ABSTRACT

In this work, we performed a comprehensive analysis of possible technical solutions for the main facilities for the development of hydrocarbon deposits in the southwestern part of the Kara Sea, the selection of competitive options for in-depth study at the subsequent design stages, identification of critical technologies required for the implementation of the selected conceptual solution, as well as the development of schedule for further work.

KEY WORDS: Facilities; conceptual solution; soil; criteria; structures; design.

INTRODUCTION

A conceptual solution is understood in this work as a selection of type(s) of the facility and a selection of the best possible design option(s) among the obtained number of facilities, as well as determination of its basic dimensions, weight and check of stability on soil (for facilities standing on the bottom). Riser types and main characteristics of anchoring systems shall be selected for floating facilities.

Then it is needed to select a facility type (or a set of facility types) and to obtain main technical characteristics of the best possible facilities that fulfill functional requirements under given metocean and soil conditions.

Finally, the best possible facility option is selected out of various technically feasible options using developed criteria, some of which are brought into the category of restrictions.

The choice of facility type shall be based on a number of influences that may include the following (Mirzoev, 2009):

- Technological;
- Engineering and geologic;
- Metocean (geographic);
- Production;
- Environmental.

At the current stage, special attention will be paid to the first three influences. Facility selection taking into account these influences is a decision-making tool.

Next, the best possible facility must be selected out of the chosen technically feasible facilities. A number of criteria should be developed to select the best possible facility. The criteria allowing to determine the best possible facility may include the following (Mirzoev, 2009):

1. Proven technical solutions;
2. Manufacturability;
3. Composition of materials;
4. Material intensity of each material;
5. Compliance with requirements of current regulations;
6. Cost of the facility (taking into account 2, 3, 4).

The best possible option is normally the facility and structure type option with the lowest cost. It shall be noted that the most frequent selection of the best possible facility based on the lowest material consumption only may lead to erroneous estimates. The reason is that the creation of a facility with the lowest material consumption may require a use of high-tech elements with high costs and expensive installation operations. However, it is difficult to carry out such an estimate at the stage of conceptual design. In order to take into account all the criteria with simplification of the formal procedure for taking into account all the criteria, they must be brought to the category of restrictions.

CRITERIA FOR CHOOSING THE BEST POSSIBLE CONCEPTUAL SOLUTION

In practice, the choice of the concept for the base structure is normally made using an expert method based on metocean conditions, functional requirements and restrictions (matters of construction process, transportation to the site, installation and mounting of the facility). This section will provide recommendations on the selection of the facility type based on a number of influences - the "applicability matrix". It shall be noted that the selection operation may result in several solutions.

There are various classification options for offshore oil and gas field facilities (OOGFF) depending on a selected feature. The following classification is the most widespread (Mirzoev, 2009):