97	1706397.90	N	39 56 24.21 W	80 32 51.37	4.21
	5094.00	37.25	57.90		5042.75	3711.14	-20.90	101.64	271.42	5.61	5.52	1.79	538391.27	1706443.21	N	39 56 24.50 W	80 32 50.79	4.33
	5188.00	41.23	48.48		5115.61	3784.00	-8.22	137.34	318.78	7.61	4.23	-10.02	538426.97	1706490.56	N	39 56 24.86 W	80 32 50.16	4.45
	5283.00	37.82	50.71		5188.88	3857.27	8.22	176.55	364.77	3.89	-3.59	2.35	538468.18	1706536.56	N	39 56 25.25 W	80 32 49.60	4.54
	5378.00	35.52	54.10		5265.08	3933.47	20.95	211.18	409.68	3.22	-2.42	3.57	538500.81	1706581.46	N	39 56 25.60 W	80 32 49.03	4.61
	5473.00	38.61	57.79		5340.88	4009.27	30.22	243.18	457.13	4.01	3.25	3.88	538532.80	1706628.91	N	39 56 25.02 W	80 32 48.42	4.68
	5567.00	42.86	56.20		5412.10	4080.49	39.10	276.57	506.57	4.64	4.52	-1.60	538568.19	1706680.34	N	39 56 26.26 W	80 32 47.77	4.75
	5662.00	44.36	55.67		5480.88	4149.27	49.78	313.23	562.87	1.64	1.58	-0.65	538602.86	1706734.65	N	39 56 26.63 W	80 32 47.08	4.80
	5757.00	39.57	53.16		5551.50	4219.89	61.71	350.12	614.56	5.34	-6.04	-2.62	538639.74	1706788.32	N	39 56 27.00 W	80 32 46.42	4.87
	5851.00	36.64	61.68		5625.51	4293.90	69.81	381.40	663.26	6.39	-3.12	9.04	538671.02	1706833.03	N	39 56 27.31 W	80 32 45.80	4.93
	5946.00	32.39	59.83		5703.88	4372.07	74.08	407.71	710.35	4.40	-4.26	-1.95	538697.34	1706882.12	N	39 56 27.58 W	80 32 45.20	4.98
	6040.00	33.24	62.72		5782.60	4450.89	77.66	432.25	755.14	1.81	0.60	3.07	538721.87	1706928.90	N	39 56 27.83 W	80 32 44.62	5.01
	6093.00	35.09	62.92		5818.16	4486.67	76.80	443.33	776.69	4.30	4.30	-0.23	538732.05	1706948.35	N	39 56 27.94 W	80 32 44.35	5.03
	6131.00	36.90	62.92		5858.99	4525.38	80.09	457.08	801.25	5.70	3.94	-7.00	538746.68	1706973.02	N	39 56 28.08 W	80 32 44.04	5.05
	6178.00	38.64	66.30		5894.08	4602.47	84.80	472.47	825.67	5.53	3.96	-6.30	538762.08	1706997.43	N	39 56 28.23 W	80 32 43.72	5.07
	6225.00	40.87	55.99		5930.16	4558.55	89.81	489.25	850.68	4.34	4.32	-0.68	538778.88	1707022.44	N	39 56 28.40 W	80 32 43.41	5.10
	6272.00	40.91	55.78		5965.69	4634.08	94.66	506.50	876.15	0.30	0.09	-0.45	538796.12	1707047.91	N	39 56 28.57 W	80 32 43.08	5.11
	6320.00	40.86	55.68		6001.98	4670.37	99.85	524.15	902.14	0.15	-0.10	0.17	538813.77	1707073.00	N	39 56 28.75 W	80 32 42.75	5.12
	6415.00	40.94	54.60		6073.78	4742.17	110.77	559.62	953.24	0.87	0.68	-1.33	538849.24	1707124.99	N	39 56 29.11 W	80 32 42.10	5.15
	6509.00	40.81	53.31		6144.87	4813.30	122.88	598.74	1002.87	0.06	-0.35	-1.37	538885.36	1707174.63	N	39 56 29.47 W	80 32 41.47	5.18
