

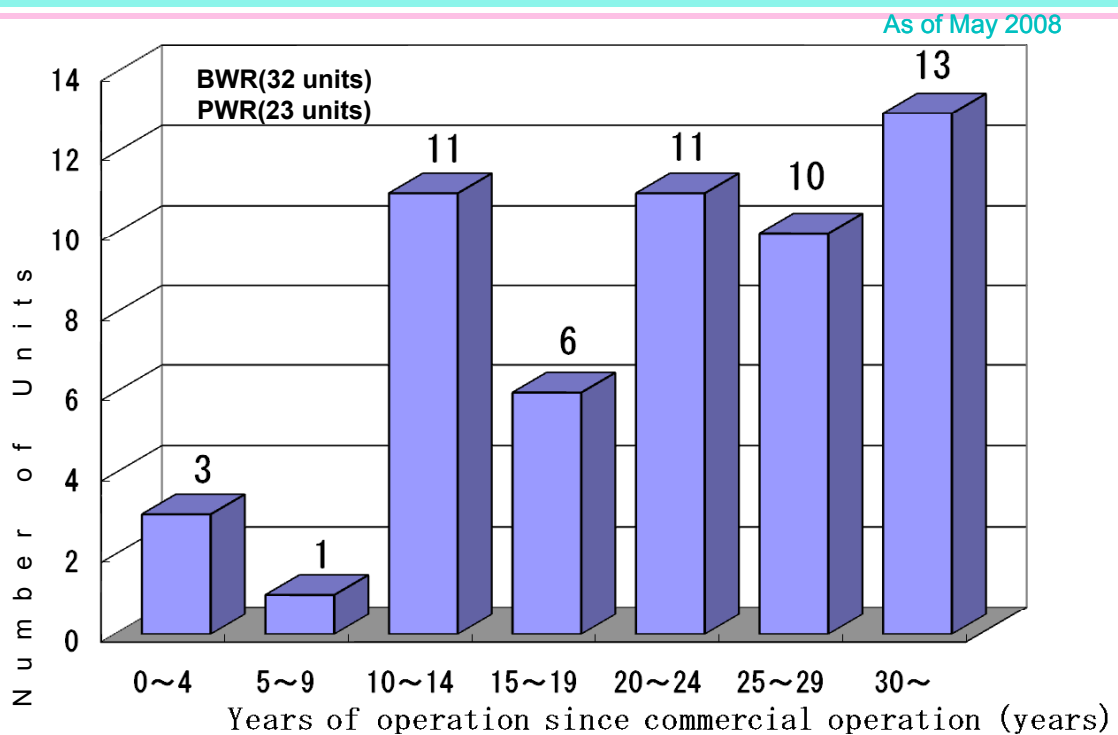
Ageing Management of Nuclear Power Plants in TEPCO

Hiroshi ABE
Toshiaki NISHIYAMA

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Tokyo Electric Power Company

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Number of Aged Nuclear Power Plants in Japan



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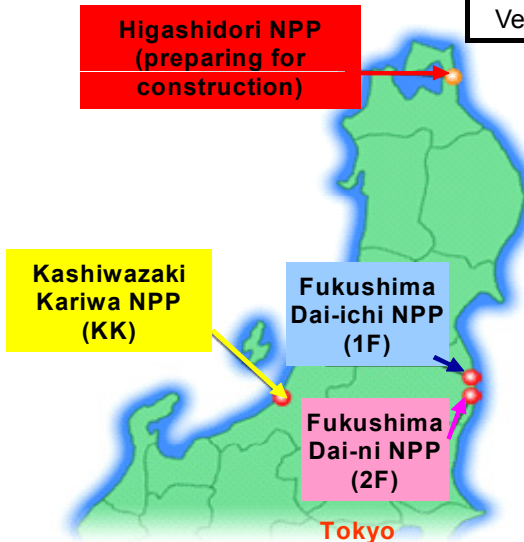
TEPCO's Nuclear Power Plants

