ISCWSA / SPE Wellbore Positioning Technical Section

Operator's Wellbore Survey Group (OWSG)

Sub-Committee

Minutes of the Teams Meeting held on November 23, 2021 (Scribe: Jonathan Lightfoot)

Attendance

Operators Present

Jonathan Lightfoot	Oxy (OWSG Incoming Chair)
Pete Clark	Chevron (OWSG Outgoing Chair)
Will Tank	Oxy (RP-78 Workgroup Chair)
Bert Kampes	Shell (IOGP P7 Workgroup Leader)
Fauzia Waluyo	Aramco
Ryan Carlson	XTO
Knut Johannes Ness	ADNOC
Dalis Deliu	ConocoPhillips
Marianne Houbiers	Equinor
Nick Robertson	BP
Todd Mckenzie	Shell
Hans Christian Dreisig	Total Energies

Industry Guests Present

Adrian Ledroz	Gyrodata (ISCWSA Incoming Chair)
Phil Harbidge	Path Control (ISCWSA QA/QC Sub-Committee Chair and Webmaster)
Ross Lowdon	Schlumberger (ISCWSA Outgoing Chair)
Marc Willerth	H&P Technologies (ISCWSA Membership Chair)
Gary Skinner	Baker Hughes (ISCWSA Collision Avoidance Rules Sub-Committee Chair)

AGENDA

- OWSG Mission & Anti-Trust
- 2015 Member Poll Review
- ISCWSA Revision 5 Model Implementation Barriers
- Separation Rule Implementation Status / Barriers
- Model Revision 5-1 & Reference Code Naming
- API RP-78 – 2022 Plan
- Focus Areas and Future Goals

To kick off the meeting the OWSG Mission & Anti-Trust Statement was read to members:

Mission Statement:

To promote practices that provide confidence that reported wellbore positions are within their stated uncertainty.

Anti-Trust Statement:

We are meeting to help develop and promote good practices in wellbore surveying necessary to support oil and gas operations which enhance safety and competition.

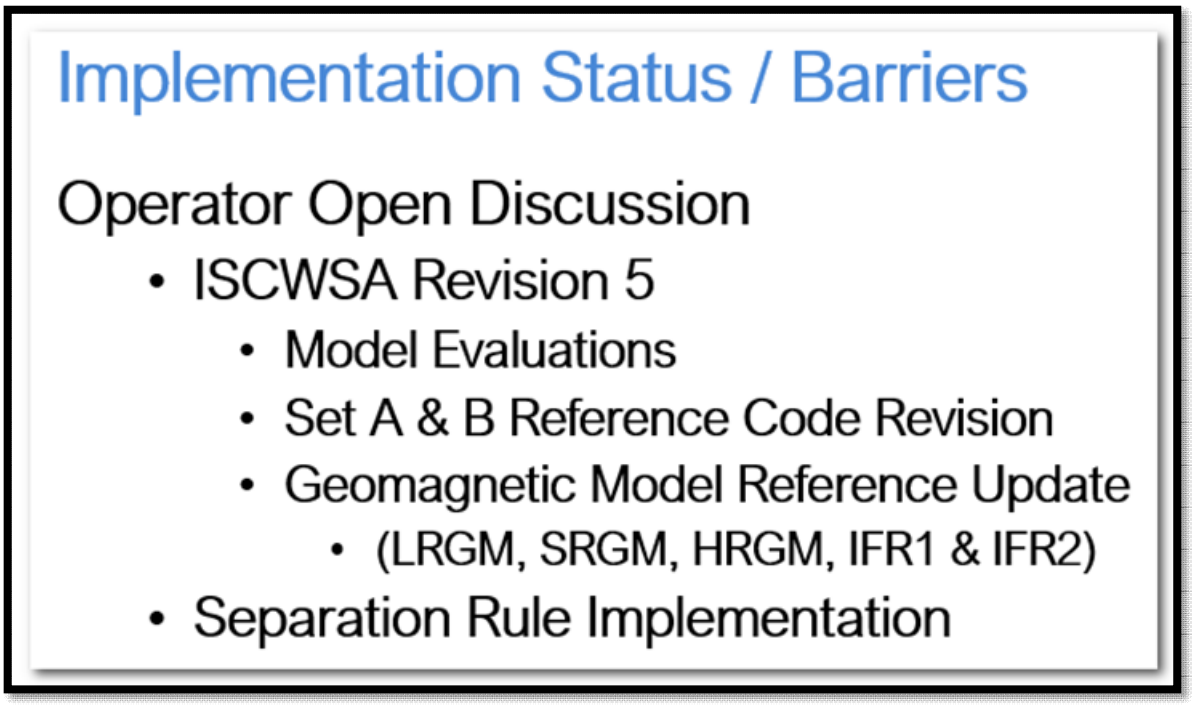
The meeting will be conducted in compliance with all laws including the antitrust laws, both state and federal. We will not discuss prices paid to suppliers or charged to customers nor will we endorse or disparage vendors or goods or services, divide markets, or discuss with whom we will or will not do business, nor other specific commercial terms, because these are matters for each company or individual to independently evaluate and determine. We are meeting to help develop and promote good practices in wellbore surveying necessary to support oil and gas operations which enhance safety and competition.