	6556.00	40.35	62.31		6180.72	4840.11	129.49	614.18	1027.18	1.49	-0.55	-2.13	538903.80	1707193.93	N	39 56 29.65 W	80 32 41.16	5.19
	6604.00	41.04	45.33		6217.13	4885.52	138.39	634.77	1050.69	9.99	1.44	-14.54	538924.39	1707222.45	N	39 56 29.86 W	80 32 40.86	5.22
	6651.00	42.05	37.69		6252.33	4920.72	150.96	658.09	1071.31	10.99	2.15	-18.26	538947.70	1707243.06	N	39 56 30.00 W	80 32 40.60	5.25
	6698.00	41.61	31.54		6287.37	4955.76	168.97	683.86	1089.10	8.77	-0.04	-13.09	538973.47	1707260.85	N	39 56 30.35 W	80 32 40.37	5.28
	6745.00	40.83	25.73		6322.73	4991.12	185.45	711.01	1103.84	8.31	-1.68	-12.36	539000.62	1707275.69	N	39 56 30.62 W	80 32 40.19	5.30
	6793.00	41.34	20.74		6358.92	5027.31	206.59	739.98	1118.37	6.91	1.06	-10.40	539026.59	1707288.12	N	39 56 30.91 W	80 32 40.03	5.32
	6840.00	43.45	16.49		6393.64	5062.03	229.67	770.00	1128.46	7.57	4.40	-9.04	539058.61	1707298.20	N	39 56 31.21 W	80 32 39.91	5.34
	6888.00	47.36	13.30		6427.33	5085.72	250.03	803.03	1135.21	9.42	8.15	-6.65	539092.63	1707308.95	N	39 56 31.53 W	80 32 39.80	5.37
	6935.00	51.16	8.07		6458.01	5126.40	284.01	837.95	1142.04	10.68	8.09	-8.21	539127.56	1707313.79	N	39 56 31.88 W	80 32 39.72	5.39
	6982.00	53.33	4.42		6486.79	5155.18	318.64	874.84	1148.35	8.94	4.62	-9.68	539164.45	1707318.10	N	39 56 32.24 W	80 32 39.67	5.41
	7029.00	55.90	0.00		6514.02	5182.41	350.81	913.12	1147.60	9.42	5.47	-9.40	539202.71	1707318.55	N	39 56 32.62 W	80 32 39.65	5.44
	7077.00	58.38	35.91		6540.07	5208.46	388.02	953.39	1146.34	8.63	5.17	-6.52	539242.99	1707318.09	N	39 56 33.02 W	80 32 39.68	5.46
	7124.00	60.64	352.20		6563.92	5232.31	426.37	993.66	1142.14	8.33	4.81	-7.69	539283.26	1707313.88	N	39 56 33.42 W	80 32 39.74	5.48
	7171.00	63.84	349.30		6585.61	5264.20	468.46	1034.70	1135.44	8.73	6.81	-8.17	539324.29	1707307.19	N	39 56 33.82 W	80 32 39.83	5.51
	7218.00	67.52	345.05		6605.17	5273.56	508.32	1078.48	1128.13	10.65	7.83	-7.77	539366.08	1707297.88	N	39 56 34.23 W	80 32 39.96	5.53
	7266.00	70.85	343.85		6622.23	5290.62	552.69	1119.73	1114.21	8.05	6.94	-4.38	539409.32	1707285.06	N	39 56 34.66 W	80 32 40.12	5.55
	7313.00	72.21	340.68		6637.12	5305.51	596.88	1162.13	1100.48	6.86	2.89	-6.32	539451.72	1707272.23	N	39 56 35.08 W	80 32 40.30	5.57
	7360.00	75.69	338.08		6650.11	5318.50	641.91	1204.38	1084.54	9.00	7.40	-5.32	539493.97	1707256.29	N	39 56 35.49 W	80 32 40.51	5.60
	7407.00	78.67	334.31		6660.58	5328.95	687.71	12										

