

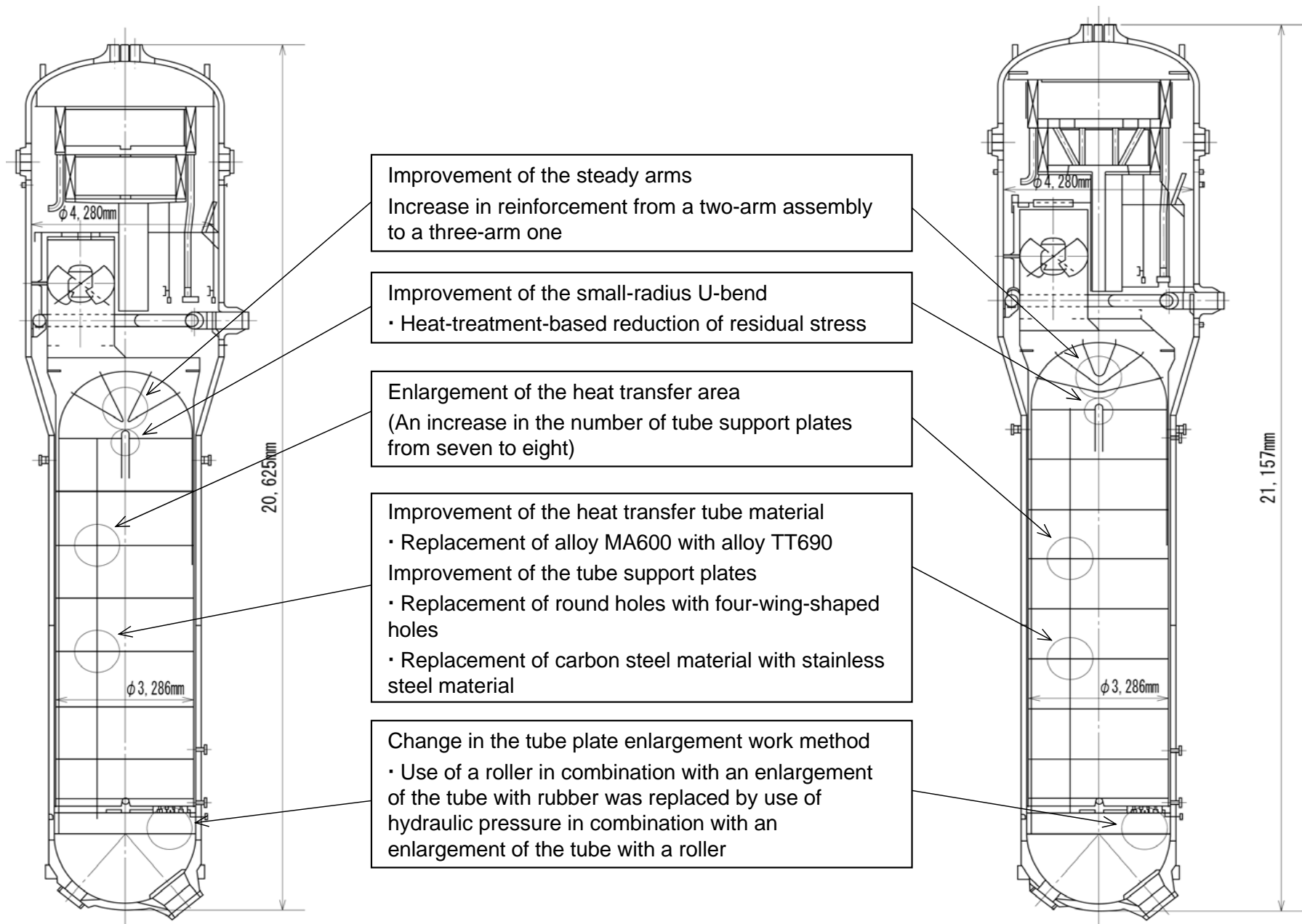
Unit 2, Genkai Nuclear Power Plant

Replacement Works for the Steam Generator and the Reactor Pressure Vessel Upper Head

Replacement works for the above components were conducted at Unit 2 of the Genkai Nuclear Power Plant during its 16th scheduled inspection (between March and October 2001).

In the following, the details of the replacement works are described.

