Special Feature

Initiatives for Ensuring the Safety and Security of Nuclear Power

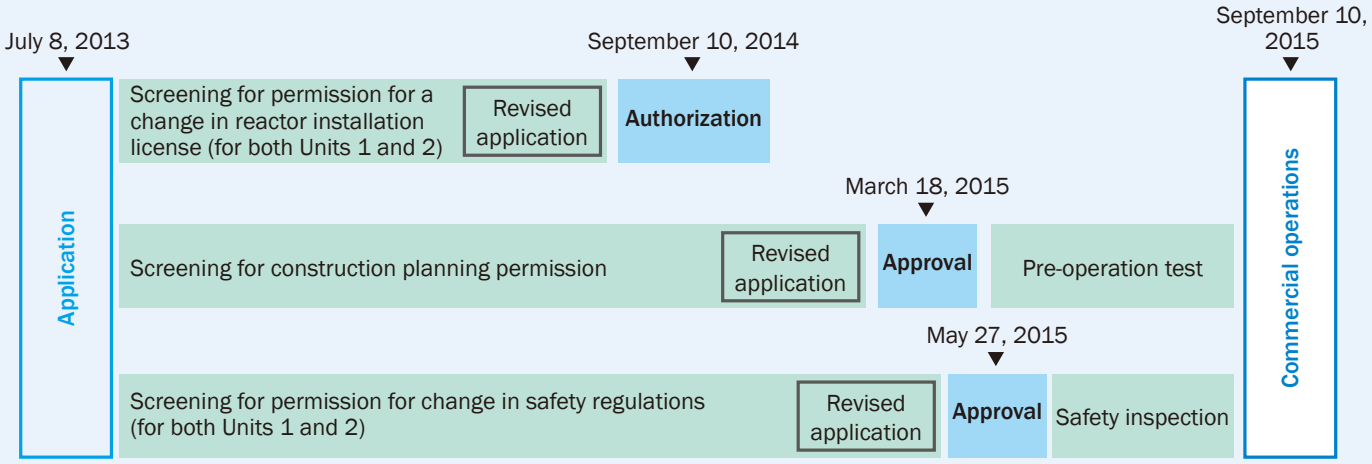
Kyushu Electric recognizes improving the safety of nuclear power as a topmost management priority. Accordingly, we are complying with the Japanese government's new regulatory requirements. At the same time, we are working on both the tangible (facilities) and intangible (operational) fronts, monitoring external opinions and undertaking voluntary and ongoing initiatives to augment safety.

Restarting Commercial Operations at Unit 1 of the Sendai Nuclear Power Station

Kyushu Electric applied in July 2013 to confirm that safety measures in place at the Sendai Nuclear Power Station Units 1 and 2 and the Genkai Nuclear Power Station Units 3 and 4 are in compliance with the national government's new regulatory standards by submitting to the Nuclear Regulation Authority applications for permission for a change in reactor installation license (basic design), construction planning permission (detailed design), permission for change in safety regulations (operational management). Applications for Sendai were filed on June 8, 2013, and for Genkai on July 12, 2013.

Unit 1 of the Sendai Nuclear Power Station underwent a pre-operation test on March 30, 2015 to confirm that actual safety measures were in accordance with construction planning permission. Thereafter, fuel loading took place on July 7, the reactor started up on August 11, operations recommenced on August 14, and commercial operations began again on September 10.

Process of Recommencing Operations at Unit 1 of the Sendai Nuclear Power Plant



*We have obtained the understanding from the heads of local municipal bodies, the governor of Kagoshima Prefecture and the mayor of Satsumasendai, regarding safety enhancement initiatives and the restarting of the Sendai Nuclear Power Station.

