





CNX PHL-29C-HS Gyro+MWD Off to 16390ft MD Survey Report

(Def Survey)

Report Date: June 09, 2014 - 08:05 AM
Client: CNX
Field: WV Barbour County (NAD27)
Structure / Blot: CNX PHL-29 Pad / PHL-29C-HS
Well: PHL-29C-HS
Borehole: Original Borehole
LWI / API#: Unknown / Unknown
Survey Name: CNX PHL-29C-HS Gyro+MWD Off to 16390ft MD
Survey Date: May 27, 2014
Tool / MWD / DDI / ERD Rater: 217.021 / 19813.294 ft / 8.049 / 1.248
Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet
Location Lat / Long: N 39° 12' 5.17875" W 80° 3' 17.7880"
Location Grid N/E Y/X: N 259963.980 RUS, E 1842733.700 RUS
CRS Grid Convergence Angle: -0.3239°
Grid Scale Factor: 0.98888802
Version / Patch: 2.7.1043.0

Survey / DLS Computation: Minimum Curvature / Libshah
Vertical Section Azimuth: 128.170° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: KB
TVD Reference Elevation: 1436.080 ft above MSL
Seasid / Ground Elevation: 1405.080 ft above MSL
Magnetic Declination: -8.832°
Total Gravity Field Strength: 989.2884mgm (8.80895 Based)
Gravty Model: GARM
Total Magnetic Field Strength: 52175.308 nT
Magnetic Dip Angle: 65.980°
Declination Date: May 27, 2014
Magnetic Declination Model: HDGM 2015
North Reference: GNM North
Grid Convergence Used: -0.3539°
Total Corr Mag North-Grid North: -0.1779°
Local Coord Referenced To: Well Head

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 (RUS), Easting (RUS), Latitude (N/S ° ' ''), Longitude (E/W ° ' ''), Directional Index.

