The World's Reactors

No. 16 PLUTO

KEY

- 1. Fuel elements
- 2. Steel thermal shield
- Lead gamma shield
 Graphite reflector
- 5. Aluminium reactor tank
- 6. Steel tank
- 7. Experimental facilities
- 8. Gamma shield cooling

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 9. Coarse control arm
 10. Heavy water level pipe
 11. Heavy water inlet pipes
 12. Heavy water outlet pipes
 13. Helium duct
 14. Air ducts
 15. Biological shield
 16. Steel outer casing
 17. Removable access plates
 18. Top plate
 19. Access plug
 20. Fine control rod cooling pumps
 21. Fine control rod drive
- 21. Fine control rod drive
 22. Coarse control arm drive
 23. Removable shielding

- 24. Ion chamber holes
 25. Movable floor
 26. Movable floor locating pockets
 27. Heavy water coolers
- 28. Heavy water circulating pumps 29. Heavy water storage vessel 30. Shut down pump

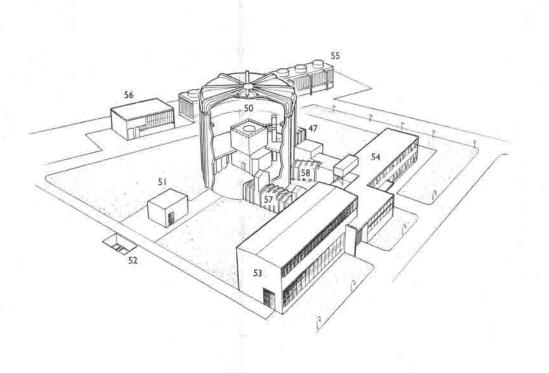
- 31. Dump tank 32. Main tank

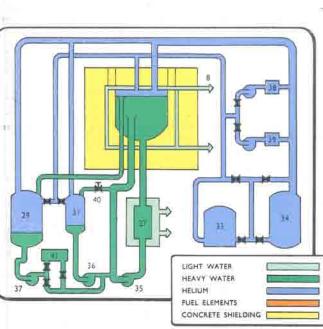
- 33. Helium gas holders
 34. Expansion tanks
 35. Main circulating pump
- 36. Transfer pump
- 37. Liquid level control pump
- 38. Recombination unit
- 39. Helium purifying unit 40. Dump valve 41. Jon exchange unit
- 42. Active element storage
 43. Fuel element assembly station
- 44. Health monitors
- 45. Decontamination water sprays

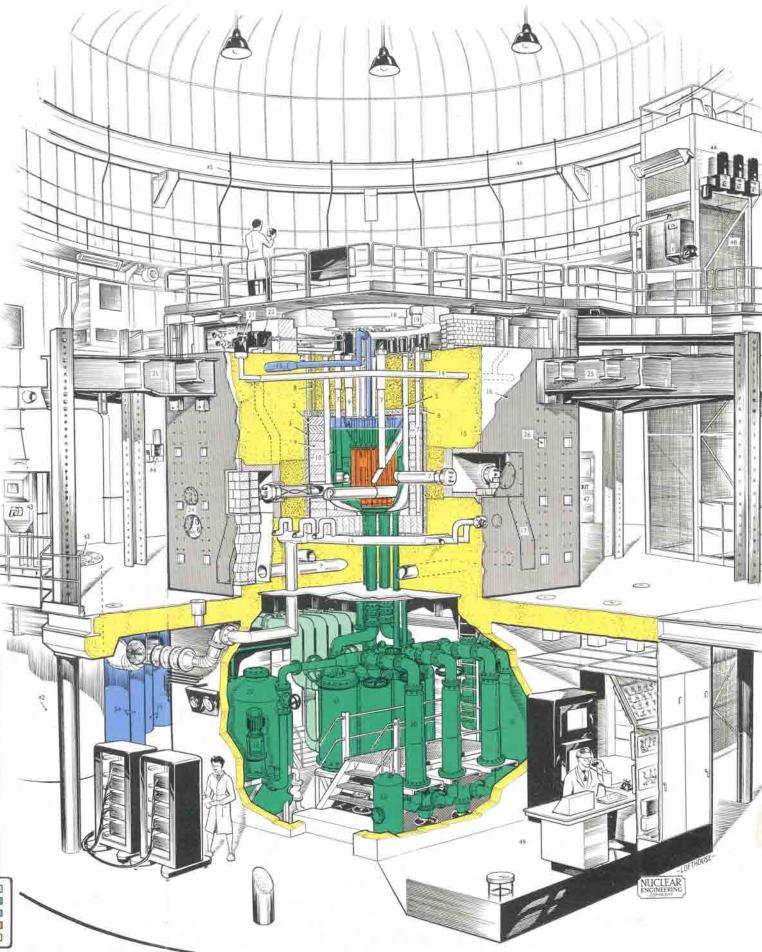
- 46. Crane track
 47. Emergency exit
 48. Lift
 49. Control room
 50. Sealed Reactor building

