

Safety and local-content regulations and technology for Brazil's deepwater

Given regulatory uncertainty in the Gulf of Mexico, Brazil's established environmental regime is attracting deepwater technology suppliers.

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With an estimated 35 rigs idled in the Gulf of Mexico (GOM), Brazil is already receiving inquiries from companies looking to move their rigs here, where vast discoveries in recent years may soon turn the country into a major crude exporter. Barroso & Associates is currently participating in three negotiations for deployment and relocation of rigs in the GOM to Brazil.

Regarding a potential stiffening of safety standards in Brazil as a result of the GOM disaster, Petrobras, as operator of some 90% of the exploratory blocks in Brazil, already imposes extremely rigorous safety standards on its contractors. I do not believe that regulations will be toughened. Safety standards in Brazil are already high compared to the GOM.

Even though the National Petroleum Agency (ANP) is the industry's watchdog for safety implementation, in practice ANP does not use these development plans to their fullest possible extent. ANP is usually confined to establish production goals and deadlines, or it accepts the plans as submitted, without making additional requirements.

Rigorous requirements of security systems in deepwater exploration usually appear in the environmental guidelines of drilling licenses issued by environmental protection agencies.

The firm has had several experiences of licenses that required, as a precondition for their effectiveness or as a condition to be reached within a given deadline, the purchase and installation of filters, additional wellhead safety equipment, secondary (redundancy) safety systems, etc., all aimed at preventing environmental accidents.

Besides the BOP, an additional safety system is used in each well in Brazil. According to petroleum engineers at Petrobras and in private companies, in addition to the BOP, Petrobras also uses an automatic lock system for each drilling column, as well as choke manifolds.

In Petrobras operations, if both the automatic BOP and locking system fail, the rig operator still has the option to remotely activate the BOP valve.

Statoil in Norway and Petrobras in Brazil require each BOP to include an acoustic control system that allows the BOP to be controlled remotely. This can be done from a supply vessel, a rig or another location.

BRAZIL SAFETY INITIATIVES

ANP Ordinance 43, of 2007, which establishes an operational safety and security management system, enacted the so-called "Technical Regulation for Management of Operational Safety and Security for Oil and Natural Gas Drilling and Production Offshore Facilities."

It is important to note that the technical regulation does not contain provisions regarding use of specific equipment/safety standards, but mainly introduces management instruments to be adopted by the oil company to prevent or to correct possible operational accidents.

Federal Law No. 9.966, enacted on April 28, 2000, regulates prevention, control and supervision of pollution caused by discharge of oil and other harmful substances in Brazilian national waters. Mainly, this law has the purpose of supplementing the Marpol 73/78 (main international convention with regard to the prevention of pollution of

the marine environment by ships from operational or accidental causes) in those cases in which such conventions would not be applicable. Law 9.666 establishes the penalties applicable to violation of the terms set forth by the law (mainly oil discharges), which include monetary penalties and even the retention of the vessel.

The scope of the law is mostly related to the accident itself (the oil discharge) as well as the international "vessels requirements," thus not considering subsea systems requirements necessary for the operational safety (such as BOP), which fall under ANP's surveillance.

Additionally, it is important to emphasize that companies subject to ANP regulation must also comply with its ordinance to the extent that the Law 9.666 is supplementary (e.g., ANP has stronger obligations in relation to the accident communication).

Since enactment of the technical regulation, ANP seems to have become more diligent in its monitoring functions—perhaps as a reaction to the *P-36* accident. (An explosion sank the *P-36*, the largest semisubmersible in the world at the time, worth half a billion dollars, in 2001.)

The Tupi extended well test interruption for replacing a defective Christmas tree is a good example of Petrobras safety standards. At the time of the well intervention, Petrobras declared that it decided to perform this preventive action in line with its HSE policies.

It is important to emphasize that, due to the company's size and current discussion of the new regulatory framework, by which Petrobras will be the sole opera-

tor of the new pre-salt areas, Petrobras is extremely diligent in its operations. An operational accident could harm both its institutional image and also the entire regulatory framework approval procedure in Congress. Thus, Petrobras rigorously applies 37 international safety and quality measures. These opinions stem from discussions with Petrobras and other petroleum engineers with whom I speak on a daily basis since 90% of our work is representing foreign companies in projects with Petrobras.