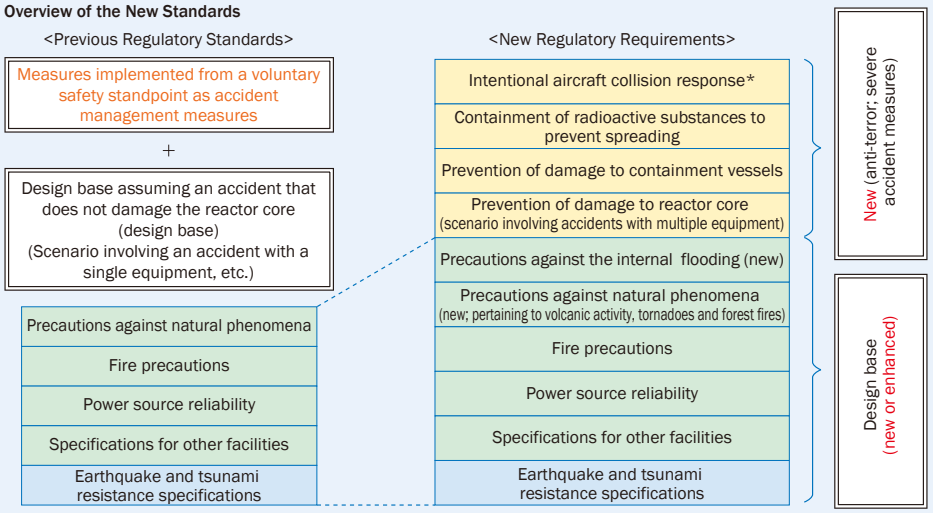
Unit 2 of the Sendai Nuclear Power Station underwent a pre-operation test in June 2015, two months following the test for Unit 1, enabling us to continue incorporating our experiences with Unit 1 testing.

We will continue implementing voluntary initiatives to further enhance safety and reliability, ensuring the full safety of our nuclear power stations. At the same time, we will respond meticulously and sincerely on government reviews toward the early recommencement of operations at Unit 2 of the Sendai Nuclear Power Station and Units 3 and 4 of the Genkai Nuclear Power Station.

Content of the Application for Permission for a Change in Reactor Installation License for Units 1 and 2 of the Sendai Nuclear Power Station

To further ensure the safety of nuclear power stations against damage stemming from earthquakes and tsunamis, the new regulatory requirements specify enhanced design base for anti-seismic and anti-tsunami functionality, as well as power source reliability and cooling facility performance. The requirements also call for large-scale disaster countermeasures for responding to situations that exceed design requirements.

Overview of the Nuclear Regulation Authority's New Regulatory Requirements



[Prepared from materials announced on July 3, 2013, by the Nuclear Regulation Authority]

*As an interim measure, a five-year grace period is set as an interim measure for facilities in responding to specific large-scale disasters (restricting the abnormal emission of radioactive materials due to large-scale aircraft collisions or acts of terrorism)

1. Strengthened and Newly Introduced Design Bases

(1) Earthquakes

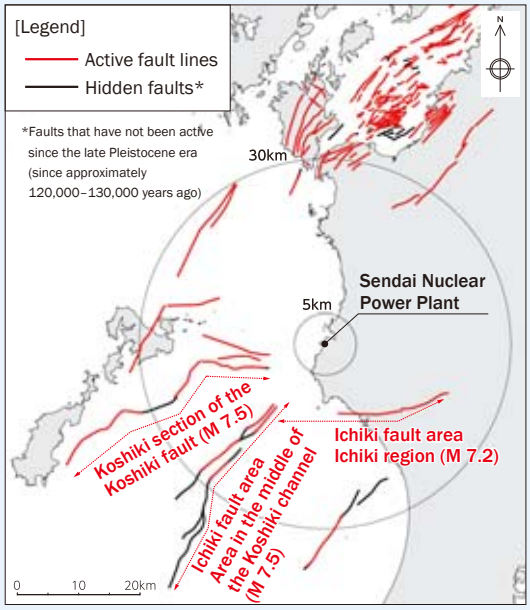
Principal content of new regulatory requirements	• Power stations situated on sites with no active fault lines • Formulation of standard seismic motion, based on the most recent scientific and technological knowledge
Principal content of applications for permission for a change in reactor installation license	• Confirmation there are no active fault lines within the power station grounds • Formulation of standard seismic motion (1) Evaluation of active fault lines in power station vicinity: 540 gal (2) Based on results of examination of the Hokkaido Rumoi–Nanbu earthquake: 620 gal

Standard seismic motion includes both

(1) Seismic movement that could conceivably occur along active fault lines in the power station's vicinity (seismic movement plotted out from a defined epicenter at each site) and

(2) Past seismic movement that is difficult to attribute to the epicenter and active fault lines (seismic movement not plotted out from a defined epicenter).

