

# Dungeness 'A' and Wylfa Power Stations

**Client :**  
BNFL Magnox Generation

**Designer :**  
BNFL Magnox Generation /  
Atkins

**Location :**  
Dungeness, Kent  
Wylfa, Anglesey

**Date :**  
1999 - 2001



The Dungeness 'A' and Wylfa contracts are both excellent examples of BAM Nuttall's ability to manage and deliver complex projects in highly controlled, demanding environments.

## Dungeness

The initial five month Phase 1 contract at Dungeness 'A' nuclear power station in Kent involved the seismic strengthening of the exterior boiler cell walls in both reactor buildings.

Phase 2 provided seismic modifications within temporarily declassified areas and took place during the scheduled reactor 1 outage.

Phase 3 comprised similar modifications during a special outage arranged for reactor 2.

Having successfully completed work at Dungeness, the entire BAM Nuttall team transferred to Wylfa nuclear power station, Anglesey to work as part of a multi-disciplinary team on the Superheater Header Restraint project, which was designed to return the power station to service by Summer 2001.



Phase 1 works at Dungeness 'A' involved the fabrication and installation of steel restraint brackets, which were fixed using Liebig anchors in percussion drilled holes. Sleeved dowel bars were also installed using diamond drilling techniques

Phase 2 works, which centred on reactor 1, included the controlled load transfer and installation of new bearings to the 1000t concrete steam drum housings, carbon fibre reinforced polymer grid reinforcement, toggle bolt drilling and installation, Liebig anchors, bonded plates, capping beam to roof parapet reinforcement, steam drum housing dowels and tensile threaded bar restraints.

Whilst it was possible to program Phase 2 works to coincide with the planned Reactor 1 Outage, the subsequent Phase 3 works to Reactor 2 were carried out within a special 'hot' outage, with the boilers being kept on-line and a system of forced air ventilation used to minimise hot working conditions. Pipe freezing isolation techniques were used to facilitate quick steam pipe diversions.

Throughout all the phases of work, numerous electrical and plant diversions were planned and undertaken before works could commence. The work at Dungeness took place within Radiation or Contamination Controlled Areas. BAM Nuttall and Magnox staff worked closely together in the preparation of all method related and quality documentation for submission to the Nuclear Installations Inspectorate.

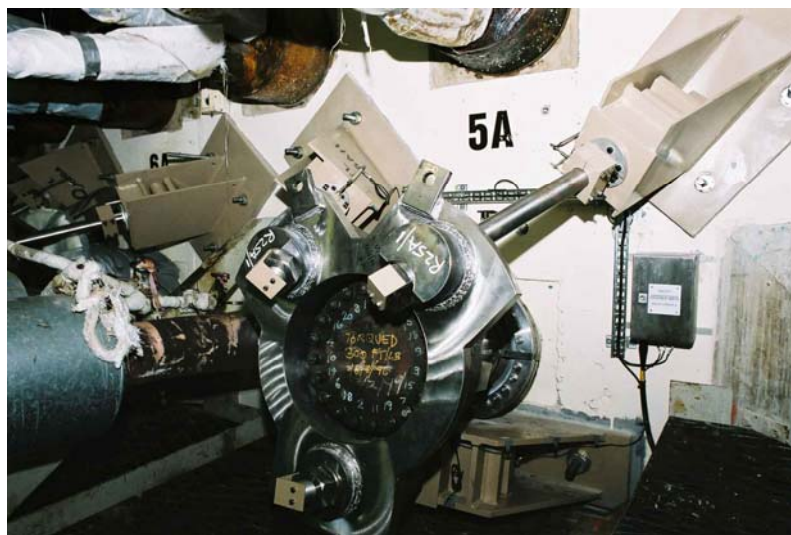


## Wylfa

The work at Wylfa Nuclear Power Station again comprised the development of method and quality documentation, with a programme of full-scale trials, leading to the installation of fabricated steel restraint assemblies to 64 'Superheater Header' pipes, which carry superheated steam from two pre-stressed concrete reactor pressure vessels. The fabrication of high-precision steel bracket assemblies was managed by BAM Nuttall through a nominated sub-contract.

Liebig anchors in diamond core drilled holes were used to fix the brackets. The brackets were connected to a forged steel restraint ring by high-yield threaded tie bars, each with an integral crush tube assembly. BAM Nuttall also carried out hot and cold commissioning work as part of the return-to-service procedure.

Approval for drilling and installation methods at Wylfa was granted by the Nuclear Installations Inspectorate after detailed trials on full scale mock ups developed by BAM Nuttall. All quality and safety documentation was scrutinized by The Independent Nuclear Safety Administration [INSA] and a Third Party Inspection Authority.



## Innovations

The geometry of each bracket/tie bar assembly relative to the pressure vessel wall was complex. BAM Nuttall developed a laser guided survey jig, which facilitated the accurate measurement of tie rod angles. This innovation proved fundamental to the success of the project.

There were known to be numerous embedded items in the pressure vessel walls, including steel reinforcement, pre-stressing tendons and cooling water pipes, all of which could not be damaged during drilling. As such, a cut-out device was developed for a percussion drill, so that it would immediately cut-out upon contact with a metallic object. This proved highly successful, with no embedments unknowingly damaged during the project.

Over the duration of the Wylfa contract, in excess of 4000 holes were percussion drilled and over 700 holes were diamond drilled into the pressure vessel.