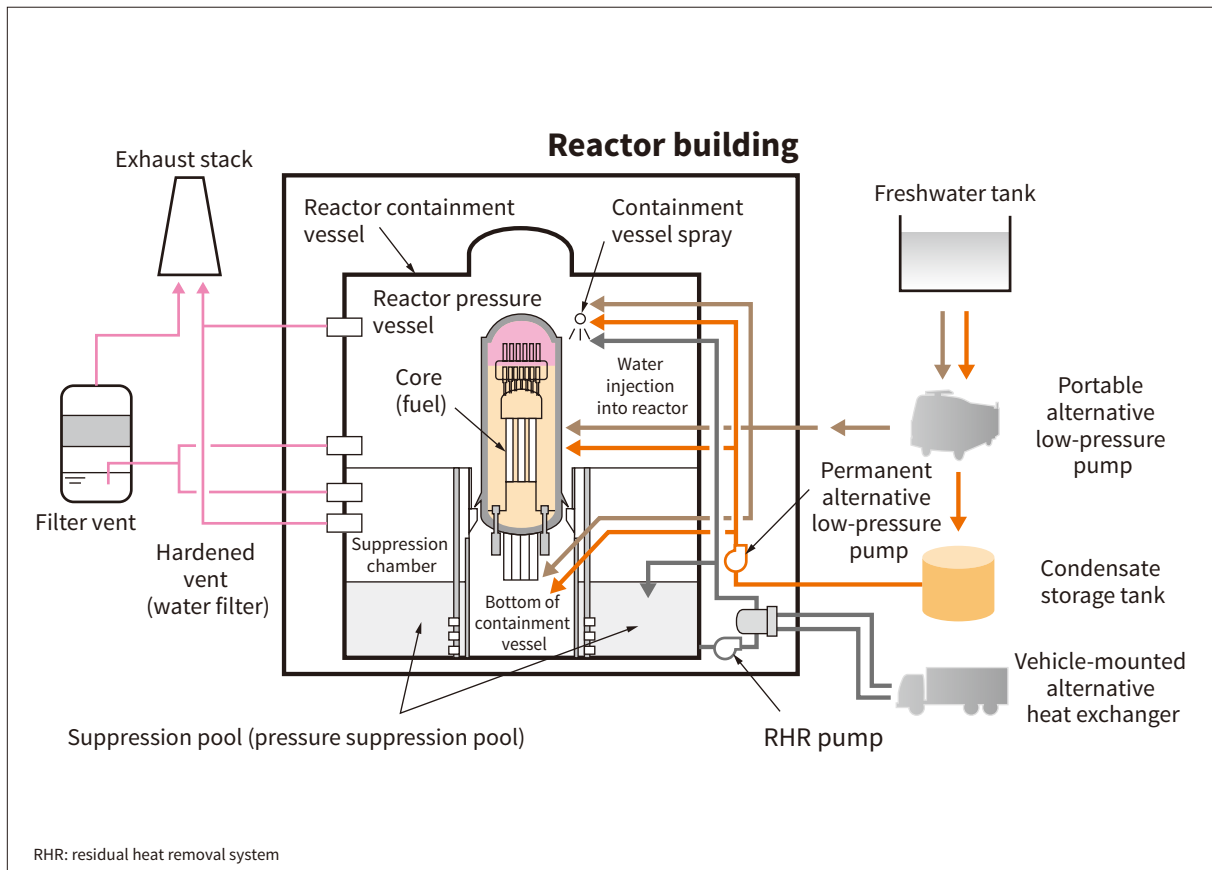


Nuclear Energy



1 Measures to prevent core or containment vessel damage in BWR plants

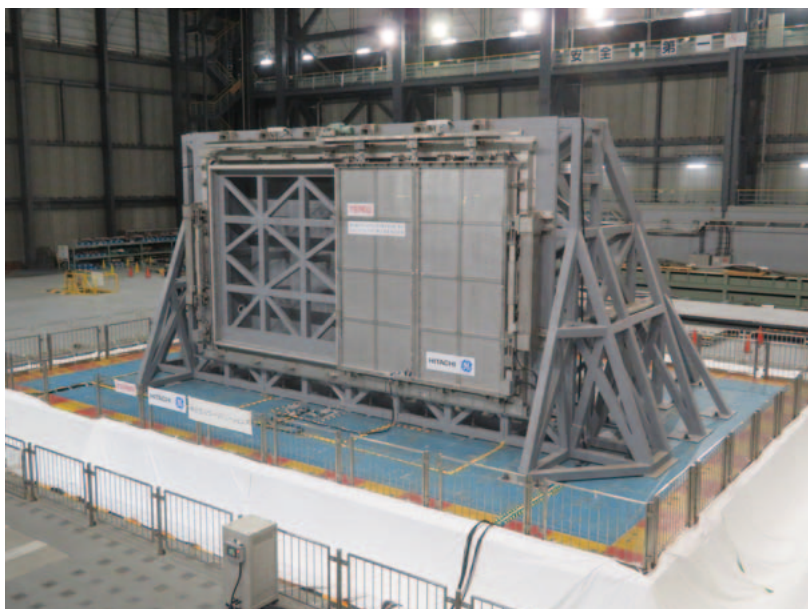
1 Design and Construction Authorization for Kashiwazaki-Kariwa Nuclear Power Plant Unit 7

Conformity assessments made under new regulatory standards apply criteria that reflect the lessons learned from the Fukushima Daiichi nuclear disaster when handling approval for installations (changes), applications for design and construction plan authorization, and safety standard reviews.

To ensure conformity with the new regulatory standards and further improve safety, Hitachi is rapidly working on a number of measures for a boiling water reactor (BWR) plant that is now in the review phase of the application for design and construction plan authorization. These efforts primarily consist of preparing for natural disasters by improving the seismic resistance of key facilities, etc., making filter vents and other equipment more

resistant to major accidents, and taking steps to combat terrorism such as preparing for aircraft collisions. The Hitachi Group has made a concerted effort to prepare for this broad spectrum of severe disasters, working on everything from new technology development to design and construction.

Japan's Nuclear Regulation Authority recently approved a revised application for design and construction plan authorization for Kashiwazaki-Kariwa Nuclear Power Plant Unit 7, which is owned by Tokyo Electric Power Company Holdings, Inc. The design and construction plan has now been authorized, and the final phase (operator inspection before use) is underway before conformity is verified by the Nuclear Regulation Authority. The Hitachi Group will continue to contribute to subsequent BWR plant conformity assessments and develop safety technologies to help increase the safety of nuclear power plants.



2 A blowout panel closure device (sliding type) undergoing vibration testing

Hitachi has responded by developing two different blowout panel closure devices designed to prevent the release of radioactive matter in severe environments caused by major earthquakes or other disasters. One of the devices is a large, 5-meter tall sliding electric door. Its seismic resistance far exceeds the magnitude of the Great East Japan Earthquake and its airtightness exceeds the high grade requirement of the Japanese Industrial Standards. The other device is a small, 1.5-meter tall swinging electric door. It has high seismic resistance and air-tightness.

