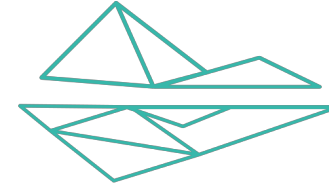


JAGTECH™ MAPS® system



Hitting the target: Efficient technology to improve drilling performance

Arild Saasen, Jagtech/UiS

09.09.2021

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CONTENTS

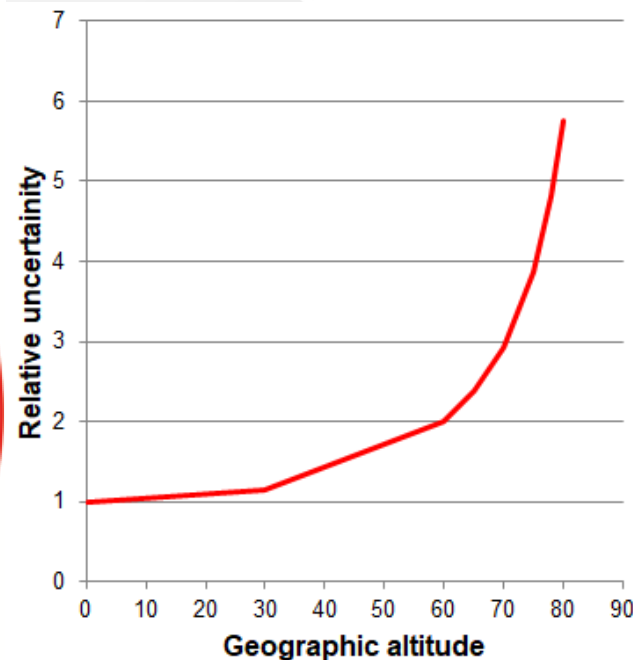
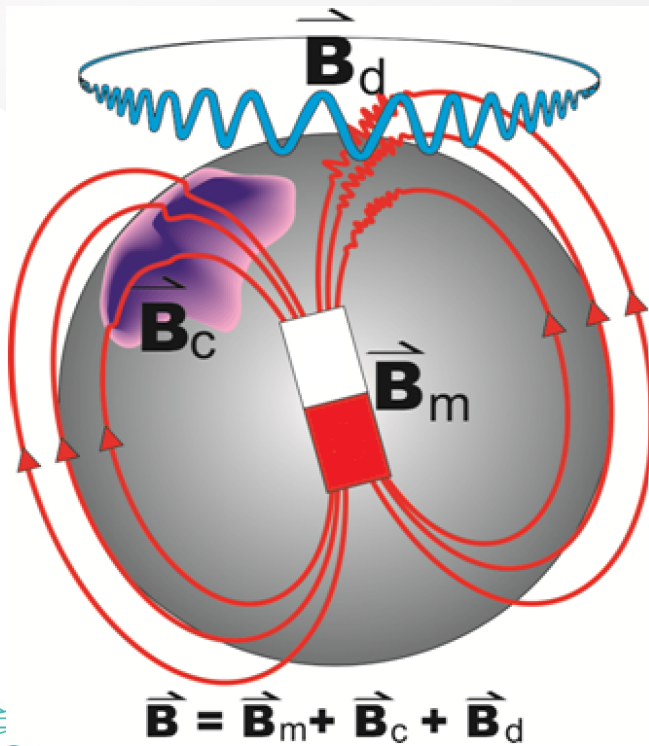
- The history of the beginning
 - R&D at Statoil just after the turn of the century
 - Invitation to tenderer for the Ivar Aasen field
- The solution for the Ivar Aasen field
- The consequence for the Ivar Aasen drilling project
- The result in other locations
- The conclusion



