THE EFFECTS OF ZINC INJECTION FROM HOT FUNCTION TEST AT TOMARI UNIT 3

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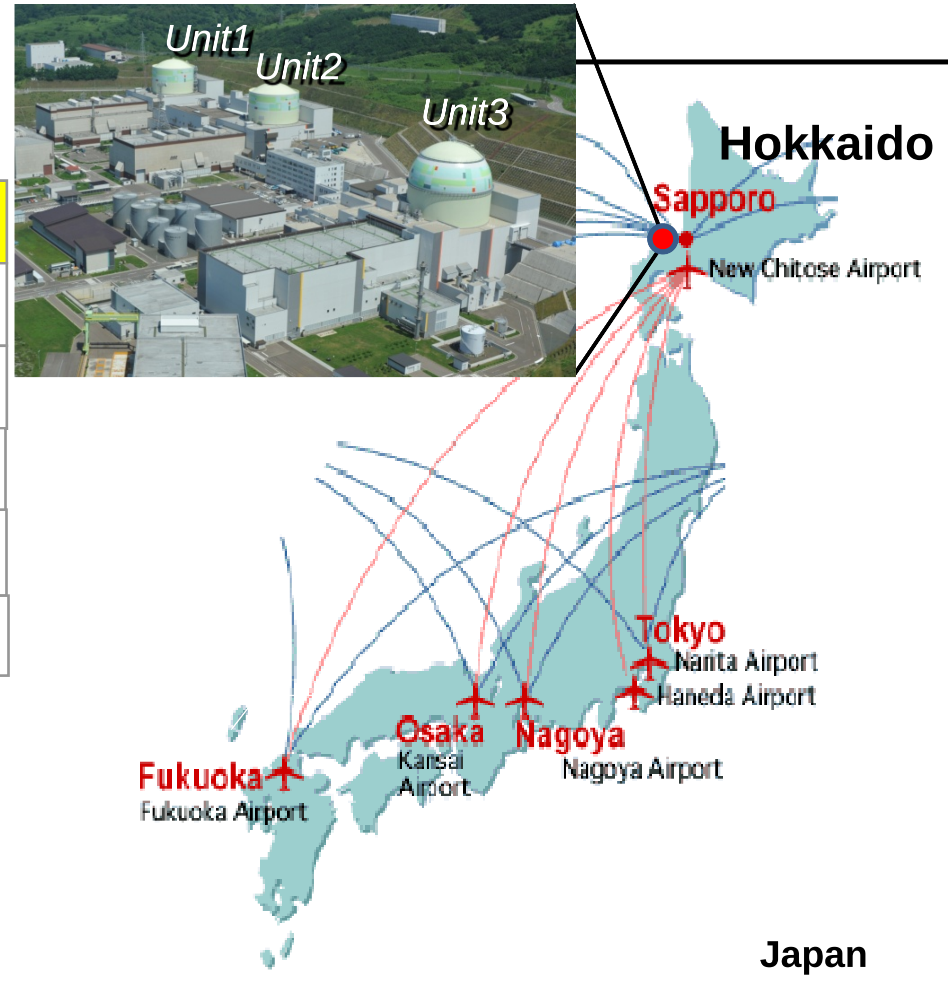
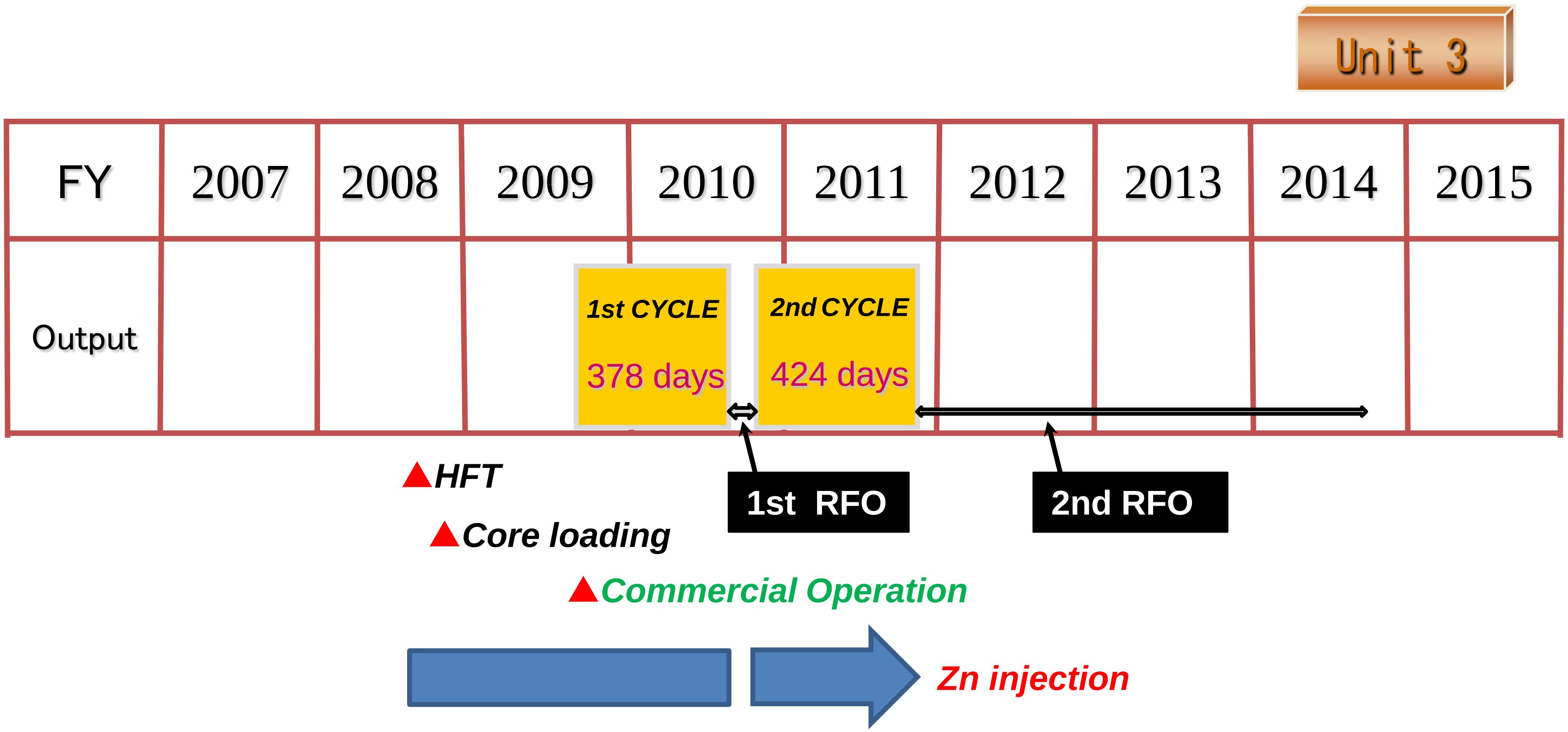
Introduction to TOMARI NPS