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Comments	MD (ft)	Incl (°)	Adm Grid (°)	TVD (ft)	TVD98 (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (ft/100ft)	BR (ft/100ft)	TR (ft/100ft)	Northing (ft)	Easting (ft)	Latitude (N/S °)	Longitude (E/W °)	Directional Difficulty Index
6801.00	22.07	85.46	8710.92	5278.92	288.82	160.57	506.80	1.24	-0.86	-2.28	209123.54	184320.48	N 39 12 8.70 W	80 3 11.34	4.62	
6845.00	21.72	85.88	8781.74	5307.46	307.46	186.56	621.89	1.57	-0.80	-3.84	208130.56	184325.31	N 39 12 8.86 W	80 3 11.16	4.54	
6893.00	20.84	83.87	8706.49	5362.49	313.31	175.33	636.81	1.78	-1.63	-20.85	208130.50	184320.70	N 39 12 8.95 W	80 3 10.97	4.58	
6938.00	20.86	47.21	8636.51	5408.51	316.80	185.87	548.07	5.14	-0.39	-14.48	209149.54	184332.75	N 39 12 7.05 W	80 3 10.81	4.60	
6987.00	21.10	85.87	8804.37	5453.37	320.78	196.47	582.44	0.40	0.92	18.04	209160.45	184338.12	N 39 12 7.15 W	80 3 10.64	4.64	
7032.00	20.40	54.82	8925.45	5492.45	325.45	205.52	575.56	1.73	-1.08	-2.11	209169.50	184338.25	N 39 12 7.25 W	80 3 10.47	4.65	
7081.00	21.10	85.82	8972.27	5538.27	330.82	215.39	539.85	1.37	-1.43	1.84	209178.39	184332.83	N 39 12 7.34 W	80 3 10.28	4.67	
7125.00	20.93	86.82	9013.34	5578.34	335.83	224.14	602.80	0.80	-0.38	3.27	209186.11	184333.08	N 39 12 7.43 W	80 3 10.13	4.68	
7172.00	23.57	89.23	9056.84	5622.84	341.89	233.54	618.08	5.94	5.62	5.13	209197.51	1843351.76	N 39 12 7.82 W	80 3 9.94	4.71	
7218.00	24.45	82.18	9098.77	5666.77	346.93	242.80	634.76	1.91	0.80	8.28	209209.86	1843368.44	N 39 12 7.82 W	80 3 9.72	4.73	
7270.00	25.78	88.08	9145.97	5711.97	352.82	251.77	654.45	3.17	2.57	13.93	209215.74	1843388.13	N 39 12 7.71 W	80 3 9.47	4.76	
7313.00	27.08	78.81	9184.48	5750.48	363.72	257.48	672.68	7.70	3.07	15.88	209221.47	1843405.36	N 39 12 7.78 W	80 3 9.24	4.79	
7362.00	28.55	81.89	9227.82	5793.82	364.87	261.86	695.46	7.53	5.04	11.80	209225.83	1843435.18	N 39 12 7.81 W	80 3 8.95	4.82	
7407.00	29.80	83.18	9266.70	5833.70	400.44	284.88	717.58	1.91	0.78	3.31	209228.86	1843451.25	N 39 12 7.84 W	80 3 8.67	4.84	
7458.00	30.34	84.83	9308.08	5875.08	418.08	287.48	742.03	1.91	0.80	3.37	209231.43	1843475.70	N 39 12 7.87 W	80 3 8.36	4.86	
7498.00	31.86	89.85	9345.95	5911.95	434.81	288.61	784.13	6.54	3.07	11.21	209232.48	1843487.81	N 39 12 7.88 W	80 3 8.08	4.88	
7549.00	34.73	93.87	9387.79	5953.79	458.87	287.80	791.48	7.76	6.14	8.84	209231.47	1843493.15	N 39 12 7.87 W	80 3 7.74	4.92	
7595.00	37.11	88.67	9425.05	5991.05	478.79	284.80	818.27	7.82	6.17	10.22	209228.57	1843551.86	N 39 12 7.84 W	80 3 7.48	4.95	
7642.00	40.19	104.41	9481.76	6027.76	508.02	298.89	847.00	10.25	8.59	12.21	209222.86	1843580.87	N 39 12 7.79 W	80 3 7.03	4.98	
7688.00	44.14	107.87	9545.86	6061.86	534.86	295.05	876.62	10.03	8.59	7.74	209214.02	1843610.29	N 39 12 7.70 W	80 3 6.65	5.02	
7732.00	46.72	110.43	9608.18	6092.18	564.80	289.54	908.71	11.17	10.41	5.56	209203.81	1843640.71	N 39 12 7.60 W	80 3 6.27	5.05	
7784.00	53.80	132.86	9688.66	6124.66	603.70	224.55	944.40	10.81	9.86	4.87	209188.52	1843678.07	N 39 12 7.48 W	80 3 5.82	5.09	
7828.00	58.04	114.80	9783.30	6149.30	639.53	203.78	977.73	10.18	9.41	4.84	209173.75	1843711.40	N 39 12 7.31 W	80 3 5.36	5.12	
7877.00	62.70	115.70	9807.52	6173.82	680.54	191.57	1018.22	9.62	9.51	1.83	209165.55	1843749.89	N 39 12 7.13 W	80 3 4.87	5.16	
7926.00	67.01	118.77	9833.33	6194.33	724.08	171.25	1055.84	10.48	8.80	6.27	209155.24	1843788.30	N 39 12 6.94 W	80 3 4.37	5.20	
7971.00	71.23	121.24	9864.37	6210.37	765.89	150.23	1092.03	10.89	9.38	5.46	209141.21	1843825.29	N 39 12 6.73 W	80 3 3.87	5.23	
8019.00	74.83	123.05	9898.38	6234.38	811.24	123.81	1130.89	11.48	9.82	3.77	209089.78	1843864.55	N 39 12 6.48 W	80 3 3.41	5.28	
8065.00	77.29	124.23	9936.46	6255.46	858.84	101.07	1169.85	11.80	9.30	2.57	209065.05	1843901.71	N 39 12 6.25 W	80 3 2.84	5.29	
8114.00	79.59	126.81	9979.28	6245.28	903.78	73.59	1207.41	5.43	4.67	2.82	209037.57	1843941.07	N 39 12 5.98 W	80 3 2.44	5.31	
8168.00	83.45	129.80	10026.80	6252.80	945.11	48.73	1240.45	6.83	1.88	6.45	209012.70	1843974.11	N 39 12 5.74 W	80 3 2.32	5.33	
8205.00	86.20	132.48	10081.91	6262.91	984.81	18.13	1278.09	7.04	6.29	3.20	208982.11	1844011.78	N 39 12 5.44 W	80 3 1.53	5.36	
