

85-10032



Noble Energy PENS1GHS Gyro+MWD 0' MD to TD @ 14955' MD Survey



Report (Non-Def Survey)

Received Office of Oil & Gas NOV 21 2014

Report Date: December 31, 2013 - 10:31 AM
Client: Noble Energy
Field: WV Ritchie County (NAD27)
Structure / Slot: Noble Energy PENS1 Pad / PENS1GHS
Well: PENS1GHS
Borehole: Original Borehole
UWI / API#: Unknown / Unknown
Survey Name: Noble Energy PENS1GHS Gyro+MWD 0' MD to update
Tort / AHD / BDI / ERD Ratio: 241.110 ' / 9077.664 R / 0.711 / 1.425
Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet
Location Lat / Long: N 39° 20' 5.757077, W 80° 59' 34.88918"
Location Grid N/E Y/X: N 307508.409 N/E, E 1577708.366 N/E
CRS Grid Convergence Angle: -0.9522 °
Grid Scale Factor: 0.99995357
Version / Patch: 2.7.998.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 316.011 ' (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: KB
TVD Reference Elevation: 1137.670 ft above MSL
Seabed / Ground Elevation: 1112.050 ft above MSL
Magnetic Declination: -7.804 °
Total Gravity Field Strength: 999.3062mgm (g 80865 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 62827.210 nT
Magnetic Dip Angle: 66.872 °
Declination Date: December 20, 2013
Magnetic Declination Model: HDGM 2013
North Reference: Grid North
Total Corr Mag North->Grid North: -0.9522 °
Total Corr Mag ->Grid North: -6.9517 °
Local Coord Referenced To: Well Head

Table with columns: Comments, MD (ft), Incl (°), Azim Grid (°), TVD (ft), TVDSS (ft), VSECC (ft), NS (ft), EW (ft), DLS (ft/100ft), BR (ft/100ft), TR (ft/100ft), Northing (N/E), Easting (E/W), Latitude (N/S), Longitude (E/W). Rows include data points from 0.00 to 8750.00 ft depth.

12/12/2014

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Table with columns: 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 (ft), Easting (ft), Latitude (N 30 20 ...), Longitude (W 80 50 ...). Rows list wellbore data points for various depths from 6700.00 to 14955.00.

Survey Type: Non-Def Survey

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

Table with columns: Description, Part, MD From (ft), MD To (ft), EOU Freq (ft), Hole Size (in), Casing Diameter (in), Survey Tool Type, Borehole / Survey. Contains 4 rows of survey parameters.

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Noble Energy PENS1GHS Gyro+MWD 0' MD to update Survey Report

(Non-Def Survey)

Report Date: December 31, 2013 - 09:22 AM
 Client: Noble Energy
 Field: WV Ritchie County (NAD27)
 Structure / Slot: Noble Energy PENS1 Pad / PENS1GHS
 Well: PENS1GHS
 Borehole: Original Borehole
 UWI / API#: Unknown / 47-8510032
 Survey Name: Noble Energy PENS1GHS Gyro+MWD 0' MD to update
 Survey Date: December 20, 2013
 Tort / AHD / DDI / ERD Ratio: 241.110° / 9077.664 ft / 6.711 / 1.425
 Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet
 Location Lat / Long: N 39° 20' 5.75707", W 80° 59' 34.88618"
 Location Grid N/E Y/X: N 307608.409 ftUS, E 1577708.366 ftUS
 CRS Grid Convergence Angle: -0.9522°
 Grid Scale Factor: 0.99995357
 Version / Patch: 2.7.998.0

Survey / DLS Computation: Minimum Curvature / Lubinski
 Vertical Section Azimuth: 316.011° (Grid North)
 Vertical Section Origin: 0.000 ft, 0.000 ft
 TVD Reference Datum: KB
 TVD Reference Elevation: 1137.670 ft above MSL
 Seabed / Ground Elevation: 1112.050 ft above MSL
 Magnetic Declination: -7.804°
 Total Gravity Field Strength: 999.3062mgn (9.80665 Based)
 Gravity Model: GARM
 Total Magnetic Field Strength: 52287.210 nT
 Magnetic Dip Angle: 66.872°
 Declination Date: December 20, 2013
 Magnetic Declination Model: HDGM 2013
 North Reference: Grid North
 Total Corr Mag North->Grid North: -0.9522°
 Total Corr Mag ->Grid North: -6.8517°
 Local Coord Referenced To: Well Head

