The accuracy of magnetic surveys is compromised as a result of variations and local distortions in the reference magnetic field. Various in-field referencing (IFR) techniques are used to enhance the performance of traditional magnetic measurement-while-drilling (MWD) wellbore surveys. However, simulation and field data studies of effects that are not commonly accounted for indicate an unrealistically high level of confidence in the IFR techniques, especially when run in conjunction with multi-station corrections (MSC).

The technical paper (IADC/SPE 128217) explores problems that frequently arise when attempting to survey certain well bore trajectories using magnetic MWD with IFR techniques and seeks to explain the causes of survey inconsistencies. Such problems seem to arise when surveying wells that approach the horizontal east-west direction. In such cases, unexplained differences between surveys conducted using IFR MWD and gyro survey equipment have been observed.

□ MWD surveys improved through various IFR techniques may be less accurate than the associated SPE WPTS error models predict.

□ The horizontal east-west singularity makes the drilling of longer high-angle tangent sections near to the east or west directions a risky operation in hazardous environments.

□ The current SPE WPTS error models for the various IFR techniques should, from a safety point of view, be substituted by a limited set of new and more realistic error models incorporating the horizontal east-west singularity.