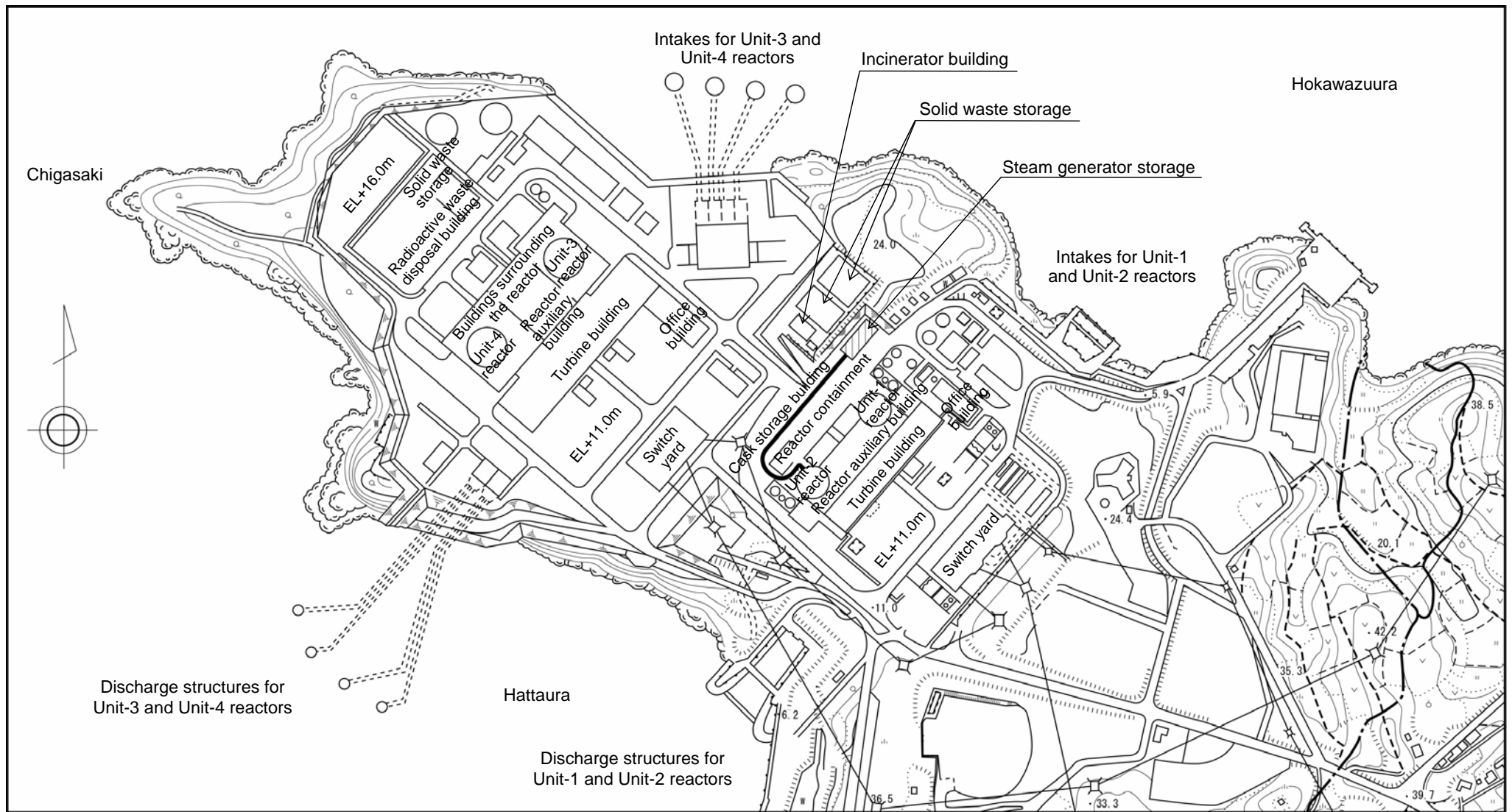




Former steam generator (model 51M)

New steam generator (model 54F)

Outline of the Replacement Work for the Steam Generator of Unit 2 of the Genkai Nuclear Power Plant

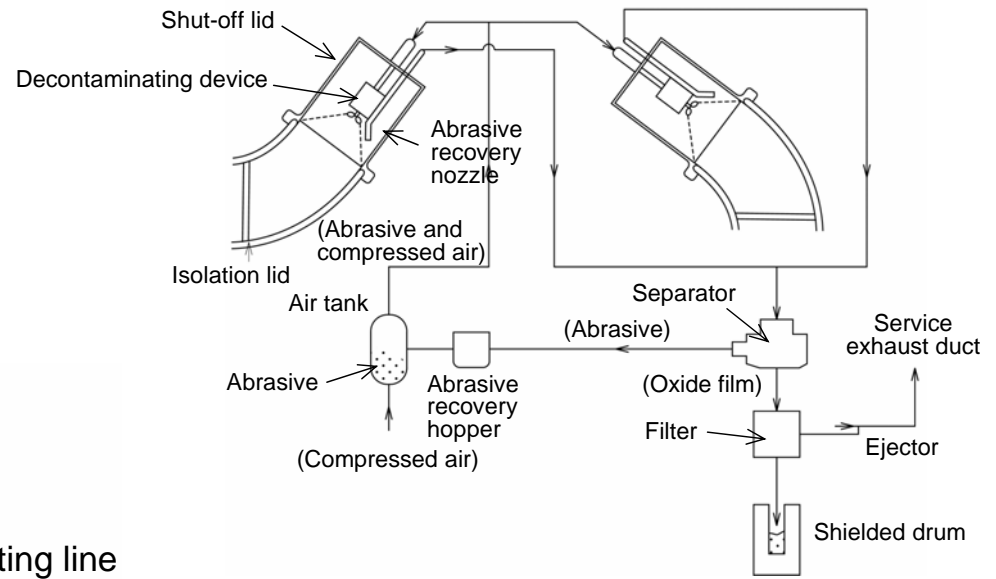
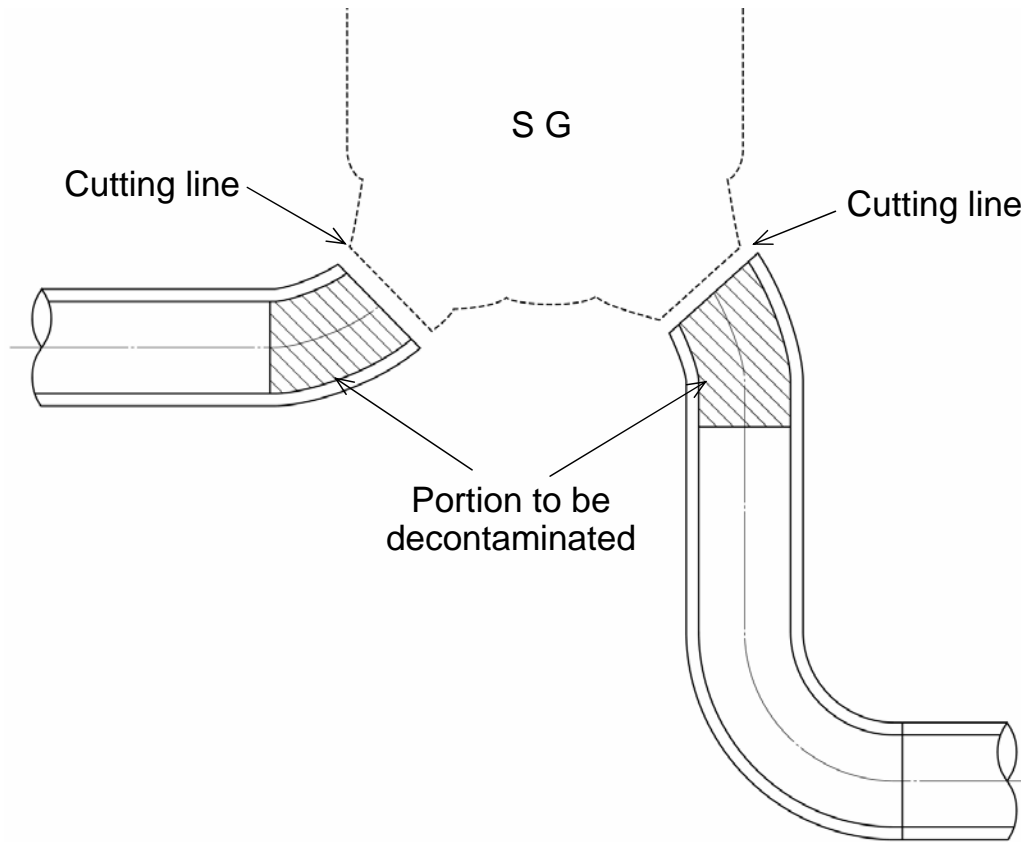