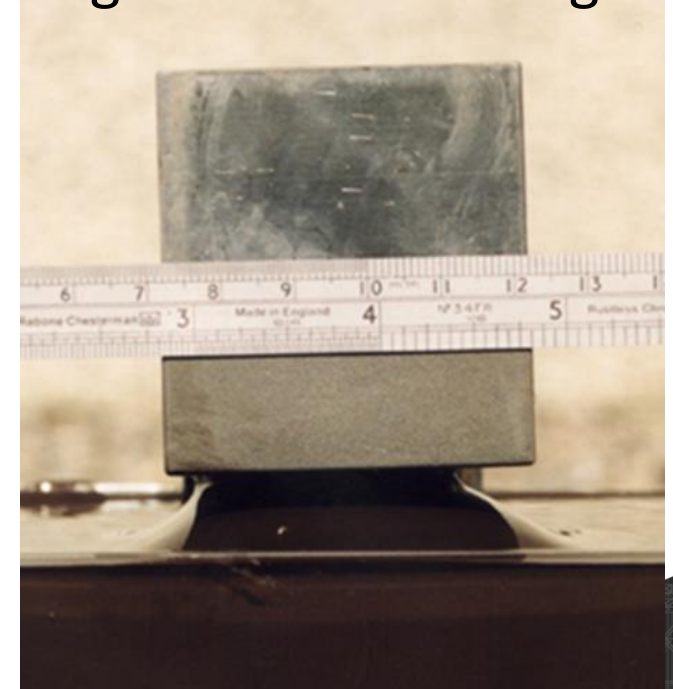
MAGNETIC CONTAMINATION OF DRILLING FLUIDS

- R&D at Statoil just after the turn of the century

More severe close to the earth's poles



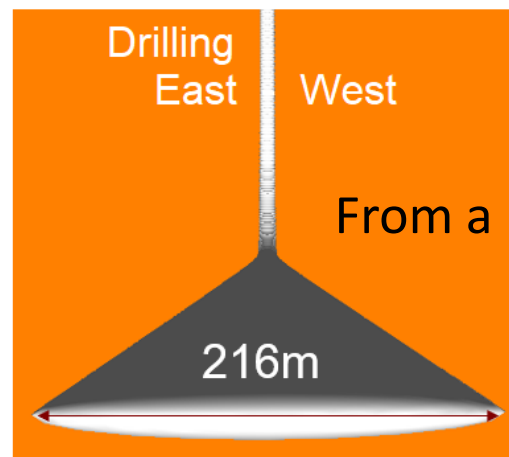
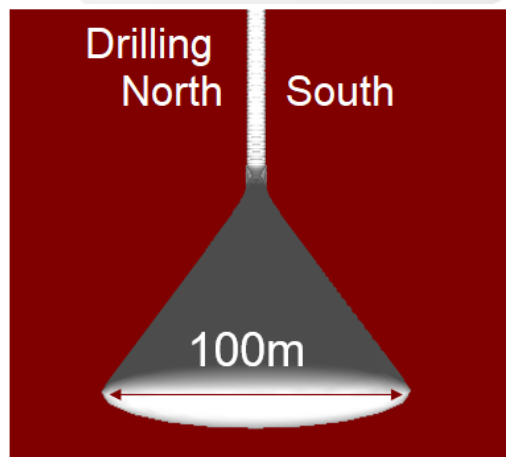
Drilling fluids can be magnetic



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MAGNETIC CONTAMINATION OF DRILLING FLUIDS - II

- R&D at Statoil just after the turn of the century
- Drilling fluid shield the down hole compasses
- Reduced signal to noise rate of different logging systems
- Agglomeration on down hole tools and BOP
- Wear on mud pump pistons and liners



From a Barents Sea location

Magnetic contamination is not included

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IVAR AASEN TENDER REQUIREMENTS