▼Distribution of Active Fault Lines in the Vicinity of the Sendai Nuclear Power Plant

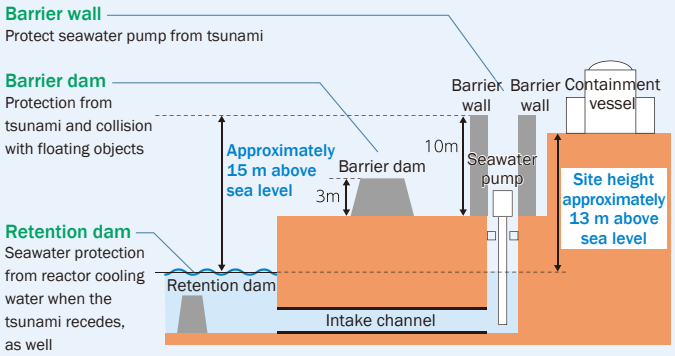


(2) Tsunamis

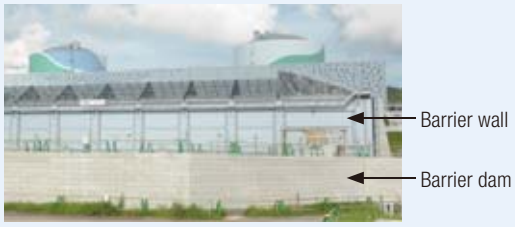
Principal content of new regulatory requirements	• Definition of a “standard tsunami” based on the most recent scientific and technological knowledge • Buildings housing equipment crucial to safety to be located at a height that a tsunami cannot reach • Establishment of protective facilities if breached by tsunami
Principal content of application for permission for a change in reactor installation license	• Definition of a standard tsunami • A tsunami stemming from an interplate earthquake in the Ryukyu Trench to a generator at a maximum high-water market of around 6m* above sea level • Principal generator facilities to be situated approximately 13m above sea level, ensuring ample protection against run-up waves • Erection of a protective wall around the seawater pump area

*Taking into consideration changes due to land subsidence from earthquake and full tide mark

▼Conceptual Image of the Reactor Site



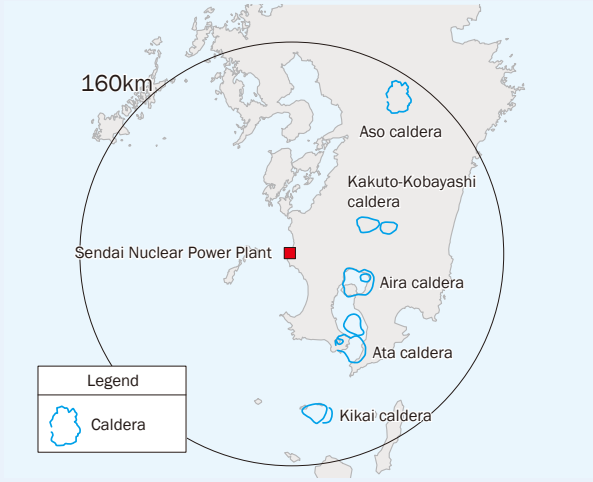
▼Barrier wall in seawater pump area



(3) Natural Phenomena, Volcanoes, Tornadoes, etc.

Principal content of new regulatory requirements	• Survey volcanic activity in the power station’s vicinity and evaluate the impact of volcanic phenomena • Design to ensure against the impact of volcanic activity during reactor operation and confirmation that the potential impact of volcanic activity is sufficiently small • Ensure the soundness of equipment crucial to safety against tornadoes and flying objects
Principal content of application for permission for a change in reactor installation license	• Evaluate that buildings and equipment necessary to safety will not be affected in the event of falling volcanic ash (depth of 15cm) • Evaluations that the potential impact of catastrophic eruptions from calderas is sufficiently small while reactor is operating (Monitoring for volcanic activity monitoring) • Erect a protective net outside equipment necessary for safety to protect against collision with flying objects in the event of a tornado with winds of 100m/s (Referencing the fact that the most severe tornado recorded to date in Japan had winds of 92m/s)

