

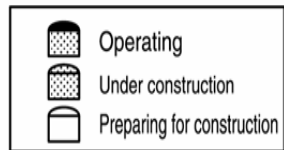
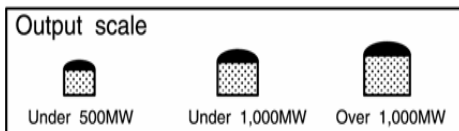
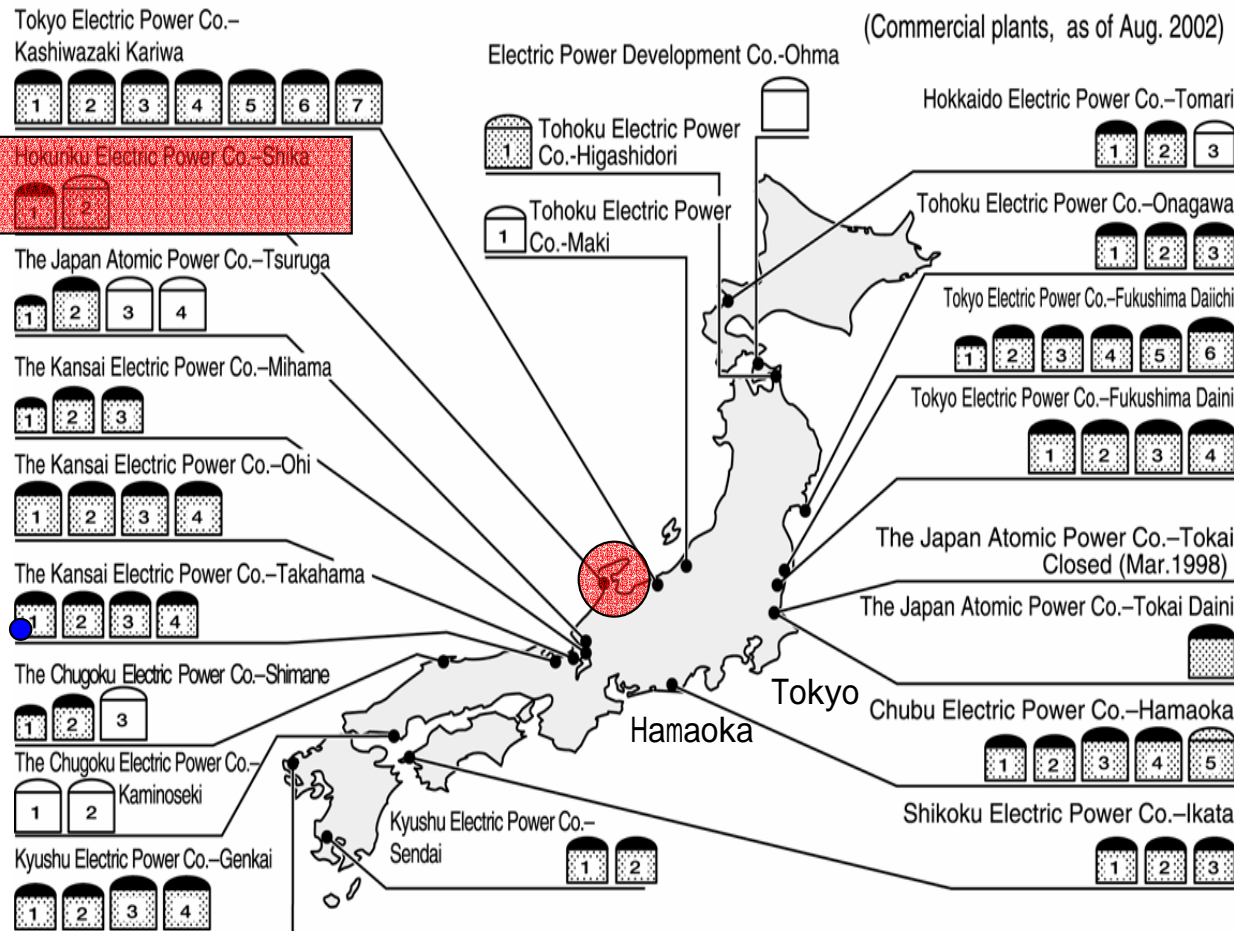
Dose Reduction Measures at Shika Nuclear Power Station Unit-1



