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Sustained Annulus Pressure: A Case Study into the Application and Integration of Distributed Optical Fiber Sensing

Michael James Webster, Elena Fiorilo, Maria Eugenia Salamanca, Andrea Cristina Lopez, Carlos Pedro Rodolfo Orlandi, Lena Urmantseva

Abstract

Distributed Fiber Optic Sensing (DFOS) allowed us to continuously gather information behind casing, while changing the wells surface conditions. The objective of this case study is to identify the potential causes of the sustained annulus pressure using distributed optical data, integrated it with conventional well information to help define remedial action.

The sensing fiber was deployed utilising fiber-enabled slickline allowing the measurement of the whole well over the duration of the survey. Conventional memory Gamma Ray, CCL, Pressure and Temperature sensors were also run on the fiber slickline. A program consisting of an initial baseline, a sequence of bleed off, shutin and production periods were used to create measurable events for the fiber to detect over a 7 hour survey period. With the integration of the information provided by the memory tools, it is possible to determine the location of the sustained pressure contribution and the fluid behavior related to the pressure and temperature changes. The combination of simple data acquisition and rapid processing at wellsite ensured data quality and enabled the option of potential remediation during the same visit to the well.

This case study from South America highlights the application of this service in a remote wellsite location with sustained casing pressure issues, the authors concluded that the contribution point was located at the Rayoso Formation and the entry point was the 9 5/8" shoe. Liquid dropout effects during the production phase were confirmed with pressure indications from the memory gauge at the bottom of the fiber.
DFOS enabled slickline provides information that allows potential remediation during the same well visit. This case study presents a simple deployment and interpretation methodology reducing time and costs and bringing fiber technology to a mass market. Partnering with key suppliers to simplify the process, helped to make fiber a routine part of an integrated surveillance service.