A major offshore operator in the South China Sea was drilling a deepwater exploration well. Due to the uncertainty of the formation depth, the operator needed real-time acoustic data to accomplish a seismic-well tie for the 17½ in. borehole section.

The well inclination gradually changed from 1.3° to 26.2° and the water depth was 3,012 ft (918 m). The acoustic source-to-formation coupling was a challenge in the large borehole, and high attenuation of the unconsolidated formation made it difficult to acquire reliable acoustic data.

Baker Hughes, a GE company (BHGE) was engaged for the operation. The BHGE China Oilfield Services team proposed using the BHGE 9-½ in. SoundTrak™ acoustic service with the BHGE OnTrak™ integrated measurement while drilling (MWD) and logging while drilling (LWD) service.

The 9-½ in. SoundTrak service was specifically designed for acoustic logging in large boreholes. Its multi-frequency and multipole source configurations ensure the acquisition of accurate data in a wide range of formation slowness and difficult conditions.

The BHGE OnTrak integrated MWD and LWD service delivers a suite of directional and formation evaluation measurements. Along with pressure and drilling dynamics monitoring, the service provides operators with accurate azimuthal gamma ray and propagation resistivity.

The BHGE team set the monopole low frequency of the acoustic source at 3,000 and high frequency at 11,000 to acquire compressional and Stoneley wave slowness data, and the quadrupole low frequency at 2,000 to measure shear slowness. These specific frequencies were used to optimize measurements in the large borehole.

During the operation, a BHGE geoscientist used the BHGE WellLink™ Wireline service to remotely monitor the operation from his office. The geoscientist provided quality control and processed the real-time low- and high-frequency curves to deliver a single, reliable compressional slowness curve to the customer.

Post-job processing of the memory data confirmed the reliability of the real-time compressional slowness. The high semblance value of the SoundTrak array waveforms confirmed the accuracy.

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of compressional, shear, and Stoneley slowness measurements.

The successful SoundTrak and OnTrak logging enabled the operator to confidently perform the seismic-well tie and then obtain a clear image of where the drill bit was on the seismic profile. The operator set the casing and drilled the section at the most optimal depth in the deep well, with no formation difficulties. Wireline logging was avoided, which saved the operator an estimated $300,000 USD.

The image shows that real-time and memory compressional slowness agree; the clean correlation image indicates reliable slowness data.