NUCLEAR SAFETY REFORM PLAN

FY2018Q3 Progress Report

Tokyo Electric Power Company Holdings, Inc.
February 20, 2019

TEPCO

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Foreword

I would like to offer my deepest apologies for the inconvenience and concern that the Fukushima Nuclear Accident, and subsequent troubles, have caused the siting community and society as a whole. We will continue to work as one to provide compensation quickly and smoothly, accelerate recovery efforts in Fukushima, move steadily forward with decommissioning, and ensure that nuclear safety is our first priority.

On March 29, 2013, TEPCO announced its Reassessment of the Fukushima Nuclear Accident and Nuclear Safety Reform Plan to implement nuclear safety reforms. Since then we have provided quarterly updates on the progress of these reforms. The following is a report on the progress that we have made during the third quarter of FY2018[1](August~December, 2018)

During this quarter a rash of incidents stemming from a lack of technological capability and insufficient ability to promote dialogue, such as the response during the cable service tunnel fire at the Kashiwazaki-Kariwa Nuclear Power Station, the nonconformances with the Unit 3 fuel handling machine, and insufficient explanations of treated water analysis results from Fukushima Daiichi, etc., have occurred. Although individual countermeasures have been implemented for each of these incidents, these types of occurrences are not being prevented. Therefore, in addition to making us reflect on our lack of ability to promote dialogue with awareness that disseminating information that can be understood [is important], these occurrences have also made us painfully aware once again of our lack of technological capability to examine the quality of current equipment and work processes, and make improvements on our own. So, we have commenced initiatives to make improvements. We will continue the process of reflecting upon our own actions and making improvements in order to improve safety awareness, our ability to promote dialogue, and technological capability without becoming complacent with the current state of affairs.

1 All dates hereinafter refer to 2018 unless otherwise noted.
To which of the six Nuclear Safety Reform Plan measures the initiative pertains is noted in brackets【 】
An explanation of abbreviations is on the last page of this report

1 PROGRESS WITH SAFETY MEASURES AT NUCLEAR POWER STATIONS

1.1 PROGRESS OF REACTOR DECOMMISSIONING

At Fukushima Daiichi, we are moving steadily and safely forward with decommissioning in accordance with the TEPCO Holdings, Inc. Mid-and-Long-Term Roadmap Towards Decommissioning of Fukushima Daiichi Nuclear Power Station Units 1 to 4 (September 26 revision).

(1) Fuel Debris Removal

◆ Unit 2

During the internal investigation of the primary containment vessel conducted in January 2018, it was confirmed that there is no significant deformation/damage to existing facilities and that deposits cover the entire floor of the pedestal. During the fourth quarter we plan to implement another investigation using the investigation unit from the prior investigation that will be modified to include a finger mechanism which will be used to touch the deposits. As with prior investigations, measures shall be implemented to prevent the gases from inside the primary containment vessel from leaking into the external environment and the investigation shall be performed while monitoring dust concentrations so as to prevent any impact on the surrounding environment in the off chance that a leak does occur


Investigation Unit (finger mechanism)

(2) Removing fuel from the spent fuel pools

◆ Unit 1

In order to secure access route to the spent fuel pool, we started removing X-braces from the reactor building on September 19 as part of preparations to protect the spent fuel pool. The removal of braces was completed on the west side on September 25, on the south side on November 21, and on the east side on December 20. Going forward we shall secure access route from the west work floor, and cover openings in the vicinity (equipment hatches) to protect these areas from falling pieces of small rubble, etc. after which small pieces of rubble in the vicinity of the spent fuel pools will be removed from each of the work floors on the east, south, and west sides. After all of this is completed, we shall begin work to protect the spent fuel pools from rubble. While continuing to strictly assess and manage risks, and move forward with work tasks, we plan to begin fuel removal in FY2023 while thoroughly implementing safety measures, such as measures to prevent the dispersion of radioactive substances.

Left: After removal of X-brace on south side

Right: Opening (equipment hatch)

◆ Unit 2

At Unit 2 we plan to perform an investigation of all parts of the operating floor in order to propose a workplan for dismantling the top of the reactor building. Work to relocate or remove objects that remained on the operating floor, which needed to be performed in advance of the investigation, was completed on November 6. The operating floor was then photographed with a gamma camera in order to examine the distribution of contamination and check for hotspots. Measurements of air dose rates and surface dose rates in low areas began on November 29.

Operating floor (after clean-up)

Taking pictures with gamma camera

◆ Unit 3

Multiple nonconformances have occurred since test operation of the Unit 3 fuel handling machine in March and it is assumed that the common cause is problems with quality management at the manufacturer and TEPCO. In order to identify any other hidden nonconformances, temporary repairs of all nonconformances were completed on September 27 and safety inspections (operation checks, equipment inspections) will be performed before the end of the year. Quality management will also be examined. During safety inspections 14 nonconformances were identified and suitable countermeasures were implemented during January 2019. During the quality management check an assessment of the reliability of all site products (79 pieces of equipment) was implemented based on ordering specifications and records, etc., and additional safety inspections were performed for pieces of equipment for which records could not be examined, and it was confirmed that reliability is adequate. In preparation for the commencement of fuel removal, nonconformances will be handled, function checks will be performed after repairs have been made, and preparations, such as fuel removal training, etc., will move steadily forward.

Fuel Handling Machine

Crane

(3) Contaminated water countermeasures

Based on the three basic policies of "removing contamination sources," "isolating water from contamination sources," and "preventing the leakage of contaminated water," TEPCO continues to implement measures to prevent the outflow of contaminated water into the power station port, and counter the problem of contaminated water leaking from tanks.

◆ Purifying Sr-treated water inside flange tanks

At Fukushima Daiichi cesium adsorption equipment has been used to treat contaminated water in order to remove cesium and strontium (Sr), which account for most of the radioactive substances contained in the contaminated water, and some of the Sr-treated water has been stored in flanged tanks, which pose a high risk of leaks. The advanced liquid processing system (ALPS) has been used to remove most of the radioactive substances from the Sr-treated water, with the exception of tritium, and as of November 17 all of the Sr-treated water stored in flanged tanks had been purified. Around March 2019, ALPS-treated water that is being stored in flanged tanks shall be moved to welded tanks in order to further reduce the risk of leakage.

(4) Preparations to dismantle the Unit 1/2 exhaust stack

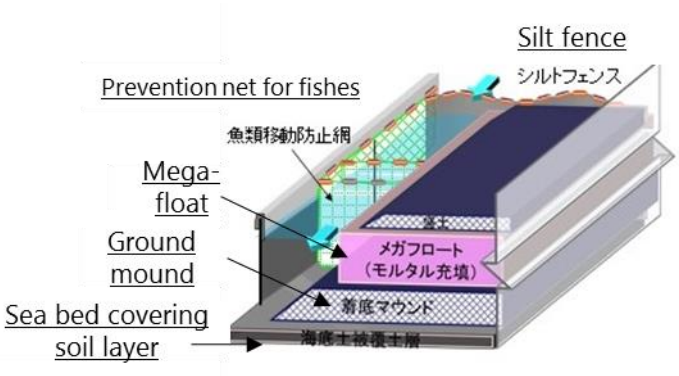
In order to ensure the seismic resistance tolerance of the Unit 1/2 exhaust stack, the top of the steel frame that supports the stack, which is damaged, will be dismantled using remotely operated equipment. In order to ensure that the dismantling work goes smoothly, a mockup of the major parts of the exhaust stack that is approximately 18m high has been built off-site in order to examine dismantling procedures. During the examination of procedures, which was completed on November 12, the performance of remotely operated equipment used on the exhaust stack mockup was examined along with work procedures that simulate actual dismantling work and work plan details, such as the amount of time that the work will take. Results have shown that there should be no large hindrances to the dismantling plan, so preparations to dismantle the stack began at Fukushima Daiichi in December.

Dismantling the main pillar

Cutting around the circumference of the stack

(5) Measures to reduce tsunami-related risks, such as the mega-float

The mega-float used to temporarily store accumulated water from the Unit 5/6 buildings, which resulted from the disaster, has the potential to become flotsam that could damage surrounding facilities in the event of a tsunami. In order to quickly eliminate this risk, offshore construction began on November 12 to anchor the mega-float inside the port and utilize it as shore protection and a wharf. During the construction period we shall devote all energy to environmental protection measures and continually monitor the environment inside the port as we move forward with this project while prioritizing safety.



Concept diagram of mega-float anchoring

Open water construction

(6) International Atomic Energy Agency (IAEA) review mission

An inspection team of experts from IAEA visited Fukushima Daiichi from November 5th through the 13th in order to review progress with decommissioning. In the overview of the inspection report received we were commended for "making a successful transition from a state of emergency to a stable state," and the "numerous improvements that could be seen since the last mission." The report also included 17 more commendations and 21 pieces of advice pertaining to contaminated water, spent fuel/debris removal, waste, and communication. The final report was received at the end of January 2019.

Field tour

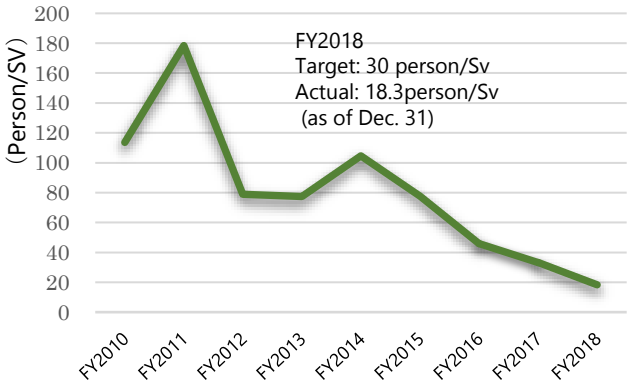
Opinion exchange

(7) Initiatives Aimed at Reducing Exposure Doses

In accordance with the revised Mid-to Long-Term Roadmap, optimal countermeasures shall be implemented for radioactive substances that pose risks after prioritizing these substances based upon current conditions. At Fukushima Daiichi, we are striving to reduce exposure doses by predicting work-related exposure doses prior to commencing any task and determining whether or not the task can be implemented upon assessing the increases or decreases in risk based upon this approach.

During the second quarter, we conducted an investigation of the area around the opening in the Unit 2 reactor building that entailed using a remote monitoring system to measure radiation levels and take photographs of objects that remain in the vicinity, and engaged in efforts to reduce exposure during the relocation and cleanup of items remaining on the reactor building operating floor. During the third quarter use of this system commenced during work to remove objects that interfere with investigations of the first floor of the reactor building. Since we have been able to reduce exposure dose during work in the high-dose environment that exists at Unit 2 by approximately the same amount (approximately 10%) as during work at Unit 3, we plan to add more remote monitoring systems and proactively leverage them during upcoming work in high-dose environments, such as inside and around the reactor buildings.

Remote monitoring system



Trends in accumulated dose rate by year

1.2 PROGRESS OF SAFETY MEASURES AT KASHIWAZAKI-KARIWA

(1) Progress with safety measures

On December 27, 2017, permission to modify the reactor installation permits for Kashiwazaki-Kariwa Units 6 and 7 was received from the Nuclear Regulation Authority (NRA). As a result, a basic design plan has been established and in accordance with this plan, detailed designs for various pieces of equipment as well as safety measures are being implemented at mainly Unit 6 and Unit 7 by leveraging the experience and lessons learned from the Fukushima nuclear accident.