	Unit 1	Unit 2	Unit 3
Rated Electric Output	579MW	579MW	912MW
Reactor type	PWR		
Commercial Operation	1990	1992	2009
SG	600TT	600TT	690TT
Letdown flow	$20m^3/h$		$54m^3/h$



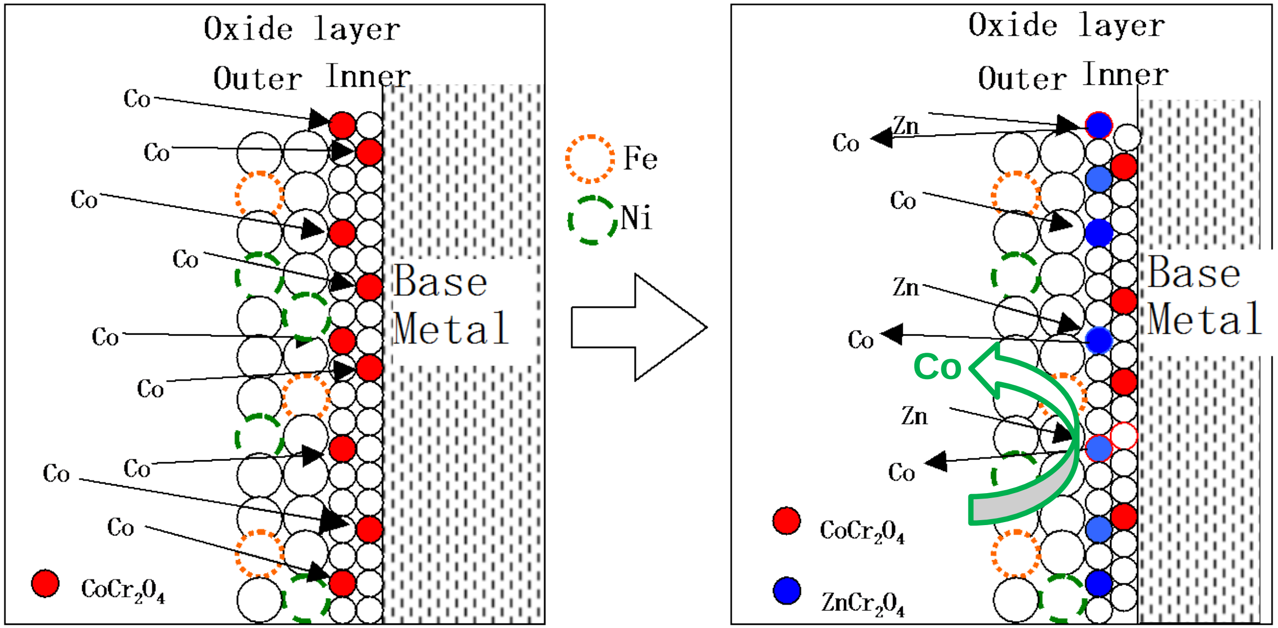
Introduction to TOMARI NPS

■ Operated History of Unit 3



