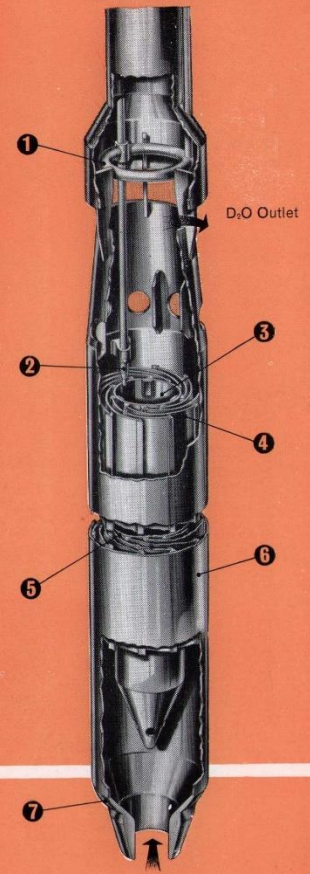
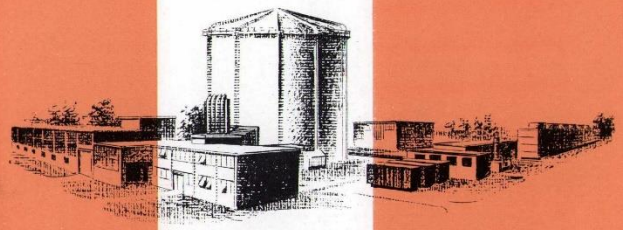
Data

OPERATION	First Critical, November 7th, 1956. Official opening, November 21st, 1956. Normally operates at between 12½ / 15 MW
FUEL	Enriched uranium alloy, annular type Mk. III E. Alloy: uranium-aluminium, aluminium clad. Plate form: 23.6 in. x 2.36 in. x 0.058 in. Curvature: on radius, 5½ in. Assembly: 4" OD. 2" ID, 10 plates per element. Total investment: 3.75 kg.
CLADDING	Aluminium: SIC 99.5% purity. Treatment: Aluminium sheet, welded on three sides, rolled.
MODERATOR	Heavy water. Total investment: 10 tons.
CORE	Reacting core: 34 in. x 28 in. x 24 in. high. Core tank: 99.8% purity A1, 6 ft. 7 in. diameter. Lattice: basically square, central row displaced, 6 in. pitch. Number of fuel elements: 25.
REFLECTOR	Graphite. Segmental blocks, lead bound. Radial thickness: 24 in.
COOLANT	Heavy water. Total Flow Rate 1000 lbs/sec. Water Velocity: through elements: 14.9ft/sec.
FLUX	Maximum thermal neutron flux: 2.2 x 10^{14} n/cm²-sec.
CONTROL	Coarse control/shut-off: six in number. Construction: 0.080 in. thick cadmium sheet, welded between 20 S.W.G. stainless-steel sheet. Signal arm: 4 ft. 10 in. long. Area of Cadmium in Core = 12,000 cm². Fine control rod: one in number. Construction: 24 in. long, 255 cm², cylinder contained between two stainless-steel tubes. Safety rods: two in number. Construction: Stainless-steel tube containing 990 cm², cadmium cylinder, 30 in. long.
SHIELDING	Top: Inner: 2 mm. Cadmium, 4 in. water-cooled lead. Intermediate: Steel shot concrete. Outer: Cast iron and steel. Side and bottom: Inner: boral plates. Intermediate: steel tank 10 ft. 10½ in. I.D. x 13 ft. 2 in. high, skin thickness ⅜ in., 1½ in. bottom plate, 4 in. water-cooled lead Outer: Barytes concrete, 5 ft. thick.
OVERALL SIZE	Ten-sided prism 22 ft. across flats; height 17 ft. from operating floor, 32 ft. from lower floor.
OUTER SHELL	Steel building, 70 ft. diameter, normally at ⅛ in. W.G. below atmosphere, will withstand 3 p.s.i. internal pressure.

1. Emergency cooling Spray Nozzle
2. Thermocouple Tube
3. Central Hole which will accommodate a 2" experimental thimble
4. Fuel Plate
5. Inner aluminium tube
6. Outer aluminium tube
7. Spherical seat

