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## **GREATER PLUTONIO, BLOCK 18, ANGOLA**

The Greater Plutonio accumulation lies in 1,200m to 1,500m of water. In 1999, BP drilled the Platina and Plutonio wells using the deepwater drillship Pride Angola, and followed these in 2000 with four more: Galio, Paladio, Cromio and Cobalto. These are all located within 20km of each other and form the Greater Plutonio development.

Later discoveries included the Cesio and Chumbo fields, slightly further to the south and west. If developed, Cesio could potentially be tied back to Greater Plutonio although Chumbo might be developed separately.

The Greater Plutonio development was approved in early 2004. BP Angola and Shell Exploration and Production Angola BV hold the Block 18 exploration permit under a production-sharing contract with Angola's state-owned oil company, Sociedade Nacional de Combustiveis de Angola (Sonangol).

The focus for the exploration campaign has been the northern part of the block, adjacent to neighbouring Block 17. It resulted in eight successes from eight exploration wells drilled.

### **DEVELOPMENT**

Development of Greater Plutonio presents a number of challenges. The fields are spread over a wide area (35km from Platina to Cobalto) with water depth varying from 1,200m to 1,500m. In addition, the group of fields involves reservoirs at different stratigraphic levels.

Plans for the joint development involve the use of subsea wells tied back to a single spread moored FPSO facility with a storage capacity of 2 million bbl. The development concept for Greater Plutonio involves some 43 subsea production and water / gas injection wells. With a 3½-year development timeline, first production is forecast for fourth quarter 2007. Capital expenditure for the development has been estimated at \$4 billion over the life of the fields. This would equate to as much as \$6.50/bbl.

The FPSO vessel is 310m long. Produced gas will initially be re-injected until the Angola LNG project is available (the vessel has 380mmscf of gas compression capacity). The subsea system will include 160km of risers and flowlines and nine manifolds.

The project features some innovative and novel technologies being applied such as a distributed temperature sensing system linked to downhole flow control of water injection, subsea multiphase metering, running trees on wires and an "all-electric" FPSO with high energy efficiency.

### **CONTRACTORS**

BP awarded FMC Kongsberg Subsea a \$270 million contract to supply subsea systems and related services. The FMC unit's scope of supply for the entire project is expected to include 45 subsea trees and associated structures, manifolds and production control systems, as well as connection systems for flowlines and umbilicals.

In 2005, BP signed a further \$80 million contract with FMC Kongsberg for the supply of subsea systems covering installation services and local Angolan supply. FMC Technologies also will supply technical services

related to installation and start-up.

BP also awarded a \$730 million field development contract to a consortium of Stolt Offshore and Technip. The contract covers engineering, procurement, fabrication and installation of risers, umbilicals and flowlines that will serve all six fields. Stolt Offshore will lead the consortium, installing 75km of 12in insulated production, gas injection, and service flowlines and 103km of umbilicals. The consortium will also install 12 FPSO mooring lines, the production manifolds and a single riser tower to hook up the FPSO.

Kellogg Brown & Root is overseeing engineering, procurement, construction and management, and Hyundai Heavy Industries will fabricate the FPSO hull and topside equipment. Emerson was awarded \$9 million for automation of offshore oil production.

WellDynamics and BP signed a multi-well contract for the provision of SmartWell downhole flow control and ancillary completion equipment to manage water injection. The project will require equal numbers of oil production wells and water injection wells. The water injection wells will provide reservoir pressure support and sweep efficiency to ensure optimal reserve recovery. An additional three gas injection wells will be used for reservoir pressure support and to dispose of associated gas production.

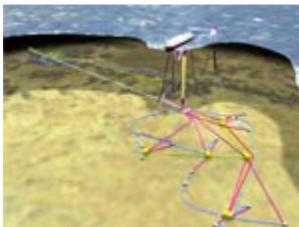
Other contracts for the development include Transocean for drilling contract services.



**The Greater Plutonio accumulation lies in 1,200m to 1,500m of water. Its development involves the use of subsea wells tied back to a single spread moored FPSO facility.**



**The deepwater drillship Pride Angola was used to drill the discovery wells.**



**Greater Plutonio field development layout.**



**The Greater Plutonio FPSO is an "all-electric" vessel with high energy efficiency.**

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