



**Anglian Oil Company Ltd.
Northern Lights
AA Pad
AA16**

**True North Directional Services Inc.
Torque and Drag Report**

**Job No. AB-CD-12345678
Revision: 1
Case #1**



True North
Directional Services Inc.

Torque and Drag Report for AA Pad, AA16, Design #1, Case #1

Operating Parameters (Rotary Drilling)	
Bit Depth	1,794.29 m
Mud Weight	800.00 kg/m ³
Flow	0.86 m ³ /min
Weight on Bit	50,000 N
Torque at Bit	1,000 N-m
Pipe Speed	0.05 m/sec
Rotary Speed	30 RPM
BHA Torque	500 N-m
BHA Drag	5,000 N
Block Weight	50,000 N
Surface Tension	132,827 N
Surface Torque	7,990 N-m
Design Safety Factors:	
Tension	1.125
Torque	1.125
Stress	1.125

Casing/Hole Details

Comp. #	Description	Outside Diameter (mm)	Inside Diameter (mm)	Friction Factor	From		To	
					Measured Depth (m)	Vertical Depth (m)	Measured Depth (m)	Vertical Depth (m)
1	13 3/8in Casing	340	323	0.20	<Surface>	<Surface>	250.00	250.00
2	9 5/8in Casing	244	229	0.20	<Surface>	<Surface>	500.00	441.03
3	7in Casing	178	166	0.20	<Surface>	<Surface>	1,000.00	486.60
3	171mm Open Hole		171	0.20	1,000.00	486.60	1,794.29	486.60

Drillstring Details

Comp. #	Component Type	Description	Outside Diameter (mm)	Inside Diameter (mm)	Weight (N/m)	Length (m)	Cumulative Length (m)
12	DP (S) - Used - Premium	4" DP (S) NC46(IF) - 15.70 lb/ft	102	82	263.13	338.47	1,794.29
11	HWDP	4" HWDP NC40(FH) - 29.70 lb/ft	102	65	433.44	800.00	1,455.82
10	DP (X) - Used - Premium	4" DP (X) H90 - 15.70 lb/ft	102	82	256.15	600.00	655.82
9	Sub	5.118" Cross Over	130	58	592.32	0.82	55.82
8	Jar	4 3/4" Mechanical Jar	121	57	666.85	4.99	55.00
7	Sub	5.236" Cross Over	133	63	592.32	0.58	50.01
6	4 3/4" Drill Collar	4 3/4" DC - 44.00 lb/ft	121	64	642.13	18.86	49.43
5	MWD	4 3/4" MWD	121	72	842.10	20.29	30.57
4	Sub	4.843" Float Sub	123	50	1,023.91	1.17	10.28
3	Sub	4.843" Float Sub	123	50	633.80	1.16	9.11
2	Motor	4 3/4" Motor Lobe 4:5 - 6.3 stg	121	57	603.50	7.73	7.95
1	Bit	6" Bit	152	57	2,043.00	0.22	0.22

