Activities for Dose Reduction

Hamaoka Nuclear Power Station

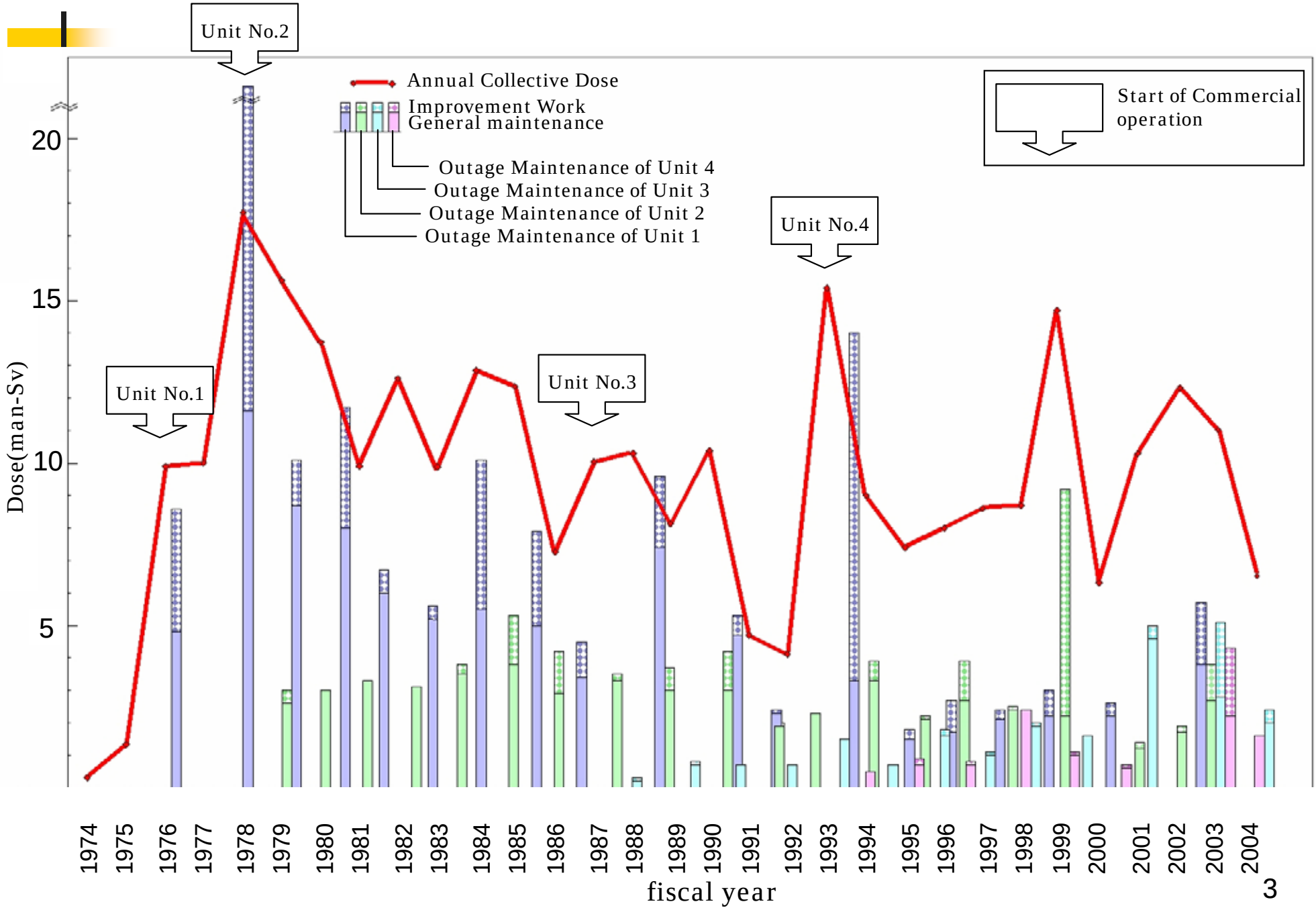
Chubu Electric Power Co.,Inc.

