

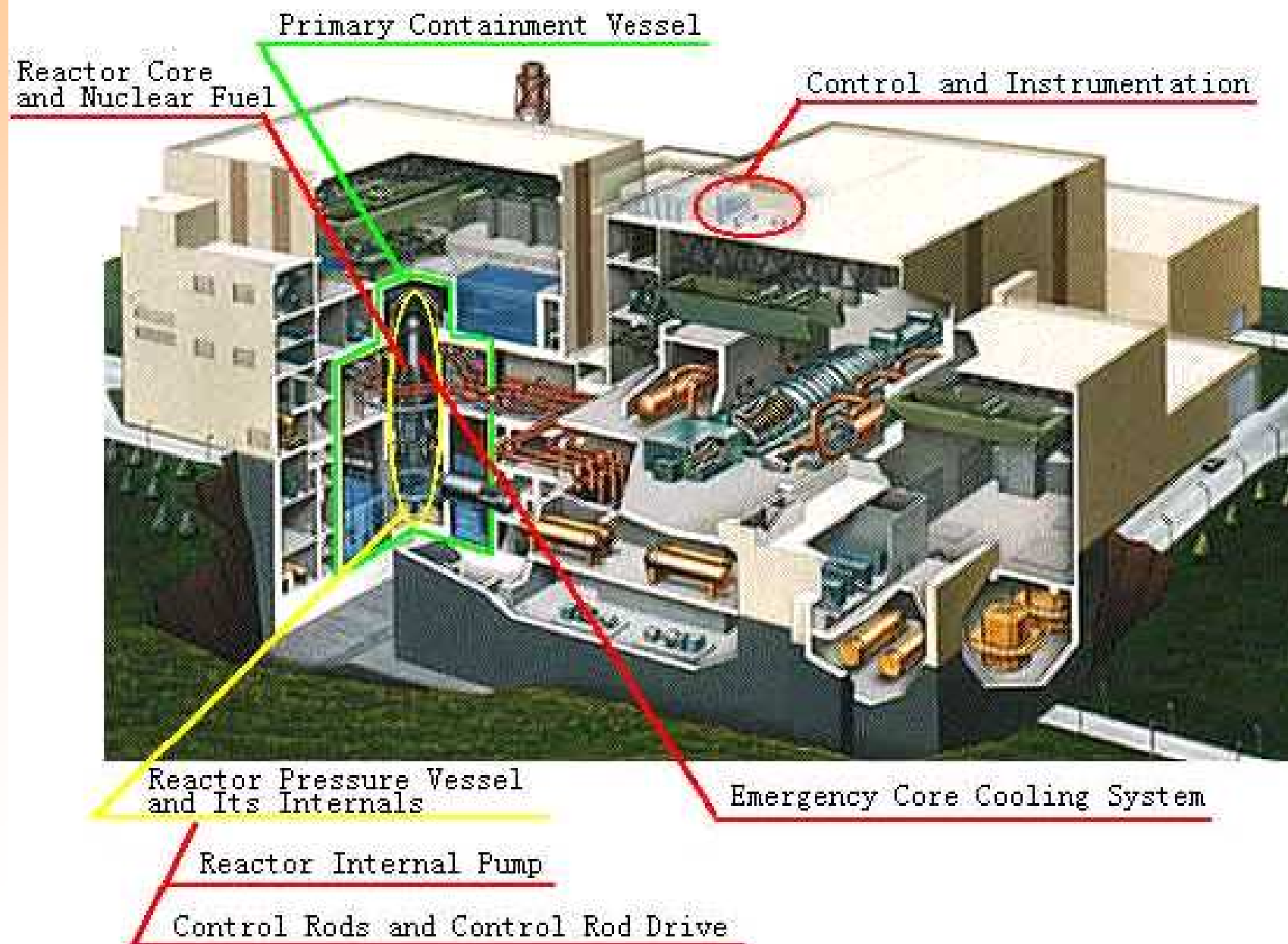
NUCL 402 Engineering of Nuclear Power Systems

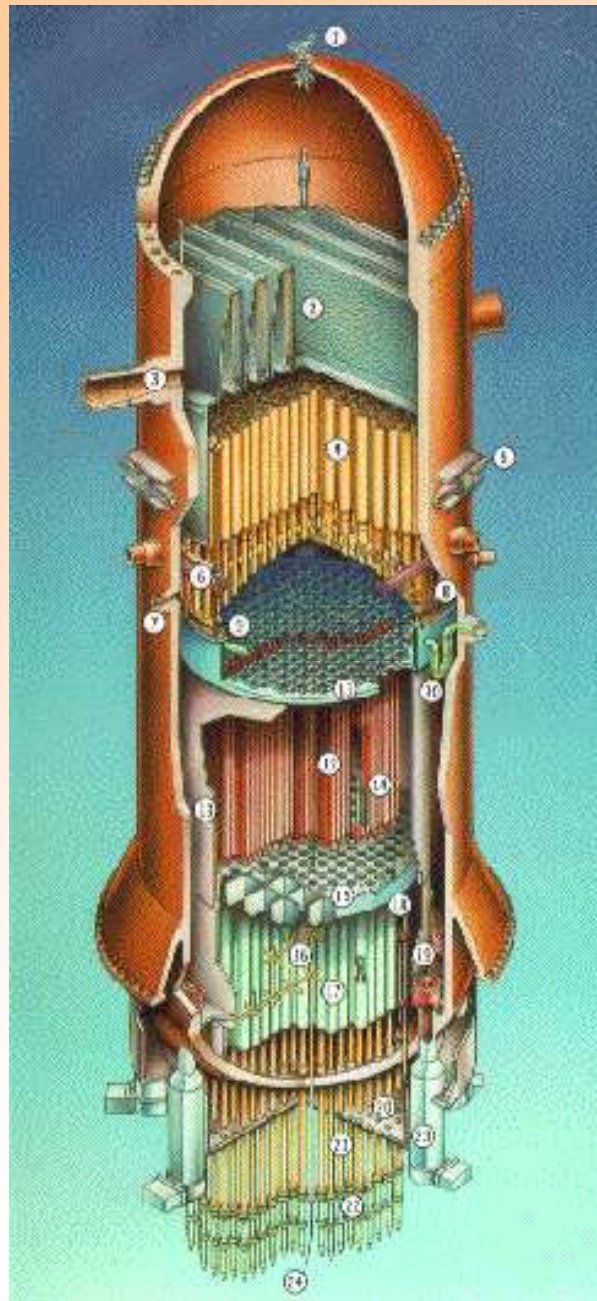
Lecture 3: ABWR, HTGR

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Advanced Boiling Water Reactor

- ✓ Power Capacity: 1350MWe
-In Commercial operation since November, 1996 (two units in operation)
Internal recirculation pumps,
- ✓ Several improvements:
 - Reactor Pressure Vessel
 - Materials and Water Chemistry
 - Fine motion control rod drives
 - Digital control and instrumentation systems
 - Multiplexing and fiber optics data transmission
 - Control room design
 - Plant layout
 - External Recirculation System Eliminated
 - Simplified Active Safety Systems