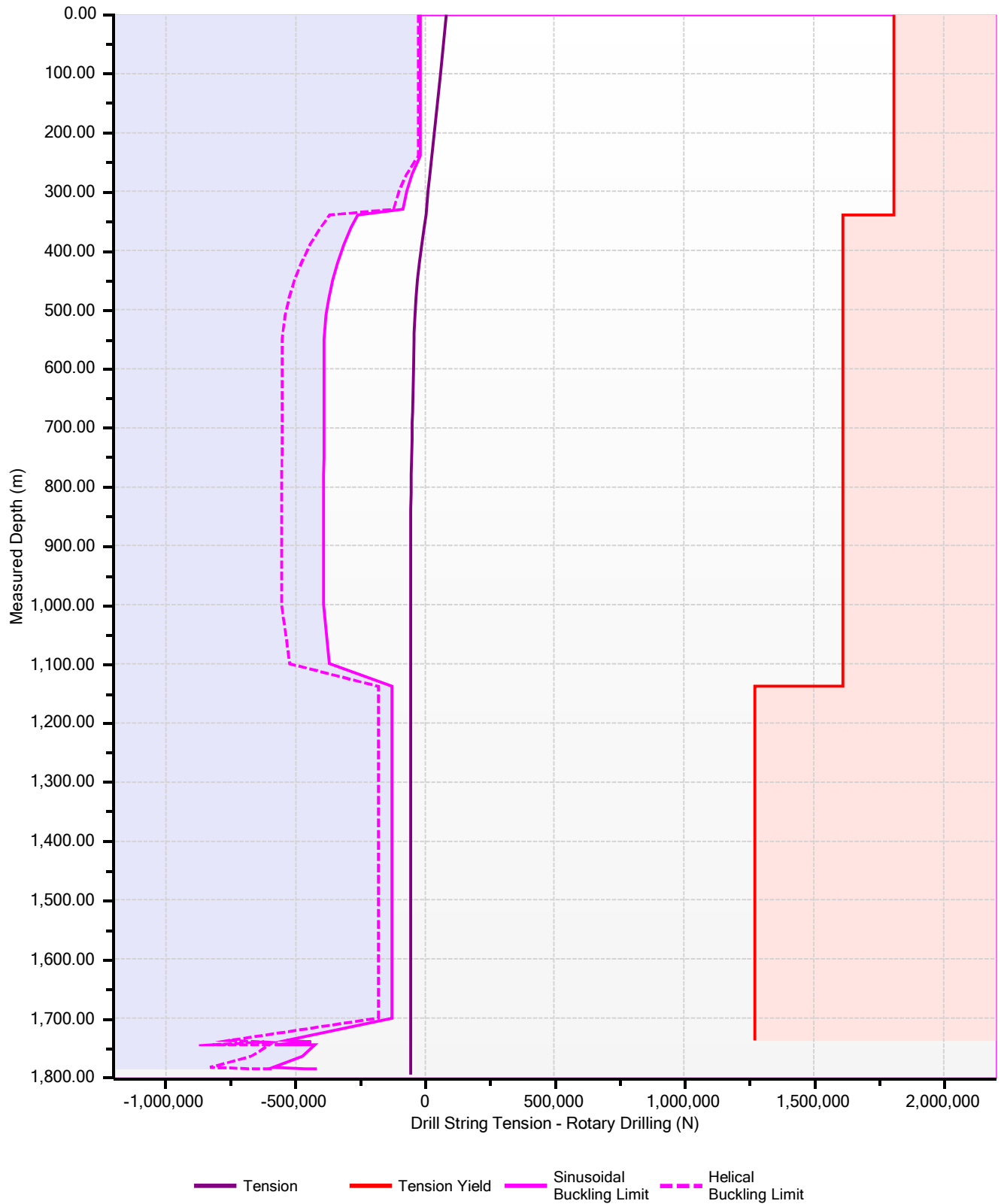
Torque and Drag Details - Rotary Drilling

Meas. Depth (m)	Incl. (°)	Azimuth (°)	Dogleg Rate (°/30m)	Helical Buckling Limit (N)	Sinusoidal Buckling Limit (N)	Normal Force (N)	Tension (N)	Torque (N-m)	Pipe Stress (kPa)	Safety Factor Pipe Stress	Safety Factor Tool Jnt Makeup	String Comp. Number
0.00	0.000	0.000	0.000	-25,113	-17,757	0	82,827	7,990	156,436	5.95	3.07	12
100.00	0.000	0.000	0.000	-25,113	-17,757	0	59,199	7,990	154,171	6.04	3.07	12
200.00	0.000	0.000	0.000	-25,113	-17,757	0	35,571	7,990	152,640	6.10	3.07	12
240.00	0.000	0.000	0.000	-25,113	-17,757	0	26,120	7,990	152,239	6.11	3.07	12
270.00	8.000	131.739	8.000	-70,916	-50,145	660	19,050	7,961	161,167	5.78	3.08	12