- 50. Sealed Reactor building
 51. Emergency control
 52. Delay tanks
 53. Active area building
 54. Laboratories and offices
 55. Cooling towers
 56. Water treatment building
 57. Vehicle airlock
 58. Personnel airlock

- 58. Personnel airlock







The World's Reactors

No. 16 PLUTO

TYPE:

Thermal heterogeneous.

PURPOSE:

High flux materials testing.

A.E.R.E., Harwell, England.

RATING:

10 MW.

LOCATION:

OPERATION: Critical, October 25, 1957.

FUEL:

Enriched uranium alloy, box type.

Alloy: uranium-aluminium, aluminium clad. Core form: 23.75 in. × 2.36 in. × 0.018 in.

Curvature: on radius, $5\frac{1}{2}$ in. Assembly: 2.9 in. sq. approx., ten plates per box.

Total investment: 2.6 kg.

CONTROL:

CLADDING:

MODERATOR:

REFLECTOR:

CORE:

Coarse control/shut-off: seven in number.

Construction: 0.080-in.-thick cadmium sheet, welded between 20 S.W.G. stainless-steel sheet.

Signal arm: 4 ft. 75 in. long. Fine control rod: one in number.

Construction: 24 in. long, 255 cm.2, cylinder contained between two stainless-steel tubes.

Safety rods: two in number.

Construction: Stainless-steel tube containing 1094-cm.2 cadmium

cylinder, 33 in. long.

Aluminium: SIC.

Treatment: Aluminium sheet, welded on three sides, rolled.

Heavy water.

Total investment: 10 tonnes.

Reacting core: 27 in. ×33 in. ×24 in. high.

Core tank: 99.8% purity Al., 6 ft. 7 in. diameter. Lattice: basically square.

Number of fuel elements: 26.

Graphite.

Segmental blocks, lead bound Radial thickness: 12 in.

COOLANT:

Heavy water.

Flow rate through elements: 10 ft./sec.

FLUX:

SHIELDING:

OVERALL SIZE:

FACILITIES

Maximum thermal neutron flux: 10¹⁴n/cm²-sec.

Top: Inner: 2mm. cadmium; 4 in. water-cooled lead. Intermediate: concrete.

Outer: cast iron and steel.

Side and bottom:

Inner: boral plates.

Intermediate: steel tank 9 ft. $0\frac{1}{2}$ in. I.D. \times 12 ft. 5 in. high, skin thickness 1 in., 2-in. bottom plate, 4-in. water-cooled lead between

Outer: Barytes and heavy concrete, 5 ft. thick.

Rectangular prism 20 ft. across flats; height 35 ft. 3 in. overall.

OUTER SHELL:

Steel building, 70 ft. diameter, pressurized at $\frac{1}{8}$ in. W.G. below

EXPERIMENTAL

Horizontal: 4-7 in. dia., right through D_2O . Vertical: 4-7 in. dia. and 4-4 in. dia. in D_2O ; 6-4 in. dia. in graphite.

