Seismic Reservoir Reevaluation Helps Vietgazprom Identify Seven New Prospects Offshore Vietnam

Multidisciplinary petrotechnical experts reinterpret available data to advance gas-condensate reservoir operations

**CHALLENGE**
Delineate reservoir potential in interbedded silts and shales with strong lateral variability, weak wavefield intensity, subseismic intervals, and limited well data.

**SOLUTION**
Reevaluate all existing well and seismic data using advanced seismic methodologies to recommend exploratory well locations.

**RESULTS**
Successfully distinguished gas-saturated reservoirs within thinly laminated deepwater fans and identified seven new exploratory drilling locations in two adjacent fields.

“Integrated interpretation of 3D seismic and well data for both fields, updating the geological model, and evaluating the distribution of pay zones within the prospective deposits have been delivered with a high level of professionalism.”

S.P. Mikhailenko
Exploration Director
Vietgazprom

Sorting out complex reservoirs under challenging conditions
For a number of years, Vietgazprom has been exploring for natural gas within a large fairway in the Gulf of Tonkin. The main reservoirs of interest in this area are complex deepsea fan deposits composed of interbedded siltstones and shales. In addition to 2D seismic data, the company had acquired two 3D seismic surveys—222 mi² and 363 mi² [357 km² and 584 km²]—and drilled four exploratory wells in two adjacent fields.

However, reservoir delineation proved difficult owing to strong lateral variability of the sediments, weak wavefield intensity, and thin target intervals, commonly below seismic resolution. The overall reservoir section is nearly 200 ft [60 m] thick, and, with only limited well data available, correlations were difficult to identify. The operator consulted with Schlumberger to find a delineation solution.

Delivering a sophisticated, multidisciplinary reservoir study
Working in collaboration with Vietgazprom, the Schlumberger petrotechnical experts in Moscow undertook the analysis and reinterpretation of existing 2D and 3D seismic and well data. Vietgazprom geoscientists systematically reviewed, contributed to, and approved each phase of the study.
To process and interpret the existing 2D and 3D seismic and well data, a multifaceted workflow was designed that included:

- seismic-amplitude interpretation and attribute analysis
- sequence-stratigraphic analysis
- velocity modeling
- petrophysical interpretation
- AVO modeling
- rock physics analysis
- seismic inversion
- facies identification and modeling
- construction of a unified 3D seismogeological model of both fields
- estimation of total initial reserves and resources
- identification of target intervals and ranking of prospects
- recommendations for drilling locations
- assessment of risks and uncertainties.

Based on the results of this in-depth study, Schlumberger recommended and ranked the best five exploratory drilling locations in one field and two in another.

**Identifying new exploration prospects**

Updated well-log correlation and petrophysical interpretation resulted in a new well-to-seismic tie. Schlumberger petrotechnical experts analyzed the geological model and successfully explained why some of the previous wells had been dry. As a result of this in-depth study, seven new drilling prospects were identified as economically viable.

AVO modeling and rock physics analysis of data from two wells led to the definition of four seismic lithotypes—reservoir, water-saturated reservoir, gas-saturated reservoir, and gas-saturated shale—which were used for simultaneous inversion. The results of inversion, along with sequence stratigraphy and paleoreconstruction, enabled the team to differentiate gas-saturated reservoir intervals from shales and to map locations of higher reservoir quality consistent with borehole tests.

Vietgazprom evaluated the Schlumberger recommendations and developed an updated drilling plan. The first new exploratory well location was drilled at the point ranked highest by the petrotechnical experts. The location was successfully drilled and then tested with a commercial volume of gas. With this success in hand, the operator planned to drill in the additional recommended regions in the near future.