# Committed to Safety: Enhancing Nuclear Safety and the Utilization of Nuclear Power

Using the lessons learned from the accident at Tokyo Electric Power's Fukushima Daiichi Nuclear Power Station, we are taking steps to enhance the safety of nuclear power generation. In addition to satisfying the new regulatory requirements enforced in July 2013, we remain highly focused on enhancing safety to an extent that exceeds the regulatory requirements. Operating on a premise of assured safety, we have also adopted the goal of extending the service life of our power stations beyond forty years in order to maintain nuclear power generation as an important energy source in the interests of energy security, global environmental issues, and the economy. With respect to the decommissioning of Units 1 & 2 of the Mihama Power Station, we are determined to undertake this time-consuming task safely and smoothly in the years to come.

# Complying with New Regulatory Requirements

From the time the new regulatory requirements were enforced, we began expanding and enhancing our safety measures by applying the best practices and discoveries from both Japan and elsewhere, establishing a redundant fail-safe system to prevent undesirable situations from developing into serious incidents. Applications for conformity examinations are made only for nuclear power plants that have adopted such measures. We continue to address the issue of examinations as part of an all-out effort to ensure nuclear safety and, while seeking the understanding of local communities and the general public regarding these undertakings, we will remain focused on resuming operation of our nuclear power plants once their safety has been assured by the Nuclear Regulation Authority.

Major Milestones Related to Our Power Stations Since 2014



### Status of conformity examination for new regulatory requirements



## Addressing the Provisional Disposition to Suspend Operation

In April 2015, the District Court of Fukui approved a motion for provisional disposition to suspend the operation of Takahama Units 3 & 4.

Since the motion for provisional disposition was filed in December 2014, the Company has been demanding that the request be denied and has argued and testified that the safety of the power plant has been ensured based on scientific and expert knowledge.

Despite our further request to the District Court of Fukui to deliberate the motion carefully and thoroughly, the court closed the deliberation in March and approved the motion for provisional disposition.

We consider that a number of findings contradict the objective evidence based on scientific and expert knowledge and, because we find this decision unacceptable, have filed an appeal and an objection to the temporary restraining order. We will continue to make every effort to claim and demonstrate the safety of Takahama Units 3 and 4 in order to have the provisional disposition order canceled without delay.

### Example of our view: Off-site power supply and main feedwater pumps

#### Our view

Maintaining the cooling function with an external power supply and the main water supply is the norm for a nuclear reactor; hence, these facilities should have seismic resistance appropriate for the safety of a critical installation.

Safety is supported by the emergency diesel generator and auxiliary water pump. An external power supply, including the power lines and the main water pump that supplies water for the generation of steam to drive the turbine, are required for power generation and are not expected to play a role regarding safety assurance.

#### Example of our view: Spent fuel

Spent fuel is not enclosed in a rigid facility similar to a reactor containment vessel. The seismic resistance of the cooling device for the spent fuel pit is Class B and there is reason to believe that an earthquake weaker than the standard could damage the device. The seismic resistance of water supply facility for the spent nuclear fuel pool should be improved to Class S.

Spent fuel can be cooled sufficiently simply by storing it underwater. The spent fuel pit and its water supply facility meet Class S seismic resistance and it is not necessary to contain the fuel in a rigid facility similar to a reactor containment vessel. Although the seismic resistance of the pit cooling facility has been classified as Class B, it is actually equivalent to Class S, and this fact has not been recognized properly.

Our view

# Ongoing Voluntary Efforts to Enhance Safety

In June 2014, the Company developed a roadmap of actions to be implemented (Further Strengthening of Ongoing Voluntary Efforts to Enhance Nuclear Safety), including actions to enhance safety in compliance with the new regulatory standards as well as emergency response capabilities such as strengthened training programs, drills, and organizations. We are determined to implement the roadmap through a cohesive effort of the entire company without being restricted by the regulatory framework.

## Enforcement of Defense-in-Depth

# ♦ Example of Takahama Units 3 & 4

Under the regulatory standard enforced in July 2013, multi-layered protective measures should be implemented to ensure safety and, in terms of the measures for each layer, the concept of "defense-in-depth," which does not rely on the effectiveness of the measures in other layers, is enforced.



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# Strengthening the Organization

In preparation for unexpected situations, employees responsible for making the initial response are present within the power plant premises and a system to summon personnel responsible for containing accidents has been established. This initiative doubles the number of response personnel that had been available prior to the earthquake. In addition, a system is in place to secure the support of partner companies and the plant manufacturers.

### **Example of Takahama Units 3 & 4**



Note: The number of personnel available for the initial response and available to be summoned in the event of an accident is subject to change depending on the results of conformity examinations.

# Enhancing Response Capabilities through Training and Drills

We implement comprehensive corporate general nuclear emergency response drills to verify the effectiveness of our coordination with the organizations concerned. In addition, the necessary training and various drills are repeated to enhance our accident response capability.

