Schlumberger

OMV Optimizes Well Test Design and Improves Reservoir Characterization in Complex Operating Environment

GeoTesting services improve confidence by optimizing test duration and providing accurate reservoir model calibration using dynamic well test data, Norwegian Barents Sea

CHALLENGE

Optimize well test to successfully characterize a complex reservoir structure, reduce uncertainty in the reservoir model, and confirm reservoir connectivity.

SOLUTION

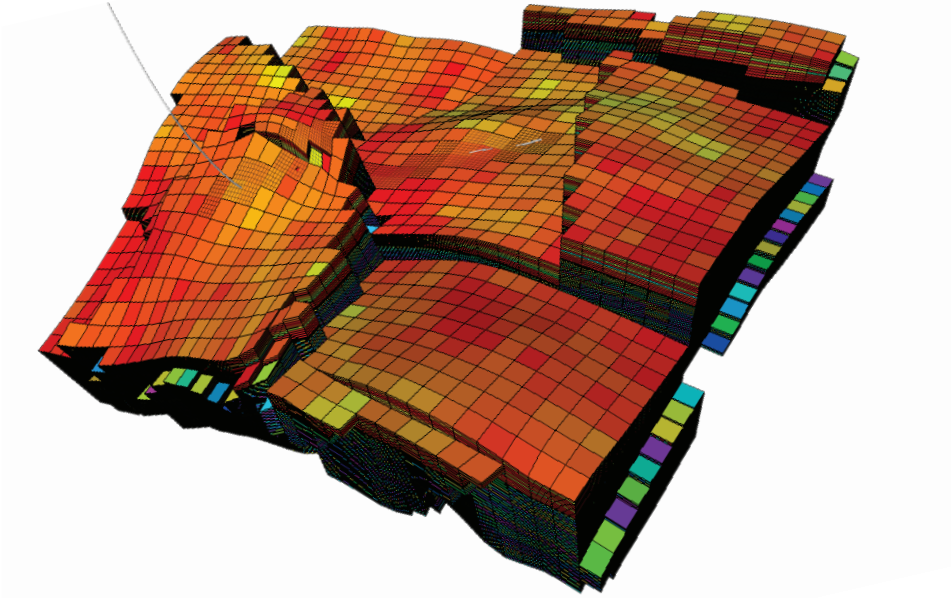
Use GeoTesting* geology-based well test design and interpretation services to determine the optimal test duration required to acquire sufficient data to characterize the reservoir with confidence.

RESULTS

Achieved accurate reservoir model calibration based on dynamic well test data and confirmed reservoir connectivity.

Complete well test and characterize complex reservoir

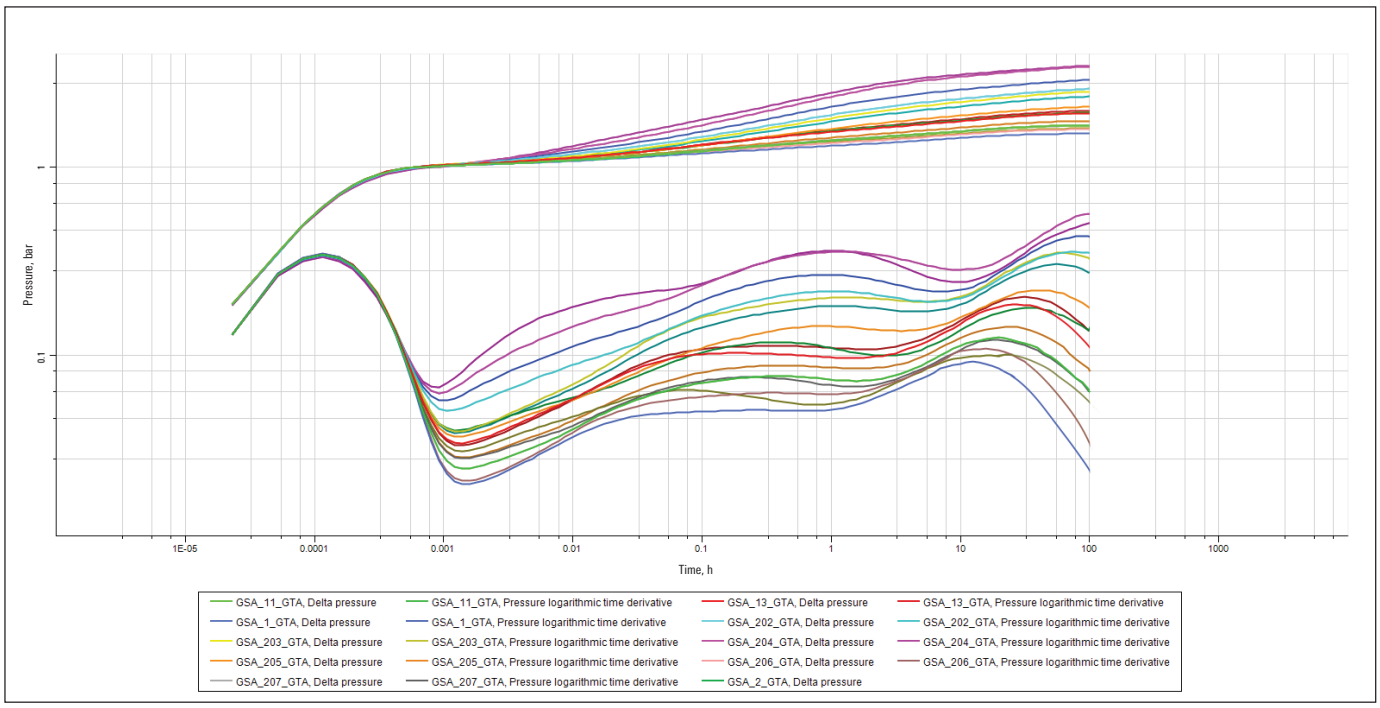
During winter months, OMV drilled and tested the Wisting Central II appraisal well in the Norwegian Barents Sea. This well is the northernmost oil discovery in Norway and is located in a shallow reservoir in a geologically complex environment. The well test was planned to reduce uncertainty in the reservoir model and to confirm reservoir conductivity. Multiple challenges contributed to the complexity of the well test and interpretation of the data, including the proximity of the well to nearby faults and the oil/water contact, uncertainty in the fault conductivities, permeability and anisotropy. Advanced well test design and interpretation methods were required to identify the contribution of each uncertain reservoir parameter on the well test response.



