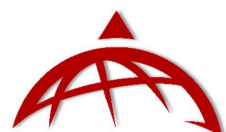




**Anglian Oil Company Ltd.
Northern Lights, AA Pad, AA16, Slot 09, Run #4**

**Job No. AB-CD-12345678
Survey Date: 23 September 2017**

**True North Directional Services Inc.
Survey Report**



True North
Directional Services Inc.



True North Directional Services Inc.

Survey Report



Database:	Example Project Database	Local Coordinate Reference:	Well AA16
Company:	Anglian Oil Company Ltd.	TVD Reference:	WELL @ 2,065.65ft (Well Elev.)
Project:	Northern Lights	MD Reference:	WELL @ 2,065.65ft (Well Elev.)
Site:	AA Pad	North reference:	Grid North
Well:	AA16	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral #1		
Survey:	Run #4		

Project	Northern Lights		
Map System:	Universal Transverse Mercator	System Datum:	Mean Sea Level
Geo Datum:			
Map Zone:	Zone 12 North		

Site	AA Pad				
Site Position:		Northing (m):	6,789,358.01 N	Latitude:	61° 14' 01.1642" N
From:	Map	Easting (m):	572,458.01 E	Longitude:	109° 39' 01.3541" W
Position Uncertainty:	16.40ft	Slot Radius:	0in	Grid Convergence:	1.18°

Well	AA16					
Well Position:	+N/-S	-91.21ft	Northing (m):	6,789,330.21 N	Latitude:	61° 14' 00.2426" N
	+E/-W	114.93ft	Easting (m):	572,493.04 E	Longitude:	109° 38' 59.0443" W
Position Uncertainty:		0.83ft	Wellhead Elevation:	2,065.65ft	Ground Level:	2,060.40ft

Wellbore	Lateral #1				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF 2025	19/09/2017	13.58	80.73	58,568.4

Survey	Run #4				
Audit Notes:					
Version:	AB-CD-12345678	Phase:		Tie On Depth:	3,926.69ft

Vertical Section:	Depth from TVD (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	86.00

Survey Program		17/11/2025			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
0.00	981.26	Run #1	GYRO-NS	OWSG Gyrocompass Gyro	
981.26	2,508.28	Run #2	MWD	MWD	
2,508.28	3,926.69	Run #3	MWD	MWD	
3,926.69	5,371.72	Run #4	MWD+IFR1+FDIR	MWD+IFR1+FDIR	

Survey	Measured Depth (ft)	Incl. (°)	Az. (°)	Vertical Depth (ft)	Sub Sea Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Closure Distance (ft)	Closure Azimuth (°)	Dogleg Rate (°/100ft)	Comments/ Formations
Run #1												
	0.00	0.00	0.00	0.00	-2,065.65	0.00	0.00	0.00	0.00	0.00	0.000	OWSG Gyrocompass Gyro (GYRO-NS)
	36.09	0.22	120.07	36.09	-2,029.56	-0.03	0.06	0.06	0.07	120.07	0.610	
	66.67	0.17	210.70	66.67	-1,998.98	-0.10	0.09	0.08	0.14	139.91	0.919	
	96.11	0.22	129.57	96.11	-1,969.54	-0.18	0.11	0.10	0.21	148.63	0.880	
	126.29	0.50	99.70	126.29	-1,939.36	-0.24	0.28	0.27	0.37	130.03	1.073	
	155.36	0.16	271.07	155.36	-1,910.29	-0.26	0.37	0.35	0.45	125.15	2.255	
	185.42	0.00	285.70	185.42	-1,880.23	-0.26	0.32	0.30	0.41	128.48	0.518	
	216.99	0.09	77.62	216.99	-1,848.66	-0.25	0.35	0.33	0.43	126.05	0.289	
	244.51	0.20	96.45	244.51	-1,821.13	-0.25	0.41	0.39	0.48	121.44	0.423	
	276.98	0.32	254.18	276.98	-1,788.66	-0.28	0.38	0.36	0.47	126.70	1.562	
	307.18	0.08	200.31	307.18	-1,758.47	-0.33	0.29	0.27	0.44	138.15	0.935	



True North Directional Services Inc.

Survey Report



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Project:	Northern Lights	MD Reference:	WELL @ 2,065.65ft (Well Elev.)
Site:	AA Pad	North reference:	Grid North
Well:	AA16	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral #1		
Survey:	Run #4		

