

51-01604



Noble Energy SHL17DHS Gyro+MWD 0' to 6805' MD Survey Report



(Dof Survey)

Report Date: June 10, 2013 - 10:12 AM
 Client: Noble Energy
 Field: WY Mesquite Canyon (NA027)
 Structure / Slot: Noble Energy SHL17 Pad / S/L 17CH5
 Well: S/L 17CH5
 Original Borehole: UREX09 / Unknown
 UWI / API#:
 Survey Name: Noble Energy SHL17DHS Gyro+MWD 0' to 6805' MD
 Survey Date: June 14, 2013
 Tool / AHD / DOI / ERD Ratio: 30.905" / 02.753 R / 3.16 / 0.012
 Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Foot
 Location Lat / Long: N 39° 58' 38" 71830", W 80° 31' 40" 53228"
 Location Grid NE YX: N 53871.771 (NUS), E 171461.701 (NUS)
 CRS Grid Convergence Angle: -0.6568"
 Grid Scale Factor: 0.9995951

Survey / DLS Computation: Mwanana Casimiro / Lutenski
 Vertical Section Azimuth: 329.804" (Grid North)
 Vertical Section Origin: 0.000 R, 0.000 B
 TWD Reference Datum: NAD
 TWD Reference Elevation: 1252.500 R above MSL
 Seabed / Ground Elevation: 1272.500 R above MSL
 Magnetic Declination: -8.401"
 Total Gravity Field Strength: 9.7933000 (9.80665 (Theory))
 Total Magnetic Field Strength: 53370.649 nT
 Magnetic Dip Angle: 67.553"
 Declination Date: June 14, 2013
 Magnetic Oscillation Model: H0(CM)2013
 North Reference: Grid North
 Grid Convergence Used: -0.6568"
 Total Corr Mag North-Grid North: -7.8039"
 Local Coord Referenced To: WGS1984