Map Showing the Route of Transportation of the Former Steam Generator in the Site

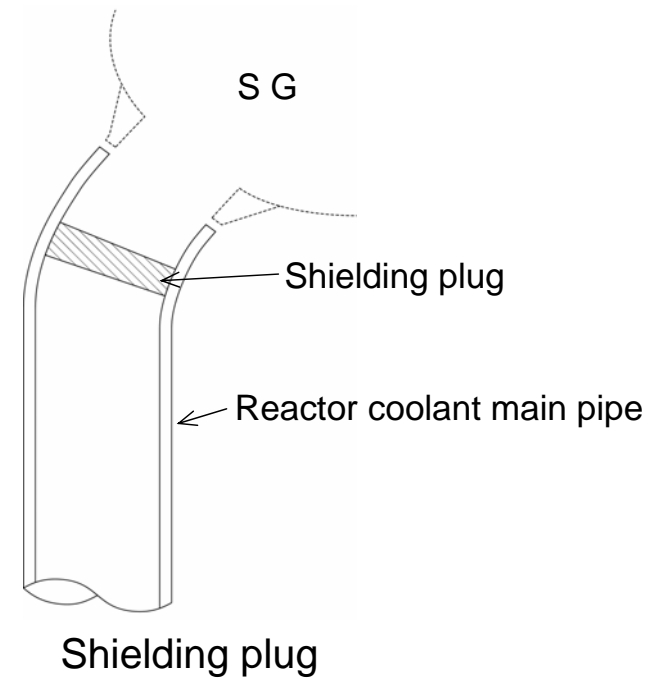
Measures Taken to Reduce the Dose during the Replacement Work for the Steam Generator of Unit 2 of the Genkai Nuclear Power Plant

- * Decontamination of the inner surface of the reactor coolant main pipe and application of a shielding plug to it after cutting of the pipe
- * Application of lead shielding onto the outer surface of the reactor coolant main pipe
- * Use of remote-operated automatic machines (automatic cutting machines, automatic edge preparation machines, and automatic welding machines for piping use)*¹

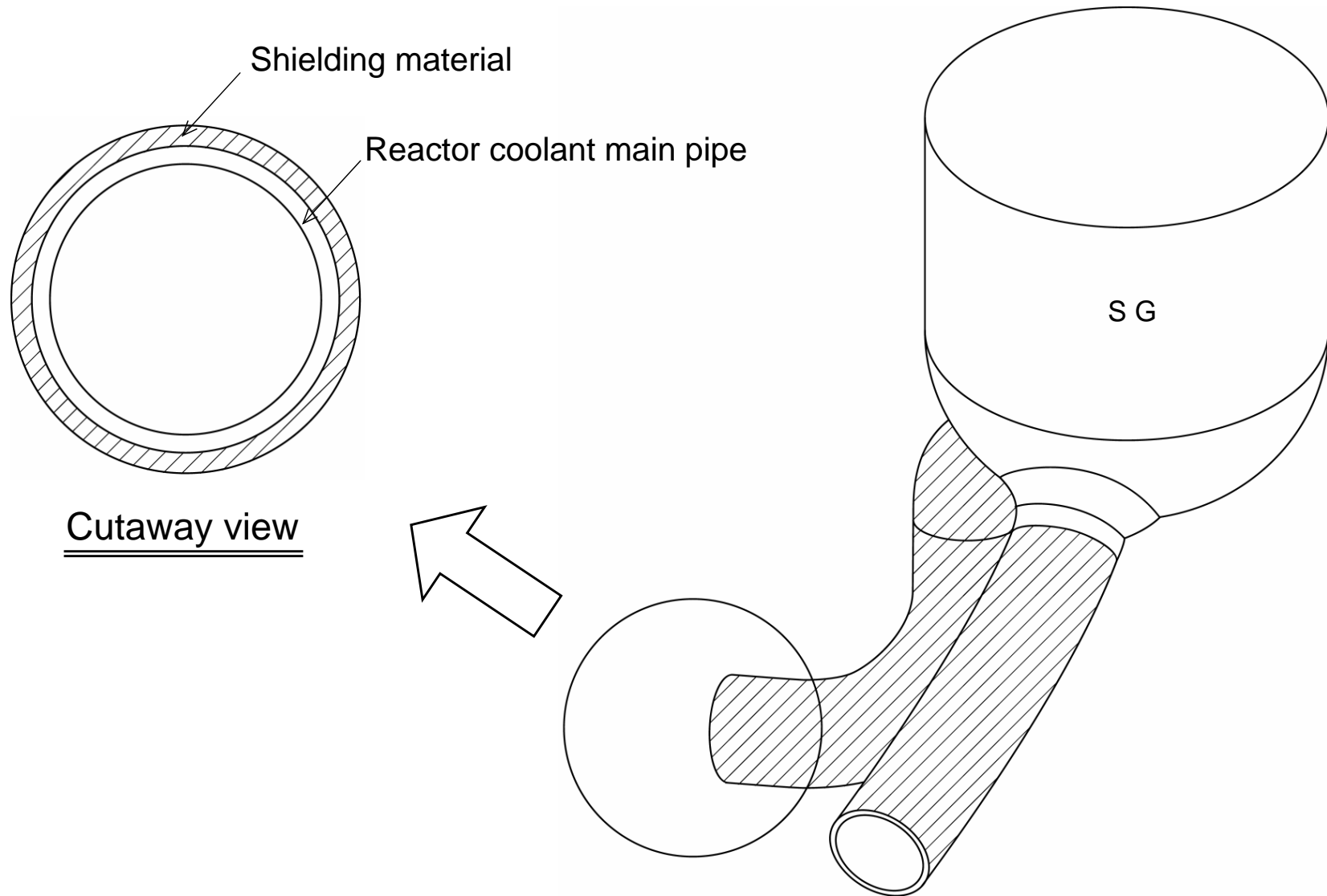
*¹ : This includes the effect of operability improvement resulting from training on mockups.