Survey											
Measured Depth (ft)	Incl. (°)	Az. (°)	Vertical Depth (ft)	Sub Sea Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Closure Distance (ft)	Closure Azimuth (°)	Dogleg Rate (°/100ft)	Comments/ Formations
336.85	0.04	237.93	336.85	-1,728.79	-0.35	0.27	0.25	0.44	141.84	0.170	
364.69	0.31	263.01	364.69	-1,700.95	-0.36	0.19	0.16	0.41	152.47	0.992	
395.92	0.04	187.97	395.92	-1,669.72	-0.39	0.10	0.08	0.40	165.01	0.982	
427.42	0.07	34.51	427.41	-1,638.23	-0.38	0.11	0.09	0.40	163.46	0.351	
457.20	0.01	172.63	457.20	-1,608.45	-0.37	0.12	0.10	0.39	161.35	0.267	
485.85	0.27	203.05	485.85	-1,579.80	-0.43	0.10	0.07	0.44	167.27	0.923	
517.80	0.12	55.45	517.80	-1,547.85	-0.48	0.10	0.06	0.49	168.84	1.184	
547.52	0.01	1.28	547.52	-1,518.12	-0.46	0.12	0.09	0.48	165.38	0.382	
574.87	0.18	196.73	574.87	-1,490.78	-0.50	0.11	0.07	0.51	167.81	0.697	
591.40	0.39	141.52	591.40	-1,474.24	-0.57	0.14	0.10	0.59	166.63	1.935	
619.50	0.13	279.76	619.50	-1,446.15	-0.64	0.16	0.12	0.66	165.67	1.747	
650.05	0.20	145.16	650.05	-1,415.60	-0.68	0.16	0.11	0.70	166.75	0.991	
680.86	0.21	266.64	680.86	-1,384.78	-0.72	0.13	0.08	0.74	169.50	1.146	
708.54	0.35	227.15	708.54	-1,357.11	-0.78	0.02	-0.03	0.78	178.37	0.835	
740.33	0.03	72.73	740.33	-1,325.32	-0.85	-0.04	-0.10	0.85	182.76	1.185	
769.94	0.28	112.69	769.94	-1,295.71	-0.87	0.03	-0.03	0.87	177.87	0.860	
799.40	1.08	92.72	799.40	-1,266.25	-0.91	0.38	0.31	0.99	157.60	2.817	
830.49	2.74	116.33	830.46	-1,235.18	-1.26	1.34	1.25	1.84	133.25	5.800	
860.59	4.70	105.57	860.50	-1,205.14	-1.91	3.17	3.03	3.70	121.04	6.861	
889.35	6.74	105.41	889.12	-1,176.53	-2.67	5.93	5.73	6.51	114.25	7.101	
919.42	8.89	105.63	918.91	-1,146.74	-3.77	9.87	9.58	10.56	110.89	7.159	
951.24	11.25	107.50	950.24	-1,115.41	-5.36	15.20	14.79	16.12	109.44	7.483	
981.26	14.00	112.80	979.53	-1,086.12	-7.65	21.34	20.76	22.67	109.73	9.931	MWD
Run #2											
1,007.79	17.10	120.53	1,005.09	-1,060.56	-10.88	27.66	26.83	29.72	111.47	14.023	
1,037.57	19.54	125.54	1,033.35	-1,032.29	-16.00	35.48	34.28	38.92	114.27	9.761	
1,052.50	20.91	126.01	1,047.37	-1,018.28	-19.02	39.67	38.25	43.99	115.61	9.205	Formation #1
1,065.34	22.08	126.37	1,059.31	-1,006.33	-21.79	43.47	41.84	48.63	116.63	9.205	
1,096.90	25.14	128.42	1,088.22	-977.42	-29.48	53.50	51.31	61.08	118.86	10.024	
1,116.99	26.96	129.90	1,106.28	-959.37	-35.05	60.34	57.74	69.78	120.15	9.612	Formation #2
1,127.85	27.95	130.62	1,115.91	-949.73	-38.29	64.16	61.33	74.71	120.83	9.612	
1,155.46	30.67	131.45	1,139.98	-925.66	-47.16	74.34	70.87	88.04	122.39	9.987	
1,178.80	32.62	132.67	1,159.86	-905.79	-55.37	83.44	79.37	100.14	123.57	8.798	Formation #3
1,186.43	33.27	133.03	1,166.26	-899.39	-58.19	86.48	82.21	104.23	123.94	8.798	
1,215.04	35.83	132.94	1,189.82	-875.82	-69.25	98.35	93.28	120.28	125.15	8.972	
1,239.29	37.69	132.85	1,209.25	-856.40	-79.13	108.98	103.19	134.68	125.98	7.669	Formation #4
1,247.99	38.36	132.82	1,216.10	-849.54	-82.78	112.91	106.86	140.00	126.25	7.669	
1,276.95	40.91	132.87	1,238.40	-827.24	-95.34	126.45	119.49	158.36	127.01	8.802	
1,303.58	42.91	133.12	1,258.22	-807.43	-107.47	139.46	131.62	176.06	127.62	7.566	Formation #5
1,304.81	43.01	133.13	1,259.12	-806.53	-108.04	140.07	132.19	176.89	127.64	7.566	
1,312.33	43.56	133.17	1,264.60	-801.05	-111.57	143.83	135.70	182.03	127.80	7.393	13 3/8in Casing
1,336.66	45.36	133.29	1,281.96	-783.69	-123.24	156.25	147.27	199.00	128.26	7.393	
1,365.12	47.88	133.28	1,301.51	-764.14	-137.42	171.31	161.30	219.61	128.74	8.842	
1,382.26	49.20	133.09	1,312.85	-752.79	-146.21	180.67	170.03	232.42	128.98	7.785	Formation #6
1,395.15	50.20	132.95	1,321.19	-744.46	-152.91	187.86	176.73	242.23	129.15	7.785	
1,427.45	53.25	132.13	1,341.20	-724.45	-170.05	206.54	194.18	267.54	129.47	9.663	
1,455.79	55.59	132.17	1,357.68	-707.97	-185.52	223.63	210.14	290.56	129.68	8.252	
1,485.02	57.95	132.55	1,373.70	-691.95	-201.99	241.70	227.02	314.99	129.89	8.146	
1,515.86	60.20	132.93	1,389.55	-676.10	-219.95	261.13	245.15	341.41	130.11	7.361	