Attendee Introductions

Each person gave a short personal statement as a meeting introduction (name, affiliation & background). Chair, Jonathan Lightfoot spoke about the format of the meetings and schedule of future meetings.

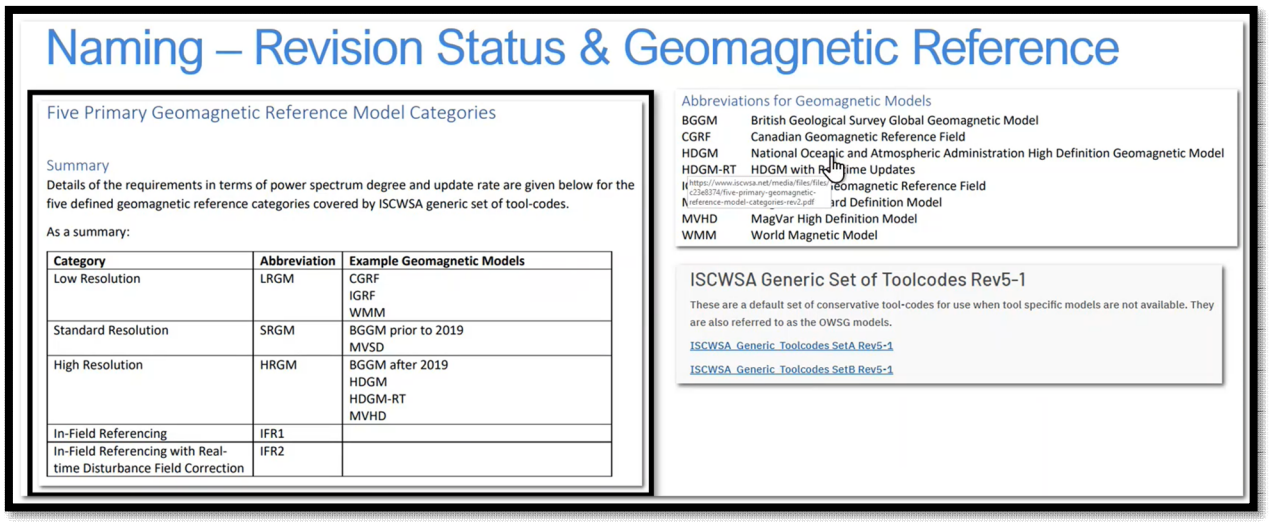
Implementation Status / Barriers

Jonathan (Oxy) discussed the error model naming format to gain agreement and alignment on error models across industry databases from service suppliers and operators. Also, Will Tank (Oxy) mentioned that the OWSG error model set will now be called the ISCWSA set and the latest revision is ISCWSA Rev 5-1 and information can be downloaded from the ISCWSA Error Model Maintenance website page: https://www.iscwsa.net/committees/error-model/ .



Geomagnetic References

Jonathan (Oxy) reviewed geomagnetic reference and revision status to guide on the format of the actual name of the models including the Geomagnetic Models Categories: Low Resolution (LRGM), High Resolution (HRGM) and Standard Resolution (SRGM) in addition to IFR1 & IFR2. The five primary categories were also discussed and the way the error models show up in software as mentioned as shown below:



Also, the OWSG Set A and B list of models were discussed by Jonathan where the revision of the prefix was reviewed. Also, difficulty with not having a short name combined with the prefix was reviewed. Jonathan mentioned that when the prefix used with the short name it organized the tools alphabetically. Will Tank brought up the fact that the OWSG name is going away and the new revision status is ISCWSA Revision 5-1.

Operator Feedback about Barriers to Implementation

Knut Ness (ADNOC) discussed the ISCWSA revision as the part of the name such as REV4 or REV5. The prefix is not being used. In addition, it was mentioned that it has been a struggle for various vendors to supply a list of tools they are using to match industry OWSG guidance. It is a struggle for vendors to provide output from their software for comparison of the results of models for Operator testing.

Dalis (ConocoPhillips) discussed challenges that exist with revision 5, they have been testing these for the past three years. Unreleased tool codes and now there are 5.1. Some service companies are pushing for revision 5. They had the service company models and they are trying to develop a system base across the company. Polling the service providers there are a mix of responses on implementation on Revision 5. Quite often vendors state that their software cannot manage revision 5. It seems like that not everyone can implement the ISCWSA Revision 5. Most are half-way with implementation and have come across challenges. Many inconsistencies experienced and management of survey tools do not appear to have a common set of good controls.

