

KellyDown Tips

Periodic tips to help you use KellyDown more effectively

Using the KellyDown Motor Yield Calculator

The KellyDown **Motor Yield Calculator** was recently incorporated into KellyDown. In its basic form, it is used to calculate the Slide Distance required when drilling a section of hole in order to achieve a specific dogleg rate given the Slide Length, Rotate Length and resultant Dogleg Rate over a previously drilled section of hole. However, it is much more than a simple Motor Yield Calculator when used in conjunction with the **Slide Sheet Editor** and either the **Correction Run** module or the **Ouija Board** module.

1. When used in its basic form, enter the **Slide Length**, **Rotate Length** and **Dogleg Rate** over Interval for the previously drilled section of hole and KellyDown calculates the resultant **Motor Yield**.

KD Motor Yield

Motor Yield Calculator

Slide Length:	15.00	ft
Rotate Length:	75.00	ft
Dogleg Rate over Interval:	1.750	°/100ft
Motor Yield:	10.500	°/100ft

Slide Length Calculator

Motor Yield:	10.500	°/100ft
Stand Length:	0.00	ft
Required Dogleg Rate:	0.000	°/100ft
Slide Distance:	0.00	ft
Slide Percent:	0	%

2. Enter the **Stand Length** and the **Required Dogleg Rate** for the next drill stand (or section) and KellyDown calculates the **Slide Distance** and the **Slide Percent** for the section.

KD Motor Yield

Motor Yield Calculator

Slide Length:	15.00	ft
Rotate Length:	75.00	ft
Dogleg Rate over Interval:	1.750	°/100ft
Motor Yield:	10.500	°/100ft

Slide Length Calculator

Motor Yield:	10.500	°/100ft
Stand Length:	88.75	ft
Required Dogleg Rate:	3.500	°/100ft
Slide Distance:	29.58	ft
Slide Percent:	33	%

- We'll use the **AA16, Run #4** in the example database that is installed with KellyDown to demonstrate how the **Motor Yield** module may be used in conjunction with the **Correction Run** module.
- Open the **Correction Run** module and enter **Sensor to Bit Distance** of 51.53ft and a **Course Length** of 3.00ft, a **Dogleg Rate** of 12.800°/100ft and a Toolface of -45° for the first **Bit Projection**. We'll also enter a single Extrapolation of 32.81ft with a Dogleg Rate of 10.000°/100ft and a Toolface of 100°. Finally enter a Correction Dogleg Rate of 3.500°/100ft.

KD Correction Run - AA16, Run #4

Bit/TD Projection Sensor to Bit Distance: 51.53

	Measured Depth (ft)	Course Length (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Inclination (°)	Azimuth (°)
Bit Projection:	5,366.05	3.00	12.800	-45.000	88.272	63.328
	5,366.05	0.00	0.000	0.000	88.272	63.328
	5,366.05	0.00	0.000	0.000	88.272	63.328
	5,414.58	48.53	0.000	0.000	88.272	63.328
Extrapolation:	5,447.39	32.81	10.000	100.000	87.705	66.562
	5,447.39	0.00	0.000	0.000	87.705	66.562
	5,447.39	0.00	0.000	0.000	87.705	66.562