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Comments	DeltaMD (ft)	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (N/S ft)	EW (E/W ft)	Closure (ft)	Closure Azimuth (°)	DLS (°/100ft)	BR (°/100ft)	TF (°)
SHL	N/A	0.00	0.00	0.00	0.00	0.00	N 0.00	E 0.00	0.00	0.00	N/A	N/A	213.89M
	126.00	126.00	1.04	213.89	125.99	-0.24	S 0.95	W 0.64	1.14	213.89	0.83	0.83	201.02M
	100.00	226.00	0.27	201.02	225.99	-0.53	S 1.92	W 1.23	2.28	212.57	0.78	-0.77	191.64M
	100.00	326.00	0.39	191.64	325.98	-0.82	S 2.48	W 1.38	2.84	209.16	0.13	0.12	189.89M
	100.00	426.00	0.36	189.89	425.98	-1.20	S 3.12	W 1.50	3.46	205.75	0.03	-0.03	190.49M
	100.00	526.00	0.25	190.49	525.98	-1.51	S 3.64	W 1.60	3.98	203.68	0.11	-0.11	199.1M
	93.00	619.00	0.38	199.10	618.98	-1.77	S 4.13	W 1.74	4.48	202.78	0.15	0.14	214.91M
	109.00	728.00	0.15	214.91	727.98	-1.96	S 4.59	W 1.94	4.98	202.85	0.22	-0.21	236.82M
	61.00	789.00	0.09	236.82	788.98	-1.97	S 4.68	W 2.02	5.10	203.34	0.12	-0.10	200.92M
	93.00	882.00	0.13	200.92	881.98	-2.00	S 4.82	W 2.12	5.27	203.73	0.08	0.04	222.08M
	94.00	976.00	0.13	222.08	975.98	-2.05	S 5.00	W 2.23	5.48	204.03	0.05	0.00	223.44M
	96.00	1072.00	0.11	223.44	1071.98	-2.06	S 5.15	W 2.37	5.67	204.68	0.02	-0.02	10.91M
	96.00	1168.00	0.10	10.91	1167.98	-2.02	S 5.13	W 2.41	5.67	205.18	0.21	-0.01	134.69M
	94.00	1262.00	0.11	134.69	1261.98	-2.06	S 5.12	W 2.33	5.62	204.52	0.20	0.01	248.62M
	94.00	1356.00	0.16	248.62	1355.98	-2.10	S 5.23	W 2.39	5.75	204.59	0.24	0.05	84.77M
	95.00	1451.00	0.09	84.77	1450.98	-2.10	S 5.27	W 2.44	5.81	204.86	0.26	-0.07	281.88M
	95.00	1546.00	0.09	281.88	1545.98	-2.08	S 5.25	W 2.44	5.79	204.94	0.19	0.00	225.96M
	96.00	1642.00	0.07	225.96	1641.98	-2.02	S 5.27	W 2.56	5.86	205.86	0.08	-0.02	144.96M
	95.00	1737.00	0.11	144.96	1736.98	-2.11	S 5.39	W 2.55	5.96	205.29	0.13	0.04	119.15M
	94.00	1831.00	0.11	119.15	1830.98	-2.28	S 5.51	W 2.41	6.01	203.68	0.05	0.00	113.37M
	95.00	1926.00	0.10	113.37	1925.98	-2.45	S 5.58	W 2.26	6.02	202.03	0.02	-0.01	303.94M
	94.00	2020.00	0.05	303.94	2019.98	-2.48	S 5.59	W 2.22	6.02	201.63	0.16	-0.05	250.96M
	95.00	2115.00	0.08	250.96	2114.98	-2.41	S 5.59	W 2.31	6.05	202.49	0.07	0.03	14.2M
	96.00	2211.00	0.10	14.20	2210.98	-2.34	S 5.53	W 2.36	6.01	203.08	0.17	0.02	133.94M
	95.00	2306.00	0.13	133.94	2305.98	-2.41	S 5.53	W 2.26	5.97	202.24	0.21	0.03	56.18M
	95.00	2401.00	0.01	56.18	2400.98	-2.52	S 5.60	W 2.17	6.00	201.24	0.14	-0.13	263.16M
	95.00	2496.00	0.48	263.16	2495.97	-2.28	S 5.64	W 2.56	6.19	204.44	0.51	0.49	268.57M