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLB (*100ft)	BR (*100ft)	TR (*100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S * * °)	Longitude (E/W * * °)	Directional Difficulty Index
7550.00	87.04	325.26	6678.85	5348.24	826.24	1367.45	993.13	8.88	8.40	-2.90	539657.03	1707164.68	N 39 58 37.09	W 80 32 41.71	5.66	
7507.00	89.79	325.79	6681.15	5349.54	874.53	1406.18	966.54	5.06	5.85	1.13	539895.76	1707136.29	N 39 58 37.47	W 80 32 42.05	5.70	
7715.00	89.89	326.34	6681.48	5349.87	990.89	1504.06	900.87	0.47	0.03	0.47	539793.65	1707072.42	N 39 58 38.43	W 80 32 42.92	5.73	
7810.00	89.60	327.55	6681.90	5350.29	1084.97	1583.70	848.85	1.31	-0.31	1.27	539873.27	1707020.61	N 39 58 39.21	W 80 32 43.59	5.76	
7904.00	89.54	327.45	6682.61	5351.00	1178.09	1662.08	783.35	0.12	-0.06	-0.11	539852.54	1706970.11	N 39 58 39.99	W 80 32 44.25	5.78	
7999.00	89.51	326.21	6683.39	5351.78	1272.04	1742.49	746.37	1.31	-0.03	-1.31	540032.05	1706918.14	N 39 58 40.77	W 80 32 44.93	5.81	
8094.00	89.48	324.65	6684.23	5352.62	1365.62	1820.71	682.47	1.84	-0.03	-1.64	540110.27	1706884.24	N 39 58 41.54	W 80 32 45.64	5.83	
8189.00	89.94	322.94	6684.71	5353.10	1458.69	1897.38	638.38	1.86	0.48	-1.80	540186.92	1706808.13	N 39 58 42.29	W 80 32 46.37	5.86	
8283.00	89.94	322.14	6684.81	5353.20	1550.38	1971.88	579.19	0.85	0.00	-0.85	540261.53	1706750.96	N 39 58 43.02	W 80 32 47.11	5.88	
8378.00	89.07	321.49	6684.89	5353.28	1842.73	2046.65	520.40	0.68	0.03	-0.68	540338.20	1706692.23	N 39 58 43.75	W 80 32 47.88	5.90	
8472.00	90.06	322.04	6684.86	5353.25	1734.10	2120.48	462.28	0.59	0.10	0.59	540410.03	1706634.06	N 39 58 44.47	W 80 32 48.64	5.92	
8567.00	90.08	324.10	6684.78	5353.15	1826.93	2196.42	405.21	2.17	0.00	2.17	540485.98	1706576.99	N 39 58 45.22	W 80 32 49.38	5.94	
8662.00	89.54	325.14	6685.09	5353.48	1920.42	2274.35	350.88	2.22	-0.55	2.15	540563.89	1706522.67	N 39 58 45.98	W 80 32 50.09	5.96	
8756.00	89.48	325.84	6685.90	5354.29	2013.17	2352.27	293.31	0.33	-0.06	-0.32	540641.80	1706470.09	N 39 58 46.75	W 80 32 50.78	5.98	
8851.00	89.46	325.80	6686.78	5355.17	2106.85	2430.85	244.94	0.05	-0.02	-0.04	540720.39	1706418.73	N 39 58 47.52	W 80 32 51.48	6.00	
8945.00	89.43	326.06	6687.69	5356.08	2199.59	2509.72	192.28	0.28	-0.03	0.28	540798.25	1706364.07	N 39 58 48.28	W 80 32 52.16	6.02	
9040.00	89.60	325.89	6688.33	5356.72	2293.32	2587.45	139.13	0.43	0.39	-0.18	540878.98	1706310.92	N 39 58 49.05	W 80 32 52.86	6.03	
