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First Jackup Drilling Operation on Grand Banks of Newfoundland—Lessons Learned

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Abstract

Fifty years after the first jackup drilled its first well for Standard Oil Company of Texas in the Gulf of Mexico, jackup drilling operations commenced for the first time in the treacherous sea conditions on the Grand Banks of Newfoundland. This paper addresses the risk management solutions, the boundary pushing technology, and the stakeholder cooperation that helped ensure jackup drilling operations on the Grand Banks could be performed without compromising safety and environmental protection. Recommendations are presented for continuing jackup activities in the region.

Introduction

The first well offshore Newfoundland was spudded in 1966 utilizing a drillship. During the 1970's several drillships and semi-submersibles were active on the Grand Banks and the Labrador Shelf. The Hibernia discovery well was drilled in 1979 by a drillship and later that year a semi-submersible re-entered the same well and conducted drill stem testing.

Over 170 exploration-appraisal wells and 80 development wells have been drilled offshore Newfoundland all of which were drilled by either floating units or drilling installations mounted on a concrete platform.

In 1996, the concept of jack-up drilling operations was proposed as an alternative way forward. The metocean operating conditions were determined to be within the capacity of new harsh environment jack-up designs. However, the iceberg and sea ice conditions on the Grand Banks required further deliberation.

An ice statistical analysis and subsequently a risk assessment were conducted to quantify whether the proposed jackup concept was an acceptable one. The following rationale was then presented to the oil and gas community to promote jack-up drilling operations as a feasible and desirable alternative.

- The jackup structure evolved quite substantially since drilling commenced offshore Newfoundland in the early 1970's.
- Non productive time in jackup drilling operations is generally considered to be 10%-14% less than semi-submersible drilling operations.
- If one gives consideration to the anchor pattern of moored floating units during drilling operations, the footprint and hence an iceberg exclusion zone is approximately 10 times the area occupied by an elevated jackup.
- Jackup acceptance criteria have been standardized so as to guide industry and regulatory regimes with respect to site specific assessments.
- There is huge potential for mobilization and equipment certification cost savings by utilizing harsh environment jackups that are present in Atlantic Canada rather than importing floating drilling units from the international arena.
- The results of a risk assessment have ultimately demonstrated the feasibility of the jack-up drilling operation in the region.

Upon completion of an independent study commissioned by Canada-Newfoundland regulatory authorities, an environmental impact study by an operator, the regulatory approval process for the drilling program, and a declaration that the ice free season had begun; a jackup was mobilized to Newfoundland waters to begin its first drilling operation on the Grand Banks.

There were several lessons learned during the two years of seasonal jackup drilling activity in the region and the ultimate objective of this paper is to share those lessons with the oil and gas community.

Ice Statistical Analysis¹

An ice statistical study commissioned in 1996 included a summary of well site data for the Newfoundland area from 1984-1990, iceberg size classification, iceberg shape factors,