CNOOC Uses SonicScope Service’s Cement Evaluation Capabilities to Complete Complex ERD Gas Well

Service detects poor cement bond in upper well section, offshore East China Sea

**CHALLENGE**
Complete an offshore extended-reach drilling (ERD) well to access four gas reservoirs.

**SOLUTION**
Use the cement evaluation component of the SonicScope* multipole sonic-while-drilling service to assess the cement bond throughout the well.

**RESULTS**
- Found areas with a poor cement bond, enabling the operator to create a stronger seal.
- Performed the first commercial use of the cement evaluation component of the SonicScope service.

**Complete complex ERD gas well, offshore China**
China National Offshore Oil Corporation (CNOOC) wanted to complete an offshore ERD well that tapped into four different reservoirs in a gas field. The well plan called for the main well—an 8½-in borehole with a 7-in liner—to drill into the deepest reservoir first, then commingle production from the other three reservoirs. Targeting four reservoirs, this well posed more challenges for the cementing and completion processes than usual.

**Use real-time LWD and cement evaluation service**
To reduce the overall cost and operation complexity, CNOOC selected an LWD tool as the cement evaluation service in this ERD well. After discussing its objective with Schlumberger, CNOOC decided to use the SonicScope service to provide a cement bond index evaluation. The cement evaluation component of the SonicScope service enables operators to receive an accurate measurement of the position and bond quality of the cement behind the casing—without the additional rig time required for conventional bond log tools. In this well, the SonicScope service was used purely for cement evaluation.

In addition to the SonicScope service, CNOOC used the arcVISION* array resistivity compensated service to log the borehole while drilling the 8½-in section.

**Identified and remedied poor cement bond above the mud loss interval**
CNOOC successfully used the cement evaluation component of the SonicScope service to acquire acoustic data inside the liner throughout the ERD well, confirming good bonding (greater than 80%) in the bottom intervals across the target sands. There was, however, poor cementing (50%) on the top section above 5,950 m [19,521 ft] where drillers encountered mud losses while drilling. This result was very close to CNOOC’s expectation; poor cementing was expected above the mud loss interval. CNOOC performed squeeze cementing to reseal the top section, which entailed injecting cement through the opening between the casing and liner to fill gaps in the existing cement and make a better seal.

This was the first time the cement evaluation component of the SonicScope service was run in China, and also the first commercial use worldwide. CNOOC provided positive feedback about the service, and it is currently being evaluated in another project.
**CASE STUDY:** CNOOC detects poor cementing in upper section of well using SonicScope service, East China Sea

Using the SonicScope service, the operator determined that there was a poor cement bond (50%) in the top section of the well.