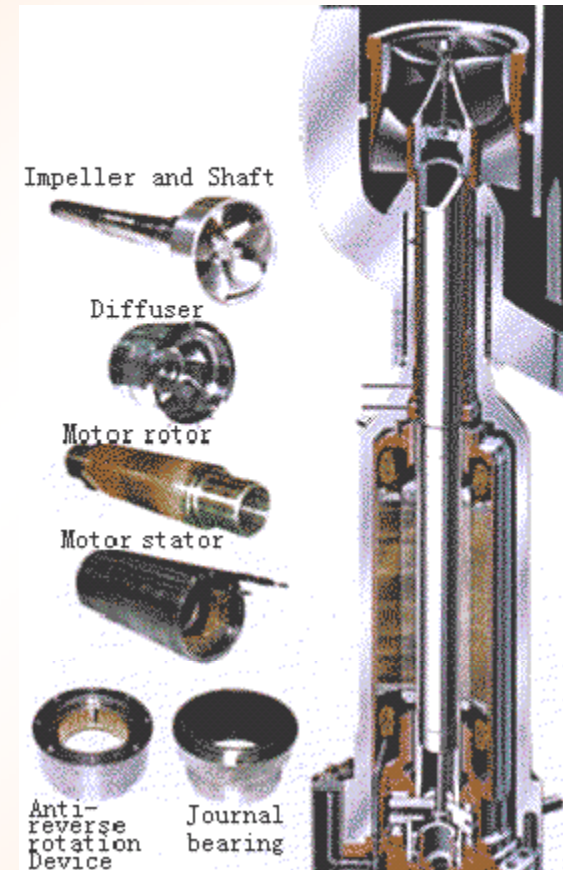


Advanced Boiling Water Reactor Assembly

- 1 Vent and Head Spray
- 2 Steam Dryer
- 3 Steam Outlet Flow Restrictor
- 4 Steam Separators
- 5 RPV Stabilizer
- 6 Feedwater Sparger
- 7 Shutdown Cooling Outlet
- 8 Low Pressure Flooder (LPFL) and Shutdown Cooling Sparger
- 9 High Pressure Core Flooder (HPCF) Sparger
- 10 HPCF Coupling
- 11 Top Guide
- 12 Fuel Assemblies
- 13 Core Shroud
- 14 Control Rod
- 15 Core Plate
- 16 In-Core Instrument Guide Tubes
- 17 Control Rod Guide Tubes
- 18 Core Differential Pressure Line
- 19 Reactor Inertial Pumps (RIP)
- 20 Thermal Insulation
- 21 Control Rod Drive Housings
- 22 Fine Motion Control Rod Drives
- 23 RIP Motor Casing
- 24 Local Power Range Monitor

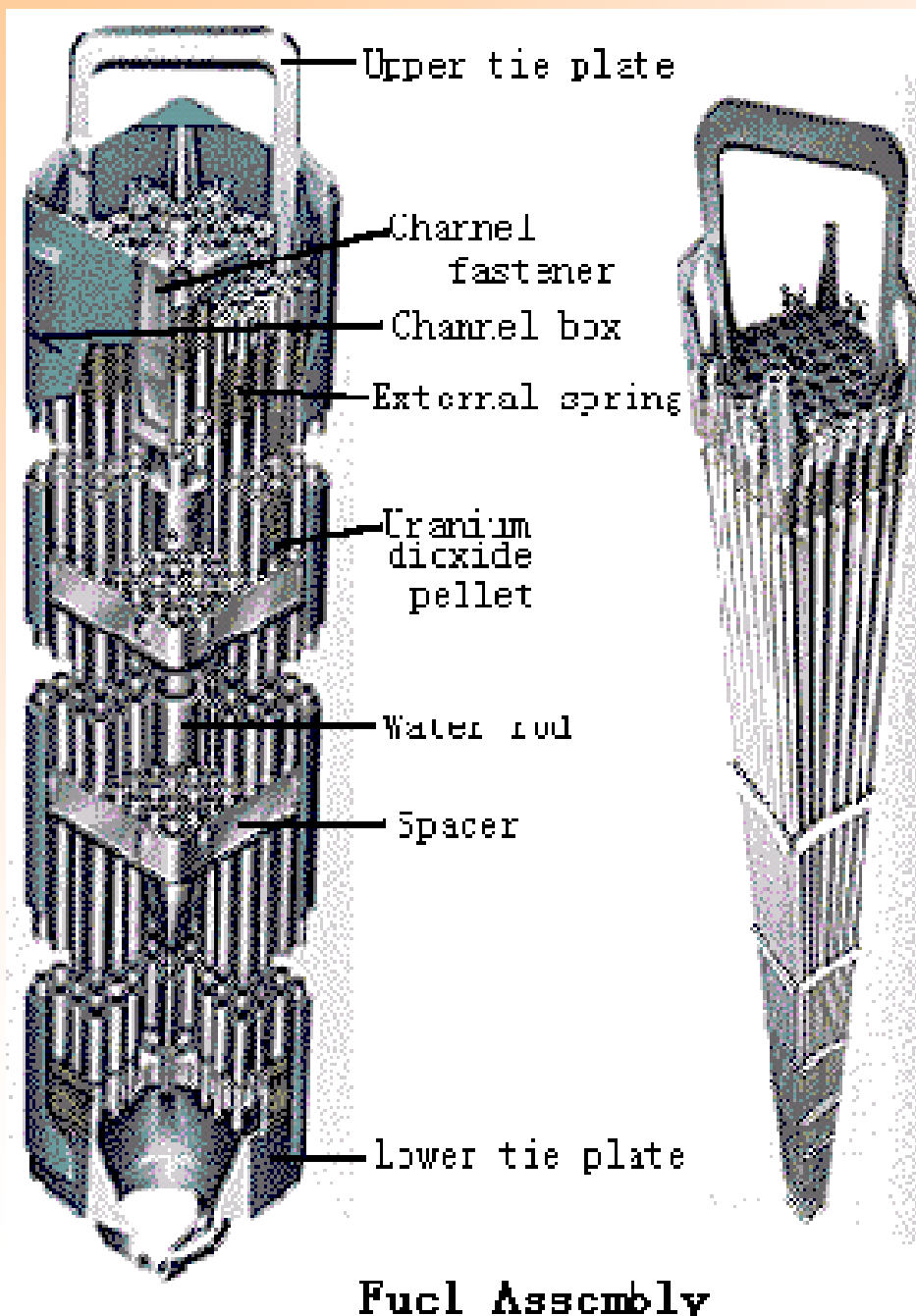


GE Nuclear Energy

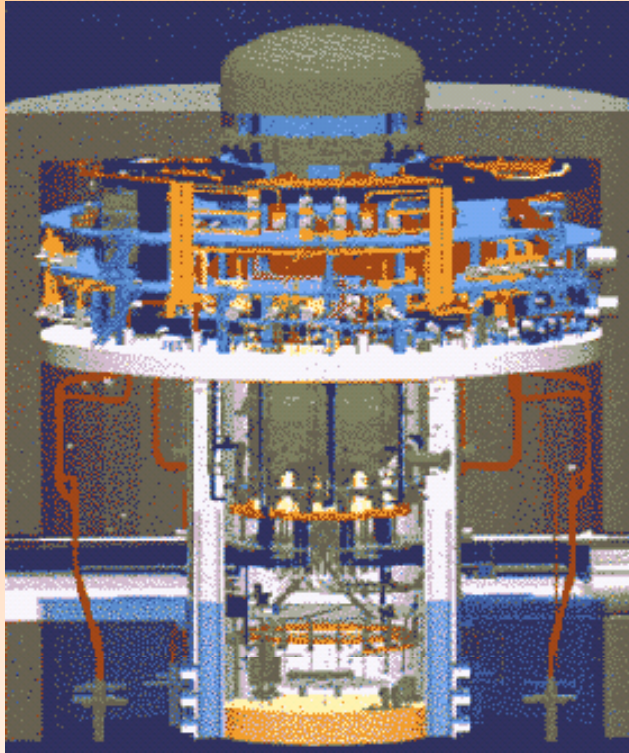


- ✓ The reactor coolant is circulated by 10 RIP installed in the RPV. Each is driven by a wet stator motor mounted in a motor casing. The speed of the pump controls the coolant flow rate, which enables control of the reactor output.