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300.00	16.000	131.739	8.000	-99,801	-70,570	66	12,117	7,958	160,043	5.82	3.08	12
330.00	24.000	131.739	8.000	-121,233	-85,725	507	5,457	7,935	158,660	5.87	3.09	12
338.47	26.259	131.739	8.000	-367,636	-259,958	762	3,645	7,926	94,313	4.02	2.27	11
360.00	32.000	131.739	8.000	-402,349	-284,504	1,889	-3,671	7,871	93,846	4.04	2.28	11
390.00	40.000	131.739	8.000	-443,131	-313,341	2,650	-13,112	7,764	94,003	4.03	2.31	11
420.00	48.000	131.739	8.000	-476,469	-336,915	3,387	-21,503	7,628	93,841	4.04	2.36	11
450.00	56.000	131.739	8.000	-503,252	-355,853	4,025	-28,683	7,466	93,372	4.06	2.41	11
480.00	64.000	131.739	8.000	-523,996	-370,521	4,551	-34,511	7,282	92,613	4.09	2.47	11
510.00	72.000	131.739	8.000	-539,016	-381,142	4,954	-38,874	7,083	91,581	4.14	2.54	11
540.00	80.000	131.739	8.000	-548,497	-387,846	5,227	-41,686	6,872	90,299	4.20	2.61	11
550.30	82.747	131.739	8.000	-550,495	-389,259	5,318	-42,284	6,799	89,807	4.22	2.64	11
600.00	82.747	131.739	0.000	-550,495	-389,259	3,531	-44,713	6,563	67,051	5.66	2.74	11
673.28	82.747	131.739	0.000	-550,495	-389,259	3,531	-48,294	6,216	63,688	5.95	2.89	11
690.00	83.010	127.253	8.000	-550,653	-389,371	4,208	-49,095	6,121	85,653	4.43	2.93	11
720.00	83.588	119.219	8.000	-550,980	-389,601	4,266	-50,448	5,950	84,603	4.48	3.02	11
750.00	84.290	111.205	8.000	-551,338	-389,855	4,327	-51,671	5,775	83,541	4.54	3.11	11
780.00	85.102	103.212	8.000	-551,701	-390,112	4,383	-52,741	5,599	82,464	4.60	3.21	11
810.00	86.009	95.239	8.000	-552,041	-390,352	4,431	-53,635	5,420	81,373	4.66	3.31	11
840.00	86.993	87.285	8.000	-552,331	-390,557	4,471	-54,338	5,240	80,267	4.72	3.43	11
870.00	88.034	79.345	8.000	-552,549	-390,711	4,500	-54,834	5,059	79,147	4.79	3.55	11
900.00	89.113	71.416	8.000	-552,678	-390,802	4,518	-55,115	4,877	78,015	4.86	3.68	11
924.29	90.000	65.000	8.000	-552,711	-390,826	4,524	-55,179	4,729	77,091	4.92	3.80	11
984.29	90.000	65.000	0.000	-552,711	-390,826	3,559	-55,163	4,443	46,402	8.17	4.04	11
1,000.00	90.000	65.000	0.000	-552,711	-390,826	3,559	-55,159	4,368	45,667	8.30	4.11	11
1,100.00	90.000	65.000	0.000	-521,248	-368,578	3,559	-55,132	3,890	41,007	9.25	4.62	11
1,138.47	90.000	65.000	0.000	-180,180	-127,407	3,559	-55,121	3,706	74,784	8.76	4.57	10
1,200.00	90.000	65.000	0.000	-180,180	-127,407	2,103	-55,111	3,526	71,578	9.15	4.80	10
1,300.00	90.000	65.000	0.000	-180,180	-127,407	2,103	-55,095	3,234	66,411	9.86	5.23	10
1,400.00	90.000	65.000	0.000	-180,180	-127,407	2,103	-55,079	2,942	61,312	10.68	5.75	10
1,500.00	90.000	65.000	0.000	-180,180	-127,407	2,103	-55,063	2,650	56,298	11.64	6.39	10
1,600.00	90.000	65.000	0.000	-180,180	-127,407	2,103	-55,047	2,358	51,393	12.75	7.18	10
1,700.00	90.000	65.000	0.000	-180,180	-127,407	2,103	-55,031	2,066	46,633	14.05	8.19	10
1,738.47	90.000	65.000	0.000	-756,172	-534,695	2,103	-55,025	1,953	9,668	78.44	N/A	9
1,739.29	90.000	65.000	0.000	-620,923	-439,059	4,864	-55,025	1,948	12,017	63.11	N/A	8
1,744.28	90.000	65.000	0.000	-817,172	-577,828	5,476	-55,023	1,909	9,105	83.29	N/A	7
1,744.86	90.000	65.000	0.000	-600,613	-424,698	4,864	-55,023	1,906	12,320	61.56	N/A	6
1,763.72	90.000	65.000	0.000	-668,883	-472,971	5,273	-55,015	1,774	12,650	59.95	N/A	5
1,784.01	90.000	65.000	0.000	-828,475	-585,820	6,915	-55,004	1,587	9,516	79.70	N/A	4
1,784.29	90.000	65.000	0.000	-828,475	-585,820	8,407	-55,004	1,584	9,504	79.80	N/A	4
1,785.18	90.000	65.000	0.000	-651,817	-460,904	8,407	-55,004	1,574	9,464	80.14	N/A	3
1,786.34	90.000	65.000	0.000	-590,529	-417,567	5,204	-55,003	1,566	10,346	73.31	N/A	2
1,794.07	90.000	65.000	0.000	-2,876,180	-2,033,766	4,955	-55,000	1,506	5,194	N/A	N/A	1
1,794.29	90.000	65.000	0.000	-2,876,180	-2,033,766	16,775	-55,000	1,500	5,182	N/A	N/A	1

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