November 2005

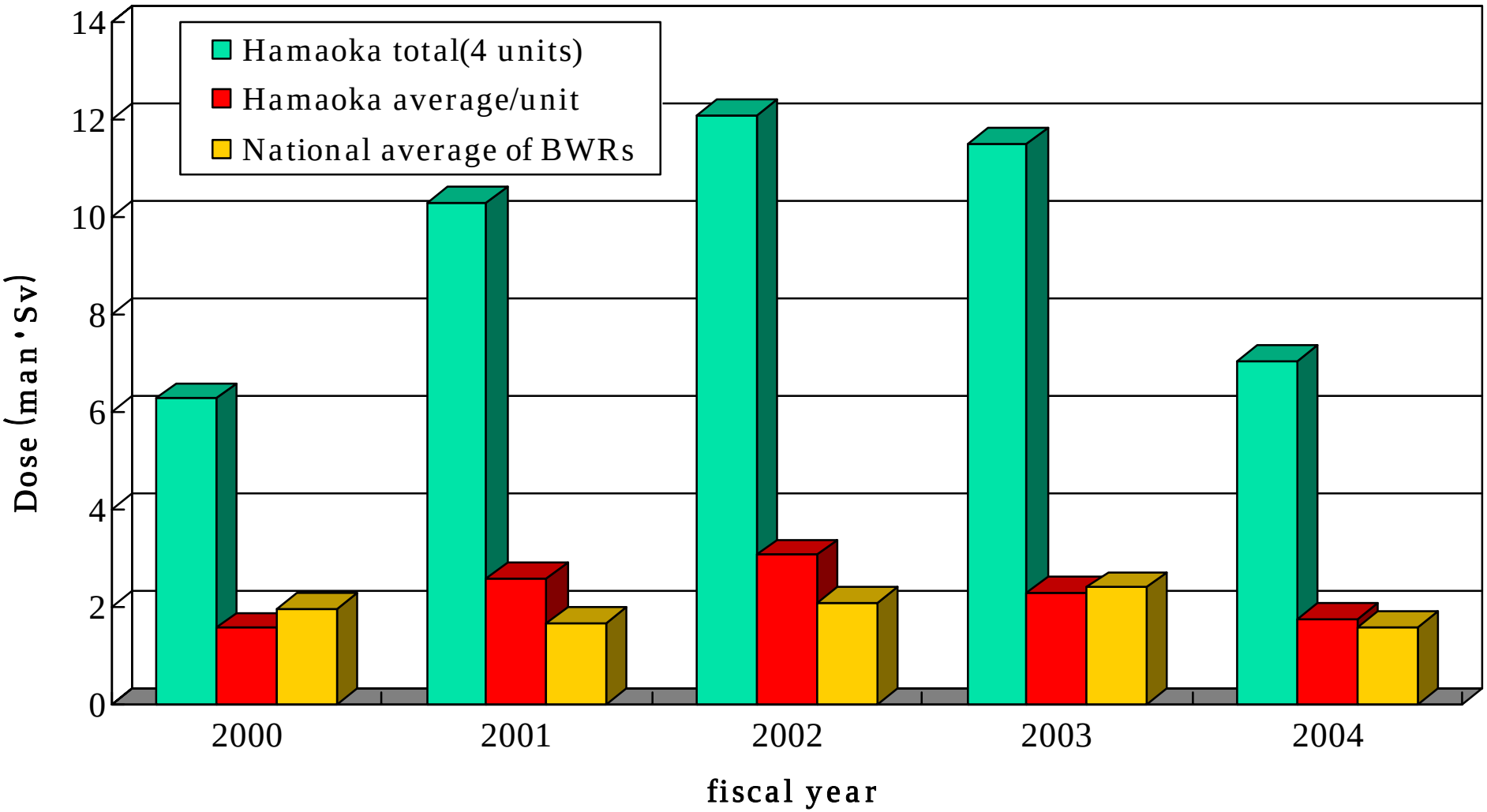
1.Reactor Type

Unit No.	Reactor type	Capacity MWe
1	BWR4 Mark-I	540
2	BWR4 Mark-I	840
3	BWR5 Mark-I improved	1100
4	BWR5 Mark-I improved	1137
5	ABWR	1380