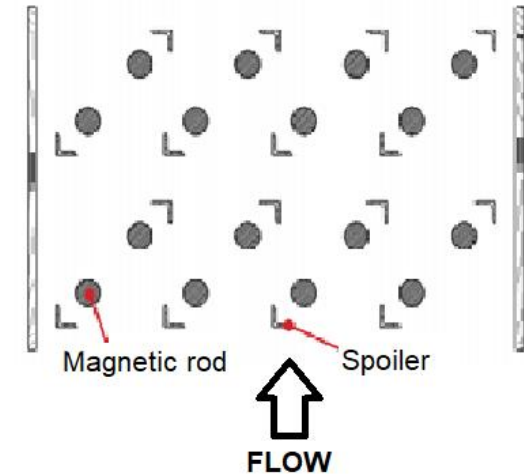
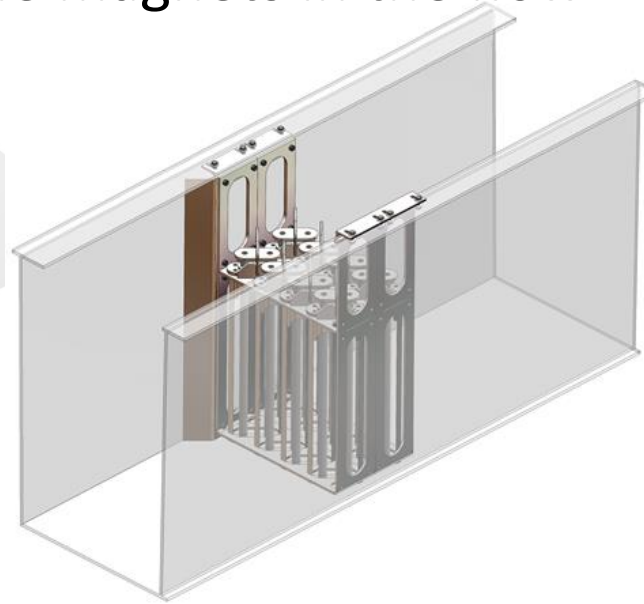
- The drilling fluid should be without magnetic contamination
 - The Ivar Aasen team was fully aware of the fact that no ditch magnet systems existed that would be able to clean the drilling fluids for magnetic fines at that time
- The selected service supplier contacted Sapeg for development and implementation of an efficient ditch magnet system
- Ditch magnets were outside Sapeg's core business
 - Jagtech was formed



THE SOLUTION FOR THE IVAR AASEN FIELD

