The World's Reactors
No. 43

Hinkley Point B

DESIGNER AND CONTRACTOR
The Nuclear Power Group Ltd., Knutsford, Cheshire, England.

OWNER OPERATOR
Central Electricity Generating Board

LOCATION
Hinkley Point, Somerset, England

TYPE
Advanced Gas-cooled Reactor

CONSTRUCTION SCHEDULE
Site work started: September 1967
Full power operation: 1972

CAPACITY
Net output: 2 x 625 MW(e)
Gross generation: 2 x 660 MW(e)
Thermal efficiency: 41.7%

REACTOR
Reactor heat: 1500 MW(t)
Mean channel gas inlet temperature: 310°C
Mean channel gas outlet temperature: 665°C
Total gas mass flow: 7743 lb/s (3512 kg/s)
Weight of uranium per reactor: 122.5 te
Mean fuel rating: 5.1 MW(e)/teU
Discharge irradiation: 18000 MWd/teU

CORE
Active core diameter: 30 ft (9.1 m)
Active core height: 27.2 ft (8.3 m)
Number of fuel channels per reactor: 308
Diameter of fuel channels: 10.375 in (263.5 mm)
Number of control rod channels: 81
Diameter of control rod channels: 5 in (127 mm)
Lattice pitch (square): 18.1 in (460 mm)

FUEL ELEMENT
Material: UO_2 pellets, stainless steel clad
Type of element: 36 pin clusters in graphite sleeve
Number of elements per channel: 8
Element length: 40.8 in (1039 mm)
Pin diameter: 0.60 in (15.25 mm)
Inner sleeve diameter: 7.5 in (190 mm)
Enrichment: flattened zone, first charge: 1.4% feed: 1.7%
unflattened zone, first charge: 2.1% feed: 2.6%

CIRCULATORS
Type: Encapsulated, centrifugal
Drive: Constant speed electric motor
Flow control: Variable guide vane
Number of circulators per reactor: 8
Power consumption per reactor: 28 MW(e)
Speed: 2970 rev/min
Circulator outlet pressure: 615 lb/in² abs (43.2 kg/cm² abs)
Circulator outlet temperature: 282°C

BOILERS
Total heat transferred per reactor: 1516 MW(t)
Bulk gas inlet temperature: 654°C
Bulk gas outlet temperature: 276°C
Gas mass flow per reactor: 7668 lb/s (3478 kg/s)
Super-heater steam flow: 1076 lb/s (479 kg/s)
Super-heater outlet pressure: 2418 lb/in² (170 kg/cm²)
Super-heater outlet temperature: 541°C
Re-heater steam flow: 977 lb/s (443 kg/s)
Re-heater inlet pressure: 610 lb/in² (42.9 kg/cm²)
Re-heater inlet temperature: 343°C
Re-heater outlet pressure: 590 lb/in² (41.5 kg/cm²)
Re-heater outlet temperature: 541°C
Number of boiler units per reactor: 12

VESSEL
Internal diameter: 62 ft (18.9 m)
Internal height: 63.5 ft (19.35 m)
Working pressure: bottom slab:
615 lb/in abs² (43.2 kg/cm² abs)
Working pressure: top slab :
579 lb/in abs² (40.7 kg/cm² abs)

TURBO GENERATOR
Gross output: 660 MW(e)
TSV pressure: 2315 lb/in² (162.8 kg/cm²)
TSV temperature: 538°C
IP cylinder TSV pressure: 565 lb/in² (39.7 kg/cm²)
IP cylinder TSV temperature: 538°C
Vacuum: 28.7 in Hg (729 mm Hg)
Final feed water temperature: 156°C
Power factor: 0.85