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Survey Report



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Project:	Northern Lights	MD Reference:	WELL @ 2,065.65ft (Well Elev.)
Site:	AA Pad	North reference:	Grid North
Well:	AA16	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral #1		
Survey:	Run #4		

Survey											
Measured Depth (ft)	Incl. (°)	Az. (°)	Vertical Depth (ft)	Sub Sea Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Closure Distance (ft)	Closure Azimuth (°)	Dogleg Rate (°/100ft)	Comments/ Formations
1,546.16	62.83	132.36	1,404.00	-661.65	-237.99	280.72	263.43	368.02	130.29	8.851	
1,575.92	65.58	132.78	1,416.94	-648.70	-256.11	300.45	281.85	394.79	130.44	9.329	
1,608.06	68.03	132.64	1,429.60	-636.05	-276.14	322.16	302.11	424.31	130.60	7.633	
1,638.18	70.05	132.94	1,440.37	-625.27	-295.25	342.80	321.37	452.42	130.74	6.775	
1,666.31	73.04	132.82	1,449.27	-616.37	-313.40	362.34	339.60	479.08	130.86	10.634	
1,695.92	75.28	132.82	1,457.36	-608.29	-332.77	383.24	359.10	507.55	130.97	7.547	
1,725.56	77.25	132.17	1,464.39	-601.25	-352.21	404.47	378.91	536.32	131.05	6.971	
1,755.58	80.09	132.69	1,470.29	-595.35	-372.07	426.19	399.20	565.76	131.12	9.620	
1,787.19	82.56	132.61	1,475.06	-590.59	-393.24	449.17	420.65	596.99	131.20	7.814	
1,807.46	82.36	132.65	1,477.72	-587.93	-406.85	463.96	434.45	617.08	131.25	0.973	AA16 LP (1)
1,816.43	82.28	132.66	1,478.92	-586.73	-412.87	470.50	440.55	625.97	131.27	0.973	
1,846.46	82.69	132.40	1,482.84	-582.80	-433.00	492.44	461.03	655.73	131.33	1.620	
1,877.47	82.58	132.56	1,486.82	-578.83	-453.77	515.11	482.21	686.47	131.38	0.618	
1,906.22	82.51	132.31	1,490.55	-575.10	-473.00	536.15	501.85	714.98	131.42	0.915	
1,937.24	83.24	132.74	1,494.40	-571.25	-493.81	558.84	523.03	745.76	131.46	2.740	
1,965.87	82.97	131.27	1,497.84	-567.81	-512.83	579.96	542.77	774.17	131.48	5.209	
1,995.82	82.88	131.14	1,501.53	-564.12	-532.41	602.32	563.71	803.89	131.47	0.497	
2,027.14	82.68	132.14	1,505.46	-560.18	-553.05	625.54	585.44	834.97	131.48	3.214	
2,055.51	83.00	130.83	1,509.00	-556.65	-571.70	646.63	605.17	863.12	131.48	4.723	
2,086.77	82.55	131.36	1,512.93	-552.72	-592.08	670.00	627.06	894.12	131.47	2.236	
2,118.26	82.64	132.06	1,516.99	-548.66	-612.86	693.31	648.87	925.35	131.48	2.205	
2,146.16	82.69	131.00	1,520.55	-545.10	-631.21	714.03	668.26	953.03	131.48	3.759	
2,177.90	83.20	130.97	1,524.45	-541.20	-651.86	737.81	690.54	984.52	131.46	1.590	
2,206.59	82.36	130.29	1,528.05	-537.59	-670.40	759.40	710.79	1,012.98	131.44	3.747	
2,236.31	83.07	128.10	1,531.82	-533.82	-689.03	782.26	732.29	1,042.44	131.37	7.686	
2,268.40	83.01	125.89	1,535.71	-529.94	-708.19	807.69	756.32	1,074.20	131.24	6.832	
2,297.47	82.93	123.02	1,539.27	-526.38	-724.52	831.48	778.92	1,102.86	131.07	9.827	
2,327.48	83.10	120.55	1,542.92	-522.73	-740.20	856.80	803.08	1,132.26	130.82	8.184	
2,356.85	83.17	119.05	1,546.43	-519.22	-754.69	882.10	827.31	1,160.89	130.55	5.069	
2,385.78	83.76	115.59	1,549.73	-515.92	-767.88	907.63	851.86	1,188.88	130.23	12.050	
2,417.32	84.46	113.29	1,552.96	-512.68	-780.86	936.19	879.44	1,219.10	129.83	7.578	
2,447.78	84.25	110.91	1,555.96	-509.69	-792.27	964.27	906.66	1,248.00	129.41	7.811	
2,478.52	84.46	109.36	1,558.98	-506.66	-802.80	992.99	934.57	1,276.92	128.95	5.079	
2,508.28	85.34	106.12	1,561.63	-504.02	-811.83	1,021.22	962.10	1,304.59	128.48	11.221	MWD
Run #3											
2,514.84	85.07	105.81	1,562.18	-503.47	-813.63	1,027.51	968.25	1,310.63	128.37	6.177	Shallow test MWD and Motor
2,546.57	83.80	104.31	1,565.25	-500.39	-821.83	1,058.00	998.09	1,339.69	127.84	6.177	
2,577.84	84.23	101.70	1,568.51	-497.13	-828.83	1,088.30	1,027.83	1,367.98	127.29	8.419	
2,606.25	84.50	99.84	1,571.30	-494.34	-834.11	1,116.08	1,055.17	1,393.33	126.77	6.597	
2,624.67	84.56	99.00	1,573.06	-492.59	-837.11	1,134.16	1,073.01	1,409.64	126.43	4.552	9 5/8in Casing
2,637.09	84.61	98.43	1,574.23	-491.42	-838.99	1,146.39	1,085.07	1,420.60	126.20	4.552	
2,666.52	85.25	95.37	1,576.83	-488.81	-842.51	1,175.48	1,113.85	1,446.23	125.63	10.568	
2,681.97	85.15	94.01	1,578.12	-487.52	-843.77	1,190.83	1,129.07	1,459.46	125.32	8.834	Dipping Plane #3
2,696.57	85.06	92.72	1,579.37	-486.27	-844.62	1,205.35	1,143.50	1,471.82	125.02	8.834	
2,726.43	85.84	89.66	1,581.74	-483.91	-845.24	1,235.10	1,173.13	1,496.63	124.39	10.522	
2,756.09	86.50	87.97	1,583.72	-481.93	-844.62	1,264.69	1,202.69	1,520.80	123.74	6.102	
2,786.27	86.39	85.87	1,585.59	-480.05	-843.01	1,294.77	1,232.81	1,545.02	123.07	6.978	
2,815.86	87.09	82.89	1,587.27	-478.37	-840.11	1,324.17	1,262.34	1,568.19	122.39	10.321	
2,845.19	87.19	81.39	1,588.73	-476.91	-836.11	1,353.19	1,291.57	1,590.66	121.71	5.097	
2,875.80	87.30	77.72	1,590.21	-475.44	-830.57	1,383.25	1,321.94	1,613.45	120.98	11.986	