Placement of the magnets in the flow

- To be able to remove smaller particles it is necessary to
 - Modify the flow to reach the very near vicinity of the magnets
 - Use strong magnetic rods
 - Clean the magnets at sufficiently short time intervals



THE SOLUTION FOR THE IVAR AASEN FIELD - II

Placement of the magnets in the flow

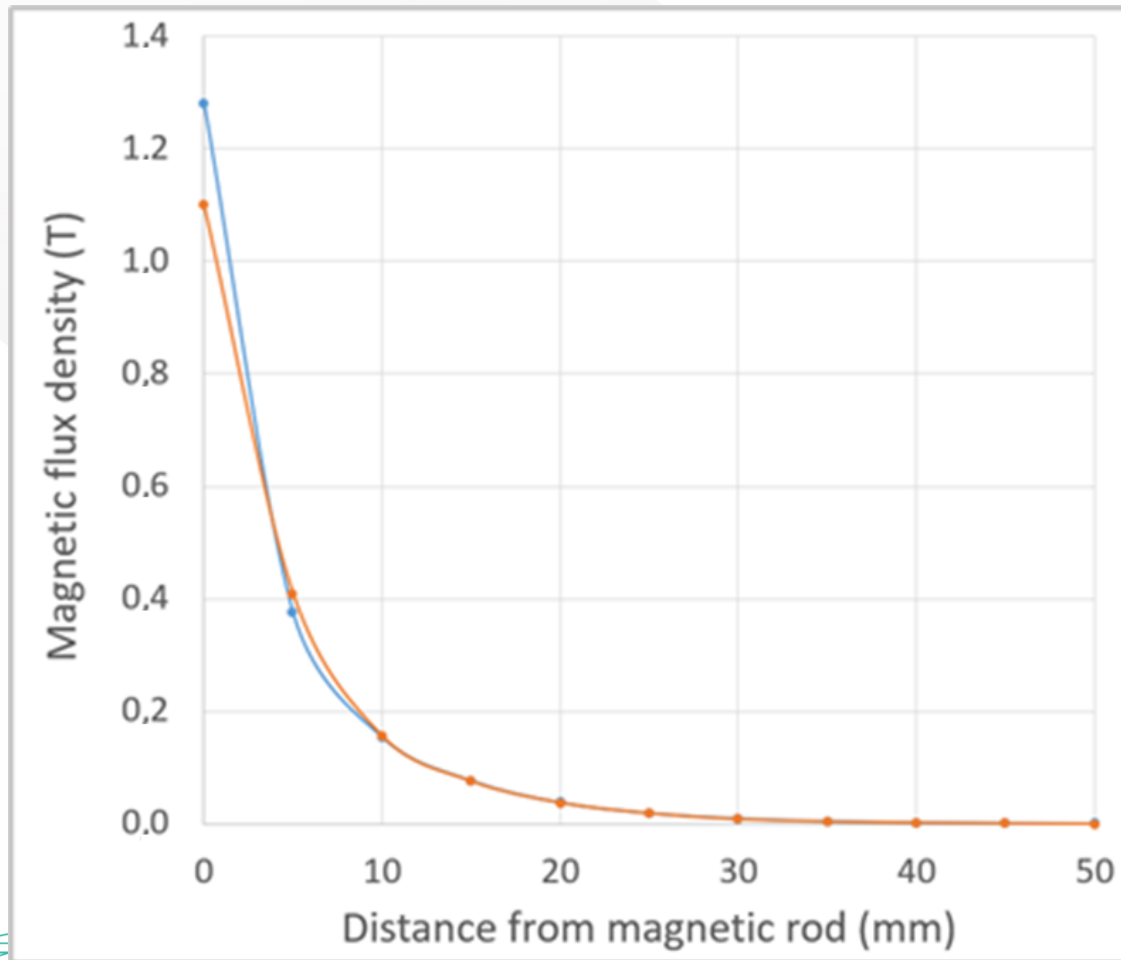
- Dual magnet structure
 - Guiding frame acts like turbulence generators
 - A cleaning scrape is mounted just underneath the handles
 - It is claimed to be easy to clean