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	95.00	2591.00	0.73	268.57	2590.97	-1.63	S 5.70	W 3.56	6.72	212.01	0.27	0.26	266.41M
	94.00	2685.00	1.14	266.41	2684.96	-0.62	S 5.77	W 5.10	7.70	221.42	0.44	0.44	265.9M
	94.00	2779.00	1.21	265.90	2778.94	0.63	S 5.90	W 7.02	9.17	229.93	0.08	0.07	275.63M
	96.00	2875.00	1.33	275.63	2874.91	2.13	S 5.87	W 9.14	10.86	237.30	0.26	0.13	273.09M
	95.00	2970.00	1.48	273.09	2969.88	3.86	S 5.69	W 11.46	12.80	243.58	0.17	0.16	274.01M
	96.00	3066.00	1.48	274.01	3065.85	5.69	S 5.54	W 13.93	15.00	248.32	0.02	0.00	268.3M
	96.00	3162.00	1.30	268.30	3161.82	7.35	S 5.49	W 16.26	17.16	251.36	0.24	-0.19	266.49M
	95.00	3257.00	1.37	266.49	3256.80	8.81	S 5.59	W 18.47	19.30	253.17	0.09	0.07	265.69M
	96.00	3353.00	1.03	265.69	3352.78	10.10	S 5.72	W 20.48	21.26	254.39	0.35	-0.35	268.86M
	95.00	3448.00	0.34	268.86	3447.77	10.84	S 5.79	W 21.61	22.37	255.00	0.73	-0.73	24.52M
	96.00	3544.00	0.35	24.52	3543.77	11.14	S 5.53	W 21.77	22.46	255.75	0.61	0.01	62.66M
	96.00	3640.00	0.57	62.66	3639.77	11.11	S 5.04	W 21.23	21.82	256.63	0.38	0.23	49.65M
	95.00	3735.00	0.40	49.65	3734.76	10.96	S 4.61	W 20.55	21.07	257.35	0.21	-0.18	73.37M
	95.00	3830.00	0.25	73.37	3829.76	10.84	S 4.34	W 20.10	20.57	257.82	0.21	-0.16	63.5M
	96.00	3926.00	0.46	63.50	3925.76	10.63	S 4.11	W 19.56	19.98	258.14	0.23	0.22	83.5M
	95.00	4021.00	0.64	83.50	4020.76	10.19	S 3.88	W 18.69	19.09	258.28	0.27	0.19	103.77M
	95.00	4116.00	0.49	103.77	4115.75	9.52	S 3.91	W 17.77	18.19	257.58	0.26	-0.16	101.02M
	95.00	4211.00	0.53	101.02	4210.75	8.82	S 4.09	W 16.94	17.43	256.42	0.05	0.04	125.35M
	95.00	4306.00	0.74	125.35	4305.74	7.86	S 4.53	W 16.01	16.64	254.19	0.36	0.22	125.51M
	94.00	4400.00	0.79	125.51	4399.73	6.62	S 5.26	W 14.99	15.88	250.66	0.05	0.05	102.64M
	95.00	4495.00	0.97	102.64	4494.72	5.31	S 5.82	W 13.67	14.86	246.95	0.41	0.19	111.29M
	95.00	4590.00	0.85	111.29	4589.71	4.00	S 6.25	W 12.23	13.73	242.93	0.19	-0.13	126.78M
	95.00	4685.00	0.66	126.78	4684.70	2.82	S 6.83	W 11.13	13.06	238.47	0.29	-0.20	121.32M
	95.00	4780.00	0.40	121.32	4779.70	1.96	S 7.33	W 10.41	12.73	234.85	0.28	-0.27	153.88M
	94.00	4874.00	0.32	153.88	4873.70	1.39	S 7.74	W 10.02	12.66	232.31	0.23	-0.09	186.99M
	95.00	4969.00	0.62	186.99	4968.69	0.81	S 8.49	W 9.96	13.09	229.57	0.41	0.32	202.47M
	94.00	5063.00	0.47	202.47	5062.69	0.34	S 9.35	W 10.17	13.81	227.42	0.22	-0.16	230.92M
	94.00	5157.00	0.77	230.92	5156.68	0.24	S 10.10	W 10.81	14.79	226.94	0.45	0.32	235.16M
	93.00	5250.00	0.81	235.16	5249.67	0.40	S 10.87	W 11.83	16.07	227.43	0.08	0.04	234.86M
	56.00	5306.00	1.03	234.86	5305.67	0.54	S 11.39	W 12.57	16.96	227.83	0.39	0.39	231.93M
	155.00	5461.00	1.12	231.93	5460.64	0.91	S 13.12	W 14.90	19.86	228.63	0.07	0.06	228.91M
Curve KOP @ 5500' MD, 5499' TVD	47.00	5508.00	3.34	228.91	5507.60	1.02	S 14.31	W 16.30	21.68	228.72	4.73	4.72	221.62M
	47.00	5555.00	9.40	221.62	5554.29	0.80	S 18.08	W 19.88	26.87	227.72	12.98	12.89	1.36L
	49.00	5604.00	14.62	221.13	5602.20	-0.03	S 25.73	W 26.61	37.02	225.96	10.65	10.65	0.35L
	47.00	5651.00	19.63	221.04	5647.10	-1.22	S 36.16	W 35.70	50.82	224.63	10.66	10.66	6.35L
	49.00	5700.00	23.72	219.91	5692.63	-2.98	S 49.94	W 47.43	68.87	223.53	8.39	8.35	6.34L
	47.00	5747.00	27.65	218.97	5734.98	-5.33	S 65.67	W 60.36	89.20	222.59	8.41	8.36	0.62R
	49.00	5796.00	32.63	219.07	5777.34	-8.32	S 84.78	W 75.85	113.76	221.82	10.16	10.16	1.32R
	47.00	5843.00	36.80	219.23	5815.96	-11.51	S 105.53	W 92.75	140.49	221.31	8.87	8.87	21.38R
	49.00	5892.00	40.11	221.23	5854.33	-14.56	S 128.78	W 112.44	170.96	221.12	7.22	6.76	94.89R
	47.00	5939.00	39.94	228.73	5890.34	-15.11	S 150.13	W 133.77	201.08	221.70	10.26	-0.36	84.93R
	48.00	5987.00	40.85	237.99	5926.93	-11.12	S 168.63	W 158.68	231.55	223.26	12.64	1.90	84.57R
	47.00	6034.00	41.32	243.43	5962.37	-3.28	S 183.72	W 185.60	261.16	225.29	7.67	1.00	80.98R
	49.00	6083.00	42.09	249.27	5998.97	-8.05	S 196.78	W 215.44	291.78	227.59	8.08	1.57	83.96R
	47.00	6130.00	42.58	254.47	6033.72	21.85	S 206.61	W 245.50	320.87	229.92	7.52	1.04	71.95R
	48.00	6178.00	44.16	260.68	6068.63	39.11	S 213.67	W 277.67	350.36	232.42	9.47	3.29	67.8R
	47.00	6225.00	46.08	266.67	6101.81	59.47	S 217.31	W 310.74	379.18	235.03	9.91	4.09	65.9R
	48.00	6273.00	47.68	271.23	6134.62	83.33	S 217.93	W 345.75	408.70	237.78	7.69	3.33	50.23R
	47.00	6320.00	50.25	275.14	6165.48	109.34	S 215.94	W 381.13	438.05	240.47	8.32	5.47	52.34R
	49.00	6369.00	53.24	279.82	6195.83	139.44	S 210.90	W 419.25	469.31	243.30	9.67	6.10	55.56R