9134.00	90.54	326.33	6688.05	5356.44	2386.10	2665.48	86.71	0.92	0.79	0.47	540955.00	1706258.51	N 39 58 49.82	W 80 32 53.54	6.05	
9229.00	90.46	326.09	6687.22	5356.61	2479.90	2744.43	33.88	0.27	-0.08	-0.25	541033.95	1706205.68	N 39 58 50.59	W 80 32 54.23	6.07	
9324.00	90.49	326.35	6688.43	5354.82	2573.69	2823.39	-18.94	0.28	0.03	0.27	541112.90	1706152.86	N 39 58 51.36	W 80 32 54.92	6.08	
9419.00	90.40	326.24	6688.69	5354.08	2667.51	2902.42	-71.65	0.15	-0.09	-0.12	541181.93	1706100.15	N 39 58 52.14	W 80 32 55.61	6.10	
9513.00	90.46	325.70	6689.90	5353.38	2760.25	2980.32	-124.28	0.58	0.06	-0.57	541269.83	1706047.55	N 39 58 52.90	W 80 32 56.30	6.11	
9608.00	90.49	325.83	6689.20	5352.59	2853.93	3058.85	-177.70	0.14	0.03	0.14	541348.38	1705994.10	N 39 58 53.67	W 80 32 57.00	6.13	
9702.00	90.49	326.64	6683.39	5351.78	2948.74	3136.99	-229.94	0.88	0.00	0.86	541426.50	1705941.87	N 39 58 54.44	W 80 32 57.68	6.14	
9797.00	90.46	326.15	6682.61	5351.00	3040.58	3216.11	-282.52	0.52	-0.03	-0.52	541505.61	1705889.29	N 39 58 55.22	W 80 32 58.37	6.16	
9891.00	90.49	325.09	6681.83	5350.22	3133.23	3293.69	-335.60	1.13	0.03	-1.13	541583.19	1705836.22	N 39 58 55.98	W 80 32 59.06	6.17	
9986.00	90.49	324.70	6681.02	5349.41	3228.67	3371.45	-390.18	0.32	0.00	-0.32	541660.94	1705781.65	N 39 58 56.74	W 80 32 59.78	6.19	
10081.00	90.40	323.17	6680.28	5348.67	3319.80	3448.28	-448.03	1.71	-0.09	-1.71	541737.77	1705725.79	N 39 58 57.49	W 80 33 0.50	6.20	
10175.00	90.54	323.06	6679.51	5347.90	3411.67	3523.48	-502.45	0.19	0.15	-0.12	541812.95	1705669.37	N 39 58 58.23	W 80 33 1.24	6.22	
10270.00	90.49	322.84	6678.65	5347.04	3504.46	3599.28	-559.68	0.24	-0.05	-0.23	541888.77	1705612.14	N 39 58 58.97	W 80 33 1.99	6.23	
10365.00	90.40	322.65	6677.84	5346.23	3597.17	3674.89	-617.19	0.20	0.00	-0.20	541964.37	1705554.63	N 39 58 59.71	W 80 33 2.74	6.24	
10460.00	90.54	322.41	6676.99	5345.38	3689.80	3750.29	-674.98	0.26	0.05	-0.25	542039.77	1705496.85	N 39 59 0.45	W 80 33 3.48	6.26	
10554.00	90.46	322.30	6676.17	5344.56	3782.41	3824.78	-732.33	0.09	-0.09	-0.02	542114.24	1705439.50	N 39 59 1.18	W 80 33 4.21	6.27	
10649.00	90.46	321.88	6675.40	5343.79	3873.92	3899.81	-790.58	0.43	0.00	-0.43	542189.28	1705381.26	N 39 59 1.91	W 80 33 5.00	6.28	
10743.00	90.09	324.30	6674.95	5343.34	3965.79	3975.01	-846.96	2.50	-0.39	2.47	542264.48	1705324.88	N 39 59 2.65	W 80 33 5.73	6.30	
10838.00	90.00	324.00	6674.88	5343.27	4058.99	4052.01	-902.60	0.33	-0.09	-0.32	542341.40	1705269.24	N 39 59 3.40	W 80 33 6.40	6.31	
