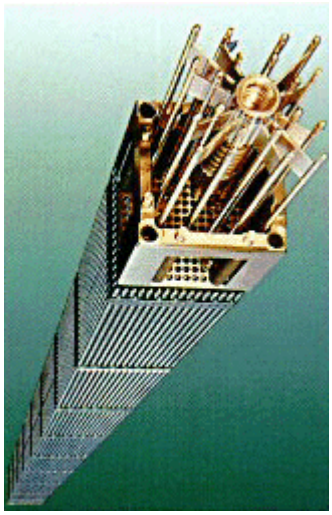
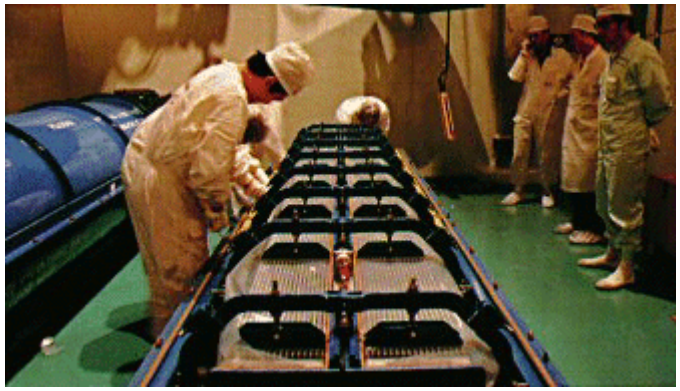
PWR Reactor Fuel Assemblies

Fuel Assembly

PWR fuel assemblies differ from BWR assemblies in that the control rods (called Rod Control Cluster Assemblies) have 16 to 20 rods and enter tubes in the assembly, as shown in the graphic on the left. The PWR fuel assembly usually has a fuel rod arrangement of 14 x 14 up to 17 x 17. Click for a 275K detailed illustration of a Westinghouse assembly. A comparison of the BWR and PWR fuel assemblies is shown below in the discussion covering Control Rods.



Courtesy Yonden



Courtesy Daya Bay NPP

PWR fuel assemblies are shipped 2 to a container (the blue cylinder to the left). For a cycle of 1 to 2 years length, 40 to 60 new fuel assemblies might be added. The fuel assemblies are unpackaged then inspected as shown in the middle picture.

The PWR fuel assemblies are about 14 feet (4 m) long. The entire length of the new fuel assembly is inspected for defects when received at the plant, as is shown in the photo to the right.

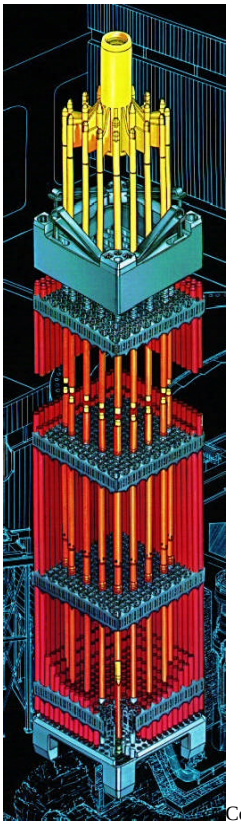
Courtesy KAERI

Control Rods

All reactors have some form of control rods that can be inserted to shutdown the reactor. The rods generally have one of 2 designs:

- rod control cluster assemblies of 16-20 rods that can be inserted into selected fuel assemblies, or
- cross or H shaped rod designs that can be inserted between a number of fuel assemblies.

Typically, PWRs use rod control clusters and BWRs use the cross rod design, as shown in the figures below..



Courtesy Westinghouse

<<<== PWR Fuel Assembly with Rod control cluster

BWR Fuel Assembly Design with Cross rod design ===>>>

Courtesy General Electric

The control rods contain the neutron "poison" (i.e. prevents neutrons from causing fission). Materials as boron carbide, alloys of silver-indium-cadmium, and hafnium are used. The neutron absorber material is typically surrounded by a stainless steel shell.

PWRs typically use the silver-indium-cadmium alloy and BWRs use boron carbide.