Zinc injection

- Zinc injection during power operation

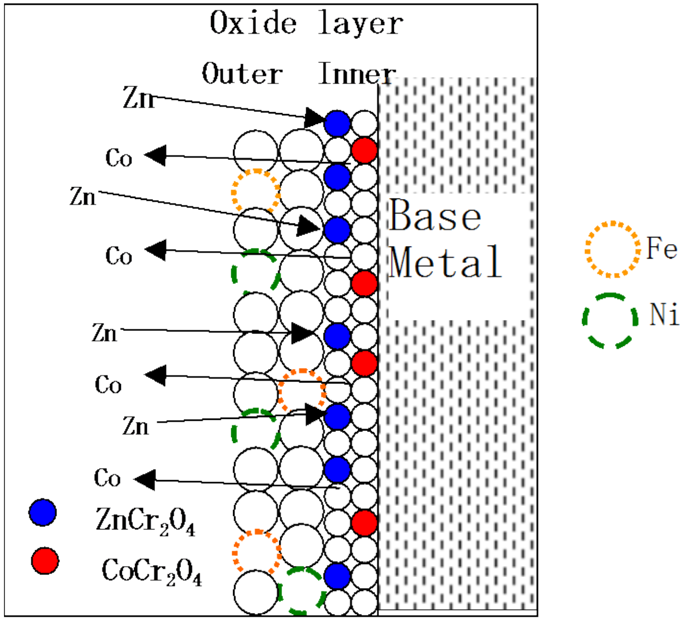


No zinc injection **Zinc injection**

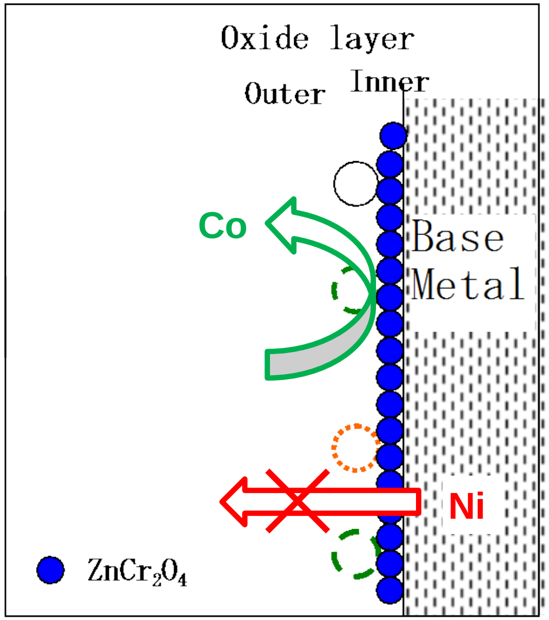
- Substitution of zinc for Co
- Suppression Co uptake into the inner oxide layer

