The World's Reactors No. 62

CALVERT CLIFFS NUCLEAR POWER STATION
Units I & II

DESIGNER & CONTRACTOR
Nuclear Steam Supply System and Nuclear Fuel:
Combustion Engineering Inc.
Balance of Plant, Systems and Structures:
Bechtel Corporation

OWNER & OPERATOR
Baltimore Gas & Electric Co., Maryland

LOCATION
Lusby, Maryland, U.S.A.

TYPE
Pressurized water; fuel-slight enriched UO_2; Zircaloy clad; chemical shim; 2570 MW(th), 883 MW(e)

CONSTRUCTION SCHEDULE

Site work started	Summer 1968
Reactor critical	Summer 1974
Full power operation	Fall 1974

all data below refer to one reactor turbine unit, the values for each unit being identical

CAPACITY

Gross generation	883 MW(e)
Net electrical output	868 MW(e)
Overall station net efficiency	868/2570 = 33.8%

REACTOR CORE

Reactor output	2570 MW(th)
Core length	136.7 in equivalent (3.48 m)
Core diameter	136 in (3.45 m)
Number of fuel assemblies	217

FUEL

Fuel material	Slightly enriched UO_2
Total quantity of UO_2	207 222 lb (93 480 kg)
Discharge irradiation	12 000 MWd/te average
Number of pins per assembly	176
Pellet diameter	0.380 in (9.64 mm)
Clad material	Zircaloy-4
Clad thickness	0.025 in (0.66 mm)
Enrichment levels	2.99, 2.45, 2.05 w/o

CONTROL

Number of control element assemblies	77
Number of part length assemblies	8
Absorber material	B_4C
Drive type	Magnetic jack
Stroke length	137 in (3.35 m)
Number of fingers per assembly	5

THERMAL DATA

Steam flow	11.27×10^6 lb/h (5.1×10^6 kg/h)
Steam pressure	850 psia (59.7 kg/cm^2)
Steam temperatures:	
Saturated steam operation	525.2°F (274°C)
Feed water temperature	430°F (221°C)

REACTOR PRESSURE VESSEL

Inside diameter	172 in (4.37 m)
Overall height	504 in (12.8 m)
Average wall thickness	8.5 in (217 mm)
Thickness of SS cladding	0.25 in (6.35 mm)
Design pressure	2500 psia (175.75 kg/cm^2)
Design temperature	650°F (343°C)
Material	A-533
Weight (incl. vessel head)	878 900 lb (398 700 kg)

TURBINE

Type	Tandem-compound, 1 HP 3LP turbines
Speed	1800 rev/min
Boiler steam at turbine inlet:	
Pressure	815 psia (57.3 kg/cm^2)
Temperature	520.3°F (271°C)

CONDENSER

Type	3 shell, 1 pass, divided water boxes
Design	5.910×10^9 Btu/h (1.487×10^9 kCal/h)
Heat transfer area	453 000 ft^2 (42 100 m^2)
Design pressure:	
Shell	29.5 in Hg vacuum (749 mm Hg)
Water box	25 psig (1.75 kg/cm^2)

GENERATOR

Design	Hydrogen inner cooled
Speed	1800 rev/min
Rating	1020 MVA
Terminal voltage	25 kV
Power factor	0.9
Frequency	60 Hz