10933.00	89.46	324.33	6675.33	5343.72	4152.18	4129.03	-958.21	0.67	-0.57	0.35	542418.49	1705213.63	N 39 59 4.16	W 80 33 7.19	6.32	
11027.00	89.61	324.83	6676.17	5344.54	4244.94	4205.68	-1012.62	0.64	0.05	0.64	542495.14	1705159.22	N 39 59 4.91	W 80 33 7.90	6.33	
11122.00	90.06	326.64	6676.53	5344.92	4338.22	4284.23	-1066.04	1.89	0.56	1.80	542573.69	1705105.80	N 39 59 5.68	W 80 33 8.69	6.35	
11217.00	89.87	326.42	6676.50	5344.89	4432.10	4363.48	-1118.43	0.25	-0.09	-0.23	542652.63	1705053.41	N 39 59 6.46	W 80 33 9.28	6.36	
11311.00	90.11	327.22	6676.44	5344.83	4525.07	4442.15	-1169.87	0.88	0.15	0.85	542731.60	1705001.97	N 39 59 7.23	W 80 33 9.95	6.37	
11406.00	89.91	327.12	6676.42	5344.81	4619.10	4521.98	-1221.38	0.24	-0.21	-0.11	542811.42	1704950.47	N 39 59 8.01	W 80 33 10.63	6.38	
11501.00	89.97	327.08	6676.52	5344.91	4713.12	4601.74	-1272.89	0.08	0.06	-0.04	542891.18	1704898.87	N 39 59 8.79	W 80 33 11.30	6.39	
11595.00	90.54	326.99	6676.10	5344.49	4806.09	4680.43	-1324.40	0.60	0.61	-0.52	542969.87	1704847.45	N 39 59 9.56	W 80 33 11.97	6.41	
11690.00	90.37	325.19	6675.35	5343.74	4899.80	4759.08	-1377.67	1.48	-0.18	-1.47	543048.51	1704794.18	N 39 59 10.34	W 80 33 12.67	6.42	
11785.00	90.43	324.98	6674.68	5343.07	4993.28	4838.98	-1432.05	0.23	0.06	-0.22	543126.41	1704739.81	N 39 59 11.10	W 80 33 13.38	6.43	
11879.00	90.51	324.76	6673.91	5342.30	5085.71	4913.85	-1486.13	0.25	0.09	-0.23	543203.28	1704685.73	N 39 59 11.85	W 80 33 14.09	6.44	
11973.00	90.52	324.89	6673.07	5341.46	5178.13	4990.69	-1540.28	0.14	0.01	0.14	543280.11	1704631.58	N 39 59 12.61	W 80 33 14.79	6.45	
12068.00	90.49	324.65	6672.23	5340.62	5271.52	5068.28	-1595.08	0.25	-0.03	-0.25	543357.37	1704578.78	N 39 59 13.37	W 80 33 15.51	6.46	
12163.00	90.52	325.14	6671.39	5339.78	5364.94	5146.00	-1649.71	0.52	0.03	0.52	543435.42	1704522.15	N 39 59 14.13	W 80 33 16.22	6.47	
12257.00	90.46	325.19	6670.59	5338.98	5457.46	5223.15	-1703.41	0.08	-0.06	0.05	543512.57	1704468.48	N 39 59 14.88	W 80 33 16.92	6.48	
12351.00	90.49	324.64	6669.81	5338.20	5549.91	5300.07	-1757.43	0.59	0.03	-0.59	543589.48	1704414.44	N 39 59 15.64	W 80 33 17.63	6.49	
12446.00	90.48	325.10	6669.02	5337.41	5643.32	5377.78	-1812.10	0.49	-0.03	0.48	543667.17	1704359.78	N 39 59 16.40	W 80 33 18.34	6.50	
12541.00	90.46	325.27	6668.23	5336.62	5736.83	5455.75	-1868.33	0.18	0.03	-0.18	543745.16	1704305.54	N 39 59 17.16	W 80 33 19.05	6.51	