Set A Error Model Paper Example

MASTER LIST OF EDM COMPASS ISCWSA REVISION 5-1 INSTRUMENT PERFORMANCE MODELS (ISCWSA / SPE WPTS) IADC/SPE 178843-MS

OWSG Prefix	Short Name	Long Name	Application	Replaces	Source	Technology Type
A001Mc	A001Mc_MWD+SRGM	ISCWSA MWD - Standard	Standard MWD using SRGM and with no additional corrections	A001Mb_MWD+BGGM	ISCWSA Standard Generic	Generic Magnetic Tool
A002Mc	A002Mc_MWD+SRGM+SAG	ISCWSA MWD + Sag Correction	MWD using SRGM and Sag correction	A002Mb_MWD+BGGM+SAG	ISCWSA Standard Generic	Generic Magnetic Tool
A003Mc	A003Mc_MWD+SRGM+AX	ISCWSA MWD + Axial Correction	MWD with Axial Correction using SRGM	A003Mb_MWD+BGGM+AX	ISCWSA Standard Generic	Generic Magnetic Tool
A004Mc	A004Mc_MWD+SRGM+AX+SAG	ISCWSA MWD + Axial Corr + Sag Correction	MWD with Axial Correction using SRGM and Sag Correction	A004Mb_MWD+BGGM+AX+SAG	ISCWSA Standard Generic	Generic Magnetic Tool
A005Mc	A005Mc_MWD+IFR1	ISCWSA MWD + IFR1	MWD with IFR1 (IFR or Crustal Anomaly Correction). NOT TO BE USED WHILE PLANNING A WELL UNLESS THE IFR MODEL WILL BE AVAILABLE AND USED DURING THE DRILLING	A005Mb_MWD+IFR1	ISCWSA Standard Generic	Generic Magnetic Tool
A006Mc	A006Mc_MWD+IFR1+AX	ISCWSA MWD + IFR1 + Axial Correction	MWD with IFR1 (IFR or Crustal Anomaly Correction) and Axial Correction. NOT TO BE USED WHILE PLANNING A WELL UNLESS THE IFR MODEL WILL BE AVAILABLE AND USED	A006Mb_MWD+IFR1+AX	ISCWSA Standard Generic	Generic Magnetic Tool
A007Mc	A007Mc_MWD+IFR1+AX+SAG	ISCWSA MWD + IFR1 + Axial Corr + Sag Correction	MWD with IFR1 (IFR or Crustal Anomaly Correction) and Axial Correction and Sag Correction. NOT TO BE USED WHILE PLANNING A WELL UNLESS THE IFR MODEL WILL BE	A007Mb_MWD+IFR1+AX+SAG	ISCWSA Standard Generic	Generic Magnetic Tool
A008Mc	A008Mc_MWD+IFR1+MS	ISCWSA MWD + IFR1 + Multi-Station Correction	MWD with IFR1 (IFR or Crustal Anomaly Correction) and Multi-Station Correction. NOT TO BE USED WHILE PLANNING A WELL UNLESS THE IFR MODEL WILL BE AVAILABLE AND	A008Mb_MWD+IFR1+MS	ISCWSA Standard Generic	Generic Magnetic Tool
A009Mc	A009Mc_MWD+IFR1+SAG	ISCWSA MWD + IFR1 + Sag Correction	MWD with IFR1 (IFR or Crustal Anomaly Correction) and Sag Correction. NOT TO BE USED WHILE PLANNING A WELL UNLESS THE IFR MODEL WILL BE AVAILABLE AND USED	A009Mb_MWD+IFR1+SAG	ISCWSA Standard Generic	Generic Magnetic Tool
A010Mc	A010Mc_MWD+IFR1+SAG+MS	ISCWSA MWD + IFR1 + Sag + Multi-Station Correction	MWD with IFR1 (IFR or Crustal Anomaly Correction) and Multi-Station Correction. NOT TO BE USED WHILE PLANNING A WELL UNLESS THE IFR MODEL WILL BE AVAILABLE AND	A010Mb_MWD+IFR1+SAG+MS	ISCWSA Standard Generic	Generic Magnetic Tool
A011Mc	A011Mc_MWD+IFR2+AX+SAG	ISCWSA MWD + IFR2 + Axial Corr + Sag Correction	MWD with IFR2 (IIFR or Crustal Anomaly with Time Varying Corrections) and Axial Correction and Sag Correction. NOT TO BE USED WHILE PLANNING A WELL UNLESS THE	A011Mb_MWD+IFR2+AX+SAG	ISCWSA Standard Generic	Generic Magnetic Tool
A012Mc	A012Mc_MWD+IFR2+SAG	ISCWSA MWD + IFR2 + Sag Correction	MWD with IFR2 (IIFR or Crustal Anomaly with Time Varying Corrections) and Sag Correction. NOT TO BE USED WHILE PLANNING A WELL UNLESS THE IFR MODEL AND	A012Mb_MWD+IFR2+SAG	ISCWSA Standard Generic	Generic Magnetic Tool
A013Mc	A013Mc_MWD+IFR2+SAG+MS	ISCWSA MWD + IFR2 + Sag + Multi-Station Correction	MWD with IFR2 (IIFR or Crustal Anomaly with Time Varying Corrections) with Sag and Multi-Station Correction. NOT TO BE USED WHILE PLANNING A WELL UNLESS THE IFR	A013Mb_MWD+IFR2+SAG+MS	ISCWSA Standard Generic	Generic Magnetic Tool
A014Mc	A014Mc_EMS+SRGM	ISCWSA EMS - Standard	Standard EMS using SRGM and with no additional corrections	A014Mb_EMS+BGGM	ISCWSA Standard Generic	Generic Magnetic Tool
A015Mc	A015Mc_EMS+SRGM+AX	ISCWSA EMS + Axial Correction	EMS with Axial Correction using SRGM	A015Mb_EMS+BGGM+AX	ISCWSA Standard Generic	Generic Magnetic Tool
A016Mc	A016Mc_EMS+SRGM+AX+SAG	ISCWSA EMS + Axial Corr + Sag Correction	EMS with Axial Correction using SRGM and Sag Correction	A016Mb_EMS+BGGM+AX+SAG	ISCWSA Standard Generic	Generic Magnetic Tool
A017Mc	A017Mc_EMS+SAG+SRGM	ISCWSA EMS + Sag Correction	EMS using SRGM and Sag correction	A017Mb_EMS+SAG+BGGM	ISCWSA Standard Generic	Generic Magnetic Tool