Target: AA16 TD

Vertical Depth: 1,596.45

Northing: 405.12 N

Easting: 4,082.70 E

Plane Inclination: 90.000

Plane Azimuth: 65.000

Reference Survey: 48

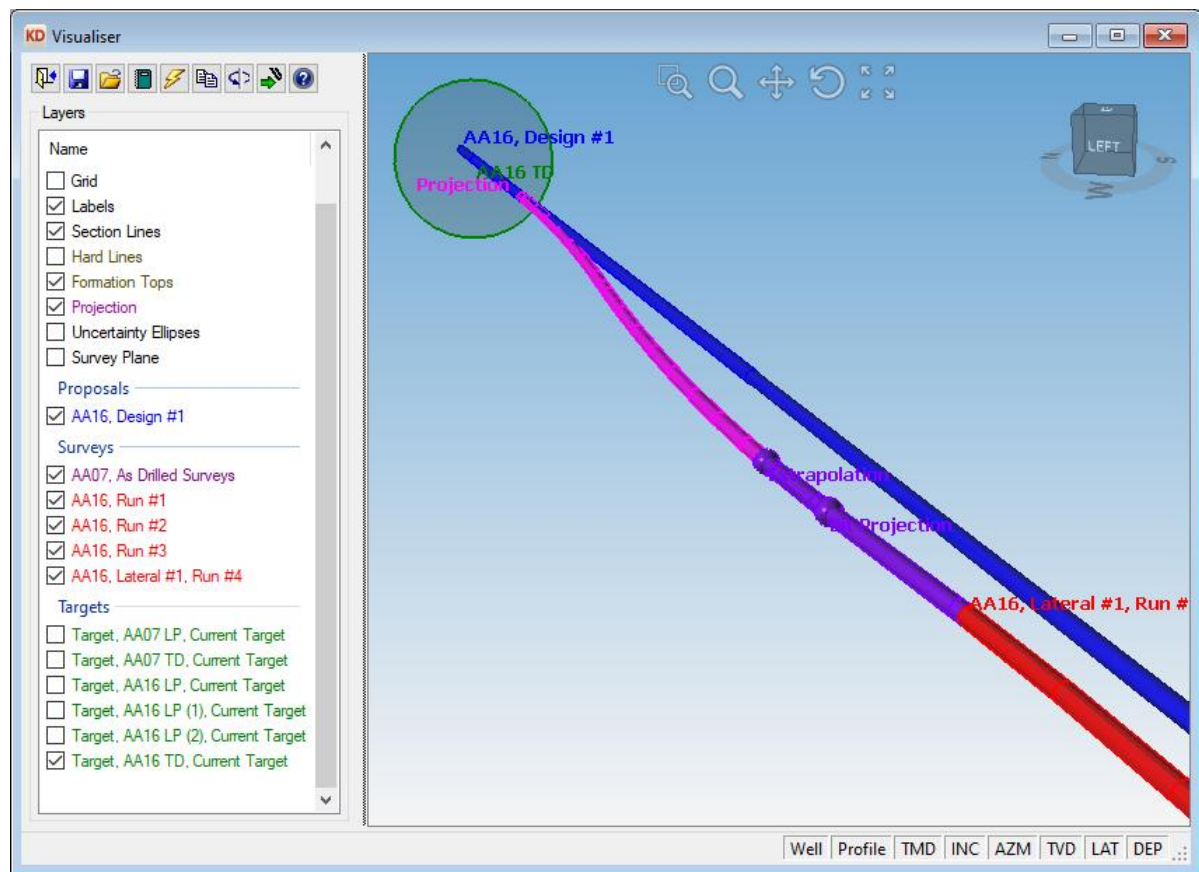
Measured Depth (ft)	Course Length (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Vertical Section (ft)
Reference Survey Data:									
5,363.05		88.000	63.600	1,597.86	211.03 N	3,640.38 E	7.571	-165.969	3,646.50
Bit/TD Projection:									
5,414.58	51.53	88.272	63.328	1,599.42	234.15 N	3,686.41 E	0.000	0.000	3,693.79
Extrapolation:									
5,447.39	32.81	87.705	66.562	1,600.58	248.03 N	3,716.11 E	10.000	100.000	3,724.24
End of First Build/Turn:									
5,608.54	161.15	92.808	68.964	1,599.86	308.99 N	3,865.22 E	3.500	25.215	3,876.62
End of Correction Run:									
5,747.32	138.78	90.000	65.000	1,596.45	363.23 N	3,992.87 E	3.500	-125.257	4,007.20

Dogleg Rate (0.010°/100ft to 866.740°/100ft): 3.500

Course Length (20.77ft to 251.84ft): 299.93

Corresponding measured depth on associated proposal at which survey should be back on-track (5,455.17ft to 5,886.80ft): 5,754.86

- Open the **KellyDown Visualiser** and observe the **Bit Projection**, **Extrapolation** and **Forward Projection** to correct the well back to the plan.



6. The correction requires two curved hole sections having dogleg rates of $3.5^{\circ}/100\text{ft}$ each, one to turn the well back towards the plan and the other to line the well back up with the plan.
7. Now look at the **Motor Yield Calculator**. It has translated the two curve sections into slide/rotate sections with the four slide sections having dogleg rates equal to the **Motor Yield** and has displayed the six sections in a grid at the bottom.

