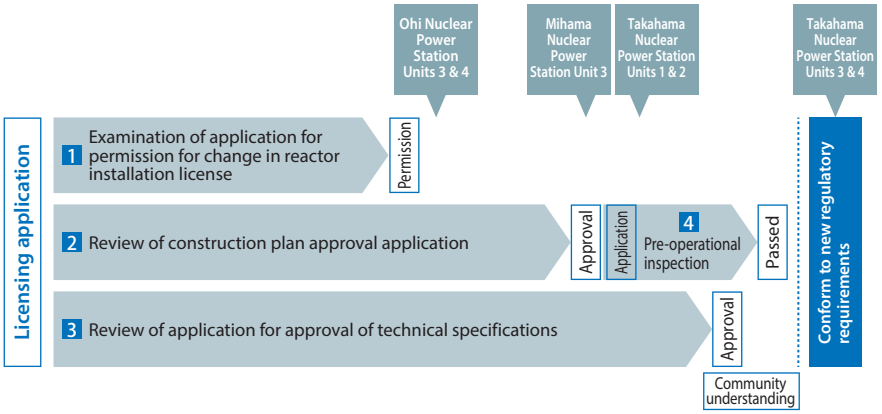
Toward the restart of nuclear power plant operation

Since the accident at Tokyo Electric Power's Fukushima Daiichi Nuclear Power Station, in addition to emergency safety measures, our company has been thoroughly strengthening countermeasures for earthquakes, tsunamis and other natural disasters along with measures to prevent damage to reactor pressure vessels. Applications for the nuclear power plants that have implemented these measures are being made to the Nuclear Regulation Authority for examination of their compliance with the new regulatory requirements. We will continue to respond earnestly, precisely and quickly to these examinations. In addition, as we gain understanding from the people in the communities where these nuclear power plants are located, we will continue to seek to resume the operation of those that have been confirmed to be safe as soon as possible.

Status of new regulatory requirement conformity examinations for our plants

On May 24, 2017, we received a nuclear reactor installation and upgrading permit from the Nuclear Regulation Authority for Ohi Power Station Units 3 and 4. This means that 7 of our plants have received permission for nuclear reactor installation and upgrading, bringing the total number permissions to 12 nationwide.

Status of new regulatory requirement conformity examinations for our plants (as of Friday, June 16, 2017)



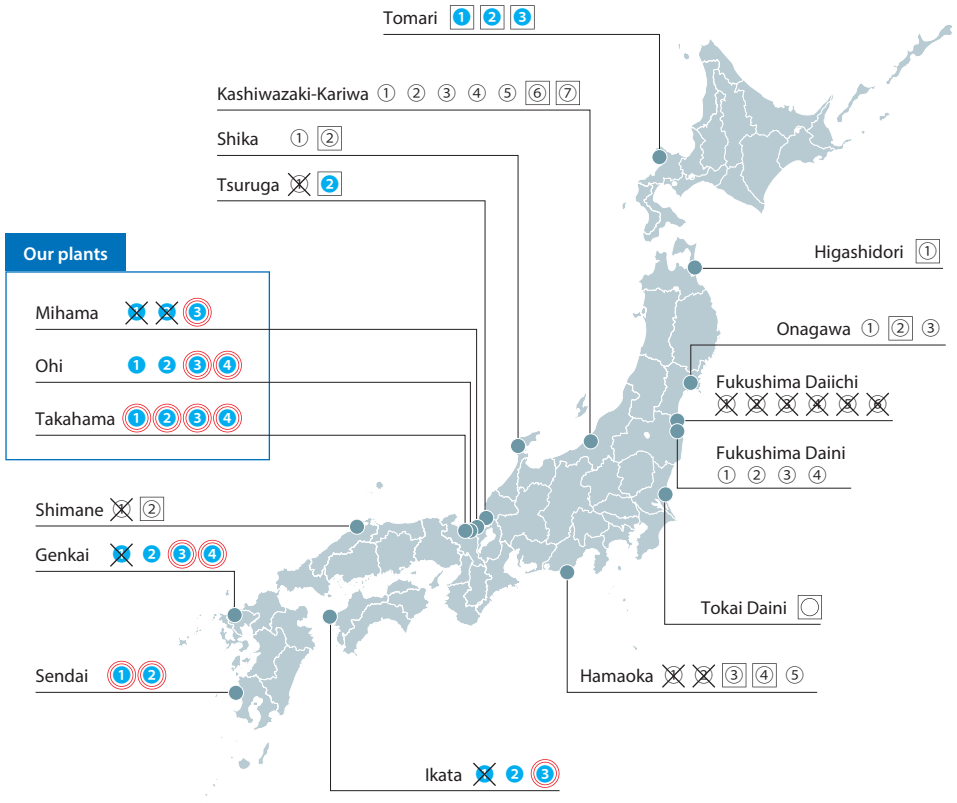
1 **Permission for change in reactor installation license**: Confirm that the basic designs for installation and system maintenance of facilities conform to installation permission standards for handling the serious accidents and other items mentioned in the application documents.