Comments	MD (ft)	heel (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	N5 (ft)	EW (ft)	DLS (ft)	DR (ft)	TR (ft)	Machting (ft)	Easting (ft)	Northing (ft)	Latitude (N/S)	Longitude (E/W)	Directional Difficulty Index
500	0.00	0.00	0.00	0.00	-1290.50	0.00	0.00	0.00	0.00	N/A	N/A	539771.77	171461.76	39 58 38.72	W 80 31 40.53	0.00	
500	0.00	0.00	212.45	50.00	-1240.50	-0.10	-0.11	-0.00	0.00	0.62	0.62	539771.65	171461.66	N 39 58 38.72	W 80 31 40.53	0.00	
1000	0.00	0.00	192.31	100.00	-1190.50	-0.34	-0.33	-0.16	0.24	0.08	-0.20	539771.29	171461.58	N 39 58 38.71	W 80 31 40.53	0.00	
1500	0.00	0.00	180.89	150.00	-1140.50	-0.57	-0.61	-0.21	0.34	-0.32	-0.20	539771.19	171461.55	N 39 58 38.71	W 80 31 40.53	0.00	
2000	0.00	0.00	128.45	200.00	-1090.50	-0.83	-0.83	-0.02	0.44	0.74	-104.82	539770.93	171461.74	N 39 58 38.71	W 80 31 40.53	0.01	
2500	0.00	0.00	107.57	245.00	-1040.51	-1.12	-1.07	0.40	0.90	0.00	-41.76	539770.70	171462.16	N 39 58 38.71	W 80 31 40.53	0.27	
3000	0.00	0.00	109.26	290.00	-990.51	-1.40	-1.29	0.96	0.48	0.48	3.64	539770.51	171462.73	N 39 58 38.71	W 80 31 40.52	0.49	
3500	0.00	0.00	106.64	340.00	-940.51	-1.72	-1.47	1.85	0.13	0.08	-7.50	539770.29	171463.41	N 39 58 38.70	W 80 31 40.51	0.64	
4000	0.00	0.00	115.02	390.00	-890.52	-2.05	-1.71	2.20	0.07	-0.26	10.02	539770.05	171464.04	N 39 58 38.70	W 80 31 40.52	0.25	
4500	0.00	0.00	133.00	440.00	-840.52	-2.52	-2.09	2.83	0.50	0.26	34.80	539769.68	171464.56	N 39 58 38.70	W 80 31 40.50	0.92	
5000	0.00	0.00	119.32	490.00	-790.53	-3.05	-2.53	3.44	0.43	0.12	-27.30	539769.24	171465.20	N 39 58 38.69	W 80 31 40.48	1.04	
5500	0.00	0.00	149.50	540.00	-740.53	-3.62	-2.82	4.09	0.77	-0.70	-6.60	539768.66	171465.75	N 39 58 38.69	W 80 31 40.48	1.16	
6000	0.00	0.00	153.23	590.00	-690.53	-4.32	-2.76	4.79	1.38	-0.42	-219.56	539767.98	171466.56	N 39 58 38.69	W 80 31 40.48	1.28	
6500	0.00	0.00	163.23	640.00	-640.54	-5.10	-2.31	5.56	1.52	1.30	-84.00	539767.46	171467.53	N 39 58 38.70	W 80 31 40.48	1.41	
7000	0.00	0.00	171.85	690.00	-590.56	-5.95	-1.27	6.41	2.35	2.34	-7.16	539770.50	171469.47	N 39 58 38.71	W 80 31 40.49	1.98	
7500	0.00	0.00	219.52	740.00	-540.65	0.02	0.20	7.67	1.27	1.22	-8.20	539772.05	171493.43	N 39 58 38.72	W 80 31 40.51	1.74	
8000	0.00	0.00	218.81	790.00	-490.66	1.06	2.01	9.24	0.26	0.18	6.58	539773.29	171491.84	N 39 58 38.74	W 80 31 40.52	1.87	
8500	0.00	0.00	210.51	840.00	-440.76	2.67	3.50	11.24	1.44	-1.44	0.40	539776.29	171490.50	N 39 58 38.74	W 80 31 40.55	1.98	
9000	0.00	0.00	227.25	890.00	-390.77	5.02	4.74	14.17	0.82	-0.66	16.48	539770.51	171493.28	N 39 58 38.70	W 80 31 40.56	2.02	
9500	0.00	0.00	323.58	940.00	-340.74	8.32	5.00	17.20	0.25	0.14	-7.34	539777.68	171498.78	N 39 58 38.75	W 80 31 40.57	2.10	
10000	0.00	0.00	329.49	990.00	-290.76	9.68	7.17	20.00	0.41	0.20	11.82	539778.84	171497.96	N 39 58 38.79	W 80 31 40.58	2.15	
10500	0.00	0.00	317.75	1040.00	-240.75	9.24	8.69	22.50	0.94	0.38	18.52	539780.28	171495.24	N 39 58 38.80	W 80 31 40.50	2.20	
11000	0.00	0.00	314.06	1090.00	-190.83	10.25	10.01	24.74	1.81	0.00	-47.36	539781.78	171492.30	N 39 58 38.80	W 80 31 40.60	2.24	
11500	0.00	0.00	301.78	1140.00	-140.84	11.89	10.92	26.56	3.08	-0.74	-24.50	539782.74	171485.10	N 39 58 38.83	W 80 31 40.62	2.23	
12000	0.00	0.00	297.75	1190.00	-90.85	12.72	11.62	27.80	4.40	-0.34	-8.00	539783.29	171483.00	N 39 58 38.83	W 80 31 40.63	2.37	
12500	0.00	0.00	216.40	1240.00	-40.87	13.54	12.30	28.52	0.89	-0.34	35.48	539784.07	171483.23	N 39 58 38.84	W 80 31 40.65	2.41	
13000	0.00	0.00	213.64	1290.00	9.12	14.45	13.00	28.50	0.18	0.10	-3.70	539784.86	171482.23	N 39 58 38.85	W 80 31 40.66	2.43	
13500	0.00	0.00	330.58	1340.00	59.10	15.22	13.74	28.26	0.72	-0.48	-25.32	539785.51	171481.40	N 39 58 38.85	W 80 31 40.67	2.40	
14000	0.00	0.00	296.27	1390.00	109.10	16.00	14.11	27.80	0.87	-0.80	0.42	539785.68	171480.74	N 39 58 38.86	W 80 31 40.68	2.49	
14500	0.00	0.00	254.14	1440.00	159.10	15.98	14.34	27.44	0.50	-0.48	15.74	539780.11	171480.33	N 39 58 38.86	W 80 31 40.68	2.51	
15000	0.00	0.00	333.91	1490.00	209.00	16.42	14.74	27.13	0.88	0.00	59.54	539780.51	171480.23	N 39 58 38.86	W 80 31 40.69	2.53	
15500	0.00	0.00	291.81	1540.00	259.00	16.81	15.06	26.82	1.00	-0.89	-84.20	539785.86	171480.74	N 39 58 38.87	W 80 31 40.69	2.56	
16000	0.00	0.00	341.48	1590.00	309.00	17.09	15.33	26.52	0.70	0.20	89.34	539787.10	171480.64	N 39 58 38.87	W 80 31 40.69	2.58	
16500	0.00	0.00	360.61	1640.00	359.00	17.22	15.54	26.22	0.24	0.24	18.54	539787.60	171480.43	N 39 58 38.87	W 80 31 40.69	2.59	
17000	0.00	0.00	323.50	1690.00	409.00	16.98	15.34	26.26	0.57	0.34	84.90	539788.11	171480.51	N 39 58 38.88	W 80 31 40.69	2.62	
17500	0.00	0.00	6.35	1740.00	459.00	16.53	15.61	26.00	0.58	0.18	-83.28	539788.20	171480.67	N 39 58 38.88	W 80 31 40.69	2.63	
18000	0.00	0.00	340.27	1790.00	509.00	16.84	17.13	25.50	0.75	-0.52	17.25	539788.00	171480.65	N 39 58 38.88	W 80 31 40.69	2.65	
18500	0.00	0.00	336.27	1840.00	559.00	18.27	17.54	24.24	0.23	0.22	-8.00	539786.31	171480.50	N 39 58 38.88	W 80 31 40.69	2.65	
19000	0.00	0.00	344.76	1890.00	609.00	19.55	17.81	23.34	0.43	-0.42	16.98	539786.58	171480.47	N 39 58 38.88	W 80 31 40.69	2.67	
19500	0.00	0.00	353.45	1940.00	659.00	19.89	18.14	22.40	0.53	0.62	17.38	539786.91	171480.37	N 39 58 38.89	W 80 31 40.69	2.69	
20000	0.00	0.00	29.12	1990.00	709.00	20.16	18.44	21.44	0.83	-0.74	71.34	539790.21	171480.38	N 39 58 38.90	W 80 31 40.65	2.75	
20500	0.00	0.00	32.30	2040.00	759.00	22.37	18.65	20.26	0.44	0.44	8.54	539790.42	171480.50	N 39 58 38.90	W 80 31 40.65	2.71	
21000	0.00	0.00	34.41	2090.00	809.00	20.61	18.93	19.00	0.09	-0.04	4.04	539790.70	171480.68	N 39 58 38.90	W 80 31 40.65	2.71	
21500	0.00	0.00	83.10	2140.00	859.00	20.77	19.08	17.80	0.00	-0.04	97.50	539790.85	171480.91	N 39 58 38.91	W 80 31 40.60	2.73	
22000	0.00	0.00	20.01	2190.00	909.00	20.82	19.24	16.60	0.74	0.02	-129.30	539791.01	171480.13	N 39 58 38.91	W 80 31 40.68	2.74	
22500	0.00	0.00	28.75	2240.00	959.00	21.08	19.49	15.52	0.27	-0.20	17.48	539791.20	171480.24	N 39 58 38.91	W 80 31 40.68	2.75	
23000	0.00	0.00	30.06	2290.00	1009.00	21.21	19.60	14.40	0.29	-0.28	20.07	539791.40	171480.30	N 39 58 38.91	W 80 31 40.68	2.76	
23500	0.00	0.00	336.28	2340.00	1059.00	21.22	19.74	13.24	0.18	0.08	-2.84	539791.51	171480.42	N 39 58 38.91	W 80 31 40.68	2.76	
24000	0.00	0.00	212.27	2390.00	1109.00	21.45	19.91	12.25	0.15	0.09	-36.02	539791.68	171480.52	N 39 58 38.91	W 80 31 40.68	2.77	
24500	0.00	0.00	62.01	2440.00	1159.00	21.60	20.08	11.11	0.28	0.01	61.48	539791.85	171480.63	N 39 58 38.92	W 80 31 40.68	2.78	
25000	0.00	0.00	37.73	2490.00	1209.00	21.66	20.16	10.01	0.41	-0.41	31.44	539791.93	171480.70	N 39 58 38.92	W 80 31 40.68	2.78	
25500	0.00	0.00	359.60	2540.00	1259.00	21.72	20.22	8.93	0.24	0.18	-104.08	539791.60	171480.76	N 39 58 38.92	W 80 31 40.68	2.78	
26000	0.00	0.00	351.30	2590.00	1309.00	21.85	20.25	7.82	0.00	0.00	1.22	539792.12	171480.71	N 39 58 38.92	W 80 31 40.68	2.78	
26500	0.00	0.00	324.25	2640.00	1359.00	22.01	20.29	6.69	0.21	0.10	-54.10	539792.27	171480.68	N 39 58 38.92	W 80 31 40.68	2.79	
27000	0.00	0.00	296.14	2690.00	1409.00	22.18	20.44	5.54	0.34	0.22	-58.22	539792.42	171480.64	N 39 58 38.92	W 80 31 40.68	2.80	
27500	0.00	0.00	265.87	2740.00	1459.00	22.27	20.70	4.44	0.38	-0.30	-90.94	539792.47	171480.28	N 39 58 38.92	W 80 31 40.68	2.80	
28000	0.00	0.00	219.07	2790.00	1509.00	22.27	20.88	3.34	0.12	-0.12	-36.42	539792.45	171480.18	N 39 58 38.92	W 80 31 40.68	2.80	
28500	0.00	0.00	37.98	2840.00	1559.00	22.41	20.89	2.24	0.76	0.52	169.74	539792.57	171480.07	N 39 58 38.92			

