



Rhum

The Rhum field lies 390km north-east of Aberdeen in 109m of water. Discovered in 1977, its' challenging high-pressure, high temperature (HPHT) profile ensured it remained the largest undeveloped gas reservoir in the UK Continental Shelf until 2003, when advanced technology made development possible. When it came on stream in December 2005, Rhum was hailed as one of the North Sea's most significant recent developments and the region's first high-pressure, high-temperature subsea tieback.

Reservoir

The Rhum reservoir consists of fine-grained Upper Jurassic turbidite sands deposited over a tilted fault block.

The produced gas has an H₂S content of 10-20ppm and a CO₂ content of 4-8.5%, and as such is classified as both 'sour' and corrosive.

Facilities

The three initial Rhum development wells are tied back to a subsea manifold via a fully rated to maximum closed-in wellhead pressure and insulated eight-inch flowline, designed to conserve heat during shut-in conditions, thus preventing hydrate formation during shutdowns.

The flows are combined at the manifold and sent to Bruce platform via a single 16-inch diameter, 44km pipe-in-pipe. The pipeline is manufactured from carbon steel with a corrosion-resistant alloy inner sleeve.

The pipeline is rated a pressure below the wellhead shut-in pressure and is protected by a High Integrity Pressure Protection System (HIPPS) – an instrument-based system designed to protect against over-pressurisation. HIPPS, installed at the Rhum production manifold, consists of three pressure transmitters, voting logic and two high-integrity, fully-rated isolation valves. Control logic initiates closure of the isolation valves before the pressure at the manifold reaches the pipeline design pressure. After approximately eight years of production, the reservoir pressure will have fallen to a level that cannot damage the pipeline and at this time the HIPPS will be disabled.

Process

Rhum gas and associated fluids tie in to a newly installed, dedicated separator on the Bruce CR Platform. Rhum gas is then piped via a bridge link to Bruce processing plant at the second stage suction of the compression train, upstream of the dehydration unit on the Bruce Platform Utilities Quarters (PUQ). Equipment for allocation metering and chemical injection of IMS, scale inhibitor and H₂S scavenger, was also installed.

Processed Rhum gas is exported via the Bruce gas export pipeline to the Frigg Transportation Pipeline System and onwards to the Transco network for distribution and sales. Associated

condensate is exported via the Bruce fluids export system to the Forties Pipeline System. Associated water is re-injected into an existing Bruce disposal well.

Low Pressure Booster Compression Project

In parallel with the Rhum development, the Bruce Partners installed new compression facilities on the CR platform to allow the platform operating pressure to be lowered from 33 barg to 9 barg. The Low Pressure Booster Compression (LPBC) project achieved sanction at the same time as Rhum. Alignment with the Rhum Project allowed significant cost savings and the benefits of an integrated topsides module. LPBC first gas was achieved in 1Q 2005.

Field characteristics

Location	390km north-east of Aberdeen and 44km north of Bruce field
Block number	3/29
Host platform	Bruce
Block awarded	1972
Discovered	1977
Development sanctioned	Spring 2003
Reservoir	High pressure (12418psi at 4745m in TVDSS) High temperature (150o C at 4745m in TVDSS)
Fluids	Gas condensate
Gas initially in place	1.1 trillion cubic feet
Recoverable reserves	800 billion cubic feet
Field life	16 years
Partners	BP (Operator, 50%), Iranian Oil Company (IOC) UK (50%)
Water depth	110m
First gas	17th December 2005
Development cost	£350 million
Integrated module weight	1900 tonnes
Built	Wallsend, UK
Plateau production	300mmscfd
No of wells	3