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Survey Report



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Project:	Northern Lights	MD Reference:	WELL @ 2,065.65ft (Well Elev.)
Site:	AA Pad	North reference:	Grid North
Well:	AA16	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral #1		
Survey:	Run #4		

Survey	Measured Depth (ft)	Incl. (°)	Az. (°)	Vertical Depth (ft)	Sub Sea Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Closure Distance (ft)	Closure Azimuth (°)	Dogleg Rate (°/100ft)	Comments/ Formations
	2,898.68	87.70	75.78	1,591.20	-474.44	-825.33	1,405.50	1,344.50	1,629.91	120.42	8.675	Dipping Plane #1
	2,908.25	87.87	74.96	1,591.57	-474.07	-822.91	1,414.75	1,353.90	1,636.67	120.19	8.675	Dipping Plane #2
	2,935.25	87.96	73.07	1,592.56	-473.09	-815.48	1,440.69	1,380.29	1,655.47	119.51	7.029	
	2,966.35	88.97	69.39	1,593.39	-472.26	-805.48	1,470.12	1,410.35	1,676.32	118.72	12.274	
	2,996.28	89.33	67.20	1,593.83	-471.81	-794.42	1,497.92	1,438.85	1,695.54	117.94	7.386	
	3,024.30	89.38	64.34	1,594.15	-471.50	-782.92	1,523.47	1,465.15	1,712.87	117.20	10.216	AA16 LP (2)
	3,026.72	89.38	64.09	1,594.18	-471.47	-781.86	1,525.65	1,467.39	1,714.33	117.13	10.216	
	3,055.66	89.55	64.55	1,594.44	-471.20	-769.33	1,551.73	1,494.28	1,731.97	116.37	1.686	
	3,086.70	89.58	65.98	1,594.68	-470.97	-756.34	1,579.91	1,523.31	1,751.62	115.58	4.609	
	3,116.03	89.69	65.52	1,594.86	-470.78	-744.29	1,606.66	1,550.82	1,770.68	114.86	1.623	
	3,147.26	90.20	65.16	1,594.89	-470.75	-731.26	1,635.04	1,580.05	1,791.12	114.10	1.989	
	3,176.98	89.48	65.19	1,594.98	-470.67	-718.78	1,662.02	1,607.83	1,810.79	113.39	2.412	
	3,205.76	89.93	64.48	1,595.13	-470.52	-706.55	1,688.06	1,634.66	1,829.96	112.71	2.921	
	3,221.17	90.05	64.71	1,595.13	-470.52	-699.94	1,701.98	1,649.01	1,840.28	112.35	1.669	AA16 LP
	3,238.34	90.18	64.96	1,595.09	-470.55	-692.64	1,717.52	1,665.02	1,851.92	111.96	1.669	
	3,267.40	90.24	65.62	1,594.99	-470.66	-680.49	1,743.92	1,692.21	1,871.99	111.32	2.283	
	3,296.96	89.71	65.74	1,595.00	-470.65	-668.31	1,770.86	1,719.93	1,892.77	110.68	1.838	
	3,326.59	90.40	64.24	1,594.97	-470.68	-655.79	1,797.71	1,747.58	1,913.59	110.04	5.572	
	3,355.69	90.18	65.14	1,594.82	-470.83	-643.35	1,824.02	1,774.69	1,934.15	109.43	3.175	
	3,387.91	90.12	64.85	1,594.73	-470.91	-629.73	1,853.21	1,804.77	1,957.28	108.77	0.921	
	3,416.88	90.30	64.12	1,594.62	-471.02	-617.25	1,879.36	1,831.72	1,978.12	108.18	2.593	