Zinc injection

- Zinc injection from HFT



Zinc injection during power operation

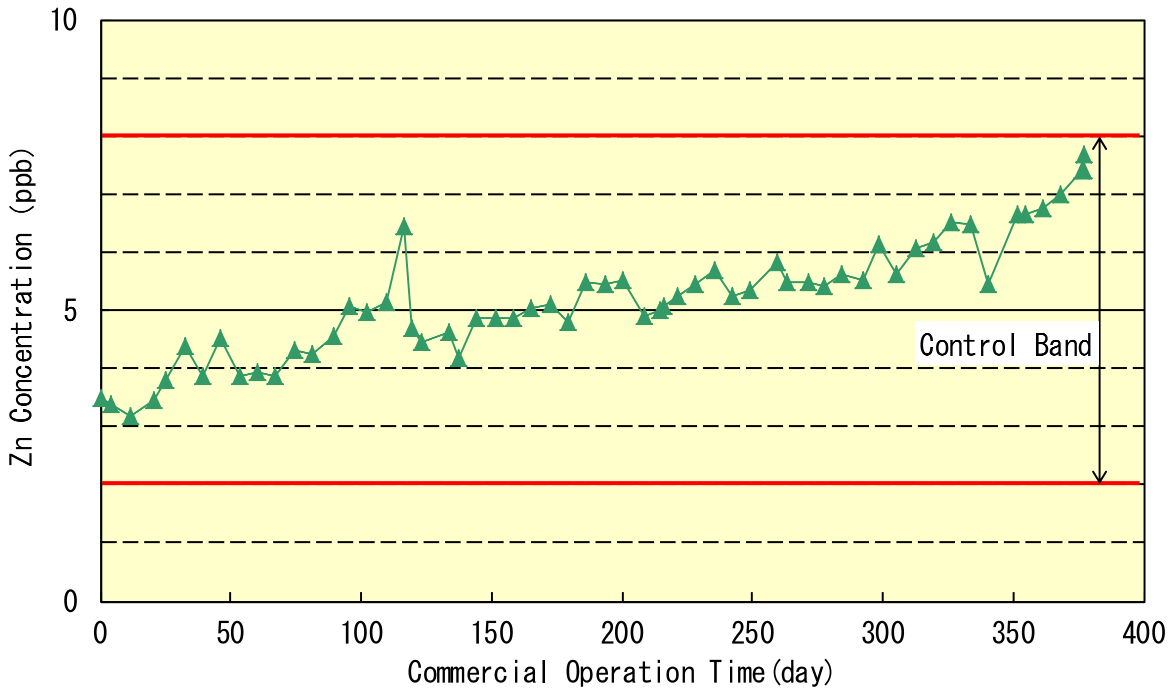


Zinc injection from HFT

- Suppression Co uptake into the inner oxide layer
- Corrosion suppression

EXPERIENCES OF 1st CYCLE

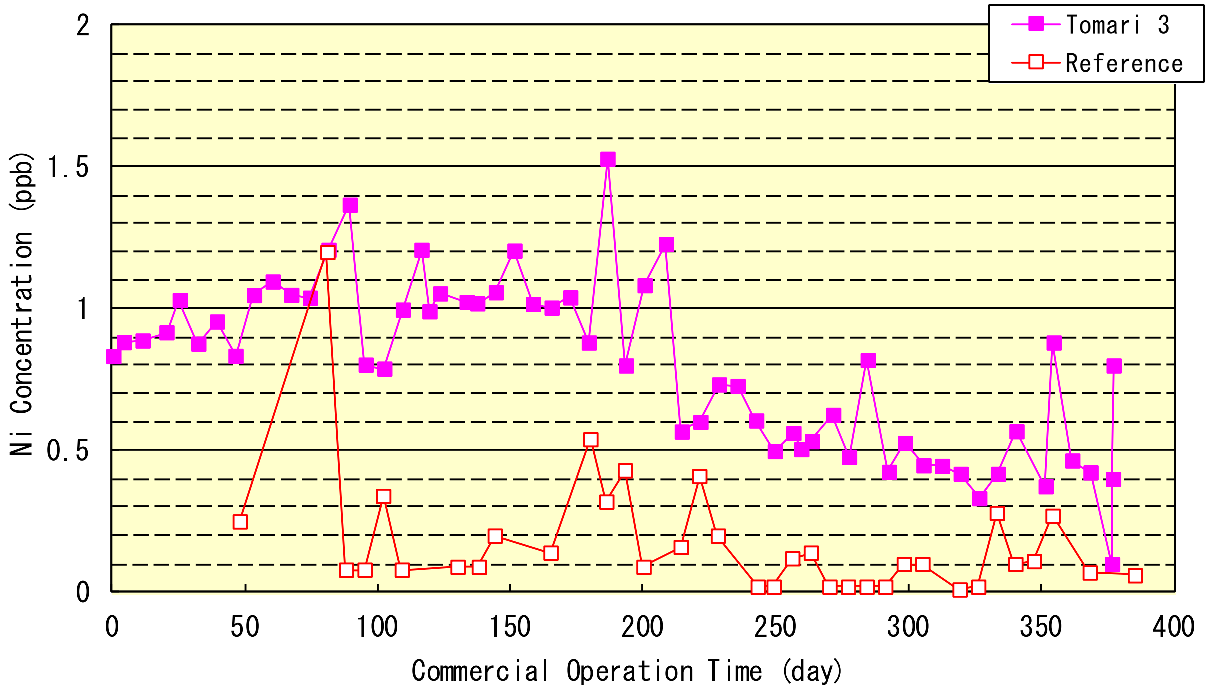
Zn concentration in the primary coolant



- Zinc concentration was controlled with the target concentration (5±3ppb).