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Curve KOP @
5500' MD, 5499'
TVD

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Comments	DeltaMD (ft)	MD (ft)	Incl (°)	Azlm Grid (°)	TVD (ft)	VSEC (ft)	NS (N/S ft)	EW (E/W ft)	Closure (ft)	Closure Azimuth (°)	DLS (°/100ft)	BR (°/100ft)	TF (°)
	47.00	6416.00	56.22	284.86	6222.98	171.37	S 202.68	W 456.71	499.66	246.07	10.81	6.34	56.34R
	48.00	6464.00	58.83	289.30	6248.76	206.81	S 190.77	W 495.39	530.85	248.94	9.51	5.44	50.2R
	47.00	6511.00	61.76	293.21	6272.05	243.87	S 175.95	W 533.42	561.69	251.74	9.54	6.23	46.96R
	49.00	6560.00	65.22	297.22	6293.93	284.86	S 157.26	W 573.06	594.24	254.65	10.17	7.06	50.49R
	47.00	6607.00	68.38	301.27	6312.45	326.21	S 136.15	W 610.73	625.72	257.43	10.39	6.72	55.55R
	47.00	6654.00	71.18	305.50	6328.70	369.23	S 111.88	W 647.53	657.13	260.20	10.33	5.96	55.79R
	47.00	6701.00	73.67	309.26	6342.89	413.52	S 84.68	W 683.12	688.35	262.93	9.29	5.30	40.43R
	49.00	6750.00	77.56	312.63	6355.07	460.78	S 53.57	W 718.95	720.94	265.74	10.36	7.94	36.72R
	47.00	6797.00	81.76	315.78	6363.50	506.98	S 21.34	W 752.08	752.38	268.37	11.10	8.94	26.29R
	48.00	6845.00	86.56	318.15	6368.39	554.70	N 13.55	W 784.65	784.77	270.99	11.14	10.00	27.57R
LP @ 6945' MD, 6371' TVD	100.00	6945.00	89.55	319.71	6371.78	654.50	N 88.89	W 850.30	854.93	275.97	3.37	2.99	37.45R
	95.00	7040.00	90.96	320.79	6371.36	749.24	N 161.93	W 911.04	925.32	280.08	1.87	1.48	118.3L
	95.00	7135.00	90.89	320.66	6369.82	843.90	N 235.46	W 971.17	999.31	283.63	0.16	-0.07	165.96L
	96.00	7231.00	90.21	320.49	6368.90	939.60	N 309.61	W 1032.14	1077.57	286.70	0.73	-0.71	92.48L
	95.00	7326.00	90.10	317.95	6368.64	1034.44	N 381.54	W 1094.18	1158.79	289.22	2.68	-0.12	93.58L
	95.00	7421.00	90.00	316.35	6368.56	1129.42	N 451.18	W 1158.79	1243.53	291.27	1.69	-0.11	47.2R
	96.00	7517.00	91.37	317.83	6367.41	1225.39	N 521.49	W 1224.14	1330.59	293.07	2.10	1.43	96.53R
	96.00	7613.00	91.07	320.44	6365.37	1321.21	N 594.07	W 1286.93	1417.43	294.78	2.74	-0.31	164.06R
	95.00	7708.00	90.79	320.52	6363.83	1415.91	N 667.34	W 1347.38	1503.58	296.35	0.31	-0.29	169.95R
	96.00	7804.00	90.00	320.66	6363.17	1511.60	N 741.51	W 1408.32	1591.60	297.77	0.84	-0.82	156.8L
	96.00	7900.00	89.86	320.60	6363.28	1607.29	N 815.72	W 1469.22	1680.48	299.04	0.16	-0.15	108.44L
	95.00	7995.00	89.83	320.51	6363.54	1701.99	N 889.09	W 1529.57	1769.20	300.17	0.10	-0.03	81.35R
	96.00	8091.00	89.90	320.97	6363.77	1797.67	N 963.42	W 1590.33	1859.38	301.21	0.48	0.07	79.96L
	95.00	8186.00	90.07	320.01	6363.79	1892.37	N 1036.71	W 1650.77	1949.31	302.13	1.03	0.18	83.16R
	96.00	8282.00	90.10	320.26	6363.65	1988.13	N 1110.39	W 1712.30	2040.82	302.96	0.26	0.03	LS
	95.00	8377.00	89.93	320.26	6363.62	2082.86	N 1183.44	W 1773.03	2131.71	303.72	0.18	-0.18	75.25R
	96.00	8473.00	90.48	322.35	6363.28	2178.45	N 1258.37	W 1833.05	2223.41	304.47	2.25	0.57	105.91L
	95.00	8568.00	89.79	319.93	6363.06	2273.06	N 1332.33	W 1892.65	2314.57	305.14	2.65	-0.73	64.08R
	96.00	8664.00	90.48	321.35	6362.83	2368.74	N 1406.56	W 1953.53	2407.21	305.75	1.64	0.72	139.54L
	96.00	8760.00	90.14	321.06	6362.31	2464.35	N 1481.38	W 2013.67	2499.87	306.34	0.47	-0.35	172.07R
	95.00	8855.00	89.35	321.17	6362.73	2558.97	N 1555.33	W 2073.31	2591.84	306.88	0.84	-0.83	88.2L
	96.00	8951.00	89.38	320.22	6363.80	2654.64	N 1629.60	W 2134.12	2685.15	307.37	0.99	0.03	59.66R
	95.00	9046.00	89.86	321.04	6364.43	2749.33	N 1703.04	W 2194.37	2777.70	307.81	1.00	0.51	42.42R
	96.00	9142.00	90.79	321.89	6363.88	2844.89	N 1778.13	W 2254.18	2871.08	308.27	1.31	0.97	88.78L
	96.00	9238.00	90.86	318.53	6362.50	2940.61	N 1851.88	W 2315.60	2965.04	308.65	3.50	0.07	89.02L
	95.00	9333.00	90.89	316.76	6361.05	3035.56	N 1922.07	W 2379.60	3058.90	308.93	1.86	0.03	149.04L
	96.00	9429.00	90.69	316.64	6359.73	3131.54	N 1991.93	W 2445.43	3154.03	309.16	0.24	-0.21	71.56L
	96.00	9525.00	90.72	316.55	6358.54	3227.53	N 2061.67	W 2511.39	3249.24	309.38	0.10	0.03	122.07R
	95.00	9620.00	89.73	318.13	6358.17	3322.50	N 2131.53	W 2575.76	3343.35	309.61	1.96	-1.04	75.98R
	95.00	9715.00	89.83	318.53	6358.54	3417.42	N 2202.49	W 2638.92	3437.28	309.85	0.43	0.11	60.83R
	96.00	9811.00	90.31	319.39	6358.42	3513.29	N 2274.90	W 2701.95	3532.10	310.10	1.03	0.50	90R
	95.00	9906.00	90.31	320.53	6357.90	3608.06	N 2347.63	W 2763.07	3625.73	310.35	1.20	0.00	73.3L
	95.00	10001.00	90.34	320.43	6357.37	3702.77	N 2420.91	W 2823.52	3719.28	310.61	0.11	0.03	32.4R
	96.00	10097.00	90.86	320.76	6356.36	3798.46	N 2495.09	W 2884.46	3813.86	310.86	0.64	0.64	49.91R
	95.00	10192.00	91.55	321.58	6354.36	3893.05	N 2569.07	W 2944.01	3907.34	311.11	1.13	0.73	119.33L
	96.00	10288.00	90.69	320.05	6352.49	3988.69	N 2643.47	W 3004.65	4001.98	311.34	1.83	-0.90	109.98R
	96.00	10384.00	90.41	320.82	6351.56	4084.40	N 2717.47	W 3065.79	4096.80	311.55	0.85	-0.29	98.74L
	95.00	10479.00	90.31	320.17	6350.97	4179.11	N 2790.77	W 3126.23	4190.66	311.76	0.69	-0.11	HS
GTC @ 10613' MD Hold 6351' TVD	96.00	10575.00	90.41	320.17	6350.36	4274.85	N 2864.49	W 3187.71	4285.65	311.94	0.10	0.10	88.08R