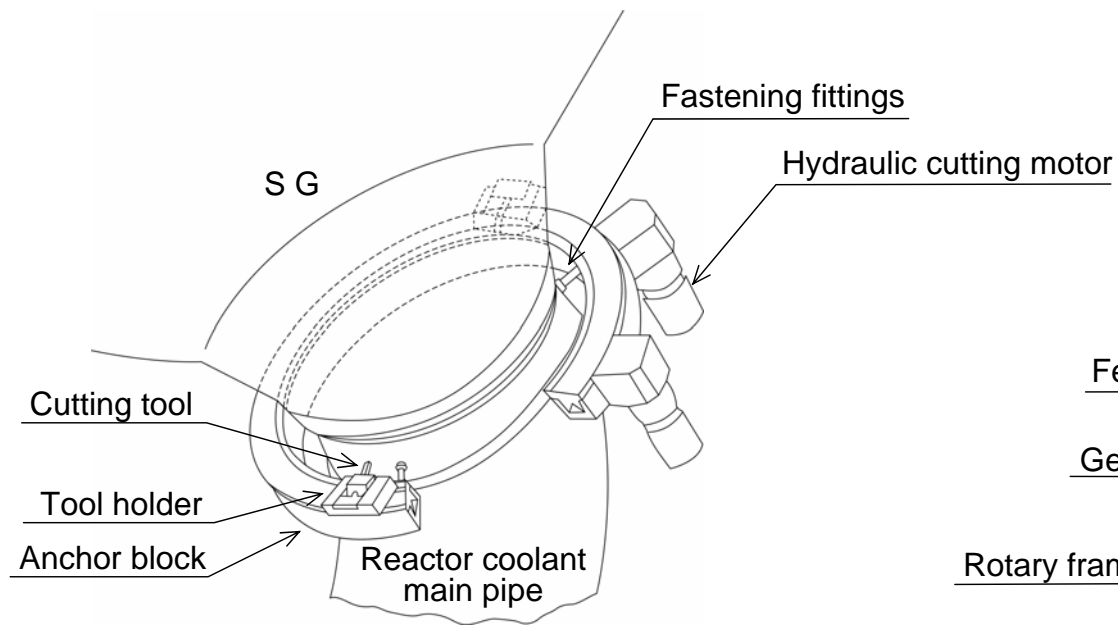
MCP physical (blast) decontamination



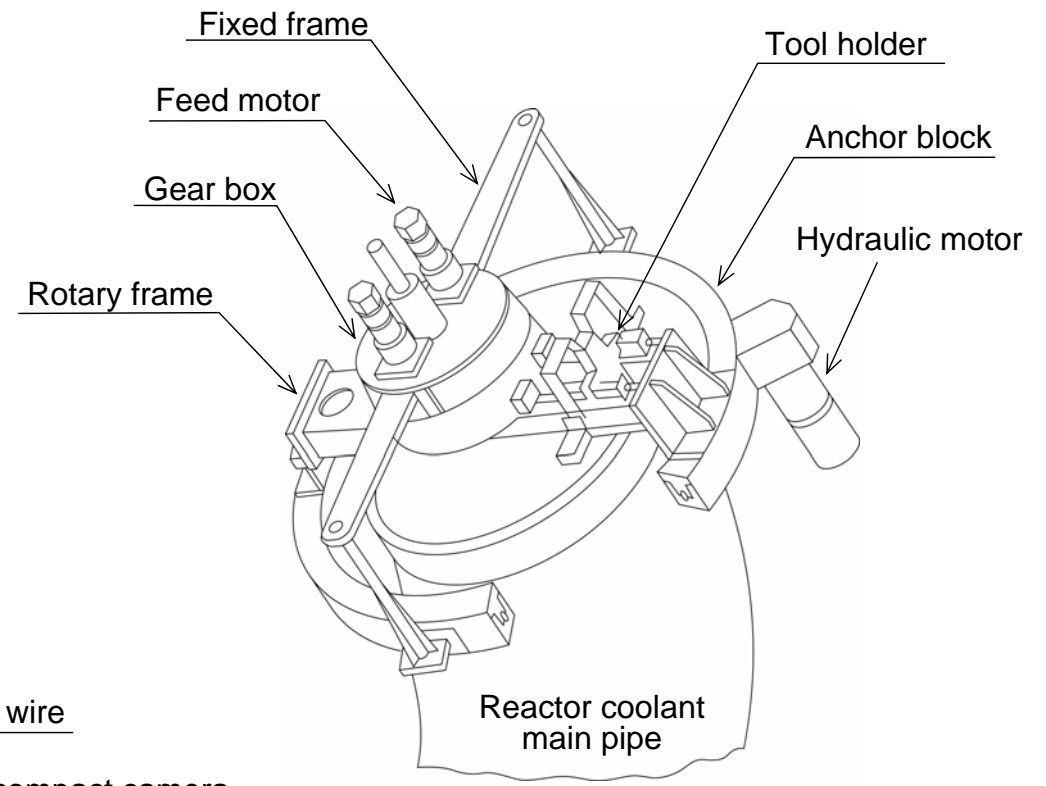
Decontamination of the Inner Surface of the Reactor Coolant Main Pipe and Application of a Shielding Plug to It