EQUIPMENT NEEDED TO DEVELOP THE PRE-SALT

Buoyed by GDP growth of over 3% every year since 2004, Brazil is frantically building new infrastructure to develop its vast reserves, including the pre-salt reservoirs in the South Atlantic margin, covering about 800 km along the coast of Brazil from Espírito Santo state southward to Santa Catarina state.

Petrobras is about to start the purchasing program for 550 generators, 550 derricks, 350 turbines, 700,000 tons of structural steel for platform hulls, 550 wet Christmas trees, 500 wellheads, 80,000 pumps, 18,000 storage tanks and 4,000 km of flexible lines.

Petrobras has more than 55,000 items in a preliminary “shopping list,” of which drilling package, FPSO packages, subsea equipment and compressors are considered to be the most critical. The company will also renovate its oil tanker fleet with 26 ships already contracted and another 23 to be tendered. These tenders will all contain gradually increasing minimum local content requirements that can go as high as 95% in 2017. This means that interested companies should start looking out for local partnerships, areas to establish new facilities, operational bases and enrollment as suppliers with Petrobras.

MAIN CHALLENGES FOR PRE-SALT E&P

Regarding the additional challenges being faced in pre-salt E&P in Brazil, I believe the main ones are finance, the technological requirements and the shortage of skilled personnel. To achieve its audacious plans, Petrobras will rely on large capitalization from shareholders, especially the controlling stakeholder, the Brazilian government. Petrobras will further count on cheap and abundant financing from government development bank BNDES and other state-owned banks.

As a strategy to reduce prices of equipment, and at the same time allow for the gradual escalation of local content requirement in its projects, the company is breaking up large service and supply contracts into smaller packages, with greater emphasis on detail and on the standardization of orders. There is also an ambitious program to locally build an FPSO in a drydock chartered by Petrobras itself in the southern part of Brazil, in a city called Rio Grande. Petrobras is also planning to revise its standard contracts to reduce risk to the supplier.

There is no existing technology for the exploration of some of the pre-salt areas. Will any company be able to build an 18-in. oil and gas pipeline grid under 10,000 ft or more of water some 300 km away from the coast? Will the alternative solutions of FPSO, FSO, FSUs, etc., be feasible from an economic standpoint? Where, how and at what cost will the associated gas be treated?

Complex technology is required, considering that the pre-salt has greater water depths, deeper and more complex well designs, slower penetration rate in the reservoir formation, longer lead times and lower availability of high-specification equipment.

Wellbore instability presents challenges. R&D must bring solutions to deal with ultradeep geological targets and formation problems, such as the thick mobile salt layer under high stress and temperature. Within hard salt it is more difficult to deal with vibration and shock, stuck pipe, torque/drag, collapsed casing, water flow and deviation of the wells.

Massive salt layers also inhibit deeper seismic resolution due to lost returns (faults, thin drilling margins, weak formations). Below salt it is even harder to achieve well control, establish loss/gain phenomena and estimate fracture and pore pressure. As for the equipment, mud hydraulics and well depth dictate the use of heavyweight large-bore drill pipe (motion compensation is a significant challenge), and wellbore materials must also be resistant to high CO₂ content.

There is a need for high-specification rigs with mud mixing, pumps and liquid storage capacity, hoisting systems, active heave compensation, hook load and derrick capacity.

The unit must be capable of housing a highly variable deck load, which translates into increased deck load, and deck space possibilities. The supplier must provide equipment reliability, which

really means a highly automated rig, with full dual-activity capability such as 30,000-ft drilling capacity in 10,000-ft water depth. Also, the fluids-handling system must be capable to handle larger volumes and provide more flexibility regarding three simultaneous systems—water- and synthetic-based mud and completion fluid.

Another requirement is the ability to drill long, highly deviated wells. The units should contain a 2.27 million-kg dual derrick, 1 million-kg drawworks/traveling equipment, active heave motion compensation, and a 1.1-million-kg top drive.

The motion characteristics of the hull must abide by many technical requirements, including enhanced dynamic positioning features and power system reliability. This means an improved station-keeping facility and power management tools, such as improved fault detection and improved generator availability, with provisions to minimize consequences of power plant faults.

Other prerequisites are the automated activation of resources on sensing an event (e.g., engine starts), improved thruster availability, a power architecture that permits assignment of thrusters to any generator, and improved thruster recovery time.

The enhanced reliability item of this rather long list of challenging requirements calls for a modular derrick drilling machine, 99.9% uptime, modular construction and rapid repair.

