



# Noble Energy SHL-8E-HS Gyro+MWD 0' MD to 15057' MD Survey Report

(Def Survey)

Report Date: April 04, 2013 - 08:20 AM  
 Client: Noble Energy  
 Field: WV Marshall County (NAD 27)  
 Structure / Slot: CNX/Noble Energy SHL-8 Pad / SHL-8E-HS  
 Well: SHL-8E-HS  
 Borehole: Original Borehole  
 UWI / API#: Unknown / Unknown  
 Survey Name: Noble Energy SHL-8E-HS Gyro+MWD 0' MD to 15057' MD  
 Tort / AHD / DDI / ERD Ratio: 263.698° / 9290.058 ft / 6.747 / 1.405  
 Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet  
 Location Lat / Long: N 39° 57' 19.53895", W 80° 32' 8.15521"  
 Location Grid N/E Y/X: N 531779.969 fUS, E 1709686.227 fUS  
 CRS Grid Convergence Angle: -0.6605°  
 Grid Scale Factor: 0.99995724

Survey / DLS Computation: Minimum Curvature / Lubinski  
 Vertical Section Azimuth: 149.435° (Grid North)  
 Vertical Section Origin: 0.000 ft, 0.000 ft  
 TVD Reference Datum: KB  
 TVD Reference Elevation: 1149.710 ft above MSL  
 Seabed / Ground Elevation: 1131.470 ft above MSL  
 Magnetic Declination: -8.713°  
 Total Gravity Field Strength: 999.3811mgn (9.80665 Based)  
 Total Magnetic Field Strength: 52729.279 nT  
 Magnetic Dip Angle: 67.414°  
 Declination Date: March 19, 2013  
 Magnetic Declination Model: BGGM 2012  
 North Reference: Grid North  
 Grid Convergence Used: -0.6605°  
 Total Corr Mag North->Grid North: -8.0522°  
 Local Coord Referenced To: Well Head

4705101555

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (fUS)	Easting (fUS)	Latitude (N/S ° '' )	Longitude (E/W ° '' )	Directional Difficulty Index
SHL	0.00	0.00	0.00	0.00	-1149.71	0.00	0.00	0.00	N/A	N/A	N/A	531779.97	1709686.23	N 39 57 19.54	W 80 32 8.16	0.00
	100.00	0.06	22.30	100.00	-1049.71	-0.03	0.05	0.02	0.06	0.06	0.00	531780.02	1709686.25	N 39 57 19.54	W 80 32 8.15	0.00
	200.00	0.14	21.23	200.00	-949.71	-0.14	0.21	0.08	0.08	0.08	-1.07	531780.18	1709686.31	N 39 57 19.54	W 80 32 8.15	0.00
	300.00	0.17	242.15	300.00	-849.71	-0.22	0.26	0.00	0.29	0.03	-139.08	531780.22	1709686.22	N 39 57 19.54	W 80 32 8.16	0.00
	400.00	0.14	115.93	400.00	-749.71	-0.13	0.13	-0.02	0.28	-0.03	-126.22	531780.10	1709686.20	N 39 57 19.54	W 80 32 8.16	0.00
	500.00	0.16	108.36	500.00	-649.71	0.08	0.04	0.22	0.03	0.02	-7.57	531780.00	1709686.45	N 39 57 19.54	W 80 32 8.15	0.00
	600.00	0.15	131.72	600.00	-549.71	0.31	-0.10	0.45	0.06	-0.01	23.36	531779.87	1709686.68	N 39 57 19.54	W 80 32 8.15	0.00
	700.00	0.12	19.81	700.00	-449.71	0.37	-0.08	0.58	0.22	-0.03	-111.91	531779.88	1709686.81	N 39 57 19.54	W 80 32 8.15	0.11
	800.00	0.04	273.94	800.00	-349.71	0.28	0.02	0.58	0.14	-0.08	-105.87	531779.99	1709686.81	N 39 57 19.54	W 80 32 8.15	0.21
	900.00	0.12	139.24	900.00	-249.71	0.37	-0.06	0.62	0.15	0.08	-134.70	531779.91	1709686.84	N 39 57 19.54	W 80 32 8.15	0.29
	1000.00	0.40	137.98	1000.00	-149.71	0.81	-0.40	0.92	0.28	0.28	-1.26	531779.57	1709687.14	N 39 57 19.54	W 80 32 8.14	0.49
	1100.00	0.43	126.30	1099.99	-49.72	1.50	-0.88	1.45	0.09	0.03	-11.68	531779.09	1709687.68	N 39 57 19.53	W 80 32 8.14	0.65
	1200.00	0.46	137.52	1199.99	50.28	2.24	-1.40	2.03	0.09	0.03	11.22	531778.57	1709688.25	N 39 57 19.53	W 80 32 8.13	0.78
	1300.00	0.33	137.29	1299.99	150.28	2.91	-1.91	2.49	0.13	-0.13	-0.23	531778.06	1709688.72	N 39 57 19.52	W 80 32 8.12	0.89
	1400.00	0.25	155.34	1399.99	250.28	3.41	-2.32	2.78	0.12	-0.08	18.05	531777.65	1709689.01	N 39 57 19.52	W 80 32 8.12	0.97
	1500.00	0.36	170.06	1499.99	350.28	3.92	-2.82	2.93	0.13	0.11	14.72	531777.15	1709689.15	N 39 57 19.51	W 80 32 8.12	1.05
	1600.00	0.42	175.05	1599.98	450.27	4.54	-3.50	3.01	0.07	0.06	4.99	531776.47	1709689.24	N 39 57 19.50	W 80 32 8.12	1.11
	1700.00	0.45	170.10	1699.98	550.27	5.24	-4.25	3.11	0.05	0.03	-4.95	531775.72	1709689.34	N 39 57 19.50	W 80 32 8.11	1.18
	1800.00	0.50	164.63	1799.98	650.27	6.03	-5.06	3.29	0.07	0.05	-5.47	531774.91	1709689.52	N 39 57 19.49	W 80 32 8.11	1.24
	1900.00	0.47	155.23	1899.97	750.26	6.86	-5.85	3.58	0.08	-0.03	-9.40	531774.12	1709689.81	N 39 57 19.48	W 80 32 8.11	1.30
	2000.00	0.44	135.11	1999.97	850.26	7.64	-6.50	4.02	0.16	-0.03	-20.12	531773.47	1709690.25	N 39 57 19.48	W 80 32 8.10	1.37
	2100.00	0.32	130.17	2099.97	950.26	8.28	-6.95	4.51	0.12	-0.12	-4.94	531773.02	1709690.74	N 39 57 19.47	W 80 32 8.10	1.42
	2200.00	0.29	121.64	2199.97	1050.26	8.76	-7.26	4.94	0.05	-0.03	-8.53	531772.71	1709691.16	N 39 57 19.47	W 80 32 8.09	1.45
	2300.00	0.34	118.72	2299.97	1150.26	9.24	-7.54	5.41	0.05	0.05	-2.92	531772.43	1709691.64	N 39 57 19.47	W 80 32 8.08	1.48
	2400.00	0.34	122.57	2399.96	1250.25	9.76	-7.84	5.92	0.02	0.00	3.85	531772.13	1709692.15	N 39 57 19.46	W 80 32 8.08	1.51