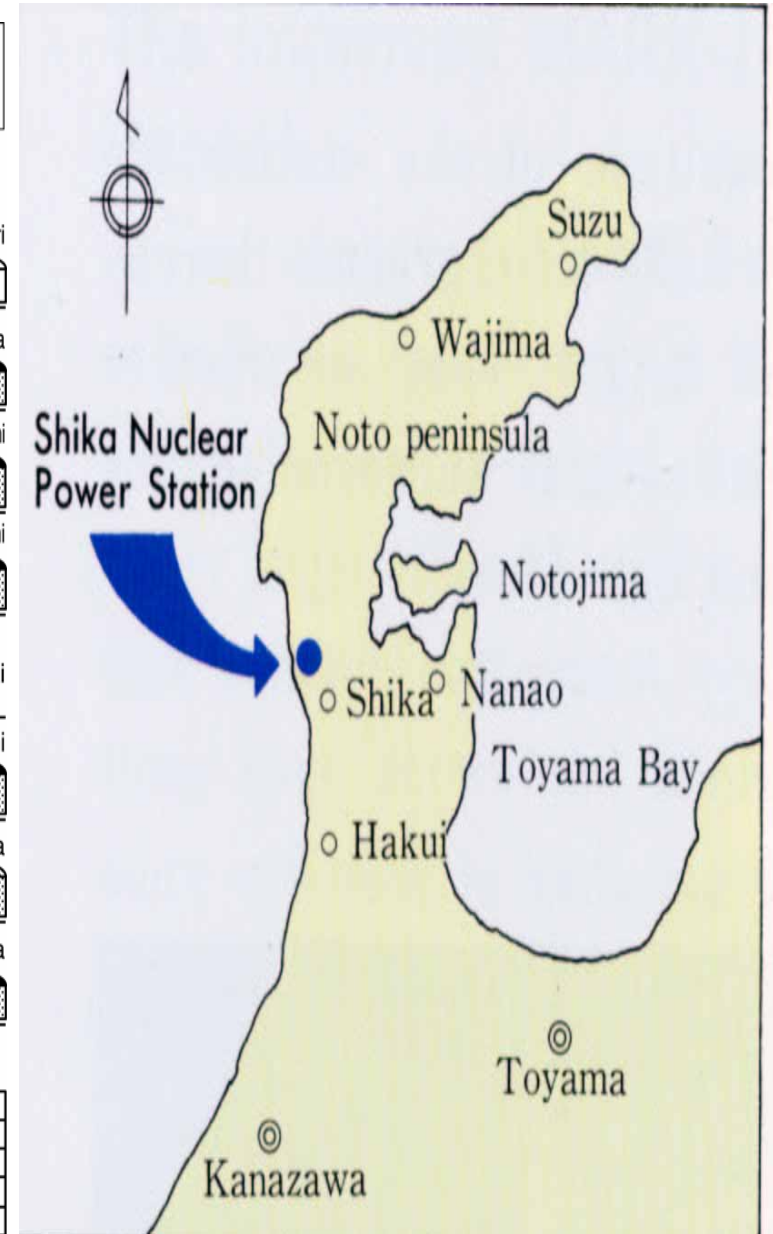
Takahashi Toshihiko
Hokuriku Electric Power Company

Location of Shika NPP

Nuclear Power Plants in Japan



	Number of Units	Total Output (MW)
Operational	52	45,742
Under construction	3	3,838
Preparing for construction	8	10,315
Total	63	59,895



