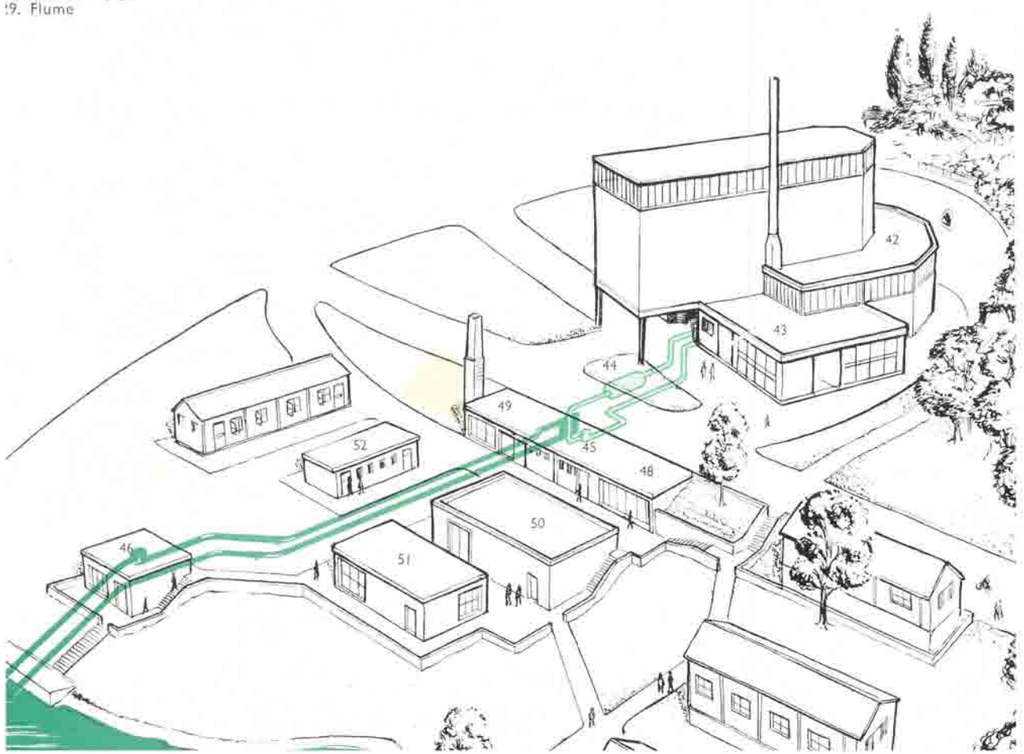
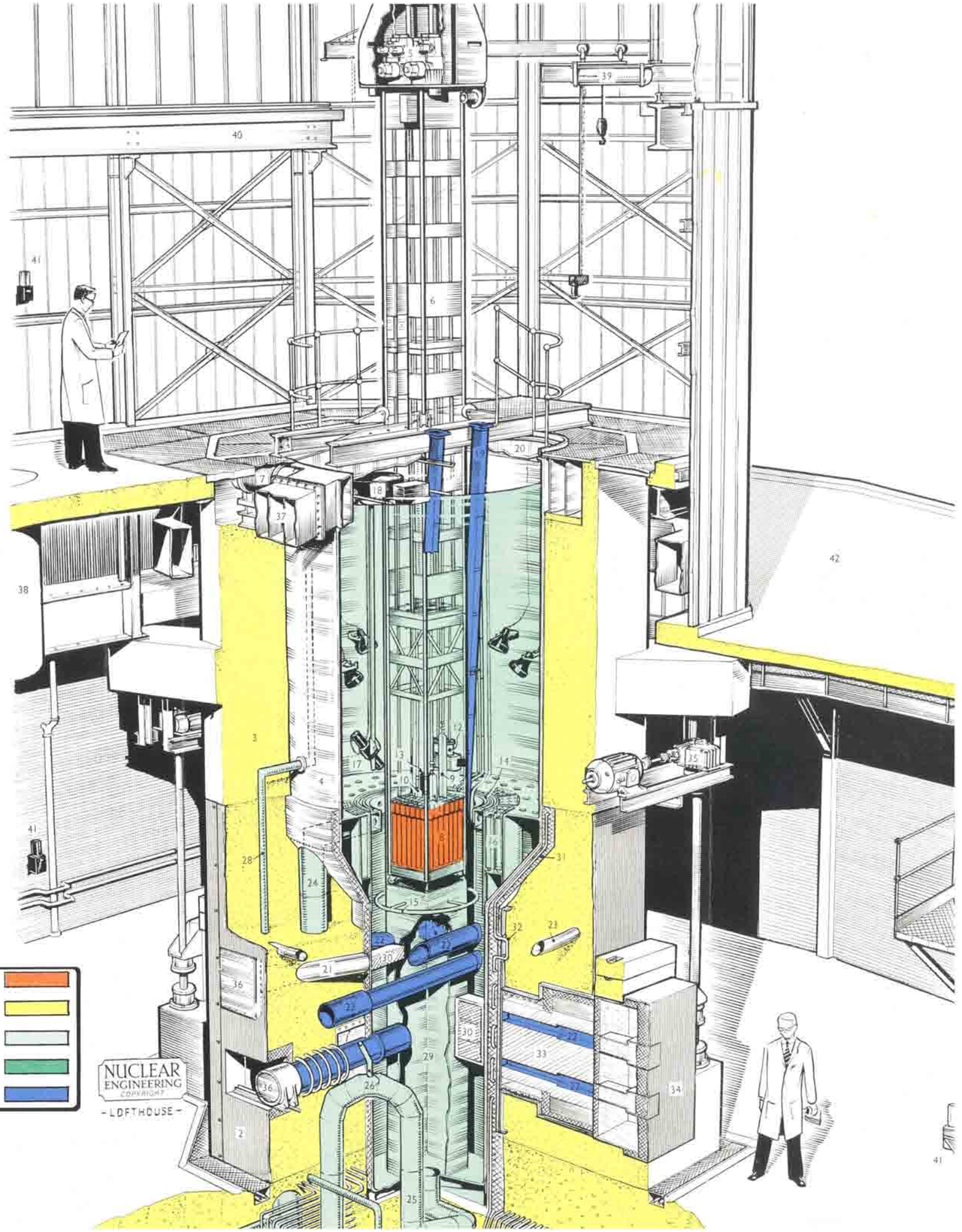
The World's Reactors