03/07/2014

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (RUS)	Eastings (RUS)	Latitude (N/S °'")	Longitude (E/W °'")	Directional Difficulty Index
	2500.00	0.15	42.54	2499.96	1350.25	9.99	-7.90	6.26	0.35	-0.19	-80.03	531772.07	1709692.49	N 39 57 19.46 W	80 32 8.07	1.57
	2600.00	0.08	388.69	2599.96	1450.25	9.88	-7.74	6.32	0.14	-0.07	-63.85	531772.23	1709692.55	N 39 57 19.46 W	80 32 8.07	1.60
	2700.00	0.03	3.43	2699.96	1550.25	9.79	-7.65	6.30	0.05	-0.05	24.74	531772.32	1709692.53	N 39 57 19.46 W	80 32 8.07	1.61
	2800.00	0.18	8.51	2799.96	1650.25	9.65	-7.47	6.33	0.15	0.15	5.08	531772.50	1709692.55	N 39 57 19.47 W	80 32 8.07	1.63
	2900.00	0.13	9.68	2899.96	1750.25	9.44	-7.20	6.37	0.05	-0.05	1.17	531772.77	1709692.59	N 39 57 19.47 W	80 32 8.07	1.65
	2965.00	0.24	1.64	2964.96	1815.25	9.27	-6.99	6.38	0.17	0.17	-12.37	531772.98	1709692.61	N 39 57 19.47 W	80 32 8.07	1.67
	3039.00	0.38	19.19	3038.96	1899.25	8.98	-6.60	6.47	0.23	0.19	23.72	531773.36	1709692.70	N 39 57 19.47 W	80 32 8.07	1.70
	3086.00	0.44	46.19	3085.96	1936.25	8.83	-6.33	6.65	0.43	0.13	57.45	531773.64	1709692.88	N 39 57 19.48 W	80 32 8.07	1.74
	3140.00	0.18	197.35	3139.96	1990.25	8.84	-6.27	6.78	1.12	-0.48	279.93	531773.70	1709693.00	N 39 57 19.48 W	80 32 8.07	1.80
	3184.00	1.32	212.89	3183.96	2034.25	9.12	-6.76	6.48	2.61	2.59	35.32	531773.21	1709692.71	N 39 57 19.47 W	80 32 8.07	1.92
	3229.00	2.46	213.15	3228.93	2079.22	9.78	-8.01	5.67	2.53	2.53	0.58	531771.96	1709691.90	N 39 57 19.46 W	80 32 8.08	2.04
	3275.00	3.17	214.64	3274.87	2125.16	10.75	-9.88	4.41	1.55	1.54	3.24	531770.09	1709690.63	N 39 57 19.44 W	80 32 8.10	2.14
	3319.00	3.96	211.39	3318.79	2169.08	11.97	-12.18	2.92	1.85	1.80	-7.39	531767.79	1709689.15	N 39 57 19.42 W	80 32 8.12	2.24
	3363.00	4.66	211.15	3362.66	2212.95	13.53	-15.00	1.21	1.59	1.59	-0.55	531764.97	1709687.44	N 39 57 19.39 W	80 32 8.14	2.34
	3451.00	5.63	207.56	3450.31	2300.60	17.51	-21.89	-2.64	1.16	1.10	-4.08	531758.08	1709683.59	N 39 57 19.32 W	80 32 8.19	2.51
	3541.00	5.01	204.59	3539.92	2390.21	22.08	-29.38	-6.32	0.75	-0.69	-3.30	531750.59	1709679.91	N 39 57 19.25 W	80 32 8.23	2.64
	3630.00	4.22	205.30	3628.63	2478.92	26.14	-35.87	-9.33	0.89	-0.89	0.80	531744.10	1709676.89	N 39 57 19.18 W	80 32 8.27	2.74
	3720.00	3.43	208.92	3718.43	2568.72	29.37	-41.22	-12.05	0.92	-0.88	4.02	531738.75	1709674.18	N 39 57 19.13 W	80 32 8.30	2.82
	3809.00	2.73	206.86	3807.30	2657.59	31.86	-45.44	-14.30	0.80	-0.79	-2.31	531734.53	1709671.93	N 39 57 19.09 W	80 32 8.33	2.89
	3899.00	2.20	204.77	3897.22	2747.51	34.00	-48.92	-15.99	0.60	-0.59	-2.32	531731.05	1709670.24	N 39 57 19.05 W	80 32 8.35	2.93
	3988.00	1.41	177.52	3986.17	2836.46	35.93	-51.57	-16.66	1.29	-0.89	-30.62	531728.40	1709669.57	N 39 57 19.03 W	80 32 8.36	2.98
	4078.00	1.06	158.88	4076.15	2926.44	37.73	-53.45	-16.31	0.59	-0.39	-20.71	531726.52	1709669.92	N 39 57 19.01 W	80 32 8.36	3.01
	4168.00	0.44	118.02	4166.15	3016.44	38.85	-54.39	-15.70	0.87	-0.69	-45.40	531725.58	1709670.53	N 39 57 19.00 W	80 32 8.35	3.04
	4258.00	0.35	34.56	4256.14	3106.43	39.03	-54.33	-15.24	0.59	-0.10	-92.73	531725.65	1709670.99	N 39 57 19.00 W	80 32 8.34	3.06
