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## **SPE 102547**

### Novel Wireless Solution to Address uncertainties in Reservoir Connectivity

#### **Abstract**

Reservoir connectivity is a common uncertainty when considering any new field appraisal or development options. Having a better understanding of reservoir connectivity provides significant benefits in optimising the field development plan. By the application of a new wireless telemetry technology, it is now possible to cost effectively gather high value reservoir connectivity information in situations that previously may have been considered technically impractical or commercially non-viable. Consider for instance, the situation where an appraisal or step-out subsea well is drilled close to an existing producing field, or a new field under development. Today, these appraisal wells are typically permanently abandoned after logging and testing without obtaining any long term pressure data, thus losing a valuable opportunity to gain a better understanding of connectivity in the reservoir and thus prove the reservoir model. Using existing technologies to acquire such data, whilst technically viable, is typically not a cost effective option, requiring either well intervention or high up-front capex. By installing a battery powered wireless telemetry system in the well at the time of well abandonment, but without in any way compromising the integrity of the abandonment, it is now possible to acquire high quality reservoir pressure and temperature data for periods of up to 2 years and beyond. Data from the abandoned well, is transmitted from reservoir depth to the seabed using wireless technology, where it is stored for subsequent collection, on demand, by a supply vessel passing overhead. The paper will review prior methods used for long term reservoir appraisal monitoring and demonstrate how advances in wireless telemetry technology now enable critical information about reservoir connectivity to be obtained from suspended/abandoned wells or zones, where previously there was no cost effective means to do so. It will describe several applications of how the wireless technology has been, or will be applied for the purpose of gaining a better understanding of the reservoir model.

#### **Introduction**

It is generally acknowledged that reservoir uncertainty is an integral component of all hydrocarbon prospect and field development decisions. The ability to deal with such uncertainty is a key factor in establishing the economic viability of proceeding with any new field development project. Uncertainties in the reservoir comprise not only information about connectivity, but also about the nature of the reservoir fluids and how they might change throughout the production life of a given field. Whilst there have been significant advances in reservoir modeling processes and seismic data processing to help better understand reservoir compartmentalization issues, there is still significant uncertainty in determining connected volumes.

Understanding reservoir connectivity is also directly related to making an accurate determination of reserves, something that is generally acknowledged (ref.1) as not having been done particularly well by the industry in general to date. Both understating and overstating reserves can have a negative impact on field economics. At the simplest level, platform facilities may be under or over sized, neither situation being desirable. In ref.2, a "Value of Information approach is described whereby it is emphasized throughout the paper that effective subsurface appraisal is the key tool to resolve or reduce reservoir uncertainty. An obvious route to minimizing uncertainties in reservoir connectivity is to maximize the time spent on appraising the prospect. Understandably, in the current era of high rig day rates, there is little motivation to remain on location for any longer than is absolutely necessary to gather the bare minimum of well data. This is especially true when considering the global portfolio of deep water prospects, including the Gulf of Mexico, West of Shetlands in the UK, West Africa and certain parts of the Far East, where the day rates for deep water semi-submersible drilling units are at an all time high. The emergence of a new wireless technology that makes possible the delivery of high value reservoir connectivity information, beyond abandonment, forms the subject matter of this paper.

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