＜Progress with Safety Measure Renovations＞

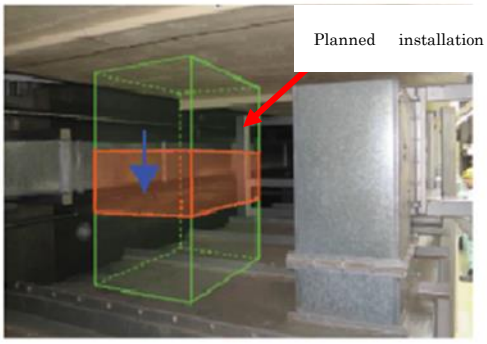
Safety Measures (※: Measures independently implemented by TEPCO		Unit 6	Unit 7
Preparations for tsunami and internal inundation	Tidal wall (seawall) construction	Completed	
	Installation of tidal walls for buildings (including flood barrier panels)	No openings below 15m above sea level	
	Installation of water-tight doors in reactor building, etc.	Completed	Completed
	Installation of tidal walls at switchyards※	Completed	
	Installation of tsunami monitoring cameras	Completed	
	Improving the reliability of flooding prevention measures (interior flooding measures)	Underway	Underway
	Dyke construction	Completed	Completed
	Installation of permanent bilge pumps in rooms housing important equipment	Completed	Completed
Preparations for power loss [Augmenting power sources]	Additional deployment of air-cooled gas turbine power supply cars	Underway	Underway
	Installation of emergency high voltage distribution panels	Completed	
	Laying of permanent cables from emergency high-voltage distribution panels to reactor buildings	Completed	Completed
	Preparation of substitute DC power sources (batteries, etc.)	Completed	Completed
	Reinforcement of transmission tower foundation※ and strengthening of the seismic resistance of switchyard equipment※	Completed	
Preparing for damage to the reactor core or spent fuel [Augmenting heat removal and cooling functions]	Preparation of large volume water pump trucks and installation of substitute seawater heat exchanger equipment	Completed	Completed
	Installation of high-pressure substitute for water injection systems	Underway	Underway
	Building of water sources (reservoirs)	Completed	
	Enhancement of the seismic resistance of pure water tanks on the Oominato side※	Completed	
Preparing for damage to the primary containment vessel or the reactor building [Measures to prevent damage to the PCV and hydrogen explosions]	Installation of filtered venting equipment (aboveground)	Underway	Underway
	Installation of filtered venting equipment (below ground)	Underway	Underway
	Installation of substitute circulation cooling system	Underway	Underway
	Installation of equipment for keeping the top of the PCV filled with water※	Completed	Completed
	Installation of H2 control and H2 detection equipment in reactor buildings	Completed	Completed
	Installation of top vents in reactor buildings※	Completed	Completed
	Installation of corium shields	Completed	Completed

Preventing the dispersion of radioactive materials	Deployment of large volume water dispersion equipment	Completed	
Preparing for fires [Countermeasures for external and internal fires]	Construction of fire belts	Underway	
	Installation of fire detectors in parking lots on high ground	Completed	
	Installation of fire detectors in buildings	Underway	Underway
	Installation of fixed firefighting systems	Underway	Underway
	Installation of cable wrappings	Underway	Underway
	Construction of fire-resistant barriers	Underway	Underway
Addressing external hazards	Countermeasures for building openings	Underway	Underway
	Removal of objects that could turn into flying debris as a result of a tornado	Underway	Underway
	Installation of spare bug filter for ventilation and air conditioning systems	Completed	Completed
Improvements to Main Control Room environments	Measures to reduce operator exposure in the event of a severe accident	Underway	
Strengthening emergency response	Construction and reinforcement of multiple access routes	Underway	
	Enhancement of communications equipment (installation of satellite phones, etc.)	Completed	
	Enhancement of environment monitoring equipment/additional deployment of monitoring cars	Completed	
	Construction of emergency materials and equipment warehouse on high ground※	Completed	
	Construction of Emergency Response Center in Unit 5	Underway	
Strengthening seismic resistance (including ground improvement measures to prevent liquefaction)	Seismic resistance assessment/renovations of outside equipment and piping	Underway	Underway
	Seismic resistance assessment/renovations of indoor equipment and piping	Underway	

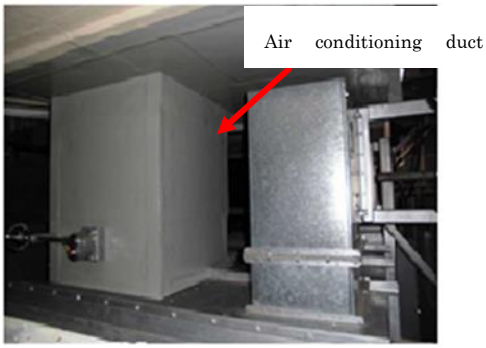
Safety measure progress that has been made during the third quarter is as follows:

◆ Strengthening emergency response (Unit 5 Emergency Response Center construction)

We are moving diligently forward with the construction of the Unit 5 Emergency Response Center in order to secure a space that can accommodate personnel that would give required instruction to handle a serious accident. The removal of objects hindering this construction, such as the process computer, has been completed and we've also completed renovations on air conditioning ducts which are needed to adjust air flow levels in conjunction with construction of the Emergency Response Center (September 2018). We are currently engaged in detailed design pertaining to the hermetic attributes of the Emergency Response Center.



Prior to air conditioning duct installation



After air conditioning duct installation

(2) Submission of reactor installation modification permit application and workplan approval application

The Kashiwazaki-Kariwa Nuclear Power Station Unit 6 and Unit 7 reactor installation modification permit application was submitted to the NRA on December 12. Changes have been made to the reactor installation modification permit application in conjunction with design changes made to improve safety and satisfy regulatory revisions made after the New Regulatory Requirements were issued.

Site Superintendent Press Conference

Furthermore, on December 13, an amendment to the Unit 7 workplan approval application was submitted to the NRA. Amendments to the work plan approval application shall be submitted in succession for those issues for which detailed design has been completed. This first amendment that was submitted includes basic design plans and equipment specifications, and also reflects assessment plans pertaining to strength and seismic resistance. An overview of these changes was given to local media outlets during site superintendent press conferences held in November and December. We will continue our initiatives to implement voluntary safety improvements. Furthermore, the completion date for Unit 7 renovations noted on this amendment is December 2020. This completion date refers to the date of completion of fieldwork and pre-use inspections that shall be performed prior to startup of the reactors and therefore may change in conjunction with the progress of future renovations. Also, the post-reactor startup pre-use inspection schedule noted on the amendment has been given as information required in accordance with authorization procedures based upon the experiences of other utilities and does not indicate a date for the actual

recommencement of operation.

The consent of the local communities is one of the largest preconditions for the recommencement of operation and TEPCO will continue to cooperate to the best of its ability with the three investigations currently being conducted by Niigata Prefecture.

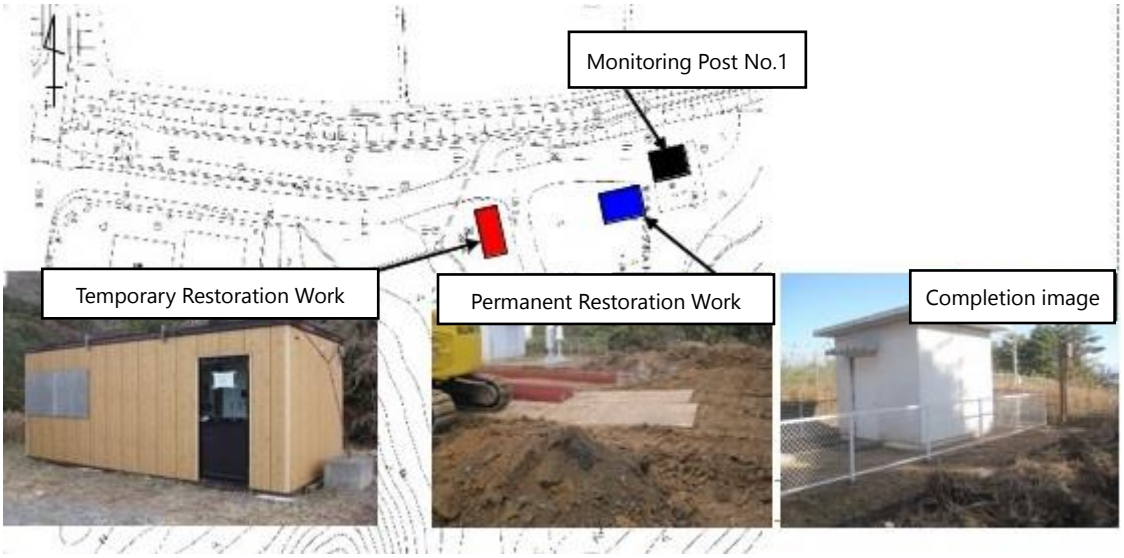
(3) Handling nuclear regulatory inspections (New Inspection System)

Nuclear regulatory inspections (New Inspection System) shall go into effect in April 2020. In light of this fact, trial implementation of nuclear regulatory inspections began at the power stations of each utility in October 2018. The basic objective of this system is to, "promote continuous utility-instigated safety improvements," and inspectors shall assess the activities of utilities by examining company records and performing field inspections (free access). During trial implementation the individual inspection guides to be used during the inspection were checked and free access, which is the core of this system, was examined. Also, at Kashiwazaki-Kariwa trial inspections using the Maintenance Management and Implementation Management inspection guides was conducted from October 16~19. Prior to trial implementation activities were held in advance to deepen understanding by TEPCO and contractor personnel handling the inspections of the details of the system and as a result issues that were pointed out by inspectors during trial implementation were taken care of without delay. Going forward we shall further develop tools for leveraging risk information, such as corrective action programs (CAP) and configuration management (CM) in order to improve nuclear safety.

1.3 PROGRESS OF SAFETY MEASURES AT FUKUSHIMA DAINI

(1) Permanent repairs on dust monitors in the Kegaya Region

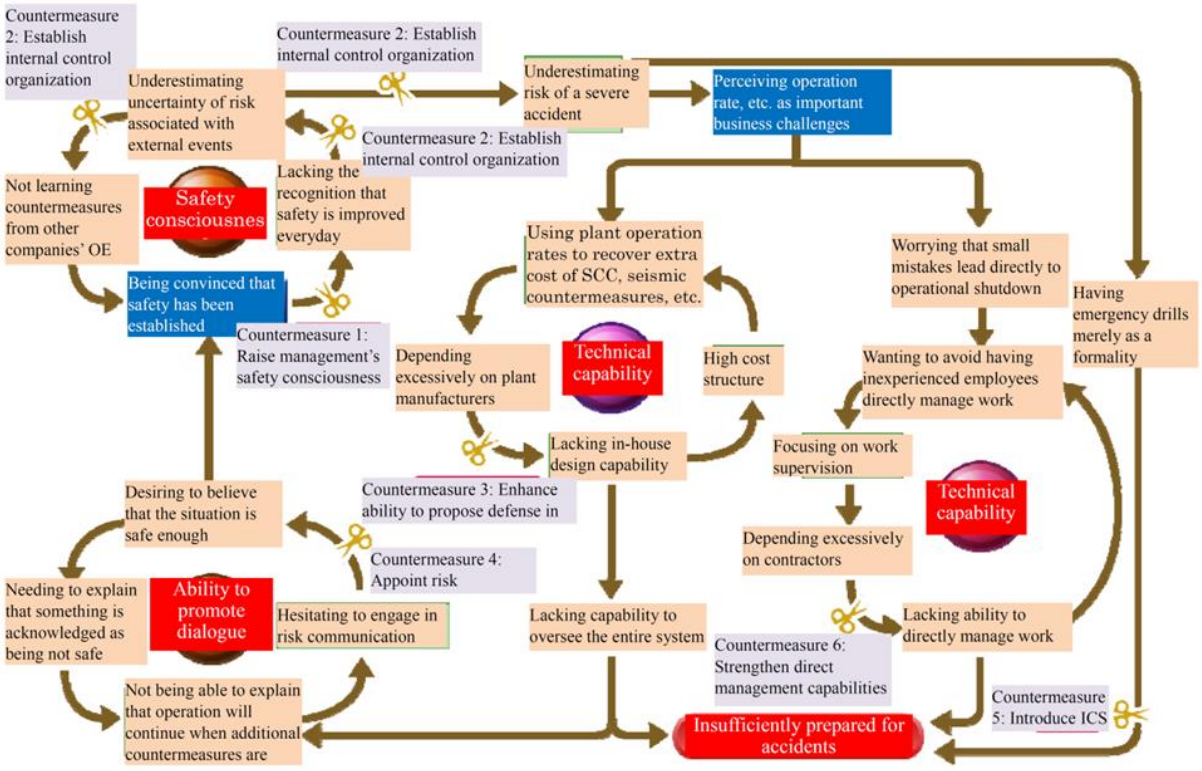
On March 11, 2011, dust monitor facilities in the Kegaya Region of Tomioka Village were swept away by the Great East Japan Earthquake and Tsunami some measurements have been taken near the No. 1 monitoring post as a temporary measure. In order to make permanent repairs, a workplan was submitted to the NRA and construction began in November 2018. This permanent facility will be completed in March 2019 and put into use.