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Comments	MD (ft)	Incl (°)	Adm Grid (°)	TVD (ft)	TVD88 (ft)	VSEC (ft)	N8 (ft)	EW (ft)	DLS (ft/100ft)	BR (ft/100ft)	TR (ft/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N8° ' ' '')	Longitude (E/W° ' ' '')	Directional Difficulty Index
	6070.00	0.25	179.70	6000.08	4779.58	42.07	41.43	-7.35	0.07	-0.51	138.27	539813.20	1711454.41	N 39 58 30.12 W	80 31 46.63	3.46
	6160.00	0.40	158.79	6150.08	4808.58	41.57	40.94	-7.24	0.21	0.17	-23.30	539812.71	1711454.52	N 39 58 30.12 W	80 31 46.63	3.47
	6250.00	0.42	106.19	6240.07	4898.57	41.12	40.55	-6.81	0.40	0.02	-58.44	539812.32	1711454.05	N 39 58 30.12 W	80 31 46.83	3.48
	6339.00	0.41	105.75	6338.07	4947.57	40.85	40.38	-6.10	0.01	-0.01	-1.06	539812.15	1711455.57	N 39 58 30.12 W	80 31 46.82	3.48
	6429.00	0.44	80.72	6428.07	5127.57	40.72	40.35	-5.53	0.20	0.03	-27.28	539812.12	1711456.23	N 39 58 30.12 W	80 31 46.81	3.49
	6518.00	0.51	70.48	6517.07	5226.57	40.79	40.54	-4.82	0.12	0.08	-11.51	539812.31	1711456.94	N 39 58 30.12 W	80 31 46.80	3.49
	6608.00	0.62	77.58	6607.06	5316.56	40.89	40.78	-3.07	0.14	0.12	7.89	539812.55	1711457.79	N 39 58 30.12 W	80 31 46.59	3.50
Final Survey 19 Jun 13	6697.00	0.85	82.45	6696.05	5405.55	40.90	40.07	-2.85	0.27	0.26	5.47	539812.74	1711458.91	N 39 58 30.12 W	80 31 46.57	3.51
Production to Bit	6740.00	0.79	92.78	6730.05	5448.55	40.82	40.99	-2.23	0.37	-0.14	24.02	539812.78	1711458.53	N 39 58 30.12 W	80 31 46.57	3.51
	6805.00	0.78	92.70	6804.04	5513.54	40.94	40.95	-1.34	0.00	0.00	0.00	539812.72	1711460.42	N 39 58 30.12 W	80 31 46.59	3.52