KD Motor Yield

Motor Yield Calculator

Slide Length: 15.00 ft

Rotate Length: 75.00 ft

Dogleg Rate over Interval: 1.750 $^{\circ}/100\text{ft}$

Motor Yield: 10.500 $^{\circ}/100\text{ft}$

Slide Length Calculator

Motor Yield: 10.500 $^{\circ}/100\text{ft}$

Stand Length: 161.15 ft

Required Dogleg Rate: 3.500 $^{\circ}/100\text{ft}$

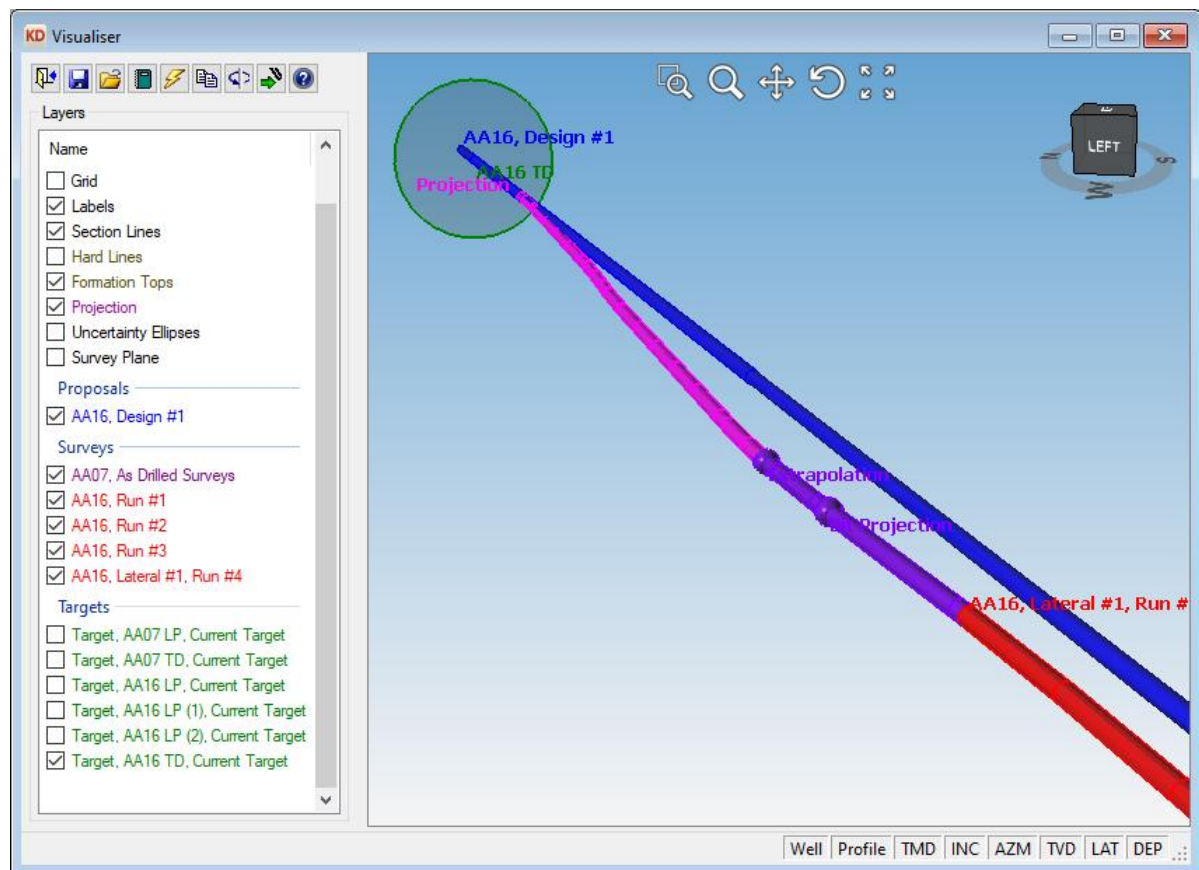
Slide Distance: 53.72 ft

Slide Percent: 33 %

Suggested Slide/Rotate

Bit Depth (ft)	Course Length (ft)	Dogleg Rate ($^{\circ}/100\text{ft}$)	Toolface ($^{\circ}$)	Inclination ($^{\circ}$)	Azimuth ($^{\circ}$)
5,447.39				87.705	66.562
5,474.24	26.86	10.500	25.215	90.257	67.763
5,581.68	107.43	0.000	0.000	90.257	67.763
5,608.54	26.86	10.500	25.215	92.808	68.965
5,631.67	23.13	10.500	-125.257	91.405	66.982
5,724.19	92.52	0.000	0.000	91.405	66.982
5,747.32	23.13	10.500	-125.257	90.002	64.999

- Click on the **Motor Yield** dialog to show the actual sections in the **Visualiser**. If you repeatedly click on the **Correction Run** dialog and then the **Motor Yield** dialog, you will be able to see the difference between the two projections in the **Visualiser**.