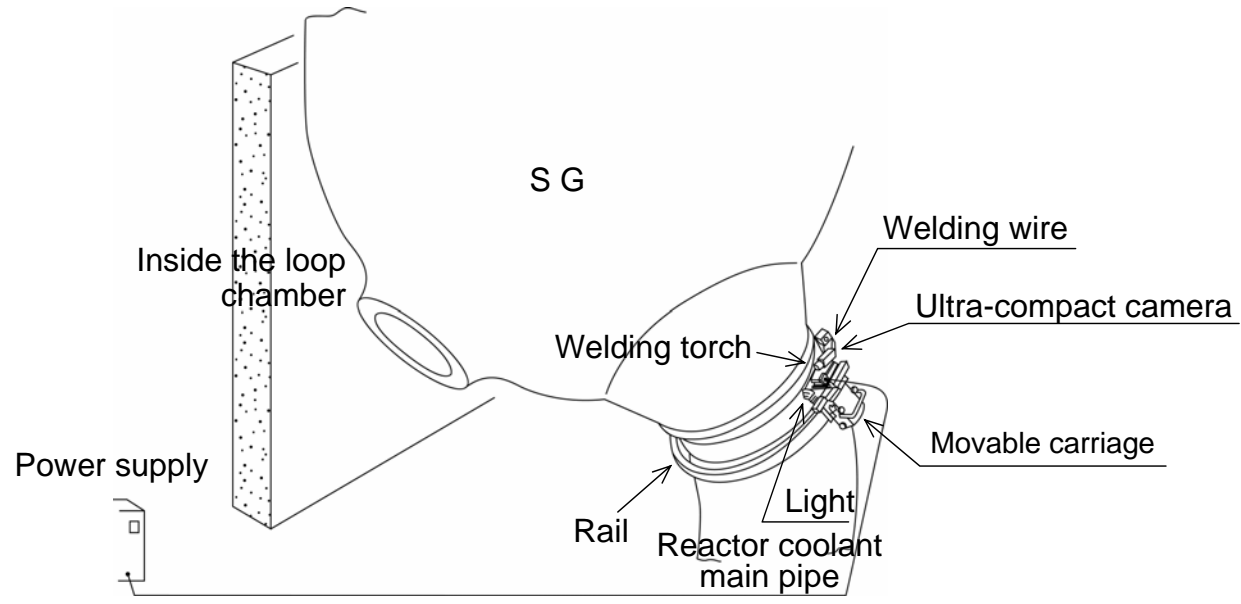
Application of Lead Shielding onto the Outer Surface of the Reactor Coolant Main Pipe