	3,447.85	90.29	64.91	1,594.46	-471.18	-603.92	1,907.31	1,860.54	2,000.64	107.57	2.540	
	3,477.38	89.81	65.42	1,594.44	-471.21	-591.52	1,934.11	1,888.14	2,022.54	107.01	2.366	
	3,508.15	89.53	64.98	1,594.61	-471.03	-578.61	1,962.04	1,916.90	2,045.58	106.43	1.699	
	3,535.51	90.40	64.80	1,594.63	-471.02	-567.00	1,986.82	1,942.43	2,066.14	105.93	3.232	
	3,566.16	90.20	65.90	1,594.47	-471.18	-554.22	2,014.67	1,971.10	2,089.51	105.38	3.644	
	3,595.72	90.07	66.03	1,594.40	-471.25	-542.18	2,041.67	1,998.87	2,112.43	104.87	0.611	
	3,625.87	89.85	65.24	1,594.42	-471.23	-529.74	2,069.13	2,027.14	2,135.87	104.36	2.735	
	3,656.61	89.40	65.14	1,594.62	-471.02	-516.84	2,097.04	2,055.88	2,159.79	103.85	1.488	
	3,685.97	89.64	65.23	1,594.87	-470.78	-504.52	2,123.69	2,083.32	2,182.79	103.36	0.876	
	3,715.57	89.57	64.18	1,595.07	-470.58	-491.87	2,150.44	2,110.89	2,205.98	102.88	3.564	
	3,747.36	89.90	64.41	1,595.22	-470.43	-478.08	2,179.09	2,140.43	2,230.91	102.37	1.257	
	3,777.77	89.76	64.59	1,595.31	-470.33	-464.99	2,206.54	2,168.73	2,255.00	101.90	0.756	
	3,807.40	89.49	63.96	1,595.50	-470.14	-452.13	2,233.23	2,196.25	2,278.53	101.45	2.311	
	3,838.37	89.67	64.33	1,595.73	-469.91	-438.62	2,261.10	2,224.99	2,303.25	100.98	1.304	
	3,865.93	89.97	64.83	1,595.82	-469.83	-426.79	2,285.99	2,250.65	2,325.49	100.58	2.145	
	3,896.31	90.22	65.07	1,595.77	-469.88	-413.93	2,313.51	2,279.00	2,350.25	100.14	1.139	
	3,926.69	89.90	65.12	1,595.73	-469.91	-401.14	2,341.06	2,307.38	2,375.18	99.72	1.078	MWD+IFR1+FDIR
Run #4												
	3,942.41	90.07	64.68	1,595.74	-469.91	-394.47	2,355.31	2,322.05	2,388.11	99.51	3.014	Circulate Bottoms Up
	3,955.73	90.22	64.31	1,595.70	-469.94	-388.73	2,367.33	2,334.44	2,399.03	99.33	3.014	Replace cap gasket on pump
	3,964.40	90.31	64.06	1,595.66	-469.98	-384.96	2,375.13	2,342.49	2,406.13	99.21	3.014	
	3,993.73	89.80	64.76	1,595.63	-470.01	-372.29	2,401.59	2,369.77	2,430.27	98.81	2.941	
	4,025.56	89.68	64.07	1,595.78	-469.87	-358.55	2,430.29	2,399.36	2,456.60	98.39	2.203	
	4,056.33	90.22	64.64	1,595.80	-469.84	-345.23	2,458.03	2,427.96	2,482.16	97.99	2.553	
	4,085.04	89.60	65.23	1,595.85	-469.80	-333.07	2,484.04	2,454.75	2,506.27	97.64	2.969	
	4,113.62	89.78	65.04	1,596.00	-469.65	-321.05	2,509.96	2,481.45	2,530.41	97.29	0.912	
	4,145.83	89.61	65.20	1,596.17	-469.48	-307.50	2,539.19	2,511.56	2,557.74	96.90	0.729	
	4,174.67	90.33	64.73	1,596.18	-469.46	-295.30	2,565.32	2,538.47	2,582.26	96.57	2.991	