9. Close the **Survey Editor** and the **Correction Run** and **Motor Yield** modules will also close.
10. Now open the **Slidesheet Editor** and open the **Correction Run** module from within the **Slidesheet Editor**. The **Bit to Sensor Distance**, **Slide Ahead**, **Motor Output** and **Toolface** etc. are all transferred from the **Slidesheet Editor** to the **Correction Run** module.
11. Now open the **Motor Yield Calculator** and notice that all the values have been transferred from the **Slidesheet Editor** and the **Correction Run** module and the Slide/Rotate sections are immediately displayed in the **Visualiser**.

KD Motor Yield

Motor Yield Calculator

Slide Length: ft

Rotate Length: ft

Dogleg Rate over Interval: °/100ft

Motor Yield: °/100ft

Slide Length Calculator

Motor Yield: °/100ft

Stand Length: ft

Required Dogleg Rate: °/100ft

Slide Distance: ft

Slide Percent: %

Suggested Slide/Rotate

Bit Depth (ft)	Course Length (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Inclination (°)	Azimuth (°)
5,447.39				88.049	64.652
5,487.13	39.74	8.519	52.775	90.099	67.348
5,601.12	113.99	0.000	0.000	90.099	67.348
5,640.86	39.74	8.519	52.775	92.146	70.045
5,673.03	32.17	8.519	-113.012	91.073	67.522
5,765.30	92.27	0.000	0.000	91.073	67.522
5,797.47	32.17	8.519	-113.012	90.001	65.000

12. But that's not all, click on the **View Report** button to view and or print a detailed **Motor Yield Report** including the last five survey records, the projection to the bit, extrapolation and the slide/rotate sequence

KD Motor Yield Report Report - Run #4

Agilis

Software Solutions Inc.

Anglian Oil Company Ltd.