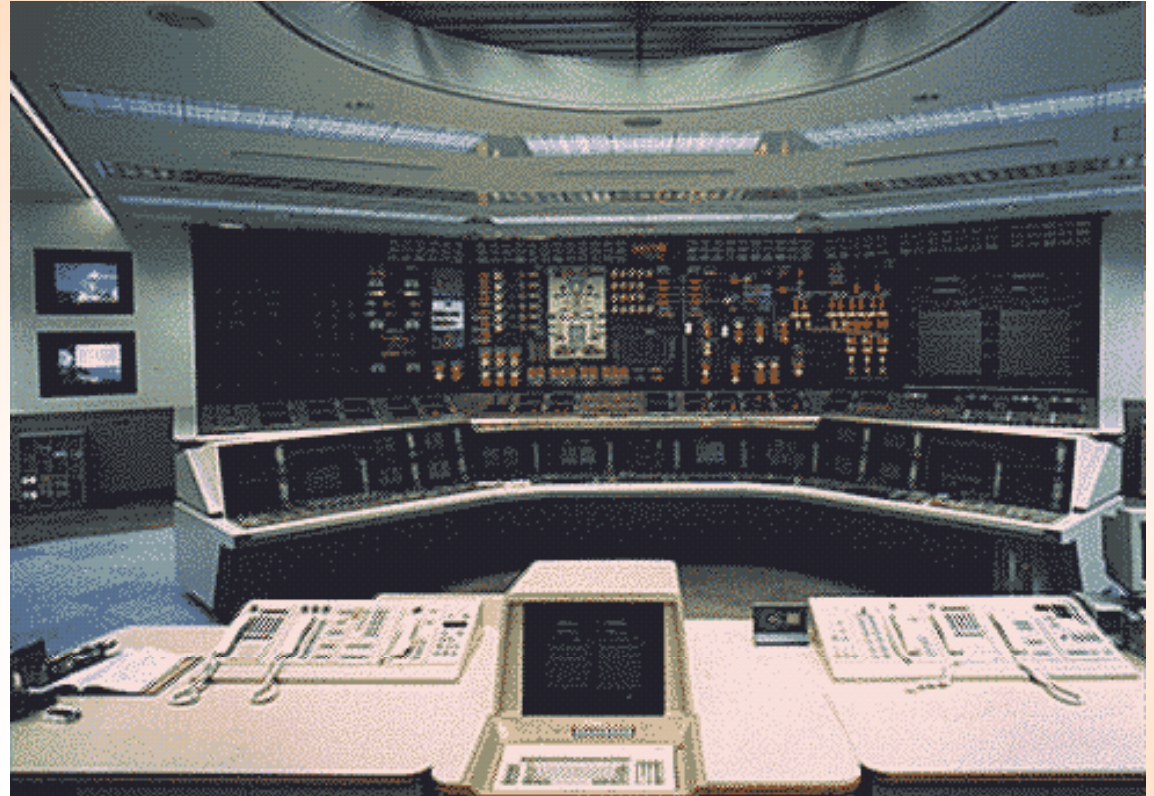
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- ✓ Each fuel rod in fuel assemblies contains sintered pellets of low-enriched uranium within a zirconium-lined cladding. They are brought together in fuel assemblies, 8x8 arrays of control rods held in place by upper and lower tie plates and spacers.

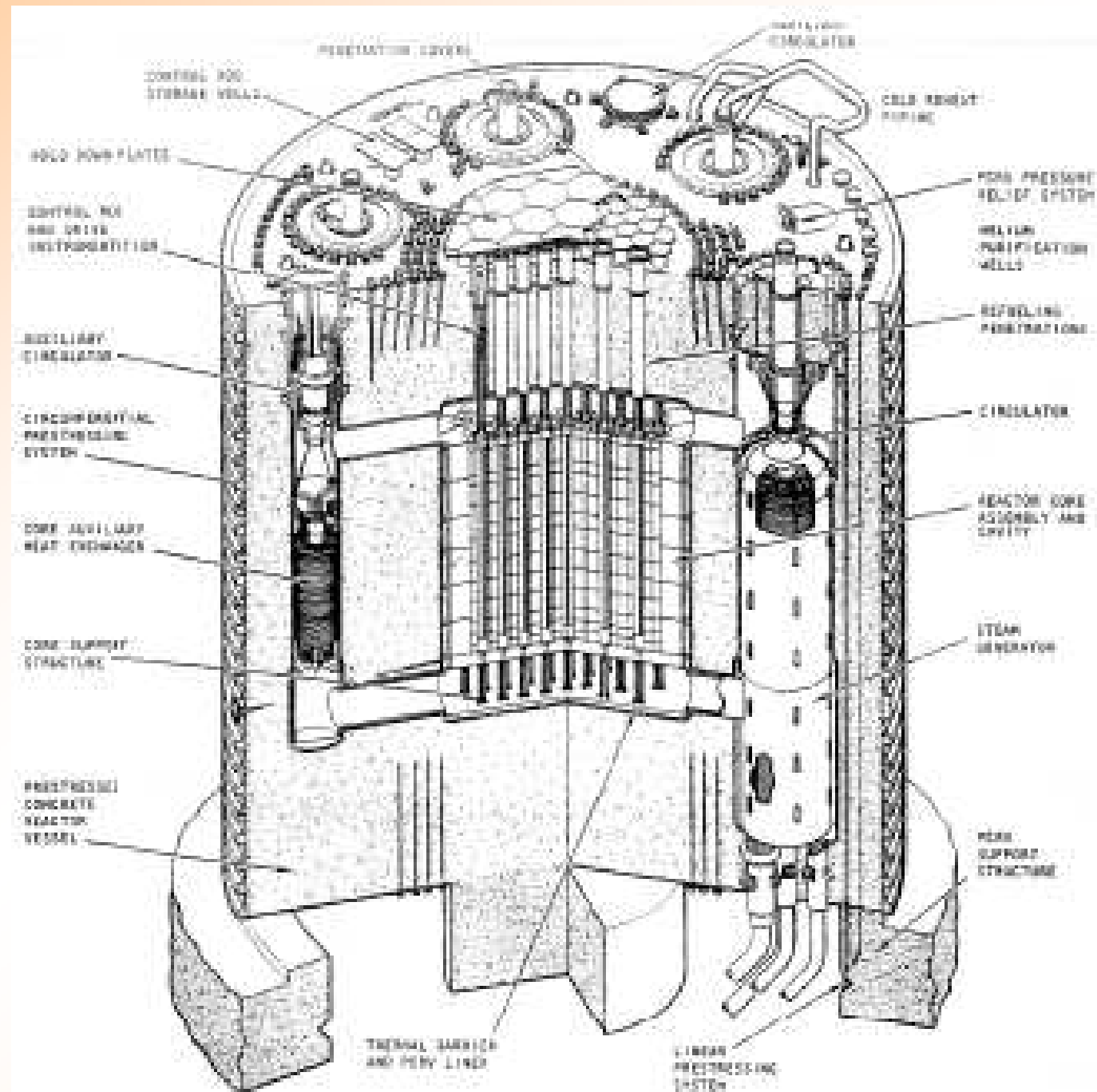


The compact cylindrical RCCV integrated into the reactor building enjoys the advantages of earthquake-resistant design and economic construction cost