	4347.00	0.35	12.57	4345.14	3195.43	38.71	-53.84	-15.03	0.15	0.00	-24.71	531726.13	1709671.20	N 39 57 19.01 W	80 32 8.34	3.07
	4435.00	0.53	4433.14	4433.14	3283.43	38.19	-53.17	-14.93	0.21	0.20	-7.81	531726.80	1709671.30	N 39 57 19.01 W	80 32 8.34	3.07
	4525.00	0.44	341.04	4523.14	3373.43	37.52	-52.43	-15.00	0.25	-0.10	-27.40	531727.54	1709671.23	N 39 57 19.02 W	80 32 8.34	3.08
	4615.00	0.70	6.17	4613.13	3463.42	36.74	-51.56	-15.05	0.39	0.29	27.92	531728.42	1709671.17	N 39 57 19.03 W	80 32 8.34	3.10
	4734.00	0.93	9.26	4732.12	3582.41	35.41	-49.88	-14.82	0.20	0.19	2.60	531730.09	1709671.41	N 39 57 19.04 W	80 32 8.34	3.11
	4823.00	0.75	14.28	4821.11	3671.40	34.44	-48.60	-14.56	0.22	-0.20	5.64	531731.37	1709671.67	N 39 57 19.06 W	80 32 8.33	3.13
	4913.00	0.77	6.61	4911.10	3761.39	33.55	-47.43	-14.35	0.12	0.02	-8.52	531732.54	1709671.88	N 39 57 19.07 W	80 32 8.33	3.14
	4957.00	0.48	349.40	4955.10	3805.39	33.14	-46.96	-14.35	0.78	-0.66	-39.11	531733.02	1709671.88	N 39 57 19.07 W	80 32 8.33	3.15
	5002.00	2.01	223.54	5000.09	3850.38	33.18	-47.34	-14.92	5.16	3.40	-279.69	531732.63	1709671.30	N 39 57 19.07 W	80 32 8.34	3.20
	5047.00	5.22	219.31	5045.00	3895.29	34.10	-49.50	-16.76	7.15	7.13	-9.40	531730.47	1709669.46	N 39 57 19.05 W	80 32 8.36	3.28
	5082.00	8.15	219.72	5089.69	3939.98	35.88	-53.54	-20.10	6.51	6.51	0.91	531726.43	1709666.13	N 39 57 19.01 W	80 32 8.41	3.36
	5137.00	10.69	223.20	5134.08	3984.37	38.12	-59.03	-25.00	5.78	5.64	7.73	531720.94	1709661.23	N 39 57 18.95 W	80 32 8.47	3.44
	5181.00	12.96	228.62	5177.14	4027.43	40.19	-65.27	-31.49	5.74	5.16	12.32	531714.70	1709654.74	N 39 57 18.89 W	80 32 8.55	3.51
	5226.00	14.97	233.90	5220.81	4071.10	41.69	-72.03	-39.98	5.28	4.47	11.73	531707.94	1709646.25	N 39 57 18.82 W	80 32 8.66	3.59
	5271.00	16.86	237.59	5264.08	4114.37	42.47	-78.96	-50.18	4.76	4.20	8.20	531705.02	1709636.05	N 39 57 18.75 W	80 32 8.79	3.66
	5316.00	19.33	237.78	5306.86	4157.15	42.89	-86.43	-62.00	5.49	5.49	0.42	531693.55	1709624.23	N 39 57 18.68 W	80 32 8.94	3.73
	5360.00	21.79	238.05	5348.05	4198.34	43.30	-94.63	-75.09	5.60	5.59	0.61	531685.34	1709611.14	N 39 57 18.60 W	80 32 9.11	3.81
	5405.00	24.26	236.89	5389.46	4239.75	43.91	-104.10	-89.92	5.58	5.49	-2.58	531675.87	1709596.31	N 39 57 18.50 W	80 32 9.29	3.88
	5450.00	26.29	234.59	5430.15	4280.44	45.16	-114.93	-105.79	5.01	4.51	-5.11	531665.05	1709580.44	N 39 57 18.39 W	80 32 9.50	3.95
	5495.00	28.51	235.26	5470.10	4320.39	46.79	-126.82	-122.74	4.98	4.93	1.49	531653.15	1709563.49	N 39 57 18.27 W	80 32 9.71	4.01
	5540.00	31.16	235.95	5509.13	4359.42	48.28	-139.46	-141.21	5.94	5.89	1.53	531640.51	1709545.02	N 39 57 18.14 W	80 32 9.95	4.08
	5629.00	37.39	237.62	5582.64	4432.93	50.54	-166.86	-183.15	7.08	7.00	1.88	531613.12	1709503.08	N 39 57 17.87 W	80 32 10.48	4.22
	5719.00	37.70	235.66	5654.01	4504.30	53.21	-197.01	-228.95	1.37	0.34	-2.18	531582.96	1709457.28	N 39 57 17.57 W	80 32 11.07	4.30
	5808.00	37.70	235.17	5724.43	4574.72	57.03	-227.91	-273.76	0.34	0.00	-0.55	531552.07	1709412.48	N 39 57 17.26 W	80 32 11.64	4.37
	5898.00	36.42	234.03	5796.24	4646.53	61.59	-259.32	-317.98	1.61	-1.42	-1.27	531520.66	1709368.27	N 39 57 16.94 W	80 32 12.20	4.44

