Technical Session Agenda
2015 SPEE Annual Meeting

11:25 AM **3D Seismic Data and its Role in the Estimation of Resources** ERC Equipoise

Since the 1960s, the seismic reflection method has become a routine tool in oil and gas exploration and production. Arguably, though, it was not until the advent of high quality three-dimensional seismic reflection data in the 1990s that the method has been adopted as an integral part of resource assessment. This is particularly true offshore, and in deeper water environments, where seismic acquisition is relatively cheap, and drilling density is low, due to cost.

In this paper we aim to take you through the two main uses of 3D seismic data in the assessment of conventional hydrocarbon accumulation. Firstly, we look at the determination of the structure of the known accumulation away from well penetration. The example we use is the Galleon field, a mature gas field offshore United Kingdom. The field is in shallow waters (less than 300') and is in late life. Drilling density is therefore reasonable. However, the reservoir is deep and the overburden geology is complex, which has affected drilling costs. Thus, there are areas of the known accumulation as it is mapped that would not be included as a known resource should a conventional drainage radius method be used in the assessment of its Contingent Resources or Reserves.

The reservoir interval can be identified fairly well using the available 3D seismic data, and interpreted away from well control, thus potentially expanding the area of the known accumulation. As seismic data are naturally recorded in time, however, the resulting time map needs to be depth converted, to represent the true structure at reservoir depth. The complex overburden above the field not only raises drilling costs, but also results in large uncertainties away from well control during the process of depth conversion. This is a challenge for resource assessors, and we illustrate how this uncertainty is estimated using multiple realisations of the depth structure.

Three dimensional seismic data not only provide an image of the time and depth structure of the known accumulation, but the strength, or amplitude, of the recorded reflections can also be used to make estimates of the geology of the subsurface and, ultimately, the reservoir of the known accumulation. As the seismic method aims to sort seismic reflections of varying source to receiver offsets that have a common reflection point, the variation in amplitude with source to receiver offset, or AvO, for each common reflection point can also be used to invert further information about the subsurface. In our second example, we explain how AvO has been used to determine the extent of a reservoir sand within a stratigraphically trapped oil accumulation offshore West Africa, not only in the definition of the edges of the accumulation, but also in the connectivity of its reservoir, backed by formation pressure data and extended well testing.

BIOGRAPHY
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