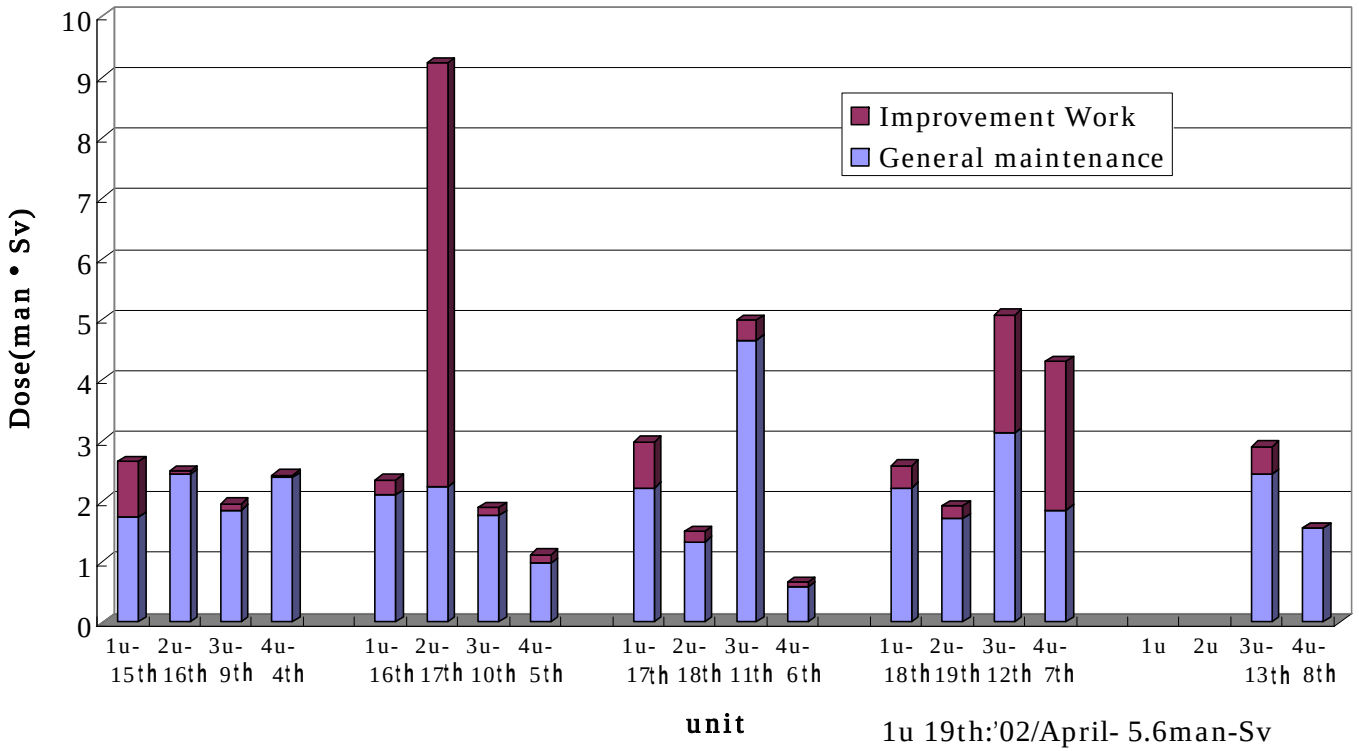
2-1. Annual Collective Dose



2-2. Annual Collective Dose



2-3.Dose in Outage Maintenance



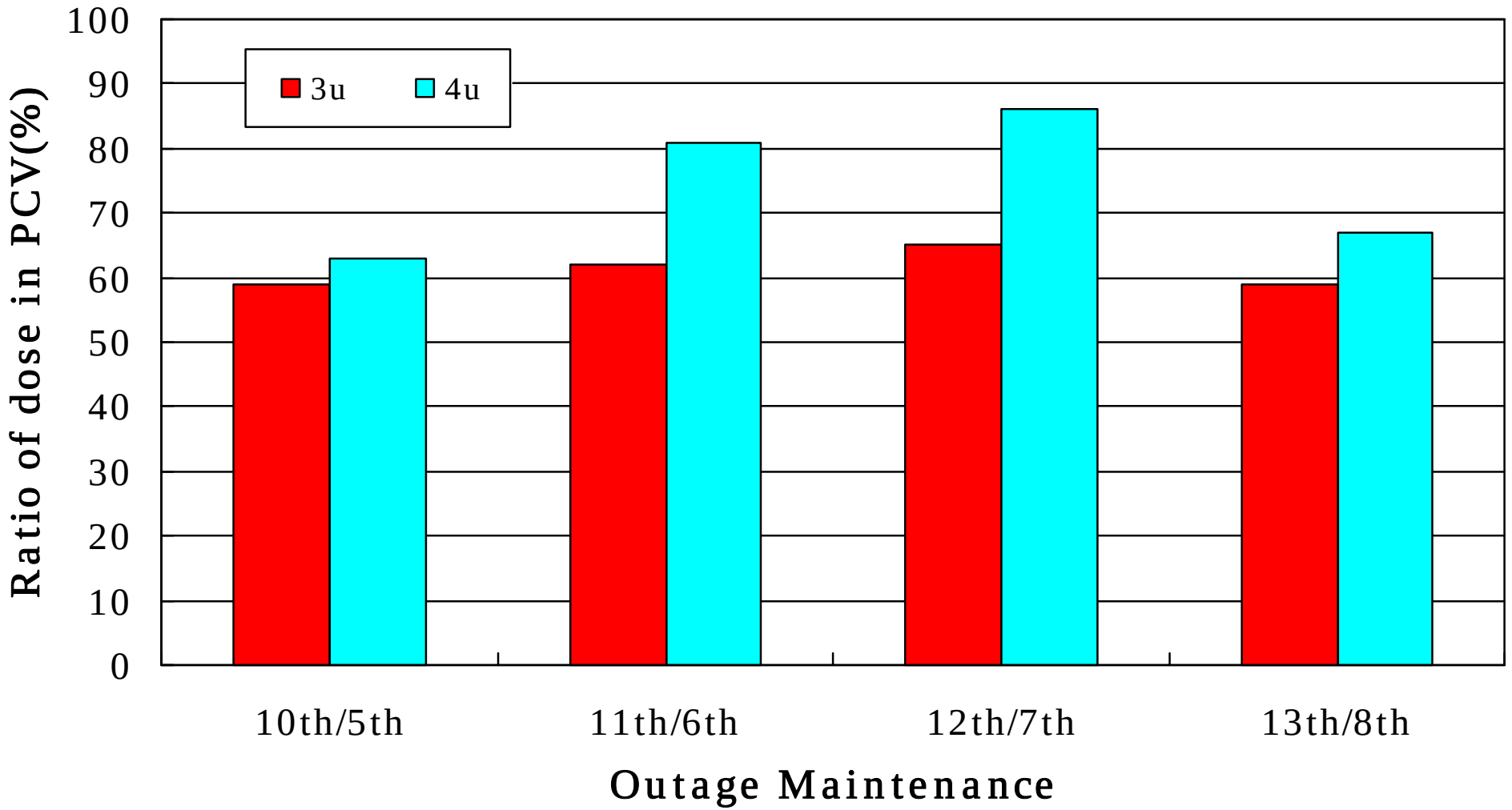
1u 19th:'02/April- 5.6man-Sv

2u 20th:'04/Feb- 3.9man-Sv

As of '05 Sept.30

Unit	Outage maintenance No.	period (including test generation period)
1	15th	'96/10/25 - '97/2/21
	16th	'98/1/5 - '98/4/10
	17th	'99/3/19 - '99/8/20
	18th	'00/9/18 - '01/3/30
2	16th	'98/6/2 - '98/9/11
	17th	'99/10/8 - '00/5/16
	18th	'01/6/15 - '01/8/31
	19th	'02/7/29 - '03/1/22
3	9th	'99/1/11 - '99/4/9
	10th	'00/5/8 - '00/8/1
	11th	'01/9/15 - '02/2/7
	12th	'03/2/20 - '03/11/28
	13th	'05/1/14 - '05/6/22
4	4th	'98/9/10 - '98/12/22
	5th	'00/1/17 - '00/3/31
	6th	'01/5/13 - '01/7/6
	7th	'02/9/4 - '03/9/3
	8th	'04/9/29 - '05/1/25

2-4.Dose in PCV (Outage Maintenance)



