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X-51 SUCCESSFULL INTRODUCTION OF NEW 4D TECHNOLOGY INTO THE BUSINESS — TIME LAPSE SEISMIC IN GANNET-C

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Time Lapse Seismic ('4D') aims at monitoring production from a field. More importantly, it may indicate unproduced areas in a field. The technology is new, with relative few examples in the industry, but hopes are high and many surveys are currently planned by the industry. Shell Expro, operating on behalf of Shell and Esso, faced the problem of introducing this new technology in a cost-effective way around the North Sea. The first dedicated 4D projects by Shell Expro has been successful straightaway, by highlighting areas of unproduced oil. The success has been controlled by a careful strategy combined with high quality acquisition/processing/ interpretation as follows,

1. In EXPRO, all North Sea fields were reviewed and classified against their technical probability of success (POS) and a Value of Information (VOI) was estimated. For the high-ranking fields, a VOI exercise was carried out. To ensure the robustness of the projects, the sensitivity of VOI to POS was calculated. It is pointed out that POS estimates for new technology would strongly depend on experience gained with the technology and are, hence, time dependent.
2. Initially, only the highest POS/VOI/VIR (Value-Investment Ratio) projects were selected, i.e. Gannet-C and Brent. The business case for the Brent 4D was weakened by the recent oil price fluctuations.
3. Gannet-C 4D was acquired in Q2 1998. Precise repetition of the acquisition proved to be a key success factor: Differences in ray paths caused by acquisition geometry differences would be difficult, if not impossible to compensate for in areas with steeply dipping geology. With help from a favourable current, shot and receiver coordinates could be replicated exactly, and identical acquisition equipment was used. Although the survey was acquired with a higher fold, the previous quad-quad geometry could be repeated exactly by de-populating.
4. Reprocessing of old and 4D datasets were done concurrently. In Gannet, no matching filter appeared to be required to equalize data sets.
5. Interpretation could be done on difference datasets that mainly contained hydrocarbon production effects.

In Gannet-C, the conclusion was that 4D enabled the detection of undrained fault blocks, now estimated to contain 15MMbbls of oil. One potential infill well targeting 5MMbbls of recoverable reserves has been identified. The Net Present Value of the time-lapse seismic experiment is estimated to be £4.5MM by de-risking the infill option. Thus, time-lapse seismic has made a major impact to the management of this field.

Based on the time-lapse successes from the Gannet-C as well as from Norske Shell's Draugen fields (both acquired in 1998), Expro has started to review the estimated POS of 4D over other fields. With low oil prices, acquisition and processing costs have also fallen. Based on these new constraints, the VOI of high-ranking fields has been reevaluated. As a consequence, Expro has decided to acquire a time-lapse survey in 1999, covering the fields Gannet A, B and D.

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