

Overview of Plant Life Management and Long-Term Maintenance Planning for the Unit 4 of Fukushima Daiichi Nuclear Power Plant

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Plant Life Management

In 1996, the central government presented the "Basic Philosophy of Measures against Aging Effect" to cope with the measures for long-term operation of nuclear power plants, indicating that the operators need to voluntarily conduct technical assessment of aging effect—plant life management—and draw up a long-term maintenance plan, with the central government verifying their validity. Also in 2003, the "Rules for Installment and Operations of Commercial Nuclear Reactors" mandated that plant life management and long-term maintenance planning be completed before the 30th anniversary of the nuclear plants from the beginning of their commercial operation and reassessment be made before every 10 years thereafter.

In 2004, the "Committee on Plant Life Management" was established by the central government, in order to enhance the measures against aging effect. In December, 2005, the Guideline for Implementing Plant Life Management was developed based on the study results of the Committee and the mandate for technical assessment and long-term maintenance planning reports was implemented by the said Rule.

We have already conducted plant life management and long-term maintenance planning for the units No.1, 2, 3, and 5 of Fukushima Daiichi Nuclear Power Plants in February 1999, June 2001, January 2006, and April 2007, respectively. Also as the unit #4 will have operated for 30 years in October 2009 (commercial operation begun on October 12, 1978), we conducted assessment on the soundness of the equipment and structures of the nuclear power plant based on the central government guideline before completing 29 years in operation.

We have also revised the plant life management report and long-term maintenance plan based on comments made by the central government review.

Major comments by the central government review

- Clarify the organization which conducted the technical assessment, etc.
 - Clarify the definition of regularly replaced products
- Align with the Guideline for Implementing Plant Life Management
- Develop the description and specificity for the philosophy and coverage of technical assessment
 - Describe the current maintenance and soundness assessment
 - Describe the long-term maintenance plan
- Implement more discrete maintenance measures assuming long-term operation
 - Prepare the inspection project of the outdoor piping covered with a heat insulating material and make the visual inspection of the piping

Operation and Maintenance of the Unit 4 of Fukushima Daiichi Nuclear Power Plant

The Unit No.5 of Fukushima Daiichi Nuclear Power Plant has gone through 21 regular inspections since the beginning of commercial operation. During this course, maintenance activities such as the care for equipment and facilities based on the regular inspections, repair and replacement based on the degradation trend and corrective action of the troubles have been conducted.

<Operational Performance of the Unit 5 of Fukushima Daiichi Nuclear Power Plant>

Cumulative Power Generation	approx. 143.9 Billion kWh
Unplanned shutdown	approx. 0.2 times/year
Cumulative Availability	approx. 70%

As of February 29, 2007

We have also implemented the following maintenance activities including preventative measures against aging deterioration.

Measures against Stress Corrosion Cracking (SCC)

- Replacement of primary loop recirculation system pipes to low-carbon stainless steel piping (FY1996-FY2002)
- Replacement to machined monolithic turbine rotor (FY1990-FY1991)