Set B Model List Example

OWSG Prefix	Short Name	Long Name	Application	Replaces	Source	Technology Type
B001Mc	B001Mc_MWD+HRGM	ISCWSA MWD + HRGM	MWD Using HRGM (HDGM or MVHD). This is the default standard EDM Compass MWD error model for Oxy unless the BU is using an advanced In-Field-Reference (IFR)	B001Mb_MWD+HRGM	ISCWSA Extended Generic	Generic Magnetic Tool
B002Mc	B002Mc_MWD+HRGM+AX	ISCWSA MWD + HRGM + Axial Correction	MWD with Axial Correction using HRGM (HDGM or MVHD)	B002Mb_MWD+HRGM+AX	ISCWSA Extended Generic	Generic Magnetic Tool
B003Mc	B003Mc_MWD+HRGM+AX+SAG	ISCWSA MWD + HRGM + Axial Corr + Sag Correction	MWD with Axial Correction using HRGM (HDGM or MVHD) with Sag Correction	B003Mb_MWD+HRGM+AX+SAG	ISCWSA Extended Generic	Generic Magnetic Tool
B004Mc	B004Mc_MWD+HRGM+SAG	ISCWSA MWD + HRGM + Sag Correction	MWD Using HRGM (HDGM or MVHD) with Sag Correction	B004Mb_MWD+HRGM+SAG	ISCWSA Extended Generic	Generic Magnetic Tool
B005Mc	B005Mc_MWD+HRGM+SAG+MS	ISCWSA MWD + HRGM + Sag + Multi-Station Correction	NOT TO BE USED WHILE PLANNING A WELL. MWD Using HRGM (HDGM or MVHD) with Sag Correction and Multi-Station Correction	B005Mb_MWD+HRGM+SAG+MS	ISCWSA Extended Generic	Generic Magnetic Tool
B006Mc	B006Mc_MWD+LRGM	ISCWSA MWD + LRGM or WMM	MWD Using IGRF or WMM	B006Mb_MWD+IGRF	ISCWSA Extended Generic	Generic Magnetic Tool
B007Mc	B007Mc_MWD+LRGM+AX	ISCWSA MWD + LRGM or WMM + Axial Correction	MWD with Axial Correction using IGRF or WMM	B007Mb_MWD+IGRF+AX	ISCWSA Extended Generic	Generic Magnetic Tool
B008Mc	B008Mc_MWD+LRGM+AX+SAG	ISCWSA MWD + LRGM or WMM + Axial Correction + Sag Correction	MWD with Axial Correction using IGRF or WMM with Sag Correction	B008Mb_MWD+IGRF+AX+SAG	ISCWSA Extended Generic	Generic Magnetic Tool
B009Mc	B009Mc_MWD+LRGM+SAG	ISCWSA MWD + LRGM or WMM + Sag Correction	MWD Using IGRF or WMM with Sag Correction	B009Mb_MWD+IGRF+SAG	ISCWSA Extended Generic	Generic Magnetic Tool
B010Mc	B010Mc_EMS+IFR1+SAG+MS	ISCWSA EMS + IFR1 + Axial Corr + Sag Correction	EMS with IFR1 (IFR or Crustal Anomaly Correction) and Axial Correction and Sag Correction	B010Mb_EMS+IFR1+SAG+MS	ISCWSA Extended Generic	Generic Magnetic Tool
B011Mc	B011Mc_EMS+IFR1+SAG	ISCWSA EMS + IFR1 + Sag Correction	EMS with IFR1 (IFR or Crustal Anomaly Correction) and Sag Correction	B011Mb_EMS+IFR1+SAG	ISCWSA Extended Generic	Generic Magnetic Tool
B012Mc	B012Mc_EMS+IFR1+SAG+MS	ISCWSA EMS + IFR1 + Sag + Multi-Station Correction	NOT TO BE USED WHILE PLANNING A WELL. EMS with IFR1 (IFR or Crustal Anomaly Correction) with Sag and Multi-Station Correction	B012Mb_EMS+IFR1+SAG+MS	ISCWSA Extended Generic	Generic Magnetic Tool
B013Mc	B013Mc_EMS+HRGM	ISCWSA EMS + HRGM	EMS Using HRGM (HDGM or MVHD)	B013Mb_EMS+HRGM	ISCWSA Extended Generic	Generic Magnetic Tool
B014Mc	B014Mc_EMS+HRGM+AX	ISCWSA EMS + HRGM + Axial Correction	EMS with Axial Correction using HRGM (HDGM or MVHD)	B014Mb_EMS+HRGM+AX	ISCWSA Extended Generic	Generic Magnetic Tool
B015Mc	B015Mc_EMS+HRGM+AX+SAG	ISCWSA EMS + HRGM + Axial Correction	EMS with Axial Correction using HRGM (HDGM or MVHD) with Sag Correction	B015Mb_EMS+HRGM+AX+SAG	ISCWSA Extended Generic	Generic Magnetic Tool
B016Mc	B016Mc_EMS+HRGM+SAG	ISCWSA EMS + HRGM + Sag Correction	EMS Using HRGM (HDGM or MVHD) with Sag Correction	B016Mb_EMS+HRGM+SAG	ISCWSA Extended Generic	Generic Magnetic Tool

