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Concept and Development of a Flow System for Handling and Exporting 600,000 bbl/day in Campos Basin, Brazil

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Abstract

Considering demands for internal Brazilian market and international crude oil trade, PETROBRAS has taken the decision to concentrate a significantly part of the future of crude oil production from three deep-water fields; Roncador, Marlim Sul and Marlim Leste, all of which are in Campos Basin, with one off-shore terminal. The name of this project is PDET.

This project comprises of a fixed central pumping station, PRA-1, a large FSO (2,1 million barrels storage capacity), and two calm buoys systems, at a depth of 100 m.

The start-up of this project involves the crude oil from three producing platform; P-52, P-51 and P-53, which are all currently under advanced construction. In the future PDET will receive the production of crude oil from two additional new platforms.

Each producing platform will have its own export pipeline, direct to PRA-1. The peak production of this system will achieve 600,000 bbl/day. PRA-1 will have special requirements to pump crude oil either to FSO or to the calm buoys systems. Based on a steel jacket structure the capacity of power generation will be 75 MW, up to 34 inches pigging capacity and many diverse pipings.

The FSO has special specifications such as the electrical power and optical swivels, both are at a high level of technology and capacity. To achieve system's targeted reliability extensive studies were done. Integrity protection system, leak detection system, offloading time, sub-sea layout and flow rates were taken into consideration. Environmental risks were fully mitigated. The final configuration, which achieved high standard integrity assurance, produced a valuable project.

This paper describes the logistics of this project focusing PRA-1 pumping, the export system through calm buoys, sub-sea facilities and the FSO. Also it will be highlighted some

management programs used to implement this project. This work reviewed the major aspects of implementing this important infrastructure offshore facility to transport crude oil.

Several technical and managerial challenges were surpassed through introduction of new technologies, tools and techniques.

Introduction

Campos Basin is the most important Brazilian E&P region, located offshore, in the southeast region of the country. As of June 2007, it has produced 1.5 million barrels of oil per day, which has accounted for 74% of PETROBRAS' total production worldwide and 82% of its domestic oil production. Campos offshore oilfields will continue to be the main source of Brazilian crude oil, in the near future. Expecting a sharp and steady increase in crude oil production, especially in deep water areas, PDET looked for the best integrated solution for Campos Basin offshore petroleum fields. In 2010 PETROBRAS domestic targets call for 2.4 million barrel of oil per day, meaning a huge increase in comparison with 2006 production. This will demand infrastructure of transport improvement to assure excellence concerning safety and operational procedures and environmental protection, which are strict requirements for Petrobras projects.

PETROBRAS' strategic plan has officially achieved 2006 for one the company's greatest-ever achievements: Brazilian self-sufficiency in crude oil production. Reaching this level of production not only call for intense efforts in upstream to keep production increasing, but also perfect coordination with the downstream segment.

E&P and Downstream areas conceived, approved and implemented a robust system to transport oil from the offshore deep water fields. So, PETROBRAS has now put in place its Campos Basin Oil Outflow and Treatment Plan (which goes by the Brazilian acronym of PDET), for the transport and delivery of the output's part from the Campos fields to the refineries.

Three fields have been included in this approach: Marlim Sul, Roncador and Marlim Leste, all of them considered massive petroleum fields.

PDET system will consolidate an important infra structure to enhance the Campos Base oil production in the coming years.

The solution adopted to handle this important new incremental oil production was to build an offshore central hub pumping platform (PRA-1) as a primary crude gathering center, a