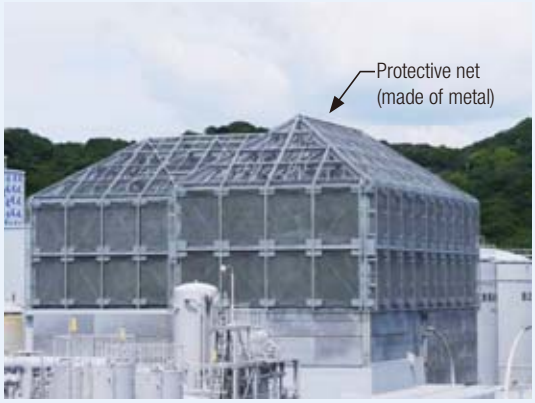
▼Locations of Calderas in Kyushu



(4) Fires, Flooding

Principal content of new regulatory requirements	• Strengthen and thoroughly enact fire protection measures • Implement measures to protect equipment crucial to safety from flooding
Principal content of application for permission for a change in reactor installation license	• Erect additional equipment, including automated fire-fighting equipment and fireproof walls • Provide reinforced piping and watertight doors to prevent water from flowing out in the event of burst tank or piping

▼Condensate tank tornado protection measure



2. Large-Scale Disaster Countermeasures

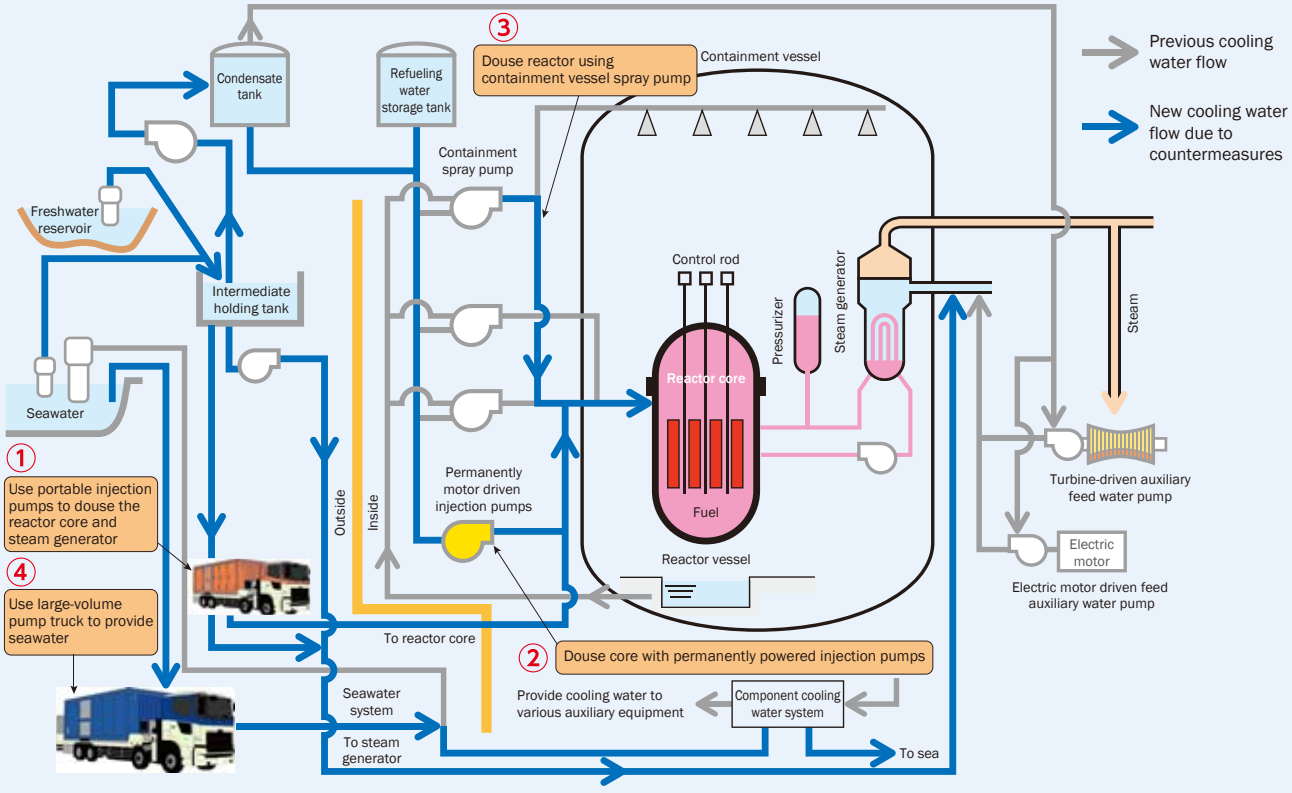
(1) Prevention of damage to reactor core

