

ISCWSA / SPE Wellbore Positioning Technical Section

Error Model Maintenance Work Group

Minutes of the Meeting at ISCWSA #52, Online, 15th October 2020

Present

Andy McGregor	H&P	Juan José Expósito	CEPSA
Jon Bang	Gyrodata	Susan Macmillan	BGS
Harry Wilson	Baker Hughes	Jonny Corcutt	Independent
Darren Aklestad	SLB	Jerry Codling	Halliburton
Phil Harbidge	Pathcontrol	Jonathan Lightfoot	Occidental
Mike Attrell	Mostar	Anne Holmes	Halliburton
Eric Maynard	EQT	Erik Nyrnes	Equinor
Steve Grindrod	Copsegrove	Dalis Deliu	Conoco Phillips
Phil Scott	DGI	Levi Smith	Icefield Tools
Denis Reynard	Pathcontrol	Orlando Ramirez	Stockholm Precision
Shuba Love	H&P	Brett Van Steenwyck	SDI
Neil Bergstrom	Independent	Adrian Ledroz	Gyrodata
Knut Ness	ADNOC		

Revision 5

Since the previous meeting, Susan Macmillan spotted some small errors in the derivation of the new geo-magnetic magnitudes. These are $\sim 0.01^\circ$ and will have limited effect on error model results, but since implementation of these magnitudes is very limited, the documentation will be corrected.

Steve Grindrod has agreed to supply the spreadsheets and diagnostics for the Rev5 standard set of models. We anticipated this work will be uploaded to the website quite soon. All members will be updated when it is available.

ACTION: Andy McGregor to update rev5 documentation with correct geo-mag magnitudes.

ACTION: Steve Grindrod to supply documentation of standard models.

ACTION: Andy McGregor to update website and inform committee.

Side-track Errors

It has become clear when evaluating the standard set of collision avoidance test cases that there are differences in how errors are handled in side-tracks.

Harry Wilson outlined four areas of possible disagreement:

- i) Is start point of side-track a survey in parent or an interpolated point.
- ii) Relative errors between side-track and parent should be zero at the side-track point.

- iii) Application of depth stretch and scale errors should only be over the interval from the side-track.
- iv) Slot uncertainty should not be included in the relative well uncertainty.

Other considerations raised were that the method should handle:

case where a continuous gyro is used in one of the wells.

case where side-track double back and closest point on parent is above the sidetrack point.

Case where wireline is used in one well and drill-pipe depth in the other.

Currently some software packages use a no error / zero error tool to the side-track point. Jerry Codling showed that these give quite good agreement. Andy McGregor commented that due to iii) above they may still fail the given pass criteria for the collision-avoidance tests.

Another approach is to subtract the covariance at the side-track from subsequent values. Erik Nyrnes thought this was wrong and the method of handling correlated values in SPE66716 should be used. Andy McGregor commented that he thought these were equivalent if the errors were all correlated. This was disputed.

A working group was set up to consider this and make a recommendation back to the group.

ACTION: Side-track working group to report back:

Lead- Harry Wilson, also Andy McGregor, Erik Nyrnes, Jerry Codling and Darren Aklestad.

Axial Interference Models

In the standard set of uncorrected MWD models we have one magnitude for axial interference: 220nT

However, this value is dependant on non-mag spacing used. Some service companies have long, medium, short, extra-short spacing models. Analysis of axial interference as determined from MSA in US land shows values > 1000nT are not untypical and it is suggested that this is not just because companies know that corrections will be applied to remove the errors.

It was agreed that model used should tie in QC tests.

Knowledgeable users have the ability to create new models as required. Will less knowledgeable users pick the correct model or are they just likely to pick the best case.

There was some consensus that a guidance document or process was needed rather than just new tool-codes. Possibly the creation of a simple non-mag spacing calculator, although it was acknowledged that published information pole strengths is limited and enforcement of de-gaussing standards patchy at best.

An alternative approach is to vary the magnitudes dynamically based on QC tests or the use of single/multi-station corrections.

No clear route forward was agreed in the allotted time. The chair to consider the matter further, liaise with the QC committee / review draft RP-78 documentation.

ACTION: Andy McGregor to consider and discuss with Phil Harbidge.