Jonathan (Oxy) brought up the original OWSG Paper and shared the spreadsheet of the main list of tools codes. The Set A, B and Revision notes were shared with the suppliers.

Pete Clark (Chevron) shared Chevron's desire and his eagerness to adopt revision 5. The first step is to implement the ISCWSA new separation rule ahead of the new revision 5 (or 5-1) error models. Once the separation rule is implemented, they plan to have a general rule to update to the latest revision of the ISCWSA models by way of a reference link. Pete mentioned that they organized the models by number to help the engineers 01 thru 83 to keep them organized in a logical manner.

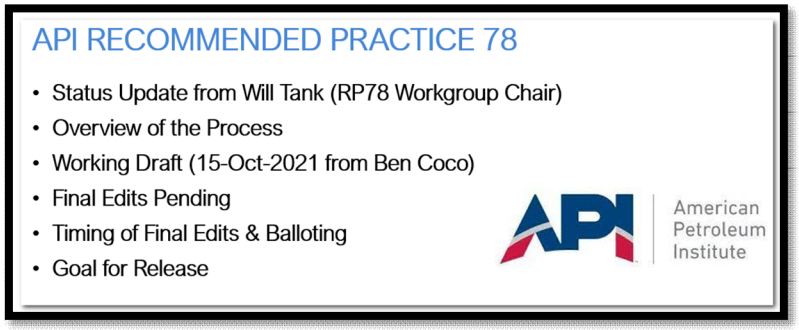
Jonathan (Oxy) discussed the expansion of the software picklist to help the user select the correct model. Also, the sample list would be made generic, and it will be shared with the OWSG group and the error model maintenance sub-committee for consideration.

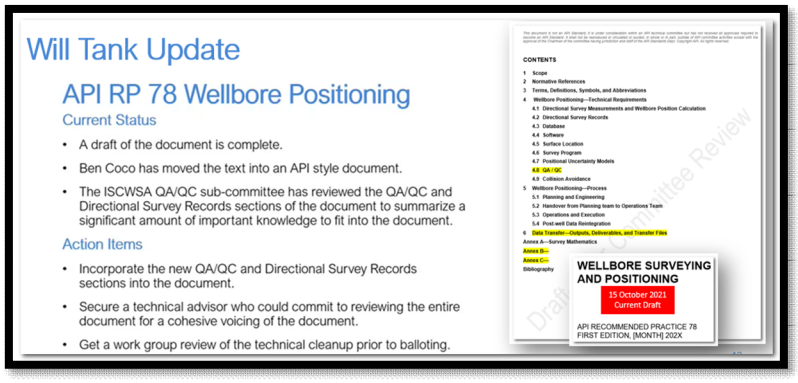
Hans discussed waiting on the software development to include the new separation rule as an added comment because there is a big reluctance to give up the old rule. The idea is to have the results of the new include a comparison to the old rule. You can have it on an added column for comparison.

Gary Skinner (Baker) discussed the Separation Rule as published in the paper remains the SPE anti-collision rule. It was mentioned that a future meeting is set up to help to standardize the final rule and considered thoughts. Pros and cons will be reviewed related to dispensation rules and input from a wider group to gain more feedback.

RP-78 Update

Will Tank (Oxy) provided comment on challenges going forward for having our service provides all speak with the same language. What is your model, what is our, how do they compare? These are challenges Operator's are faced with the same issues. Also, background information about RP78 was discussed. The forward plan to summarize the key engineering practices and push the other material to an eBook. The Magnetic Survey, Gyro & Depth QA/QC in addition to Directional Survey Records. Will gave an update about a technical advisor is needed to have time, bandwidth, and ability to do the technical review. Will mentioned that funding has been secured from API and that ISCWSA may help provide additional support if needed. Names have been suggested but a candidate has not been selected yet. Once the technical review is complete the document will be released for balloting.