3.Dose Reduction Countermeasures

Facility design

Reactor Water chemistry control

Shielding in D/W

Shielding lines

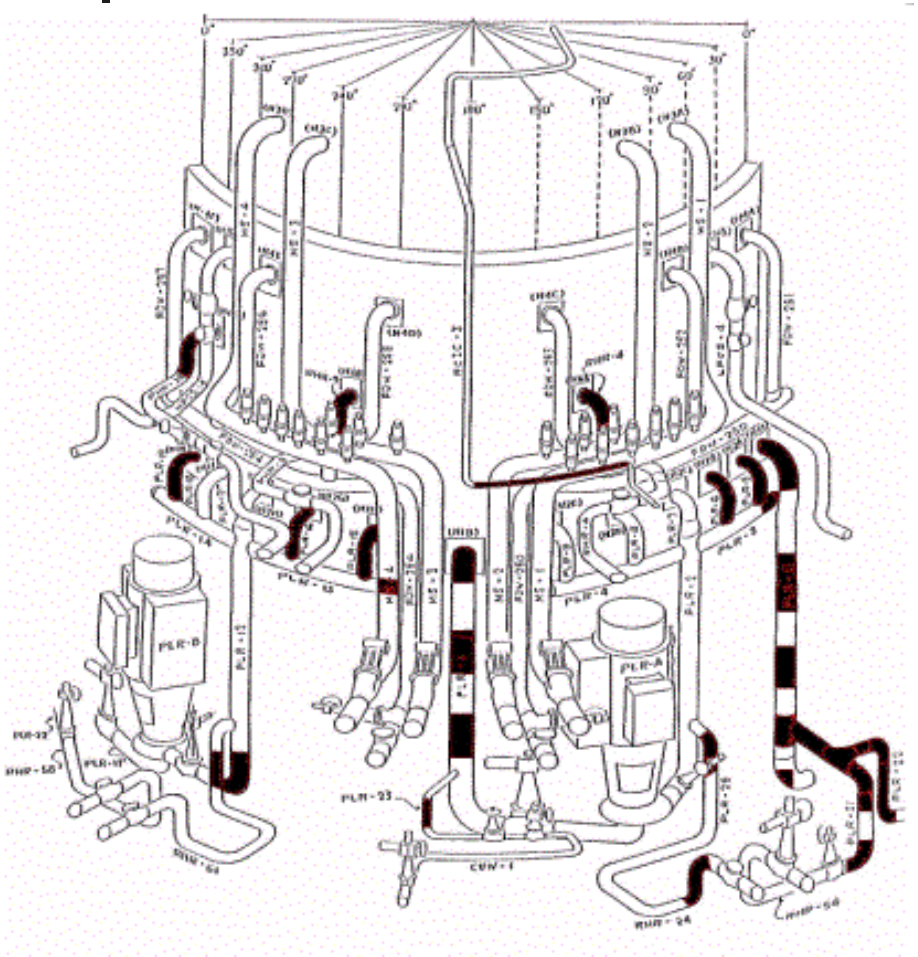
Flushing lines

Remote or automatic equipment

Mock –up training

Activities of dose reduction by employees etc

4-1.Shielding in the D/W of Unit 3



Shielded Part

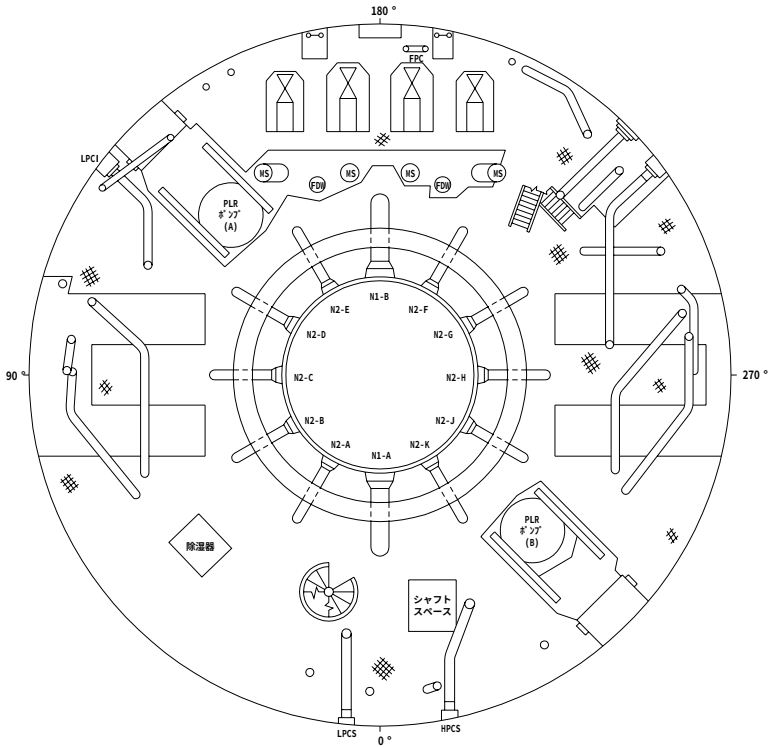
Average dose rate in PCV

	Before	After	reduction rate
dose rate	0.095	0.069	△28%

Data at the 10th outage maintenance

unit:mSv/h

4-2. Shielding in the D/W of Unit 3

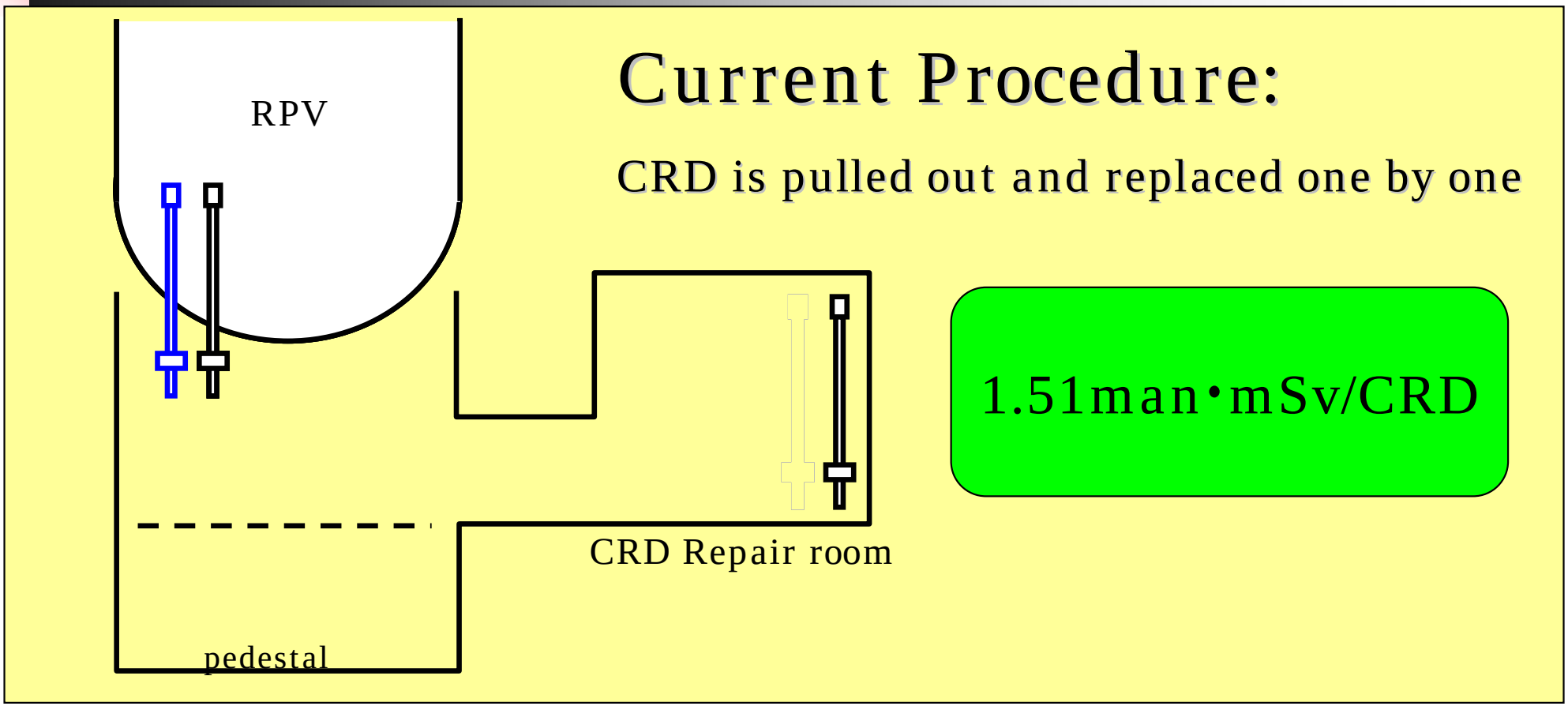


5.Ideas from Employees to Achieve Dose Reduction

5-1.Improvement of CRD Replacement Procedure

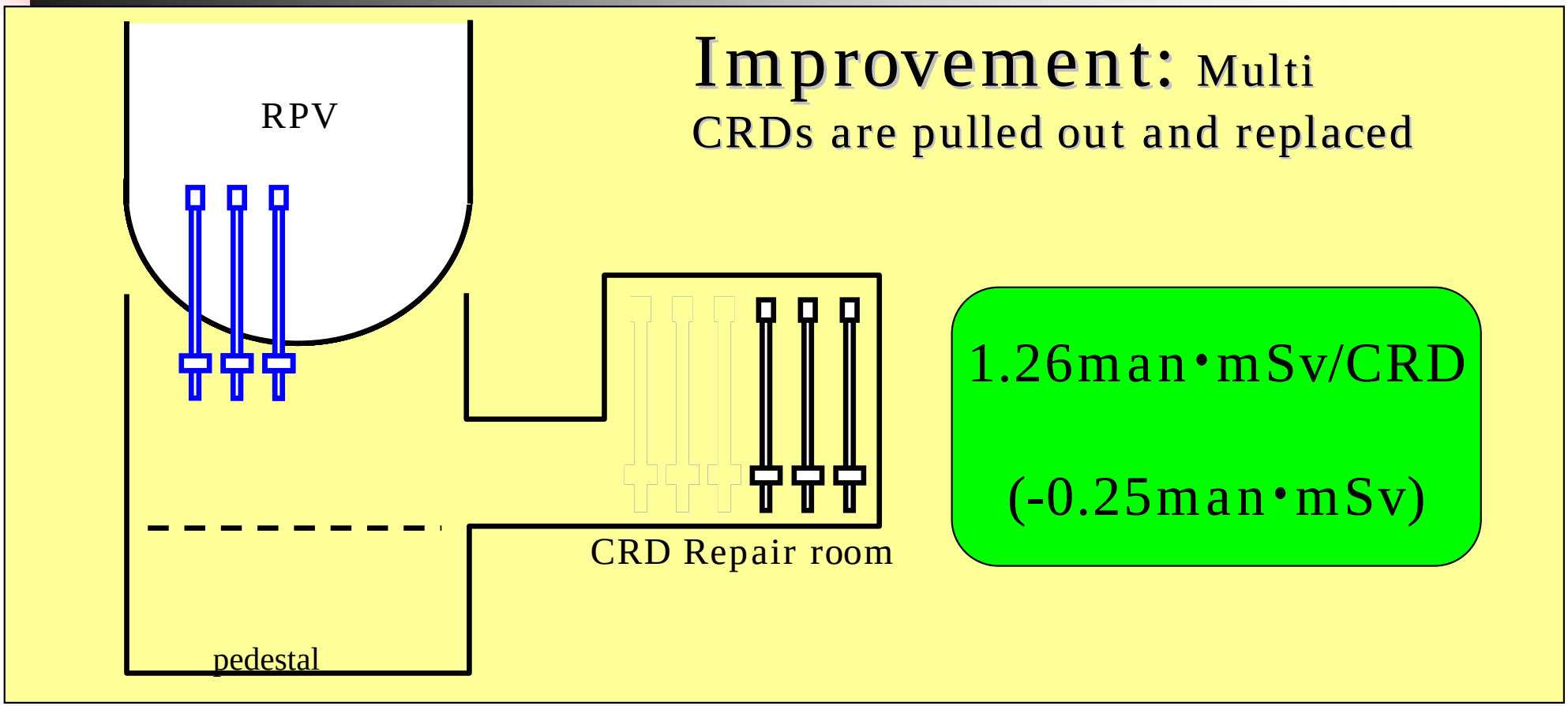
Shortening time for replacement

Unit No.3



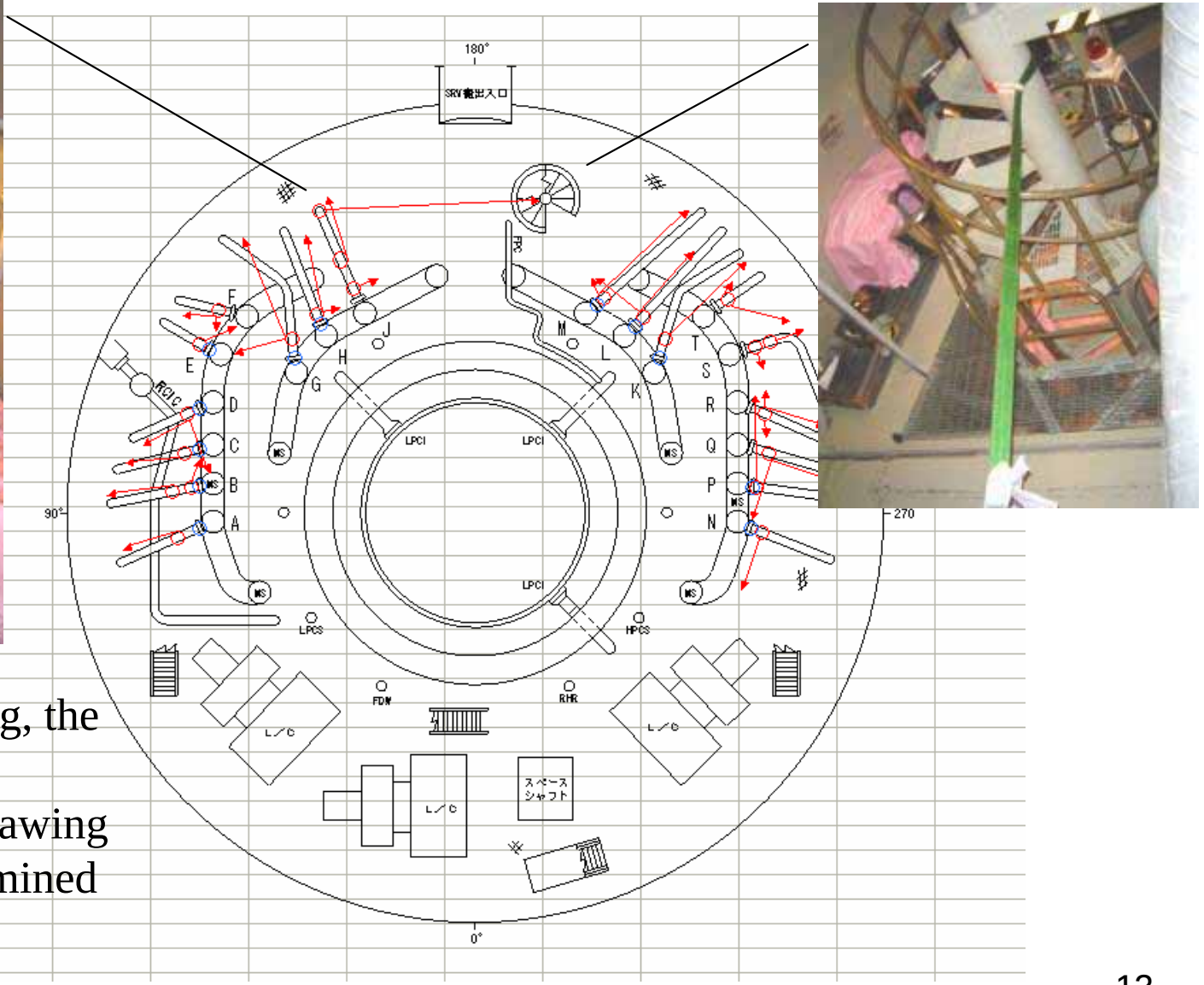