Mk III Fuel Element





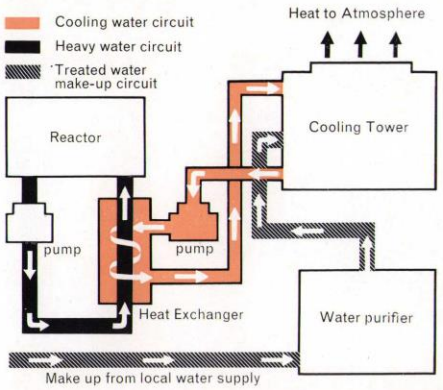
D I D O

HEAVY WATER REACTOR

ATOMIC ENERGY RESEARCH ESTABLISHMENT. HARWELL

I.S. LEAFLET No. 291348

Reactor Cooling System

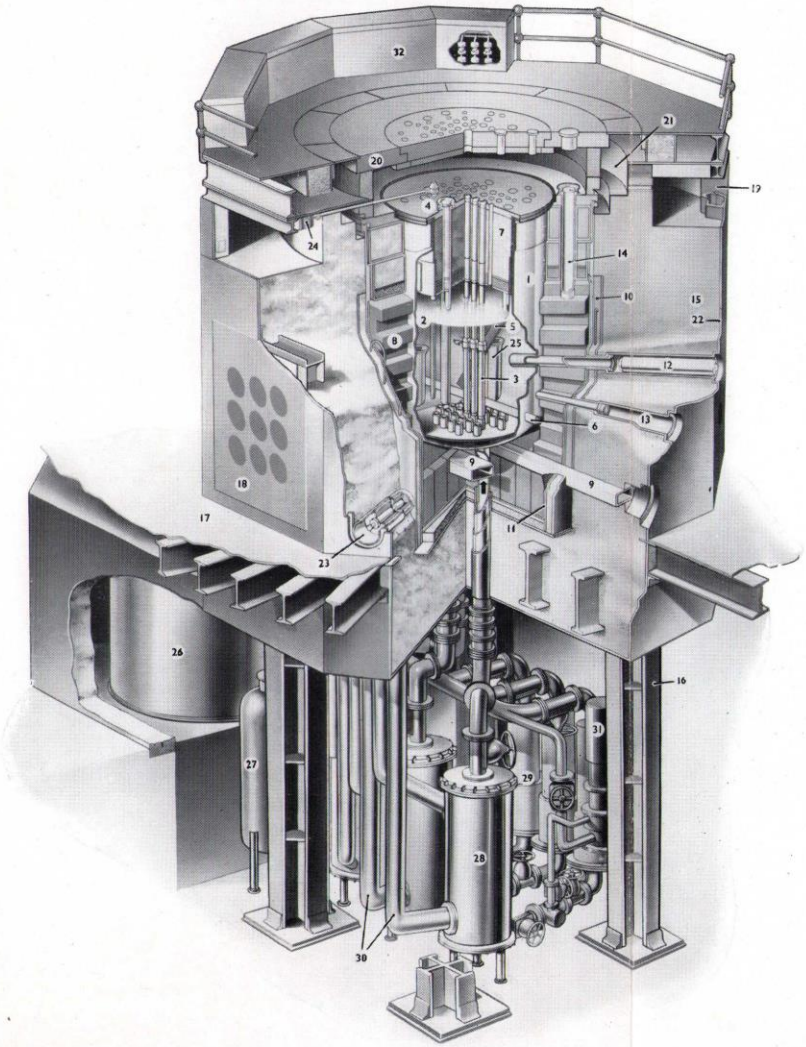


Purpose

To test fuels, coolants and materials for possible use in future Power Reactors.

To produce high specific activity Isotopes for Medical and Industrial uses.

To further research in Nuclear and Solid State Physics, Chemistry and Metallurgy.



1. REACTOR ALUMINIUM TANK CONTAINING HEAVY WATER
2. HEAVY WATER LEVEL
3. FUEL ELEMENT
4. VERTICAL EXPERIMENTAL HOLE THIMBLE
5. CONTROL SIGNAL ARMS 6 IN NUMBER
6. EXPERIMENTAL HOLE 4" x 1" (2 Tan Hole)
7. TOP BIOLOGICAL SHIELD
8. GRAPHITE REFLECTOR
9. EXPERIMENTAL HOLES 12" x 8" (12 HGR Holes)
10. LEAD THERMAL SHIELD (WATER COOLED)
11. REACTOR STEEL TANK WITH BORAL SHEET LINING
12. EXPERIMENTAL HOLE ENTERING HEAVY WATER ZONE
13. EXPERIMENTAL HOLE ENTERING GRAPHITE ZONE
14. VERTICAL EXPERIMENTAL HOLE ENTERING GRAPHITE ZONE
15. CONCRETE BIOLOGICAL SHIELD
16. REACTOR SUPPORTING STRUCTURE
17. FIRST FLOOR
18. THERMAL COLUMN
19. HOLLOW STANCHIONS COMMUNICATING WITH BASE OF REACTOR
20. 14" THICK STEEL TOP PLATE AND RING
21. DUCT FOR EXPERIMENTAL SERVICES
22. BIOLOGICAL SHIELD CASING PLATES
23. ION CHAMBER
24. FINE CONTROL ROD GEAR BOX
25. HEAVY WATER OUTLET PIPE
26. HEAVY WATER STORAGE TANK
27. HEAVY WATER DUMP TANK
28. HEAVY WATER HEAT EXCHANGERS
29. HEAVY WATER MAIN CIRCULATION PUMP
30. SECONDARY COOLING WATER PIPING (TO COOLING TOWERS)
31. HEAVY WATER EMERGENCY CIRCULATOR
32. EXPERIMENT COOLING SYSTEM