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	5987.00	36.36	234.55	5867.89	4718.18	66.33	-290.14	-360.85	0.35	-0.07	0.58	531489.84	1709325.39	N 39 57 16.63 W	80 32 12.75	4.49
	6077.00	36.71	235.66	5940.20	4790.49	70.37	-320.79	-404.79	0.83	0.39	1.23	531459.20	1709281.45	N 39 57 16.32 W	80 32 13.31	4.54
	6164.00	36.67	234.38	6009.97	4860.26	74.37	-350.58	-447.38	0.88	-0.05	-1.47	531429.40	1709238.86	N 39 57 16.02 W	80 32 13.85	4.59
	6210.00	36.04	233.41	6047.02	4897.31	77.00	-366.65	-469.41	1.85	-1.37	-2.11	531413.34	1709216.83	N 39 57 15.86 W	80 32 14.13	4.61
	6255.00	36.56	226.67	6083.30	4933.59	81.35	-383.75	-489.80	8.94	1.16	-14.98	531396.24	1709196.45	N 39 57 15.69 W	80 32 14.39	4.66
	6300.00	37.51	218.78	6119.24	4969.53	89.15	-403.63	-508.14	10.76	2.11	-17.53	531376.35	1709178.11	N 39 57 15.49 W	80 32 14.62	4.71
	6345.00	38.99	209.11	6154.61	5004.90	101.14	-426.70	-523.62	13.69	3.29	-21.49	531353.28	1709162.63	N 39 57 15.26 W	80 32 14.82	4.76
	6389.00	40.61	201.17	6188.44	5038.73	117.01	-452.17	-535.54	12.12	3.68	-18.05	531327.82	1709150.71	N 39 57 15.01 W	80 32 14.96	4.81
	6434.00	41.88	195.33	6222.28	5072.57	136.54	-480.32	-544.80	9.01	2.82	-12.98	531299.67	1709141.45	N 39 57 14.73 W	80 32 15.08	4.84
	6479.00	42.51	191.53	6256.63	5105.92	158.28	-509.71	-551.81	5.84	1.40	-8.44	531270.28	1709134.44	N 39 57 14.44 W	80 32 15.16	4.88
	6524.00	43.38	187.19	6288.57	5138.86	181.79	-539.95	-556.79	6.85	1.93	-9.64	531240.04	1709129.46	N 39 57 14.14 W	80 32 15.22	4.91
	6568.00	45.74	183.69	6319.93	5170.22	206.77	-570.67	-559.69	7.74	5.36	-7.95	531209.32	1709126.56	N 39 57 13.84 W	80 32 15.26	4.94
	6613.00	48.45	180.55	6350.56	5200.85	234.51	-603.60	-560.89	7.90	6.02	-6.98	531176.39	1709125.36	N 39 57 13.51 W	80 32 15.27	4.97
	6658.00	51.52	178.62	6379.50	5229.79	264.31	-638.06	-560.63	7.57	6.82	-4.29	531141.94	1709125.62	N 39 57 13.17 W	80 32 15.26	5.00
	6702.00	54.88	176.06	6405.85	5256.14	295.45	-673.24	-558.98	8.94	7.64	-5.82	531106.76	1709127.27	N 39 57 12.82 W	80 32 15.23	5.04
	6747.00	58.33	172.88	6430.62	5280.91	329.48	-710.62	-555.34	9.67	7.67	-7.07	531069.38	1709130.91	N 39 57 12.45 W	80 32 15.18	5.07
	6792.00	62.79	170.37	6452.74	5303.03	365.77	-749.38	-549.61	11.04	9.91	-5.58	531030.63	1709136.64	N 39 57 12.07 W	80 32 15.10	5.11
	6837.00	66.00	168.12	6472.18	5322.47	403.94	-789.23	-542.03	8.44	7.13	-5.00	530990.77	1709144.22	N 39 57 11.68 W	80 32 15.00	5.14
	6882.00	69.14	164.65	6489.36	5339.65	443.72	-829.64	-532.23	9.97	6.98	-7.71	530950.36	1709154.02	N 39 57 11.28 W	80 32 14.87	5.17
	6926.00	70.83	162.20	6504.42	5354.71	483.83	-869.26	-520.43	6.49	3.84	-5.57	530910.75	1709165.82	N 39 57 10.89 W	80 32 14.71	5.20
	6971.00	73.07	159.63	6518.36	5368.65	525.76	-909.69	-506.44	7.37	4.84	-5.71	530870.32	1709179.81	N 39 57 10.49 W	80 32 14.52	5.23
	7016.00	74.82	157.30	6530.81	5381.10	568.46	-949.91	-490.56	6.32	3.89	-5.18	530830.10	1709195.68	N 39 57 10.10 W	80 32 14.31	5.26
	7060.00	77.23	154.46	6541.44	5391.73	610.88	-988.87	-473.11	8.32	5.48	-6.45	530791.15	1709213.13	N 39 57 9.71 W	80 32 14.08	5.29
	7105.00	80.79	150.24	6550.02	5400.31	654.98	-1027.98	-452.61	12.14	7.91	-9.38	530752.04	1709233.63	N 39 57 9.33 W	80 32 13.81	5.32