NPS	Unit No.	Capacity(MW)	Commencement of Commercial Operation	Operating Years
Fukushima Dai-ichi	1	460	26-Mar-1971	38
	2	784	18-Jul-1974	34
	3	784	27-Mar-1976	33
	4	784	12-Oct-1978	30
	5	784	18-Apr-1978	30
	6	1100	24-Oct-1979	29
Fukushima Dai-ni	1	1100	20-Apr-1982	26
	2	1100	03-Feb-1984	25
	3	1100	21-Jul-1985	23
	4	1100	25-Aug-1987	21
Kashiwazaki Kariwa	1	1100	18-Sep-1985	23
	2	1100	28-Sep-1990	18
	3	1100	11-Aug-1993	15
	4	1100	11-Aug-1994	14
	5	1100	10-Apr-1990	18
	6	1356	07-Dec-1996	12
	7	1356	02-Jul-1997	11

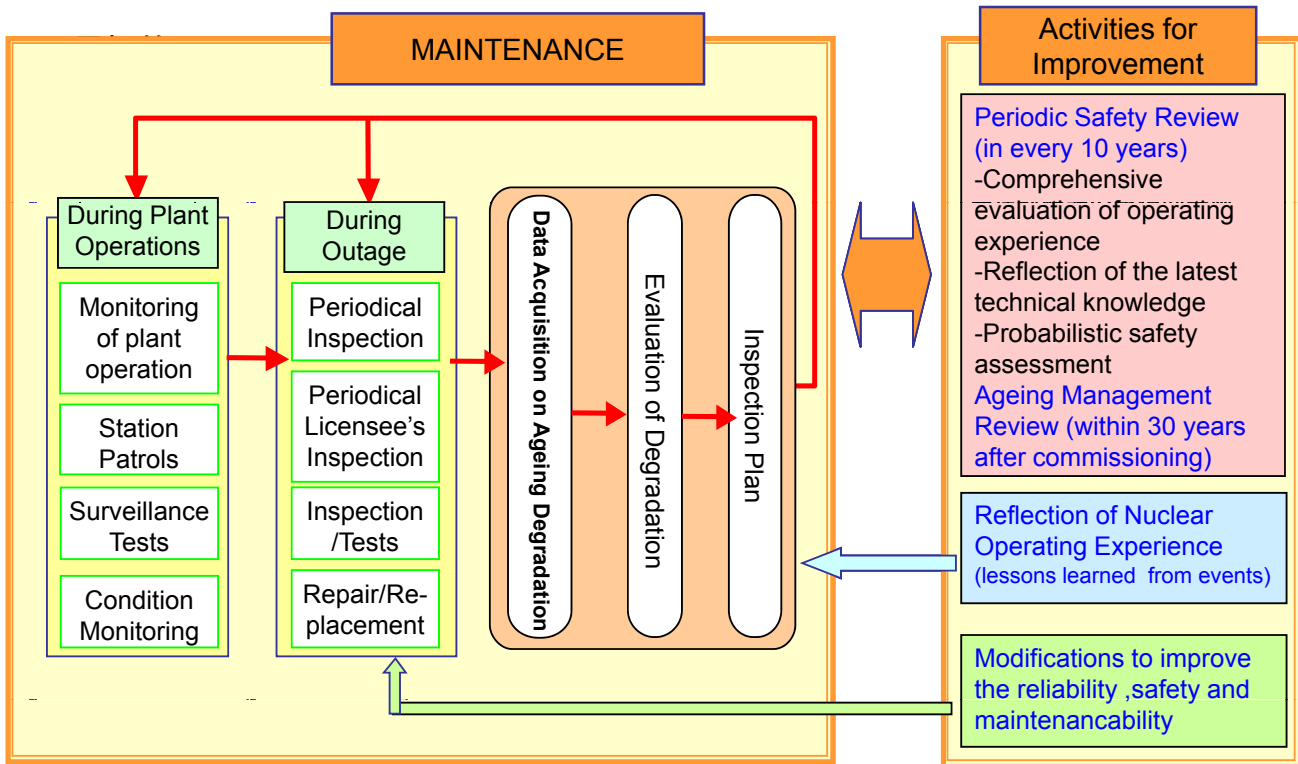
As of March 31, 2009 3

Fukushima Dai-ichi Nuclear Power Plant (1F NPP)

Unit	1	2	3	4	5	6
Output (MWe)	460	784	784	784	784	1100
Turn Over	Mar. 1971	Jul. 1974	Mar. 1976	Oct. 1978	Apr. 1978	Oct. 1979
Plant Vendor	GE	GE+T	Toshiba	Hitachi	Toshiba	GE