True North Directional Services Inc. Survey Report



Database:	Example Project Database	Local Coordinate Reference:	Well AA16
Company:	Anglian Oil Company Ltd.	TVD Reference:	WELL @ 2,065.65ft (Well Elev.)
Project:	Northern Lights	MD Reference:	WELL @ 2,065.65ft (Well Elev.)
Site:	AA Pad	North reference:	Grid North
Well:	AA16	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral #1		
Survey:	Run #4		

Survey	Measured Depth (ft)	Incl. (°)	Az. (°)	Vertical Depth (ft)	Sub Sea Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Closure Distance (ft)	Closure Azimuth (°)	Dogleg Rate (°/100ft)	Comments/ Formations
	4,187.80	90.19	65.20	1,596.12	-469.52	-289.74	2,577.21	2,550.72	2,593.45	96.41	3.799	Survey Depth: 4,187.80 ft., Inc: 90.25°, Azm: 65.75°
	4,204.89	90.00	65.82	1,596.10	-469.55	-282.66	2,592.77	2,566.73	2,608.13	96.22	3.799	
	4,214.73	89.93	65.70	1,596.10	-469.54	-278.62	2,601.74	2,575.97	2,616.62	96.11	1.395	Swap pumps, sync MWD
	4,235.01	89.80	65.46	1,596.15	-469.50	-270.24	2,620.20	2,594.97	2,634.10	95.89	1.395	
	4,264.11	89.77	65.16	1,596.26	-469.39	-258.08	2,646.64	2,622.19	2,659.20	95.57	1.010	
	4,277.23	90.02	65.04	1,596.28	-469.36	-252.55	2,658.55	2,634.45	2,670.51	95.43	2.121	CO2 on floor
	4,294.52	90.35	64.87	1,596.23	-469.42	-245.23	2,674.21	2,650.59	2,685.43	95.24	2.121	
	4,323.79	90.00	65.45	1,596.14	-469.51	-232.94	2,700.77	2,677.94	2,710.79	94.93	2.322	
	4,355.41	90.34	64.30	1,596.04	-469.60	-219.51	2,729.40	2,707.44	2,738.21	94.60	3.800	
	4,384.05	89.87	64.13	1,595.99	-469.65	-207.05	2,755.19	2,734.04	2,762.96	94.30	1.765	
	4,416.57	89.69	64.52	1,596.12	-469.53	-192.97	2,784.49	2,764.25	2,791.17	93.96	1.300	
	4,443.86	90.26	65.48	1,596.13	-469.52	-181.43	2,809.23	2,789.73	2,815.08	93.70	4.109	
	4,475.00	89.69	65.95	1,596.14	-469.50	-168.63	2,837.61	2,818.94	2,842.62	93.40	2.354	
	4,504.46	89.66	64.65	1,596.31	-469.34	-156.32	2,864.38	2,846.50	2,868.64	93.12	4.398	
	4,536.45	89.57	65.39	1,596.52	-469.12	-142.81	2,893.37	2,876.36	2,896.90	92.83	2.330	
	4,566.08	89.72	65.65	1,596.70	-468.94	-130.53	2,920.34	2,904.12	2,923.25	92.56	0.998	
	4,594.52	89.40	64.06	1,596.92	-468.72	-118.45	2,946.08	2,930.64	2,948.46	92.30	5.708	
	4,625.85	90.09	65.58	1,597.06	-468.59	-105.12	2,974.44	2,959.86	2,976.29	92.02	5.354	
	4,654.53	90.18	65.00	1,596.99	-468.66	-93.13	3,000.49	2,986.68	3,001.93	91.78	2.046	Totco crashed
	4,683.99	89.72	64.44	1,597.02	-468.63	-80.55	3,027.13	3,014.13	3,028.20	91.52	2.469	
	4,713.81	90.11	65.17	1,597.06	-468.59	-67.86	3,054.11	3,041.94	3,054.87	91.27	2.770	
	4,744.78	89.76	65.85	1,597.10	-468.55	-55.02	3,082.30	3,070.95	3,082.79	91.02	2.466	
	4,776.34	90.20	65.92	1,597.11	-468.54	-42.12	3,111.10	3,100.59	3,111.39	90.78	1.420	
	4,804.76	90.15	65.27	1,597.02	-468.62	-30.38	3,136.98	3,127.22	3,137.12	90.55	2.287	
	4,834.58	89.76	64.01	1,597.05	-468.60	-17.61	3,163.93	3,154.99	3,163.97	90.32	4.412	
	4,865.39	89.55	64.81	1,597.24	-468.41	-4.31	3,191.71	3,183.64	3,191.71	90.08	2.675	
	4,881.79	89.67	65.12	1,597.35	-468.30	2.63	3,206.57	3,198.95	3,206.57	89.95	2.040	Auto driller issues
	4,894.65	89.77	65.37	1,597.41	-468.24	8.02	3,218.25	3,210.97	3,218.26	89.86	2.040	
	4,924.97	89.68	63.53	1,597.55	-468.09	21.09	3,245.60	3,239.17	3,245.67	89.63	6.063	
	4,954.00	90.11	65.36	1,597.61	-468.04	33.62	3,271.80	3,266.17	3,271.97	89.41	6.485	
	4,985.46	89.75	63.64	1,597.65	-468.00	47.16	3,300.19	3,295.44	3,300.53	89.18	5.606	
	5,014.60	90.15	64.14	1,597.68	-467.97	59.98	3,326.35	3,322.43	3,326.89	88.97	2.225	
	5,046.75	89.57	64.69	1,597.75	-467.89	73.86	3,355.35	3,352.33	3,356.17	88.74	2.490	
	5,063.15	89.80	64.95	1,597.84	-467.80	80.84	3,370.20	3,367.63	3,371.17	88.63	2.112	Work On Pumps
	5,075.88	89.99	65.15	1,597.87	-467.78	86.21	3,381.74	3,379.52	3,382.84	88.54	2.112	
	5,106.43	90.38	63.57	1,597.77	-467.88	99.43	3,409.28	3,407.91	3,410.72	88.33	5.323	
	5,119.55	90.06	63.56	1,597.72	-467.93	105.27	3,421.03	3,420.04	3,422.65	88.24	2.429	Work On Pumps
	5,137.04	89.63	63.56	1,597.77	-467.88	113.06	3,436.68	3,436.20	3,438.54	88.12	2.429	
	5,165.09	90.26	64.59	1,597.79	-467.85	125.33	3,461.91	3,462.22	3,464.18	87.93	4.321	
	5,181.49	89.86	64.32	1,597.77	-467.87	132.40	3,476.71	3,477.48	3,479.23	87.82	2.983	Swap Pumps
	5,195.80	89.50	64.08	1,597.86	-467.79	138.62	3,489.59	3,490.76	3,492.34	87.73	2.983	
	5,224.31	90.44	64.33	1,597.87	-467.78	151.03	3,515.26	3,517.23	3,518.50	87.54	3.402	
	5,249.33	90.07	64.44	1,597.76	-467.89	161.85	3,537.82	3,540.50	3,541.52	87.38	1.522	7in Casing
	5,256.13	89.98	64.47	1,597.76	-467.89	164.78	3,543.96	3,546.82	3,547.79	87.34	1.522	
	5,269.26	89.97	64.72	1,597.76	-467.88	170.41	3,555.81	3,559.04	3,559.89	87.26	1.868	Attempted to slide, Pressure was up and down, sweep was in the hole and dusting up mud. Could not c