EXPERIENCES OF 1st CYCLE

Ni concentration in the primary coolant

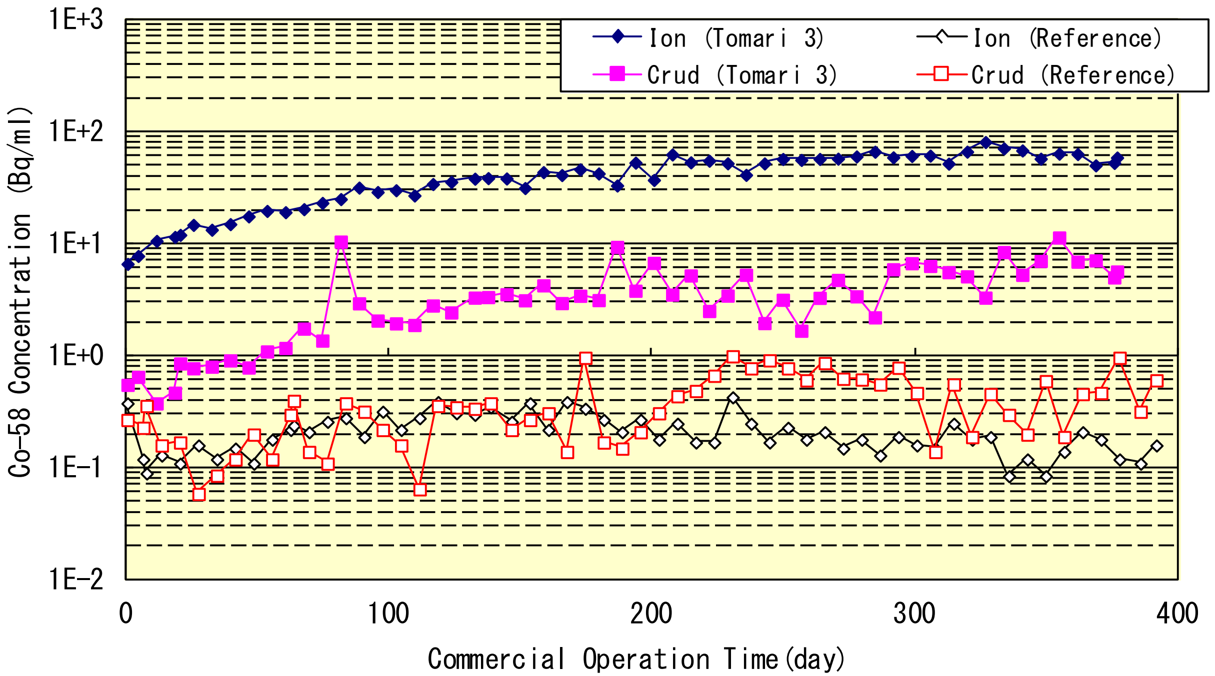


- Ni concentration was higher than that of the reference plant.

⇒ Ni releases from corrosion products and the base metal of SG tube.

EXPERIENCES OF 1st CYCLE

Co-58 concentration in the primary coolant

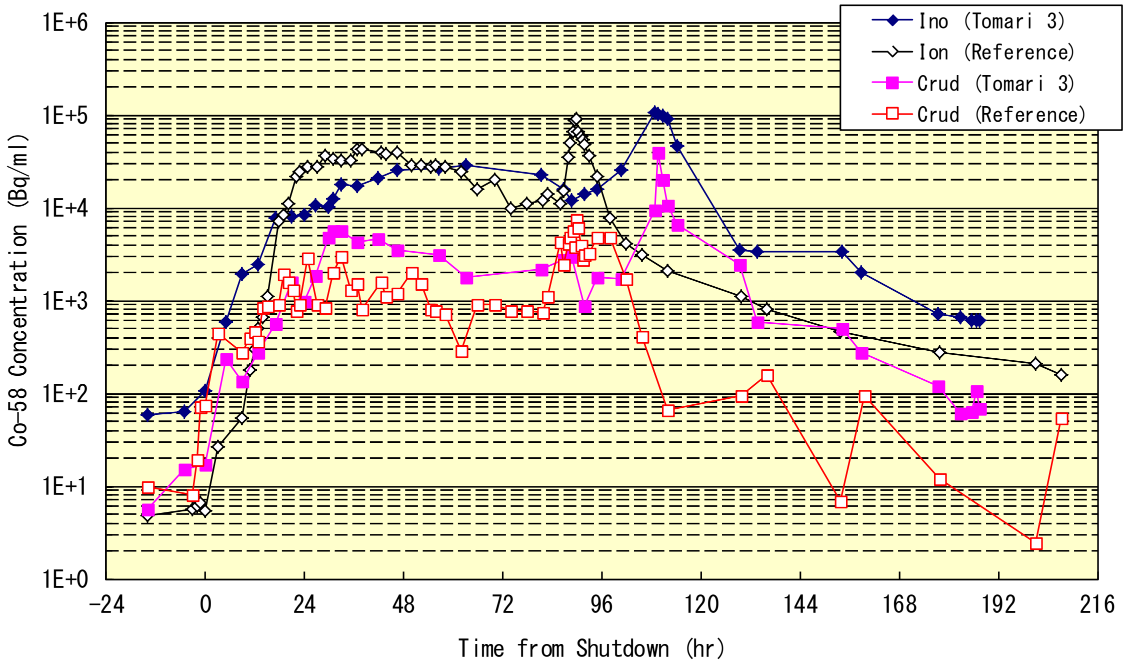


- The Co-58 concentration was higher than that of the reference plant.