2 **Construction plan approval application**: In the nuclear reactor installation and upgrading permit, confirm that detailed plans (construction plans) based on the basic design for permitted reactor pressure vessel facilities conform to technical standards.

3 **Approval of technical specifications**: Confirm that security regulations that regulate items related to reactor pressure vessel facilities, including operator management (procedures, systems, etc.), are sufficient in terms of preventing disasters at reactor pressure vessels and other facilities.

4 **Pre-operational inspection**: Through records and actual operation, confirm that manufacture and installation are in accordance with the permitted construction plans and that functions, performance levels and other items are as prescribed.

Status of nuclear power plants and new regulatory requirements throughout Japan (as of June 16, 2017)



Key

Plant status

Operational: ● PWR (pressurized water reactor)
○ BWR (boiling water reactor)
Decommissioned: ×

New regulatory requirement compliance status

Nuclear reactor installation and upgrading permit received: ◯
Application submitted: □

Operating			
New regulatory requirement compliance status	PWR (reactors)	BWR (reactors)	Total (reactors)
Nuclear reactor installation and upgrading permit received	12	0	12
Application submitted	4	9*	13
Application not submitted	4	13	17
Total	20	22	42

Decommissioned			
	4	10	14

* Excluding the Oma Nuclear Power Plant, which is under construction

Takahama Nuclear Power Station Units 3 and 4 resume operation

On March 9, 2016, a provisional disposition preventing the resumption of operation was issued by the Otsu District Court for Takahama Power Station Units 3 and 4, halted their operation. On March 28, 2017, however, the Osaka High Court accepted the arguments of our company and lifted this disposition preventing the resumption of operation. While receiving the understanding of the people in the communities where this nuclear power plant is located, our company steadily advanced preparation work for the resumption of operation with safety as our highest priority. As a result, Unit 3 started power generation on June 9, while Unit 4 resumed commercial operation on June 16. We will continue safe and stable operation in the future and link this to restoring trust in nuclear power.

Upon the resumption of operation, we have strengthened our systems for responding to emergencies by, for example, increasing the number of initial response personnel at the power plant who engage in activities to secure power and water supply. We have also increased the number of personnel who staff our Nuclear Power Division in order to provide power plant support. Moreover, based on reflection on the incidents that occurred at Unit 4 in February 2016 (water leaked within the controlled area and an automatic reactor trip occurred) and the crane collapse accident at Unit 2 in January 2017, we are arranging recurrence prevention measures as well as measures to prevent similar accidents.

We reflected on these two incidents and one accident, and considered three points of insufficiency: ❶ the involvement of our company itself, ❷ checks, and ❸ risk management. Based on these perspectives, we investigated recurrence prevention measures and measures to prevent similar accidents.

Central Control Room at the time power generation started

Nuclear Power Division Director Toyomatsu (at right) observing connection of generator to transmission network

Points of reflection regarding the incidents and the accident at the Takahama Power Station

Incidents/accident	Overview	Reflections
Unit 4 water leak within the managed zone (February 20, 2016)	When water was made to flow directed at the heating of the primary cooling material line, leakage occurred from a valve on the line that the water passed through.	● Double-checking was not done to confirm tightening, and the involvement of our company itself was insufficient.
Unit 4 automatic reactor trip (February 29, 2016)	While conducting procedures to connect the generator to the power transmission grid, the generator stopped automatically. In response, the reactor also stopped automatically.	● Checks of reconstruction work that accompanied operation changes were only conducted by the divisions responsible for the construction. Checks by multiple in-house experts were not conducted.
Unit 2 crane collapse accident (January 20, 2017)	Blown by strong winds, a large crane fell onto an auxiliary building and fuel handling structure for Unit 2.	● Our company itself was not sufficiently involved in the management of materials and equipment used for construction. ● The impacts on the nuclear power facilities during the execution of civil engineering and construction work were not checked sufficiently. ● Risk management concerning natural phenomenon was not done sufficiently.

Recurrence prevention measures considering our reflections (examples)

Perspectives	Recurrence prevention measures (examples)
❶ Involvement of our company itself	● For every type of construction work on the premises of our power plants, our employees now take responsibility for implementing checks from the construction planning stage and for confirming fulfillment of and instructing about the requirements of our company at work sites.
❷ Conducting of multiple overlapping checks	● For the design and setting basis of equipment used for application changes, in addition to inspections by the responsible divisions, we have added reviews by in-house experts (nuclear safety supervisors, chief nuclear reactor technicians, chief electricians and construction division engineers). ● At civil engineering and construction worksites, in addition to site checks by the responsible divisions, we have added site checks by power plant management and the newly-assigned assistant director who has expertise in civil engineering and construction work.
❸ Risk management	● At the resumption of operation, in addition to usual inspections by operators and preventative maintenance staff, a team of about 130 members was formed and implemented safety checks of the site. ● We established a risk review meeting, with members including the director of the power plant, to discuss whether latent sources of danger might exist in construction work and to investigate necessary countermeasures. ● In the power plant central control room where staff members are always stationed, weather information can now be received in real time 24 hours a day. Moreover, when a wind storm warning or other official announcement is made, systems for vigilance and preparation can be quickly initiated at power plants and the Nuclear Power Division.
Prevention of similar accidents	● From the perspective of confirming safety assurance, fire protection, industrial accident prevention, and construction management systems (information acquisition procedures, command and direction systems) for essential safety equipment, we conducted site confirmations of every construction task under way at three power plants (1,516 cases). We did this to determine whether safety management was suitable or not, and implemented suitability improvements in 295 cases.

