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RONCADOR, CAMPOS BASIN, BRAZIL

In March 2001, the P-36, which was stationed over the Roncador field, sank after three explosions left 11 workers dead. At the time, the world's biggest semisubmersible had been producing 84,000b/d and 1.3 million m³/d of gas. The P-36 had been projected to produce 90,000b/d of crude by the end of the year and to peak at its capacity of 180,000b/d by the year 2004.

THE EXPLOSION

Petrobras said that here had been a gas leak, which escaped into the column where the blasts took place.

Water flooded the platform pontoons, causing it to list at a 25-degree angle. The platform then commenced to sink, despite 4,100t of nitrogen being pumped into the flooded compartments at a rate of 200l/hour, in an attempt to discharge about 15% of the estimated 7 million litres of seawater.

To help in the operations, 21 support vessels and the semisubmersible platform Petrobras P-23 were on location.

Roncador is situated 130km off the north-eastern coast of the state of Rio de Janeiro, Brazil. It lies north-east of the Albacora Field, to the east of the Frade Field in the ultradeep waters of the Campos Basin. The field was discovered in 1996 by the wildcat well RJS-436, which found reserves of 31 ° API oil in Cretaceous sandstone.

In October 1977, the well 1- RJS 513 drilled toward the Southwest of the field in 1559m water. This confirmed the extension of the reservoir but revealed the existence of an 18-degree API oil. It also discovered an unexpected gas cap in the reservoir.

EARLY PRODUCTION SYSTEM

In order to maximise reservoir information and improve the economics of the project, Petrobras took the decision to develop Roncador with an early production system until the main facilities were completed.

Petrobras signed a four-year charter with Falcon Reading and Bates for the Seillean FPSO. Used until recently in the North Sea by BP in the Donan field, it is the only FPSO system in the world with a dynamic positioning system that obviates the use of mooring cables. The vessel has a displacement of 79,600t, the capacity to produce and process up to 20,000bopd and to store up to 48,672m³ (306, 000 barrels).

The Seillean arrived in Brazil in December 1998. It is equipped with a flare, two cargo-handling cranes, a process plant inside the hull, a completion tower and crew accommodation. Production can reach 20,000 barrels per day.

PRODUCTION

The crude reached the vessel through a single-production rigid riser. Because of the relatively low reservoir temperature and the temperature drop in the production riser, it was necessary to increase the wellstream temperature. Two heaters were installed to boost the temperature to 67 °C. The natural gas produced fuels for

the turbo-generators, which supply all Seillean's energy requirements.

The early production system used subsea equipment comprised by the following parts resident on the seabed: two subsea trees, six vertical connection modules and an emergency disconnect package with multiplex controls.

PHASE I

In the first phase of the project, a semisubmersible with a processing capacity of 180,000 barrels per day, was installed at a 1,360m water depth. This rig, the ex-Spirit of Columbus, was re-named Petrobras 36 and adapted for deepwater production at the Davie Yard, in Quebec, Canada.

The semisubmersible had a processing capacity of 180,000bpd, a compression capacity of 4.8 million m³/d and a water injection capacity of 24,000m³/day.

The oil was transferred from this unit to a very large crude carrier (VLCC) tanker, converted at AESA Shipyard in Cadiz, Spain. The Petrobras 47 tanker functioned as a floating storage and offloading (FSO) unit. Located in an 815m water depth, the vessel has a deadweight of 268,000t, a storage capacity of 1.8 million bbl and can transfer liquids at a rate of 3,250m³/hour.

The oil came onstream by means of 26 wells (21 production wells and five injection wells) and gas was exported in a 176km-long, 20in pipeline. There are a total of 467km 4in and 6in flowlines.

After the accident, Petrobras took a series of measures to minimize the oil production losses. Two actions were therefore, adopted:

- The interconnection of new wells from the final design of Module 1 in the Marlim Sul field (platforms P-30 and P-38) is now planned for an earlier date. It is being brought forward with the help of drilling rigs and vessels, resources initially planned for the P-36
- Two production systems will substitute the P-36, and their start-up is planned for the second half of 2002 (Module 1 A, Phase 1) and early 2004 (Module 1 A, Phase 2)

By adopting these measures, the Brazilian oil production levels of Petrobras should reach 1.52 million barrels a day in 2002 - an annual increase of 9.4%, in the period 2000-2002. The production goal for 2005, fixed before the P-36 accident, is confirmed at 1.9 million barrels a day, which forecasts an annual growth of 8.4% in the Brazilian oil production of Petrobras between 2000 and 2005.



The P-36 on the Roncador field, listing heavily, prior to sinking.



Water flooded the platform's pontoons, causing the platform to list at a 25° angle.



This rig, the ex-Spirit of Columbus, was re-named P-36, and adapted for deep water production at the Davie Yard, in Quebec, Canada.



The ANM subsea christmas tree, capable of bearing substantial pressure 2,000m under the sea.



Installation of the ANM subsea christmas tree.



The Seillean, on location at the Roncador field, carrying out early production.

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