

PETROJARL BANFF





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THE PETROJARL BANFF BEGAN PRODUCING FROM THE BANFF FIELD 30 JANUARY 1999. A PURPOSE-BUILT, TURRET-MOORED VESSEL, THE SHIP EMPLOYS A UNIQUE WEDGE SHAPED DESIGN. THE DOUBLE-HULL SHIP HAS A BEAM WHICH EQUALS 45% OF THE LENGTH OVERALL. THE TURRET IS LOCATED FORWARD OF MIDSHIPS, ALLOWING THE SHIP TO 'WEATHER VANE', OR TURN WITH THE WIND AND WAVES.



Petrojarl Banff - Location of the Field



OPERATING EXPERIENCE

PETROJARL BANFF is currently producing under contract to CNR International in the Banff and Kyle Fields in blocks 29/2a and 22/27a in the UK sector of the Central North Sea, approximately 200 km east of Aberdeen, Scotland in 90 m water. Peak production of about 60,000 barrels of oil per day (bopd) was achieved in July 1999. By December 2006, the FPSO has produced approx. 40,9 mmbbls from the Banff and Kyle Fields.

One well from the Kyle Field was tied back to the PETROJARL BANFF in 2004. In September 2005 the remaining three wells were tied back to PETROJARL BANFF.

SPECIFICATIONS PETROJARL BANFF FPSO

Field Operator (Banff/Kyle Fields)	CNR International (UK) Ltd.
Duty Holder (Banff/Kyle Fields)	Teekay Petrojarl ASA
Design	Roar Ramde/PGS Offshore Technology
Builder	Hyundai Mipo Dockyard (HMD) Ulsan, South Korea
Start of Construction	March 1997

OTHER FACILITIES

Cranes	2 main, 1 deck stores
Accommodation	60
Helideck	S61N
Lifesaving	Pressurized evacuation tunnel, free fall lifeboats

OPERATING PARAMETERS

Design criteria	100-Year Storm
Water depth	Currently moored at 95m, upgradeable

MAIN PARTICULARS

Type: Floating Production, Storage and Offloading vessel (FPSO)

Length overall	120.7 m (395 ft)
Breadth	53.5 m (175 ft)
Depth	16.5 m (54 ft)
Draught	11.5 m (38 ft)
Displacement	32,287 mt
Oil storage	120,000 bbls
Slop tanks	500 m ³





PRODUCTION CAPACITIES

Production is characterized by the following throughput capacities:

Crude:	95,000 bopd
Water injection:	90,000 bwpd
Gas compression:	85 mmscfd
Risers/umbilicals:	3 production risers, 1 gas injection riser, 1 oil export riser, 1 gas export riser, 2 umbilical risers, expandable up to 10 risers plus 1 umbilical riser

The given capacities are nominal and based on typical North Sea crude. The actual capacities will depend on specific gravity, GOR, pressure etc. Furthermore the process plant is designed with flexibility for modifications. Increased throughput and improved product specification can be achieved to meet the specific field requirements.

LAYOUT

The ship is arranged, from forward to aft, in the following sequential order:

- Helicopter deck
- Accommodation area
- Engine and control rooms
- Turret area
- Process area
- General facilities including power generation
- Flare tower

CLASSIFICATION

Classification: DNV + 1A1 Ship Shaped Oil Production Storage Unit, Posmoor TA, Crane, Heldk-SH, EO.

REGULATIONS

The vessel complies with all current UK rules and regulations.



Picture showing main layout of the FPSO.

SUBSEA SYSTEM

The Banff and the Kyle Fields are tied back to **PETROJARL BANFF**.

SUBSEA SYSTEM BANFF

The subsea development consists of four production wells and one gas injection well. The subsea wells are tied back to two subsea manifolds (1.6 km from the FPSO) and in turn to the FPSO through a system of flowlines and dynamic risers. The manifolds can accommodate further wells if required.

SUBSEA SYSTEM KYLE

The subsea development consists of four production wells located on two drill sites about 12 and 17 km from the FPSO. The wells are tied back to the FPSO through an 8th inch flowline and dynamic riser. The subsea facilities can accommodate further wells.

MANIFOLD AND SWIVEL SYSTEMS

Production fluids can be commingled in the subsea manifold and/or in the production manifold, downstream of the turret and swivel stack. The fluids are then routed to the FPSO's process facilities where the crude oil is stabilized and de-watered prior to being exported to a remote shuttle tanker, or, as circumstances dictate, routed to the FPSO storage tanks.