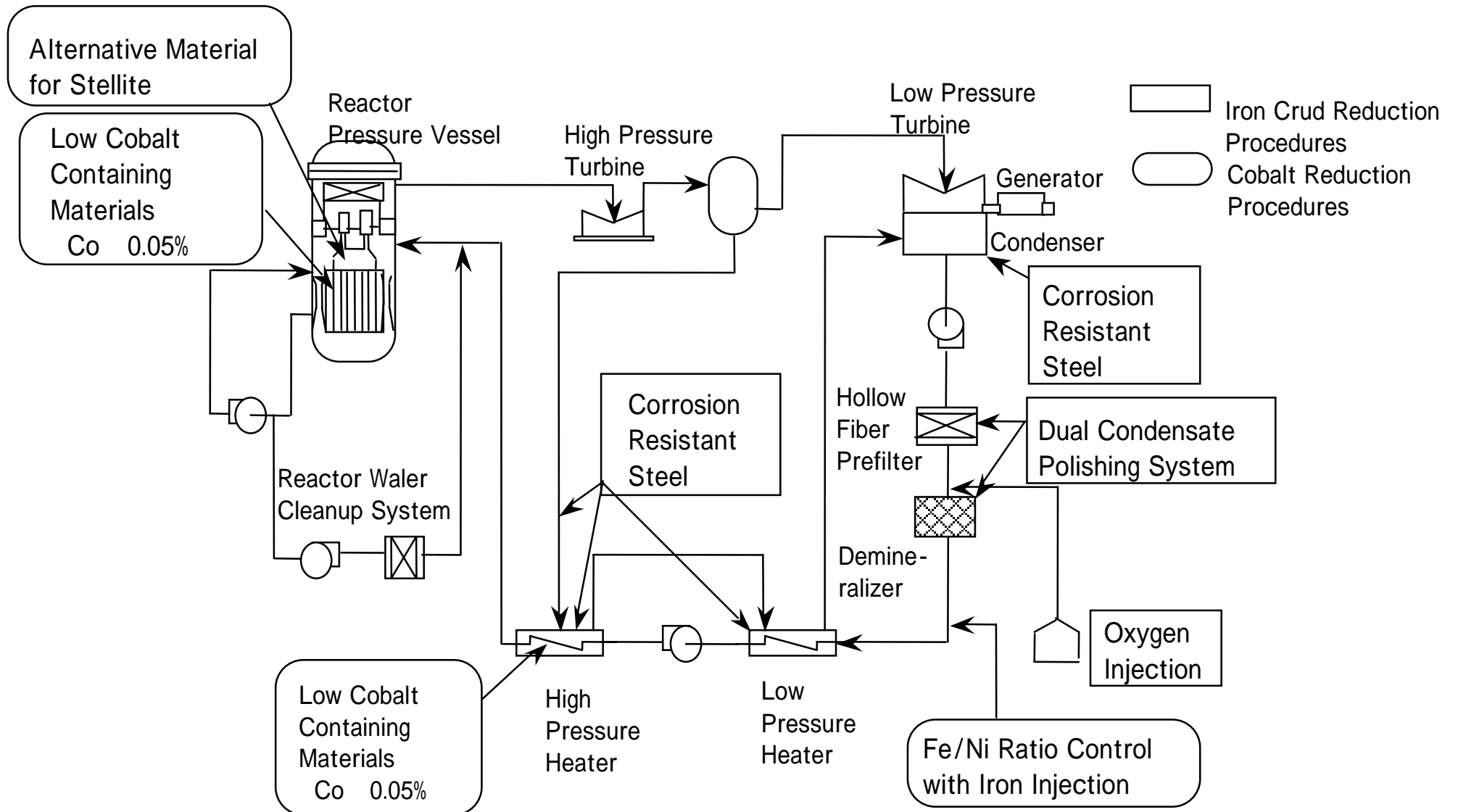
Major Specification of Shika Unit-1&2

	Shika Unit-1	Shika Unit-2
Commercial operation	July 1993	March 2006(Plan)
Reactor type	BWR5	ABWR
Electric power	540MW	1358MW
Condensate polishing system	hollow fiber filter + demineralizer	hollow fiber filter + demineralizer
RWCU flow rate	64t/h (2% of feed-water flow rate)	154t/h

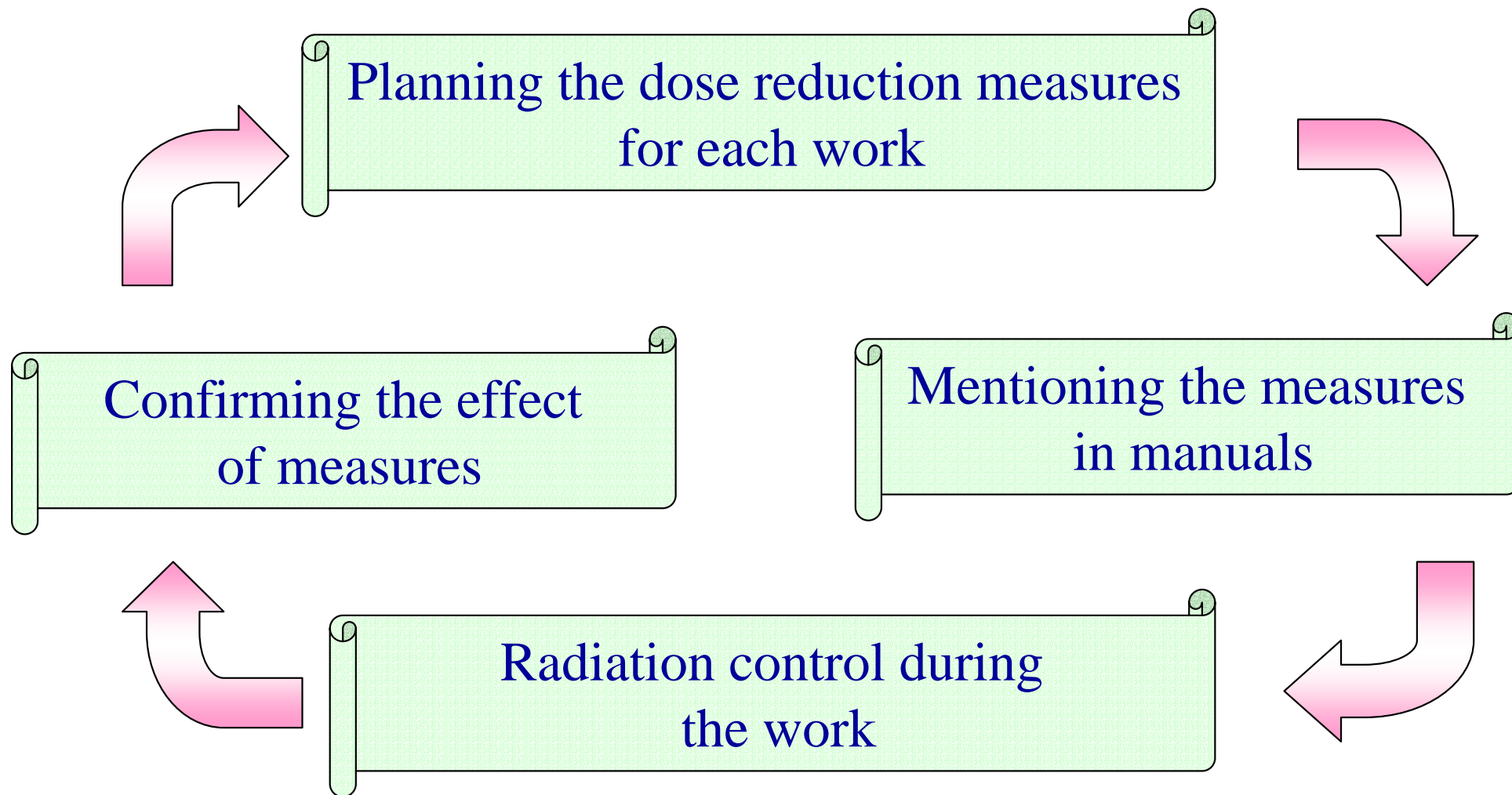
Dose reduction measures on design and construction stage