Principal content of new regulatory requirements	• Introduce measures to ensure against damage to reactor core even if safety measures fail
Principal content of application for permission for a change in reactor installation license	• Diversify power supply methods • Installation of large-scale air-cooled generator to provide for the event of damage to external power supplies and permanent emergency power supplies • Diversify reactor cooling methods • In addition to permanent pumps, add mobile pumps and other equipment (1) Use portable injection pumps (new) to douse reactor and steam generator (2) Douse reactor with permanently powered injection pumps (new) (3) Use the containment vessel spray pump (functional addition) to douse the reactor (4) Use large-volume pump truck (new) to supply seawater to component cooling water system

▼Mobile high-capacity generator

▼Large-volume pump truck

Prevention of Damage to Reactor Core



(2) Prevention of damage to containment vessels

Principal content of new regulatory requirements	• Introduce measures to ensure containment vessel is not damaged, even in the event of damage to the reactor core
Principal content of application for permission for a change in reactor installation license	• Diversification of containment vessel cooling methods (1) Containment spray vessel using permanently powered injection pumps (new) (2) Containment spray vessel using portable injection pumps (new) (3) Use large-volume pump truck (new) to supply seawater to containment vessel recirculation unit*1 • Measures to reduce hydrogen concentration • To prevent hydrogen explosions, enable reduction of hydrogen concentration if hydrogen escapes from the containment vessel (4) Static catalyst hydrogen recoupling device*2 (5) Install electrical hydrogen igniter*3

*1 Device to cool air inside the containment vessel through heat exchange with cooling water

*2 Device using a catalyst (platinum, palladium) to prompt the reaction of hydrogen and oxygen into water

*3 Device using an electrical heater to force combustion of hydrogen into water

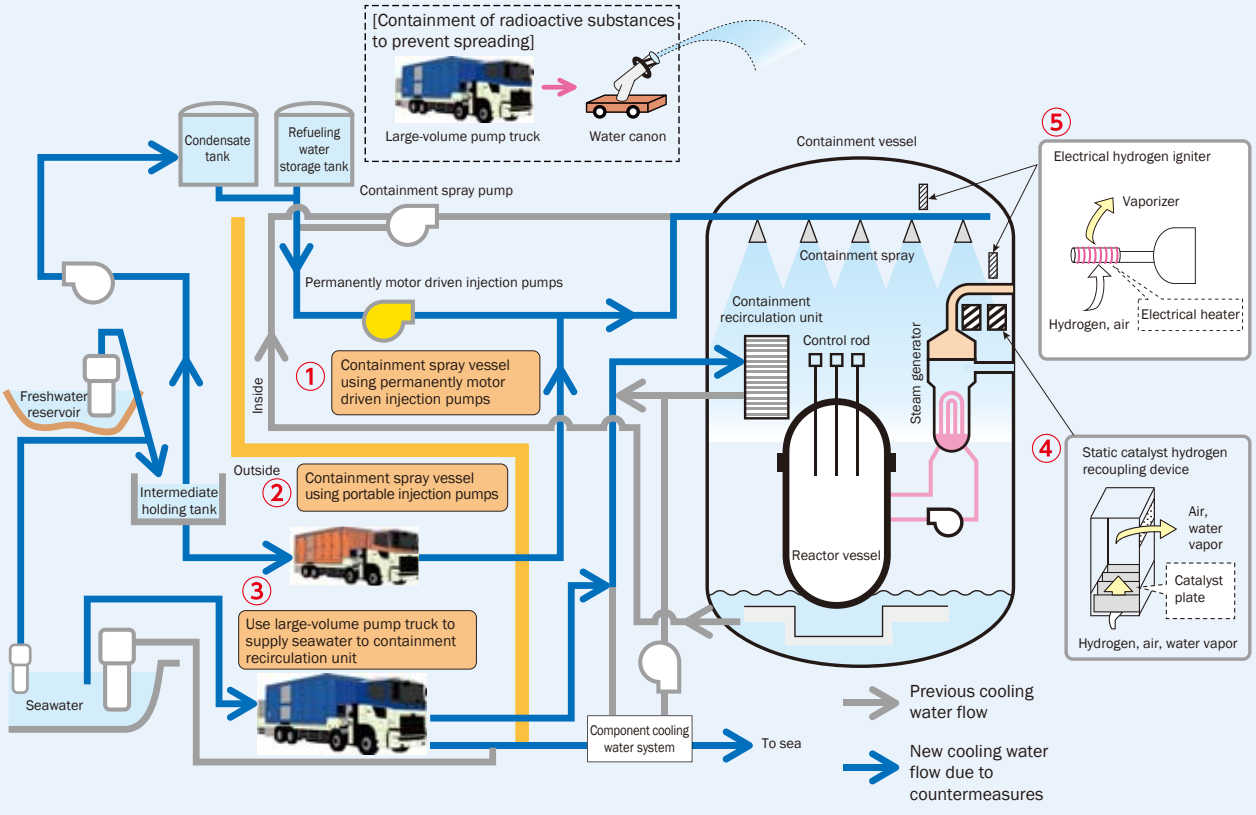
(3) Containment of radioactive substances to prevent spreading