12635.00	89.37	324.99	6668.35	5336.74	5829.34	5532.87	-1920.07	1.23	-1.19	-0.30	543822.28	1704251.80	N 39 59 17.92	W 80 33 19.75	6.52	
12730.00	89.43	324.62	6669.34	5337.73	5922.74	5610.50	-1974.80	0.39	0.06	-0.39	543899.90	1704197.06	N 39 59 18.68	W 80 33 20.47	6.53	
12824.00	89.34	324.48	6670.35	5338.70	6015.07	5687.06	-2029.30	0.20	-0.10	-0.17	543976.46	1704142.53	N 39 59 19.43	W 80 33 21.18	6.54	
12919.00	89.34	324.87	6671.45	5339.84	6108.44	5764.61	-2084.23	0.54	0.00	0.54	544054.00	1704087.68	N 39 59 20.19	W 80 33 21.90	6.55	
13013.00	90.51	324.66	6671.57	5339.96	6200.65	5841.43	-2138.39	1.29	1.24	-0.33	544130.82	1704033.50	N 39 59 20.94	W 80 33 22.60	6.56	
13108.00	90.49	324.79	6670.74	5339.13	6294.23	5918.88	-2193.25	0.14	-0.02	0.14	544208.37	1703978.64	N 39 59 21.70	W 80 33 23.32	6.57	
13203.00	90.49	324.90	6669.93	5338.32	6387.63	5996.65	-2247.85	0.12	0.00	0.12	544286.04	1703923.94	N 39 59 22.48	W 80 33 24.04	6.58	
13297.00	90.40	325.05	6669.20	5337.59	6480.10	6073.63	-2301.90	0.19	-0.10							

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TYD (ft)	TYDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (ft/100ft)	BR (ft/100ft)	TR (ft/100ft)	Northing (NUS)	Easting (EUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Directional Difficulty Index
	13487.00	90 43	324.73	6667.75	6336.14	6667.02	6220.30	-2410.82	0.44	-0.03	-0.44	544518.67	1703761.08	N 39 50 24.74 W	80 33 26.16	6.60
	13581.00	90.37	324.86	6687.09	6335.48	6759.43	6306.10	-2405.01	0.15	-0.06	0.14	544595.47	1703706.89	N 39 59 25.50 W	80 33 26.87	6.61
	13676.00	90 60	325.22	6666.20	6334.68	6852.00	6383.96	-2519.44	0.45	0.24	0.38	544673.32	1703652.40	N 39 59 26.26 W	80 33 27.56	6.62
	13771.00	90 54	326.10	6665.34	6333.73	6946.64	6482.40	-2573.03	0.03	-0.06	0.03	544751.76	1703598.68	N 39 59 27.03 W	80 33 28.26	6.63
	13865.00	90 49	325.48	6664.50	6332.89	7039.24	6540.12	-2625.89	0.68	-0.05	-0.68	544826.48	1703546.02	N 39 59 27.79 W	80 33 28.97	6.64
	13960.00	90 40	325.08	6663.76	6332.15	7132.77	6618.10	-2680.01	0.41	-0.00	-0.40	544907.55	1703491.90	N 39 59 28.56 W	80 33 29.68	6.65
	14055.00	90 37	325.09	6663.12	6331.51	7226.25	6696.09	-2734.38	0.03	-0.03	0.01	544985.44	1703437.53	N 39 59 29.32 W	80 33 30.39	6.66
	14149.00	90 46	324.84	6662.44	6330.83	7316.72	6773.06	-2788.35	0.28	0.10	-0.27	545062.41	1703383.57	N 39 59 30.07 W	80 33 31.10	6.66
	14244.00	90 43	325.23	6661.70	6330.09	7412.18	6850.81	-2842.78	0.41	-0.03	0.41	545140.25	1703329.13	N 39 59 30.84 W	80 33 31.81	6.67