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Comments	DeltaMD (ft)	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (N/S ft)	EW (E/W ft)	Closure (ft)	Closure Azimuth (°)	DLS (°/100ft)	BR (°/100ft)	TF (°)
	95.00	10670.00	90.48	322.27	6349.63	4369.45	N 2938.54	W 3247.21	4379.43	312.14	2.21	0.07	161.57L
	96.00	10766.00	90.45	322.26	6348.85	4464.88	N 3014.46	W 3305.96	4473.96	312.36	0.03	-0.03	92.99L
	95.00	10861.00	90.34	320.16	6348.19	4559.48	N 3088.50	W 3365.47	4567.85	312.54	2.21	-0.12	70.25R
	96.00	10957.00	90.62	320.94	6347.39	4655.18	N 3162.63	W 3426.47	4662.93	312.71	0.86	0.29	156.8L
	96.00	11053.00	90.34	320.82	6346.58	4750.83	N 3237.10	W 3487.04	4757.97	312.87	0.32	-0.29	162.41L
	95.00	11148.00	89.93	320.69	6346.36	4845.50	N 3310.68	W 3547.14	4852.09	313.03	0.45	-0.43	140.01R
	96.00	11244.00	89.62	320.95	6346.74	4941.16	N 3385.09	W 3607.78	4947.22	313.18	0.42	-0.32	119.25L
	96.00	11340.00	88.87	319.61	6348.00	5036.88	N 3458.92	W 3669.12	5042.48	313.31	1.60	-0.78	75.43R
	96.00	11436.00	89.00	320.11	6349.79	5132.65	N 3532.30	W 3731.00	5137.85	313.43	0.54	0.14	70.73R
	95.00	11531.00	90.34	323.94	6350.33	5227.11	N 3607.17	W 3789.44	5231.78	313.59	4.27	1.41	93.23R
GTC @ 11621' MD Hold 6348' TVD	96.00	11627.00	90.24	325.71	6349.85	5321.97	N 3685.64	W 3844.74	5325.97	313.79	1.85	-0.10	48.6L
	95.00	11722.00	91.65	324.11	6348.28	5415.81	N 3763.35	W 3899.34	5419.20	313.98	2.24	1.48	84.25L
	96.00	11818.00	92.10	319.58	6345.14	5511.23	N 3838.78	W 3958.60	5514.24	314.12	4.74	0.47	98.37L
	95.00	11913.00	91.58	316.07	6342.09	5606.12	N 3909.14	W 4022.34	5608.98	314.18	3.73	-0.55	135.37L
	96.00	12009.00	90.07	314.58	6340.70	5702.10	N 3977.39	W 4089.83	5704.94	314.20	2.21	-1.57	125.1R
	95.00	12104.00	89.55	315.32	6341.02	5797.08	N 4044.51	W 4157.06	5799.93	314.21	0.95	-0.55	140.2L
	96.00	12200.00	88.83	314.72	6342.38	5893.06	N 4112.41	W 4224.91	5895.91	314.23	0.98	-0.75	86.64R
	95.00	12295.00	88.90	315.91	6344.26	5988.03	N 4179.94	W 4291.70	5990.88	314.24	1.25	0.07	68.93R
	96.00	12391.00	90.03	318.84	6345.16	6083.98	N 4250.56	W 4356.70	6086.72	314.29	3.27	1.18	176.88R
	95.00	12486.00	89.48	318.87	6345.56	6178.87	N 4322.10	W 4419.21	6181.42	314.36	0.58	-0.58	158.86L
	96.00	12582.00	88.73	318.58	6347.06	6274.75	N 4394.24	W 4482.53	6277.14	314.43	0.84	-0.78	105.44R
	95.00	12677.00	88.49	319.45	6349.37	6369.59	N 4465.93	W 4544.82	6371.81	314.50	0.95	-0.25	52.93R
	96.00	12773.00	89.79	321.17	6350.81	6465.30	N 4539.79	W 4606.12	6467.30	314.58	2.25	1.35	32.8L
	95.00	12868.00	90.24	320.88	6350.78	6559.94	N 4613.65	W 4665.87	6561.71	314.68	0.56	0.47	23.2R
	94.00	12962.00	90.45	320.97	6350.22	6653.59	N 4686.62	W 4725.12	6655.16	314.77	0.24	0.22	54.41R
	96.00	13058.00	91.68	322.69	6348.43	6749.07	N 4762.08	W 4784.43	6750.42	314.87	2.20	1.28	128.34L
GTC @ 13097' MD Hold 6345' TVD	96.00	13154.00	90.24	320.87	6346.82	6844.57	N 4837.48	W 4843.82	6845.71	314.96	2.42	-1.50	126.87R
	95.00	13249.00	90.21	320.91	6346.45	6939.22	N 4911.20	W 4903.74	6940.21	315.04	0.05	-0.03	74.88R
	96.00	13345.00	90.31	321.28	6346.01	7034.84	N 4985.90	W 4964.03	7035.68	315.13	0.40	0.10	105.07L
	96.00	13441.00	90.24	321.02	6345.55	7130.46	N 5060.66	W 5024.25	7131.16	315.21	0.28	-0.07	135R
	95.00	13536.00	90.03	321.23	6345.33	7225.08	N 5134.62	W 5083.87	7225.66	315.28	0.31	-0.22	149.26L
	96.00	13632.00	89.66	321.01	6345.59	7320.69	N 5209.35	W 5144.13	7321.17	315.36	0.45	-0.39	52.12R
	96.00	13728.00	89.73	321.10	6346.10	7416.32	N 5284.02	W 5204.48	7416.70	315.43	0.12	0.07	79.38L
	95.00	13823.00	89.76	320.94	6346.52	7510.96	N 5357.87	W 5264.23	7511.25	315.51	0.17	0.03	70.91L
	95.00	13918.00	90.21	319.64	6346.55	7605.69	N 5430.95	W 5324.93	7605.92	315.56	1.45	0.47	83.77L
	96.00	14014.00	90.27	319.09	6346.15	7701.53	N 5503.80	W 5387.45	7701.71	315.61	0.58	0.06	97.69L
	96.00	14110.00	90.17	318.35	6345.78	7797.42	N 5575.94	W 5450.78	7797.57	315.65	0.78	-0.10	84.9R
	94.00	14204.00	90.27	319.47	6345.42	7891.29	N 5646.78	W 5512.56	7891.42	315.69	1.20	0.11	95.36L
	94.00	14298.00	90.24	319.15	6345.00	7985.14	N 5718.06	W 5573.84	7985.23	315.73	0.34	-0.03	50.53R
	95.00	14393.00	90.38	319.32	6344.48	8079.99	N 5790.01	W 5635.87	8080.06	315.77	0.23	0.15	106.99L
	95.00	14488.00	90.27	318.96	6343.95	8174.84	N 5861.86	W 5698.02	8174.89	315.81	0.40	-0.12	141.91L
	94.00	14582.00	89.90	318.67	6343.81	8268.73	N 5932.60	W 5759.92	8268.76	315.85	0.50	-0.39	90R
	95.00	14677.00	89.90	319.71	6343.97	8363.58	N 6004.50	W 5822.01	8363.60	315.88	1.09	0.00	90R
	95.00	14772.00	89.90	320.95	6344.14	8458.31	N 6077.63	W 5882.65	8458.32	315.93	1.31	0.00	34.51R
	95.00	14867.00	90.38	321.28	6343.91	8552.93	N 6151.57	W 5942.29	8552.93	315.99	0.61	0.51	63.43R
Final Survey 31- Dec-13	49.00	14916.00	90.76	322.04	6343.42	8601.69	N 6190.01	W 5972.68	8601.69	316.02	1.73	0.78	HS
Projection to TD	39.00	14955.00	90.76	322.04	6342.90	8640.47	N 6220.75	W 5996.67	8640.47	316.05	0.00	0.00	