A new cleaning device on later rigs

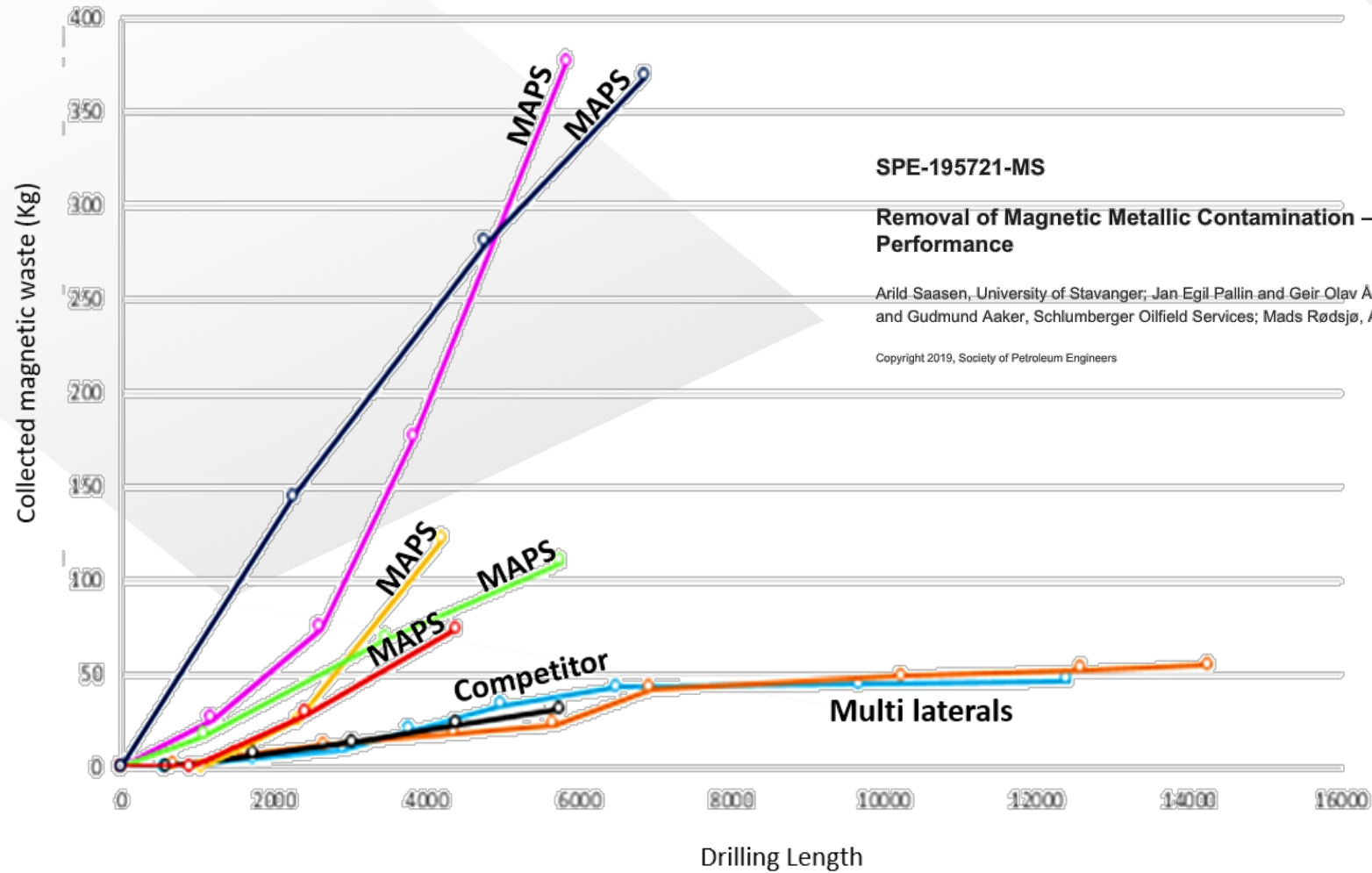
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THE SOLUTION FOR THE IVAR AASEN FIELD - III