Preparing for operation beyond 40 years

In the Long-term Energy Supply and Demand Outlook established by the government in July 2015, nuclear power was specified to have a fixed ratio of 20–22% of the total power supply composition by fiscal 2030.

If all the existing nuclear power plants cease operation after 40 years of active use, nuclear power generation will only be about 15% of the total amount of power generation in fiscal 2030. In order to assure that nuclear power fulfills its role as 20–22% of the total energy composition in fiscal 2030, at our company, we believe that it is necessary to operate our nuclear power plants beyond 40 years with the assurance of safety as a major prerequisite.

Significance of approval of operating period extension for Takahama Nuclear Power Station Units 1 and 2 and Mihama Nuclear Power Station Unit 3

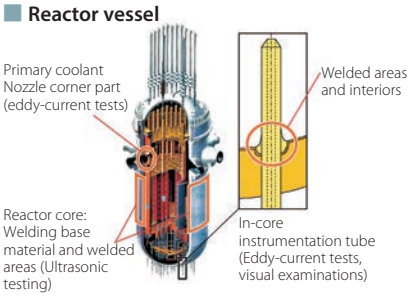
In accordance with the law, inspections to determine states of degradation in detail (special inspections) were conducted for Takahama Nuclear Power Station Units 1 and 2 and Mihama Nuclear Power Station Unit 3. Based on these results, evaluations of the health of equipment anticipated to be crucial during a 60-year operation period were conducted. As a result, these were the only power plants in Japan that received permission for operation period extensions* from the Nuclear Regulation Authority. In addition to advancing the necessary construction work, every part of our company will continue making efforts to gain the understanding of members of society, starting with the communities near these facilities, regarding the necessity and safety of continued operation after 40 years.

* The operating periods of nuclear power plants are set by the Nuclear Reactor Regulation Law to 40 years counting from the date that operation started. With approval from the Nuclear Regulation Authority, however, this can be increased once by a maximum of 20 years.

Special inspections

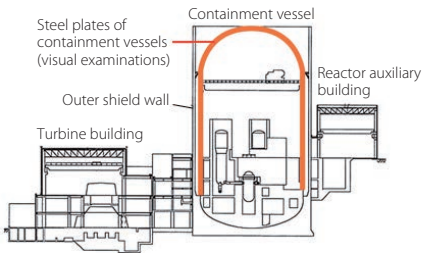
For reactor vessels, containment vessels and concrete structures, which are difficult to replace, in addition to ordinary maintenance, we conducted inspections to determine states of degradation in detail (special inspections) in accordance with the law.

Reactor vessel



We confirmed that there were no cracks, breaks or other defects through careful visual inspections and tests using ultrasonic waves and electric currents.

Containment vessel



We checked the state of the external coating with careful visual inspection and confirmed that there were no instances of coating detachment, corrosion or other defects or abnormalities.

Concrete structures

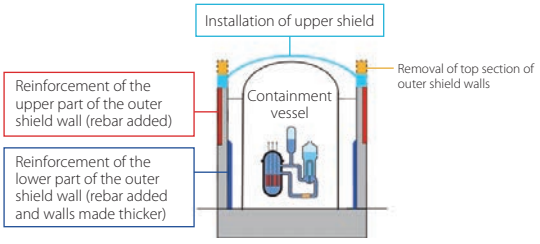
Strength testing example

In order to check changes to material states and strengths, particularly for places exposed to extreme temperatures and other severe environmental factors from containment vessels and similar facilities, we removed concrete samples from each unit and confirmed that they had no problems.

Construction safety improvement measures (example)

Containment vessel upper shield installation work (Takahama Nuclear Power Station Units 1 and 2)

In order to reduce radiation from the reactor containment vessel and reduce radiation exposure during outside work in the event of a severe accident, we installed a dome-shaped reinforced-concrete upper shield on the top outer perimeter of the containment vessel. In addition, we reinforced the outer shield walls.



Steady decommissioning of Mihama Nuclear Power Station Units 1 and 2

On April 19, 2017, plans for decommissioning Mihama Nuclear Power Station Units 1 and 2 were approved by the Nuclear Regulation Authority.

We are advancing the decommissioning safely and steadily based on learning from our predecessors both in and outside Japan, while sharing information and cooperating mutually with those with related concerns. By doing this, we expect that the decommissioning plan for Mihama Nuclear Power Station Units 1 and 2 will become a model for decommissioning PWR plants in Japan and that this will contribute to raising basic technique levels for decommissioning throughout Japan.