Construction overview

2 THE PROGRESS STATUS OF THE NUCLEAR SAFETY REFORM PLAN

In addition to the six measures for stopping the "negative spiral" that has exasperated structural issues faced by the Nuclear Power Division implemented based upon the Nuclear Safety Reform Plan announced in March 2013, TEPCO is engaged in initiatives to strengthen governance and develop internal communication after these areas were identified as needing further improvement.



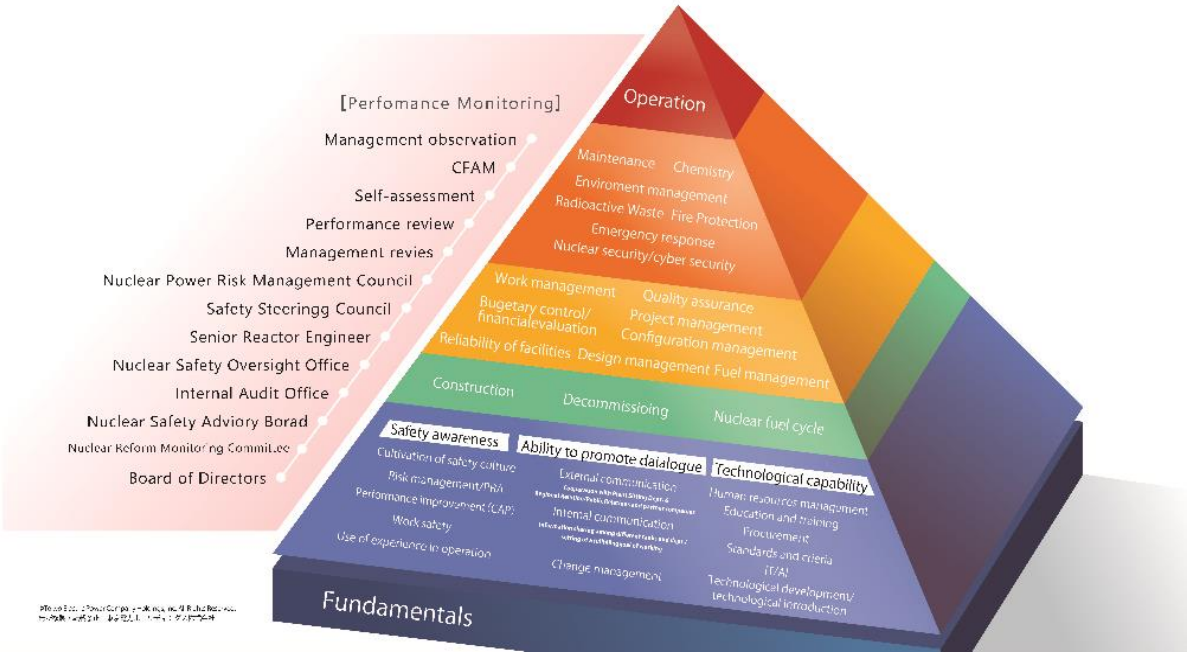
Furthermore, employees engage in duties based upon the Nuclear Power Division Management Model that was created (June 2017) as part of initiatives to strengthen governance. The Nuclear Safety Reform Plan Progress Report gives updates on "Better Aligning the Vectors of the Organization (Strengthening Governance)" and on "safety awareness," "the ability to promote dialogue," and "technological capability," which are the main values of the Management Model.

Vision: Keep the Fukushima Nuclear Accident firmly in mind; we should be safer today than we were yesterday, and safer tomorrow than today; we call for nuclear power plant operators that keep creating unparalleled safety.

Mission: To achieve nuclear power generation with safety and efficiency that meet the highest international standards.

Values: Safety awareness, Ability to promote dialogue, Technological capability.

Basic policy to achieve goals: Constant reforms and improvements, Promotion of work under direct management by seeing, hearing and feeling



2.1 Activities to Better Align the Vectors of All Divisions

2.1.1 Strengthening Governance

(1) Development and permeation of the management model

A management model was created to enable all employees in the Nuclear Power & Plant Siting Division to engage in their duties with a common understanding of the objectives of the division and each other's roles (June 2017). During FY2018 we shall engage in activities that aim for excellence upon creating a business plan based on the Management Model.

On December 3, a progress report was given on key issues for FY2018 to managers from Headquarters, each power station, and the Niigata Headquarters so as to deepen the understanding and strengthen the involvement of employees thereby ensuring that the work plans formulated upon the Management Model are carried out without fail. An explanation of key issue proposals for FY2019 that are based upon the business environment surrounding TEPCO was also given. According to a survey that was distributed after the briefing ended, approximately 90% of participants were satisfied with the briefing and some commented that, "it was good to be able to hear directly from nuclear leaders," and that, "I was able to understand the environment surrounding the Nuclear Power Division and received some clarity about what we should be aiming for." At current time each department is formulating work plans for FY2019 based upon the FY2019 key issue proposals.


Briefing on the progress with FY2018 key issues and explanation of key issues for FY2019

(2) Improvement activities by CFAM/SFAM

CFAMs and SFAMs have been assigned to each field of the Management Model to ascertain excellence achieved in other countries, identify key issues to be resolved, and formulate and implement improvements (April 2015).

During the third quarter, CFAM in each functional field started coordinating with the line (power station/headquarters) to analyze gaps in preparation to formulate work plans for the next fiscal year (fourth quarter). While analyzing gaps, the team also deliberated whether or not to continue key initiatives from this fiscal year (strengthening risk management, permeating the concept of operational focus, CAP improvements, human error prevention), which will be discussed later in this report, and also if there were any other initiatives that should be added. At current time, all key initiatives from this fiscal year will be continued next fiscal year, and improvements to contractor management shall be added as a new initiative.

Furthermore, CFAM have formulated implementation plans for key self-assessments of the process of having individuals identify gaps between current performance and the world's highest levels of performance on their own, and are proactively making improvements. CFAM are now in the process of formulating/implementing action plans based on plan progress management and the results of those self-assessments. By continuing these key self-assessments, reforms and improvements will proceed quickly without having to rely on third-party assessments. Please refer to 3. Progress Assessment and 3.2 Assessment by the Nuclear Power Division (1) Key Self-Assessments for details on the results of key self-assessments implemented during the third quarter.

Also, during the first and second quarters, CFAM and the line coordinated to look back upon how the Fundamentals, which dictate rules for engaging in daily duties that all personnel engaged in work in the Nuclear Power Division should know, have been leveraged and made revisions that offer more detail. At current time the revised version is being distributed to employees and briefings on the revisions are being held in accordance with the communication plan formulated through change management. A version of fundamentals for contractors that stipulates which fundamentals should be employed by contractors has also been formulated and is being distributed in conjunction with briefings on the material.

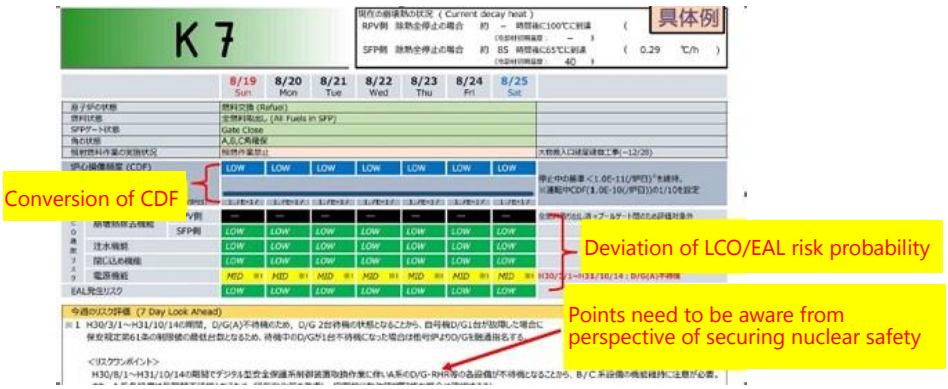
Revised Fundamentals booklet and briefing at power station

And, the entire Division is focusing on the four issues that will be discussed below based upon third-party assessments and self-assessments conducted during last fiscal year. The status of these initiatives is as follows.

◆ Enhancing risk management

In order to further improve nuclear safety, activities (pre-work TBM-KY, protection of important equipment by operators, etc.) for each functional field, such as operations, maintenance, and engineering, etc., are being improved to ensure that foreseen risks for the entire Nuclear Power & Plant Siting Division, including power stations, are measured by the same ruler. In particular, an action plan to enable risk management/PRA CFAM to coordinate with related CFAM/SFAM and systematically identify, assess, handle, and monitor risks, has been formulated, executed and progress is being monitored.

At Kashiwazaki-Kariwa and Fukushima Daini, in addition to initiatives to assess risks from the perspective of nuclear safety and share these weekly risks with power station executives during site meetings, etc., nuclear safety/radiological safety risk assessments are being performed for each task and high-risk tasks are explained by the head of groups implementing the work and discussed with power station executives. Also, initiatives are underway to convey nuclear safety/work safety-related risks to all those involved in a task prior to commencing work.



Example of sharing of weekly risk assessment results at power stations

◆ Permeation of operational focus

In order to support operations, which is the most important functional field of the entire organization, the concept of “operational focus” is being spread while strengthening existing mechanisms to ensure that the requirements of the Operations Division are considered when

making operations-related decisions and when setting work priorities. Since it is expected that workers in the operations field will lead by example and become role models for other functional fields, operations CFAM have worked together with education and training departments to develop educational materials that will help the idea of operational focus to permeate and education has begun. Furthermore, operators are providing training on human performance tools so that the actions and behaviors of operators become the model for power station personnel. By refining these skills through daily use and retrospection, human errors have decreased and operator performance is improving.

An example of activities outside of the operations field is the commencement of training on operational focus for new employees. The results of a questionnaire on the degree to which operational focus is understood and has permeated through the organization showed that permeation of this concept amongst office workers is insufficient, so lectures on operational focus by power station executives and CFAM are being held again. Items related to operational focus will also be added to the fundamentals in order to accelerate the permeation of operational focus amongst all workers through daily use and retrospection.

◆ Improving corrective action programs (CAP)

We aim to make efficient and effective improvements by using CAP to completely manage not only nonconformance and OE information, but also information useful for improving performance that can contribute to nuclear safety (such as management observation (MO) results, benchmarking results, third-party assessment results, near-miss information, etc.) and formulate even more fundamental countermeasures. Attempts were made in the operations and maintenance fields to analyze information inputted into CAP and make corrections after identifying weaknesses, and during the third quarter this process was applied to other fields as well. Furthermore, when the importance level of nonconformance information is being determined, in addition to nonconformance management, an attempt has been made at Kashiwazaki-Kariwa to classify this information while focusing on nuclear safety. Through these efforts we aim to further promote improvements to nuclear safety.