PROCESS SYSTEM

Process equipment is mounted on raised decks located above the ship's main deck. The main systems located within the process plant comprise the separation trains, produced water treatment, seawater injection, gas dehydration, gas compression, cooling and heating medium and fuel gas system.

The turret can accommodate up to 10 risers but initially, only the following risers are installed:

- Two production risers (10")
- One production riser (8")
- One gas injection riser (8")
- One oil export riser (12")
- One gas export riser (8")
- Two umbilicals

Within the turret, each line is connected to a hydraulically activated ESD valve.

FLARING SYSTEM

As a consequence of a minimum flaring philosophy, all separator off-gas not used for fuel is captured for recompression and exported via pipeline. This is achieved using:

1 x 100% electric driven LP and MP Recompression train

1 x 100% electric driven HP and Export Compression train

OFFLOADING SYSTEM

Oil is exported directly to an FSU moored to a Single Turret Loading System (STL). Shuttle tankers, equipped with dynamic positioning equipment, transport the oil to market. Banff gas is exported into the Central Area Transmission System (CATS).

STATIONKEEPING SYSTEM

The turret provides the connection between the vessel and the mooring system, transfer risers and umbilical. The main elements of the stationkeeping system are:

- 10 mooring lines set in five pairs made of wire and chain components attached to drag embedment anchors
- 10 drag embedded anchors

The mooring system has been designed to ensure that all DNV POOSMOOR damaged case safety factors can be met without the need to use the vessel thrusters.

UTILITES

The majority of the machinery and utility systems are arranged in the aft section.

ELECTRIC POWER

- Two dual fuel ABB GT35's, 16.1MW each
- Two Wärtsila WN16V25 diesels, 3.5 MW each
- Emergency generator, Cummins Diesel, 800 kW

SERVICE AIR

Ships and Process dedicated.

WATER

Two fresh water generators, each with a capacity of 25m³ per day, produce fresh water by evaporation of seawater. The main heat source is waste heat from the turbine generators. There is an electric heater back up, to enable 12.5m³/h of freshwater generation.

COOLING WATER

Service water lift pumps are used to deliver seawater to the topsides facilities.

FIRE WATER

Three independent 100% duty, diesel/hydraulic firewater pumps. Flowrate of 1500 m³/hr represents 100% pump duty, however the pump is capable of operating at 150% duty flow and 65% duty head.

CRANES

Two electro-hydraulic pedestal type offshore cranes are installed on the main deck, one port and one starboard, in order to load and unload from supply boats as well as moving heavy items during maintenance and other activities. The overlapping radii of the two deck cranes and the forward "stores crane" ensure ease of access to all major equipment and laydown areas. This smaller crane rated for 8 tonne at 17m radius is mounted on the accommodation roof, primarily for the accommodation supplies and engine room maintenance purposes.

ACCOMMODATION

Accommodation is provided for 60 personnel although core manning for normal operations is 42 including catering. The accommodation is located forward of the H120 fire/blast wall and incorporates the living quarters, CCR and incident management areas, offices, and the entrance to engine room and other machinery.

SHUTTLE TANKERS

Teekay Petrojarl is currently operating two shuttle tankers, specially equipped for operations with FPSOs. The shuttle tankers are PETRONORDIC (92.995 tdw) and PETROATLANTIC (92.995 tdw).

In addition Teekay Petrojarl owns the shuttle tanker RITA KNUTSEN (124.472 tdw) which presently is on bareboat charter to Knutsen OAS Shipping.

FSU

The APOLLO SPIRIT was installed on the Banff Field in August 2000 as a permanent FSU loading through an STL loading system.





COMPANY BACKGROUND

Teekay Petrojarl is the largest operator of Floating Production, Storage and Off-loading (FPSO) vessels in the North Sea. With a combined production capacity of 350,000 barrels of oil per day and a crude storage capacity of more than one million barrels, we have a long, proven track record in safely operating FPSO vessels in one of the harshest environments in the world.

Teekay Petrojarl owns and operates five FPSOs of which two are on each of the Norwegian and UK Continental shelves and one offshore Brazil. The company currently has another FPSO under construction in Singapore for the production of oil for Petrobras in 2012. All production units are under contracts producing for oil and gas companies. Our operating fleet also includes two shuttle tankers, one storage tanker and a 40% ownership in the FPSO Ikdam, operating offshore Tunisia.

With our head office in Trondheim Norway and operations offices in Aberdeen and Macaé, Brazil as well as a site office in Singapore, our 700 employees offshore and onshore possesses a unique blend of operational, engineering and professional expertise.