5-2.Improvement of CRD Replacement Procedure

Unit No.3



5-3.Standardization of drawing directions of the connected Pipes to SRVs

Unit No.3



When SRVs disassembling, the lines connected SRVs are needed to be removed. Drawing directions should be determined in advance.

5-4.Other Ideas for Dose Reduction by Radiation Control Staff Members

Item	Present situation	Improvement idea	Expected Effect (man-mSv)
Omission of contamination preventing sheet on pedestal floor	Sheets cover floor to prevent contamination caused by CRDs replacement	Decontamination by water is also effective to prevent contamination	3.4
Reevaluation of access area for CRD Replacement	The location of Present access area was not the best because there was PLR pipe's radiation around area	Changing the location of access area	2.8

6-1. Encouragement system for dose reduction

Promoting workers' motivation and ideas for dose reduction by commending good practices(Since 1994).

Applicants

All employees in the Hamaoka NPS

6-2-1. Encouragement system for dose reduction (example)

Transferring work of CUW powder resin from sump B to sump A(in Maintenance of Sump B)

In inspection of storage sump B, workers were expected to be highly exposed by CUW resin.Their dose was successfully reduced with equipment improved by themselves.

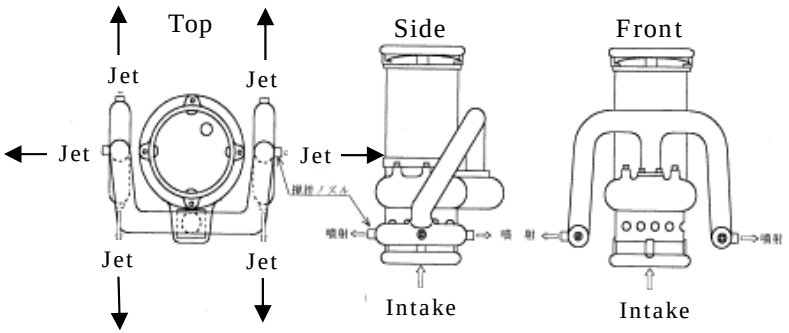
Workers' Idea : Taihei Electric Co,

Origination of stirring pump with 6 jets

Remodeling an ordinary water pump sold at a home center into the stirring pump with 6 jets originated with workers