Drawings by John Way, MSIA,
National Trade Press Studio

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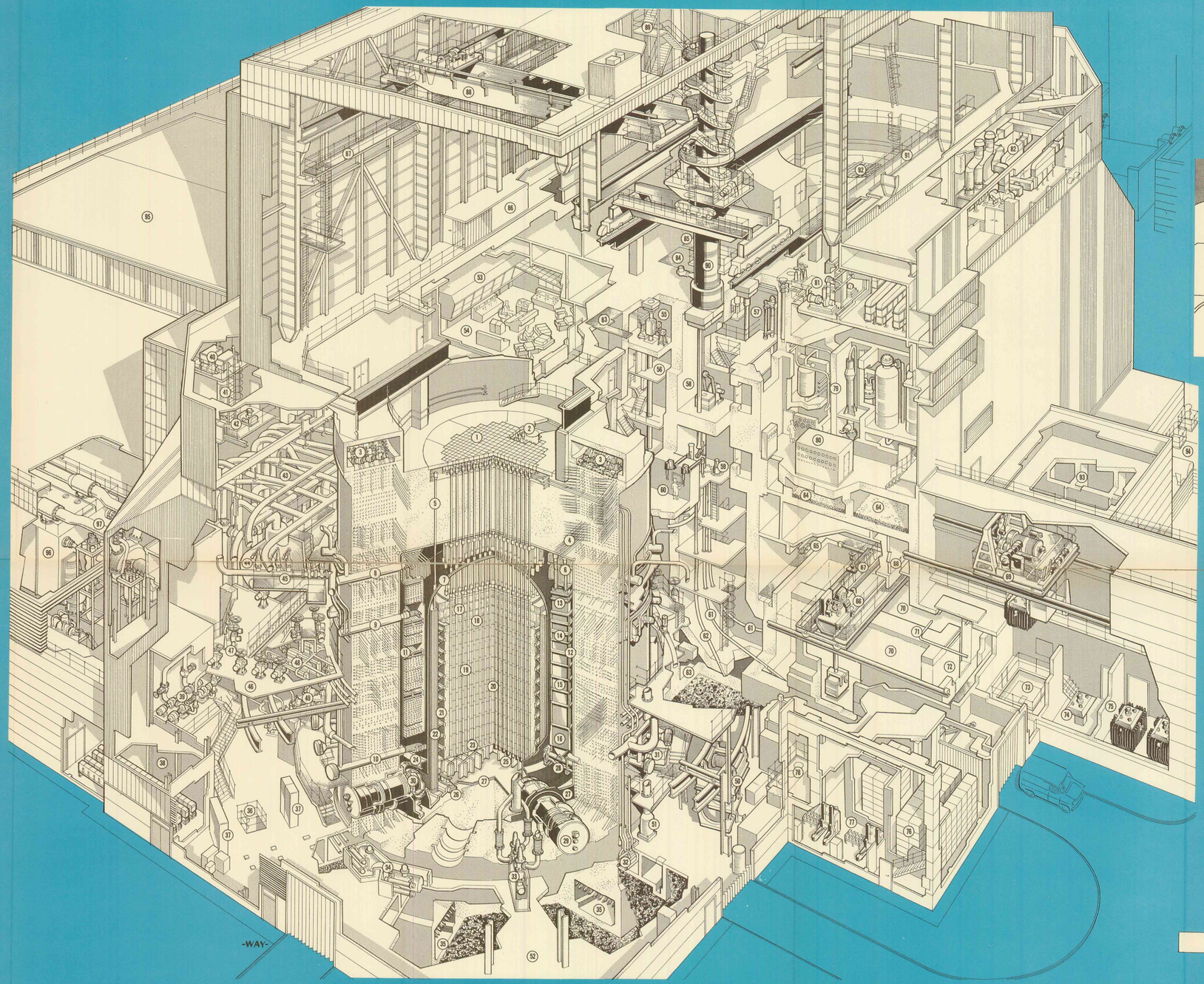
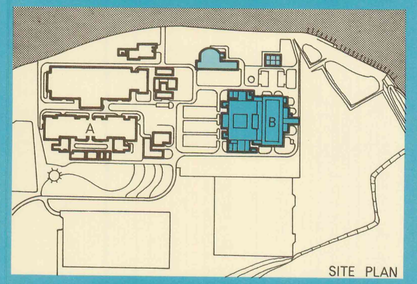
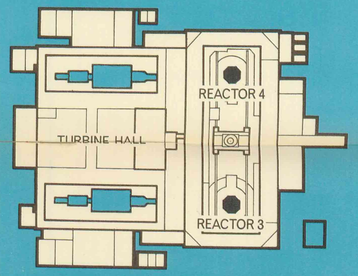
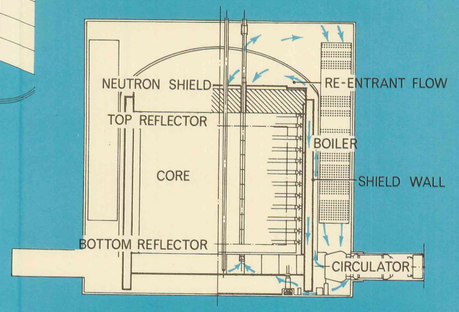




