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Modern Deepwater Site Investigation: Getting It Right The First Time

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Abstract

Deepwater site investigation for petroleum production facilities requires much more than the simple one-boring approach that has been common at many continental shelf sites. Instead, because foundation-zone soil and geologic conditions found at many deepwater sites can be complex, a multi-phased approach that integrates and analyzes various geoscience and geotechnical data is required to optimize deepwater siting, geohazard risk assessment, and foundation design. This paper summarizes best practices for planning and executing a modern deepwater site investigation. The paper is based on our experience in carrying out various aspects of more than 100 deepwater site investigations over some 20 years. Although others have documented case histories illustrating specific deepwater site investigations, described various data acquisition tools, and discussed geohazards risk assessment in some detail, to our knowledge no generic, public summary exists that: 1) explains the numerous considerations and significance of each in planning and executing a deepwater site investigation; 2) describes the range and significance of geoscience and geotechnical components that can be required; 3) gives the generic phases and sequence of execution required to optimize the process; and 4) provides guidance on the cost and schedule time required to carry out a deepwater site investigation.

The paper outlines a methodology for efficient, effective deepwater site investigation that is a useful explanation and guide for anyone responsible for this activity. The methodology will help operators optimize the planning and execution of deepwater site investigations, including geohazard risk assessments, and deliver results to project design teams in a timely manner. Unlike major operators, most independent operators and facilities designers/constructors do not have site investigation and geohazard specialists on staff who are experts in the methodology presented. This paper is written principally for these organizations and provides them with a practical methodology for planning and executing effective deepwater site investigations.

Introduction

Purpose and Scope. The purpose of this paper is to describe what we believe to be the best-practice approach to a modern deepwater site investigation required for various petroleum exploration and development activities. Specifically, the paper outlines a methodology for efficient, effective deepwater site investigation and is intended as a useful explanation and guide for anyone responsible for this activity. The paper briefly describes what needs to be done and the various tools used, why it is important to do the various tasks involved, and when and in what sequence they should be done. The paper generally does not describe how to do the individual tasks as many other previously published papers have discussed details of deepwater site investigations (see *References and Other Selected Literature* at end).

Definitions. For the purposes of this paper, the following definitions apply:

- **Site investigation:** the sequence of geophysical survey and soil data acquisition programs, soil sample testing, and data analysis, integration, and synthesis needed to characterize and assess seafloor and foundation zone/tophole conditions, including geohazard risk assessment, in connection with deepwater drilling operations and facilities siting and foundation design.