

DECOMMISSIONING OVERVIEW: NINIAN CENTRAL PLATFORM

Introduction

The Ninian Central Platform (NCP) is located in the UK sector of the North Sea, approximately 120 km east of the Shetland Islands and 460 km north-north-east of Aberdeen in UKCS Block 3/3a. Built in Loch Kishorn in north-west Scotland, the 623,000 tonne concrete gravity based structure (CGBS) was at the time of construction the world's largest man-made movable object.

The platform was towed to its current position in May 1978 where it was lowered to the sea floor and commissioned as part of the Ninian field development, comprising the now-decommissioned Ninian Northern Platform (NNP), the Ninian Southern Platform (NSP) whose decommissioning planning is currently in progress, and tied back subsea facilities; together all of these are known as the Ninian 'Hub' (see Figure 1).

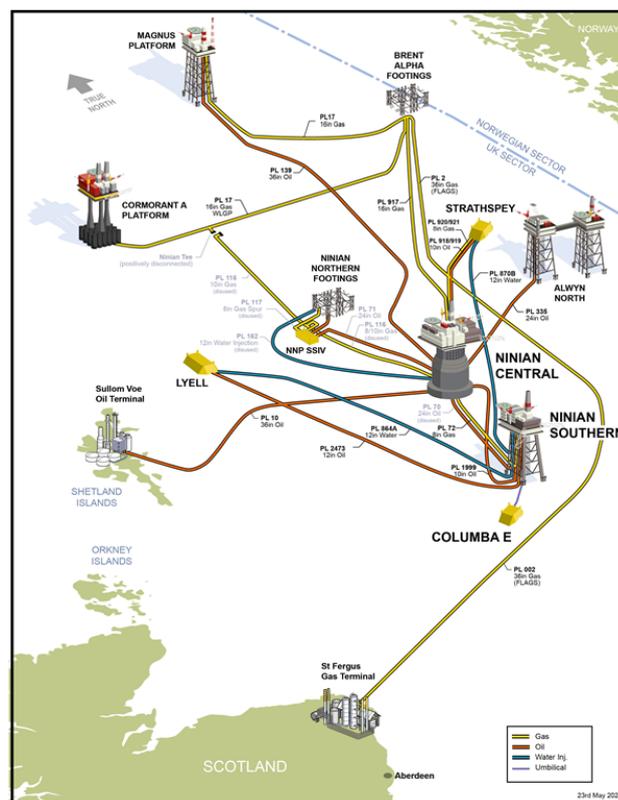


Figure 1: Ninian Southern Platform – Location

Ninian Central was designed to operate as a combined drilling, production and gathering facility serving the Ninian Hub and satellite fields. Oil and gas production from the platform began in April 1979.

Platform Characteristics

The CGBS, originally designed by Howard Doris, has an overall height of 155 m, standing in a water depth of 133.3 m (Lowest Astronomical Tide). Circular in design (see Figure 2), it stands upon a 140 m diameter base slab which supports seven concentric circular walls braced by eight radial diaphragm walls. The structure is restrained laterally by a pattern of steel skirts which penetrate 4 m into the clay subsoil. The base and all walls are bound into a single structural unit by a complex system of steel reinforcement and pre-stressed cables encased within the concrete to accommodate oil storage. The 'cells' represent the annuli (gaps) formed by walls 2 to 5 which are capped by concrete domes.