Improvement of the procedures of work	Automatic or remote system	Automatic equipment for In Service Inspection
		Automatic machine for CRD replacement
		Automatic decontamination machine for reactor well
Improvement of the environment of the work field	Reduction of corrosion product	Use of materials with low-cobalt content
		Dual Condensate polishing system
		Oxygen injection into the feed-water system
	Reinforcement of shielding	Shielding of PLR piping
		Shielding of high radiation rate piping

Measures for reducing corrosion product in Shika unit 1



The Systematic approach to dose reduction of each work (PDCA cycle)



Dose reduction measures on operation stage



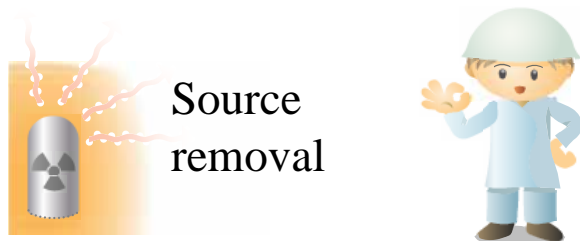
- temporary shielding
- minimizing the drainage range



- securing the distance between source and working area
- preventing the thoughtless access to source

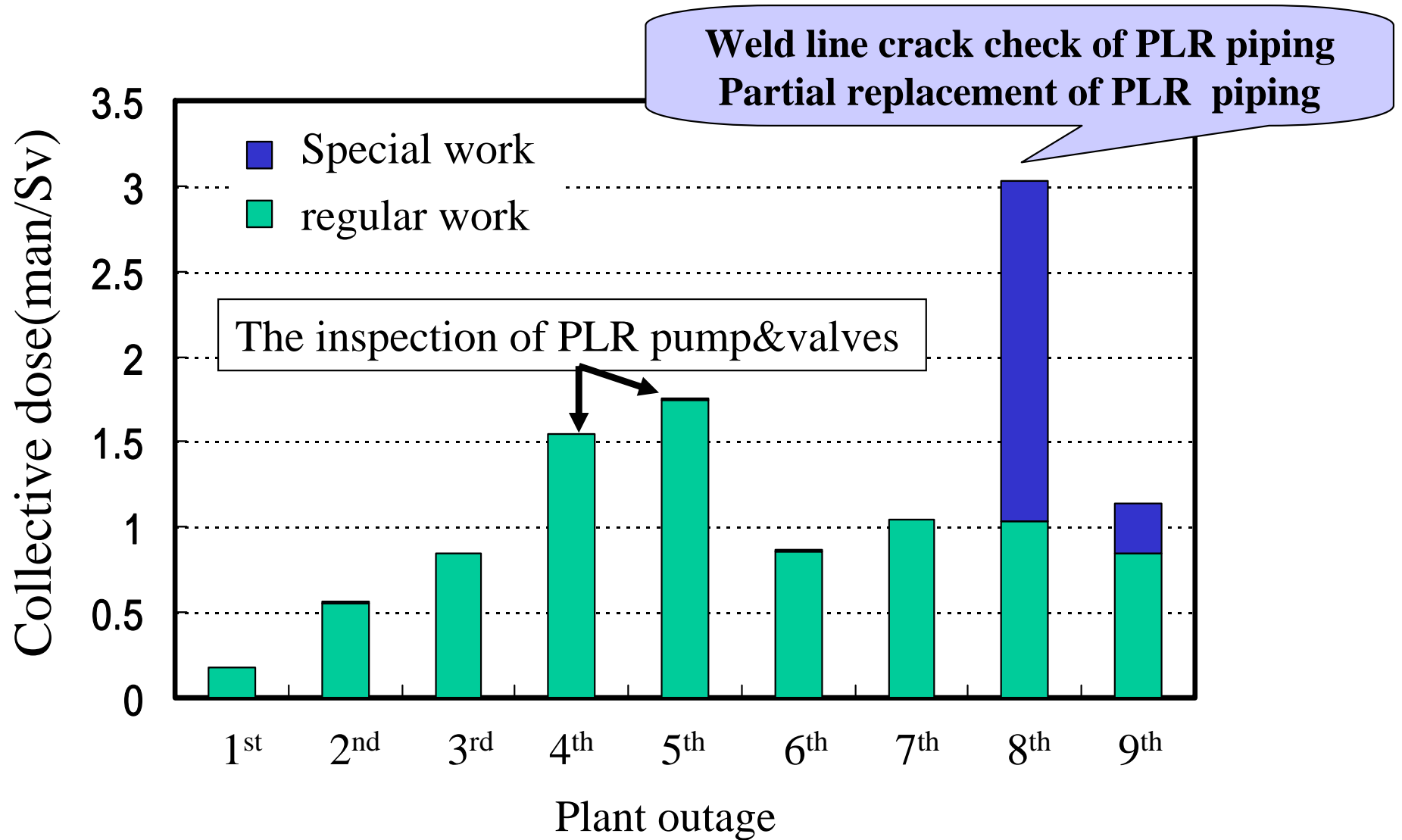


- shortening the work time by mock-up
- control the work time

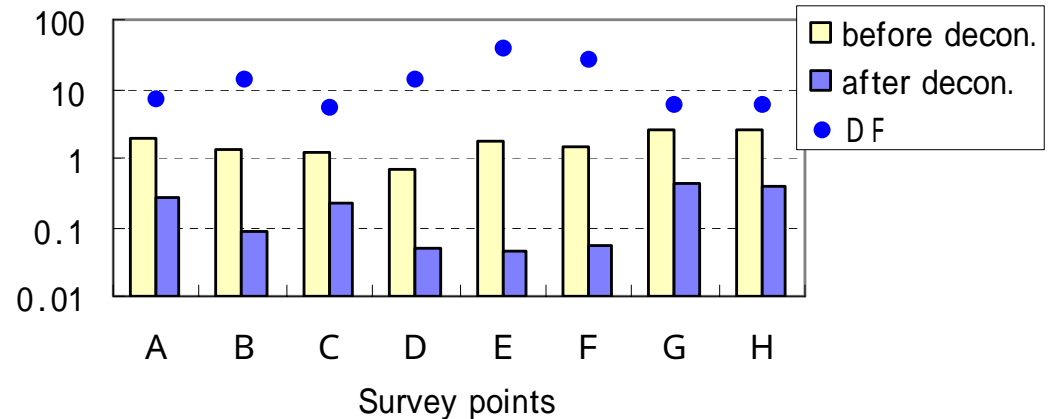
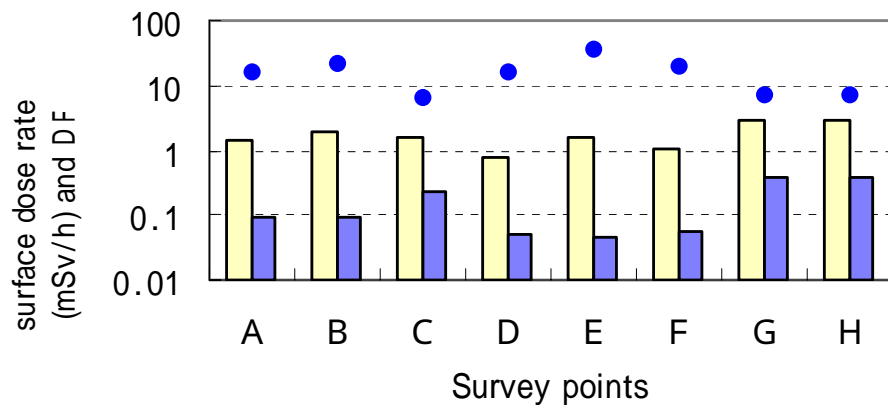
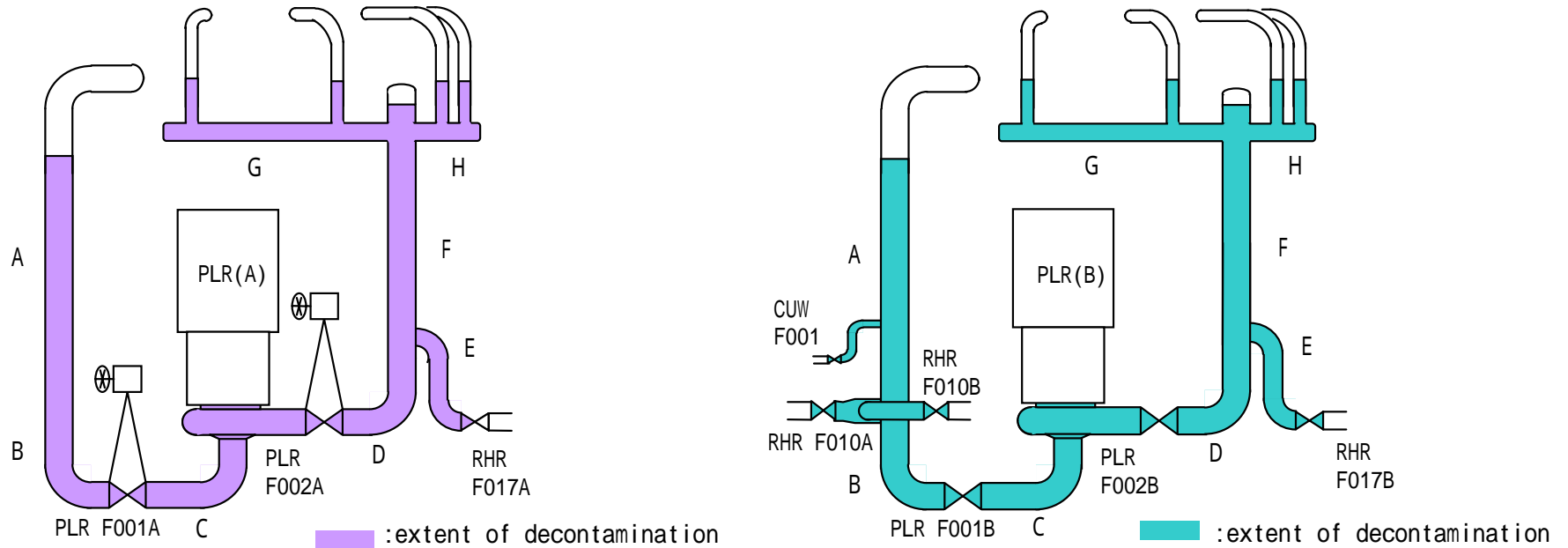


- **Chemical decontamination**
- **RHR low temperature shutdown cooling operation**