Northern Lights

Motor Yield Report Report for AA Pad, AA16, Run #4

Measured Depth (ft)	Course Length (ft)	Incl. (°)	(Grid) Azimuth (°)	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Travelling Distance (ft)	Cylinder Highside Direction
Existing Survey Data											
5,247.46		90.000	64.500	1,597.54	161.11 N	3,536.15 E	3,539.55			9.90	83.682
5,276.76	29.30	90.000	65.000	1,597.54	173.60 N	3,562.65 E	3,566.72	1.707	90.000	10.02	83.762
5,308.59	31.82	90.300	64.400	1,597.46	187.20 N	3,591.42 E	3,596.23	2.108	-63.434	10.18	84.330
5,335.82	27.23	90.000	64.100	1,597.39	199.03 N	3,615.94 E	3,621.40	1.558	-135.000	10.53	84.908
5,363.05	27.23	89.000	63.600	1,597.63	211.03 N	3,640.39 E	3,646.50	4.106	-153.438	11.10	83.937
Projection to Bit											
5,392.92	29.88	88.616	61.420	1,598.25	224.82 N	3,666.88 E	3,673.75	7.408	-100.000	12.49	81.739
5,414.58	21.65	88.616	61.420	1,598.77	235.18 N	3,685.89 E	3,693.33	0.000	0.000	13.91	80.409
Extrapolation											
5,447.39	32.81	88.049	64.652	1,599.72	250.05 N	3,715.12 E	3,723.36	10.000	100.000	15.17	77.536
Correction to Well Plan											
5,460.00	12.61	88.700	65.508	1,600.08	255.36 N	3,726.55 E	3,735.09	8.519	52.775	15.23	76.209
5,480.00	20.00	89.731	66.865	1,600.36	263.43 N	3,744.85 E	3,753.82	8.519	52.751	14.90	74.816
5,487.13	7.13	90.099	67.348	1,600.37	266.21 N	3,751.42 E	3,760.53	8.519	52.732	14.66	74.514
5,500.00	12.87	90.099	67.348	1,600.34	271.16 N	3,763.29 E	3,772.68	0.000	0.000	14.14	74.030
5,520.00	20.00	90.099	67.348	1,600.31	278.87 N	3,781.75 E	3,791.55	0.000	0.000	13.35	73.203
5,540.00	20.00	90.099	67.348	1,600.28	286.57 N	3,800.21 E	3,810.42	0.000	0.000	12.55	72.272
5,560.00	20.00	90.099	67.348	1,600.24	294.27 N	3,818.67 E	3,829.30	0.000	0.000	11.76	71.216
5,580.00	20.00	90.099	67.348	1,600.21	301.97 N	3,837.12 E	3,848.17	0.000	0.000	10.98	70.008
5,600.00	20.00	90.099	67.348	1,600.17	309.68 N	3,855.58 E	3,867.04	0.000	0.000	10.20	68.615
5,601.12	1.12	90.099	67.348	1,600.17	310.11 N	3,856.61 E	3,868.09	0.000	0.000	10.16	68.531
5,620.00	18.88	91.072	68.629	1,599.98	317.18 N	3,874.12 E	3,885.98	8.519	52.775	9.18	67.430
5,640.00	20.00	92.102	69.987	1,599.42	324.25 N	3,892.82 E	3,905.06	8.519	52.788	7.60	66.973
5,640.86	0.86	92.146	70.045	1,599.39	324.54 N	3,893.62 E	3,905.88	8.519	52.826	7.52	66.974
5,660.00	19.14	91.508	68.544	1,598.78	331.30 N	3,911.52 E	3,924.14	8.519	-113.012	5.94	66.914
5,673.03	13.03	91.073	67.522	1,598.49	336.18 N	3,923.60 E	3,936.48	8.519	-113.060	5.18	66.881
5,680.00	6.97	91.073	67.522	1,598.36	338.84 N	3,930.04 E	3,943.06	0.000	0.000	4.85	66.875
5,700.00	20.00	91.073	67.522	1,597.98	346.49 N	3,948.52 E	3,961.95	0.000	0.000	3.89	66.852
5,720.00	20.00	91.073	67.522	1,597.61	354.13 N	3,966.99 E	3,980.84	0.000	0.000	2.93	66.814
5,740.00	20.00	91.073	67.522	1,597.23	361.78 N	3,985.47 E	3,999.73	0.000	0.000	1.98	66.739
5,760.00	20.00	91.073	67.522	1,596.86	369.42 N	4,003.95 E	4,018.62	0.000	0.000	1.02	66.522
5,765.30	5.30	91.073	67.522	1,596.76	371.45 N	4,008.84 E	4,023.62	0.000	0.000	0.76	66.374
5,780.00	14.70	90.583	66.369	1,596.55	377.20 N	4,022.37 E	4,037.46	8.519	-113.012	0.22	64.907
Corrected to Well Plan											
5,797.47	17.47	90.001	65.000	1,596.46	384.40 N	4,038.29 E	4,053.76	8.519	-113.029	0.00	0.000

All data is in Feet (US Survey) unless otherwise stated. Directions and coordinates are relative to Grid North.

Vertical depths are relative to RKB. Northings and Eastings are relative to Well AA16x.

The dogleg severity is in Degrees per 100 feet (US Survey).