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Comments	DeltaMD (ft)	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (N/S ft)	EW (E/W ft)	Closure (ft)	Closure Azimuth (°)	DLS (°/100ft)	BR (°/100ft)	TF (°)
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Survey Type: Non-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	25.620	Act Stns	30.000	30.000	SLB_NSG+MSHOT-Depth Only	Original Borehole / Noble Energy PENS1GHS Gyro+MWD 0' MD to update
	1	25.620	619.000	Act Stns	30.000	30.000	SLB_NSG+MSHOT	Original Borehole / Noble Energy PENS1GHS Gyro+MWD 0' MD to update
	1	619.000	1356.000	Act Stns	30.000	30.000	SLB_INC_ONLY<10	Original Borehole / Noble Energy PENS1GHS Gyro+MWD 0' MD to update
	1	1356.000	5306.000	Act Stns	30.000	30.000	SLB_MWD-STD	Original Borehole / Noble Energy PENS1GHS Gyro+MWD 0' MD to update
	1	5306.000	5555.000	Act Stns	30.000	30.000	SLB_MWD-INC_ONLY	Original Borehole / Noble Energy PENS1GHS Gyro+MWD 0' MD to update
	1	5555.000	14916.000	Act Stns	30.000	30.000	SLB_MWD-STD	Original Borehole / Noble Energy PENS1GHS Gyro+MWD 0' MD to update
	1	14916.000	14955.000	Act Stns	30.000	30.000	SLB_BLIND+TREND	Original Borehole / Noble Energy PENS1GHS Gyro+MWD 0' MD to update

