



Buoy-Supported Riser in location, ready to be submerged and installed

Field Information

The Sapinhoá oil field is an oil field located in the southern Brazilian Santos Basin, 310 kilometres (190 miles) off the coast of Rio de Janeiro in a water depth of 2,153m (7,065 feet). It was discovered in 2008 and originally named Guará field, under development by Petrobras. The oil field is operated by Petrobras and owned by Petrobras (45%) Repsol Sinopec Brazil (25%) and BG Group (30%). The total proven reserves of the Sapinhoá oil field range from 1,100-2,000 million barrels.

Source: Offshore-Technology.com

Lula oil field, previously known as Tupi oil field, is one of the world's biggest producing ultra-deepwater oil and gas fields located in water depths from 2,000m to 5,000m in the Santos Basin, approximately 250km off the coast of Rio de Janeiro, Brazil. It is jointly owned by Petrobras (65%), Shell Brasil Petroleo (25%) and Petrogal Brasil (10%). The Lula oil field is expected to reach one million barrels of oil-equivalent per day (Mboed) into production by 2019 and is estimated to hold up to 8.3 billion barrels of recoverable oil-equivalent resources.

Source: Compelo.com



OUR VALUES



Safety



Integrity



Sustainability



Performance



Collaboration



Innovation



PROJECT CLIENT

Petrobras

Petrobras Sapinhoá-Lula NE

Project at a glance

Sapinhoá-Lula NE is a Subsea Umbilical, Riser and Flowline (SURF) contract awarded by Petrobras, offshore Brazil. The project saw the deployment of four decoupled riser systems featuring large submerged buoys supporting 27 Steel Catenary Risers (SCRs). Each Buoy-Supported Riser (BSR) can fit 22 or 23 lines, between SCRs, flexibles and umbilicals. During this project, Subsea 7 installed 27 SCRs and the Operator installed the associated flexibles and umbilicals.

Sapinhoá-Lula NE is the largest Engineering, Procurement, Installation and Commissioning (EPIC) SURF contract awarded in Brazil to date.

Full project information overleaf

Highlights

- Largest EPIC / SURF contract in Brazil.
- Pioneer at tackling: 48 thousand tons of equipment, ultra deep water and first pre-salt riser system.
- Project technology was shortlisted for the Best Mechanical Engineering Achievement Award by ASME Petroleum Division.
- Suppliers based across four continents with a very challenging schedule.
- During the installation process, up to four vessels working together.
- Buoys three and four installed simultaneously.
- Total: 105km / 8,600 welds
- Production record achieved in the pre-salt through Subsea 7's BSR system.

Our Differentiators





Petrobras Sapinhoá-Lula NE

Project

Petrobras
Sapinhoá-Lula NE

Location

Santos Basin,
offshore Brazil

Water depth

Beyond 2,100m

Project Type

SURF

Date Awarded

March 2011

Date Completed

2015

Vessels

Seven Oceans,
Seven Polaris,
Skandi Neptune

Scope of Work

Sapinhoá-Lula NE is a significant discovery made by Petrobras in the Santos Basin, Brazil in ultradeep water depths beyond 2,100m, 300km from shore.

The project scope included the engineering, procurement, installation and pre-commissioning of four decoupled riser systems featuring:

- Four submerged buoys each weighing about 2,800 tonnes were installed at 250 metres below the sea level, 16 buoy foundations and 32 associated tethers
- 27x associated steel catenary risers (SCRs) of 3.9km each and associated pipeline end terminations
- 18x 7.5-inch production lines
- 3x 9.5-inch water injection lines
- 6x 8-inch gas injection lines
- 27x anchor suction piles
- 4x monitoring systems for buoys and SCRs.

Technology and Innovation

To meet the system's performance and installation requirements various innovative technologies were required.

Petrobras and its partners selected this Buoy Supported Riser (BSR) system as the most effective solution for the project. In order to meet the system's performance and installation requirements, various innovative technologies were required.

These were:

- An efficient method to install corrosion resistant alloy (CRA) mechanically lined BuBi™ pipe by the reel-lay installation method
- The development of the Angular Connection Module (ACM). This unique engineering capability greatly simplified buoy hardware by minimising the number of connections and potential leak paths
- A 400t tension capable Riser Installation Tool (RIT), allowing for the reliable deployment of 27 SCRs
- A state-of-the-art fracture mechanics engineering assessment for plastically strained pipe joints made of Alloy 625 welds
- A novel tethered tensioned mooring system, similar to that for Tension Leg Platforms (TLPs), but using spiral strand cables for installation simplicity and to achieve the necessary dynamic performance
- A tether chain based tensioning system capable of withstanding top angle variations associated with the buoys natural offsets and the potential length variations of the almost two kilometres long tethers
- A bottom connector device used to simplify connections to foundations.

The combined result of all these innovations, some incremental and resulting from existing technologies, and others entirely new and breakthrough, gave rise to the complete BSR system.

Petrobras was awarded the Offshore Technology Conference (OTC) 2015 Distinguished Achievement Award for successfully supporting the development of new technologies such as the Angular Connection Module (ACM), which connects flexible jumpers to pre-installed buoys. In addition, due to BSR system technology, in 2015 Subsea 7 received a Technology Achievement Award by OTC Brazil and, also, the ANP Technology Innovation Award, given by the Brazilian National Agency for Petroleum, Natural Gas and Biofuels (ANP).

Assets and Worksites

Engineering and project management work took place at the Subsea 7 offices in Rio de Janeiro, Brazil. Fabrication of the rigid pipelines took place over 15 months at Ubu Pipeline Spoolbase, ES in Brazil.

SCRs were reel-laid by *Seven Oceans* and hooked-up to the subsea buoys. Offshore installation commenced in early 2013, using *Seven Oceans*, *Seven Polaris* and *Skandi Neptune* and was completed in 2015.