- Magnetic field strength
 - Strong close to the magnets
 - Weak 10cm from the surface

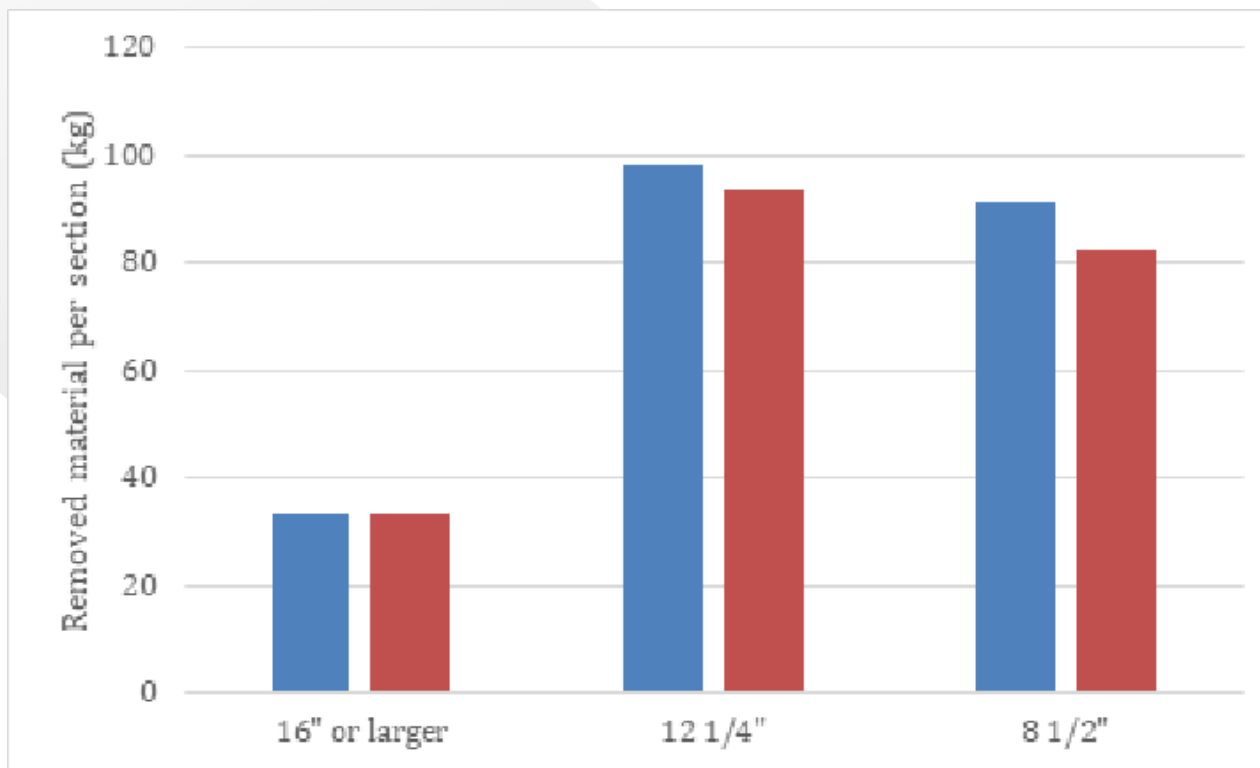
IVAR AASEN DITCH MAGNET PERFORMANCE