◆ Human Error Prevention

By analyzing the causes of human error and implementing company-wide countermeasures we have been able to minimize error and improve human performance thereby leading to improvements in safety. In the maintenance field training on human error prevention tools is being provided for contractor work foreman. During the third quarter plans to expand education on human error prevention, etc., to the entire Nuclear Power Division and contractors were deliberated further.

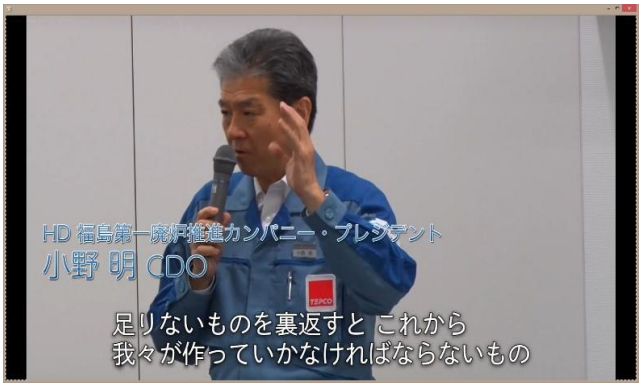
(3) Permeation of the Decommissioning Promotion Strategy

The Fukushima Daiichi Decontamination & Decommissioning (D&D) Engineering Company (FDEC) is carrying out its responsibilities based on the Decommissioning Promotion Strategy (initial version issued in September 2016) that stipulates the general direction and basic policies needed to move quickly forward with decommissioning in a safe and steady manner. Like the Management Model in the Nuclear Power & Plant Siting Division, the goal of the strategy, which is to improve safety, has not changed, but a different approach is employed due to differences in the background of issues and projects, and differences in the relationship with stakeholders.

On December 20 the strategy was revised for the second time. Further reform plans for the FDEC were incorporated into this revision. These reform plans include formulation of a long-term decommissioning plan, the strengthening of project management and the internalization of decommissioning technology, such as for debris removal, etc., as well as strategies for human assets that support all these endeavors.

Prior to the revision, the FDEC president gave an explanation of these reform plans to employees on August 6. And, an in-house mini forum was held from August through November as an individual reform measure (Fukushima Daiichi: nine times, Headquarters: twice). More focus has been put on exchanging opinions rather than the briefings in many forms because reflecting the opinions of field workers engaged in decommissioning is vital for implementing effective and feasible reforms. The strategy was revised upon gathering and reflecting these opinions in individual measures.

Going forward we will continue activities to help foster understanding about the strategy while moving from the planning stage to the detailed execution stage of individual reform measures. And, the relationship between the strategy and actual duties shall be strengthened so that the strategy policies are reflected without fail in actual duties.



Explanation of reform plans


Mini-forum

2.1.2 Internal Communication

(1) Initiatives for promoting internal communication

In order to widely share information, such as the important initiatives of each department, problems and knowledge, etc., within the company, we have increased the number of opportunities for in-house briefings, such as briefings on key issues noted in the business plan.

At Headquarters, one of the activities of the internal communication team is to hold briefings on topics that are thought to be of great concern and importance to many employees. During the third quarter a briefing on international conditions in the nuclear power industry was held in October, and in November a briefing was held on permits for Kashiwazaki-Kariwa Nuclear Power Station Units 6 and 7. These briefings were broadcast to Fukushima Daini and Kashiwazaki-Kariwa via teleconferencing systems.

Many participants commented that they would like to see these briefings continue so such opportunities will be created going forward.

Explanation of Kashiwazaki-Kariwa Unit 6/7 permits, etc. (Headquarters)

We are also creating opportunities for people from different departments to participate in recreational activities in order to transcend departmental boundaries and foster wider connections. Participants have commented that they have been able to develop friendships with people in other departments and that it is easier to communicate as a result. Such opportunities will be continually created during the next quarter and onward.

At Fukushima Daini we are creating communication opportunities that transcend company hierarchy as an initiative to foster personnel motivation. During the third quarter opportunities were created for the site superintendents, deputy site superintendents, Nuclear Safety Center Director, unit superintendents, and general managers to learn about concerns and questions directly from station personnel. During informal discussions between the site superintendent and younger employees greatly worried about the impact that the announcement to decommission the facility will have, instead of concern about the future these younger employees had many positive things to say, which contradicted expectations, thereby enabling the site superintendent to accurately ascertain the current state of employee motivation through direct dialogue. These opportunities for station personnel to directly engage in dialogue with management shall be further developed in the future because they aid in sharing a common vision and improving motivation.

At the Kashiwazaki-Kariwa Nuclear Power Station an on-site relay marathon was held with contractors on October 23 in order to cultivate a sense of unity between all those working at the site and create opportunity for personnel from different departments and companies to interact. This is the 18th time the relay race has been held and this year 55 people broken into 11 teams from TEPCO, and 110 people broken into 22 teams from contractors participated. The daily practice of all runners paid off. Participants and supporters commented that, "participating in a sporting event has made the sense of unity between people working at the site stronger. I was able to push myself further hearing the cheers from supporters." This type of communication activities shall be continued in the future to foster relationships between people working on site and form a sense of unity with contractors.


Site relay marathon（Kashiwazaki-Kariwa）

(2) Using in-house media to share information

In-house media is being used as follows to share information between TEPCO HD and core company employees.

◆ Company intranet videos
- "Kashiwazaki-Kariwa Preparedness Training ~Recovering from the Harsh Assessment by Regulatory Agencies~ (October 4)
- 15th Nuclear Reform Monitoring Committee Meeting ~Expectations for Rooted Independent Self-Assessments~ (October 15))
- Things Employees Should Know ~The Facts about and Lessons learned from 3.11 - Companywide Employee Training~ (November 1)
- Opening of the TEPCO Decommissioning Archive Center (November 28)
- KK Guidance Meetings by Consultant Ito ~Still not good enough. Leveraging everyone's knowledge at KK~ (December 7)

◆ TEPCO Group News Letter
- 10th Decommissioning Project Report
- Answering questions about contaminated water countermeasures (November 13)

◆ "Messages from Management" sent via the intranet
- "Talking about Fukushima in New York and Washington DC" from the Executive Vice Chairman (October 15)
- "Talking about Fukushima again in the United States" from the Executive Vice Chairman (November 14)
- "International Atomic Energy Association (IAEA) Review Results of the Fukushima Daiichi Decommissioning" from the Senior Executive Officer (November 20)
- "For Students Aiming to Become Science Communicators" from the Executive Vice Chairman (November 22)
- "The decommissioning archive has been opened" from the President (November 30)
- "Talking about Fukushima ~Shanghai~" from the Executive Vice Chairman (December 6)
- "A treated water portal site has been created" from the Senior Executive Officer (December 11)
- "The future of energy in Europe" from the Executive Vice Chairman (December 20)

Going forward we will disseminate information that fulfills the desires of employees and leverage the advantages of different types of in-house media, such as videos and the group newsletter, in order to share information through an effective media mix.

Video posted on company intranet
(15th Nuclear Reform Monitoring Committee meeting ~Expectations for the rooting of independent self-assessments~)

TEPCO Group News Letter
(Decommissioning Project Report #10)

(3) Sharing of information on important tasks in the Nuclear Power Division

Since July 2016, site superintendents and Headquarter general managers have been sending e-mails to all members of the Nuclear Power Division about important work issues in order to share information on these matters. An effectiveness assessment conducted during the second quarter of this year showed that issues are not being identified sufficiently so improvements were made to lower barriers to information dissemination and create as many opportunities as possible to share information on work issues. In particular, improvements were made to focus on conveying information about issues that the power generation departments/groups, and Headquarter groups want other departments to know about, and issues for which advice on solutions is sought.

After these improvements, the frequency of information dissemination during the third quarter was steady at four times a month, which is the target frequency, and information about important issues in each department was conveyed by the power station deputy site superintendent, Safety Center Director and CFAM, etc., who had not previously conveyed such information, thereby creating opportunities to lower the barriers of information dissemination and learn about work issues, which was the objective.

Furthermore, through the reader survey conducted whenever information is disseminated, readers were asked to note what topics they would like to learn about or have information shared on. During the third quarter, information was shared three times on work issues that were brought up in the survey. We will continue to improve two-way communication into the future.

2.2 INITIATIVES TO IMPROVE SAFETY AWARENESS

2.2.1 Cultivating Nuclear Safety Culture

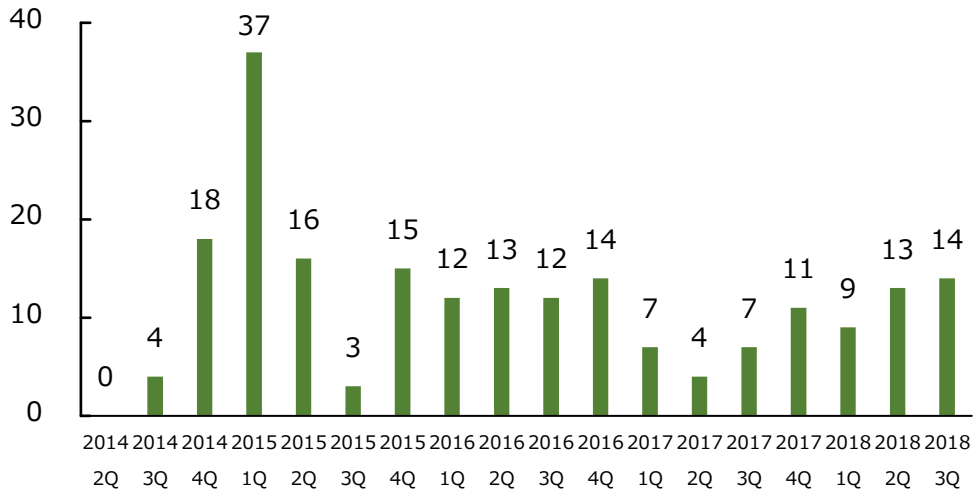
(1) Improving Safety Awareness【Measure 1】

◆ Direct Dialogue between Nuclear leaders

Since the fourth quarter of FY2015, nuclear leaders at Headquarters (General Manager of the Nuclear Power & Plant Siting Division (CNO) and other Headquarter General Managers) have been

visiting power stations to engage in direct dialogue with power station executives (site superintendent, unit superintendents, Nuclear Safety Center director, power station general managers) in order to improve the safety awareness of the entire organization. During the third quarter a discussion was held on measures for accelerating Toyota-type *Kaizen* initiatives. (Kashiwazaki-Kariwa: October 24, Fukushima Daini: November 27)

All discussion participants realize that is necessary for all members to understand Toyota-type *Kaizen* initiatives, create an environment that enables all members to participate, and broaden the scope of Kaizen in accordance with reform plans, such as improving skill during preparedness training, etc., in order to promote *Kaizen* and produce results. Furthermore, for example, participants also confirmed that we must move forward while creating mechanisms and innovative ways to motivate members, such as by creating opportunities to reward hard work within the Nuclear Power & Plant Siting Division and share information on excellence that should be viewed as good examples to follow.