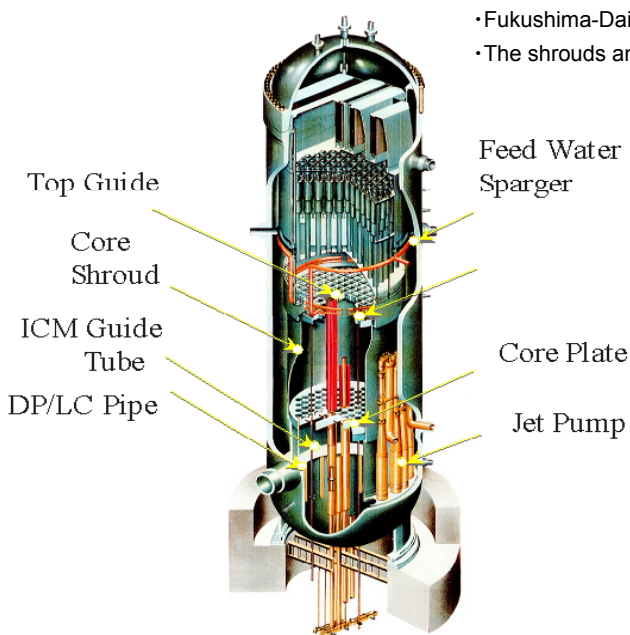


Maintenance Activities



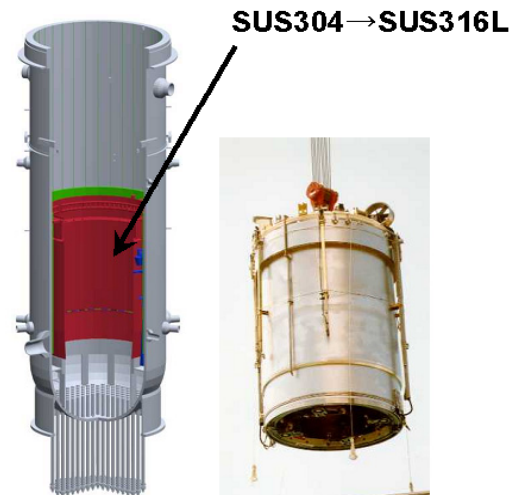
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Replacement of RPV Internals



BWR pressure vessel and internals

- Fukushima-Daiichi Unit 3 (1998), Unit 2 (1999), Unit 5, (2000), Unit 1 (2001)
- The shrouds and other internals such as FW sparger replaced with SUS316L

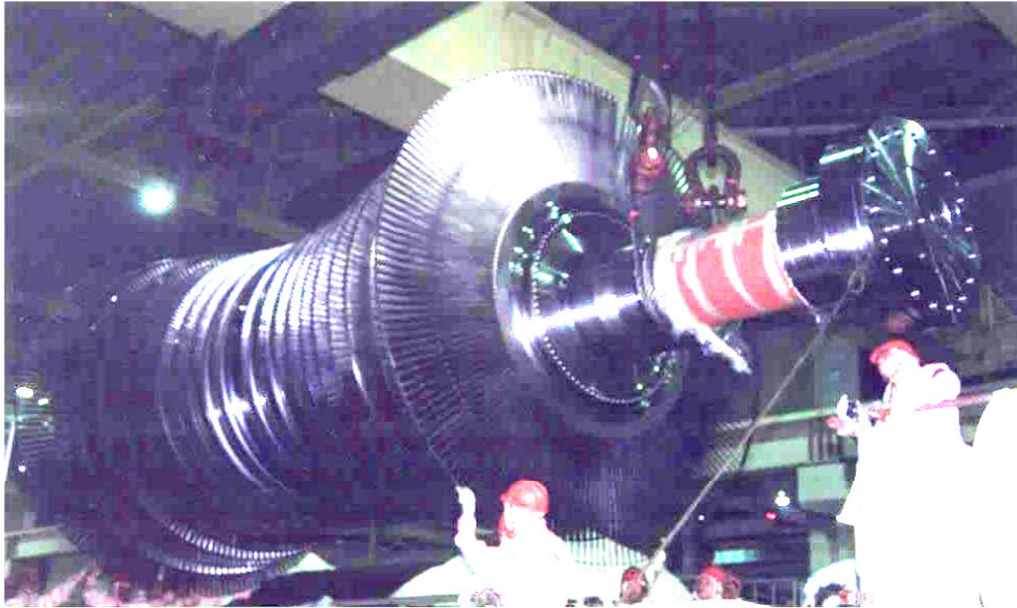


Operator's ageing measures for nuclear power plants Federation of Electric Power Companies of Japan (February 1, 2005)