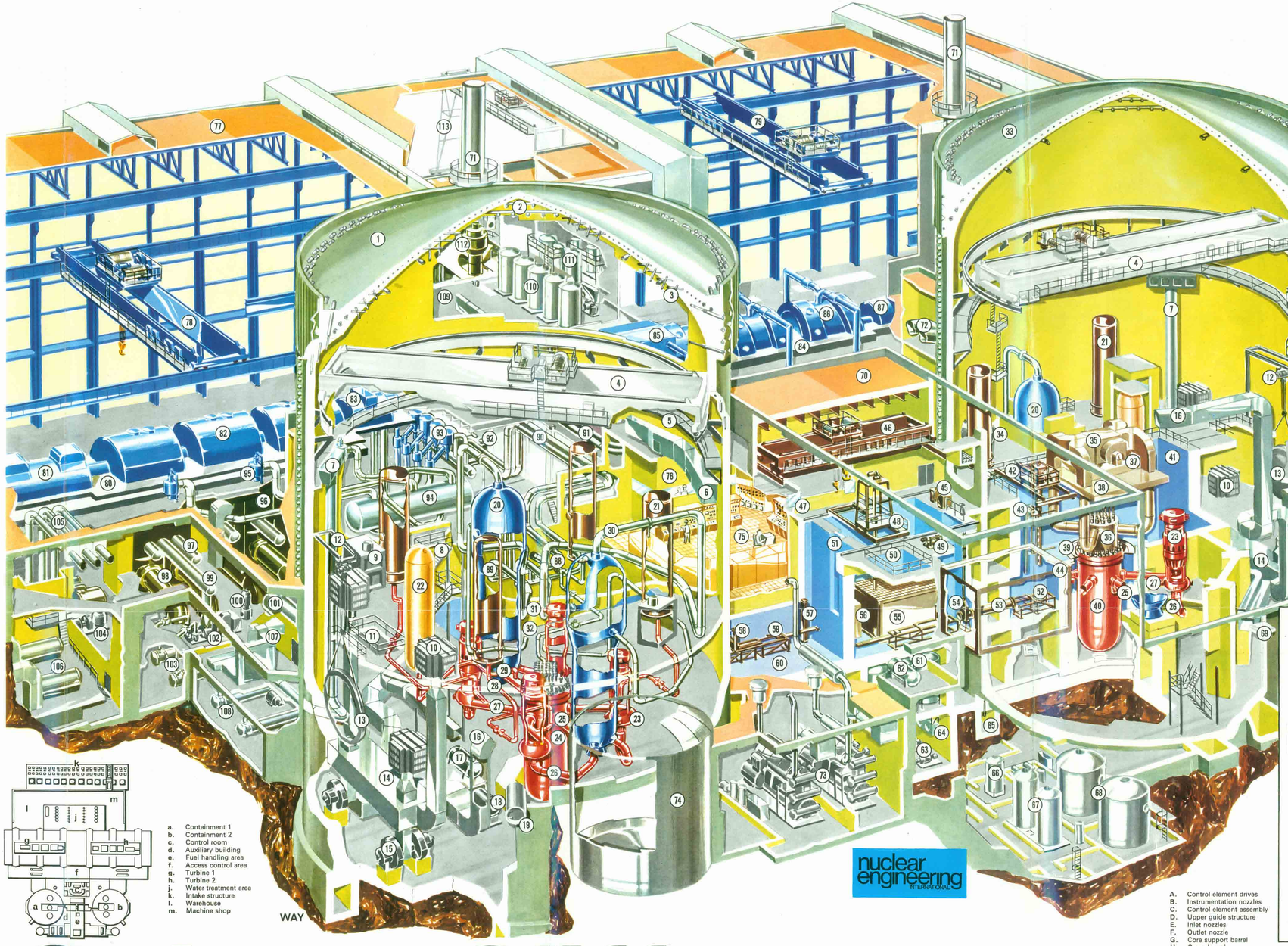
MAIN TRANSFORMER

Rated power	500 MVA
High voltage rating	500 kV
Low voltage	25 kV

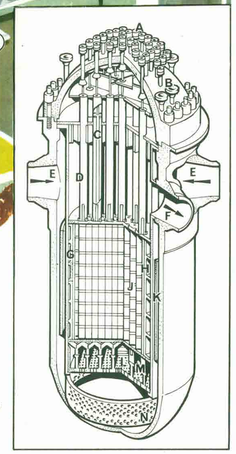
CONTAINMENT

Type	Post tensioned, reinforced concrete, cylinder and dome
Diameter	130 ft (39.6 m)
Height	182 ft (55.4 m)
Wall thickness	3.75 ft (1.14 m)
Foundation slab thickness	10 ft (3.05 m)
Design pressure	50 psig (3.52 kg/cm^2)
Design temperature	276°F (136°C)
Free volume	2×10^6 ft^3 (56×10^3 m^3)