⇒ Suppression Co uptake into inner oxide layer

EXPERIENCES OF 1st RFO

Concentrations of radioactive Co-58（Ion,Crud） in the primary coolant



- The particulate Co-58 was higher than that of the reference plant. The ionic Co-58 was at the same level as that of the reference plant.

  ⇒ The amount of the corrosion product with a higher specific radioactivity has decreased.

EXPERIENCES OF 1st RFO

Amount of Ni,Co-58,and Co-60 removal

	Tomari unit 3	Reference plant
Ni (g)	3039	3639
Co-58 (Bq)	1.3×10^{14}	1.2×10^{14}
Co-60 (Bq)	8.0×10^{11}	5.2×10^{11}

- The amount of Ni removal was about 20% less than that of the reference plant.

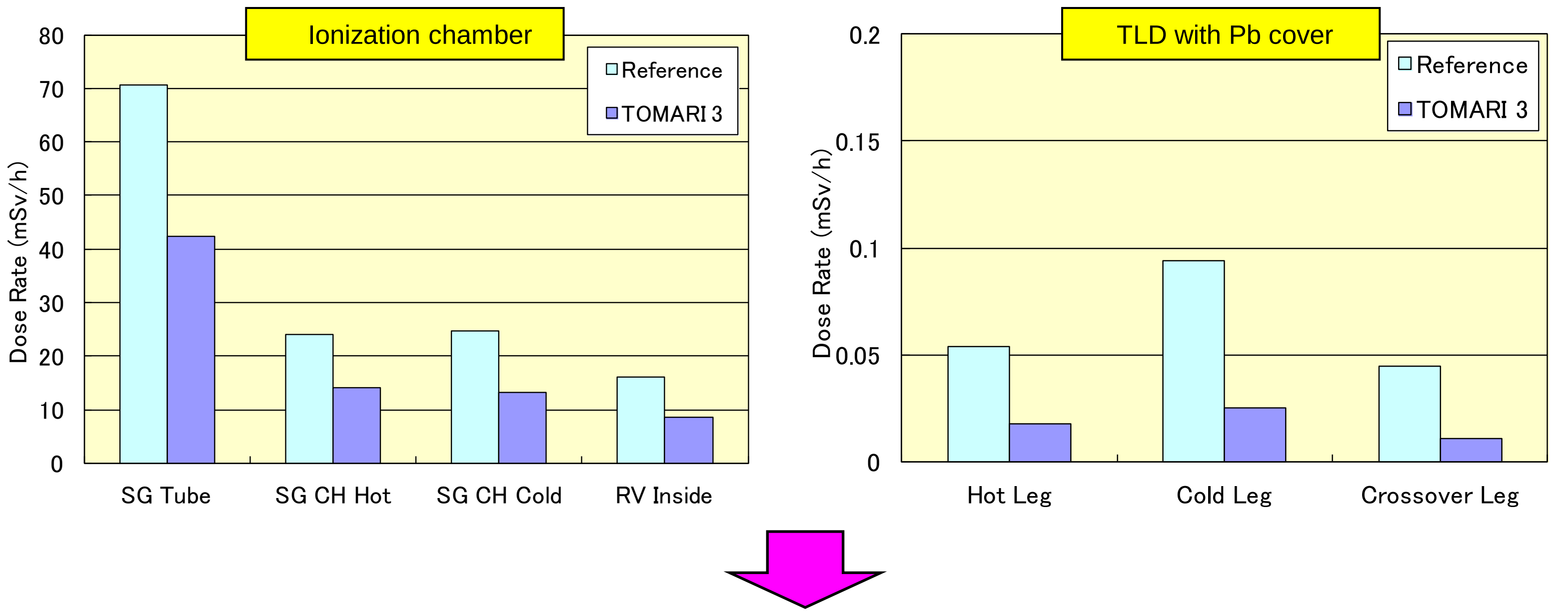
  ⇒ **Corrosion suppression effect**

- The amount of Co-58 removal was about equal to that of the reference plant.