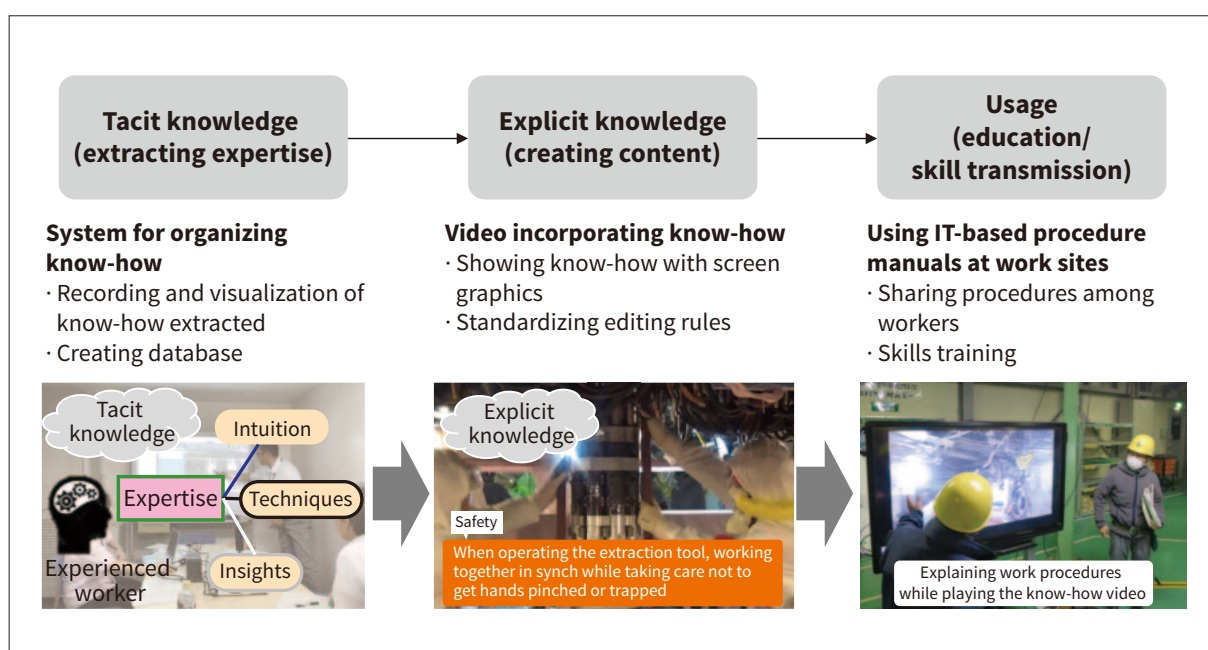
It is also designed for severe environments, able to withstand radiation during disasters and high-temperature steam environments of over 170°C. The use of these devices has enabled upgrading to nuclear power plants with enhanced safety performance.

2 Development of Blowout Panel Closing Devices

To maintain reactor facility safety features, blowout panels have always been installed in nuclear power plants for use as a pressure release mechanism that reduces the indoor pressure and temperature during a disaster. When regulatory authorities began demanding a reduction in the post-disaster exposure risk for operators after the Great East Japan Earthquake, facilities started improving safety by immediately closing the panels as soon as the pressure and temperature dropped after the panels were opened.

3 Improving the Safety and Economy of Nuclear Power Plants after Restarting

Nuclear power plays an important role for improving environmental value as a low-carbon power source. It will need to be made more economical once high safety is assured. Hitachi-GE Nuclear Energy, Ltd. provides solutions driven by digital technologies as an initiative



3 Features of digital based procedure manuals function



4 Checking state of SFP cover placement device (left), and SFP cover when air mortar is fully charged (right)

to improve the amount of power generation (availability factor) while maintaining the safety and reliability of power plant equipment. In order to shorten the period of periodic inspections and improve work productivity, the company will digitalize on-site work procedures to pass on technology and improve its quality.

These efforts are referring to use cases of digitalization experiences in other industries, in addition to the knowledge of nuclear industry expertise in Japan and overseas.

Specifically, the know-how of skilled workers is accumulated as digital data to provide work instructions for novice workers. Furthermore, the digitalized know-how data is used for skills education and for checking procedures before work starts.

In addition, models of plant dynamics and aging degradation will be constructed and applied to equipment maintenance utilizing plant operation information.

Through these activities, the company will promote digital innovation with customers and contribute to improving the performance of nuclear power plants.

(Hitachi-GE Nuclear Energy, Ltd.)

fuel pool (SFP) is scheduled for removal. As part of this rubble removal work, an SFP cover is placed on the SFP to reduce the risk of adverse effects on the soundness of the fuel assemblies from roof steel frames, small rubble, and other objects falling into the SFP.

To prevent the SFP cover from interfering with the rubble near the SFP, the SFP cover was placed on the SFP remotely in rolled-up form and then inflated with air to expand it to a size large enough to cover the fuel assemblies. The SFP cover was constructed to provide the required buoyancy when inflated with an air mortar.

A series of improvements enabled Hitachi-GE Nuclear Energy to devise the structure of the SFP cover along with the methods used for its delivery and placement. These improvements were the result of elemental testing that began in 2013, along with detailed field studies, mockup testing, and remote operation training.

To advance decommissioning projects over a long term, the company plans to continuously develop products and technologies tailored to customer need based on accumulated technologies.

(Hitachi-GE Nuclear Energy, Ltd.)

4 Installation Completion of Spent Fuel Pool Cover for Fukushima Daiichi Nuclear Power Station Unit 1

For Fukushima Daiichi Nuclear Power Station Unit 1, rubble such as the roof steel frames above the spent