No. 17 MERLIN

KEY

1. Experimental area
2. Steel outer casing
3. Biological shield
4. Reactor tank
5. Control-rod motors
6. Core structure
7. Core hoist winch
8. Core in loading position
9. Fine control rod
0. Coarse control rod
1. Shut-down rods
2. Ionization chamber
3. Fission chamber
4. Core spray
5. Feed to fission product detector
6. Fuel element storage compartments
7. Underwater television camera
8. T.V. camera manipulator
9. Chemical tubes
0. Perspex cover
1. Ion tube
2. Experimental facilities
3. Air suction ring main
4. Feed water inlet pipe
5. Feed water outlet pipe
6. Anti-syphon tube to top of tank
7. Cooling water pipes
8. Overflow pipe
9. Flume
30. Graphite nose pieces
31. Thermal shield
32. Thermal shield cooling pipes
33. Thermal column
34. Thermal column door
35. Door-raising mechanism
36. Removable covers
37. Air extract duct
38. Wash-down tank for upper floor
39. Fuel element handling hoist
40. Travelling crane track
41. Health monitor
42. Reactor building
43. Control room
44. Delay tank
45. Primary pump house
46. Secondary pump house
47. Lake
48. Make-up plant house
49. Boiler house
50. Sub-critical facility and fuel element store
51. Effluent treatment plant
52. Change room





The World's Reactors

No. 17 MERLIN

TYPE: Pool, with four-position core.

PURPOSE: Research, testing, education and training.

LOCATION: Aldermaston, England.

OWNER: A.E.I., Ltd.

CONSTRUCTION: A.E.I.—John Thompson Nuclear Energy Co., Ltd.

RATING: 5 MW maximum.

FUEL:
Uranium, 93% U^{235} (initial charge),
future charges, lower enrichment.
20/80 (wt.) U–Al alloy, Al clad.
Minimum critical investment: 2.67 kg U^{235}.
Normal investment: 3.5 kg U^{235}.