8251.00	82.42	133.81	10134.70	6262.70	1029.26	-12.72	1313.38	11.48	10.11	5.47	208951.28	1844047.01	N 39 12 5.13 W	80 3 1.08	5.38	
8291.00	83.12	134.82	10194.52	6262.70	1079.26	-38.33	1341.88	11.21	10.82	2.95	208924.85	1844075.51	N 39 12 4.87 W	80 3 0.72	5.42	
8321.00	83.12	134.25	10251.25	6261.25	1109.06	-80.12	1363.44	3.16	2.33	2.13	208903.88	1844097.09	N 39 12 4.87 W	80 3 0.44	5.43	
8341.00	81.80	133.39	10307.39	6257.39	1136.54	-122.57	1408.31	1.75	-1.47	-0.88	208881.81	1844118.98	N 39 12 4.08 W	80 2 59.82	5.46	
8368.00	81.19	133.61	10361.91	6254.91	1163.11	-167.83	1457.21	0.64	-0.02	208861.26	1844230.96	N 39 12 3.42 W	80 2 58.73	5.50		
8396.00	81.01	134.02	10414.02	6251.11	1182.20	-253.71	1508.82	0.21	0.00	0.00	208840.38	1844300.57	N 39 12 2.77 W	80 2 57.84	5.52	
8424.00	81.01	134.02	10465.02	6246.02	1201.20	-318.77	1563.74	0.48	-0.19	0.44	208819.52	1844368.38	N 39 12 2.13 W	80 2 56.86	5.55	
8452.00	81.89	133.68	10514.73	6245.73	1215.71	-363.87	1621.50	1.00	0.84	-0.36	208800.12	1844436.16	N 39 12 1.48 W	80 2 55.11	5.58	
8480.00	82.07	134.07	10562.45	6245.45	1230.45	-448.88	1681.94	0.45	0.18	0.41	208781.32	1844504.98	N 39 12 0.84 W	80 2 53.24	5.61	
8508.00	82.07	133.06	10608.06	6242.06	1245.06	-515.58	1745.87	1.05	0.00	1.05	208762.86	1844571.51	N 39 12 0.19 W	80 2 51.36	5.63	
8536.00	82.15	133.22	10651.82	6238.42	1259.42	-580.07	1813.88	0.54	0.48	0.23	208743.83	1844638.82	N 39 12 0.18 W	80 2 49.48	5.65	
8564.00	82.15	133.22	10703.52	6234.52	1273.52	-648.85	1886.86	1.18	-0.38	1.09	208724.89	1844707.49	N 39 12 0.08 W	80 2 47.57	5.68	
8592.00	82.42	135.51	10754.73	6230.73	1287.73	-717.02	1964.80	0.90	-0.28	-0.85	208705.88	1844776.93	N 39 11 58.22 W	80 2 45.68	5.70	
8620.00	82.15	136.31	10804.86	6226.86	1301.86	-784.48	2047.80	0.50	-0.39	-0.55	208686.86	1844846.96	N 39 11 58.22 W	80 2 43.79	5.73	
8648.00	82.15	135.89	10854.99	6222.99	1315.99	-851.43	2134.81	0.48	-0.09	-0.48	208667.84	1844917.01	N 39 11 57.55 W	80 2 41.89	5.75	
8676.00	82.15	135.89	10905.02	6219.02	1330.02	-918.18	2226.80	0.80	-0.00	0.80	208648.82	1844987.07	N 39 11 56.80 W	80 2 39.97	5.77	
8704.00	81.89	134.48	10955.05	6215.05	1344.05	-985.10	2318.79	2.07	-0.16	-2.06	208629.81	1845057.12	N 39 11 55.57 W	80 2 38.03	5.78	
8732.00	81.89	133.48	11005.08	6211.08	1357.08	-1051.34	2410.79	1.08	-0.10	-1.05	208610.87	1845127.17	N 39 11 54.83 W	80 2 36.07	5.81	
8760.00	82.07	133.02	11055.02	6207.02	1370.02	-1115.37	2502.74	0.77	0.78	0.14	208591.84	1845197.22	N 39 11 54.08 W	80 2 34.11	5.83	
8788.00	82.06	132.96	11104.97	6203.97	1383.97	-1180.14	2594.62	0.29	0.29	-0.02	208572.86	1845267.24	N 39 11 53.37 W	80 2 32.15	5.85	
8816.00	82.06	133.17	11154.90	6199.90	1396.90	-1244.82	2686.53	0.65	0.00	-0.65	208553.88	1845337.29	N 39 11 52.60 W	80 2 30.19	5.87	
8844.00	82.06	133.17	11204.83	6195.83	1409.83	-1309.54	2778.44	0.85	0.00	-0.85	208534.91	1845407.34	N 39 11 51.83 W	80 2 28.23	5.88	
8872.00	82.06	133.17	11254.76	6191.76	1422.76	-1374.20	2870.35	1.01	-0.84	0.37	208515.92	1845477.39	N 39 11 51.07 W	80 2 26.27	5.90	
8900.00	82.39	132.61	11304.69	6187.69	1436.69	-1438.84	2962.26	0.37	-0.18	-0.31	208496.94	1845547.44	N 39 11 50.31 W	80 2 24.31	5.92	
8928.00	82.33	133.52	11354.62	6183.62	1450.62	-1503.51	3054.17	0.87	0.66	-0.66	208477.96	1845617.49	N 39 11 49.55 W	80 2 22.35	5.94	
8956.00	82.42	132.80	11404.55	6179.55	1464.55	-1568.18	3146.08	0.88	0.88	0.88	208458.98	1845687.54	N 39 11 48.79 W	80 2 20.39	5.95	
8984.00	82.42	132.80	11454.48	6175.48	1478.48	-1632.85	3237.99	0.85	0.00	-0.85	208439.99	1845757.59	N 39 11 48.03 W	80 2 18.43	5.97	
9012.00	82.42	133.11	11504.41	6171.41	1492.41	-1697.52	3329.90	0.85	0.00	-0.85	208420.99	1845827.64	N 39 11 47.27 W	80 2 16.47	5.97	
9040.00	82.42	133.11	11554.34	6167.34	1506.34	-1762.19	3421.81	0.47	-0.37	0.29	208401.97	1845897.69	N 39 11 46.51 W	80 2 14.51	5.98	
9068.00	82.42	133.11	11604.27	6163.27	1520.27	-1826.86	3513.72	0.57	-0.26	-0.04	208382.96	1845967.74	N 39 11 45.75 W	80 2 12.55	6.00	
9096.00	82.15	133.48	11654.20	6159.20	1534.20	-1891.53	3605.63	0.42	0.37	0.20	208363.94	1846037.79	N 39 11 44.99 W	80 2 10.59	6.03	
9124.00	82.33	133.89	11704.13	6155.13	1548.13	-1956.20	3697.54	0.70	0.19							