	7150.00	83.91	146.80	6556.01	5406.30	699.56	-1066.00	-429.33	10.27	6.93	-7.64	530714.02	1709256.92	N 39 57 8.96 W	80 32 13.51	5.35
	7195.00	86.87	143.47	6559.63	5409.92	744.28	-1102.79	-403.69	9.88	6.58	-7.40	530677.23	1709282.56	N 39 57 8.60 W	80 32 13.18	5.38
	7239.00	89.48	140.50	6561.03	5411.32	787.88	-1137.43	-376.61	8.98	5.93	-6.75	530642.59	1709309.63	N 39 57 8.26 W	80 32 12.82	5.41
	7329.00	88.80	141.42	6562.38	5412.67	876.88	-1207.33	-319.93	1.27	-0.76	1.02	530572.70	1709366.31	N 39 57 7.57 W	80 32 12.08	5.44
	7418.00	88.11	142.68	6564.78	5415.07	965.11	-1277.48	-265.22	1.61	-0.78	1.42	530502.55	1709421.02	N 39 57 6.88 W	80 32 11.37	5.47
	7508.00	87.15	142.35	6568.50	5418.79	1054.38	-1348.83	-210.50	1.13	-1.07	-0.37	530431.20	1709475.74	N 39 57 6.19 W	80 32 10.66	5.50
	7597.00	88.76	141.86	6571.67	5421.96	1142.59	-1419.02	-155.87	1.89	1.81	-0.55	530361.01	1709530.37	N 39 57 5.50 W	80 32 9.95	5.53
	7687.00	88.25	141.74	6574.02	5424.31	1231.76	-1489.72	-100.23	0.58	-0.57	-0.13	530290.31	1709586.00	N 39 57 4.81 W	80 32 9.22	5.56
	7776.00	89.42	142.30	6575.83	5426.12	1320.00	-1559.86	-45.47	1.46	1.31	0.63	530220.18	1709640.76	N 39 57 4.12 W	80 32 8.51	5.59
	7866.00	89.73	142.42	6576.50	5426.79	1409.31	-1631.12	9.49	0.37	0.34	0.13	530148.92	1709695.71	N 39 57 3.42 W	80 32 7.79	5.61
	7956.00	89.14	142.41	6577.39	5427.68	1498.63	-1702.44	64.38	0.66	-0.66	-0.01	530077.60	1709750.60	N 39 57 2.72 W	80 32 7.08	5.64
	8045.00	90.07	143.12	6578.00	5428.29	1587.02	-1773.30	118.23	1.31	1.04	0.80	530006.75	1709804.45	N 39 57 2.03 W	80 32 6.37	5.66
	8134.00	89.42	143.73	6578.40	5428.69	1675.53	-1844.77	171.26	1.00	-0.73	0.69	529935.28	1709857.48	N 39 57 1.33 W	80 32 5.68	5.69
	8224.00	89.28	144.16	6579.42	5429.71	1765.11	-1917.52	224.23	0.50	-0.16	0.48	529862.53	1709910.45	N 39 57 0.62 W	80 32 4.99	5.71
	8314.00	89.83	143.35	6580.12	5430.41	1854.67	-1990.11	277.44	1.09	0.61	-0.90	529789.95	1709963.65	N 39 56 59.90 W	80 32 4.30	5.73
	8403.00	89.48	144.16	6580.65	5430.94	1943.23	-2061.88	330.06	0.99	-0.39	0.91	529718.18	1710016.27	N 39 56 59.20 W	80 32 3.61	5.75
	8493.00	89.38	142.71	6581.55	5431.84	2032.73	-2134.16	383.67	1.61	-0.11	-1.61	529645.90	1710069.88	N 39 56 58.49 W	80 32 2.91	5.78
	8582.00	88.73	143.54	6583.02	5433.31	2121.18	-2205.35	437.07	1.18	-0.73	0.93	529574.72	1710123.27	N 39 56 57.80 W	80 32 2.22	5.80
	8672.00	89.55	141.05	6584.37	5434.66	2210.46	-2276.54	492.10	2.91	0.91	-2.77	529503.53	1710178.31	N 39 56 57.10 W	80 32 1.50	5.82
	8761.00	90.38	138.85	6584.42	5434.71	2298.24	-2344.66	549.36	2.64	0.93	-2.47	529435.41	1710235.57	N 39 56 56.43 W	80 32 0.75	5.85
	8851.00	91.34	139.61	6583.07	5433.36	2386.80	-2412.81	608.13	1.36	1.07	0.84	529367.26	1710294.33	N 39 56 55.76 W	80 31 59.99	5.87
	8940.00	90.58	139.70	6581.58	5431.87	2474.50	-2480.63	665.74	0.86	-0.85	0.10	529299.45	1710351.93	N 39 56 55.10 W	80 31 59.24	5.89
	9030.00	89.97	138.72	6581.15	5431.44	2563.06	-2548.77	724.53	1.28	-0.68	-1.09	529231.31	1710410.73	N 39 56 54.43 W	80 31 58.48	5.90
	9120.00	90.24	140.39	6580.98	5431.27	2651.73	-2617.26	782.91	1.88	0.30	1.86	529162.82	1710469.11	N 39 56 53.76 W	80 31 57.72	5.92
	9209.00	89.31	142.46	6581.33	5431.62	2739.85	-2686.84	838.40	2.55	-1.04	2.33	529093.25	1710524.59	N 39 56 53.08 W	80 31 56.99	5.95