ELEMENTS:
MTR type: 14 plates per box.
Critical loading: 20 elements minimum.
Active length 23.6 in.
Box dimensions: $2\frac{7}{8}$ in. × $2\frac{7}{8}$ in.

LATTICE:
Up to 49 elements in square array.
3-in. pitch, $\frac{3}{8}$-in. gap between rows for control and safety elements.

MODERATOR:
Light water.
Reflector: light water or beryllia.

REACTIVITY: Maximum: 5.5% δk excess.

FLUX:
At core centre, water reflected, 5 MW power:
Epithermal neutron, 2×10^{14} n/cm², sec.
Thermal neutron, 5×10^{13} n/cm², sec.
γ, 4×10^{8} r/h.

PRIMING: Sb—Be source on each element.

CONTROL:
S.S. sheathed Cd, cruciform shape;
Two safety units: —5.5% δk each,
Coarse unit: —5.5% δk.
S.S. strip, $1\frac{1}{4}$ in. × $\frac{1}{8}$ in.;
Fine unit: —0.5% δk.

DRIVE:
Coarse: constant-speed motor, in and out, gravity, spring-assisted in event of trip.
Fine: variable-speed motor, in and out.
Coarse travel time: 25 min to full out.
Min. fine travel time: 25 sec to full out.

COOLANT:
Light water.
Primary flow: two 800-gal/min electric pumps, one diesel-driven pump; max. total flow: 1,900 gal/min.
Delay tank: 100 sec.
Max. temp.: 45°C.
Primary purification bleed: 1,000 gal/h filtered,
150 gal/h ion exchange.
Secondary flow: two 900-gal/min pumps.

MAIN TANK:
High-purity aluminium, $\frac{3}{8}$-in. thick,
sunk 2 ft 3 in. below floor level.
Dimensions: 16 ft 3 in. × 5 ft 6 in. dia.
widening to: 13 ft 9 in. × 11 ft 6 in. dia.

SHIELDING:
Lead thermal shield 4 in. thick encased in Al.
Barytes concrete 3.5 g/cm³ for first 15 ft, ordinary concrete above.
Thickness: 6 ft $1\frac{1}{2}$ in. to 10 ft 9 in. above floor,
3 ft 6 in. to top.

FACILITIES:
Top position: fuel changing.
Upper exptl.: see table.
Lower exptl.: see table.
Bottom position: storage.

Experimental Facilities

Type	Dimensions	Plane	Number	
			Upper	Lower
Thermal column	4 ft 6 in. × 4 ft 6 in. × 6 ft	Horizontal	2 (one removable)	0
Holes in thermal columns	4 in. × 4 in. × 6 ft	Horizontal	7	0
Hole in centre of core	3 in. × 3 in. × 24 in.	Vertical	1	1
Vacant lattice positions	3 in. × 3 in. × 24 in.	Vertical	50 max.	50 max.
Through-holes tangential to core	6 in. i.d.	Horizontal	0	2
Shelf	1 ft 6 in. × 1 ft 6 in.	Horizontal	0	1
Holes stopped at lattice	12 in. i.d.	Horizontal	1	0
	6 in. i.d.	Horizontal	3	4
	3 in. × 6 in.	Vertical	0	2
γ-radiation facilities	3 in. × 3 in. × 24 in.	2	20 max., in fuel storage bays	

Data sheets in this series already published in "Nuclear Engineering" are:

No. 1. *BEPO* (*April*, 1956)
No. 2. *CP5* (*May*, 1956)
No. 3. *NRX* (*June*, 1956)
No. 4. *DIMPLE* (*August*, 1956)
No. 5. *ZEUS* (*September*, 1956)
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No. 9. *THE SOUTH OF SCOTLAND ELECTRICITY BOARD STATION* (*February*, 1957)
No. 10. *BERKELEY POWER STATION* (*March*, 1957)
No. 11. *BRADWELL POWER STATION* (*April*, 1957)
No. 12. *DOUNREAY FAST REACTOR* (*June*, 1957)
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No. 14. *RWE* 1 (*September*, 1957)
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