SITE PLAN





1. Charge face, reactor 3 (121 ft. 6 in.)
2. Permanent access penetration
3. Upper stressing gallery
4. Helical stressing cables
5. Flux measuring penetration
6. Reheater slings
7. Gas baffle
8. Reheat penetration
9. Main steam penetration
10. Feed penetration
11. Boiler 16
12. Boiler 15
13. Reheater
14. Superheater
15. Evaporator
16. Economiser
17. Neutron shield
18. Top reflector
19. Graphite core
20. 308 fuel channels (8 elements per channel)
21. Restraint rods
22. Boiler shield wall
23. Bottom reflector
24. Circulator outlet gas duct
25. Reactor diagrid
26. Reactor roller supports
27. Thermal insulation
28. Boiler support beam
29. Circulators (8 per reactor)
30. Circulator closure dome
31. Decay heat penetration
32. Pressure vessel cooling water mains
33. Gas relief valves and filters
34. Oil tanks and coolers
35. Lower stressing gallery
36. Access to lower stressing gallery
37. Circulator gauge boards
38. Battery room
39. De-gasser extraction pumps
40. De-gasser pressure setting tanks
41. De-gasser
42. De-gasser vacuum pumps
43. Steam pipe well
44. Start-up vessel
45. L.T. relief valves and access platform
46. 66 ft. level platform
47. Steam valves (pedestal control)
48. Pressure vessel treated water coolers
49. Auxiliaries system treated water pumps
50. Circulator house crane grab
51. Boiler emptying vessels
52. Ground floor (34 ft. 6 in.)
53. Control room viewing gallery
54. Control room
55. New fuel cell
56. Lower new fuel cell
57. Upper maintenance room
58. Irradiated fuel dismantling cell
59. Bottling machine
60. Manipulators
61. Fuel disposal tubes
62. Tie rod disposal tubes
63. Debris vault
64. Waste dessicant vault
65. Pond maintenance hoist
66. 3 ton skip crane
67. Fuel manipulator
68. Fuel manipulator handling bay
69. 50 ton flask crane
70. Pond bays
71. De-ionised water spray
72. Flask bay
73. Flask decontamination bay
74. Lid storage bay
75. Flask storage bay
76. New fuel store
77. Conveyancer trucks and battery charging room
78. Resin filling connections
79. Gas by-pass plant
80. Gas by-pass plant instrumentation
81. Gas blowdown plant
82. Contamination vent plant room
83. Hoist well cover
84. Test facility cover
85. Charge machine maintenance well cover
86. Charge hall viewing gallery
87. Charge hall crane access walk way
88. Charge hall crane
89. Charge machine access staircase
90. Charge machine
91. Charge machine access walkway
92. Reactor 4
93. Sludge tanks
94. CO_2 storage tanks
95. Turbine hall
96. Turbine 7
97. H.P. steam lines

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