

Know what is down there! – LWD formation testing and sampling improves reservoir understanding while drilling

S. Erdmann, N. Ritzmann, A. Cartellieri, J. Pragt
Baker Hughes Celle Technology Center, Celle

Abstract

A good understanding of the reservoir and the subsurface is crucial during the entire life cycle of a field. It is critical to know what fluids are present, and what properties they have in order to reduce risk by planning operational procedures, safety and production installations properly. In this paper we present data from the latest logging-while-drilling (LWD) formation testing and sampling service to illustrate what information can be obtained in real time, and near-real time, while drilling a well and how it can be integrated with other services to improve the understanding of the subsurface.

The first prototype of the LWD formation testing and sampling service was deployed in 2011. Since then, multiple field runs have been performed, and the service has continuously improved. The current configuration can collect up to 16 high-quality, single-phase downhole samples for detailed laboratory analysis. While being downhole, in-situ measurements of temperature, pressure, density, viscosity, sound speed and refractive index can be performed on the fluid, which is pumped from the formation. Compressibility and mobility, as well as an estimate of the gas-to-oil ratio (GOR) can be inferred from the data. Integration of sensor responses enables discrimination of fluid type, i.e., oil, gas, water or mud. In late 2016, spectrometers were added to the service, yielding insight into true chemical composition of the fluid. Furthermore, the option for an in-situ PVT test is available, delivering bubble point information.

In addition to the hardware, associated software deliverables have been developed over the years, making data visualization, interpretation and quality control more intuitive today than in the past. Examples illustrating the ease of data integration with other formation evaluation services will be shared. This integration delivers key information to improve certainty on fluid distribution, fluid properties, geological features and subsurface conditions, which enables improved planning and further reduction of overall risk from drilling to production.