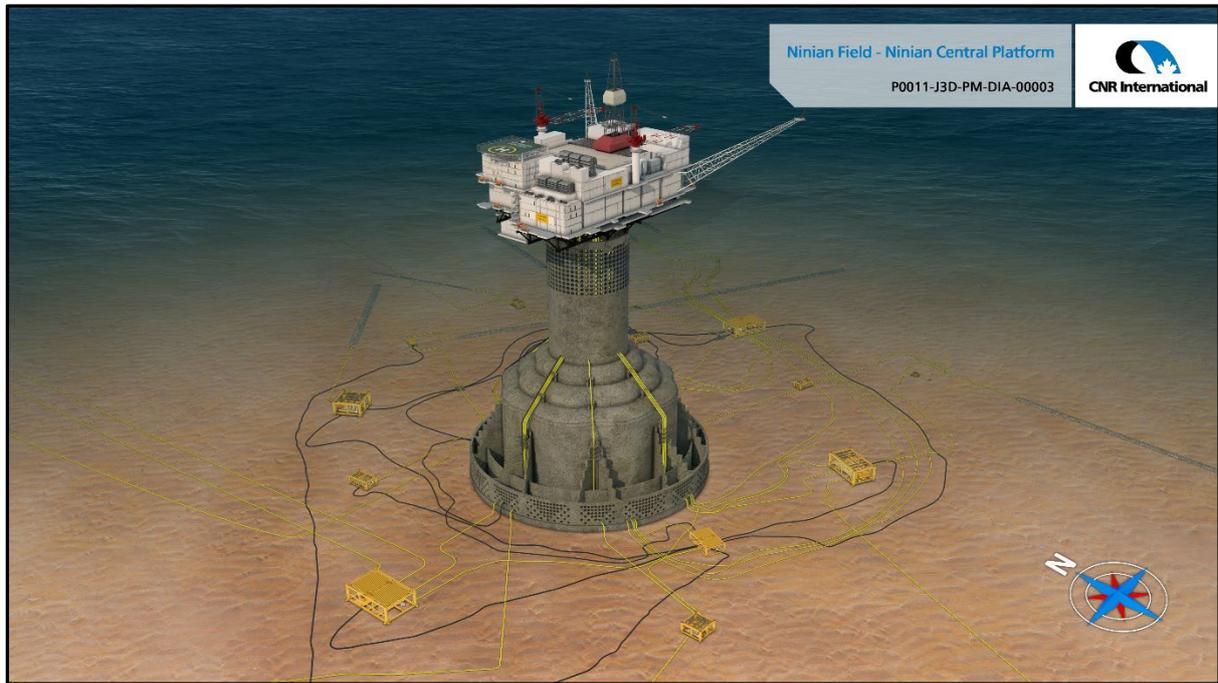


Figure 2: Ninian Central Platform

Concrete Gravity Base Cells

Following a thorough review, CNRI are confident the concrete cells in the base of the structure were never used for oil storage. A lengthy data search of the original construction and operations documentation provided by the previous owners of NCP has been performed to ascertain the historical and current status of the concrete cells. After careful examination of the data, including third party inspection reports and discussion with the original design engineers Doris, consideration was given during design to use the cells as oil storage. However, this option was discarded at an early stage of the platform construction. In addition, the export pipeline to Shetland (Ninian Pipeline 'PL10') was available at the time of NCP first oil, removing a requirement for temporary storage. The cells were used for ballasting purposes during construction, tow-out, and final set-down on the seabed, following this the ballasting control equipment was removed.

Figure 3 (overleaf) shows a cross section of the structure.

The two innermost walls of the CGBS are the central shaft (wall 1) and the 'Jarlan' breakwater wall (wall 2). The Jarlan wall was designed to dampen wave action in the splash zone at water level. Both of these walls rise above sea level to provide support for the module support frame and platform modules. The central shaft also provides storage capacity for drilling water and diesel although the diesel is no longer stored in the base but on top of the water column within the central shaft. This is because the central shaft flooded with sea water in 2004, necessitating modifications for diesel storage.

All but two risers and J-tubes are supported on the external wall of the central shaft. Caissons are supported off the inside face of wall 2. Conductor guide frames are supported between walls 1 and 2. All other walls are submerged. The annuli (concentric circles) formed by walls 2 to 5 are capped by precast concrete domes to form sealed cells which are filled with seawater. Circular walls 6 and 7 act as stiffeners for the base slab and diaphragm walls. In addition, wall 7 is perforated to provide an anti-scour facility.

An informative 20 minute film on the construction and tow out of the Ninian Central Platform which gives an excellent insight into the structure is available to view on the National Library of Scotland [Moving Image Archive](#).



Figure 5: Topsides (South Face)

Planning for Decommissioning

Today, NCP is approaching the end of economic production, after significantly exceeding its original design life of 30 years. Planning has therefore commenced for the decommissioning of the facilities in line with regulatory guidance, including the development of Decommissioning Programmes (DPs) for public and statutory consultation, and for regulatory approvals. Two discrete documents will be developed covering programmes for the Topsides and the CGBS:

- 1) The Topsides DP which will be focused largely on the structure above the water line, including plugging and abandonment of the platform wells, flushing and cleaning and making safe of the topsides, including the connections to third party facilities and satellite fields, removal of the topsides and cutting the associated risers and umbilicals down to the top of the sub-structure Jarlan wall.
- 2) The DP for the CGBS which will describe the activities required to safely decommission the substructure supporting the topsides including the internals such as conductors, risers, J-tubes and other components

For the development of the CGBS DP, a more comprehensive process of assessment is required than for the Topsides because of the particular challenges associated with a structure of this size and weight: the CGBS was not designed for removal. Studies exploring the decommissioning options for the concrete sub-structure have therefore been initiated to examine the potential for removal, for example by refloat and for piece-small deconstruction. These will include expert assessment of the feasibility and potential safety and environmental impacts of the different decommissioning options.

The complexities of the decommissioning challenge associated with NCP are acknowledged under international rules. While the starting point for development of the sub-structure DP is an examination of full removal options, under OSPAR Convention [Decision 98/3](#), the platform is classed as a derogation candidate from the 'clear seabed' requirement as a gravity based concrete installation, meaning that a leave in place option for the sub-structure *may* be permitted. For this, an authoritative comparative evaluation of alternative decommissioning end points against five key criteria would need to be carried out, namely: environment, safety, societal, and technical feasibility, plus cost (as a differentiator only where other criteria are equal).

It should be noted that the production of two separate DPs for NCP will not prejudice options for decommissioning the substructure, but will allow the full examination of options for the CGBS to be thoroughly explored and assessed by regulators over a longer timeframe than is required for the preparation of the Topsides DP.

Infrastructure associated with NCP including the Strathspey and Columba facilities will be decommissioned as part of a separate Subsea DP for the Ninian Hub, to be developed and submitted for regulatory approval on a standalone basis after appropriate studies and investigations have been carried out.

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