Principal content of new regulatory requirements	• Introduce measures to control the spreading of radioactive substances outside the site even in the event of damage to the containment vessel
Principal content of application for permission for a change in reactor installation license	• Use water canon to spray damaged areas of the containment vessel, and erect a silt fence (in-sea curtain) to prevent spreading into the ocean

(4) Base equipment to handle severe accidents

Principal content of new regulatory requirements	• Establish emergency response posts as on-site command centers in the event of severe accidents
Principal content of application for permission for a change in reactor installation license	• Establish alternative emergency operations facility • Establish alternative emergency operations facility that satisfy new regulatory requirements for seismic resistance, communication equipment, etc.

Prevention of damage to containment vessels and containment of radioactive substances to prevent spreading



Securing Necessary Personnel for Large-Scale Disaster Countermeasures and Conducting Various Drills

At the Sendai Nuclear Power Plant, we have adopted a night-watch system to ensure a rapid response in the event of a severe accident, even if it should occur outside normal working hours, on a holiday or at night, by continuously maintaining an on-alert squad of 52 people. These 52 people take part in drills on a daily basis and manage their resources to form a rapid-response team in the event of a severe accident.

Severe Accident Drills at Nuclear Power Stations

Power supply drills (transporting power cables, etc.), cooling water provision drills (portable diesel, etc.), radioactive substance dispersion control drills, firefighting drills with dedicated fire-fighting groups


Transporting power cables


Setting up a portable diesel injection pump


Erecting a water canon


Drill assuming a forest fire near the site

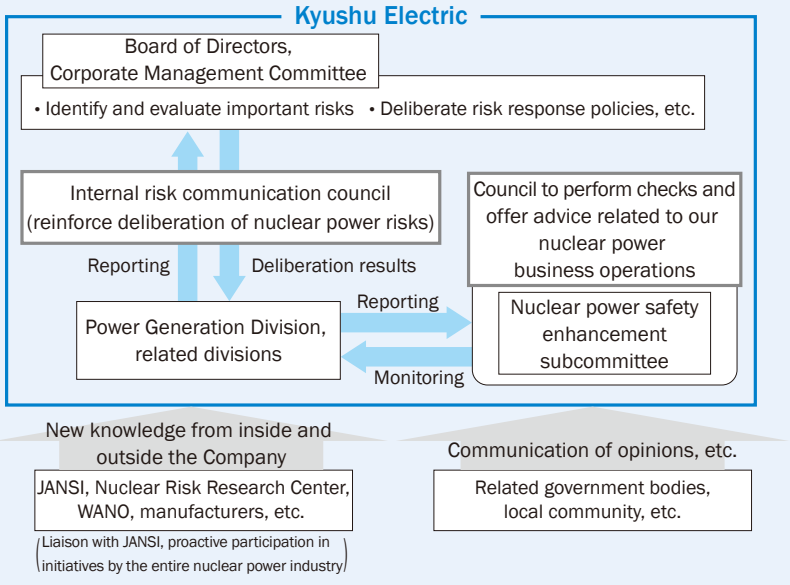
Reinforcing the Management of Nuclear Power Risks