No. of times direct dialogue was engaged in by the GM of the Nuclear Power & Plant Siting Division and each department

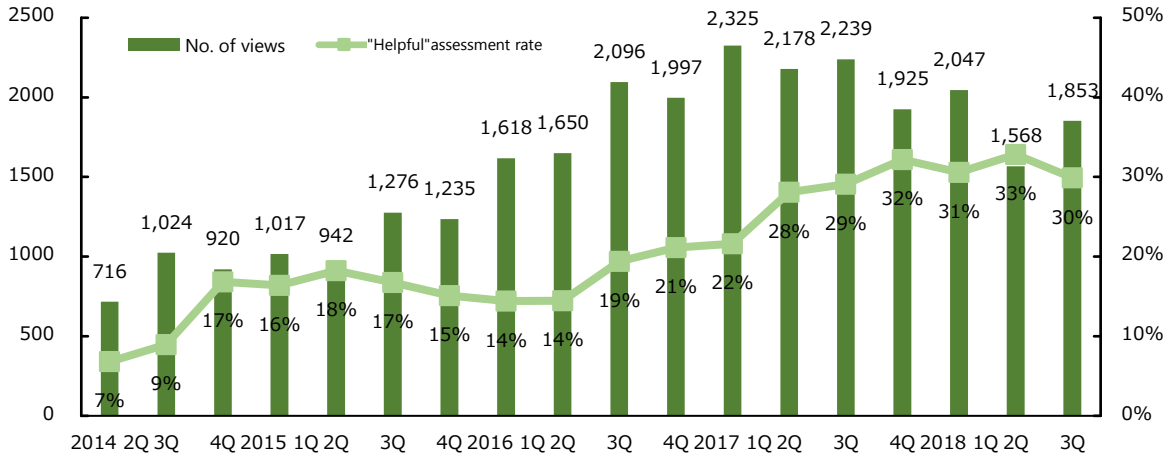
◆ Messages from Nuclear leaders

In order to promote nuclear safety reforms, nuclear leaders must accurately convey their expectations, and the reasons for those expectations, so that they permeate throughout the entire organization. In order to do this, nuclear leaders are leveraging video messages, intranet messages, email, meetings and morning briefings as opportunities to convey their expectations.

The following graph shows the number of times that messages by nuclear leaders have been read by employees via the intranet.

October 1	Thanks to all that provided field support to Hokkaido Electric 【Kashiwazaki-Kariwa Superintendent】
October 4	Don't let them say that, "It's because they were a dream team!"【Chief Nuclear Officer】
October 4	The increase in worker accidents is troubling【Nuclear Safety Management Dept. GM】
October 22	James Lind & Sascha Bajin（Coaching power）【FDEC Decommissioning Promotion Office GM】
October 25	Establishment of Kaizen Office【Kashiwazaki-Kariwa Superintendent】

October 25	An important vote to protect our cherished plant【Nuclear Safety Management Dept. GM】
October 30	A company that gets results【Fukushima Daini Superintendent】
October 30	Teachings from a hard drill sergeant-Being someone who gives people confidence【Nuclear Safety Oversight Office Director】
November 2	Thanks to everyone who participated in emergency response training and who conducted the first round of home visits【Kashiwazaki-Kariwa Superintendent】
November 2	Looking at OE information【Nuclear Safety Management Dept. GM】
November 19	We have achieved much with layered groundwater flow countermeasures【Fukushima Daichi Superintendent】
November 21	Fukushima Daiichi quality being changed by the four horsemen of PDCA【Fukushima Daichi Superintendent】
November 22	Comparing things that are difficult to compare【FDEC Decommissioning Promotion Office GM】
November 27	Let's make an even safer work environment【Kashiwazaki-Kariwa Superintendent】
November 29	Carlos Ghosn【Fukushima Daini Superintendent】
December 3	Aiming to be a power station that is safe and trusted【Kashiwazaki-Kariwa Superintendent】
December 19	Dragon Zakura is back【FDEC Decommissioning Promotion Office GM】
December 21	What is needed to become a power station that is safe and trusted【Kashiwazaki-Kariwa Superintendent】
December 25	Preventing year-end/New Year's worker accidents and breaking the chain【Higashidori Nuclear Power Construction Office Superintendent】
December 27	Reckless driving【Fukushima Daini Superintendent】
December 20	Striving to improve nuclear security culture【Fukushima Daichi Superintendent】



Number of views per message sent via the intranet/"Helpful" assessment rate

(2018 Q3 does not include result for December, which was shorter than the viewing period of one month)

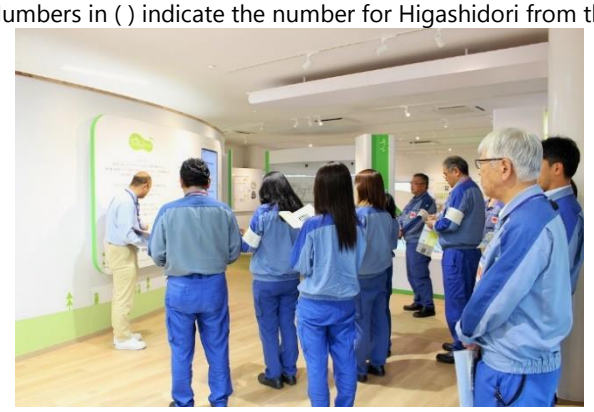
◆ Commendations given by CNO and the president of FDEC

Since FY2015, CNO and the president of the Fukushima Daiichi Decontamination & Decommissioning Engineering Company have given awards to those people that have led the way and taken on great challenges, and people who have achieved high objectives in regards to the Nuclear Safety Reform Plan and other missions. The following chart shows the number of commendations that were given.

Commendations given by CNO and the president of the Fukushima Daiichi Decontamination & Decommissioning Engineering Company

Period	HQ	Fukushima Daiichi	Fukushima Daini	Kashiwazaki-Kariwa
FY2015	24(2)	47	19	24
FY2016	25(1)	19	14	25
FY2017	21(2)	5	15	22
FY2018				
Q1	4	0	6	3
Q2	5(1)	4	4	4
Q3	5(1)	9	3	4

Numbers in ( ) indicate the number for Higashidori from the total



CNO awards

FDEC President Awards

(2) Nuclear Leader Training【Measure 1】

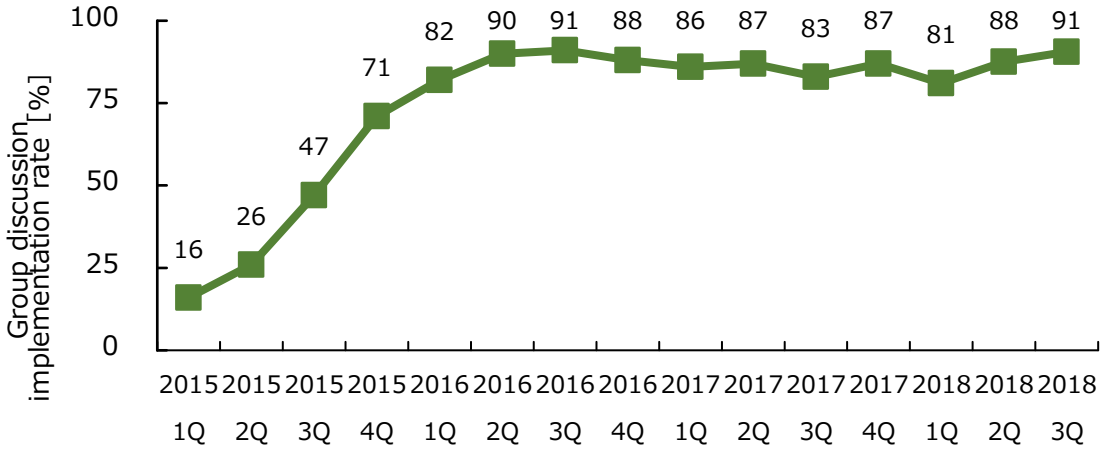
This fiscal year, training on Ascertaining Plant Behavior and Accident Sequences was provided to unit superintendents at Fukushima Daiichi and Kashiwazaki-Kariwa in order to provide knowledge necessary for nuclear safety.

(3) Reflecting on the traits of individuals and the organization【Measure 1】

The Nuclear Power Division engages in activities aimed at making the act of reflecting upon the 10 traits and 40 behaviors (10 traits) for robust nuclear safety culture a natural occurrence. All Nuclear Power Division personnel use the intranet system to reflect on whether or not they are embodying the Traits. Group discussions on these results and recent performance information are

held once every two weeks in order to deliberate and implement improvement actions and close the gaps between the Traits and one's own behavior.

Implementation rate of group discussion [%]



Retrospection example	Group discussion example
PA2: Understanding the responsibility to nuclear safety and adhering to the responsibility through daily behavior and daily tasks	Reaffirming the role of the work foreman, objectives, and the importance of following procedures in the wake of the scaffolding support nonconformance
CL1: Gathering and assessing operating experience from within and outside of the company systematically, effectively, and in a timely manner, and leveraging that experience.	Recent internal OE information was used to discuss causes and lessons learned, and exchange opinions about why the same type of mistakes keep happening.
WP3: Drafting and maintaining accurate and most up-to-date documents without omissions	Work procedures for drafting documents created in effort to maintain and improve task sustainability and task comprehension level

(4) Activities to develop communication and understanding amongst contractors

In order to improve nuclear safety at TEPCO's nuclear power stations, contractors must have the same understanding of nuclear safety reforms as TEPCO and cultivate nuclear safety culture. That is why we created a contractor version of the fundamentals to ensure that those workers engaged in tasks on-site in particular will work as one with TEPCO employees. Moving forward activities to permeate the use of these fundamentals shall be developed.

We also continue to create explanatory materials and engage in dialogue in accordance with the content of services and products provided to the power stations with the understanding that it is important for people that have few chances to directly work at a power station, such as personnel at contractor headquarters and in factories of vendors, etc., to understand the relationship between

their own work and nuclear safety. During this quarter in particular, briefings from the perspective of contractors was given about identifying the relationship between the Traits and existing initiatives being implemented by each company.

(5) Initiatives to share regrets and lessons learned from the Fukushima Nuclear Accident

Nuclear leaders are leading initiatives to share regrets and lessons learned from the Fukushima Nuclear Accident with nuclear operators all over the world.

◆ Opening of the TEPCO Decommissioning Archive Center

On November 30, the TEPCO Decommissioning Archive Center was opened. The intent of the archive is to enable as many people as possible from Fukushima and the surrounding communities, as well as people from within Japan and overseas, to learn about the facts of the Fukushima Nuclear Accident and the current state of decommissioning. The archive uses videos, models, and panel displays to explain how the nuclear accident unfolded and show the progress with decommissioning. As of the end of December, the Archive has had approximately 3,300 visitors from within and outside the prefecture.

Preserving the memories and records of the Fukushima Nuclear Accident and passing down the regrets and lessons learned to parties both within and outside the company to prevent such an accident from ever happening again is an important responsibility of TEPCO. In addition, making the long-term and vast decommissioning process visible, and explaining progress in an easy-to-understand manner is vital for gathering knowledge from both within and outside of Japan and continuing to persevere. While coordinating with related facilities and the local communities, TEPCO will strive to pass down the lessons learned from the nuclear accident to later generations and help bring peace of mind to everyone engaged in recovery efforts.

1st Floor Decommissioning field exhibit

2nd Floor Memories, records, regrets and learned l essons

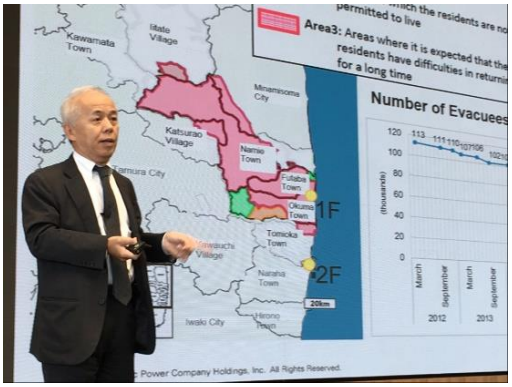
◆ Lectures by Nuclear Leaders

The Vice Chairman has been proactively given lectures both within and outside of Japan to speak directly about his experiences with the Fukushima nuclear accident, the efforts that have ensued since the accident, recovery in Fukushima, and the current situation at TEPCO.