  ⇒ **Suppression Co uptake into the inner oxide layer and decreasing Ni inventory**

EXPERIENCES OF 1st RFO

Dose-rates on SG tube, SG CH,RV Inside, and MCP



- The dose-rates at SG , RV inside and MCP were about over 40% less than those of the reference plant.

⇒ **The dose-rate reduction effect with zinc injection is about 40-60% at the 1st RFO.**

EXPERIENCES OF 1st RFO

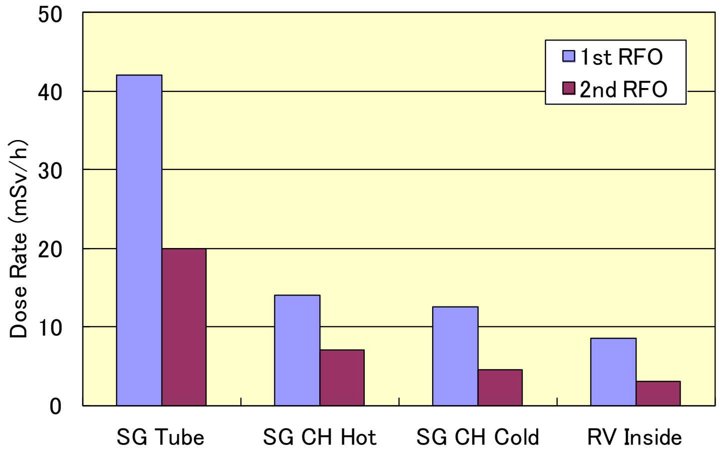
Evaluation of Radiation Source Inventory [TBq]

	Tomari unit 3	Reference plant
Co-58 inventory	22.2	43.2
Co-60 inventory	0.9	2.1
Radiation source inventory	**24.2**	**48.1**

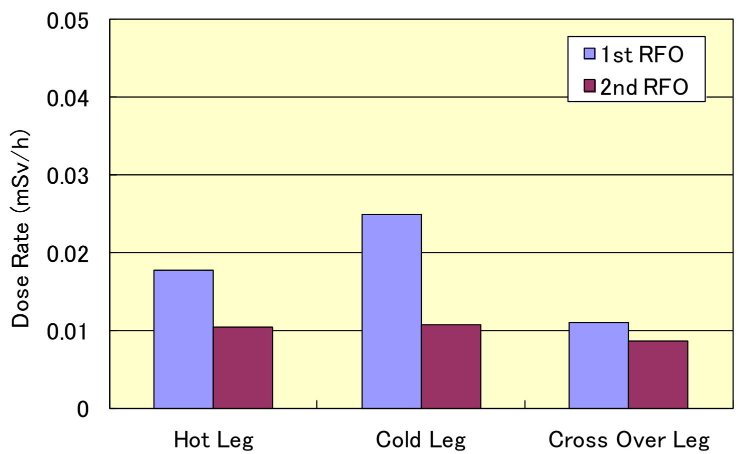
- The Co-58, Co-60 and radiation source inventory were about 50% less than those of the reference plant.

⇒ **These are in good consistency with the actual dose-rates on the main components.**

EXPERIENCES OF 2nd RFO



- The dose-rates on SG tube, SG CH and RV Inside at the 2nd RFO were about 50-60% less than those at the 1st RFO.



- The dose-rates on MCP at the 2nd RFO were about 20-60% less than those at the 1st RFO.

CONCLUSION

- ✓ At the 1st RFO, the dose-rates at the main components are about 50% less than that of the reference plant, as a similar trend to the radiation source inventory.

- ✓ Considerable dose-rate reduction at the 2nd RFO was confirmed compared to the 1st RFO.

- ✓ From now on, further dose-rate reduction effect is expected.

Thank you for your Attention.