Automatic cutting machine

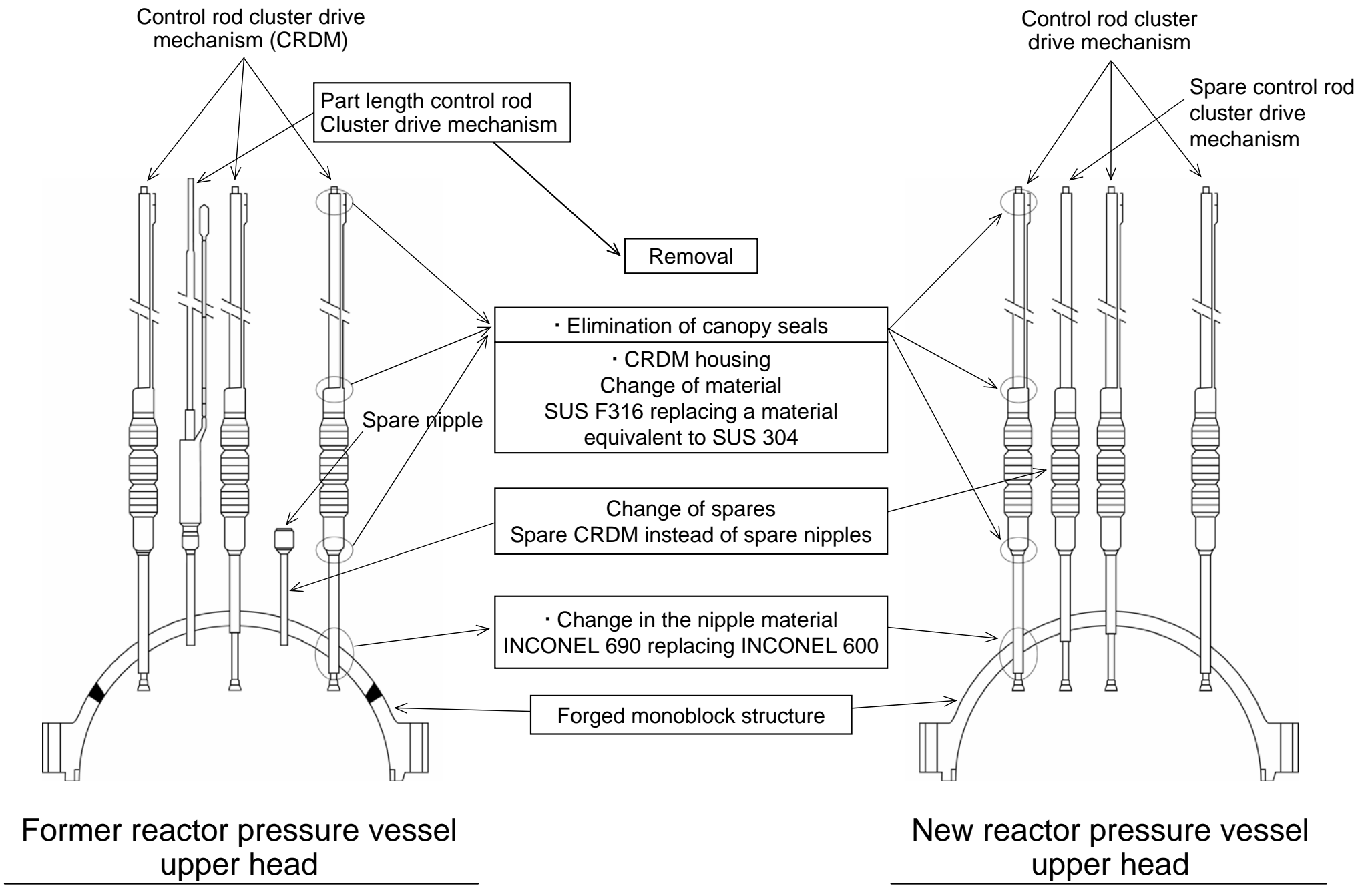


Automatic edge preparation machine



Automatic welding machine

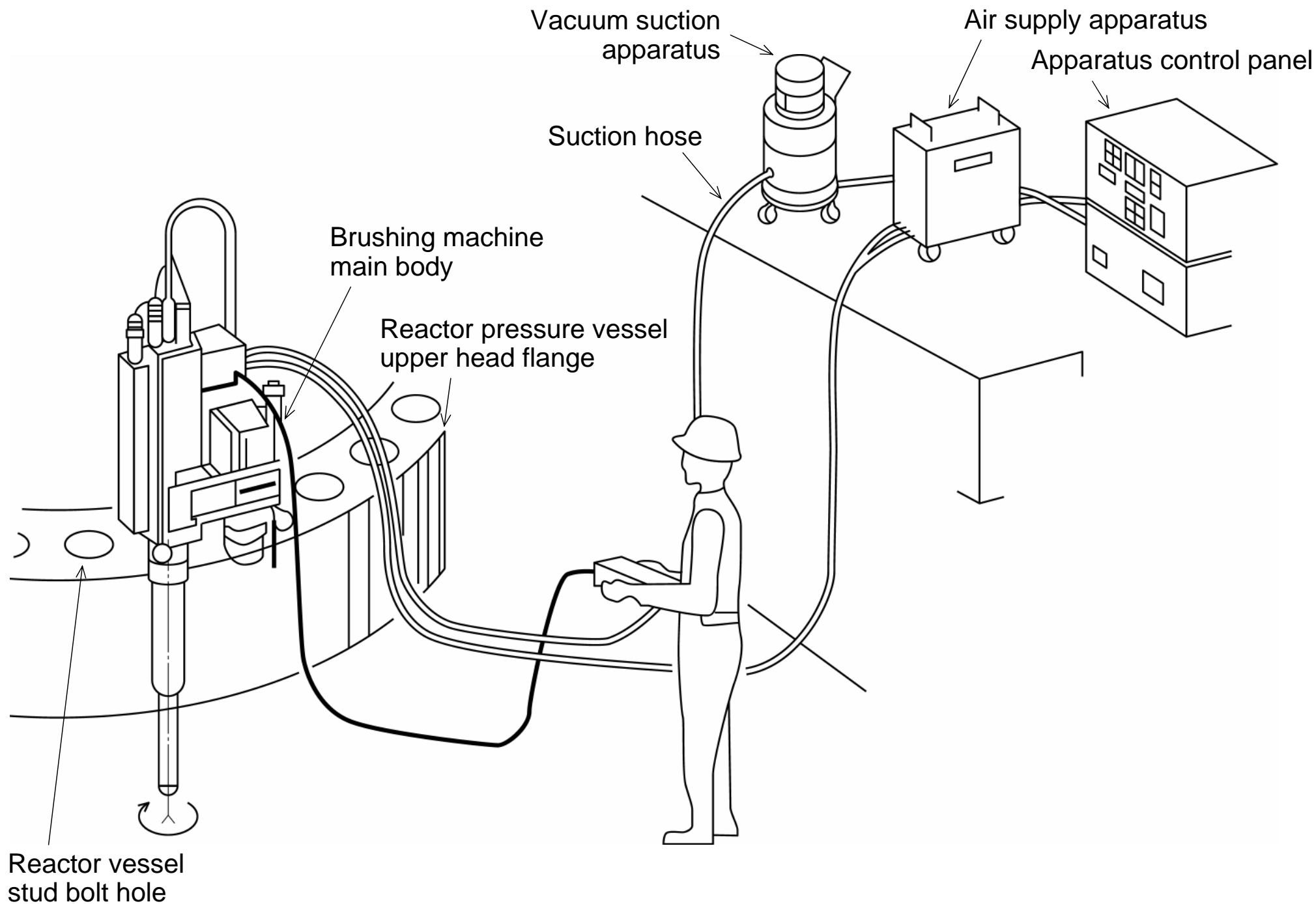
Use of Automatic Remote-operated Machines



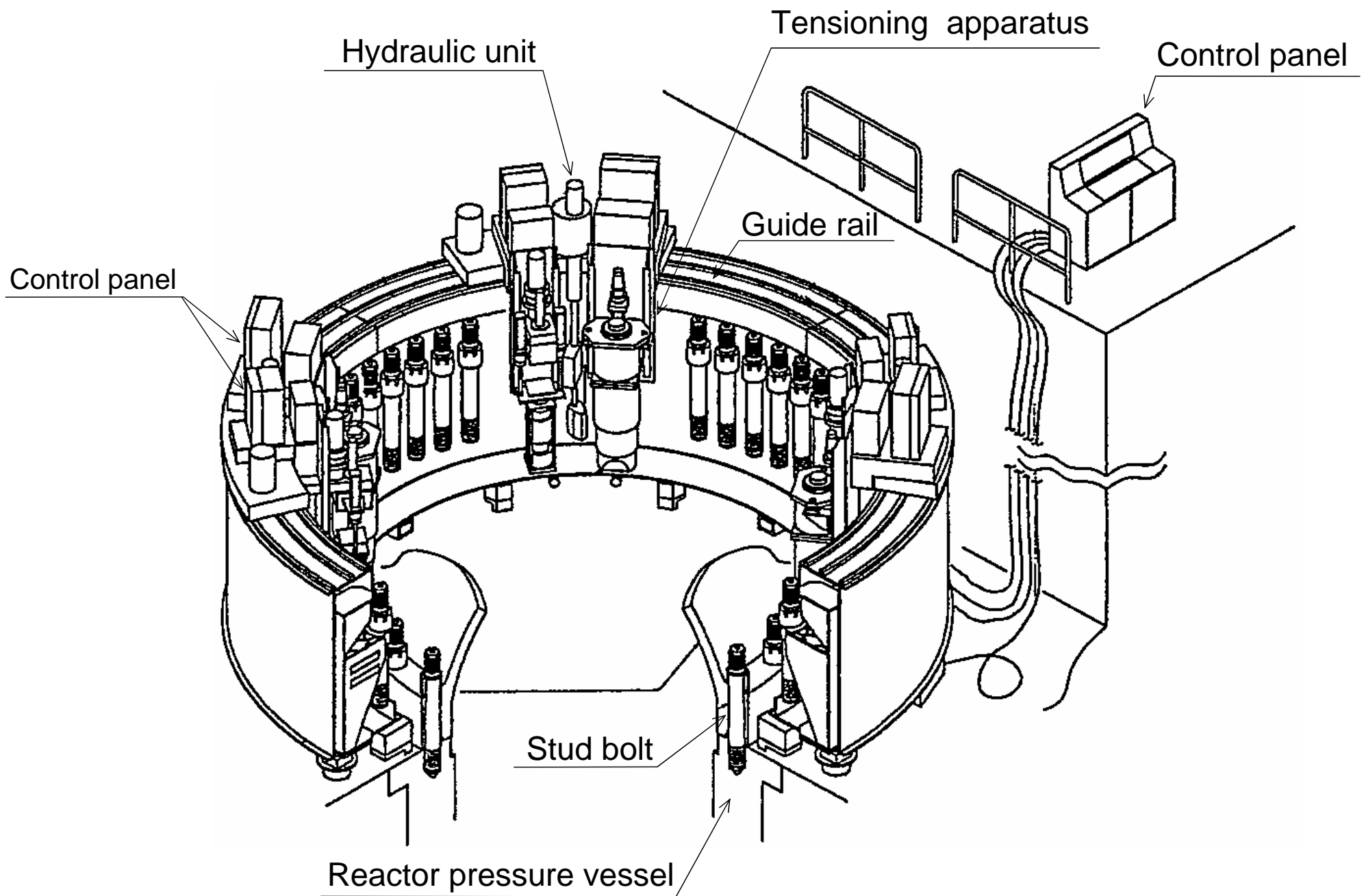
Outline of the Replacement Work for the Reactor Pressure Vessel Upper Head of Unit 2 of the Genkai Nuclear Power Plant

