FDIR SOLVES WELL KNOWN PROBLEMS WITH MSA &IFR

Why FDIR? (Fault Detection Isolation and Recovery)

CASE STUDY

"**NEVER EXPECT A SUCCESSFUL MSA CORRECTION** if the predominant direction of the planned horizontal hole is within +/- 30 of East/ West."

ISCWSA 37th General Meeting Presentation

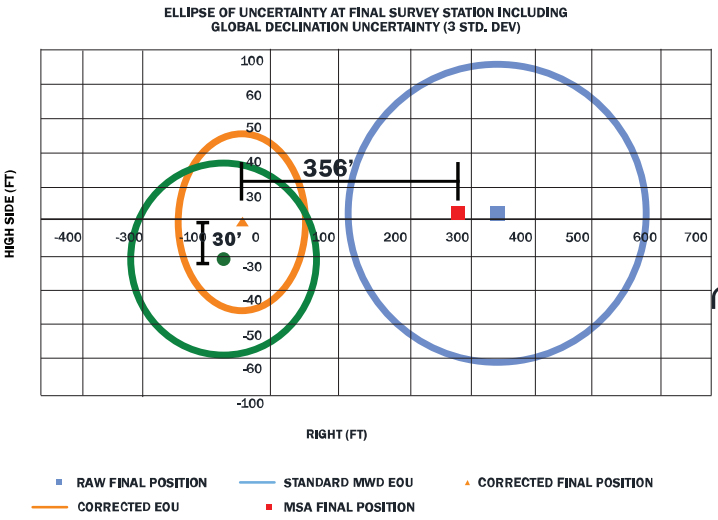
"**DECLINATION CAN BE UP TO 0.5 OR MORE IN ERROR,** even for magnetic systems that utilize IFR techniques. Such errors lie outside the IFR and IIFR 3 sigma error model."

SPE/IADC 194130

"the claim of increased accuracy for MWD directional surveys processed using multistation analysis (MSA) **MAY NOT ALWAYS BE VALID**"

SPE/IADC 173098

REALTIME MSA WELL DRILLED 270 DEG. EAST



FDIR DETECTED 356' MSA ERROR

ERROR VERIFIED WITHIN 30' WITH CONTINUOUS GYRO

FDIR IS THE NEXT GENERATION SURVEY CORRECTION SOFTWARE BUILT TO OVERCOME THESE PROBLEMS

Industry Papers/Presentation Detailing Problems with MSA and IFR

1. SPE/IADC 96211, "Analyses of the Accuracy and Reliability of Magnetic Directional Surveys," Nyrnes, E. and Torkildsen, T, 2005.
2. SPWLA 46th Annual Logging Symposium, "Error Properties of Magnetic Directional Surveying Data," Nyrnes, E., Torkildsen, T., and Nahavandchi, H., June 26-29, 2005.
3. SPE/IADC 125677, "Minimum Requirements for Multi-Station Analysis of MWD Magnetic Directional Surveys," Nyrnes, E., Torkildsen, T., and Wilson, H., 2009.
4. SPE/IADC 128217, "Wellbore Positions Obtained While Drilling by the Most Advanced Magnetic Surveying Methods May Be Less Accurate than Predicted," Ekseth, R. and Weston, J., 2010.
5. ISCWSA 37th General Meeting, "Combined use of MWD and gyro surveying to reduce wellbore positioning uncertainties," Maus, S. and McCulloch, S., March 8, 2013.
6. SPE/IADC 173098, "Assessment of the Validity of MWD Survey Accuracy Following Multistation Analysis," Hanak, C., Wilson, H., Gjertsen, M., 2015.
7. ISCWSA 44th General Meeting, "East-West Exclusion Zones: Why Do We Have Them and How Can We Eliminate Them?" Hanak, C. September 22, 2016.
8. Bergstrom, N., "High Accuracy Wellbore Surveys Multi-Station Analysis (MSA)," IADD Roadmap to the Future, September 28-29, 2016.
9. ISCWSA 48th General Meeting, "Declination Error at Depth: A Comparison Study of Gyro vs. MWD Surveys," Hanak, C., September 27, 2018.
10. SPE 194130, "Combined Gyroscopic and Magnetic Surveys Provide Improved Magnetic Survey Data and Enhanced Survey Quality Control," Weston, J. and Ledroz, A., 2019.