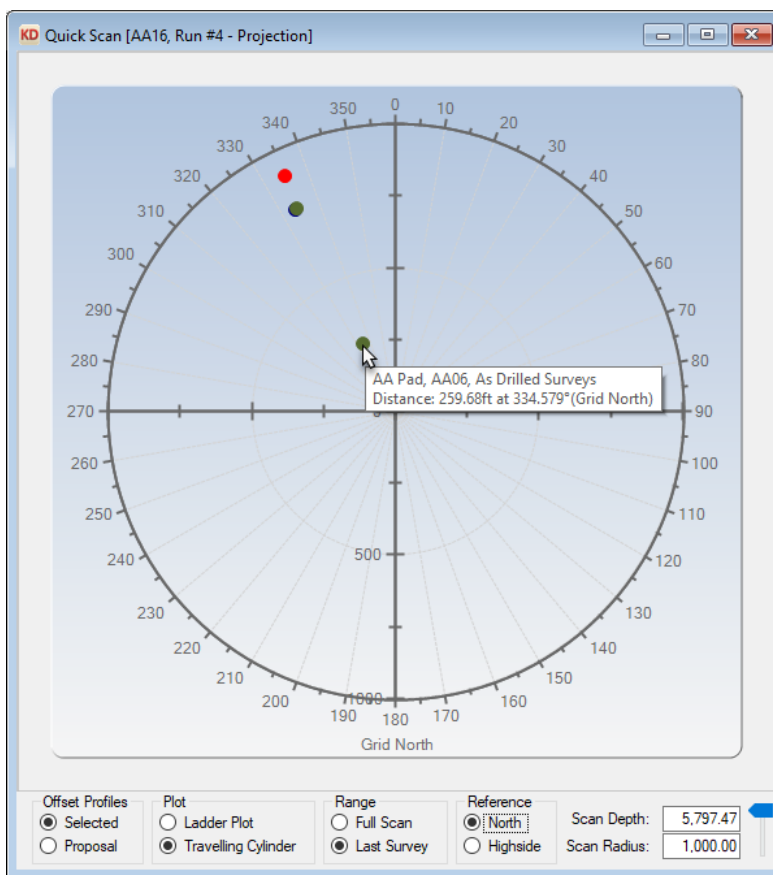
Vertical Section is from Well AA16x calculated along an azimuth of 86.682° (Grid).

Based upon minimum curvature calculations, at a measured depth of 5,797.47ft, the bottom hole displacement is 4,056.54ft, in the direction of 84.563° (Grid).

13. You may also interpolate the correction based on several criteria including Measured Depth, Inclination, Azimuth etc. and don't forget, KellyDown doesn't just show the first interpolation that satisfies the criteria, but all of them. For example, if you enter an Azimuth value, KellyDown will find all the interpolated depths having that azimuth.

KD Interpolated Survey Data [AA16 - Run #4]													
No.	Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Distance to Plan (ft)	Highside Direction to Plan	Proposed Inclination (°)	Proposed Azimuth (°)
1	5,382.15	88.755	62.206	1,598.00	219.73 N	3,657.39 E	3,663.97	7.408	-100.000	11.85	82.499	90.000	65.000
2	5,699.08	91.073	67.522	1,598.00	346.13 N	3,947.66 E	3,961.08	0.000	0.000	3.93	66.853	90.000	65.000
3	190.11	0.010	66.000	190.11	0.26 S	0.32 E	0.31	0.289	153.335	0.41	-117.557	0.000	0.000
4	410.99	0.018	66.000	410.99	0.39 S	0.10 E	0.08	0.351	-162.975	0.40	-81.031	0.000	0.000
5	451.64	0.009	66.000	451.64	0.37 S	0.12 E	0.10	0.267	175.630	0.39	-84.597	0.000	0.000
6	514.44	0.084	66.000	514.43	0.49 S	0.09 E	0.06	1.184	-170.283	0.49	-76.510	0.000	0.000
7	3,008.06	89.338	66.000	1,593.82	789.77 S	1,508.79 E	1,460.55	10.187	-88.170	5.35	119.143	89.818	66.314
8	5,467.25	89.073	66.000	1,600.22	258.34 N	3,733.16 E	3,741.86	8.519	52.751	15.17	75.609	90.000	65.000
9	5,784.71	90.426	66.000	1,596.51	379.11 N	4,026.68 E	4,041.87	8.519	-113.029	0.12	63.043	90.000	65.000
* Add New Interpolation													

14. You may also perform a detailed **anti-collision scan** on the correction run and show the proximity of other wells in the **Quick Scan** module.



15. From the **Slidesheet Editor**, open the **Ouija Board** module. Set the required **Dogleg Rate** to 3.5°/100ft and immediately see the suggested Slide/Rotate sequence in order to penetrate the target centre.