Measures taken to reduce the dose during the replacement work for the reactor pressure vessel upper head of Unit 2 of the Genkai Nuclear Power Plant

- * Reduction in working hours through the use of the automatic reactor vessel stud hole brushing machine
- * Reduction in working hours through the use of the fully-automatic reactor vessel stud bolt handling machine
- * Reduction in working hours through the integration of reactor vessel upper internals



Use of the Automatic Reactor Vessel Stud Hole Brushing Machine

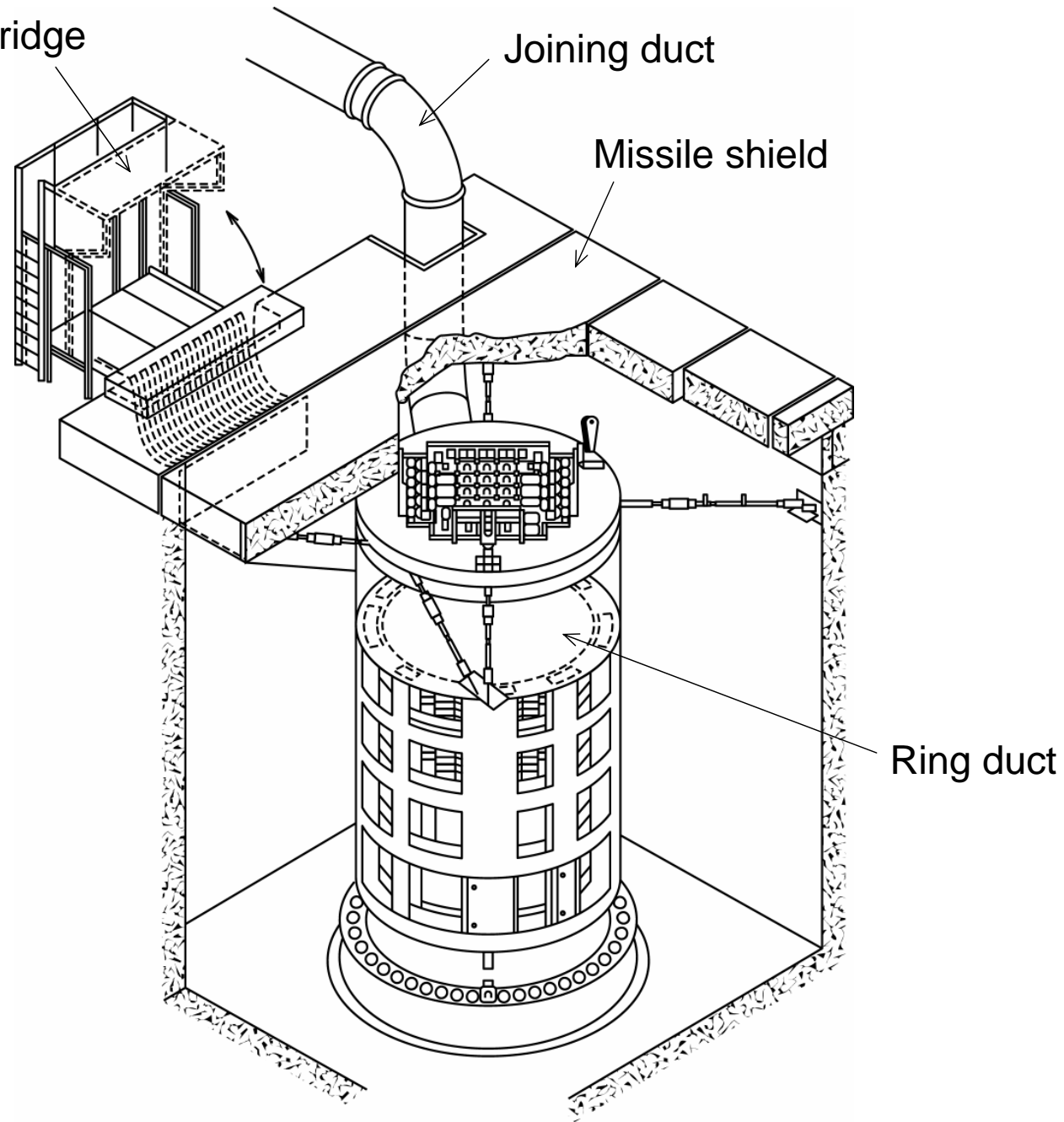


Use of the Fully-automatic Reactor Vessel Stud Bolt Handling Machine

Movable cable bridge

Joining duct

Missile shield



Ring duct

Integration of Reactor Vessel Upper Internals

Measures Taken to Reduce the Dose in Unit 2 of the Genkai Nuclear Power Plant and the Effects Achieved by the Measures Taken

Unit: (man·mSv)

Description		Effect	
		Before the measure was taken*2	After the measure was taken
Replacement work for the steam generator Track record value 0.88 man·Sv	Decontamination of the inner surface of the reactor coolant main pipe and application of a shielding plug to it	651.15	49.98
	Application of lead shielding on the outer surface of the reactor coolant main pipe	869.98	403.83
	Use of remote-operated automatic machines (automatic cutting machines, automatic edge preparation machines, and automatic welding machines for piping use)*1	128.59	47.58
Replacement work for the reactor pressure vessel upper head Track record value 0.10 man·Sv	Reduction in working hours through the use of the automatic reactor vessel stud hole brushing machine	2.49	0.87
	Reduction in working hours through the use of the fully-automatic reactor vessel stud bolt handling machine	16.50	9.22
	Reduction in working hours through the integration of reactor vessel upper internals	17.55	7.62

*1: This includes the effect of operability improvement resulting from training on mockups.