	14339.00	90 51	325.13	6660.92	6329.31	7505.69	6928.89	-2897.03	0.13	0.08	-0.11	545218.24	1703274.69	N 39 59 31.60 W	80 33 32.52	6.68
	14433.00	90 40	325.16	6660.46	6328.85	7598.21	7000.03	-2950.75	0.48	-0.48	0.03	545295.37	1703221.17	N 39 59 32.36 W	80 33 33.22	6.69
	14528.00	89 86	324.04	6660.52	6328.91	7691.68	7083.00	-3005.17	0.31	-0.21	-0.23	545373.23	1703166.75	N 39 59 33.12 W	80 33 33.93	6.70
	14623.00	89 97	324.78	6660.66	6329.05	7765.10	7161.58	-3059.85	0.20	0.12	-0.17	545450.91	1703112.08	N 39 59 33.88 W	80 33 34.64	6.70
	14717.00	89 88	324.91	6660.80	6329.19	7877.52	7238.44	-3113.68	0.18	-0.12	0.14	545527.77	1703057.06	N 39 59 34.63 W	80 33 35.35	6.71
	14812.00	89 77	324.67	6661.11	6329.50	7970.02	7316.06	-3168.75	0.27	-0.09	-0.25	545605.38	1703003.18	N 39 59 35.40 W	80 33 36.06	6.72
	14907.00	89 91	325.31	6661.37	6329.76	8064.37	7393.86	-3223.25	0.69	0.15	0.67	545683.19	1702948.68	N 39 59 36.16 W	80 33 36.78	6.73
	15001.00	90 26	325.03	6661.23	6329.62	8156.60	7471.02	-3276.94	0.48	0.37	-0.30	545760.34	1702895.00	N 39 59 36.91 W	80 33 37.48	6.74
	15096.00	90 37	325.03	6660.71	6329.10	8250.37	7548.87	-3331.39	0.12	0.12	0.00	545838.19	1702840.55	N 39 59 37.68 W	80 33 38.19	6.74
	15190.00	90 34	325.04	6660.13	6328.52	8342.85	7625.90	-3385.26	0.03	-0.03	0.01	545915.21	1702786.69	N 39 59 38.43 W	80 33 38.89	6.75
	15285.00	90 43	324.93	6659.49	6327.88	8436.30	7703.71	-3439.76	0.15	0.06	-0.12	545993.01	1702732.18	N 39 59 39.19 W	80 33 39.61	6.76
	15380.00	90 49	325.54	6658.73	6327.12	8529.82	7781.75	-3493.93	0.65	0.06	0.64	546071.05	1702678.01	N 39 59 39.96 W	80 33 40.31	6.76
	15475.00	90 29	325.39	6658.08	6326.47	8623.42	7860.00	-3547.79	0.26	-0.21	-0.18	546149.30	1702624.16	N 39 59 40.73 W	80 33 41.02	6.77
	15569.00	90 20	325.23	6657.68	6326.07	8716.88	7937.29	-3601.29	0.20	-0.10	-0.17	546226.59	1702570.67	N 39 59 41.48 W	80 33 41.72	6.78
	15663.00	90 29	325.13	6657.28	6325.67	8809.81	8014.46	-3654.98	0.14	0.10	-0.11	546303.76	1702516.99	N 39 59 42.24 W	80 33 42.42	6.79
Final Survey	15713.00	90 40	325.55	6656.98	6325.37	8857.75	8055.59	-3683.39	0.87	0.22	0.84	546344.68	1702468.58	N 39 59 42.64 W	80 33 42.79	6.79
Projection to TD	15748.00	90 40	325.55	6656.73	6325.12	8892.24	8084.45	-3703.10	0.00	0.00	0.00	546373.74	1702468.76	N 39 59 42.93 W	80 33 43.05	6.79

51-01660

Survey Type: Del 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	22 430	Act Strs	30 000	30 000	SLB_NSG+MSHOT-Depth Only	Original Borehole / Noble Energy SHL-26C-HS Surveys 0ft to 15748ft MD
