Oil and Natural Gas Corporation Limited (ONGC)—an oil and gas company headquartered in Dehradun, India—planned to perform a well optimization study, ahead of a planned hydrofracturing project, on one of its oldest onshore fields. To accomplish the study in the most efficient manner, the company sought to replace outdated, time-consuming methods with modern reservoir simulation and well location technology.

With the high cost of drilling and fracturing, a primary objective was to improve the prediction process to ensure optimal well locations. After meeting with Schlumberger, it was agreed that a combination of the ECLIPSE simulator—using its flux boundary capabilities—and the well design module from the Petrel platform, would best meet ONGC’s requirements.

**Efficient simulation**

The new reservoir model consisted of 12 layers and approximately 2 million cells. One of the layers was undrilled sand and to develop this area, a history match of the full-field model was performed. Then, a sector of the undrilled area of interest was cut and used for prediction. The total simulation time for the full field was around 90 minutes, and for the sector only around 5 minutes.
The total number of wells suggested for the area was 200. Various sensitivities were run on different locations of the wells, placing them at a distance of 200, 300, and 400m. Local grids were also used to study the sweep efficiency in detail. The grids were analyzed at variants of 50 by 50 and 25 by 25. Similarly, the variants were run for wells with spacings of 300 and 400m.

Various sensitivities were tried on this sector model to optimize the well location and hence to get the maximum recovery.

Depletion drive.

The ECLIPSE flux boundary option allowed the team to break a full field model into separate sector models, enabling detailed simulation studies of key areas to be undertaken, while keeping overall run times low. It also allowed multiple reservoir engineers to work in parallel on the field, and sector models to be created with boundary conditions established from a full-field run.

Line drive.

The team was pleased with the results. It used to take up to 6 hours to run a full-field model with a separate scenario for each proposed well, and this was cut to just 90 minutes thanks to the new workflow. The ONGC well team was able to successfully target a selected undrilled sector within the area of interest, quickly run simulations to history match the area, and confidently recommend accurate well locations.

Peripheral line.

Inverted 5-spot drive.