True North Directional Services Inc.

Survey Report



Database:	Example Project Database	Local Coordinate Reference:	Well AA16
Company:	Anglian Oil Company Ltd.	TVD Reference:	WELL @ 2,065.65ft (Well Elev.)
Project:	Northern Lights	MD Reference:	WELL @ 2,065.65ft (Well Elev.)
Site:	AA Pad	North reference:	Grid North
Well:	AA16	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral #1		
Survey:	Run #4		

Survey											
Measured Depth (ft)	Incl. (°)	Az. (°)	Vertical Depth (ft)	Sub Sea Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Closure Distance (ft)	Closure Azimuth (°)	Dogleg Rate (°/100ft)	Comments/ Formations
5,285.43	89.96	65.02	1,597.77	-467.88	177.28	3,570.46	3,574.13	3,574.86	87.16	1.868	
5,317.26	90.34	64.40	1,597.68	-467.96	190.88	3,599.23	3,603.78	3,604.29	86.96	2.272	
5,344.49	90.01	64.10	1,597.60	-468.04	202.71	3,623.76	3,629.07	3,629.42	86.80	1.681	
5,357.61	89.82	63.86	1,597.62	-468.02	208.46	3,635.55	3,641.24	3,641.52	86.72	2.247	Swap pumps
5,371.72	89.62	63.62	1,597.69	-467.96	214.70	3,648.20	3,654.29	3,654.51	86.63	2.247	Rig up and tear down
Bit Projection											
5,423.25	89.62	63.62	1,598.03	-467.62	237.60	3,694.36	3,701.94	3,702.00	86.32	0.000	4 1/2in Liner

Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude	
-hit/miss target										
-Shape										
AA16 LP	90.00	65.00	1,596.45	-704.13	1,703.93	22,273,956.73 N	1,879,958.19 E	61° 13' 52.9604" N 109° 38' 24.5300" W		
- survey misses the target center by 4.81ft at 3,221.17ft MD (1,595.13TVD, 699.94 S, 1,701.98 E)										
- Polygon										
AA16 LP (1)	82.75	131.74	1,486.68	-410.05	459.58	22,274,250.82 N	1,878,713.83 E	61° 13' 56.1108" N 109° 38' 49.8279" W		
- survey misses the target center by 10.47ft at 1,807.46ft MD (1,477.72TVD, 406.85 S, 463.96 E)										
- Circle										
AA16 LP (2)	90.00	65.00	1,596.45	-787.33	1,525.53	22,273,873.54 N	1,879,779.78 E	61° 13' 52.1776" N 109° 38' 28.2102" W		
- survey misses the target center by 5.38ft at 3,024.30ft MD (1,594.15TVD, 782.92 S, 1,523.47 E)										
- Circle										
AA16 TD	90.00	65.00	1,596.45	405.12	4,082.70	22,275,065.98 N	1,882,336.95 E	61° 14' 03.3943" N 109° 37' 35.4556" W		
- survey does not penetrate the target plane										
- Polygon										

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Subsea Depth (ft)	Name	Dip Angle (°)	Dip Direction (°)
1,052.50	1,047.37	-1,018.28	Formation #1	4.00	80.00
1,116.99	1,106.28	-959.37	Formation #2	8.00	100.00
1,178.80	1,159.86	-905.79	Formation #3	12.00	120.00
1,239.29	1,209.25	-856.40	Formation #4	16.00	140.00
1,303.58	1,258.22	-807.43	Formation #5	20.00	160.00
1,382.26	1,312.85	-752.79	Formation #6	24.00	180.00
	1,509.18	-556.46	Dipping Plane #4		65.00
2,681.97	1,578.12	-487.52	Dipping Plane #3		65.00
2,898.68	1,591.20	-474.44	Dipping Plane #1	0.00	65.00
2,898.68	1,591.20	-474.44	Dipping Plane #2	0.00	65.00

Casing Points				
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
1,312.33	1,264.60	13 3/8in Casing	13 3/8	17 1/2
2,624.67	1,573.06	9 5/8in Casing	9 5/8	12 1/4
5,249.33	1,597.76	7in Casing	7	9 1/2
5,423.25	1,598.03	4 1/2in Liner	4 1/2	6 1/2



True North Directional Services Inc. Survey Report



Database:	Example Project Database	Local Coordinate Reference:	Well AA16
Company:	Anglian Oil Company Ltd.	TVD Reference:	WELL @ 2,065.65ft (Well Elev.)
Project:	Northern Lights	MD Reference:	WELL @ 2,065.65ft (Well Elev.)
Site:	AA Pad	North reference:	Grid North
Well:	AA16	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral #1		
Survey:	Run #4		

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Comment
2,514.84	1,562.18	-813.63	1,027.51	Shallow test MWD and Motor
2,514.84	1,562.18	-813.63	1,027.51	Wash to bottom
2,514.84	1,562.18	-813.63	1,027.51	Safety meeting, clean floor
2,514.84	1,562.18	-813.63	1,027.51	Pick up BHA
3,942.41	1,595.74	-394.47	2,355.31	Circulate Bottoms Up
3,942.41	1,595.74	-394.47	2,355.31	FiT
3,955.73	1,595.70	-388.73	2,367.33	Replace cap gasket on pump
4,187.80	1,596.12	-289.74	2,577.21	Survey Depth: 4,187.80 ft., Inc: 90.25°, Azm: 65.75°
4,214.73	1,596.10	-278.62	2,601.74	Swap pumps, sync MWD
4,214.73	1,596.10	-278.62	2,601.74	Hanging up, hard time controlling toolface
4,277.23	1,596.28	-252.55	2,658.55	CO2 on floor
4,654.53	1,596.99	-93.13	3,000.49	Totco crashed
4,881.79	1,597.35	2.63	3,206.57	Auto driller issues
5,063.15	1,597.84	80.84	3,370.20	Work On Pumps
5,119.55	1,597.72	105.27	3,421.03	Work On Pumps
5,181.49	1,597.77	132.40	3,476.71	Swap Pumps
5,269.26	1,597.76	170.41	3,555.81	Attempted to slide, Pressure was up and down, sweep was in the hole and dusting up mud. Could not c
5,357.61	1,597.62	208.46	3,635.55	Swap pumps
5,371.72	1,597.69	214.70	3,648.20	Rig up and tear down

Checked By:	Approved By:	Date:
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