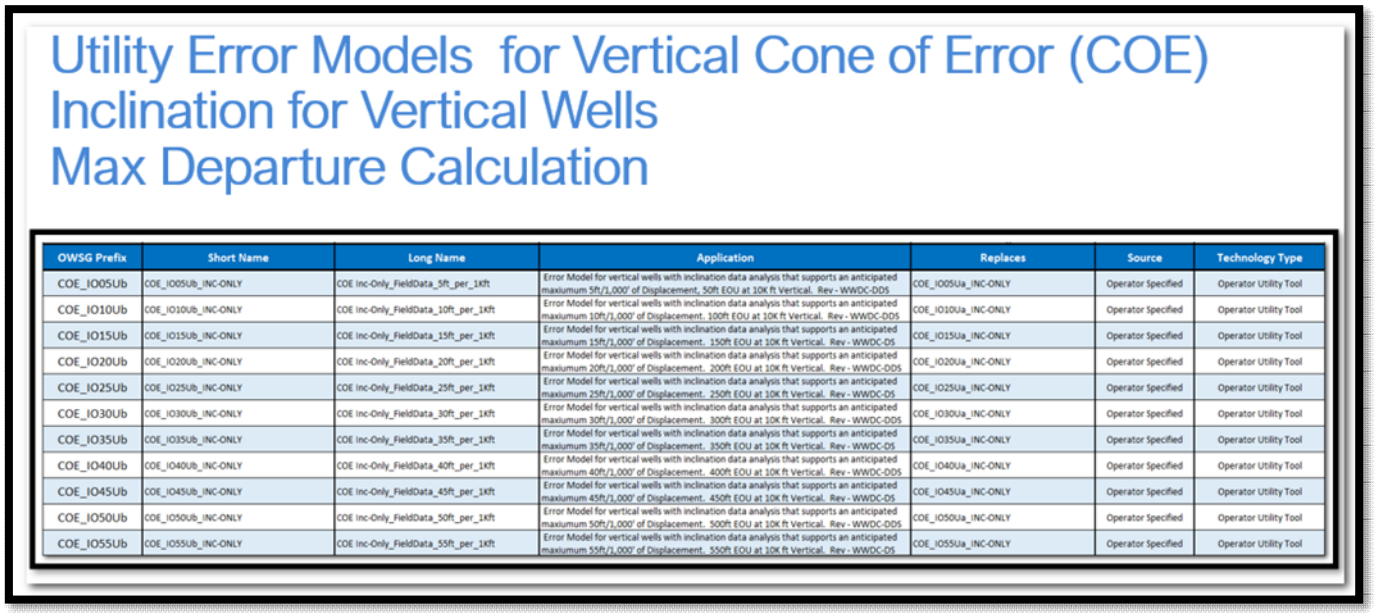




Jonathan (Oxy) provided a quick review of the API RP-78 Workgroup website. The request was for everyone to make sure their company is represented. The roster list will be shared to ensure that each company has a person present. Will mentioned that we must be a bit careful to ensure that we do not have considerable roadblocks to the balloting process. Once the technical review is complete, each company will get a single vote to approve the document.

Cone of Uncertainty Models and Application

Jonathan reviewed the Utility Error models for Cone of Uncertainty and their application for maximum departure of wells with actual inclination surveys. The following table was shared:



Utility Error Models for Vertical Cone of Error (COE)
Inclination for Vertical Wells
Max Departure Calculation

OWSG Prefix	Short Name	Long Name	Application	Replaces	Source	Technology Type
COE_IO05Ub	COE_IO05Ub_INC-ONLY	COE Inc-Only_FieldData_5ft_per_1Kft	Error Model for vertical wells with inclination data analysis that supports an anticipated maxiumum 5ft/1,000' of Displacement, 50ft EOU at 10K ft Vertical. Rev - WWDC-DD5	COE_IO05Ua_INC-ONLY	Operator Specified	Operator Utility Tool
COE_IO10Ub	COE_IO10Ub_INC-ONLY	COE Inc-Only_FieldData_10ft_per_1Kft	Error Model for vertical wells with inclination data analysis that supports an anticipated maxiumum 10ft/1,000' of Displacement. 100ft EOU at 10K ft Vertical. Rev - WWDC-DD5	COE_IO10Ua_INC-ONLY	Operator Specified	Operator Utility Tool
COE_IO15Ub	COE_IO15Ub_INC-ONLY	COE Inc-Only_FieldData_15ft_per_1Kft	Error Model for vertical wells with inclination data analysis that supports an anticipated maxiumum 15ft/1,000' of Displacement. 150ft EOU at 10K ft Vertical. Rev - WWDC-D5	COE_IO15Ua_INC-ONLY	Operator Specified	Operator Utility Tool
COE_IO20Ub	COE_IO20Ub_INC-ONLY	COE Inc-Only_FieldData_20ft_per_1Kft	Error Model for vertical wells with inclination data analysis that supports an anticipated maxiumum 20ft/1,000' of Displacement. 200ft EOU at 10K ft Vertical. Rev - WWDC-DD5	COE_IO20Ua_INC-ONLY	Operator Specified	Operator Utility Tool
COE_IO25Ub	COE_IO25Ub_INC-ONLY	COE Inc-Only_FieldData_25ft_per_1Kft	Error Model for vertical wells with inclination data analysis that supports an anticipated maxiumum 25ft/1,000' of Displacement. 250ft EOU at 10K ft Vertical. Rev - WWDC-D5	COE_IO25Ua_INC-ONLY	Operator Specified	Operator Utility Tool
COE_IO30Ub	COE_IO30Ub_INC-ONLY	COE Inc-Only_FieldData_30ft_per_1Kft	Error Model for vertical wells with inclination data analysis that supports an anticipated maxiumum 30ft/1,000' of Displacement. 300ft EOU at 10K ft Vertical. Rev - WWDC-DD5	COE_IO30Ua_INC-ONLY	Operator Specified	Operator Utility Tool
COE_IO35Ub	COE_IO35Ub_INC-ONLY	COE Inc-Only_FieldData_35ft_per_1Kft	Error Model for vertical wells with inclination data analysis that supports an anticipated maxiumum 35ft/1,000' of Displacement. 350ft EOU at 10K ft Vertical. Rev - WWDC-D5	COE_IO35Ua_INC-ONLY	Operator Specified	Operator Utility Tool
COE_IO40Ub	COE_IO40Ub_INC-ONLY	COE Inc-Only_FieldData_40ft_per_1Kft	Error Model for vertical wells with inclination data analysis that supports an anticipated maxiumum 40ft/1,000' of Displacement. 400ft EOU at 10K ft Vertical. Rev - WWDC-DD5	COE_IO40Ua_INC-ONLY	Operator Specified	Operator Utility Tool
COE_IO45Ub	COE_IO45Ub_INC-ONLY	COE Inc-Only_FieldData_45ft_per_1Kft	Error Model for vertical wells with inclination data analysis that supports an anticipated maxiumum 45ft/1,000' of Displacement. 450ft EOU at 10K ft Vertical. Rev - WWDC-D5	COE_IO45Ua_INC-ONLY	Operator Specified	Operator Utility Tool
COE_IO50Ub	COE_IO50Ub_INC-ONLY	COE Inc-Only_FieldData_50ft_per_1Kft	Error Model for vertical wells with inclination data analysis that supports an anticipated maxiumum 50ft/1,000' of Displacement. 500ft EOU at 10K ft Vertical. Rev - WWDC-DD5	COE_IO50Ua_INC-ONLY	Operator Specified	Operator Utility Tool
COE_IO55Ub	COE_IO55Ub_INC-ONLY	COE Inc-Only_FieldData_55ft_per_1Kft	Error Model for vertical wells with inclination data analysis that supports an anticipated maxiumum 55ft/1,000' of Displacement. 550ft EOU at 10K ft Vertical. Rev - WWDC-D5	COE_IO55Ua_INC-ONLY	Operator Specified	Operator Utility Tool