NUCLEAR ENGINEERING INTERNATIONAL May 1974
© IPC Business Press Ltd., 1974
Nuclear Engineering International
Dorset House, Stamford Street,
London, SE1 9LU, England



a. Containment 1
b. Containment 2
c. Control room
d. Auxiliary building
e. Fuel handling area
f. Access control area
g. Turbine 1
h. Turbine 2
j. Water treatment area
k. Intake structure
l. Warehouse
m. Machine shop



A. Control element drives
B. Instrumentation nozzles
C. Control element assembly
D. Upper guide structure
E. Inlet nozzles
F. Outlet nozzle
G. Core support barrel
H. Core shroud
J. Fuel assembly
K. Thermal shield
L. Core plate
M. Core support
N. Flow baffle

Calvert Cliffs

1. Containment 1
2. Spray headers
3. Stressing tendons
4. Polar crane
5. Crane access platform
6. Cooling air duct
7. Purge air plenum
8. Stairway to lower levels
9. Charcoal filters
10. Containment coolers
11. Equipment access opening
12. Lifting rig for equipment hatch
13. Equipment hatch
14. Mixing plenum
15. Reactor cavity cooling fans
16. Cooling air duct to high level
17. Pressurizer quench tank
18. Reactor coolant drain tank
19. Personnel emergency air lock
20. Steam generators
21. Safety injection tanks
22. Pressurizer
23. Reactor coolant pumps
24. Reactor vessel 1
25. Primary inlet pipes
26. Primary return pipes, steam generators to pumps
27. Primary return pipes, pumps to reactor
28. Safety injection pipe, to primary return
29. Pressurizer pipe, to primary inlet
30. Main steam pipes from steam generators to turbines
31. Main steam penetrations
32. Feedwater penetrations
33. Containment 2
34. Personnel air-lock
35. Control element drive mechanism cooler
36. Cooling air plenum
37. Missile shield
38. Electrical platform
39. Reactor cavity seal ring
40. Reactor vessel 2
41. Refueling pool
42. Refueling machine
43. Control element assembly charge machine
44. New fuel storage room
45. Transfer machine console
46. Cask handling crane
47. Fuel handling area viewing window
48. Spent fuel pool handling machine
49. New fuel elevator
50. Cask wash-down pit
51. Fuel transfer gate
52. Fuel upender
53. Fuel transfer tube
54. Transfer tube lock
55. Spent fuel storage racks
56. Spent fuel shipping cask
57. Spent fuel inspection rack
58. Fuel carriage
59. Fuel transfer machine
60. Spent fuel pool
61. Waste gas decay tanks
62. Miscellaneous waste evaporator
63. Emergency core cooling system pumps
64. Coolers
65. Lower tendon access gallery
66. Volume control tank
67. Concentrated boric acid tanks
68. Coolant waste monitor tanks
69. Buttress inspection access
70. Auxiliary building
71. Ventilation stack
72. Ducts to ventilation stack
73. Emergency diesel generators
74. Refueling water storage tank
75. Control room
76. Viewing gallery
77. Turbine building
78. Turbine building 200 ton crane
79. Turbine building 40 ton crane
80. Turbine 1
81. Generator
82. Low pressure turbines
83. High pressure turbine
84. Turbine 2
85. High pressure turbine
86. Low pressure turbines
87. Generator
88. Main steam isolation valves
89. Main steam relief valves
90. Main steam to turbine 1
91. Main steam to turbine 2
92. Hydraulic fluid power unit
93. Main steam stop valves
94. Moisture separator/reheater
95. Containment isolation valves
96. Condensers
97. Low pressure feed water heaters
98. Condenser circulating water pipes
99. Feed water pump turbine exhaust
100. Heater drain pump
101. Heater drain tanks
102. Feed pump turbines
103. Low pressure feed water heaters
104. Condensate booster pumps
105. Isolation bus ducts
106. Auxiliary boilers
107. Containment purge air supply equipment
108. Service water heat exchangers
109. Water treatment area
110. Condensate mixed bed demineralizers
111. Condensate regeneration vessels
112. Circulating water pumps
113. Intake area service crane