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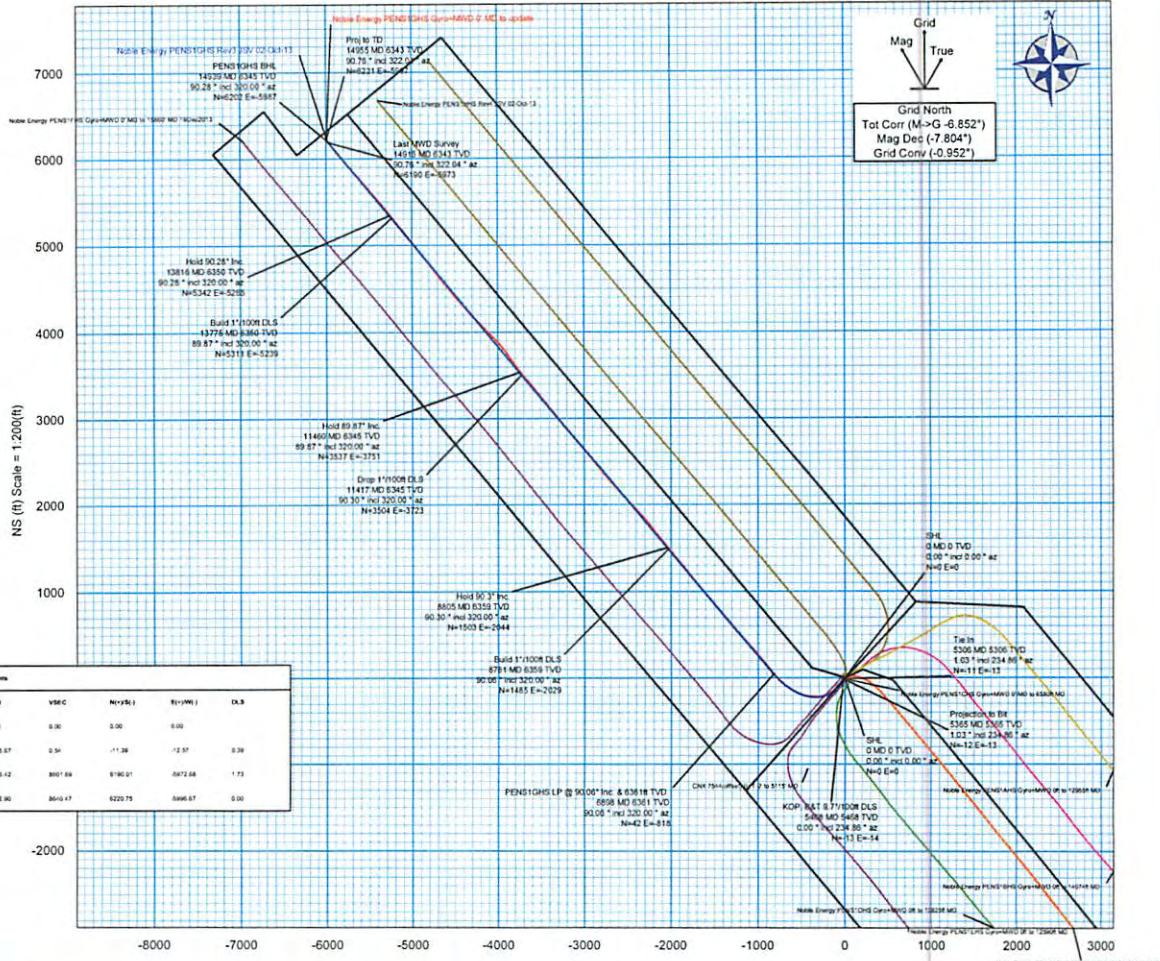
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Noble Energy

