



Going beyond the log – from cement bond logging to barrier verification – consistency in zonal isolation assessments

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Abstract:

Safe well operation requires eliminating any unwanted flow to surface, cross flow between subsurface zones and out-of-zone injection. Zonal isolation is achieved through impermeable seals between porous and permeable formations and a continuous formation-to-completion seal at the wellbore.

To be effective as a barrier, annular fill in the borehole must have sufficient sealing capability – at least equal to the caprock - to withstand potential pore pressure and fracture gradient contrasts and variations.

Despite the potential impact of inadequate zonal isolation during the full well life cycle, regulatory standards concerning verification of annular seal quality are vague and usually driven by industry best practise, in-house guidelines developed by operators or service companies. In addition, variations in regulatory requirements and inconsistencies in the approach to verification across the industry complicate matters further.

This paper proposes guidelines for a consistent and quantified assessment of zonal isolation at the wellbore suitable for the full well life cycle, with special considerations made for effective well abandonment. The guidelines address verification of bond quality for a variety of annular fill materials (cement, formation, remediation material etc.), and circumferential coverage to provide a consistent assessment of annular zonal isolation as well as considerations on addressing conflicting evidence during well abandonment planning.

Bio:



Dr Sigrid Kramer is a subject matter expert for cement bond log evaluation and Head of Well Integrity with Islay Subsurface & Engineering.

After completing her PhD in Applied Geophysics, Sigrid started with BP as a Petrophysicist with a focus on Operation Petrophysics and later became BP certified in Cement Bond Log Evaluation. She has extensive experience working in technically challenging environments and previously held a regulatory role with the Dutch State Supervision of Mines, giving her a unique perspective on compliance and operational assurance. In addition to her technical contributions, Sigrid is actively involved in training and mentoring, helping to build petrophysical capabilities across teams.