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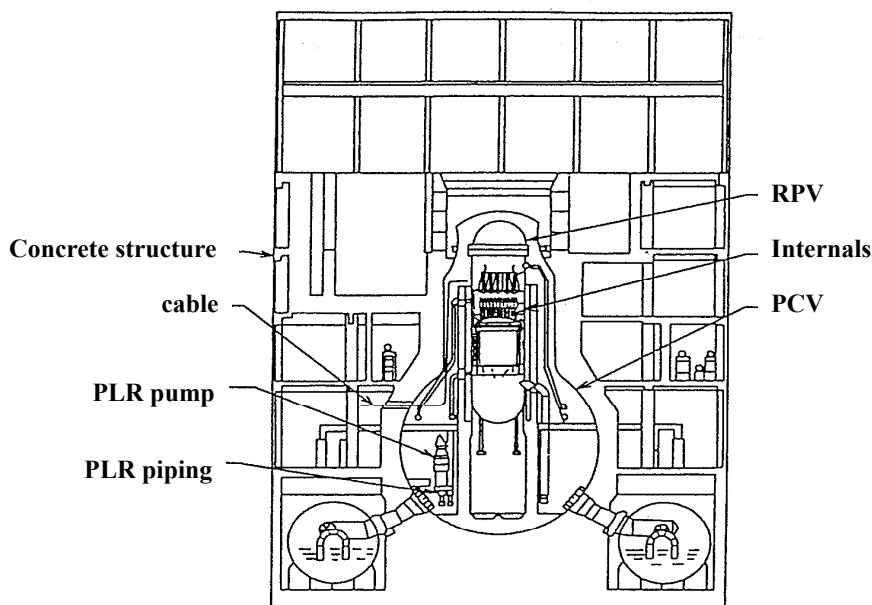
Replacement of Turbine Rotor

- Fukushima-Daiichi Unit 1: 1989, etc.
- Crack indications in the discs (due to SCC)



Operator's ageing measures for nuclear power plants Federation of Electric Power Companies of Japan (February 1, 2005)