Survey Type: Def Survey

Survey Error Model: ISCWBA Rev 0 *** 3.47 05 000% Confidence 2.7865 sigma

Description	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
	0.000	18.500		30.000	30.000	SLB_NSQ+MSHOT-Depth Only	Original Borehole / Noble Energy SHL 17DHS Gyro-MWD 0' to 8805' MD
	18.500	2977.000		30.000	30.000	SLB_NSQ+MSHOT	Original Borehole / Noble Energy SHL 17DHS Gyro-MWD 0' to
	2977.000	3101.000		30.000	30.000	SLB_MWD+POOR	Original Borehole / Noble Energy SHL 17DHS Gyro-MWD 0' to
	3101.000	4160.000		30.000	30.000	SLB_MWD-STD	Original Borehole / Noble Energy SHL 17DHS Gyro-MWD 0' to
	4160.000	4279.000		30.000	30.000	SLB_MWD-POOR	Original Borehole / Noble Energy SHL 17DHS Gyro-MWD 0' to
	4279.000	6740.000		30.000	30.000	SLB_MWD-STD	Original Borehole / Noble Energy SHL 17DHS Gyro-MWD 0' to
	6740.000	6805.000		30.000	30.000	SLB_BLIND+TREND	Original Borehole / Noble Energy SHL 17DHS Gyro-MWD 0' to