03/07/2014

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVSS (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
	9298.00	88.80	142.73	6582.80	5433.09	2828.20	-2757.53	892.46	0.65	-0.57	0.30	529022.57	1710578.65	N 39 56 52.39 W	80 31 56.29	5.96
	9388.00	87.87	142.66	6585.42	5435.71	2917.54	-2829.08	946.98	1.04	-1.03	-0.08	528951.01	1710633.17	N 39 56 51.69 W	80 31 55.58	5.98
	9477.00	89.14	143.81	6587.74	5438.03	3005.99	-2900.35	1000.23	1.92	1.43	1.29	528879.75	1710686.41	N 39 56 50.99 W	80 31 54.88	6.00
	9567.00	90.41	143.63	6588.09	5438.38	3095.54	-2972.90	1053.48	1.43	-0.20	-0.20	528807.20	1710739.66	N 39 56 50.28 W	80 31 54.19	6.02
	9657.00	89.66	143.91	6588.04	5438.33	3185.10	-3045.50	1106.68	0.69	-0.83	0.31	528734.60	1710792.85	N 39 56 49.57 W	80 31 53.50	6.03
	9746.00	88.90	144.97	6589.15	5439.44	3273.75	-3117.90	1158.43	1.47	-0.85	1.19	528662.21	1710844.61	N 39 56 48.86 W	80 31 52.82	6.05
	9836.00	89.73	142.93	6590.23	5440.52	3363.33	-3190.65	1211.39	2.45	0.92	-2.27	528589.46	1710897.56	N 39 56 48.15 W	80 31 52.13	6.07
	9925.00	89.28	142.33	6591.00	5441.29	3451.70	-3261.38	1265.40	0.84	-0.51	-0.67	528518.74	1710951.57	N 39 56 47.45 W	80 31 51.43	6.08
	10015.00	87.94	142.47	6593.18	5443.47	3540.99	-3332.66	1320.30	1.50	-1.49	0.16	528447.46	1711006.47	N 39 56 46.76 W	80 31 50.71	6.10
	10105.00	89.69	140.66	6595.04	5445.33	3630.12	-3403.14	1376.23	2.80	1.94	-2.01	528376.98	1711062.40	N 39 56 46.07 W	80 31 49.98	6.12
	10194.00	89.93	140.22	6595.34	5445.63	3718.02	-3471.75	1432.91	0.56	0.27	-0.49	528308.37	1711119.08	N 39 56 45.39 W	80 31 49.25	6.13
	10284.00	89.93	142.61	6595.45	5445.74	3807.14	-3542.10	1489.04	2.66	0.00	2.66	528238.03	1711175.20	N 39 56 44.71 W	80 31 48.51	6.15
	10374.00	89.62	142.91	6595.80	5446.09	3896.53	-3613.75	1543.50	0.48	-0.34	0.33	528166.38	1711229.66	N 39 56 44.00 W	80 31 47.80	6.16
	10463.00	89.07	143.26	6596.82	5447.11	3984.97	-3684.90	1596.96	0.73	-0.62	0.39	528095.23	1711283.11	N 39 56 43.31 W	80 31 47.11	6.17
	10553.00	90.69	143.12	6597.01	5447.30	4074.44	-3756.96	1650.88	1.81	1.80	-0.16	528023.18	1711337.03	N 39 56 42.60 W	80 31 46.40	6.19
	10642.00	90.55	143.64	6596.05	5446.34	4162.93	-3828.38	1703.96	0.61	-0.16	0.58	527951.76	1711390.11	N 39 56 41.90 W	80 31 45.71	6.20
	10732.00	89.55	142.88	6595.97	5446.26	4252.41	-3900.51	1757.80	1.40	-1.11	-0.84	527879.64	1711443.95	N 39 56 41.19 W	80 31 45.01	6.22
	10821.00	88.87	141.67	6597.19	5447.48	4340.70	-3970.89	1812.25	1.56	-0.76	-1.36	527809.25	1711498.40	N 39 56 40.50 W	80 31 44.30	6.23
	10911.00	89.66	143.28	6598.35	5448.64	4430.03	-4042.26	1867.06	1.99	0.88	1.79	527737.89	1711553.21	N 39 56 39.81 W	80 31 43.59	6.25
	11001.00	88.76	143.99	6599.59	5449.88	4519.56	-4114.73	1920.42	1.27	-1.00	0.79	527665.43	1711606.56	N 39 56 39.10 W	80 31 42.89	6.26
	11090.00	87.87	144.88	6602.21	5452.50	4608.18	-4187.09	1972.16	1.41	-1.00	1.00	527593.07	1711658.30	N 39 56 38.39 W	80 31 42.22	6.27
	11179.00	89.35	144.34	6604.36	5454.65	4696.84	-4259.62	2023.69	1.77	1.66	-0.61	527520.54	1711709.82	N 39 56 37.68 W	80 31 41.54	6.29
	11269.00	90.76	147.03	6604.28	5454.57	4786.63	-4333.95	2074.42	3.37	1.57	2.99	527446.21	1711760.55	N 39 56 36.95 W	80 31 40.88	6.30
	11358.00	90.24	147.22	6603.50	5453.79	4875.56	-4408.69	2122.73	0.62	-0.58	0.21	527371.47	1711808.86	N 39 56 36.21 W	80 31 40.25	6.32