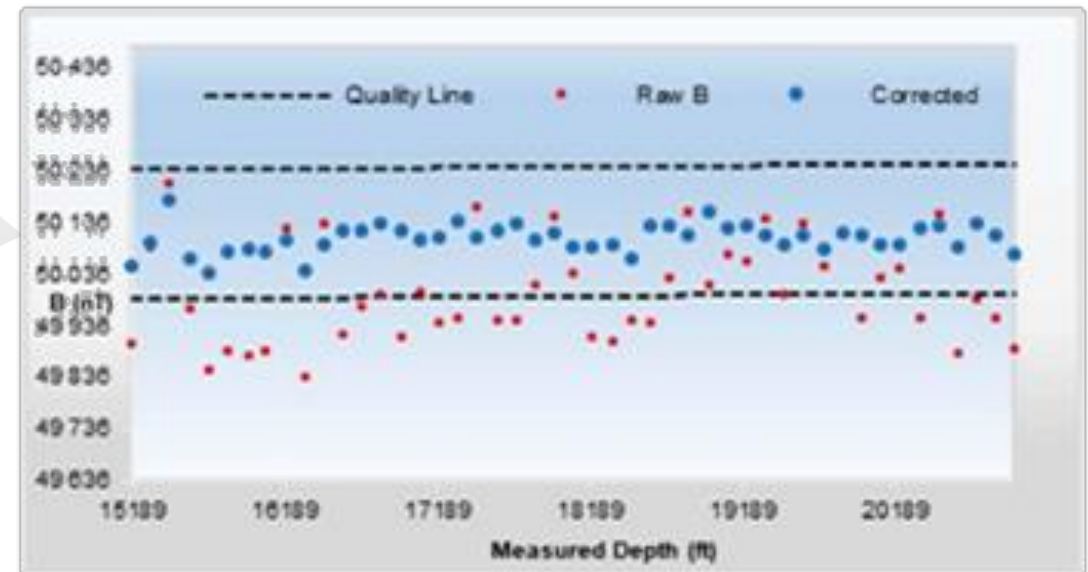
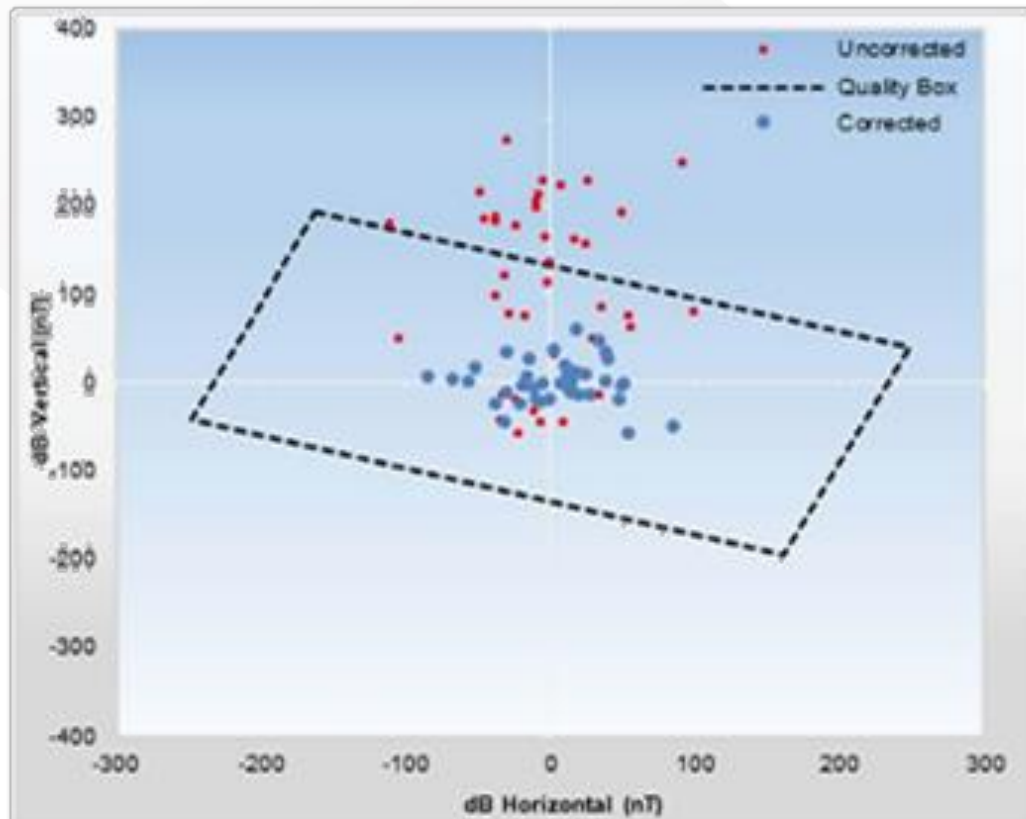
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IVAR AASEN DITCH MAGNET PERFORMANCE - II