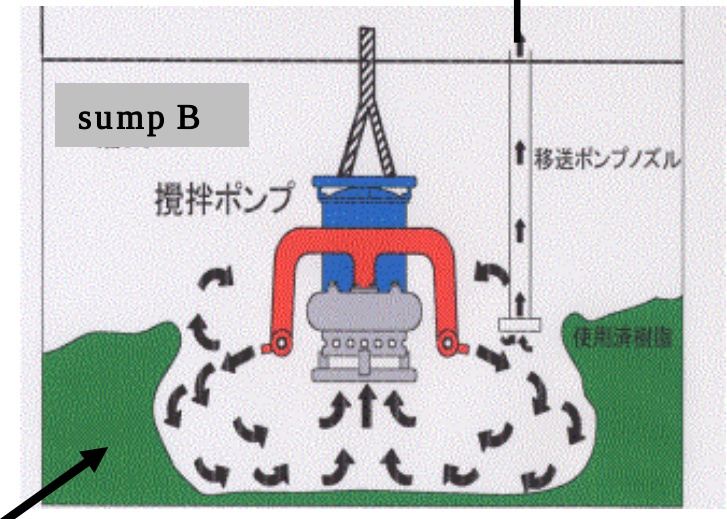
6-2-2. Encouragement system for dose reduction (example)

Workers' Efforts



6 Jets

Discharge device in orange was attached to the pump



resin 2000mSv/h

Effect

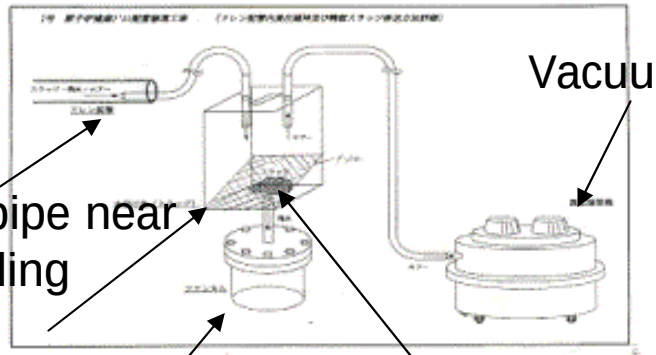
Expected **450** man・mSv ⇒ Result 144 man・mSv

6-3. Encouragement system for dose reduction (example)

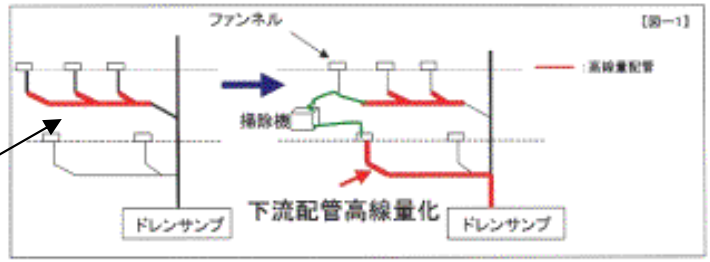
Removing high radioactive sludge by Sludge Drain Separator

In replacement of drain pipes,workers were expected to be highly exposed by high radioactive sludge remaining in the pipes.
Their dose was successfully reduced with the Sludge Drain Separator originated by themselves.

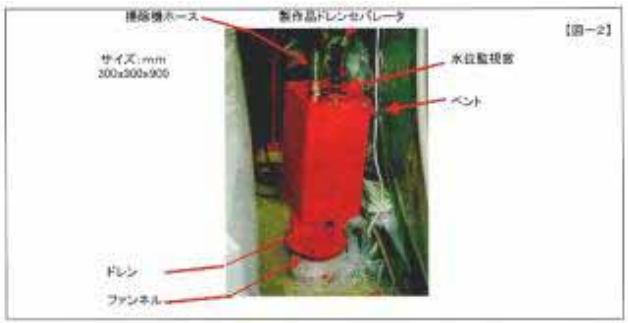
Workers' Idea : Chubu Plant Company



Idea : Origination of Sludge Separator



One part of the drain pipe running the ceiling was cut then sludge was removed and the pipe was replaced