Computerization of Control and Instrumentation (C&I) and power electronics-computerization of Control and Instrumentation (C&I) and power electronics

✓ HTGR



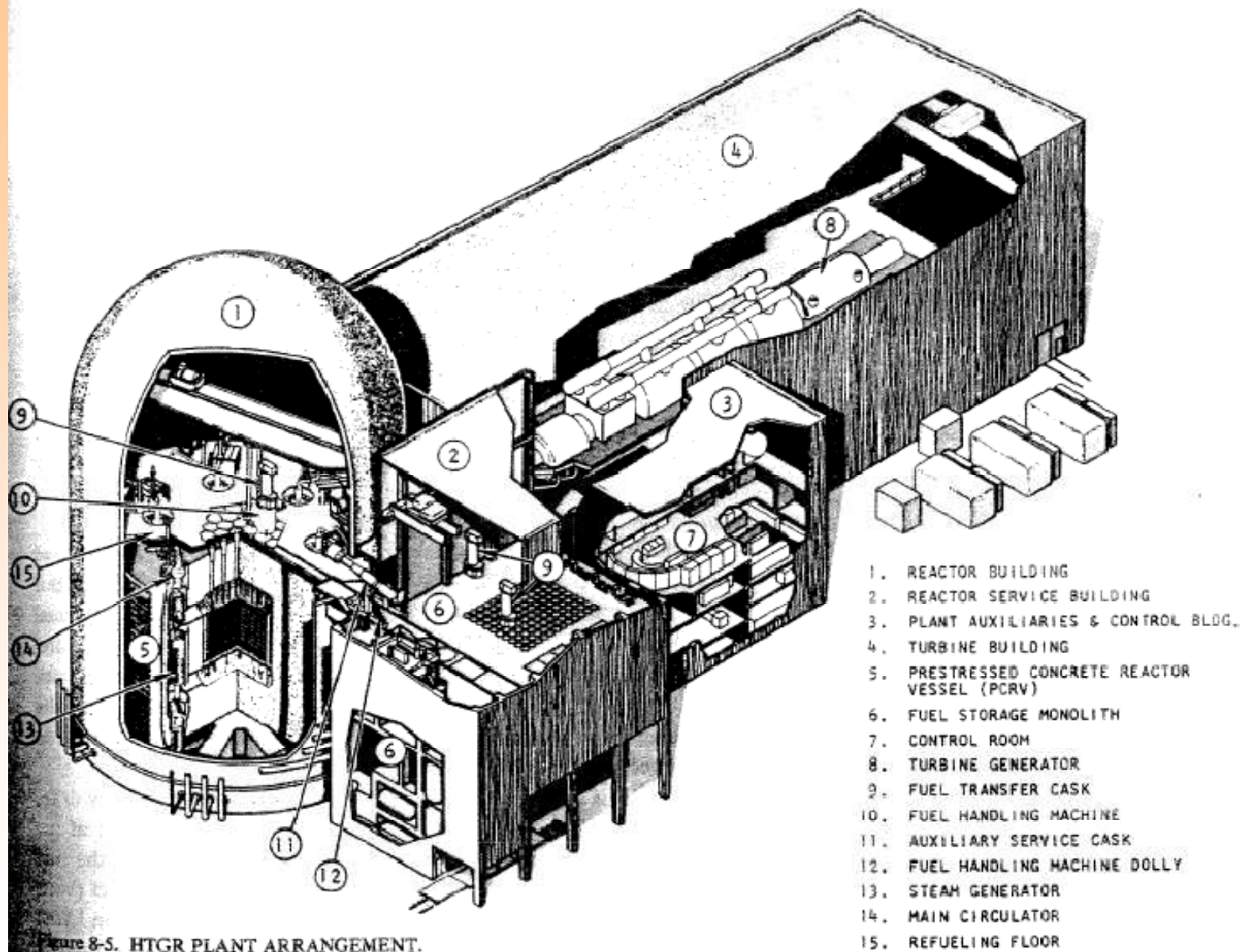
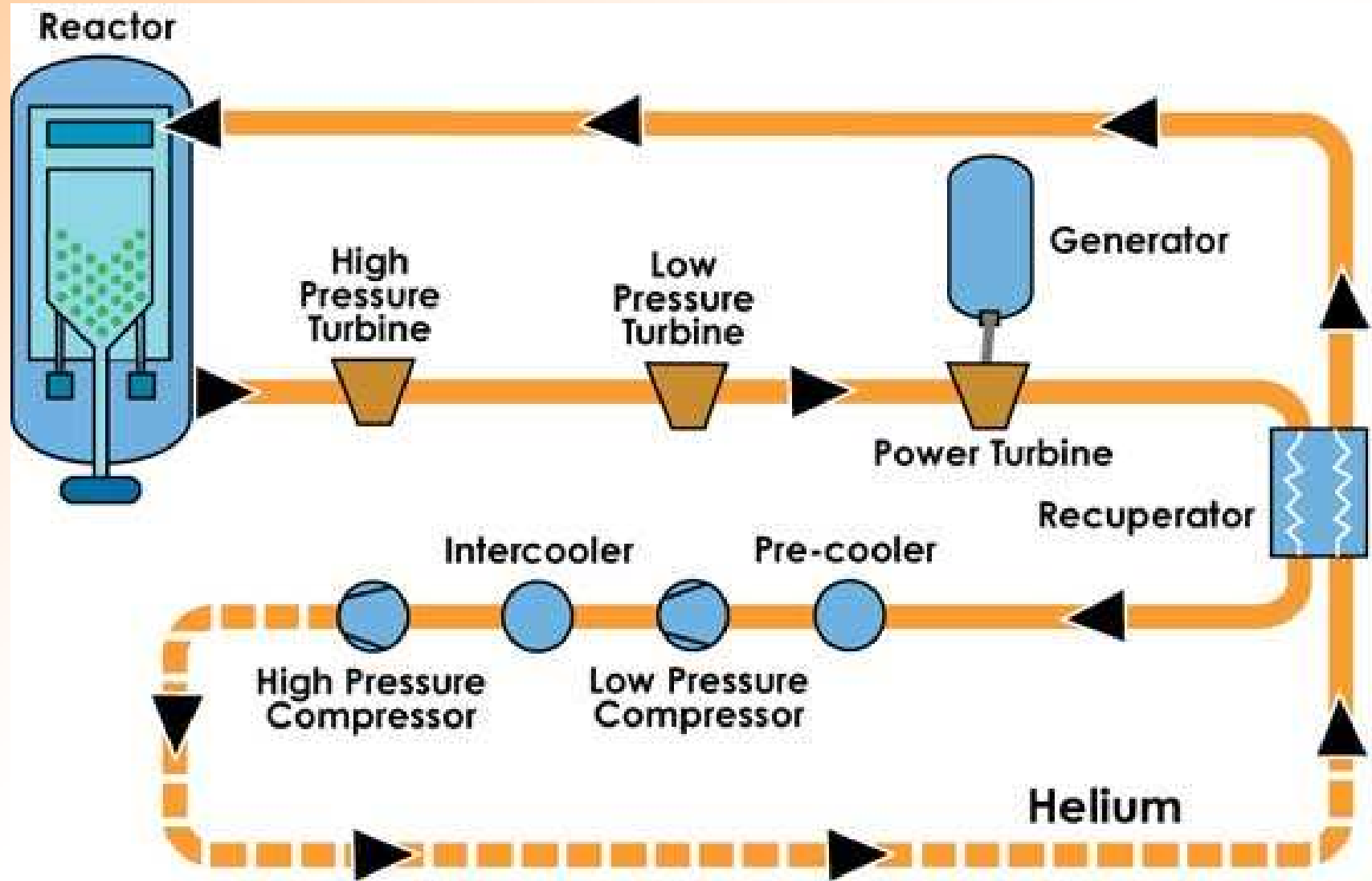
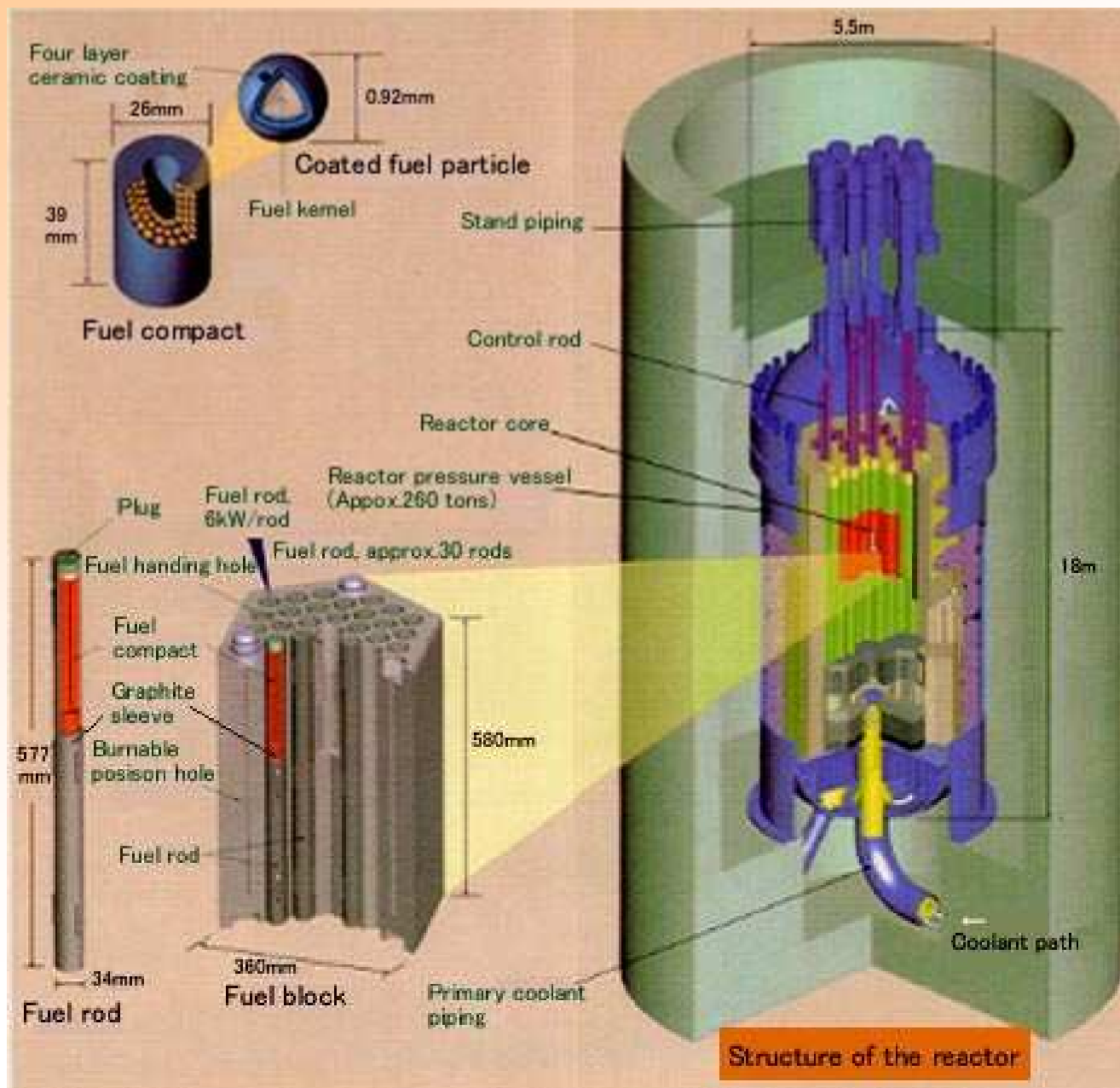
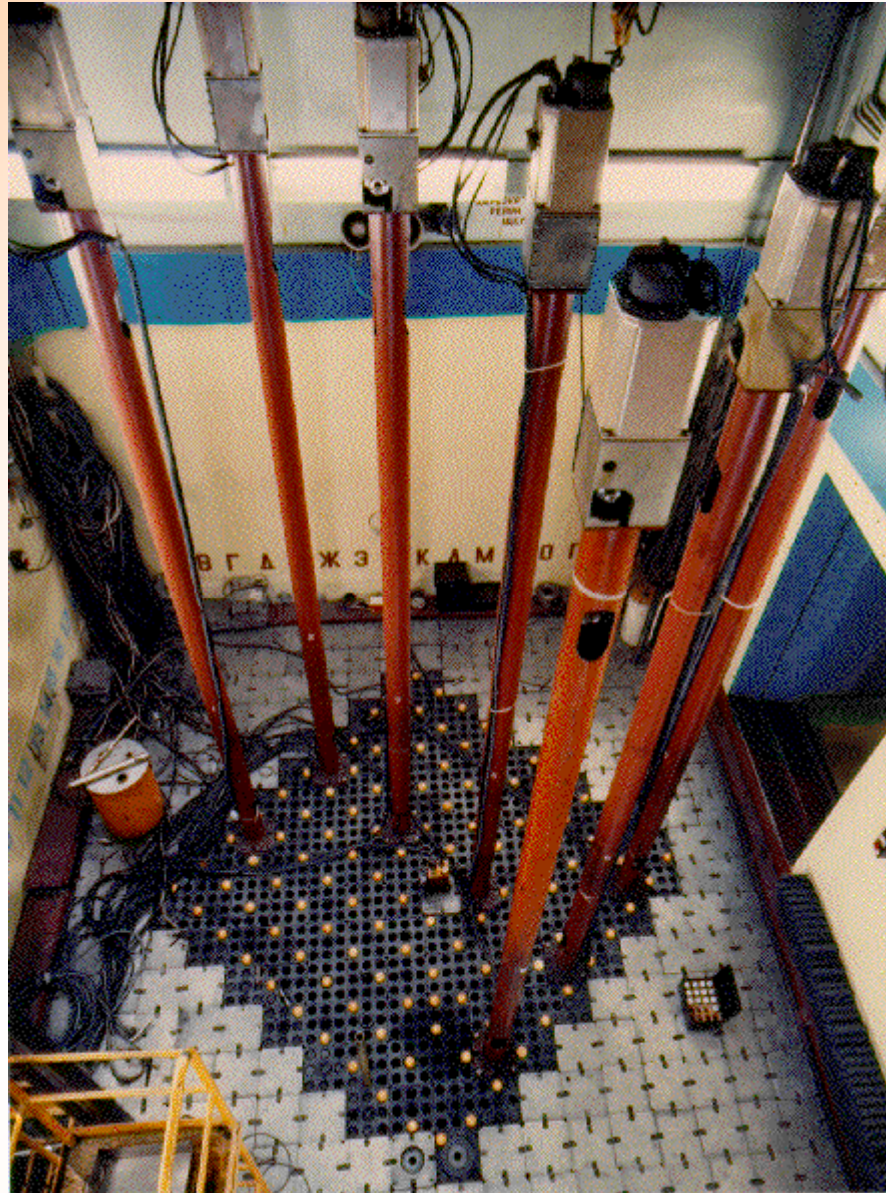