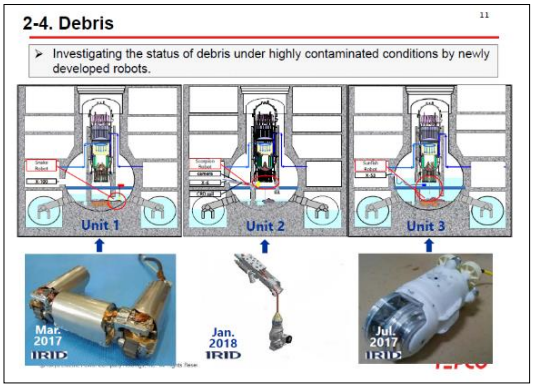
Date	City, Country	Location	Attendees
October 2	New York, USA	Japan Society	Society members, members of the press
October 3	Washington DC, USA	Johns Hopkins University	Students/professors, members of the press
October 3	Washington DC, USA	Georgetown University	Students/professors
October 29	Austin, USA	University of Texas	Business school students/professors
October 30	Austin, USA	University of Texas	Nuclear engineering students/professors
October 31	Berkeley, USA	UC Berkeley	Business school students/professors
November 17	Kyoto, Japan	Doshisha University	Students (events tie up)
November 23	Shanghai, China	Shanghai Electric Power Co., Ltd.	Shanghai Electric Power Co., Ltd. employees
December 3	London, England	Japan Society UK	Society members, members of the press
December 5	Paris, France	OECD/NEA CSNI Members	Seminar participants from many countries
December 5	Paris, France	Paris School of International Affairs	Business school student/professors
December 6	Paris, France	EDF	EDF Employees

With the 2020 Tokyo Olympic and Paralympic games approaching one of our most important missions is to convey information about the current state of Fukushima correctly and alleviate any concern about Japan that people overseas may have with the anticipation that Japan will have a great many visitors during the 2020 Olympic Games. The number of lecture attendees ranges from two to 30 people, but the people that do attend have a great interest in the subject matter and question-and-answer sessions are lively with inquiries about the greatest lesson learned from the accident and the safety of food from Fukushima.

To people living overseas the mental image of the Fukushima Accident still remains quite vivid and many are quite surprised when the progress of decommissioning and the current state of recovery is conveyed to them. We will continue our initiatives to convey correct and up-to-date information.



UC Berkeley



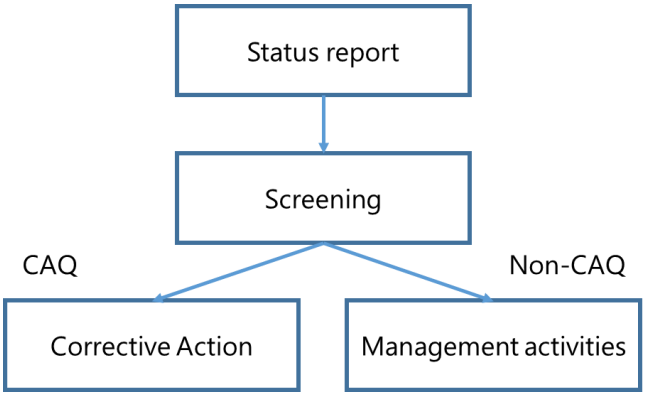
Slide from presentation

2.2.2 Performance Improvements (CAP)

(1) Promoting improvement through CAP【Measure 3】

We aim to make efficient and effective improvements by using CAP to manage not only nonconformance and OE information, but also information useful for improving performance that can contribute to nuclear safety (management observation (MO) results, benchmarking results, third-party review results, near-miss information, etc.), in a unified manner, and implement fundamental countermeasures.

During the third quarter we continued to analyze information inputted into CAP and make corrections after identifying common weaknesses. In particular, we began quarterly performance assessments of major fields at Kashiwazaki-Kariwa and Fukushima Daini. In regards to condition reports (CR) input by contractors that began in the second quarter, information to make improvements, such as requests and recommendations by contractors in the field. During the third quarter, in addition to nonconformance management, attempts were made at Kashiwazaki-Kariwa to classify nonconformance information not only by the level of importance but also from the perspective of nuclear safety. During the fourth quarter these initiatives will be further developed as we aim to further promote nuclear safety improvements.



Concept diagram of dividing by focusing on nuclear safety

※CAQ refers to Condition Adverse to Quality which is a criteria for CAP screening (assigning response level in consideration of nuclear safety)

(2) Improvements through Management Observation【Measure 2】

In order to promote nuclear safety reforms and improve nuclear safety, TEPCO engages in management observation (MO), which is proactively employed by the best nuclear operators overseas. Through MO, managers can observe actual conditions in the field and accurately identify problems.

Issues pointed out during MO at Fukushima Daini and Kashiwazaki-Kariwa have been inputted into CAP in order to create condition reports and make improvements to the problem, and this data analysis is being continued. MO results for the third quarter are as follows:

	Fukushima Daiichi	Fukushima Daini	Kashiwazaki-Kariwa
# of times implemented	1,040	811	1,248
# of times per month per manager	3.61times/month/person	4.36times/month/person	3.82times/month/person
Good MO rate*	–	75%	66%

＊Good MO rate: Percentage of MO that PICO (performance improvement coordinator) have deemed to be good practices. However, this was not done at Fukushima Daiichi.

(3) Improvement through benchmarking

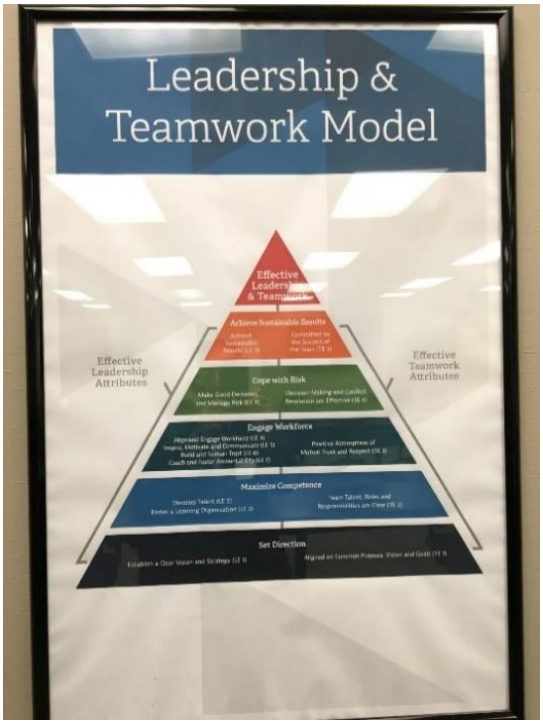
◆ Benchmarking with the Vogtle Nuclear Power Station and the headquarters of Duke Energy

In October, the Fukushima Daini site superintendent and operations CFAM visited the Southern Company's Vogtle Nuclear Power Station and the headquarters of Duke Energy, which have excellent reputations, to benchmark organizational management and operational focus (Ops Focus)

At the Vogtle Nuclear Power Station, effective activities to engage the workforce were seen. And, in regards to operational focus activities, both organizations ran meetings under the strict governance of CFAM and had mechanisms for managing issues (issue tracking). The excellence observed will be proactively employed at TEPCO.

Vogtle Power Station Training Center


Pictures depicting activities that embody the 10 traits



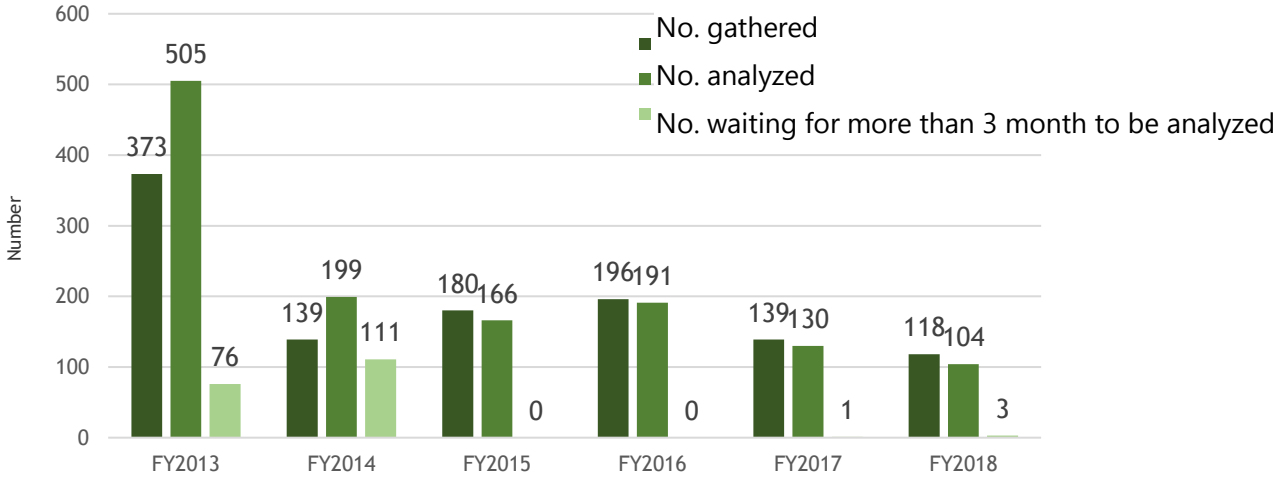
Leadership & Team Work Model poster

2.2.3 Leveraging Operating Experience【Measure 3】

◆ Gathering and sharing OE information

One of the lessons learned from the Fukushima Nuclear Accident is that we must "learn from the failures of others." Lessons to be learned are being identified and countermeasures deliberated/implemented under the premise that something that has occurred somewhere else in the world can also occur at TEPCO power stations.

During the third quarter, 69 pieces of new OE information were newly gathered and 38 pieces of OE information, that include information gathered in the past, were analyzed. There were two pieces of OE data that waited for more than three months to be analyzed.



OE data gathering and analysis performance trends

(Note: The reason why there were so much data gathered in FY2013 is because OE data from prior to the Fukushima Nuclear Accident was analyzed)

Recent OE information is posted on the company's intranet thereby providing an environment in which all Nuclear Power Division personnel can easily access newly arrived OE information. The viewing rate of new OE information, which is a nuclear safety reform PI, during the third quarter for the entire Nuclear Power Division was 56%.

◆ SOER and severe accident information study sessions

Focused study sessions on 22 accidents and troubles, which have been selected as SOER and information on serious accidents from both within and outside of Japan, such as the cable fire at the Browns Ferry Nuclear Power Plant, are being held for all Nuclear Power Division personnel, including regular employees, to provide an overview of these accidents and troubles, and understand the lessons learned from them.

Training on the lessons learned from the Chernobyl accident was held at Headquarters and all power stations during the third quarter. Participants learned about the background of the Chernobyl accident from American experts that were dispatched to Chernobyl to investigate the accident and had interviewed operators. Group discussions on safety culture and risk management, and human performance were held to discuss what aspects should be reflected at TEPCO.

Case explanation by overseas experts

Group discussion

2.2.4 Improving the Ability to Propose Defence-in-Depth Measures (Risk Management)

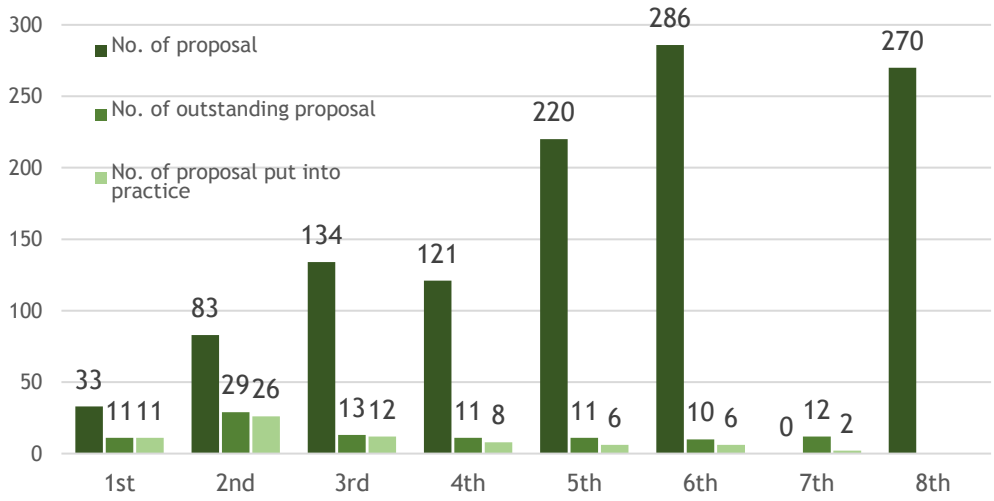
(1) Competitions to Enhance the Ability to Propose Safety Improvement Measures【Measure 3】

◆ 8th Competition

TEPCO has been holding Safety Improvement Proposal Competitions so that personnel may, in addition to conducting multi-faceted reviews from the perspective of defence-in-depth, acquire the technical ability to propose cost-effective safety measures and have these proposals put promptly into practice.