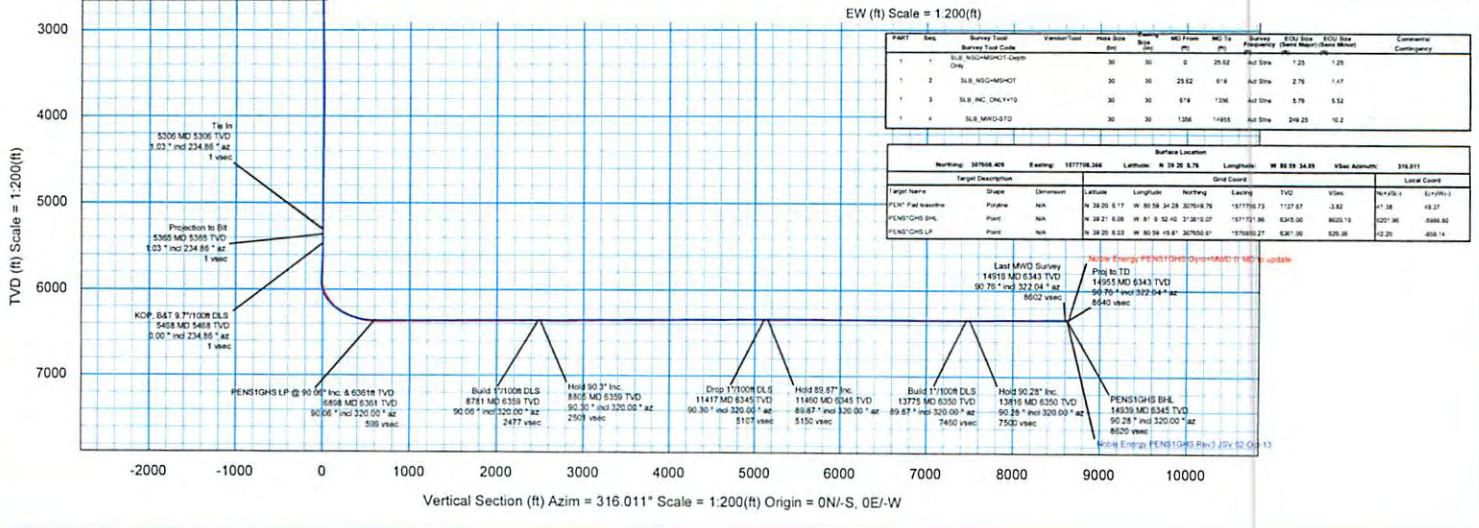


Borehole: Original Borehole		Well: PENS1GHS	Field: WV Ritchie County (NAD27)	Structure: Nomac 78
Gravity & Magnetic Parameters Model: HDGM 2013 Dip: 66.872° Date: 12/20/2013 MagDec: -7.804° FS: 52287.21nT Gravity FS: 993.326mgal (0.8065 Gal/mGal)		Surface Location NAD27 West Virginia State Plane, Northern Zone, US Feet Lat: N 39 20 5.76 Northing: 307608.409ftUS Grid Conv: -0.952° Lon: W 80 59 34.89 Easting: 1577708.366ftUS Scale Fact: 1		Miscellaneous Slot: PENS1GHS TVD Ref: KB(1137.67ft above MSL) Plan: Noble Energy PENS1GHS Gyro-MWD 0' MD to update

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- Noble Energy PENS1GHS Gyro-MWD 0' MD to update
- CIN 7544 (offsite) B+T of up 5119' MD
- Noble Energy PENS1GHS Gyro-MWD 0' MD to update
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- Noble Energy PENS1GHS Gyro-MWD 0' MD to update
- PENS1GHS LP
- PEN1 Pad baseline
- PENS1GHS BH-L



Critical Point	MD	INCL	AZIM	TVD	VSIC	NS(=N)	EW(=E)	DLB
SPL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1 in.	5306.00	1.00	234.86	5306.87	0.34	-11.36	-12.87	0.39
Last MWD Survey	1495.00	90.78	322.04	6342.42	8907.89	6190.81	-5872.68	1.73
Proj to TD	1495.00	90.78	322.04	6342.80	8910.17	6220.75	-5866.87	0.00



Point	Seq	Survey Line	Wellbore	Well Size	MD From Bit	MD To Bit	MD From PLS	MD To PLS	SLW Rate	ACD Rate	Commen
1	1	SLR, NSG-MWD-27-Open-Drill		30	30	0	25.62	25.62	Aut Slw	1.25	1.25
1	2	SLR, NSG-MWD-101		30	30	25.62	61.6	35.98	Aut Slw	2.78	1.17
1	3	SLR, INC, Chk 1-11		30	30	61.6	136.6	75.0	Aut Slw	5.78	5.53
1	4	SLR, MWD-STD		30	30	136.6	198.6	62.0	Aut Slw	249.25	16.2

Target Name	Shape	Dimension	Latitude	Longitude	Northing	TVD	VSec.	N(=NS)	E(=WE)	Level Count
PEN1 Pad baseline	Polyline	NAK	N 39 20 5.76	W 80 59 34.89	307608.409	1137.67	-3.82	41.38	-88.37	
PENS1GHS SPL	Point	NAK	N 39 21 6.08	W 81 9 12 40 31.81	157770.86	6342.80	8910.17	6220.75	-5866.87	
PENS1GHS LP	Point	NAK	N 39 20 6.03	W 80 59 34.89	307608.41	157880.27	6342.80	8910.17	-5866.87	