#### Number of drills

	FY 2011	FY 2014
Mihama Nuclear Power Station	About 290 times	About 700 times
Takahama Nuclear Power Station	About 280 times	About 1,500 times
Ohi Nuclear Power Station	About 290 times	About 1,000 times

#### Number of participants in training and drills (total)

	EV 2011	EV 2014	
	112011	112014	
Mihama Nuclear Power Station	About 380	About 1,200	
Takahama Nuclear Power Station	About 480	About 1,600	
Ohi Nuclear Power Station	About 470	About 1,400	



Makoto Yagi, company president (right), leading the comprehensive corporate nuclear response drill





Severe condition drill for practicing fire pump installation (in radioactivity protection gear)

Training for dealing with serious accidents using tools to visualize plant behavior

# Ensuring Widespread Adoption of Our Commitment to the Development of a Safety Culture

In order to instill throughout the organization our Commitment to Enhancing Nuclear Safety, which was established as a corporate message in August 2014, we have implemented various activities to continue this effort while implementing improvements by setting specific goals based on five practices, as an example. Through this initiative, we are continuing to develop our safety culture.

#### Commitment to Enhancing Nuclear Safety

Preface	<ul> <li>Every one of us shall remember the lessons learned from the Fukushima-Daiichi nuclear accident and ceaselessly strive to enhance nuclear safety to protect the people not only in the plant-hosting communities but also the whole country, and to preserve the environment.</li> </ul>
Characteristics of nuclear power generation and risk awareness	<ul> <li>Nuclear power generation has superior characteristics in terms of energy security, prevention of global warming and economic efficiency, and is an essential power source for the future. On the other hand, nuclear power generation has risks of radiation exposure and environmental contamination. Every one of us shall always bear in mind that once a severe accident happens due to lack of proper management, it could cause enormous damage to the people and the environment.</li> </ul>
Continuous removal/ reduction of risk	<ul> <li>To enhance nuclear safety, we shall fully understand the characteristics and risks of nuclear power generation and continually remove or reduce such risks while identifying and evaluating them, never believing at any moment that we have reached the goal of ensuring safety. These efforts shall be conclucted at each level of the Defense-in-Depth.</li> </ul>
Development of safety culture	<ul> <li>Safety culture is the basis for continuously removing or reducing risks. Since the accident of Mihama Unit No. 3, we have been reviewing and improving our safety culture, and we shall develop such safety culture.</li> <li>To this end, we shall always be ready to question anything, learn from others and listen to the voices of society and discuss issues uninhibitedly while respecting diverse opinions with further efforts.</li> </ul>
Commitment to enhancing nuclear safety	<ul> <li>Enhancing nuclear safety is the overriding priority in the company. It is also important to promote two-way communications with the people in the plant-hosting communities and the whole country, and to share common perceptions on nuclear safety.</li> <li>Under the President's leadership, every one of us shall work together to tirelessly enhance nuclear safety.</li> </ul>

#### Five Practices

- Repeatedly question even in-house rules and common practices.
- Exchange diverse opinions and discuss issues uninhibitedly regardless of status or position.
- Encourage the raising of safety concerns and treat them in a fair manner.
- Listen sincerely to the voices of the plant-hosting communities and the whole country.
- Learn proactively from experiences and findings both inside and outside the country.

# Targeting a Service Life Exceeding 40 Years

The Company was the first in Japan to submit an application for an extension to the service life of a nuclear power plant when it did so for Takahama Units 1 & 2. Although the Nuclear Reactor Regulation Law amended in 2012 stipulated the service life for nuclear power plants to be forty years, extending the service life once—to a limit of an additional twenty years—is possible by obtaining the approval of the Nuclear Regulation Authority. To apply for this approval, it is necessary to undergo a special inspection. The Company did so for Takahama Units 1 & 2 (December 2014 to April 2015) and Mihama Unit 3 (May 2015 to present writing). Also, in preparation for this service life extension, major items of equipment are replaced according to a plan.



# Service Life Extensions in the U.S.A.

In the U.S.A., a system exists allowing for an extension to the forty-year operation permit (10CFR Part 54), and more than 70% of the power plants in that country have already obtained approval for a sixty-year service life, with more than 30% now operating past the forty year mark.

Status		Number of plants	
		99	
In operation Application submitted Application		92	
	Application	Approved	74
	In process	18	
	pending	7	
Among the 74 plants approved for operation, 32 are running beyond the 40-year mark.			

# Decommissioning Mihama Units 1 & 2 with a Priority on Safety

A decision was made to decommission Mihama Units 1 & 2 with comprehensive consideration given to maintaining the supply capacity, ensuring the technical feasibility of various safety measures, and introducing accounting systems to facilitate decommissioning. The Decommissioning Management Section has been established as the core organization for conducting the decommissioning smoothly while putting top priority on safety and addressing multi-dimensional issues as a pioneer in the decommissioning process for pressurized water reactors - including research related to the decommissioning process and collaboration with other operators.

# Major Tasks of the Decommissioning Management Section

- Developing plans for the decommissioning process and associated tasks
- Promoting research and technological development related to the decommissioning process, developing and discovering technologies, and facilitating collaboration with other operators and local companies

# Standard Decommissioning Processes\*

Decommissioning entails three steps: cleaning, waiting, and scrapping.



\*Specific measures are determined by the operator depending on the outcome of the safety verification performed by the Nuclear Regulation Authority