Top management is taking a leadership role in addressing the risks of nuclear power. While promoting an understanding of these risks both within and outside the Company, we are working to identify the broad range of risk. We have established an internal risk communication council comprising all layers of management to deliberate risk from diverse perspectives and reinforce our risk management initiatives.

Making use of a council composed of outside experts to perform checks and offer advice related to our nuclear power business operations, we are undertaking efforts to enhance safety with respect to nuclear power's risks and conducting monitoring from a third-party perspective.

We have also established a caldera volcano response committee, chaired by the president. This committee, which receives third-party advice, oversees the management of risk with respect to caldera volcanos.

Organizations Reinforcing Nuclear Power Risk Management




Meeting of the council to perform checks and offer advice related to our nuclear power business operations

Japan Nuclear Safety Institute (JANSI)
To ensure ongoing efforts to address measures for enhancing the safety of nuclear power stations, this organization leads and supports operators and makes its judgments from an independent perspective unaffected by nuclear power facilities operators.

World Association of Nuclear Operators (WANO)
Fostering communication and friendly competition among nuclear power facilities operators, this organization strives to enhance the safety and reliability of nuclear power station operations.

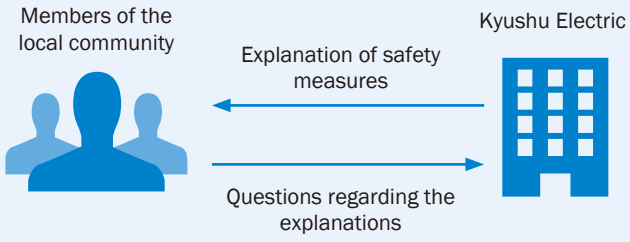
Enhancing Communications with Local Communities about Nuclear Power

We listen carefully to the opinions of local community members and encourage "risk communication," in which we share information about the risks related to nuclear power.

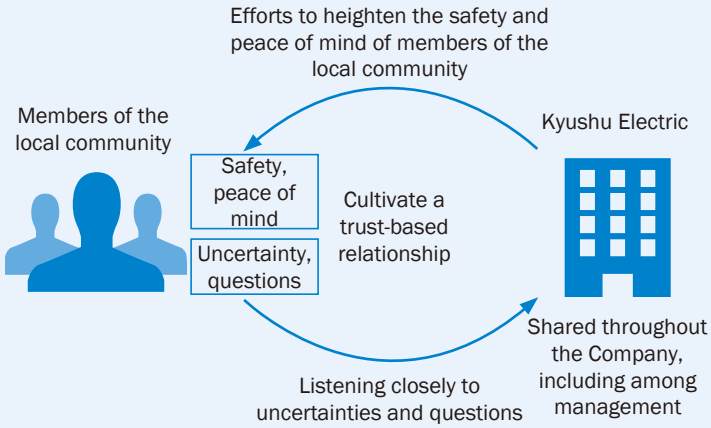
We reflect uncertainties and questions from the local community in our risk management and work to enhance community members' safety and peace of mind, cultivating a trust-based relationship.

(1) Recognizing the importance of communications, given that risks exist, we communicate thoroughly with employees and maintain ongoing communications with the members of the communities that house our nuclear power sites, thereby strengthening local organizations.
(2) Throughout our communication activities, we listen carefully to the concerns and questions raised by members of the local community.
(3) By sharing input from the local community throughout the Company, including with management, we endeavor to foster an awareness that our operations are safe and provide peace of mind.

In the Past: Efforts to Understand



From Here on out: Risk Communication



In July 2015, we established the Genkai Office as an ongoing organization to serve as a forum for communication activities with members of the local community.