During FY2018 the 8th competition to newly gather suggestions from the field and input on risks was held and a total of 270 proposals were received from not only power stations and the Headquarter Nuclear Power Division, but other departments as well. The proposals were reviewed by the Secretariat, and voted on by all of the employees in the Nuclear Power Division. As a result, 15 potential outstanding proposals were selected. Nuclear leaders will now review the selections to determine which will be chosen as outstanding proposals.

The following chart shows the number of proposals that were submitted as of the 8th competition and the number of outstanding proposals as of the 7th competition that were put into practice:



Number of submissions to the Safety Improvement Proposal Competitions/Number of outstanding proposals/Number of proposals put into practice

(Note: During the 7th competition we conducted a repechage for unselected proposals so the number of new proposals submitted was 0. Outstanding proposals from the 8th competition are being selected)

◆ Outstanding proposals that have been put into practice

During the third quarter one of 13 outstanding proposals from the third competition was put into practice. At the Kashiwazaki-Kariwa Nuclear Power Station a system that enables the location of workers to be ascertained via on-site PHS was introduced in order to guarantee human safety during an emergency.

The process for putting outstanding proposals into practice will continue to be monitored and follow-ups conducted if the process does not go smoothly.

(2) Using hazard analysis to construct improvement processes【Measure 3】

We are creating approaches to, and mechanisms for, accidents and hazards that have high "cliff-edge potential" and for which there is great uncertainty in regards to the frequency of occurrence. And, efforts are being made to propose and implement countermeasures under the assumption that these accidents will happen.

At Kashiwazaki-Kariwa, the analysis of approximately 30 identified hazards was completed in FY2014 and countermeasures are being deliberated in accordance with the created plans. The impact of, and countermeasures for, hazards identified since FY2015 (electromagnetic pulse caused by high-altitude nuclear explosion) are being additionally deliberated. And, at Fukushima Daini a hazard analysis of the stable cooling of spent fuel pools began.

(3) Risk Information-based Decision Making (RIDM)

Appropriately deliberating and installing safety equipment, and operating that equipment suitably, is indispensable to ensure plant safety. In particular, considering risk information, such as equipment reliability, etc., during the safety equipment design/deliberation stage, creating equipment that is effective at maintaining nuclear safety, and considering risk such as core damage during the operations stage when suitably maintaining systems that should be maintained for nuclear safety, including the aforementioned equipment, leads to plant safety improvements.

Therefore, we are promoting the use of risk information during the design management process and of safety management processes during shutdown and constructing these processes so that risk information can be fully utilized.

During the design management process, considering qualitative risk assessments when deliberating design and comprehensively identifying risks and formulating risk reduction measures based upon question lists that identify risks will result in more effective equipment design. During the safety management process during shutdown, by qualitatively identifying the risk of core damage during the periodic inspection process through a probabilistic risk assessment (PRA) it is possible to avoid processes for which the risk of simultaneously excluding multiple categories of equipment in conjunction with inspections increases and also formulating risk reduction measures in advance. We are deliberating clarifying these mechanisms in manuals so that we can more proactively leverage risk information.

Furthermore, we will promote the use of risk information and work processes other than those mentioned above in order to operate plants efficiently while guaranteeing safety.

2.3 INITIATIVES TO IMPROVE THE ABILITY TO PROMOTE DIALOGUE

Although initiatives to improve the ability to promote dialogue are underway, the rash of inappropriate incidents has prompted us to commence initiatives to make further improvements while being aware of disseminating information that can be understood, etc.

2.3.1 Improving Risk Communication Skills【Measure 4】

(1) Communication with the Siting Community【Measure 4】

◆ Activities in the Fukushima region

- Conveying information that is easy to understand

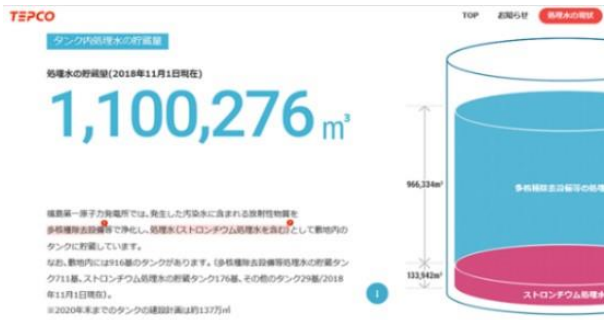
Creation of a treated water portal site

When releasing the results of the water analysis of treated water, which has reduced risk since it results from the purification of contaminated water that contains radioactive substances, the data provided on the TEPCO website was not easily understood. In light of this a treated water portal site has been created on the TEPCO website (December 10). The portal site breaks down the explanations given by the government committee and also uses diagrams, graphs, and a glossary to explain how treated water is being stored, the attributes of such water, and contaminated water treatment history. Those that have viewed the site have said that the portal site makes the current state of treated water and treated water issues simple, and visually easy to understand. We will continually improve and develop the content of this portal site, such as by covering issues of great concern through a FAQ format, etc., in order to enable the portal site to answer questions the public

may have and alleviate their concerns. An English version of the site was also created in January 2019 (site opened on January 21).

Developing the virtual tour

In addition to the Japanese PC version of the web content "INSIDE FUKUSHIMA DAIICHI ~A virtual tour of the decommissioning site~," which provides videos and 360° photos of the Fukushima Daiichi reactor buildings and facilities to show the current state of decommissioning (created in March), a Japanese smart phone version and also an English PC version have been created to enable as many people as possible to experience this tour (November 1). After the English PC version was created, overseas experts commented that, "it is very useful for understanding the state of decommissioning," and we will be releasing an English smart phone version so as to enable access from anywhere in the world.



Treated water portal site

INSIDE FUKUSHIMA DAIICHI

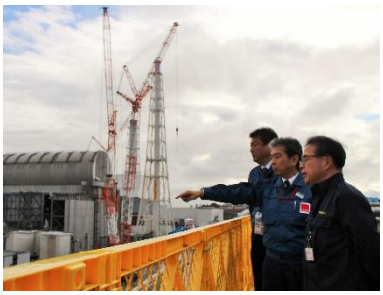
- Communication with stakeholders

Fukushima Daiichi tours

Tours of the Fukushima Daiichi Nuclear Power Station are given to convey the progress of decommissioning. During the third quarter, in addition to visitors from the siting community, tours were given to NRA Chairman Fuketa (October 5), Environment Minister Harada and Minister of Education, Culture, Sports, Science and Technology/Education Revitalization Director Shibuyama (October 22), Fukushima Prefecture Governor Uchibori (November 1), Recovery Minister/Fukushima Nuclear Accident Recovery Director Watanabe, and Deputy Recovery Minister Tachibana (December 5), and METI Minister Seko (December 12) who all commented on the steady progress with decommissioning that has been made.

Visit by Governor Uchibori

Visit by Recovery Minister Watanabe



Visit by METI Minister Seko

The FDEC President also gave a tour to university students attending a special lecture entitled "Thinking about Nuclear Power from Fukushima" given by Kansai Gakuin University and former

anchorman of News Zero, Professor Nobutaka Murao (October 27). After the tour, participants commented that, "the site was so organized it looked like any other construction site," and "it was good to be able to see this with my own eyes because you don't really get a feel for what's actually going on, including the damage caused by harmful rumors, when you're in Kansai. When I get back to Kansai I'm going to tell everyone about what I saw and felt."

Going forward we will increase the number of people given tours as we coordinate with the TEPCO Decommissioning Archive Center, which opened on November 30, to convey the facts of the Fukushima Daiichi Nuclear Power Station Accident and the progress with decommissioning in an easy-to-understand manner. (Tour participant target for this fiscal year: 15,000 visitors)

◆ Activities in the Niigata area

- Conveying information that is easy to understand

Videos about the power station featuring local freelance announcer Emily Nakata are being posted on the TEPCO website to inform residents of Niigata Prefecture about the safety measures being implemented at Kashiwazaki-Kariwa (November 7).

Emily Nakata also conducts interviews with TEPCO employees about how they feel about working at the power station that are made into leaflets and distributed to residents of Niigata Prefecture (December 11). Some people outside of the company have commented that the information is, "friendly and easy to understand," and "this type of corporate communication where you can actually see the faces of employees conveys the serious efforts being put into safety." However, it has also been pointed out that the leaflets are very long and difficult to read, so we will consider all of these opinions as we strive to convey information in a suitable manner.

Kashiwazaki-Kariwa safety measure video content on website

Leaflet "The feelings of we who work in Niigata"

- Communication with stakeholders

Direct dialogue between the president and local residents (Regional Council on Ensuring Transparency at the Kashiwazaki-Kariwa Nuclear Power Station)

We continue to attend meetings of the Regional Council on Ensuring Transparency at the Kashiwazaki-Kariwa Nuclear Power Station to give reports on safety renovations at Kashiwazaki-Kariwa and report on the progress of communication activities, while also listening to the opinions of council members. (October 3, November 21, December 5 (held monthly)).

On November 21 the president attended the annual information sharing meeting that is also attended by prefectural, city, and village leaders. The president expressed regrets over the cable

fire that occurred on November 1, stated that improvements to how information is transmitted will be made, and explained the status of implementation of corporate communication activities, such as visits to all resident homes and communication booths. In response council members stated their opinions about insufficiencies in how information was conveyed about the cable service tunnel fire and television commercials, and said that, "being able to directly speak with executive resulted in a worthwhile and productive meeting." We will continue to listen to the opinions of the local community and convey information suitably as we create opportunities to engage in dialogue with community residents.

Community information sharing meeting (November 21)

- Service Hall Events

Every year students from the region are invited to experience working at Kashiwazaki-Kariwa. One of the participating students proposed the idea of allowing school clubs to give presentations and recitals, such as performances by the brass band, at corporate communications facilities in order to create an opportunity for students the same age to gain an interest in nuclear power and energy. Based on this opinion, during the third quarter a total of four local junior high schools performed at Service Hall events during the third quarter, in addition to the guided tours of the power station that are already given and other events. In two days, 1,027 people visited the facility. Parents and friends of the performers said that they would like the performances to continue and that these types of events are friendly. In light of these opinions, we will continue to think of innovative ways in which we can help the younger generation foreman interest in energy.


Performance during Service Hall event

- Communication Booths

TEPCO has been setting up communication booths to allow the residents of Niigata Prefecture to express their opinions [about TEPCO and nuclear energy] and for the most part these booths have been standalone fixtures. However, during the third quarter we were invited to set up these booths as part of other larger events held in Niigata Prefecture. In particular, we were able to participate in events that are of great concern to local residents, such as events that center on caregiving, welfare, and health. Our foot-pedaled power generating machine served as an excellent tool for engaging the residents of Niigata Prefecture and fostering communication.

We will continue to proactively create opportunities to engage in communication with the people of Niigata Prefecture in order to convey conditions at the power station, hear the opinions of the local community, and reflect these opinions and requests in our operation policies.