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Comments	MD (ft)	Incl (°)	Adm Grid (°)	TVD (ft)	TVSSA (ft)	VSEC (ft)	NS (ft)	EW (ft)	DL9 (ft)	BR (ft)	TR (ft)	Northing (ft)	Easting (ft)	Latitude (°)	Longitude (°)	Directional Offshore Index
	5578.00	26.49	120.03	5565.82	4275.32	-28.43	-0.69	50.01	10.34	10.32	-1.70	53871.09	1711512.07	N 38 58 38.72 W	80 31 45.88	3.97
	5623.00	30.82	125.45	5605.31	4314.81	-48.48	-13.13	88.52	0.72	0.71	-0.93	53875.04	1711530.27	N 38 58 38.60 W	80 31 46.05	4.06
	5668.00	33.44	128.82	5643.41	4352.01	-70.04	-26.72	88.21	6.13	5.82	-3.02	53874.06	1711549.97	N 38 58 38.40 W	80 31 45.40	4.14
	5713.00	39.21	122.97	5690.35	4399.85	-84.21	-40.80	109.67	6.26	0.16	-1.89	538730.92	1711571.42	N 38 58 38.33 W	80 31 45.12	4.21
	5757.00	49.61	126.60	5714.98	4424.48	-119.30	-90.21	132.03	9.43	8.62	0.07	538716.56	1711560.79	N 38 58 38.18 W	80 31 44.83	4.29
	5802.00	39.00	128.58	5749.31	4458.81	-149.71	-73.81	155.19	4.17	4.44	6.04	538697.06	1711614.95	N 38 58 38.01 W	80 31 44.60	4.35
	5847.00	37.85	128.43	5784.16	4493.16	-179.38	-59.12	177.31	0.56	-1.13	1.89	538680.06	1711635.96	N 38 58 37.83 W	80 31 44.24	4.41
	5892.00	34.17	130.07	5820.60	4530.00	-190.08	-108.63	197.05	8.22	-8.16	1.42	538662.16	1711695.41	N 38 58 37.67 W	80 31 43.98	4.46
	5937.00	30.60	129.59	5858.90	4569.06	-221.87	-193.44	216.05	9.55	-7.93	-0.96	538648.34	1711878.40	N 38 58 37.52 W	80 31 43.73	4.51
	5982.00	26.91	119.88	5898.01	4607.51	-241.94	-195.00	234.91	11.02	-8.20	-15.36	538630.78	1711896.98	N 38 58 37.41 W	80 31 43.50	4.56
	6027.00	22.32	109.90	5938.02	4647.82	-287.01	-142.02	281.61	13.31	-10.43	-19.05	538615.19	1711913.26	N 38 58 37.34 W	80 31 43.25	4.61
	6071.00	18.81	99.53	5980.16	4689.08	-268.72	-146.72	298.04	11.50	-8.24	-23.04	538605.05	1711928.33	N 38 58 37.20 W	80 31 43.09	4.65
	6116.00	10.00	87.30	6022.10	4732.66	-270.74	-147.02	278.92	0.02	-5.80	-27.18	538624.18	1711941.87	N 38 58 37.29 W	80 31 42.92	4.68
	6161.00	13.72	74.57	6065.58	4776.14	-281.51	-145.01	291.26	8.32	-5.07	-28.23	538625.87	1711953.81	N 38 58 37.21 W	80 31 42.77	4.71
	6206.00	14.14	57.42	6109.38	4818.88	-283.18	-141.82	308.83	0.40	0.05	-38.98	538630.15	1711972.68	N 38 58 37.35 W	80 31 42.85	4.72
	6250.00	17.61	45.40	6152.67	4862.17	-281.87	-133.68	310.31	10.50	7.71	-26.71	538627.00	1711972.06	N 38 58 37.43 W	80 31 42.53	4.76
	6295.00	18.02	32.19	6196.31	4904.61	-277.34	-122.84	318.23	10.50	4.91	-29.28	538640.14	1711980.97	N 38 58 37.64 W	80 31 42.41	4.78
	6340.00	21.67	18.45	6237.43	4946.93	-269.02	-108.33	329.91	11.44	3.80	-30.53	538663.45	1711978.85	N 38 58 37.88 W	80 31 42.33	4.82
	6385.00	24.05	5.50	6278.93	4988.43	-266.72	-91.34	328.42	12.37	5.51	-26.64	538690.44	1711971.17	N 38 58 37.85 W	80 31 42.20	4.86
	6429.00	28.95	357.06	6318.00	5028.10	-241.10	-72.45	329.78	10.58	5.59	-19.25	538980.33	1711970.53	N 38 58 38.04 W	80 31 42.23	4.80
	6474.00	25.30	396.05	6356.33	5067.83	-227.14	-51.58	327.30	0.16	5.42	-15.92	539070.59	1711980.10	N 38 58 38.25 W	80 31 42.32	4.92
	6519.00	32.76	244.47	6396.68	5108.38	-203.38	-29.78	322.10	0.84	7.40	-12.40	539742.01	1711933.03	N 38 58 38.47 W	80 31 42.30	4.96
	6564.00	38.40	348.28	6433.91	5143.41	-175.75	-4.42	314.41	9.83	8.29	-0.31	539787.25	1711978.15	N 38 58 38.71 W	80 31 42.49	4.96
	6609.00	40.67	336.13	6488.30	5177.80	-148.99	21.21	304.65	0.86	0.50	-4.89	538792.08	1711969.39	N 38 58 38.96 W	80 31 42.62	5.01
	6653.00	45.27	325.94	6531.22	5216.82	-118.82	60.54	292.22	0.38	10.22	-2.80	538821.51	1711954.87	N 38 58 39.24 W	80 31 42.78	5.05
	6698.00	45.64	338.08	6581.04	5241.14	-88.15	79.04	279.70	0.81	0.71	-1.91	539851.70	1711941.45	N 38 58 39.54 W	80 31 42.80	5.08
	6742.00	53.61	315.84	6588.96	5269.45	-52.10	115.43	285.65	0.03	0.02	-0.55	539883.20	1711927.40	N 38 58 39.85 W	80 31 43.14	5.11
	6787.00	57.84	334.04	6584.29	5293.70	-16.20	141.00	248.89	0.96	0.40	-4.00	539916.67	1711911.64	N 38 58 40.18 W	80 31 43.34	5.16
	6832.00	61.34	331.78	6607.06	5318.58	23.28	179.64	232.21	8.90	7.78	-5.02	539951.40	1711893.06	N 38 58 40.63 W	80 31 43.88	5.18
	6877.00	64.26	330.23	6627.63	5337.13	83.10	214.63	212.80	7.16	6.47	-2.44	539990.40	1711874.66	N 38 58 40.83 W	80 31 43.83	5.21
