
3D seismic interpretation of shallow gas hazards to optimize casing design in development drilling

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At Seligi Field, a 3-D seismic survey shot in 1987 has provided benefits in field development over and above the main objective of reservoir mapping. At the Seligi D platform, a procedure was developed to optimise the use of shallow casing in development wells by fully utilizing the 3-D seismic data set and interpretation techniques available on a seismic interpretation workstation. This procedure enables EPMI to make considerable cost savings in the development of Seligi, without jeopardising operational safety.

The optimisation procedure was as follows :

Firstly, shallow gas in exploration and development wells was calibrated against seismic amplitude, highlighting the gas occurrences in colour, on the workstation. Secondly, planned well trajectories provided by reservoir and drilling engineers were converted to time and put into the workstation. This then enabled the intersections and proximity of the well trajectories to shallow gas to be interpreted with a facility and accuracy not previously attainable.

Two types of display were examined for this purpose :

- Vertical seismic lines extracted from the 3-D data set along each planned well bore and tying to calibration points at nearby exploration wells.
- Horizontal timeslices at 4 msec intervals, each showing all 32 planned well bores from the D platform as well as the exploration wells.

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Both displays used colour amplitude to highlight shallow gas.

In addition to the seismic analysis, safety margins were developed through discussions with the drilling engineers to accommodate the limitations inherent in the seismic data.

This procedure will enable casing design optimisation at future platforms to be achieved much more rapidly and accurately than was possible using previously available methods. It also provides a case history of an unexpected benefit of 3-D seismic data, which will produce cost savings far in excess of the original cost of the survey.