- Summary of all wells
- Average removal of magnetic debris per section for the Ivar Aasen field (blue columns) and all wells drilled on Maersk Interceptor (red columns)



TYPICAL NORTH SEA DIRECTIONAL DRILLING RESULT

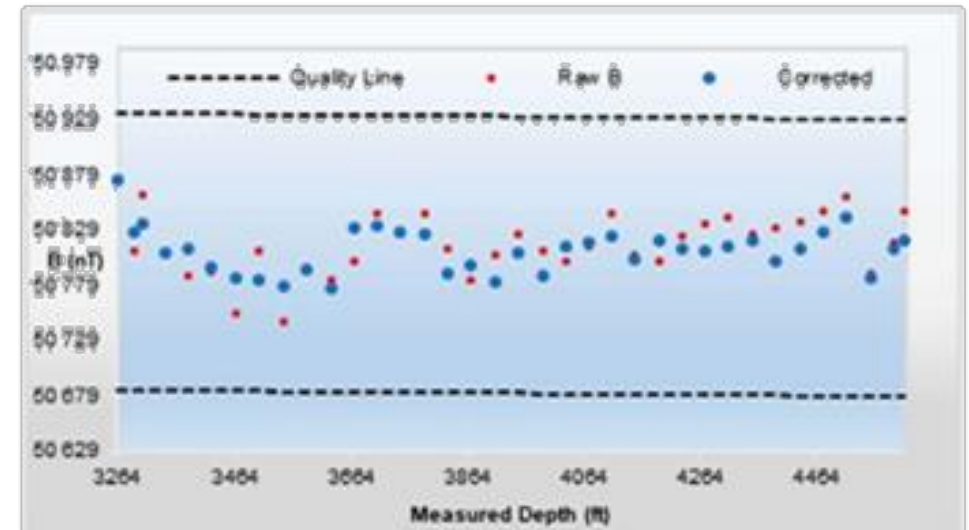
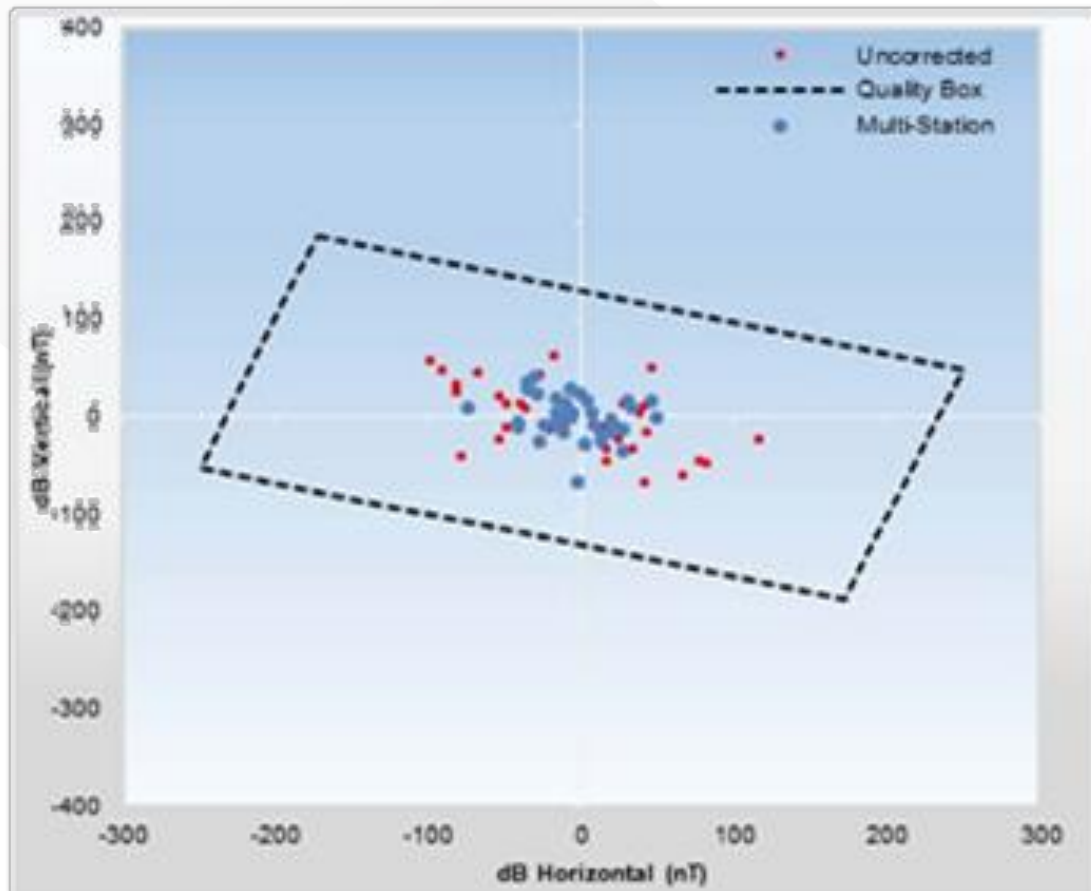


Complete information free at:

<https://doi.org/10.1115/1.4049290>

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IVAR AASEN DIRECTIONAL DRILLING PERFORMANCE



Complete information free at:
<https://doi.org/10.1115/1.4049290>

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IVAR AASEN – OPERATION AND PERFORMANCE SUMMARY

- Operation with flow field position ditch magnet system
 - Proper cleaning procedures
- Performance
 - Significantly improved efficiency compared to use of simpler systems
- Logging
 - No need to pull out of the well the replace or repair tools
 - Unusual good signal to noise ratio in logging tools
- Directional drilling measurements
 - Good results reported



CONCLUSION

- An efficient ditch magnet system was developed
 - Successful on Ivar Aasen and other applications
 - Have now been used on 8 locations / rigs
- Improved logging results
- Improved directional drilling measurements
- Selected documentation
 - Saasen, A., Poedjono, B., Ånesbug, G.O. and Zachman, N., 2021, “Efficient Removal of Magnetic Contamination from Drilling Fluids: The Effect on Directional Drilling”, *J. Energy Resources Technology*, **143** (10), paper 103201. Free access: <https://doi.org/10.1115/1.4049290>
 - Saasen, A., Pallin, J.E., Ånesbug, G.O., Lindgren, A.M., Aaker, G. and Rødsjø, M., "Removal of Magnetic Metallic Contamination – Improved Drilling Fluid Performance”, paper **SPE-195721-MS**, SPE Offshore Europe Conference and Exhibition, Aberdeen, UK, 3-6 September, 2019