	6921.00	69.50	326.47	6645.23	5354.73	150.45	240.49	192.55	0.90	0.88	-1.73	540021.25	1711854.30	N 38 58 41.21 W	80 31 44.10	5.24
	6966.00	73.41	328.82	6669.86	5369.38	145.98	265.07	170.87	10.26	10.71	-1.88	540057.72	1711832.42	N 38 58 41.56 W	80 31 44.38	5.27
	7011.00	78.90	329.24	6691.44	5389.94	180.41	323.21	148.23	7.65	7.53	1.39	540094.97	1711802.28	N 38 58 41.93 W	80 31 44.68	5.30
	7056.00	80.30	328.01	6710.33	5398.88	233.48	360.58	125.47	7.60	7.78	-1.40	540132.74	1711887.22	N 38 58 42.30 W	80 31 44.87	5.33
	7101.00	85.16	327.31	6730.07	5395.57	276.00	368.81	101.70	11.15	10.78	-2.89	540170.55	1711903.55	N 38 58 42.67 W	80 31 45.28	5.37
	7146.00	88.84	328.17	6750.29	5388.26	327.01	425.58	77.71	6.84	6.11	-5.99	540207.28	1711930.48	N 38 58 43.03 W	80 31 45.80	5.39
	7191.00	85.42	325.82	6769.87	5400.07	373.02	477.72	54.02	6.82	6.12	-1.08	540245.47	171937.03	N 38 58 43.44 W	80 31 45.87	5.42
	7247.00	88.73	325.17	6792.68	5402.08	423.01	519.67	20.19	2.72	2.67	-0.88	540281.42	1711481.95	N 38 58 43.98 W	80 31 46.35	5.44
	7302.00	80.00	324.94	6803.57	5403.07	512.88	562.82	-36.70	1.45	0.27	-0.26	540324.36	1711430.08	N 38 58 44.57 W	80 31 47.01	5.48
	7347.00	90.24	324.30	6813.38	5402.88	598.04	608.04	-82.04	0.67	0.27	-0.61	540373.74	1711382.26	N 38 58 45.26 W	80 31 47.69	5.52
	7391.00	90.21	323.58	6803.03	5402.53	601.68	738.03	-135.17	0.01	-0.03	-0.81	540425.27	1711329.60	N 38 58 46.00 W	80 31 48.38	5.55
	7436.00	90.48	324.55	6822.40	5401.00	781.58	816.50	-187.93	1.12	0.30	1.08	540502.83	1711279.78	N 38 58 46.71 W	80 31 49.07	5.58
	7481.00	90.38	326.77	6801.82	5401.32	863.04	883.04	-239.83	1.38	-0.11	1.37	540555.07	1711222.94	N 38 58 47.43 W	80 31 49.73	5.61
	7536.00	90.31	325.97	6811.29	5400.79	950.52	937.61	-288.78	0.24	-0.08	0.22	540729.34	1711173.01	N 38 58 48.15 W	80 31 50.38	5.64
	7581.00	90.45	325.24	6800.60	5400.19	1049.50	1031.87	-339.80	0.83	0.15	-0.81	540803.60	1711122.17	N 38 58 48.88 W	80 31 51.06	5.67
	7626.00	90.07	324.81	6809.20	5399.70	1138.45	1104.80	-390.82	0.84	-0.43	-0.48	540878.52	1711071.18	N 38 58 49.60 W	80 31 51.71	5.70
	7671.00	89.60	325.94	6805.25	5399.70	1228.40	1178.46	-441.33	0.50	-0.16	-0.26	540956.17	1711016.45	N 38 58 50.31 W	80 31 52.30	5.72
	7716.00	89.87	325.30	6800.38	5399.86	1317.37	1251.65	-492.11	0.40	0.04	0.39	541023.27	1710966.67	N 38 58 51.03 W	80 31 53.05	5.76
	7771.00	89.00	325.10	6800.48	5399.06	1408.34	1324.70	-543.81	0.27	-0.08	-0.26	541090.41	1710891.78	N 38 58 51.75 W	80 31 53.71	5.77
	7816.00	89.86	324.45	6805.05	5400.15	1498.28	1386.24	-595.88	0.79	-0.04	-0.78	541159.98	1710808.11	N 38 58 52.47 W	80 31 54.39	5.79
	7861.00	89.83	324.26	6809.30	5400.39	1587.20	1470.58	-647.53	0.19	-0.03	-0.19	541232.90	1710814.28	N 38 58 53.18 W	80 31 55.07	5.82
	7906.00	89.79	323.70	6801.10	5400.69	1675.09	1543.38	-700.44	0.65	-0.04	-0.64	541316.08	1710761.35	N 38 58 53.88 W	80 31 55.76	5.84
	7951.00	89.80	324.27	6801.84	5401.34	1763.97	1615.37	-752.77	0.79	-0.46	0.84	541387.07	1710706.02	N 38 58 54.60 W	80 31 56.44	5.86
	8006.00	89.77	323.33	6803.64	5402.14	1852.01	1688.09	-804.07	1.21	0.24	1.19	541458.70	1710651.77	N 38 58 55.34 W	80 31 57.11	5.88
	8051.00	89.38	323.70	6803.45	5402.95	1942.80	1762.37	-858.03	0.47	-0.23	0.41	541533.97	1710604.77	N 38 58 56.04 W	80 31 57.77	5.90
	8096.00	89.52	326.21	6804.30	5403.80	2031.87	1836.61	-908.85	0.59	0.10	0.57	541607.70	1710556.95	N 38 58 56.78 W	80 31 58.43	5.92
	8141.00	89.80	326.52	6804.78	5404.26	2121.87	1910.84	-954.70	0.54	0.42	0.34	541682.63	1710507.10	N 38 58 57.40 W	80 31 59.08	5.94
	8186.00	89.83	326.36	6809.07	5404.47	2211.87	1985.04	-1004.48	0.10	-0.06	-0.18	541757.03	1710457.35	N 38 58 58.23 W	80 31 59.73	5.96
	8241.00	89.86	326.26	6805.21	5404.71	2300.60	2060.00	-1053.80	0.09	0.03	-0.08	541831.89	1710408.00	N 38 58 58.96 W	80 32 0.32	5.98
	8286.00	89.73	326.01	6808.53	5405.03	2390.85	2134.75	-1103.04	0.34	-0.14	-0.31	541906.43	1710358.77	N 38 58 59.69 W	80 32 1.02	6.00
	8331.00	89.92	325.08	6806.04	5405.34	2480.84	2209.23	-1154.49	0.36	-0.12	-0.38	541980.91	1710307.33	N 38 58 60.42 W	80 32 1.69	6.01
	8376.00	89.80	325.02													