KD

Motor Yield

Motor Yield Calculator

Slide Length:

13.12

ft

Rotate Length:

14.11

ft

Dogleg Rate over Interval:

4.106

°/100ft

Motor Yield:

8.519

°/100ft

Slide Length Calculator

Motor Yield:

8.519

°/100ft

Stand Length:

115.64

ft

Required Dogleg Rate:

3.500

°/100ft

Slide Distance:

47.51

ft

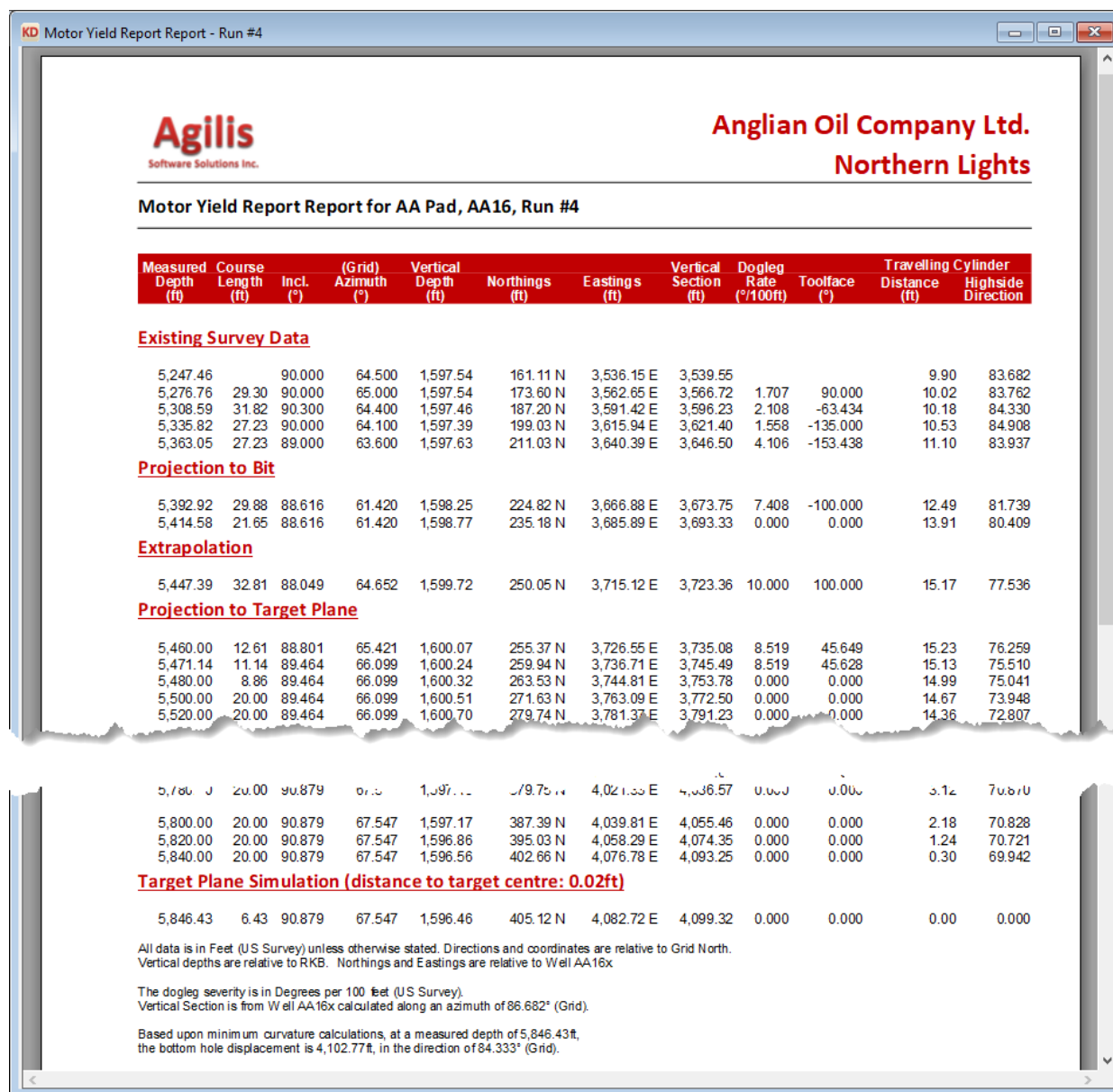
Slide Percent:

41

%

Suggested Slide/Rotate

Bit Depth (ft)	Course Length (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Inclination (°)	Azimuth (°)
5,447.39				88.049	64.652
5,471.14	23.75	8.519	45.649	89.464	66.099
5,539.27	68.13	0.000	0.000	89.464	66.099
5,563.03	23.75	8.519	45.649	90.879	67.547
5,846.43	283.40	0.000	0.000	90.879	67.547



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