*2: Values calculated on the basis of exposure track records (dose values) under the assumption that the dose reduction measures are not taken

Measures in Chemical Control Taken to Reduce the Dose in Unit 2 of the Genkai Nuclear Power Plant

- Early removal of dissolved oxygen

At the startup(at the time of filling RCS with water), vacuum venting machines and gas stripper packages are used to remove dissolved oxygen at an early stage, thereby making the atmosphere reductive to suppress the elution of Ni and Cr from the new steam generator.

- Control of dissolved hydrogen at a low level

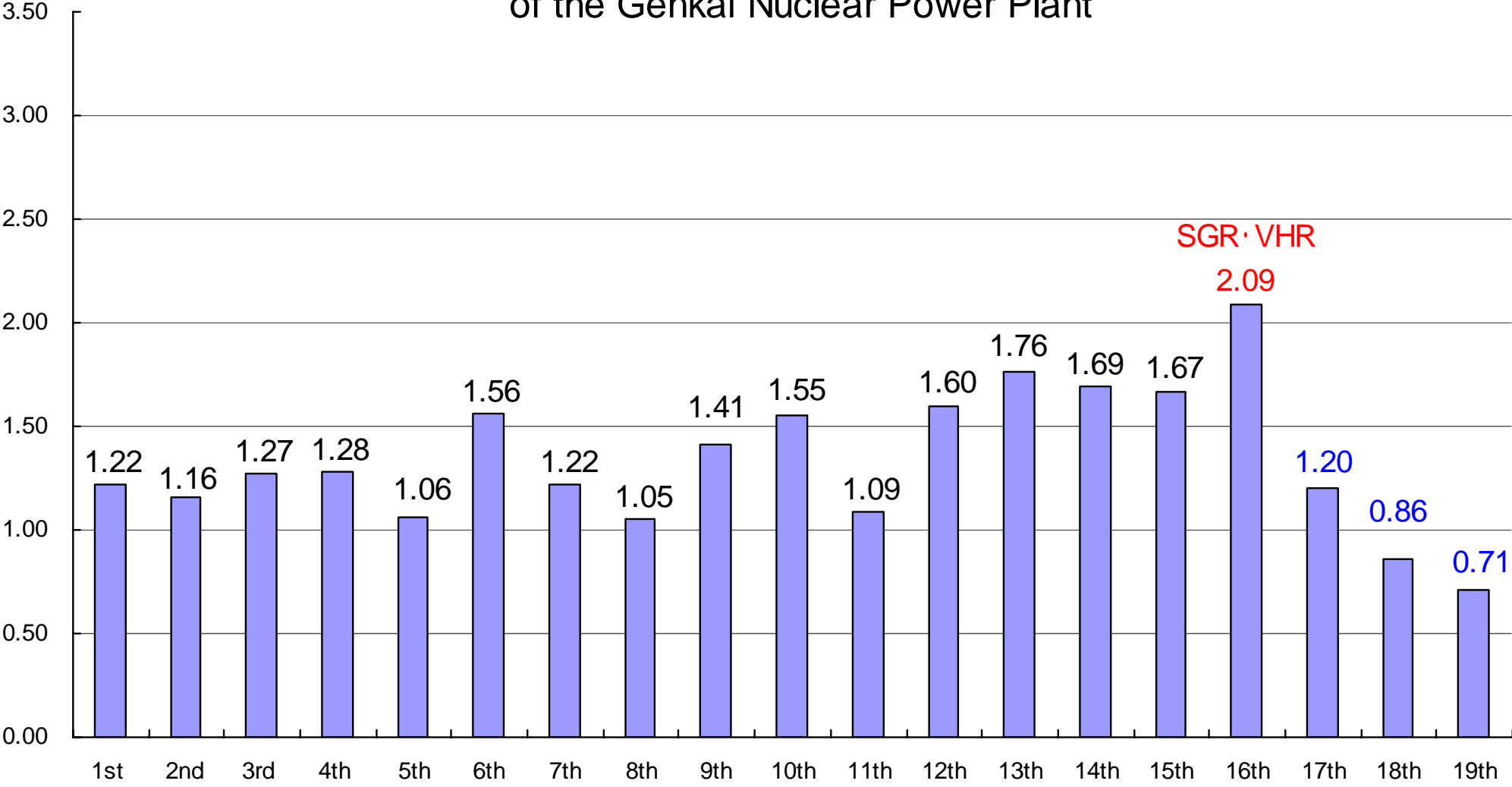
By keeping the dissolved hydrogen concentration at a lower level during power operation, the amount of Ni on the fuel surface is lowered.

- Removal of new outer layer clad

By adding H_2O_2 at shutdown (when the cold shutdown state is reached) to keep the dissolved hydrogen concentration at a lower level, the removal of Ni and Co-58 is accelerated.

Graph Showing the Change in Dose at Scheduled Inspections for Unit 2 of the Genkai Nuclear Power Plant

man sV



Summary

- In the replacement works described above, taking different dose reduction measures suitable to individual work specifics allowed us to achieve greater dose reduction effectiveness.
- Recently, factors contributing to an increase in dose associated with inspection and maintenance activities have occurred; in ordinary scheduled inspections, however, taking various dose reduction measures as described above helps to secure dose reduction effectiveness.
- We will continue studying new dose reduction measures to further cut down on dosage.

