Platform Design for Arctic Shallow Waters

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ABSTRACT

This paper describes main facets of the methodology of design solution selection for production drilling in iced offshore shallow waters: Arctic seas, the Northern Caspian Sea, the Sea of Azov. The paper covers basic principles of structural ice impact protection and studies the way the main operational parameters affect platform architecture. Criteria charged by drilling operators to offshore structures are shown. Procedure to select and develop design options for subsequent expert evaluation was of particular interest. Special consideration was given to the complement and qualification of experts making the selection.

KEY WORDS: Concept; completion; procedure; criterion; expert; evaluation

INTRODUCTION

At this point of time, not only coastal states washed by the arctic seas (Russian Federation, Norway, Finland, USA, Denmark, Canada) attend intently to offshore arctic development but also other countries declare great interest in field development in this severe conditions (China, India). Exploratory drilling will be complete in the next few years leading to time of commercial oil and gas production as the main activity.

Severe climate and the need to resolve ice load problem issue for drilling operators, research institutes and design agencies the technical challenges demanding new methods to determine required principle parameters of facilities and their components. Proper selection of philosophy, facility type as well as their principle characteristics allows cutting design, fabrication, construction and operation costs.

Factors affecting concept selection

Environmental, climatic traits of the region and also economical, constructional features as well as production operator plans shall be attributed to the factors affecting platform concept selection. These factors are outlined in Fig. 1.

The chart analysis (Fig.1) shows that development of fields with large confirmed reserves shall be approached integrally. Predicted production rates, processing capacity and total project profits shall be harmonized with each other.

For example, if processing infrastructure is less developed, drilling production wells using conventional Jack-up unit during ice-free seasons within 9 – 10 years can be more economically sound in long-term, than construction of a tailored mobile ice-resistant unit.

Way of application of intense loads (or the way to avoid them) due to environment and climate conditions determines selection of facility architecture. And with it, process parameters also indirectly affect the facility architecture by necessity to accommodate powerful and heavy equipment and stores.

Principle requirements to facility architecture and design may be defined as follows:
- Minimization of ice load application surface area,
- Minimization of windage area.

Fig. 1 Factors affecting concept selection