Figure 8-5. HTGR PLANT ARRANGEMENT.



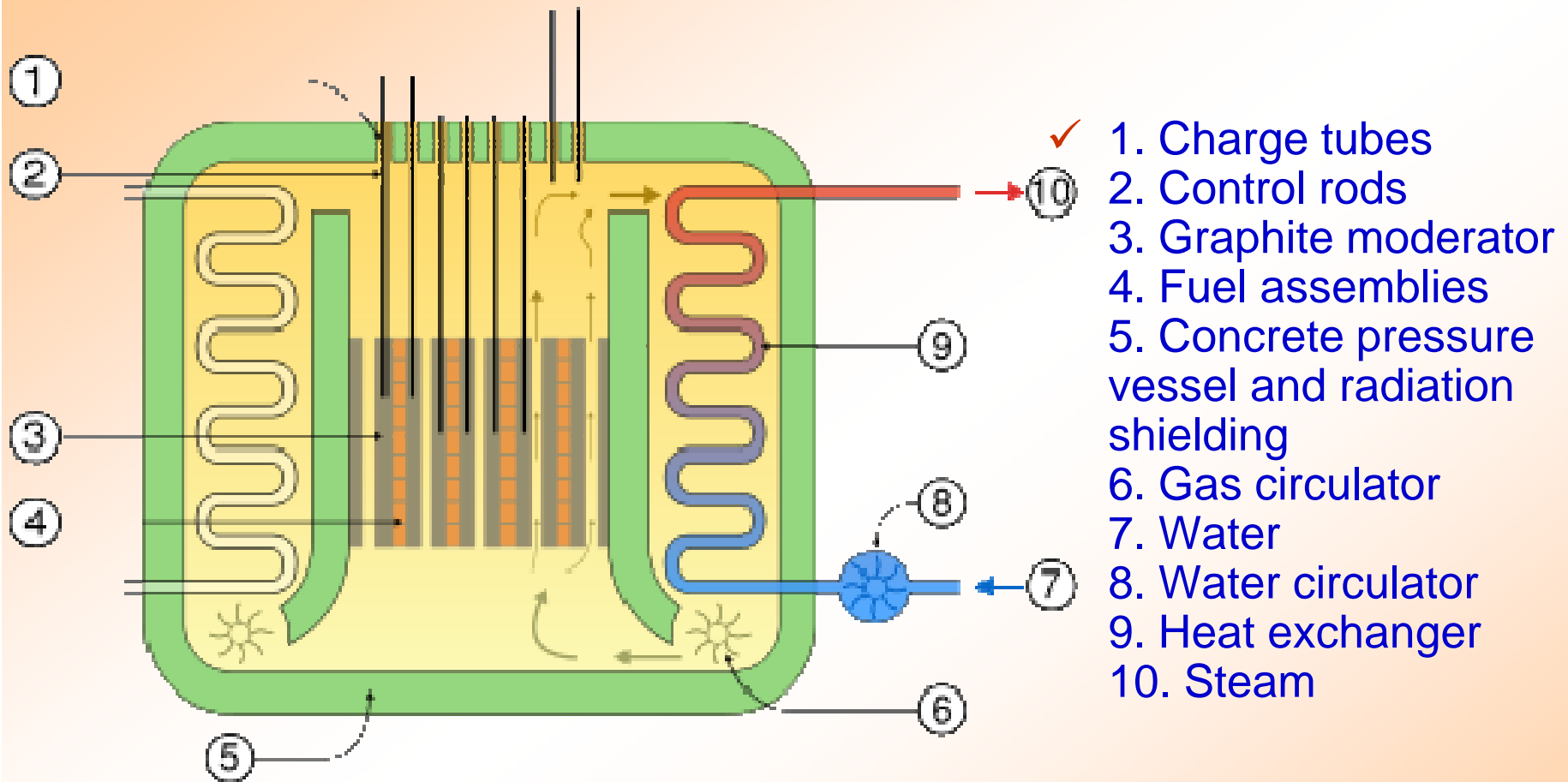
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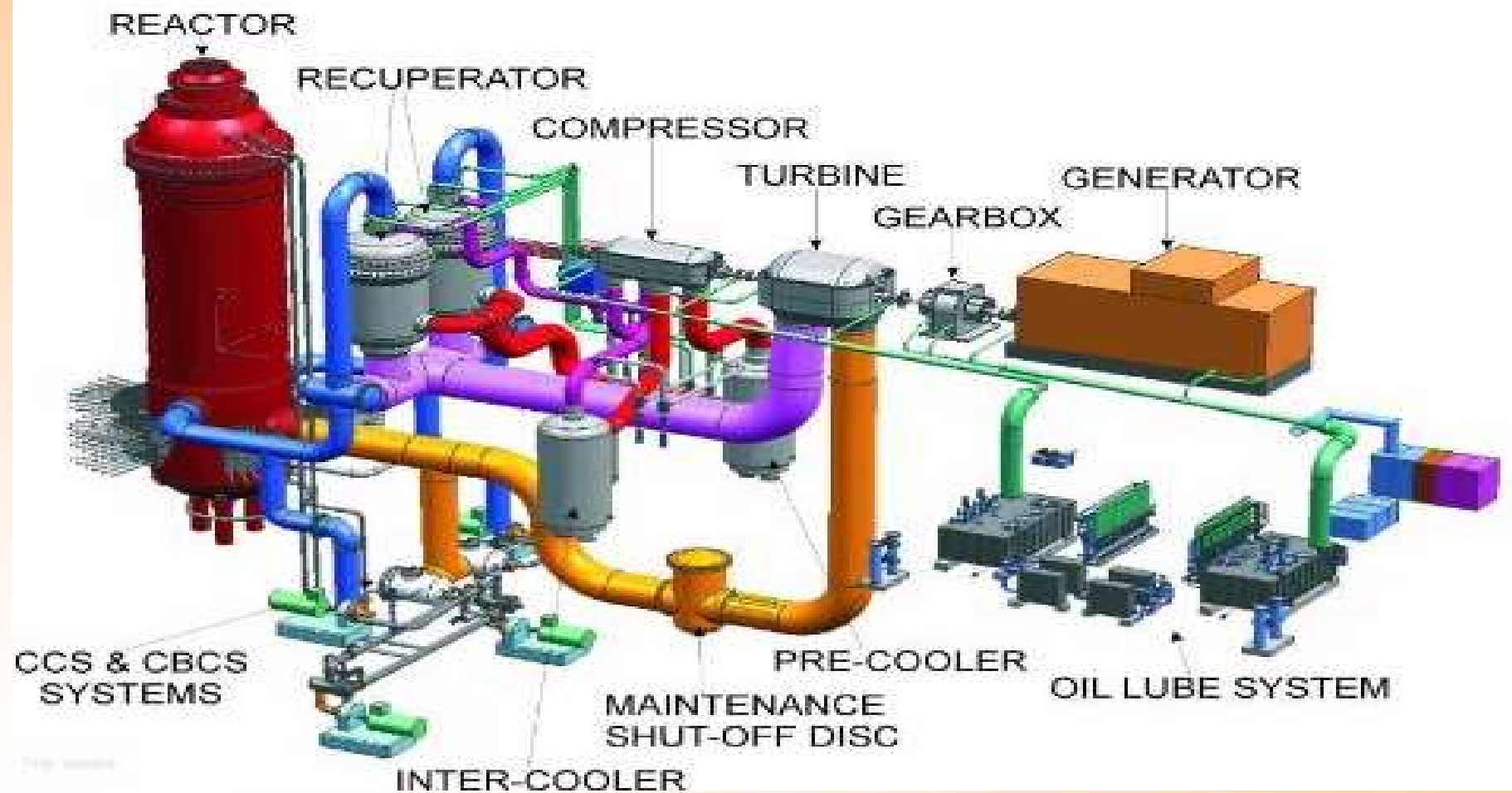
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Advanced Gas Reactors (14 plants in UK)