	1	22 430	1178 000	Act Strs	30 000	30 000	SLB_NSG+MSHOT	Original Borehole / Noble Energy SHL-26C-HS Surveys 0ft to
	1	1178 000	15713 000	Act Strs	30 000	30 000	SLB_MWD-STD	Original Borehole / Noble Energy SHL-26C-HS Surveys 0ft to
	1	15713 000	15748 000	Act Strs	30 000	30 000	SLB_BLIND+TREND	Original Borehole / Noble Energy SHL-26C-HS Surveys 0ft to

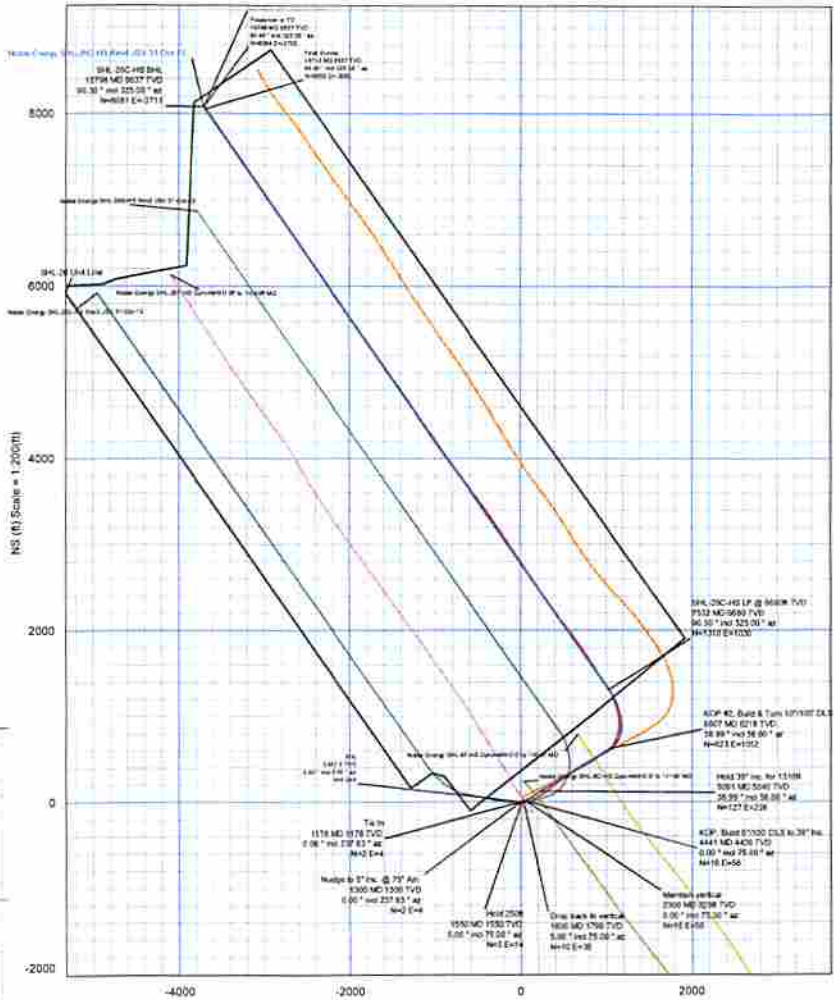
51-01660



Noble Energy



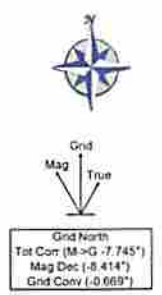
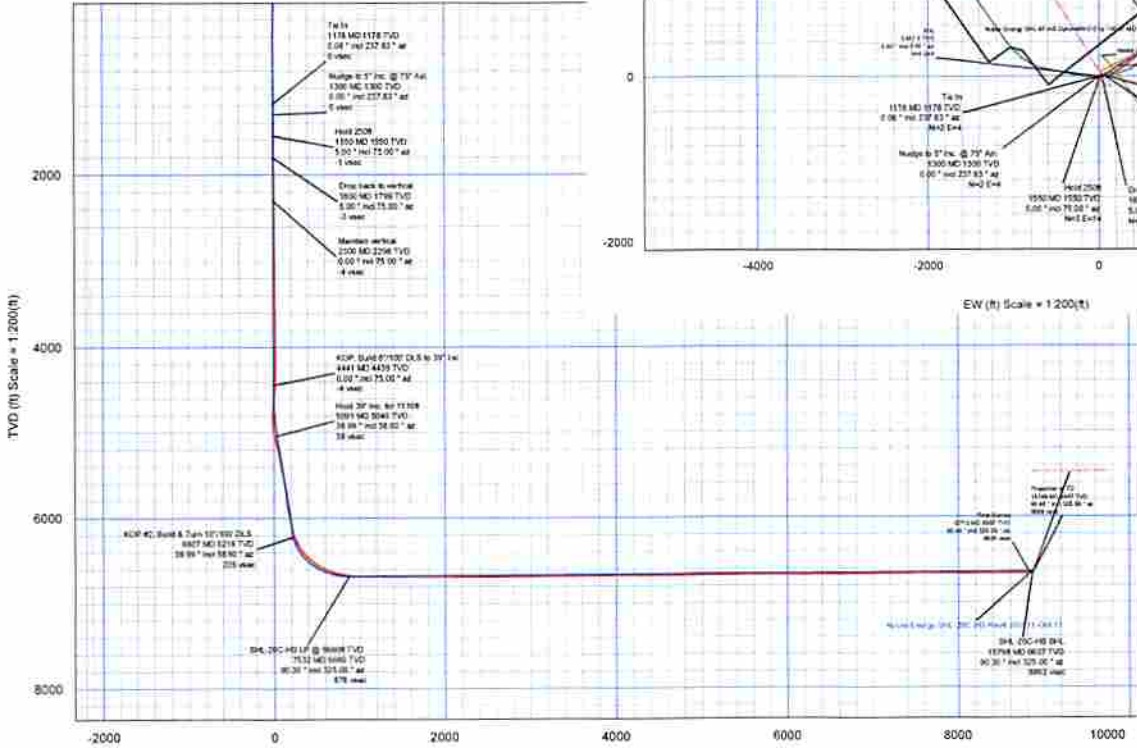
Borehole: Original Borehole	Well: SHL-26C-HS	Field: WV Marshall County (NAD 27)	Structure: Nabors M59
Gravity & Magnetic Parameters			
Model: HDGM 2013	Dip: 67.511°	Date: 12/19/2013	Surface Location: NAD27 West Virginia State Plane, Northern Zone, US Feet
Mag Dec: -8.414°	FS: 51128.156mT	Gravity FS: 979.545mgals	Lat: N 39 58 23.47 Lon: W 80 32 54.26
			Northing: 53228.639105 Easting: 1796171.737825 Grid Cont: -8.569° Scale Fact: 1
			Magnanometer: SHL-26C-HS TVD Ref: KN1311 81N above MSL Plan: MWD Surveys



FBM	Seq	Survey Type	Start Date	End Date	Start Time	End Time	Start Lat	Start Lon	Start Elev	End Lat	End Lon	End Elev	Comments
1	1	S.S. 2010080701	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control
1	2	S.S. 2010080702	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control
1	3	S.S. 2010080703	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control
1	4	S.S. 2010080704	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control

Survey Name	Start Date	End Date	Start Time	End Time	Start Lat	Start Lon	Start Elev	End Lat	End Lon	End Elev	Comments
2010080701	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control
2010080702	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control
2010080703	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control
2010080704	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control

Survey Name	Start Date	End Date	Start Time	End Time	Start Lat	Start Lon	Start Elev	End Lat	End Lon	End Elev	Comments
2010080701	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control
2010080702	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control
2010080703	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control
2010080704	08/07/10	08/07/10	08:00	08:00	39.9713	-80.5426	44.50	39.9713	-80.5426	44.50	Control



Vertical Section (ft) Azim = 339.997° Scale = 1,200(ft) Origin = 0N/-S, 0E/-W

09/19/2014