	11448.00	89.28	144.81	6603.88	5454.17	4965.39	-4483.31	2173.03	2.88	-1.07	-2.68	527296.86	1711859.16	N 39 56 35.48 W	80 31 39.59	6.33
	11537.00	89.07	145.13	6605.16	5455.45	5054.11	-4556.18	2224.11	2.17	-0.24	0.36	527223.99	1711910.24	N 39 56 34.77 W	80 31 38.93	6.34
	11627.00	89.90	143.17	6605.97	5456.26	5143.72	-4629.13	2276.82	2.36	0.92	-2.18	527151.05	1711962.94	N 39 56 34.05 W	80 31 38.24	6.36
	11716.00	91.00	141.93	6605.27	5455.56	5232.07	-4699.78	2330.93	1.86	1.24	-1.39	527080.40	1712017.05	N 39 56 33.36 W	80 31 37.54	6.37
	11806.00	90.03	142.53	6604.46	5454.75	5321.35	-4770.92	2386.05	1.27	-1.08	0.67	527009.27	1712072.17	N 39 56 32.66 W	80 31 36.82	6.38
	11895.00	89.18	141.83	6605.08	5455.37	5409.64	-4841.22	2440.62	1.24	-0.96	-0.79	526938.97	1712126.74	N 39 56 31.98 W	80 31 36.11	6.39
	11985.00	90.86	142.82	6605.04	5455.33	5498.94	-4912.45	2495.63	2.17	1.87	1.10	526867.74	1712181.74	N 39 56 31.28 W	80 31 35.39	6.41
	12075.00	90.24	143.79	6604.18	5454.47	5588.42	-4984.61	2549.40	1.28	-0.69	1.08	526795.58	1712235.52	N 39 56 30.57 W	80 31 34.69	6.42
	12164.00	89.79	144.20	6604.16	5454.45	5677.02	-5056.61	2601.72	0.68	-0.51	0.46	526723.59	1712287.83	N 39 56 29.86 W	80 31 34.01	6.43
	12254.00	90.79	142.28	6603.70	5453.99	5766.49	-5128.70	2655.58	2.41	1.11	-2.13	526651.49	1712341.69	N 39 56 29.16 W	80 31 33.31	6.44
	12343.00	90.17	141.69	6602.96	5453.25	5854.73	-5198.82	2710.39	0.96	-0.70	-0.66	526581.38	1712396.49	N 39 56 28.47 W	80 31 32.59	6.45
	12433.00	89.14	141.20	6603.50	5453.79	5943.86	-5269.20	2766.48	1.27	-1.14	-0.54	526511.01	1712452.58	N 39 56 27.78 W	80 31 31.86	6.46
	12522.00	89.97	141.13	6604.19	5454.48	6031.93	-5338.52	2822.29	0.94	0.93	-0.08	526441.69	1712508.39	N 39 56 27.10 W	80 31 31.13	6.47
	12611.00	89.11	140.34	6604.90	5455.19	6119.90	-5407.43	2878.61	1.31	-0.97	-0.89	526372.79	1712564.71	N 39 56 26.43 W	80 31 30.40	6.49
	12701.00	89.66	142.11	6605.87	5456.16	6208.97	-5477.58	2934.97	2.06	0.61	1.97	526302.63	1712621.07	N 39 56 25.74 W	80 31 29.67	6.50
	12790.00	91.20	143.30	6605.20	5455.49	6297.35	-5548.38	2988.90	2.19	1.73	1.34	526231.84	1712674.99	N 39 56 25.05 W	80 31 28.96	6.51
	12880.00	90.41	143.16	6603.94	5454.23	6386.81	-5620.47	3042.76	0.89	-0.88	-0.16	526159.75	1712728.86	N 39 56 24.34 W	80 31 28.26	6.52
	12969.00	89.48	143.87	6604.02	5454.31	6475.33	-5692.02	3095.68	1.31	-1.04	0.80	526088.20	1712781.77	N 39 56 23.64 W	80 31 27.57	6.53
	13058.00	91.44	143.46	6603.31	5453.60	6563.88	-5763.71	3148.41	2.25	2.20	-0.46	526016.52	1712834.50	N 39 56 22.94 W	80 31 26.89	6.54
	13148.00	90.79	143.04	6601.56	5451.85	6653.34	-5835.81	3202.25	0.86	-0.72	-0.47	525944.42	1712886.33	N 39 56 22.23 W	80 31 26.18	6.55
	13237.00	90.07	143.66	6600.89	5451.18	6741.83	-5907.21	3255.38	1.07	-0.81	0.70	525873.02	1712941.46	N 39 56 21.53 W	80 31 25.49	6.56
	13327.00	89.00	143.40	6601.62	5451.91	6831.35	-5979.58	3308.87	1.22	-1.19	-0.29	525800.65	1712994.95	N 39 56 20.82 W	80 31 24.79	6.57
	13416.00	89.31	142.63	6602.93	5453.22	6919.78	-6050.67	3362.41	0.93	0.35	-0.87	525729.57	1713048.48	N 39 56 20.13 W	80 31 24.10	6.58
	13505.00	90.55	141.38	6603.04	5453.33	7008.03	-6120.80	3417.19	1.98	1.39	-1.40	525659.44	1713103.27	N 39 56 19.44 W	80 31 23.38	6.59
	13595.00	89.48	141.66	6603.02	5453.31	7097.17	-6191.26	3473.19	1.23	-1.19	0.31	525588.99	1713159.26	N 39 56 18.75 W	80 31 22.65	6.60

