

Advanced Cement Evaluation Saves Operator 15–45+ Hours in Rig Costs

Invizion Evaluation service integrates cementing software, job planning, and Isolation Scanner service to enable logging well within 27 hours of cementing

CHALLENGE

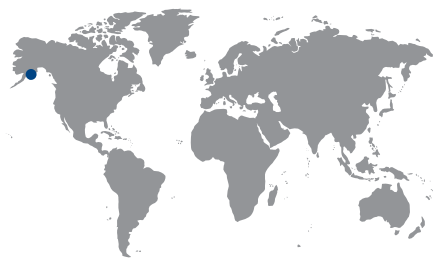
Determine top of cement (TOC) and minimize rig time waiting on cement (WOC) for a highly deviated well where the expected low temperature around the TOC and a small density contrast among the mud, spacer, and slurry would make it difficult to evaluate the cement and identify any contamination.

SOLUTION

- Use Invizion Evaluation* well integrity evaluation service to predict TOC and indicate the optimal time to log based on fluid placement forecast.
- Deploy Isolation Scanner* cement evaluation service on wireline tractor to measure acoustic impedance, flexural attenuation, and third–interface echo (TIE) to differentiate all fluid levels behind casing.

RESULTS

Logged the well only 27 hours after the cement job, which typically takes 42 to 72+ hours to set, saving approximately 15–45+ hours in WOC rig costs.



Cement evaluation at early hours of cement setting

An operator in Alaska was experiencing issues with depleted sands, equivalent circulating densities, and a narrow fracture pressure window, which resulted in a small allowance in density among the drilling mud, MUDPUSH* spacer family for cementing, and LiteCRETE* lightweight cement slurry. The densities of the different fluids were 10.4, 11.0, and 11.5 lbm/galUS, respectively, with an acoustic impedance difference of approximately 0.3 Mrayl after 10 hours. State regulations require an operator to confirm TOC and circumferential coverage before continuing operations. Based on the close range of the impedance values, the operator would have needed to wait at least 3 days.