51-01604

Comments	MD (ft)	Incl (°)	Arith Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	N9 (ft)	EW (ft)	DL9 (ft/100ft)	BR (ft/100ft)	TR (ft/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ° ' '')	Longitude (E/W ° ° ' '')	Directional Difficulty Index
	14413.00	90.36	323.50	6676.38	5365.88	7582.02	6384.10	-4062.37	0.66	-0.08	0.09	640165.50	1707300.57	N 30 50 41.34 W	80 32 40.05	6.09
	14640.00	89.84	324.22	6671.19	5386.09	7671.78	6459.84	-4145.17	1.48	-0.58	1.37	646227.33	1707316.77	N 30 50 42.04 W	80 32 40.74	6.58
	14692.00	89.48	326.61	6670.71	5389.21	7761.73	6528.48	-4190.80	1.00	-0.42	1.54	646300.87	1707295.54	N 30 50 42.78 W	80 32 41.41	6.70
	14683.00	89.42	326.10	6677.87	5387.07	7851.69	6603.92	-4248.00	0.57	-0.07	-0.87	646376.01	1707213.88	N 30 50 43.49 W	80 32 42.08	6.71
	14771.00	89.52	325.71	6678.40	5387.90	7940.06	6678.78	-4298.69	0.09	0.11	0.69	646448.27	1707193.30	N 30 50 44.21 W	80 32 42.74	6.72
	14881.00	89.95	325.93	6679.13	5388.03	8030.05	6751.07	-4348.40	1.30	0.03	1.36	646523.18	1707113.45	N 30 50 44.94 W	80 32 43.30	6.73
	14950.00	80.72	327.03	6679.59	5389.10	8110.65	6826.70	-4396.00	0.27	0.10	0.11	646597.77	1707084.08	N 30 50 45.67 W	80 32 44.03	6.74
	15040.00	80.83	328.72	6680.05	5390.55	8200.08	6901.66	-4448.17	0.37	0.12	-0.34	646673.14	1707016.78	N 30 50 46.41 W	80 32 44.67	6.74
	15120.00	80.31	329.06	6679.04	5389.44	8288.95	6976.94	-4495.06	0.54	0.34	-0.07	646747.52	1706965.00	N 30 50 47.14 W	80 32 45.31	6.76
	15210.00	80.41	329.04	6679.37	5388.87	8378.64	7050.92	-4544.88	0.81	0.11	-0.80	646822.39	1706916.07	N 30 50 47.88 W	80 32 45.96	6.76
	15300.00	80.41	329.30	6679.73	5388.23	8478.64	7125.07	-4595.10	0.50	0.00	0.60	646897.14	1706868.88	N 30 50 48.61 W	80 32 46.62	6.77
	15398.00	80.00	327.50	6679.39	5387.80	8567.83	7200.27	-4643.04	1.32	-0.43	1.25	646971.73	1706818.22	N 30 50 49.34 W	80 32 47.25	6.79
	15488.00	80.90	325.51	6678.44	5387.94	8657.81	7276.50	-4691.32	1.13	-0.14	1.12	647046.98	1706770.64	N 30 50 50.08 W	80 32 47.88	6.79
	15578.00	89.90	329.20	6678.90	5388.10	8747.66	7353.94	-4737.83	0.83	0.00	0.83	647125.10	1706724.10	N 30 50 50.84 W	80 32 48.49	6.79
	15667.00	89.79	327.31	6678.84	5388.34	8833.52	7429.35	-4784.62	2.10	-0.12	-2.19	647200.81	1706677.35	N 30 50 51.59 W	80 32 49.10	6.80
	15757.00	89.66	329.14	6679.27	5388.77	8920.62	7504.69	-4833.00	1.31	-0.14	-1.30	647276.04	1706630.07	N 30 50 52.33 W	80 32 49.74	6.81
	15846.00	89.79	325.34	6679.70	5389.20	9015.80	7578.15	-4884.10	0.91	0.15	-0.80	647350.60	1706582.80	N 30 50 53.05 W	80 32 50.40	6.82
	15936.00	89.90	325.41	6679.84	5389.44	9105.47	7652.21	-4935.23	0.14	0.12	0.08	647423.95	1706535.74	N 30 50 53.77 W	80 32 51.07	6.82
	16026.00	89.76	324.96	6680.21	5389.71	9194.43	7726.28	-4986.05	0.53	-0.16	-0.51	647498.72	1706488.03	N 30 50 54.49 W	80 32 51.73	6.83
	16116.00	89.70	324.17	6680.58	5390.06	9284.38	7798.61	-5038.23	0.89	0.03	-0.88	647570.05	1706440.76	N 30 50 55.21 W	80 32 52.41	6.84
	16206.00	89.70	323.03	6680.01	5390.41	9373.22	7870.24	-5091.04	1.28	-0.03	-1.28	647641.08	1706393.04	N 30 50 55.91 W	80 32 53.10	6.85
	16296.00	89.87	323.26	6681.12	5390.82	9463.04	7942.70	-5145.01	0.39	0.23	0.28	647713.70	1706345.97	N 30 50 56.61 W	80 32 53.81	6.85
	16386.00	89.83	323.55	6681.28	5390.78	9551.89	8013.73	-5198.05	0.34	-0.16	0.30	647785.18	1706298.03	N 30 50 57.31 W	80 32 54.50	6.86
	16476.00	89.70	324.17	6681.59	5390.80	9641.74	8086.30	-5251.42	0.29	0.22	0.19	647857.03	1706250.57	N 30 50 58.02 W	80 32 55.19	6.87
	16566.00	89.90	323.72	6681.44	5390.94	9730.81	8157.95	-5304.08	0.15	-0.15	0.00	647928.27	1706203.17	N 30 50 58.73 W	80 32 55.88	6.87
	16656.00	89.86	324.57	6681.63	5391.13	9819.61	8230.08	-5356.21	0.98	-0.04	0.93	648000.50	1706155.78	N 30 50 59.43 W	80 32 56.50	6.88
	16746.00	89.10	325.86	6681.69	5391.18	9909.47	8303.98	-5407.65	1.40	0.27	1.43	648076.41	1706108.44	N 30 50 60.10 W	80 32 57.23	6.88
	16836.00	89.86	329.86	6681.89	5391.10	9999.47	8378.82	-5457.41	1.14	-0.27	1.11	648150.34	1706061.08	N 30 50 60.78 W	80 32 57.90	6.90
	16926.00	89.73	329.53	6682.01	5391.51	10089.47	8453.30	-5508.28	0.40	-0.15	-0.37	648224.72	1706013.72	N 30 50 61.42 W	80 32 58.52	6.90
	17016.00	89.79	328.51	6682.28	5391.89	10178.48	8528.37	-5558.83	0.07	0.07	-0.02	648299.78	1705966.07	N 30 50 62.10 W	80 32 59.17	6.91
	17106.00	89.63	329.00	6682.48	5392.18	10267.48	8602.41	-5609.31	0.47	0.04	-0.47	648373.92	1705918.69	N 30 50 62.78 W	80 32 59.82	6.91
	17196.00	80.72	325.81	6683.04	5392.54	10357.48	8676.98	-5659.70	0.33	-0.12	-0.31	648448.38	1705871.30	N 30 50 63.46 W	80 32 60.48	6.92
	17286.00	80.10	327.85	6683.18	5392.88	10447.44	8752.31	-5704.04	2.31	0.42	2.27	648523.71	1705823.97	N 30 50 64.13 W	80 32 61.12	6.93
	17376.00	90.07	330.80	6683.04	5392.84	10538.33	8828.77	-5750.47	3.09	-0.03	3.09	648600.17	1705776.53	N 30 50 64.80 W	80 32 61.72	6.94
Final Survey 03Jan13	17396.00	90.31	331.77	6682.95	5392.45	10628.28	8883.31	-5783.07	4.77	0.86	4.18	648674.70	1705829.04	N 30 50 65.47 W	80 32 62.30	6.94
Projection to Bit	17431.00	80.31	331.77	6682.76	5392.26	10699.14	8884.14	-5780.52	0.00	0.00	0.00	648655.54	1705881.48	N 30 50 66.14 W	80 32 62.91	6.95