Goal Brainstorming

An open discussion about focus areas for this group in a brainstorming exercise.

Focus Areas and Future Goals

- Ideas for OWSG Focus Areas and Future Goals
- Brainstorm Ideas for Future Meetings
  - Recent Well Intercepts
  - Survey RIP Comparisons
  - Operator Standards, Guidelines Procedures & Workflows
  - Close Approaches & Collisions

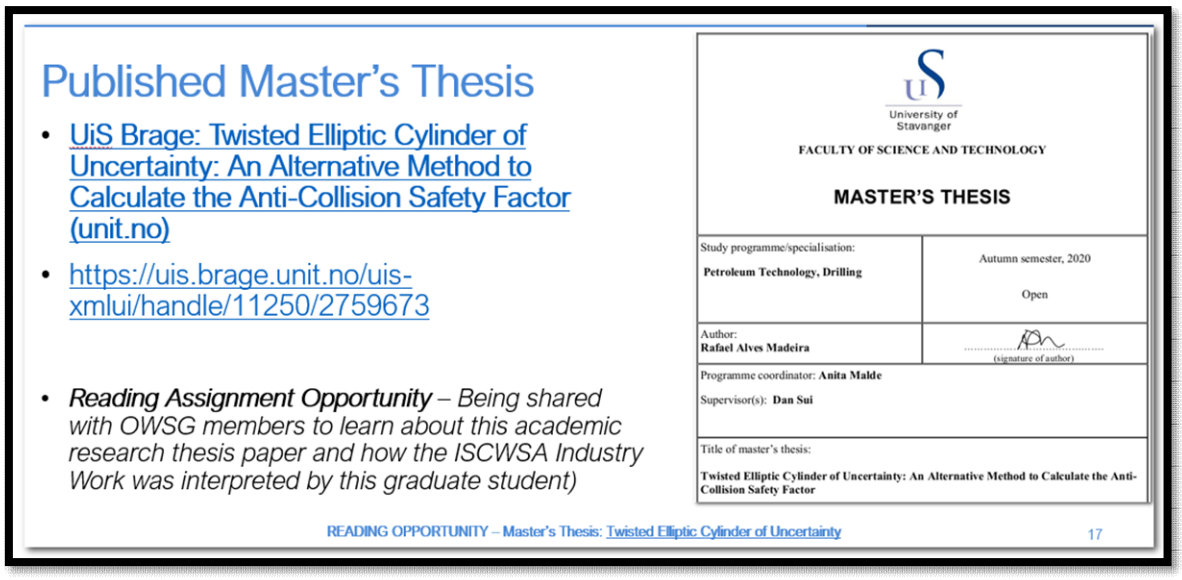
Ideas Offered

- Tools codes for inclination only – Shared field data studies for Cone of Error. Help select a guide for choice of the error model based on field departure studies. Help the drilling engineer select the best model choice for models based on field departure estimates based on historical data and machine learning. Simplify the select process for the drilling engineer or end user to help with safe separation.