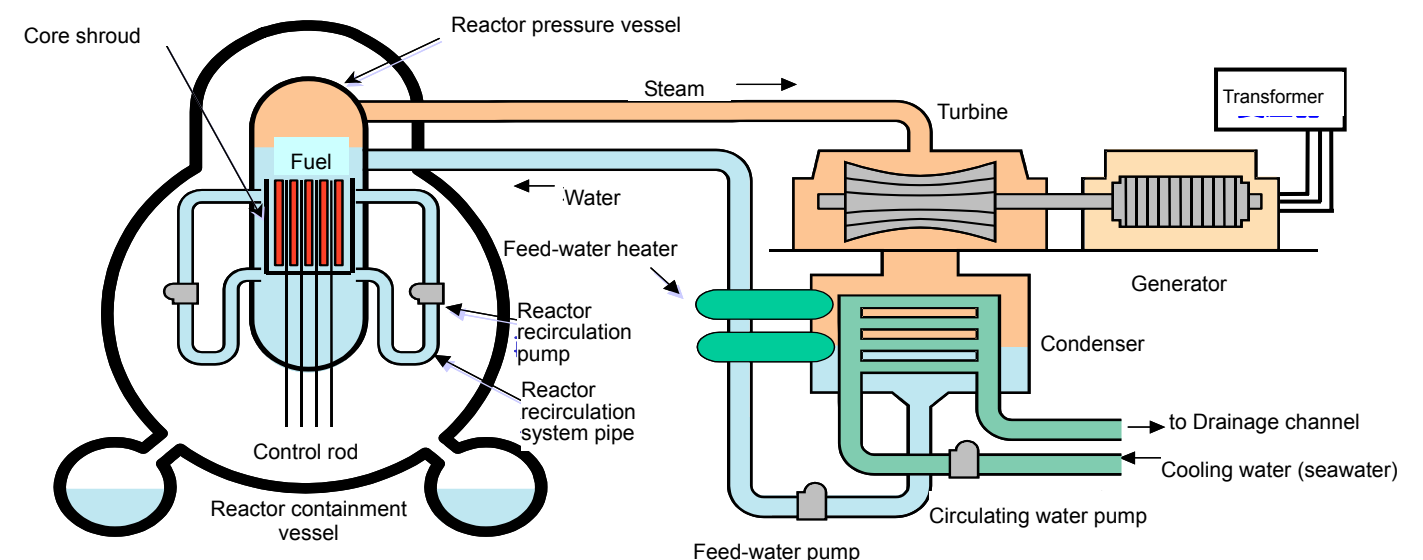
Measures against corrosion and thinning

- Replacement of feed-water heater (body) (FY1983-FY2002)
- Repair of steam turbine low-pressure internal cylinders (A, B) (FY2002-FY2005)

Measures against fatigue crack

- Replacement of primary loop recirculation pump casing cover (FY1997)

Furthermore, addition of diesel generators and improvement of action plans for accident management were implemented to increase safety and reliability.