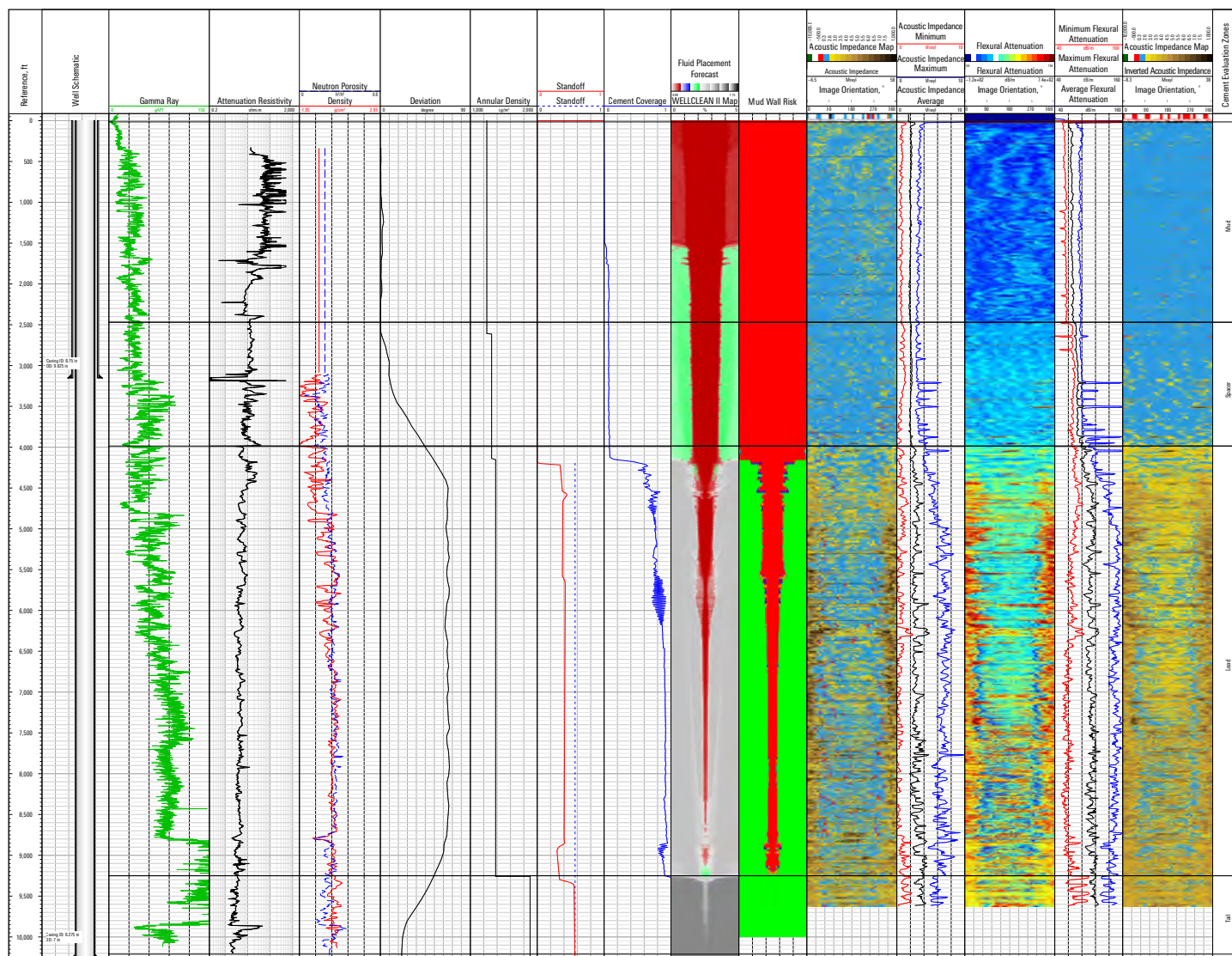
Optimizing wait on cement time

The operator consulted with Schlumberger and, due to the challenges of the job, elected to use the Invizion Evaluation service's workflow to predict fluid placement at the end of the cement job and to determine any possible contamination and the expected top of fluids at the end of the job. Due to the well deviation, it was critical to account for possible contamination on the narrow side of the annular space. An ultrasonic cement analyzer (UCA) laboratory test conducted at the most probable contamination percentage and the WELLCLEAN II* numerical cement placement simulator were used to indicate the expected acoustic properties of the cement top. The operator and Schlumberger analyzed the UCA tests and log to determine that the cement would require at least 3 days to be visible to a conventional ultrasonic imager. Schlumberger recommended logging with the Isolation Scanner service to take advantage of the sensitivity of the tool's flexural attenuation measurement for identifying the solids and fluid interfaces.

Invizion Evaluation service brings higher degree of confidence

Logging the well with Isolation Scanner service 25–27 hours after the cement job confirmed that the cement had set to significantly save rig costs for WOC, which typically requires from 42 to 72+ hours. The flexural attenuation measurement, which is highly sensitive to the material behind the casing, was used to determine the quality of the cement bond, even with a relatively short wait for the cement to set. The TIEs were used to determine the pipe centralization and velocity of the material behind the casing, from which the presence or absence of cement was inferred. The Isolation Scanner service's measurement of acoustic impedance, flexural attenuation, and TIE quantitatively evaluated the cement job and casing condition where conventional ultrasonic technologies could not provide the best answers. The TOC, which was predicted by the WELLCLEAN II simulator, was correlated with the Isolation Scanner service's measurement at the same depth, resulting in an interpretation with a high degree of confidence for the operator.

CASE STUDY: Advanced cement evaluation confirms cement set in 27 hours, Alaska



The Invizion Evaluation service enabled the operator to determine the quality of the cement bond and used integrated data to confirm the cement had set.

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