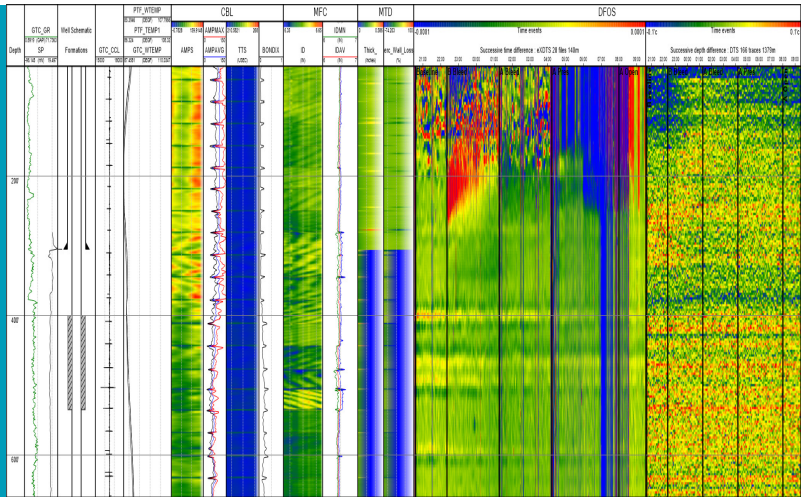
Expro Excellence

Integrated Well Integrity Investigation of an Abandoned Well

Well Intervention & Integrity



Objectives and background

- Approximately ten years after abandonment, an unexpected loss-of-containment event was identified when water was observed at surface beneath the well monument. The client required a comprehensive well-integrity investigation to determine the likely source of the water, identify any communication pathways, and assess the overall integrity of the abandoned well
- The diagnosis was particularly challenging due to conflicting indicators. During B-annulus bleed-off operations, annulus pressure was recorded at 0 psi, yet a continuous and abundant volume of water was returned at surface. The absence of any clear pressure signature made it difficult to determine whether fluid migration was occurring and to identify the origin of the water using conventional diagnostic methods alone

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- Expro applied an integrated diagnostic methodology that combined Distributed Fibre Optic Sensing (DFOS) with conventional well-integrity evaluation and downhole measurement technologies
- Rather than relying solely on a static temperature survey, Expro designed a dynamic investigation that involved controlled manipulation of the A and B annuli to create measurable changes in well conditions. Responses captured through Distributed Temperature Sensing (DTS/eXDTS) were analysed over time and depth and then correlated with:
  - Well completion architecture
  - Surface observations
  - Pressure and temperature measurements
  - Spinner survey results
  - Casing inspection data
  - Cement evaluation findings
- By integrating multiple datasets, Expro was able to distinguish between naturally occurring thermal features and operationally induced responses potentially associated with fluid communication. This holistic approach provided a far greater level of diagnostic confidence than any single measurement technique could achieve independently

Value to the client

- Expro's integrated investigation transformed an uncertain and difficult-to-diagnose surface water event into a clearly defined and constrained shallow well-integrity issue
- The multi-discipline analysis enabled the client to:
  - Better understand the likely source and migration pathway of the observed water
  - Identify potential areas of shallow fluid communication
  - Reduce uncertainty associated with the loss-of-containment event
  - Make informed decisions based on a robust evidence-based diagnosis
  - Focus future remediation or monitoring activities on the most likely integrity risk areas
- By combining advanced DFOS technology with conventional integrity diagnostics, Expro delivered actionable insights that improved understanding of the well condition and supported targeted, cost-effective decision making for the client

Well integrity