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CANTARELL OIL FIELD, GULF OF MEXICO, MEXICO

The Cantarell Field is Pemex Exploración y Producción's (PEP) large, heavy oilfield, located 100km off the coast of the Yucatan Peninsula, in the Gulf of Mexico. It is the largest offshore development project in the world to date, with a total installed cost of more than $5 billion.

Crude oil from the field in the Bay of Campeche is transported via pipelines to tanker berths at Cayo de Arcas and to storage tanks onshore at Dos Bocas, where part of the production is exported and the balance is transported inland by pipeline. Produced gas is sent onshore for treatment and consumption and the balance is returned offshore for gas lift.

Cantarell produces about one-third of Mexico's total output of oil, which is approximately 1.2 million barrels per day.

DESIGN AND DEVELOPMENT

Bechtel prepared a conceptual design study in conjunction with PEP in 1996 for the development of the Cantarell Field. This identified a number of projects to remove short-term production bottlenecks and increase the long-term production of the field. The design, fabrication and installation of the facilities to accomplish these objectives is known as the Cantarell Field Development Project.

The short-term debottlenecking projects, known as the Short-Term Plan, include modifications to existing platforms to add new production separation facilities, pumps, and compressors, and the installation of additional produced gas-compression facilities, interconnecting pipelines and a floating storage offloading vessel (FSO).

The projects to increase the long-term production of the Cantarell Field are known as the Long-Term Plan. This plan consists of several major components, including the installation of new wellhead platforms, riser and injection platforms, two new central processing complexes, accommodation platforms, bridges and flares, and interconnecting pipelines.

OIL PRODUCTION

One of the main reasons for Cantarell's prolific oil production rate is because of a giant natural gas bubble that has maintained pressure over the reservoir for the last 20 years. As reservoir pressure has decreased, Pemex has decided to

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maintain reservoir pressure through the injection of nitrogen, which will increase the final reservoir recovery.

As gas is at a premium in Mexico. Pemex knew it could put the gas to a better use by selling it. So project managers Bechtel and Pemex studied other options, such as steam and water injection. Because of the oil field's geological formation, neither of these turned out to be a viable solution. But nitrogen was. After six months of study, the team recommended that nitrogen be used to pressurise the reservoir and enhance production at Cantarell.

Nitrogen-production facilities will be constructed onshore as a private venture near the town of Atasta, and the nitrogen will be sent offshore via pipeline for injection into the reservoir. The nitrogen production for pressure maintenance will be approximately 1,200 billion standard ft^3 per day.

Basic engineering and contract package development is now being performed in Bechtel's Villahermosa, Mexico, San Francisco and Houston offices. The work moved to contractors' shops after the award of 30 EPC contracts and to the project office located in Villahermosa, Mexico, during the fabrication, offshore installation, hook-up and commissioning phase of the project.

OBJECTIVES

The objectives for the Cantarel field development project were:

- Phase One - Increase production capacity by approximately 25% from the January 1996 levels by de-bottlenecking
- Phase Two - Expand production capacity an additional 50% by adding new facilities
- Increase the reliability/availability of the existing production facilities
- Eliminate gas flaring

NITROGEN PLANT

Nitrogen is a key part of the entire Cantarell upgrade and this particular facility promises to be the biggest in the world — 10 times the size of the largest existing plant. Producing 1.2 billion cubic feet of nitrogen a day to provide injection to allow pressure maintenance in the Canterell reservoir, the facility will double the world's current total output of nitrogen.

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