Collective Dose of Plant Outage at Shika Unit-1



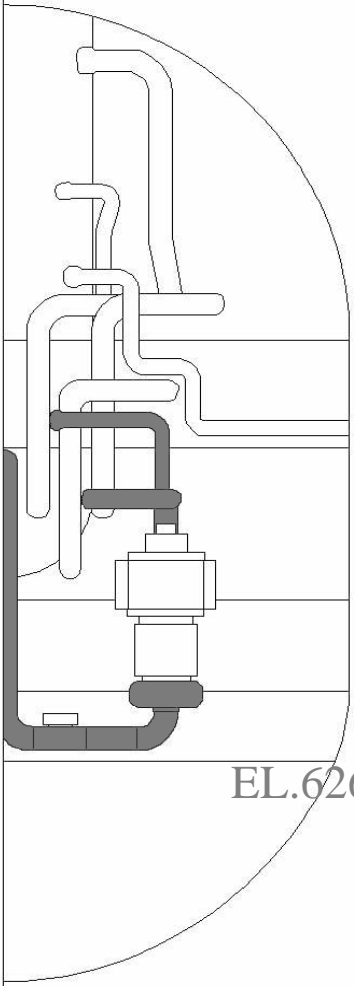
The result of 8th outage Chemical decontamination



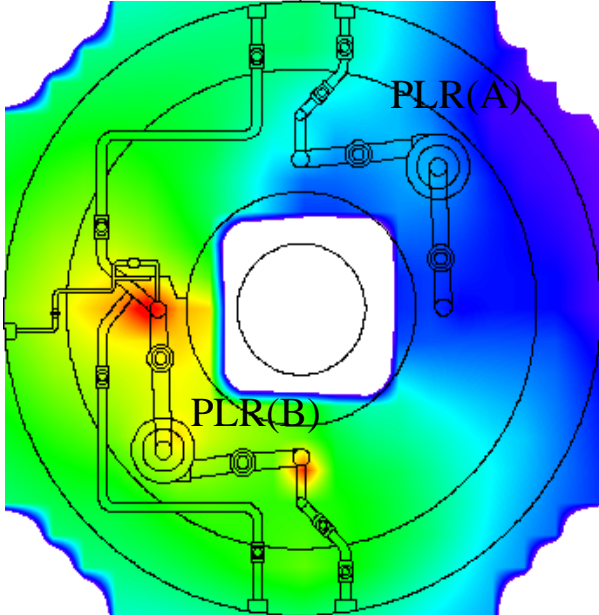
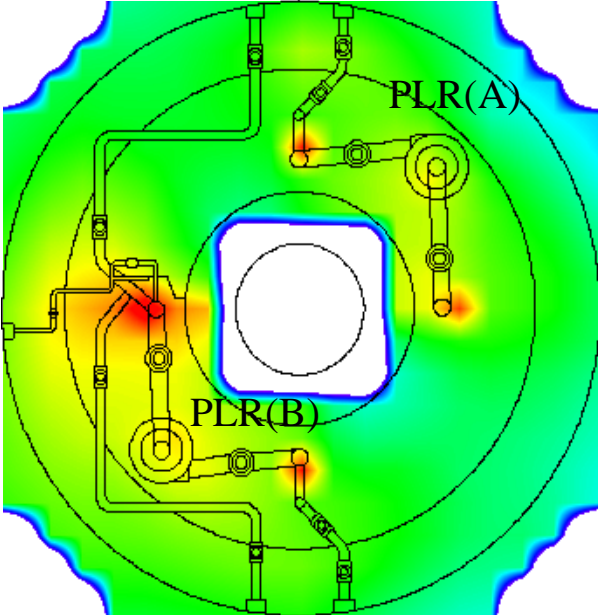
Results of Chemical Decontamination (example of EL.6260)

Before Decon.

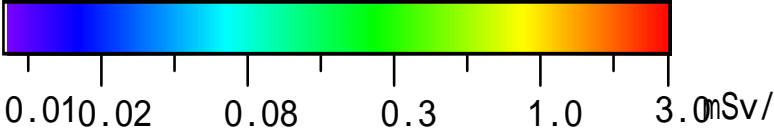
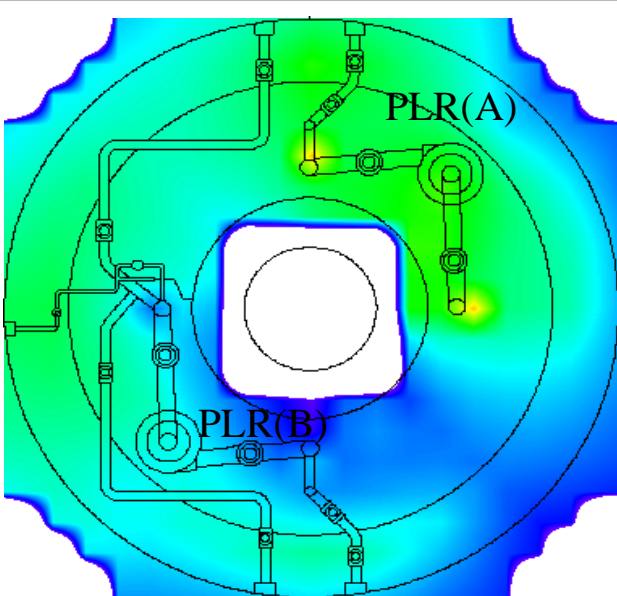
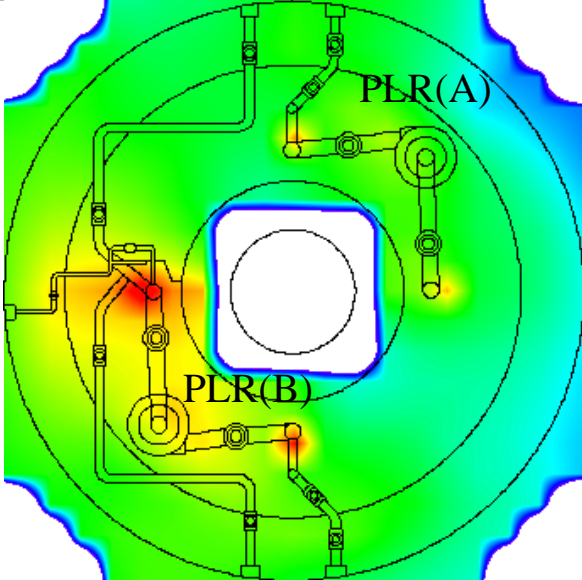
After Decon.