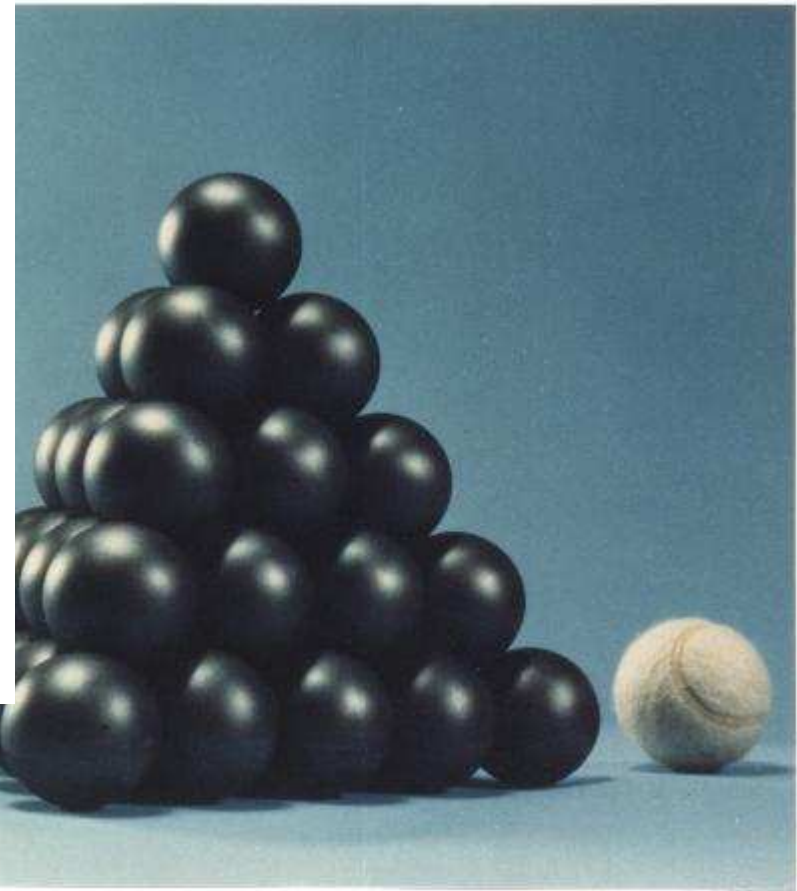
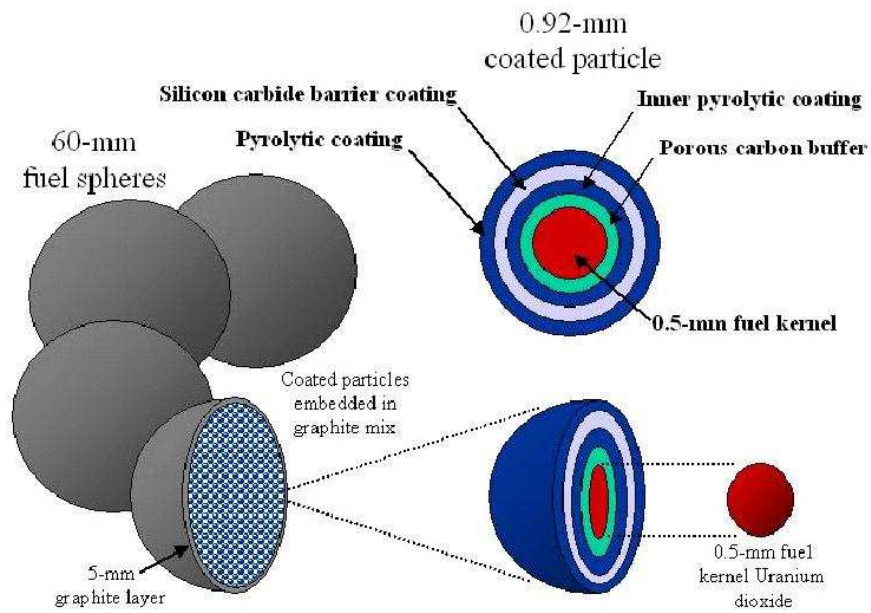


Carbon dioxide coolant circulates through the core, reaching 640 °C (1,184°F) and a pressure of around 40 bar (580 psi), and then passes through boiler (steam generator) assemblies outside the core but still within the steel lined, reinforced concrete pressure vessel