Survey Type:

Def Survey

Survey Error Model:
Survey Program:

ISOWSA Rev 0 "" 3-D 05 000% Curvature 2.7D55 sigma

Description	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hoie Size (ft)	Casing Diameter (ft)	Survey Tool Type	Borehole / Survey
	0.000	18.500		Act Strs	30.000	SLB_NSG+MSHOT-Depth Only	Original Borehole / Noble Energy SHL 17DHS Gyro+MWD 0' to 6805' MD
	18.500	2077.000		Act Strs	30.000	SLB_NSG+MSHOT	Original Borehole / Noble Energy SHL 17DHS Gyro+MWD 0' to
	2077.000	3161.000		Act Strs	30.000	SLB_MWD+POOR	Original Borehole / Noble Energy SHL 17DHS Gyro+MWD 0' to
	3161.000	4190.000		Act Strs	30.000	SLB_MWD+STD	Original Borehole / Noble Energy SHL 17DHS Gyro+MWD 0' to
	4190.000	4978.000		Act Strs	30.000	SLB_MWD+POOR	Original Borehole / Noble Energy SHL 17DHS Gyro+MWD 0' to
	4978.000	5264.000		Act Strs	30.000	SLB_MWD+STD	Original Borehole / Noble Energy SHL 17DHS Gyro+MWD 0' to
	5264.000	17390.000		Act Strs	30.000	SLB_MWD+STD	STO1 / Noble Energy SHL 17DHS STO1 MWD 5264' to 17431' MD
	17390.000	17431.000		Act Strs	30.000	SLB_GLIND+TREND	STO1 / Noble Energy SHL 17DHS STO1 MWD 5264' to 17431' MD