Effect

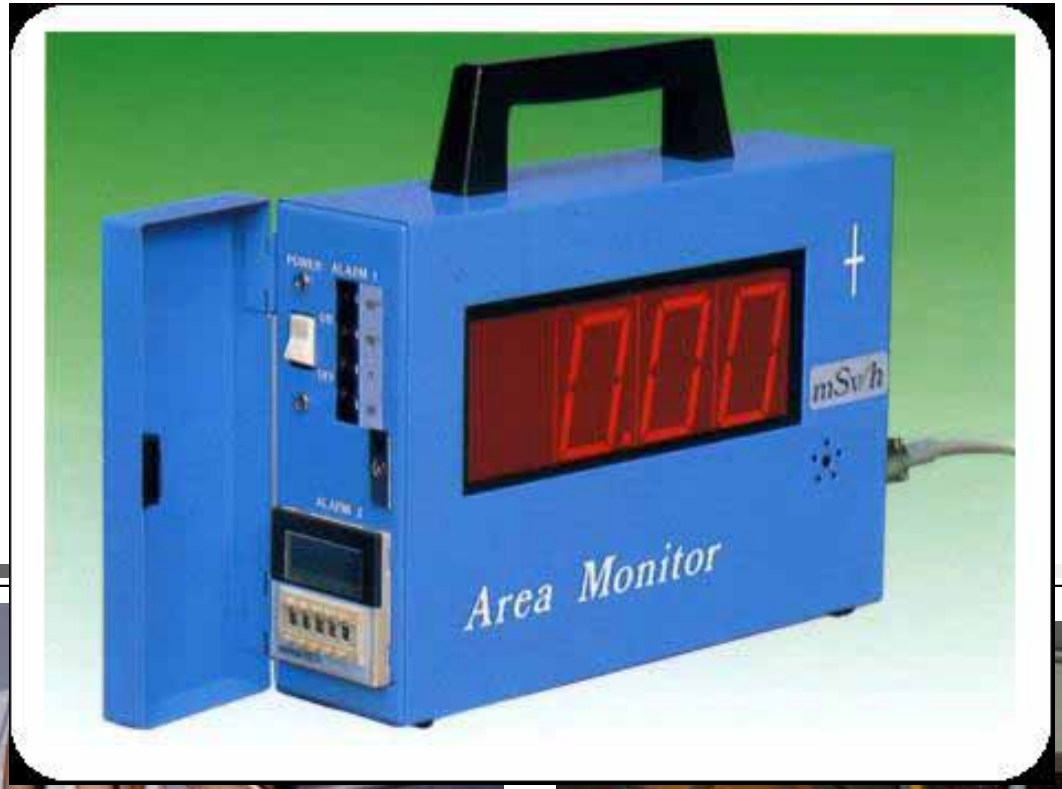
Expected 270 man・mSv

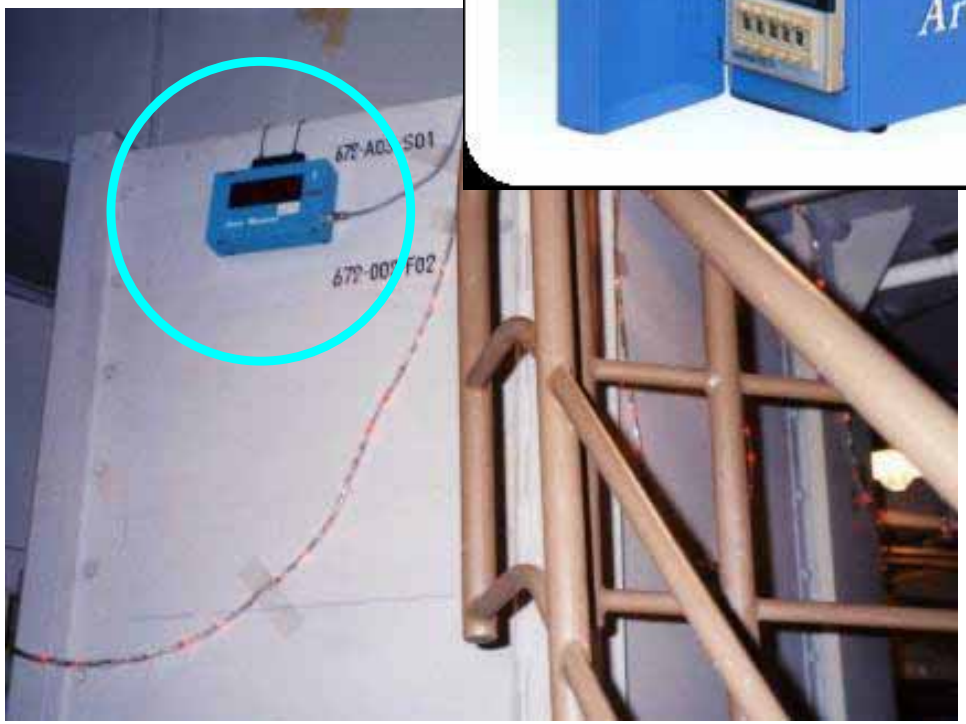
Result 180 man・mSv

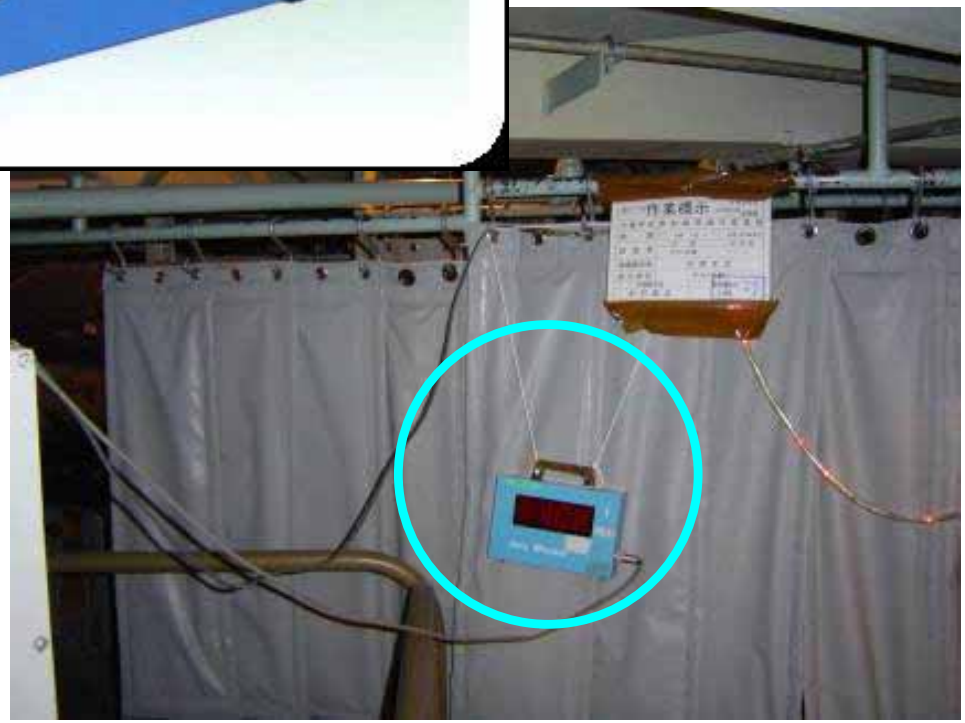
7-1.Illumination Warning Rope

Flickering diode lights call attention to high radiation area.

7-2.Digital Area Monitor







7-3.Information Displays at the entrance of the radiation control area

Radiation level

Message

Information on radiation level and messages from Radiation control section is on the displays.

Entrance devise

8-1.Development of Radiation Reduction

Unit 3

fiscal year / measurements	87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 (Outage) 1 2 3 4 5 6 7 8 9 10 11 12 13	Remarks
Remote or automatic equipment	▼ Well wall decontamnation equipment ▼ CRD remote exchanging equipment ▼ Automatic ultrasonic testing equipment ▼ Automatic fuel exchanging equipment	
Reduction of radiation level in workplace	▼ Improved PCV(Mark I Improved type) ▼ Reduction of metal impurities brought into the reactor ・condensate water fliter / demineralizer etc. ▼ Flushing high-level radiation lines Chemical decontamination ▼ ▼ ▼ ▼ ▼ ▼ Decontaminaton of bulkhead ▼ Shielding high-level radiation lines ▼ Removal of the reactor vessel separator under water	

8-2.Development of Radiation Reduction