4th outage
PLR(A)



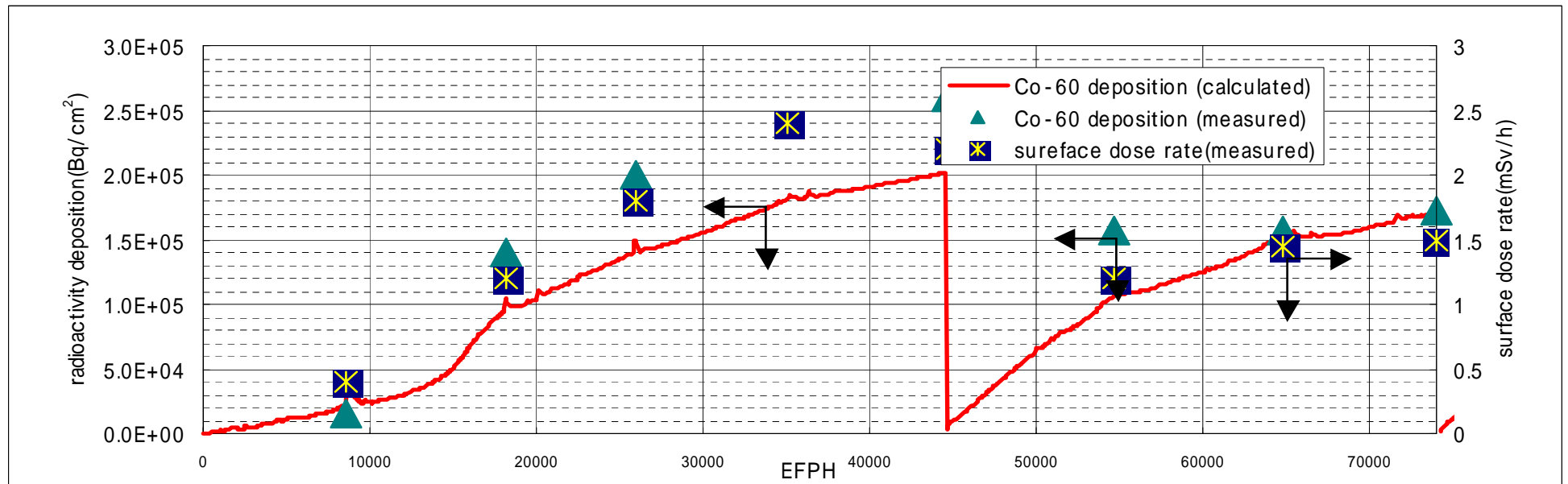
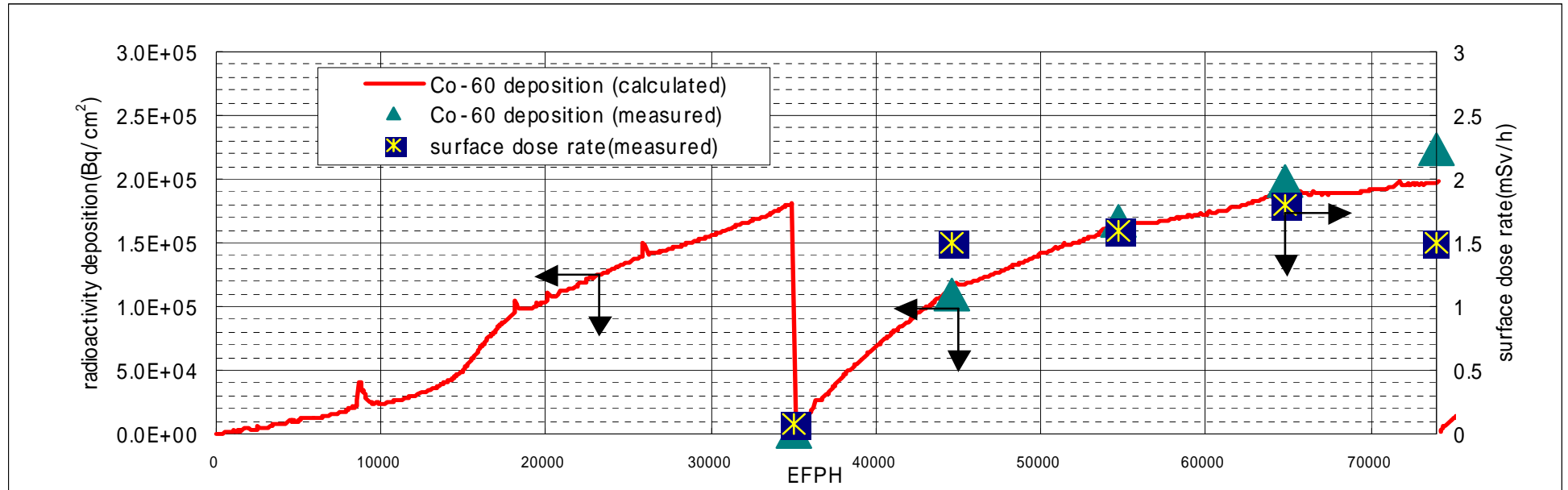
5th outage
PLR(B)