- The probability of colliding would be a great focus area for development of new industry standards.
- Magnetic and Gyro measurement in the same well. How can we combine for using both surveys? Good practices for this will be helpful. How do we apply models to these type of combination surveys? Recommendations for gyros and magnetic surveys, and where do we stop the gyro to help reduce the survey uncertainty for proven engineering practices.
- Deepwater casing wear mitigation is based on surveys.
- Standardization of the way we talk together. The more we can communicate to business partners a standard approach.
- In the Middle East, they deal with old surveys. We also work with major and small companies. Many gaps assist in collision avoidance rules and error models. Been working to promote uniformity among vendors and well separation evaluation. Looking for us to help have a uniform approach to vendors when we use error models and exercises to evaluate the ability of companies and a way to compare these for validation purposes.
- Issue that the separation factor should be linked to a probability. So, the single separation factor should have one probability. If you simplify, and have two perfectly parallel wells, you can regard it as what was mentioned but with a normal distribution. But then you can calculate probabilities of either colliding or being on the other side. You can also calculate the probability of the being a certain distance away to either side which people often are only worried about being too close. But sometimes the geologist is also worried about being too far away. Common sense sometimes gets us in trouble. Simplification will be very help in this regard. Many papers have been published and many presentations have been made, yet we still need to suggest some basic rules about collision probability and supplying a better way to describe the assumptions, risks, and best practices for use.
- Interface with the OSDU. Modeling of data types and WITSML for trajectory related objects. They may need test wells data for testing, sample error models, and case study information to help with the development of realtime data for subsurface data loading and realtime data analytics. Maybe develop a machine-readable error model format for error models for realtime applications. Review IOGP P7 Error Models, discuss the format and review the error listing of terms in this project.
- Provide information to rig contractors and suppliers to better quantify survey uncertain for application of the traditional separation rule. What is the probability that my safe decision is truly safe? For example, I am steering away from the other well, what is the probability that I am achieving planned steering objectives? How can we provide help to know that we are in trouble way before we are in trouble, well before a collision risk? Should we be further apart when wells are being stimulated?
- How do we model uncertainty in shape? What is the actual shape of the wellbore? It may be important to determine the shape of the uncertainty.
- Bridging documentation with vendors is important. Old topic of depth between wireline, rig depth and logging depth. Inclination and azimuth are generally very accurate with good focus. However, we do not spend too time working on depth accuracy.
- Relay updates and information to drilling engineers. We need more help to train drilling team members. Educational sub-committee is helping to provide good information for raising awareness. How can we change this to a format good for drilling engineers, rigsite personnel

and field service provider personnel? We need to constantly provide direct feedback form OWSG to the Educational Sub-Committee.

To close Jonathan provided a link to a master's Thesis titled, "Twisted Elliptical Cylinder of Uncertainty". A link to the 83-page master's thesis about this academic study where three separation factor methods are compared was provided to information only: https://uis.brage.unit.no/uis-xmlui/handle/11250/2759673?locale-attribute=en



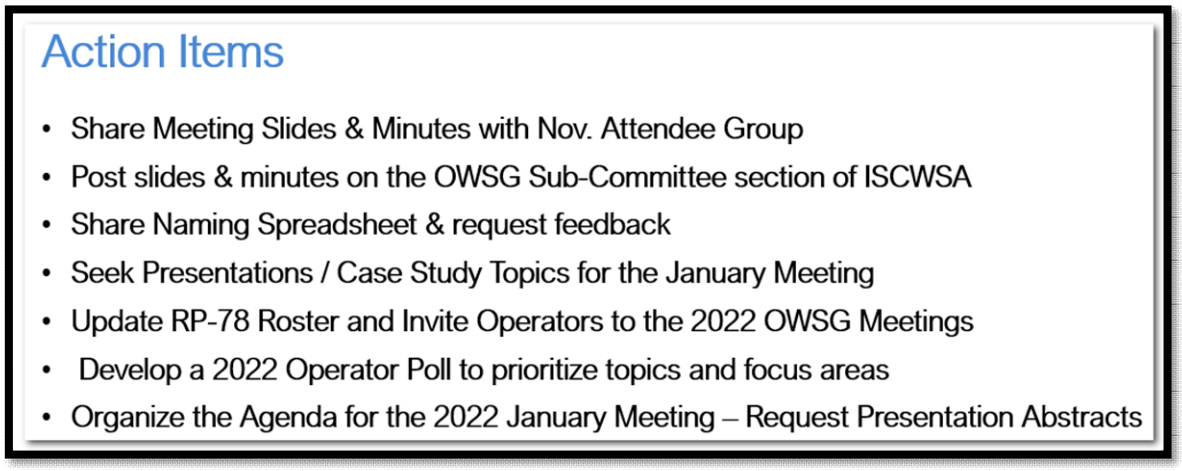
The document link was provided as an optional reading assignment to the OWSG members.

Open Discussion

Phil Harbidge (Path Control), serving as Survey QA/QC Sub-Committee Chair and ISCWSA Webmaster, offered to provide training on the ISCWSA website related to loading minutes and presentation on the main ISCWSA website.

Action Items

Action items are listed below:



Next meeting is scheduled for 2022 Jan 25th.

Meeting adjourned.