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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 (RUS)	Easting (RUS)	Latitude (N/S °'")	Longitude (E/W °'")	Directional Difficulty Index
	13684.00	90.48	141.59	6603.05	5453.34	7185.34	-6261.03	3528.44	1.13	1.12	-0.08	525519.22	1713214.51	N 39 56 18.07	W 80 31 21.93	6.61
	13773.00	89.69	141.72	6602.92	5453.21	7273.52	-6330.83	3583.66	0.90	-0.89	0.15	525449.42	1713269.72	N 39 56 17.38	W 80 31 21.22	6.62
	13863.00	90.10	143.30	6603.08	5453.37	7362.86	-6402.24	3638.43	1.81	0.46	1.76	525378.02	1713324.50	N 39 56 16.68	W 80 31 20.50	6.63
	13952.00	89.35	143.29	6603.51	5453.80	7451.35	-6473.59	3691.63	0.84	-0.84	-0.01	525306.67	1713377.69	N 39 56 15.99	W 80 31 19.81	6.64
	14042.00	88.70	143.43	6605.04	5455.33	7540.83	-6545.79	3745.33	0.74	-0.72	0.16	525234.47	1713431.39	N 39 56 15.28	W 80 31 19.11	6.65
	14131.00	90.10	143.27	6605.97	5456.26	7629.32	-6617.19	3798.45	1.58	1.57	-0.18	525163.07	1713484.51	N 39 56 14.58	W 80 31 18.42	6.66
	14220.00	89.14	143.23	6606.56	5456.85	7717.80	-6688.50	3851.70	1.08	-1.08	-0.04	525091.77	1713537.75	N 39 56 13.88	W 80 31 17.72	6.67
	14310.00	91.34	143.32	6606.18	5456.47	7807.28	-6760.63	3905.51	2.45	2.44	0.10	525019.64	1713591.57	N 39 56 13.17	W 80 31 17.02	6.68
	14399.00	91.61	144.34	6603.89	5454.18	7895.82	-6832.46	3958.02	1.19	0.30	1.15	524947.82	1713644.07	N 39 56 12.47	W 80 31 16.34	6.69
	14489.00	90.89	143.71	6601.93	5452.22	7985.40	-6905.27	4010.88	1.06	-0.80	-0.70	524875.01	1713696.92	N 39 56 11.76	W 80 31 15.65	6.70
	14578.00	90.38	143.43	6600.94	5451.23	8073.93	-6976.88	4063.73	0.65	-0.57	-0.31	524803.41	1713749.77	N 39 56 11.05	W 80 31 14.96	6.70
	14667.00	90.07	143.18	6600.59	5450.88	8162.42	-7048.24	4116.91	0.45	-0.35	-0.28	524732.05	1713802.95	N 39 56 10.35	W 80 31 14.27	6.71
	14757.00	89.28	143.21	6601.10	5451.39	8251.88	-7120.30	4170.82	0.88	-0.88	0.03	524659.99	1713856.86	N 39 56 9.65	W 80 31 13.56	6.72
	14846.00	88.63	143.16	6602.73	5453.02	8340.34	-7191.54	4224.15	0.73	-0.73	-0.06	524588.75	1713910.19	N 39 56 8.95	W 80 31 12.87	6.73
	14935.00	87.97	142.55	6605.37	5455.66	8428.71	-7262.45	4277.86	1.01	-0.74	-0.69	524517.85	1713963.90	N 39 56 8.26	W 80 31 12.17	6.74
	14996.00	87.22	142.20	6608.01	5458.30	8491.18	-7312.30	4316.29	1.31	-1.19	-0.56	524468.00	1714002.32	N 39 56 7.77	W 80 31 11.67	6.74
	15057.00	87.22	142.20	6610.87	5461.16	8549.64	-7358.86	4352.41	0.00	0.00	0.00	524421.43	1714038.44	N 39 56 7.31	W 80 31 11.20	6.75

Final Survey  
03Apr13  
Projection to Bit

Survey Type: Def Survey

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

Survey Program:

Description	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
	0.000	18.240		30.000	30.000	SLB_NSG+MSHOT-Depth Only	Original Borehole / Noble Energy
	18.240	3086.000		30.000	30.000	SLB_NSG+MSHOT	SHL-8E-HS Gyro+MWD 0' MD to 15057' MD
	3086.000	14998.000		30.000	30.000	SLB_MWD-STD	Original Borehole / Noble Energy
	14998.000	15057.000		30.000	30.000	SLB_BLIND+TREND	SHL-8E-HS Gyro+MWD 0' MD to 15057' MD

03/07/2014  
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