Evaluation Components in Ageing Management Study

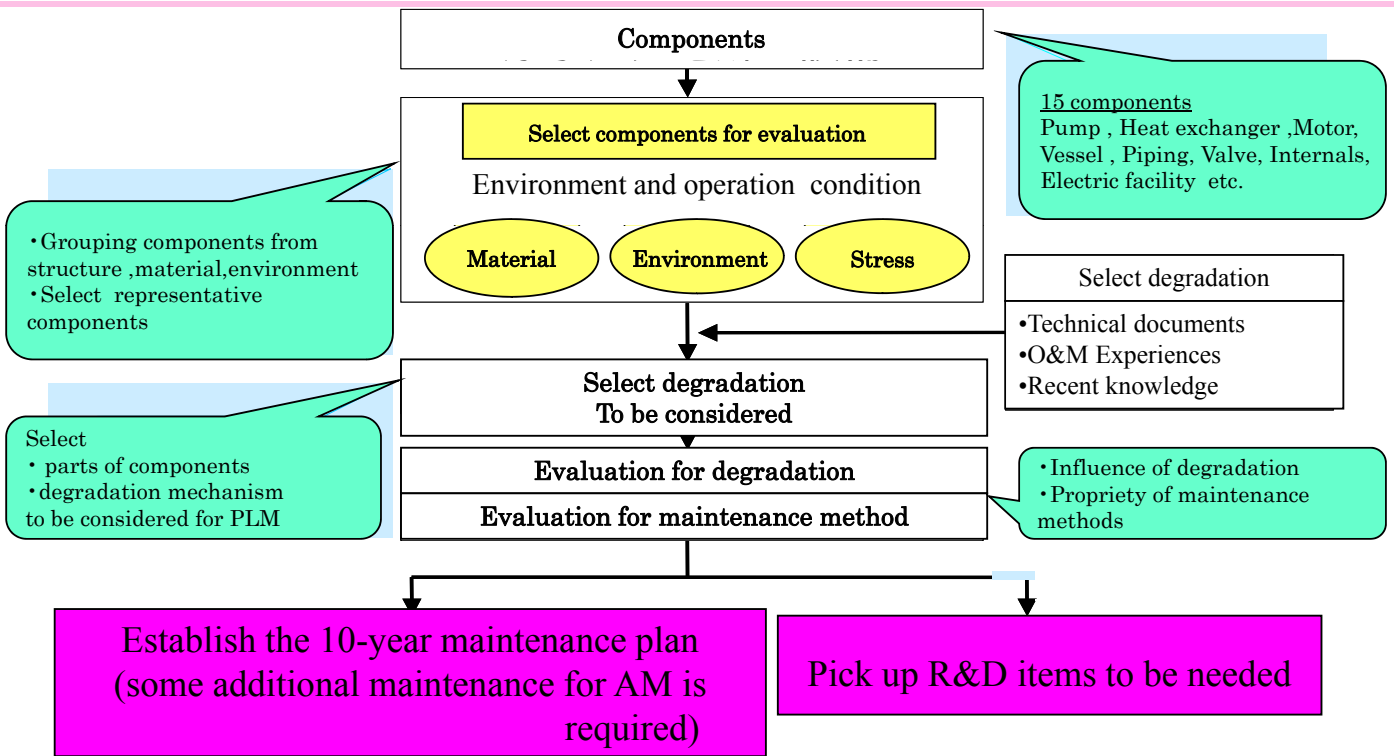


BWR Nuclear power supply system

<Components>

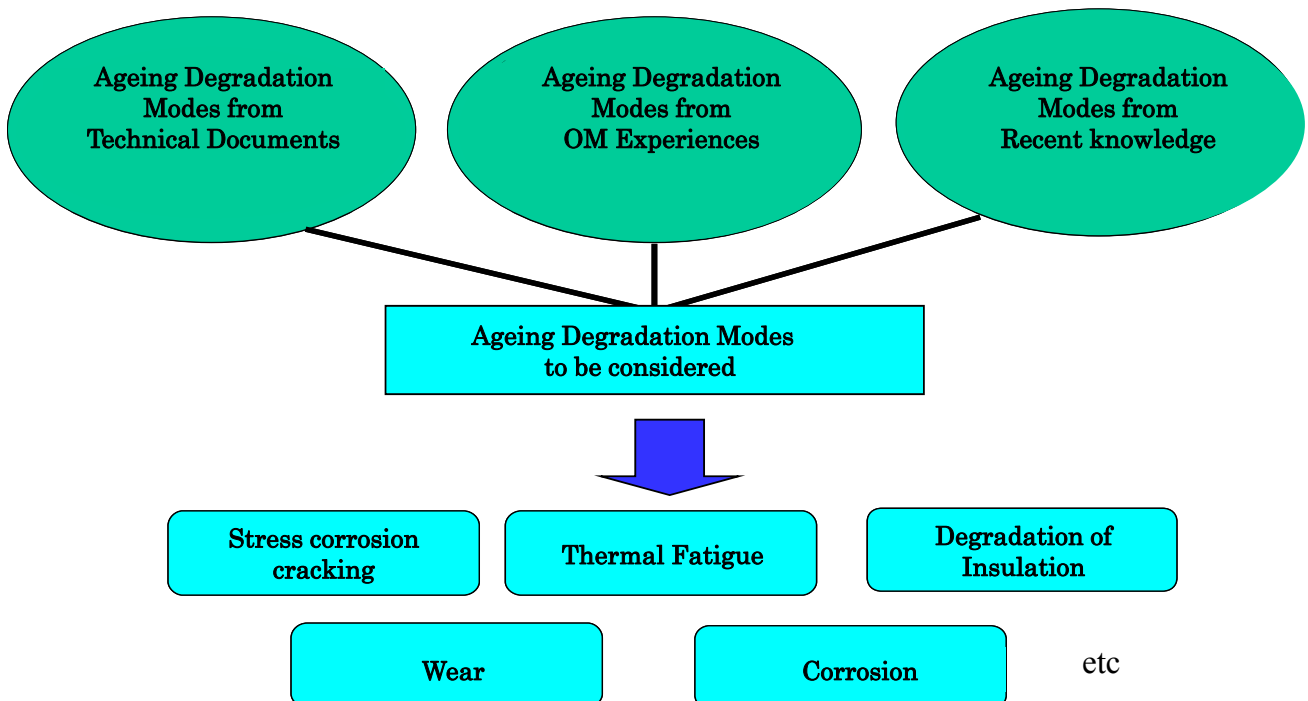
- Pump
- Motor
- Piping
- Internals
- Electric facility
- Concrete structure
- I&C
- Air ventilation
- Power supply
- Heat exchanger
- Vessel
- Valve
- Cable
- Turbine
- Mechanical facility
- Others