The results of chemical decontamination of PLR piping

outage	Dose reduction (calculated)	work
4th	0.8man/Sv	• The inspection of PLR pump(B)&valves
5th	0.95man/Sv	• The inspection of PLR pump(B)&valves
8th	3.99man/Sv	• Weld line crack check of PLR piping • Partial replacement of PLR pipes

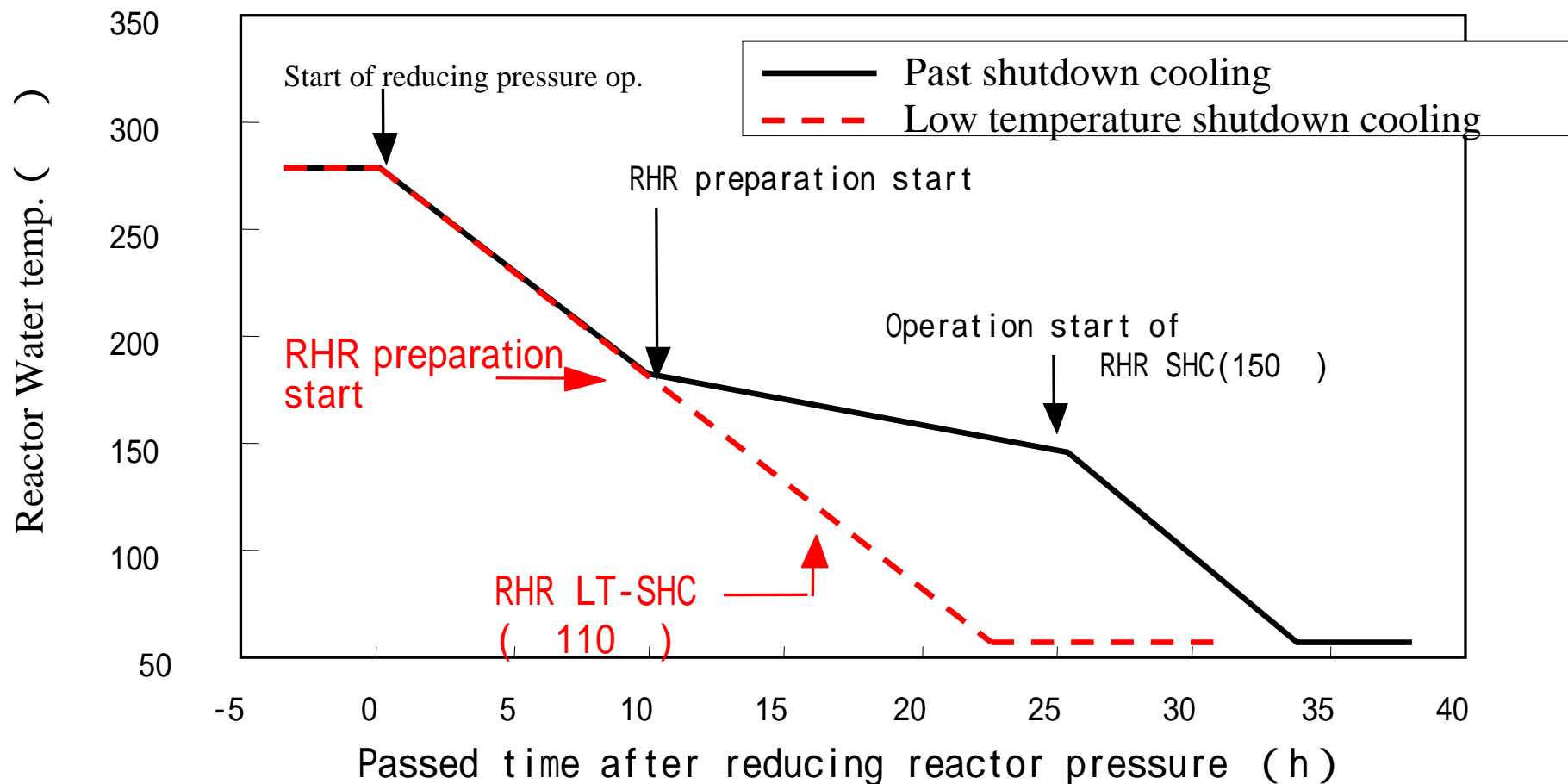
Co-60 deposition on PLR piping with decontamination



RHR low temperature shut down cooling operation

: Period of reactor cooling by condenser
 : Period of reactor cooling by RHR

Past SHC	
LT-SHC	



Radioactivity deposition on RHR piping during shutdown cooling