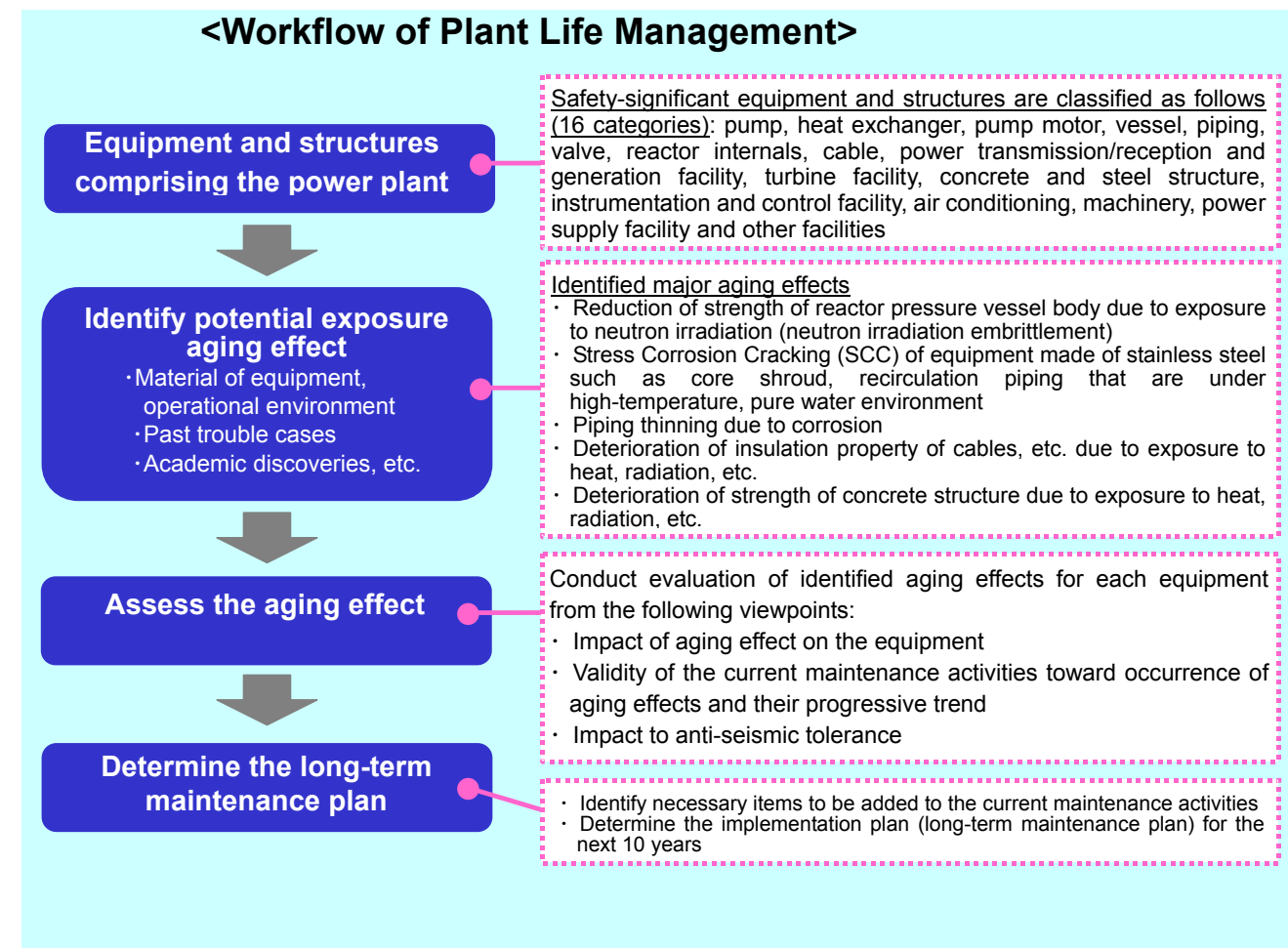


Overview of Plant Life Management

In the plant life management, the soundness of safety-significant equipment and facilities (vessels, piping, pumps, valves, buildings and other thousands of equipment and structures) against aging effect and progressive trend assuming a long term operation (60 years), as well as the validity of the current maintenance activities and impacts on the anti-seismic properties.

If the assessment results reveal concerns in the materialization of aging effect in the future, necessary additional items to the current maintenance activities are identified and the specific implementation plan, including coverage, methods and schedule, is to be made for the duration of the next 10 years (long-term maintenance plan).

The assessment would be reviewed regularly (every 10 years) and when new knowledge is obtained.



Assessment Results and Long-Term Maintenance Plan

Assessment revealed that even assuming 60 years of operation, most of the equipment and structure can be kept sound with the current maintenance activities.

We have also added further maintenance items for certain equipment in addition to the current list (additional inspection items, accumulation of data, enhancement of knowledge base, implementation of testing, etc.) as the long-term maintenance plan (56 items for 45 equipment/facilities).

We will maintain and control the equipment and facilities in sound conditions by implementing the long-term maintenance plan in addition to the currently implemented maintenance activities.

<Assessment Results and Long-Term Maintenance Plan (main items)>

Equipments/ Facilities	Major aging effects	Overview of the assessed results	Overview of the long-term maintenance plan	
			Maintenance items *1	Schedule *2
Vessel	Embrittlement of reactor pressure vessel due to neutron irradiation	Sound status can be kept by temperature control considering embrittlement and by continuing the nondestructive inspection	Study reusability technique of the tested inspection pieces and early application of the new embrittlement estimation formula to the real equipment	Mid-Long term
	Fatigue of reactor pressure vessel	Enough tolerance is estimated after assessing the fatigue due to the repetitive activation and deactivation	Conduct regular reassessments based on the actual operation	Next assessment
Core Internals	Stress Corrosion cracking of the core shroud (under high-temperature, pure water environment)	Soundness can be kept by continuing the inspections according to the directives of the central government	If any new knowledge base is confirmed by the future results of inspections and researches, additional inspections, inspection intervals or other items will be reviewed.	Mid-Long term
Piping	Piping thinning due to corrosion of carbon steel pipes	Soundness can be kept by conducting adequate management along with the measurement of pipe wall thickness, etc.	Continue measurement of the pipe wall thickness to accumulate data and enhance the knowledge base (including anti-seismic assessment review)	Short-term
	Stress corrosion cracking in the recirculation piping (under high-temperature, pure water environment)	Soundness can be kept by continuing the inspections according to the directives from the central government	If new observation is obtained such as the data for crack development, additional inspection or inspection interval will be reviewed	Mid-long term
Cable	Deterioration of insulation properties	It was determined that there is only a remote possibility that the insulation properties degrade quickly from the long-term soundness testing simulating potential heat and radiation to the cables	Conduct long-term soundness testing for certain cables	Short term / Mid-long term
Concrete Structure	Deterioration of the strength of reactor buildings	As the deterioration of the strength is minimal with the temperature and radiation during normal operation, it was confirmed there is enough strength from the past measurements	-	-

*1: "-" means the current maintenance activities will be continued

*2: short time: within 5 years; mid-long term: within 10 years; next assessment: at the reassessment conducted every 10 years

We will continue an ongoing improvement in our activities by accumulating operational experience and enhancing the knowledge base and reflecting them to the maintenance activities, as this assessment is only based on the current experience and knowledge.

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