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVD98 (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (*100ft)	BR (*100ft)	TR (*100ft)	Northing (ftUS)	Eastng (ftUS)	Latitude (NS ° ' ")	Longitude (EW ° ' ")	Directional Difficulty Index
	18198.00	80.40	132.50	7400.80	5668.60	8841.44	-5605.76	7045.32	0.33	0.00	-0.33	250458.40	1849778.78	N 39 11 11.16 W 80	1 47.26	6.83
Final Survey 07Jun14	16281.00	80.88	132.28	7389.75	5685.75	9033.19	-5587.77	7113.28	0.38	0.28	-0.28	250388.40	1848848.74	N 39 11 10.57 W 80	1 47.00	6.84
PTB	16308.00	80.75	132.77	7399.54	5685.54	9050.14	-5579.26	7125.81	3.05	0.53	3.00	250384.91	1848859.26	N 39 11 10.46 W 80	1 46.84	6.84
	16390.00	80.75	132.77	7398.47	5684.47	9131.87	-5634.84	7186.00	0.00	0.00	0.00	250328.23	1848919.45	N 39 11 9.91 W 80	1 46.07	6.85

Survey Type: Def Survey

Survey Error Model: ISOWSA Rev D \*\*\* 3-D 95.000% Confidence 2.7835 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
		0.000	28.520	Act Sins	30.000	30.000	SLB_NSG+MSHOT-Depth Only	Original Borehole / CNX PHL-29C-HS Gyro+MWD Off to 16390ft MD
		28.520	4845.000	Act Sins	30.000	30.000	SLB_NSG+MSHOT	Original Borehole / CNX PHL-29C-HS Gyro+MWD Off to 16390ft MD
		4845.000	16308.000	Act Sins	30.000	30.000	SLB_MWD-STD	Original Borehole / CNX PHL-29C-HS Gyro+MWD Off to 16390ft MD
		16308.000	16390.000	Act Sins	30.000	30.000	SLB_BLIND+TREND	Original Borehole / CNX PHL-29C-HS Gyro+MWD Off to 16390ft MD

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