Procedure of Ageing Management Study



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Procedure of Ageing Management Study



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Procedure of Ageing Management Study

Evaluate all of the selected components

Ageing Degradation Modes to be evaluated in RCW heat exchanger (example)

Component	consumable	material	degradation phenomenon						
			wallthinning		crack		material property change		others
			wear	corrosion	fatigue	scc	thermal ageing	degradation	
tube		copper alloy	△	○					
water chamber		carbon		○	△				
tube plate		copper alloy		△					
shell		carbon		△					
basket	○								
support bolts		carbon		○					

○ Ageing Degradation Modes to be considered critical

△ Ageing Degradation Modes to be considered non-critical from the engineering judgment

Break down into each parts

Degradation to be considered

Results of Evaluation

Most components

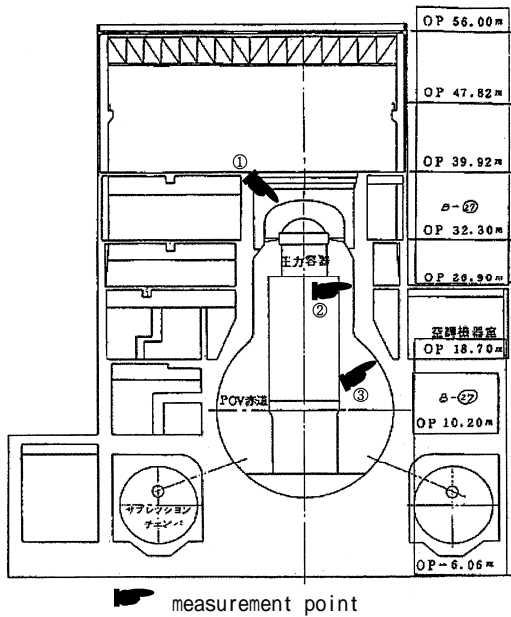
Long-term and safe operation is possible if the current maintenance is continued

Some components

Some additional maintenance for AM is required

⇒ **Establish the 10-year maintenance plan**

Example of Added Maintenance Task (Fukushima-Daiichi Unit3)



PCV Structure of Fukushima-Daiichi Unit 3

Ageing Management on PCV (Primary Containment Vessel)

➤ Evaluation :

Possibility of corrosion at carbon steel shell of PCV

➤ Current maintenance tasks:

Leak rate test, VT on painted surface

➤ Added maintenance tasks:

Measurement of wall thickness

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Example of Added Maintenance Task (Fukushima-Daiichi Unit3)

Components	Ageing Degradation Mode	Current Maintenance Tasks	Added Maintenance Tasks
CUW-Hx	Corrosion of shell	Leak test	Measurement of wall thickness
Off-gas pre-heater/condenser	Corrosion of shell	Leak test	Measurement of wall thickness
PCV	Corrosion of shell	Leak test	Measurement of wall thickness
Off-gas piping	SCC	Leak test	UT
Shroud/shroud-support	SCC	VT	Periodical inspection (VT,UT)
Turbine rotor	SCC of dovetail	VT	UT
Soleplate bolts	Corrosion	VT	Tensile test (sampling)

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Summary and Up-coming Issue

TEPCO introduced “Ageing Management in our NPPs” this time.

We will report “New Maintenance Strategy and Effective Ageing Management” at the next Occasional Topics in EJAM