Reservoir model showing reservoir complexity.

Use GeoTesting services to optimize test design for successful reservoir characterization

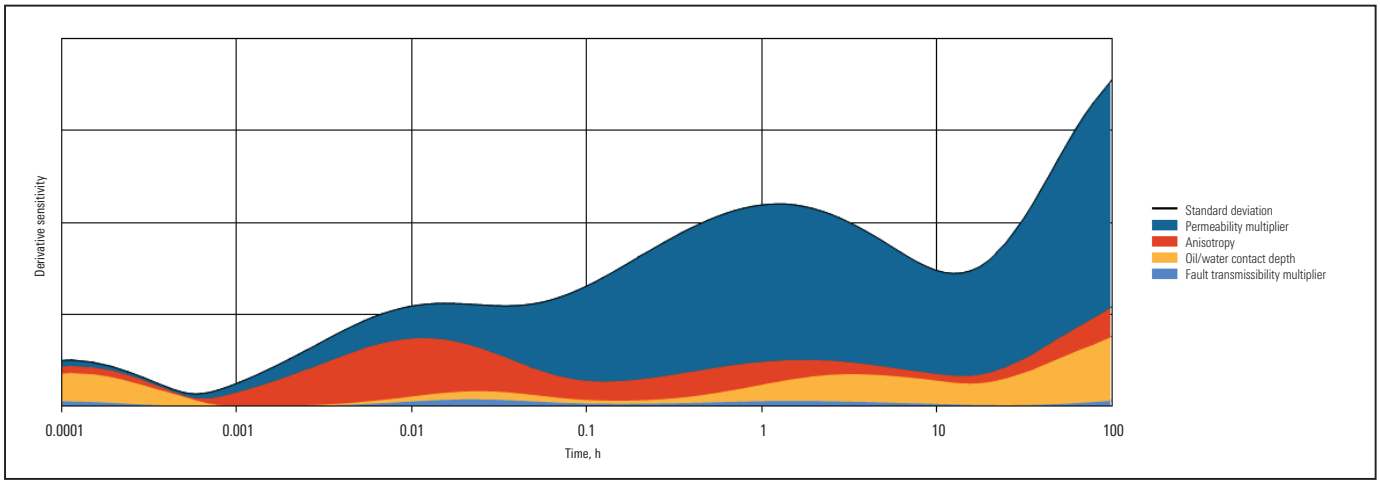
Schlumberger recommended that OMV use the GeoTesting geology-based well test design and interpretation services to calculate the time-dependent effect of uncertain reservoir parameters on the well test response so that the optimum well test duration could be determined to give confidence on the calibrated reservoir model. Multiple well test simulations were performed by using GeoTesting services on the existing reservoir model to cover the range of uncertainty in the model that needed to be characterized by the well test.



Simulation of multiple cases showing a wide range of derivative behavior.

Achieved reservoir model certainty using dynamic measurements

Using GeoTesting Global Sensitivity Analysis (GSA), a time-dependent sensitivity analysis on each uncertain reservoir parameter was conducted. The results showed the evolution of the well test data sensitivity to the different parameters that needed to be characterized. The analysis also helped optimize the well test duration with maximum certainty for reservoir characterization.



Plot showing time-dependent sensitivity of the build-up derivative to uncertain parameters.

After the well test, the GSA simulation cases produced using GeoTesting services were used as a starting point for the final interpretation. Success was achieved by calibrating the reservoir model in the Petrel* E&P software platform with the dynamic well test data using GeoTesting services. Associated uncertainty on the reservoir parameters was presented with the interpretation results to establish the confidence levels on the final model and to confirm reservoir connectivity.

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