LOCAL CONTENT REQUIREMENT

Basically, “local content” consists of contractual commitments embedded in concession contracts (oil licenses or oil lease licenses in some jurisdictions), whereby the concessionaires are required to procure a minimum percentage of equipment and services from local suppliers. By upping such demands throughout the country’s E&P projects, Brazil aims at fostering the development of a strong local offshore petroleum industry supply chain.

Naturally any obligation imposed on the concessionaires (license holders) will subsequently be mirrored in contracts down the line with their suppliers and contractors.

However, in practical terms, the concessionaires (remembering that Petrobras is likely to have a hand in 90% of all concessions) will require varying levels of local content from their suppliers

and contractors based on the specific type of activity. Technology-intensive products and services will carry a lower local content percentage than low-tech activities will. This is obviously because Brazil still lacks an installed capacity for high-tech work in the offshore industry.

Under Brazil's current regulatory framework, local content commitment is one of the judgment criteria applied in evaluating bidders' offers, together with the Minimum Exploratory Program and the Signature Bonus. In presenting their offers, bidders indicate a specific percentage of local content, which is turned into a number of points used to rank bidders' offers along with other parameters.

Surprisingly, local content policy is not expressly established in Brazil's current Petroleum Law (Law 9.478/97). The development of local industry is mentioned briefly in the section of the law on the national energy policy's main principles.

In the first few bidding rounds conducted by ANP, local content commitment was mainly regulated by concession contract provisions. By 2003, ANP established in Ordinance 180 the specific rules regarding the reporting and monitoring of local content.

In the seventh bidding round, ANP introduced major changes in concession contract provisions and created a guide book for concessionaires to use in monitoring the fulfillment of local content commitments. The impetus, titled Mobilization Program for the National Oil and Natural Gas Industry (PROMINP), introduced in 2003 and first applied to the licenses in the seventh bidding round. Since its inception, PROMINP has significantly raised the participation of local industry in investments in Brazil's oil and gas sector from 57% in 2003 to 75% in the first half of 2009.

This represents \$14.2 billion worth of goods and services purchased in the Brazilian marketplace. Estimates indicate that 640,000 new jobs were created in the sector during the 6-year period. To sum up, commitment to PROMINP significantly increased local participation from \$35 billion in the years 2003–2007 to \$190 billion expected for the years 2009–2013.

With this new scenario, Petrobras and other oil and gas players operating in Brazil will demand locally produced goods and services in increasingly larger amounts. This offers a great opportunity for local companies, even those with

foreign ownership, to supply locally (in the most efficient manner) materials, equipment, components and services in a shorter period of time while still meeting high quality standards. Of course, they must be prepared to move quickly to become enrolled on the vendors' list (CRCC) with Petrobras.

As far as regulation goes, ANP crafted a local content certification system to be applied in concession agreements between ANP and the concessionaires. This complies with contractual requirements established since Round 7. This regulation already constitutes a set of four administrative acts.

The "Local Content Certificate" is a document issued by a "certifier" that is pre-registered with ANP. Currently, the most important certifier is National Organization of the Petroleum Industry (ONIP), which is also the one appointed by Petrobras in almost all of its contracts. ONIP has 2,000 companies registered as members, all of them participating in the supply chain for the offshore petroleum industry.

The certification is conducted according to a template made available by ANP. It states the percentage of local content of the particular good or service hired for measurement. Activities are carried out by an entity duly accredited by the ANP (regardless of commercial relationship) to publicly certify, through issuance of a certificate, that a given good or service is in compliance with the requirements established in the Regulations of Local Content Certification.

According to Administrative Act ANP No. 36, the agreement executed between the certifier and contracting party will necessarily contain: a clear definition of the product, product for temporal use (goods used in rental agreements, charter party, tenancy or operational or financial leasing, etc.), service, subsystem, system or set of systems to be certified.

After President Luiz Inácio Lula da Silva took office in January 2003, he implemented the local content requirements and other measures for the purpose of generating jobs and revenues within the country. Government figures estimate that from 2003 to 2009 a total of some 8 million jobs were created, and the government expects to add an additional 1 million jobs in 2010.

The initiatives even added to the ranks of the formally employed during the 2009 crisis, while inequality was reduced, with the Gini index (the key measure of income inequality) im-

proving from 0.59 in 2002 to 0.55 by 2008—a remarkable achievement for a country once labeled one of the most unequal in the world. **WO**

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