



OTC 20241

Minimal Structures for Marginal Fields in Offshore Nova Scotia

C. Dunn, C. DesRochers, and G. MacDonald, Martec Limited, member of the Lloyd's Register Group

Copyright 2009, Offshore Technology Conference

This paper was prepared for presentation at the 2009 Offshore Technology Conference held in Houston, Texas, USA, 4–7 May 2009.

This paper was selected for presentation by an OTC program committee following review of information contained in an abstract submitted by the author(s). Contents of the paper have not been reviewed by the Offshore Technology Conference and are subject to correction by the author(s). The material does not necessarily reflect any position of the Offshore Technology Conference, its officers, or members. Electronic reproduction, distribution, or storage of any part of this paper without the written consent of the Offshore Technology Conference is prohibited. Permission to reproduce in print is restricted to an abstract of not more than 300 words; illustrations may not be copied. The abstract must contain conspicuous acknowledgment of OTC copyright.

Abstract

The Nova Scotian Offshore has many undeveloped fields which contain various amounts of recoverable oil and gas. The amount of recoverable product, however, does not support the capital expense of major physical infrastructure which has been the norm for the previous offshore developments in this region. These marginal fields will require alternative types of infrastructure which will lower the overall requirement and costs of production. Minimal platforms have been known to reduce the size and cost of production developments, and in some cases eliminating the requirement of heavy lift vessels for offshore installation.

This paper presents a study of the application of minimal structures for use in the severe environment of the Nova Scotian Offshore. A survey of the global fleet of the minimal structures is reviewed along with a comparative wave study to confirm the degree of increased severity of the Nova Scotian conditions. Three minimum platform concepts, which have no requirements for heavy lift vessels, are presented. Case Studies are provided to confirm the performance of the structures in the Nova Scotian conditions.

Introduction

The economic viability of an offshore development is not only dependent upon the quality of the discovery itself, but is also heavily influenced by the cost of the offshore facility that will extract and distribute the hydrocarbon. Offshore fields, which have questionable economic viability, are considered 'marginal fields'. Some marginal fields have become economically viable by reducing the cost of the offshore facility used to extract and distribute the product. The reduction in cost of the facility is significantly attributed to reducing the size of the offshore installation. These types of installations are referred to as 'minimal platforms'. Minimal platforms as designed to current standards have been shown to be robust and suitable for many different offshore regions (WS Atkins 2002). Minimal platforms reduce the cost of the facility in a number of ways:

- Reduction in steel weight
- Simplified fabrication methods
- Reduction in production equipment
- Elimination of heavy lift vessels

Currently the Nova Scotian Offshore (NSO) region has many discoveries which could be defined as marginal fields. Historically offshore field development for the NSO has used standard large scale and capital intensive infrastructure which would likely be uneconomical for these marginal fields. Minimal platforms may provide more cost effective options for future developments.

The reduction in platform size and weight has many advantages. These smaller and lighter platforms may eliminate the requirement for extremely expensive offshore heavy lift vessels. The mobilization of these vessels to the remote NSO can have a huge impact on the cost of an offshore installation. Utilization of innovative transport and installation techniques can eliminate the need for these vessels and greatly reduce the installation costs.

However, the NSO seastate is of significant importance in consideration of the use of minimal platforms. The environmental conditions offshore of Eastern Canada are considered severe. Large waves, high tides, strong currents, high winds, spray ice and cold temperatures are some of the factors to be contended with in the design of an offshore facility. These environmental conditions play a significant role in determining the structural robustness of the facility.

This study sets out to develop appropriate minimal structure concepts which would provide suitable structural and operational robustness for consideration in future marginal field developments for the NSO.