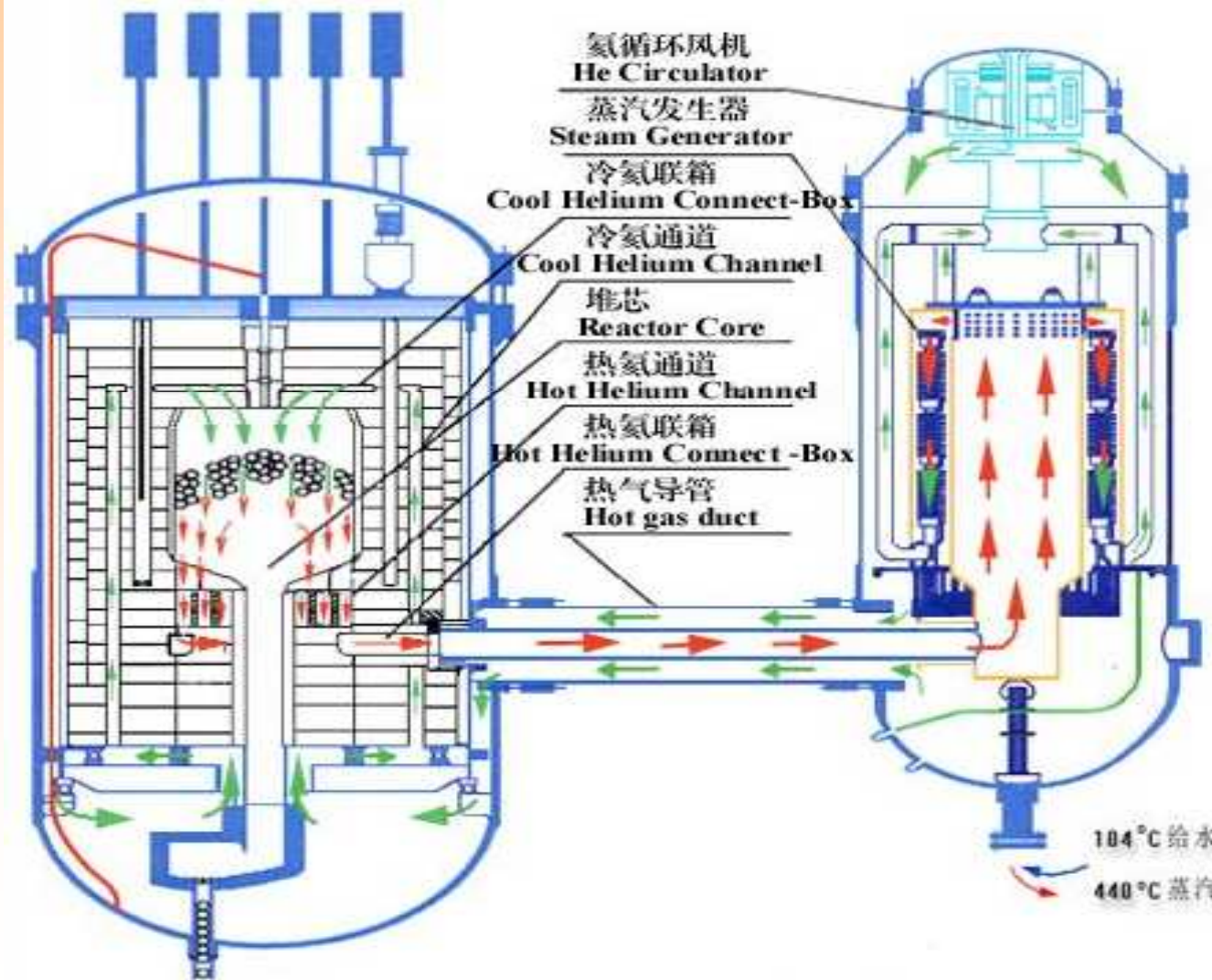
PBMR (South Africa)



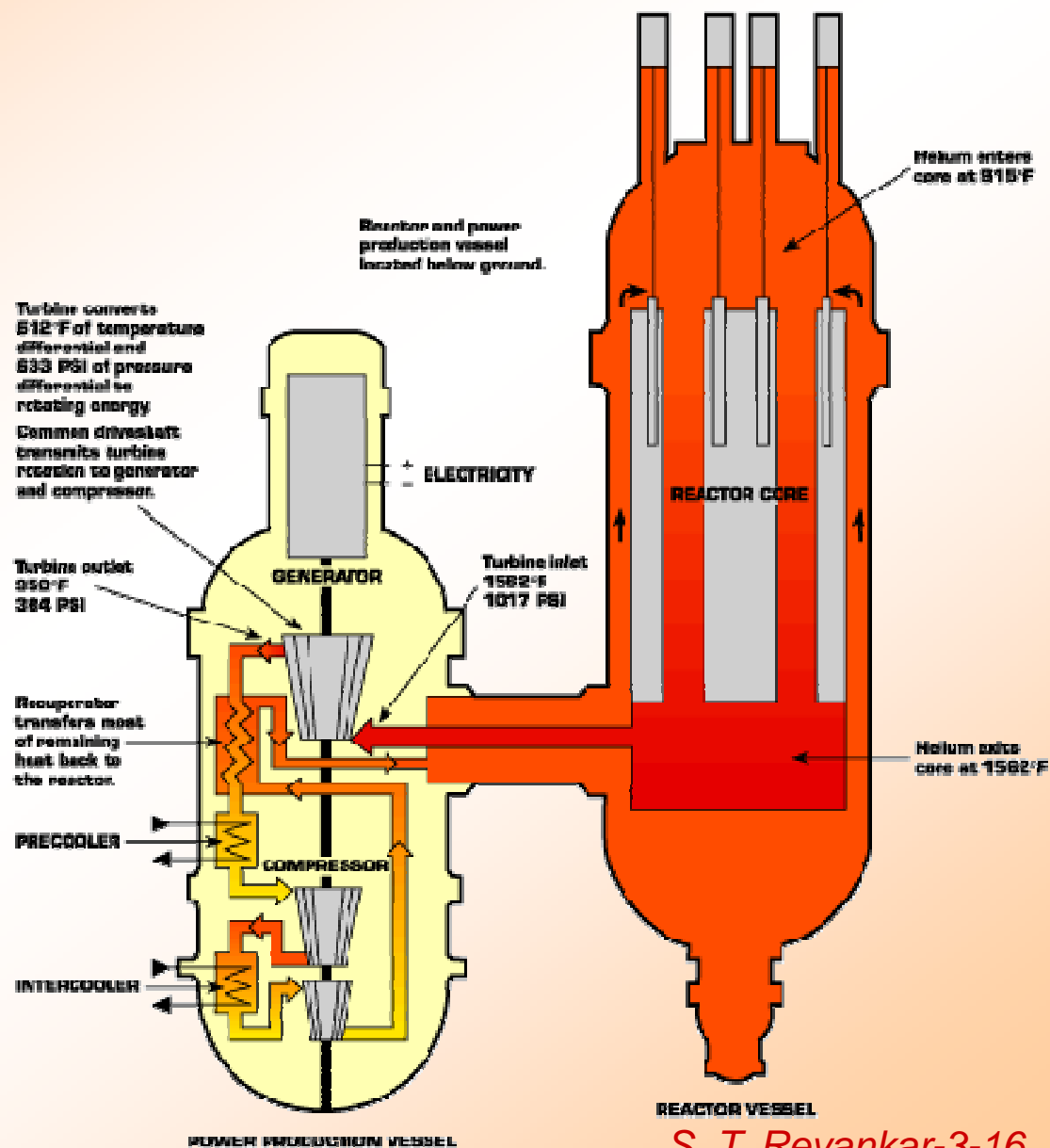
Fuel Pebbles



HTR-10 (China)



Gas Turbine-Modular Helium Reactor GT-MHR



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