TEPCO booth at Niigata Prefecture event

(2) Communicating with overseas partners【Measure 4】

- Conveying information that is easy to understand

Integrated Report

Since last fiscal year we have been issuing and integrated report in order to share information about nuclear power with investors. An English version of the report was released on November 22 in order to convey information to overseas investors as well. From this fiscal year the information conveyed by TEPCO to overseas parties has been checked and reviewed by external experts in an effort to convey information in a suitable manner.

Conveying information via SNS

We continue to send email magazines to overseas media outlets and experts, and post information on Facebook and Twitter in order to proactively disseminate information. During the third quarter one email magazine was sent, 41 posts were made to Facebook, and 43 tweets were sent out. The Facebook post on QuantuMR※ in November elicited quite a response. We will continue to deliberate the content of posts and the social impact that they have.

※ Mechanism for managing, sharing, and receiving comments on information and timelines in a MR space (Mixed Reality)

Facebook post on QuantuMR that was announced at the end of November

Tweet about Fukushima Daiichi virtual tour

(3) Info magazine data【Measure 4】

	Hairomichi	Monthly 1F	Notice from 2F	News Atom
				
Date of Issue	Oct. 10, Dec. 10	Oct. 20, Nov. 20, Dec. 20	Oct. 1, Dec. 3	Oct. 14, Nov. 4, Dec. 2
Distribution	Approx. 70,000 copies	Approx. 2,000 copies	Approx. 14,000 copies	Approx. 33,000 copies
Overview	・Young employee introduction ・Thoughts from employees that experienced 3.11 ・Fukushima Daiichi NPS internship	・1F today ・The people who protect 1F ・Devotion to safety	・Power station function introduction ・Site air dose rates ・Aiming for zero accidents	・Monthly power station news ・As a worker at the power station ・A message to the residents of Kashiwazaki City and Kariwa Village

2.4 Initiatives to Improve Technological Capability

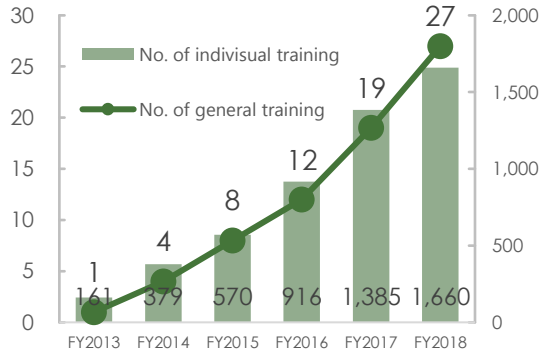
Although initiatives to improve technological capability are underway, we have been made painfully aware once again of our inability to examine current equipment and work processes and make improvements on our own, so efforts aimed at further improvement have commenced.

2.4.1 Strengthening Technological Capability (during times of emergency)

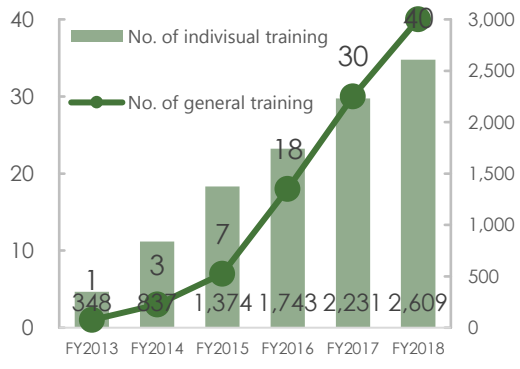
(1) Enhancement of Power Station and Headquarter Emergency Response (Organizational) Capabilities【Measure 5】

In the results of training assessments for each nuclear power station by the NRA conducted during FY2017, it was pointed out in regards to sharing information with the NRA that explanations from TEPCO are insufficient, and that handling in the case that information from the plant data system cannot be transmitted is insufficient. An Emergency Response Improvement Plan, which includes reorganizing experienced teams, assigning personnel responsible for sharing information, and improving the knowledge and skills of personnel, etc., was compiled (disclosed on August 27) in light of the harsh assessment of FY2017 training. During the third quarter individual and general training sessions were held based upon this improvement plan. During the general training sessions at Kashiwazaki-Kariwa (October 2) and Fukushima Daiichi (December 4) that were observed by members of the NRA it was confirmed that improvements have been made to information sharing functions, so similar training will be held at Fukushima Daini.

Results for each power station are as follows:



<1F>



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◆ Fukushima Daiichi; Third Quarter General Training: October 15, November 9, November 15, November 26, December 4

During general training held on December 4 an emergency response simulation was conducted under the observation of the NRA. During the simulation personnel relocated from the main administration building to the seismic isolation building emergency response center in response to a large earthquake and set objectives for repairing equipment after personnel had assembled. The basic method of sharing information between the power station and Headquarters was observed and improvements were made to anything that was noticed or things that could've been done better during training. In particular, in regards to the sharing of information between the power station and Headquarters, advanced study sessions and training on speaking out was conducted in order for power station personnel to give suitable explanations, and information sharing tools were improved. By using many documents and diagrams to explain the situation, the information given by the power station to Headquarters and other sites was more detailed than it had ever been. Representatives of NRA in attendance stated that they were able to get an overall understanding of the information they required, but also noted that the explanation of how it is predicted the accident will unfold needs to be addressed going forward. Furthermore, since primarily experienced teams were used during general training in the third quarter, in the fourth quarter personnel with less experience will continue to participate in training in order to improve skills.

Emergency Response Center（Fukushima Daiichi）

◆ Fukushima Daini; Third Quarter General Training: October 25, November 22, December 10, December 20

During general training on November 22 training was conducted on responding to an electromagnetic pulse caused by high-altitude nuclear explosion. During the scenario, a loss of all AC power resulted in loss of cooling function to spent fuel pools, and many electronic and communications equipment were rendered inoperable. Amidst the scenario trainees were able to transport materials and equipment from storage facilities, inject cooling water into the spent fuel pools, and install communications equipment in the main control rooms in accordance with procedures that had been prepared in advance. In the emergency response center, the electromagnetic pulse was simulated by turning out the lights so that trainees could respond under conditions that simulate an actual event. While the cooling of spent fuel pools was able to be continued by other means for injecting cooling into the spent fuel pools and securing minimally required communications equipment, there were logistics-related issues, such as confirming the safety of the family of personnel, and assembling personnel, etc., that were identified, so improvements will be made.

◆ Kashiwazaki-Kariwa; Third Quarter General Training: October 2, October 18, December 12

During general training held on October 2 an emergency response simulation was conducted under the observation of the NRA. As a result of conducting drills and individual training based on the Emergency Response Improvement Plan the sharing of information between the power station

and Headquarters, which was an issue that needed to be addressed, has been improved through the use of information sharing tools and dedicating certain personnel to the task of hotline management, etc. Trainee participants responded to a scenario where an earthquake had caused damage to Units 6 and 7 that were in operation, and Units 1 through 5 that were shut down. The simulated accident was handled appropriately with the emergency response headquarters making decisions on repair plans and priorities, and the conclusion that core damage had occurred and that the containment vessel should be vented was also drawn appropriately. During general training on December 12, personnel with less experience than veteran teams practiced assembling and gained more experience. Having veteran teams give instructions prior to engaging in training was made into a rule, and the training was implemented based on basic scenarios. In light of the fact that preparedness personnel with less experience identified issues that need to be addressed, training implementation methods will be deliberated and further improvements made so that training is more effective at providing skills.

Emergency Response Center（Kashiwazaki-Kariwa）

Assembly training

◆ Headquarters; Third Quarter General Training: October 2, October 15, October 30, November 9, November 15, November 21, November 26, December 4, December 10, December 20

During general training at Kashiwazaki-Kariwa (October 2), improving the skill of personnel that have less experience then veteran teams at Headquarters was identified as an issue that needs to be addressed since veteran teams comprised of personnel with much knowledge handled the training scenario. During the third quarter training focused on providing skills to personnel in the government liaison team that conveys information to the NRA. Gathered information was periodically sorted into four categories (current conditions, forecast, strategy, progress) and conveyed to the NRA in an easy-to-understand manner thereby implying a method for conveying information that does not rely on personnel skill.


Emergency Response Center Director (HQ)

Government Liaison Team (HQ)

(2) Improving the in-house technological capability of power stations【Measure 6】

◆ Fukushima Daiichi

Unit 5 and 6 operators have engaged in fire engine and power supply truck training since FY2014. As of the end of December, 36 operators had been certified on the operation of fire engines thereby exceeding our 31-operator goal (80% of the 38 operators in the field (one fewer operator compared with 2018Q2)), and 36 operators had been certified on the operation of power supply cars (see the chart below for details). The priority for operators working at Unit 1~4 and with water treatment equipment is to acquire skill in operation management, such as the use of reactor coolant injection equipment and contaminated water treatment equipment, etc.

◆ Fukushima Daini

Training on fire engines and power supply cars commenced in FY2014. As of the end of December, 27 operators have been certified on the operation of fire engines thereby meeting our 27-operator goal (80% of the 34 operators in the field (decrease of two operators since the first quarter)), and 27 operators had been certified on the operation of power supply cars (see the chart below for details). Certified personnel targets for power supply cars was not met during the first quarter but was achieved during the second quarter. Furthermore, in light of the conditions at Fukushima Daini, from the second quarter work management teams that used to be split between Units 1 and 2, and Units 3 and 4, have been merged so that they can handle any unit. This diversity should improve not only the handling of ordinary tasks but also emergencies.

◆ Kashiwazaki-Kariwa

Fire engine and power supply car operation training commenced during FY2013. As of the end of September, 102 operators have been certified on the operation of fire engines thereby exceeding our 94-operator goal (80% of the 117 operators in the field (decrease of nine operators since the first quarter)), and 103 operators had been certified on the operation of power supply cars (see the chart below for details). As of the end of September, the number of instructors in shift departments was 146 (decrease of 11 since the first quarter). Also, a field operations competition like the one that was held first at Fukushima Daini was held for auxiliary operators. Operators from each unit competed in common field tasks, such as pre-startup checks after pump inspections, in order to learn points for improvement thereby maintaining/improving and standardizing field skills.

Power Station	Fire Trucks		Power Supply Cars	
	No. of certifications (comparison with last quarter)	Fill rate	No. of certifications (comparison with last quarter)	Fill rate
1F	36 (-2)	116%	36 (-2)	116%
2F	27 (-2)	100%	30 (+3)	110%
KK	102 (-9)	109%	103 (-4)	110%

Initiatives to improve the in-house technological capability of operators (no. of certifications)

(3) Status of initiatives to improve the in-house technological capability of power stations (maintenance field)【Measure 6】

◆ Fukushima Daiichi

We are continually implementing training to develop in-house technological capability (training on the operation of power supply cars, emergency generator operation training, concrete pump truck operation training, training on the temporary laying and connecting of hoses, etc.) in order to improve the ability to respond to emergencies.

During the third quarter training focused on dealing with damage to reactor coolant injection equipment caused by a tsunami (fire truck deployment, hose laying, etc.) and also how to handle a situation where spent fuel pool cooling equipment was rendered inoperable (configuring cooling water injection lines using vehicle-mounted cooling water injection pumps) thereby improving skills needed in an emergency.

Training on handling damage to reactor cooling water injection equipment

Training on handling damage to spent fuel pool cooling equipment

◆ Fukushima Daini

In order to improve the ability to respond to emergencies we are conducting repetitive training drills with four teams (① rubble removal/road repair, ② generator replacement, ③ temporary cable connecting, ④ coolant pump repair).

From the third quarter team members have been rotated in order to increase the number of personnel that can respond to an emergency by subjecting them to training with different team

members. Since training for motor replacement teams and coolant pump repair teams consists of a series of tasks, training was provided not just for singular teams but for groups of teams in succession since in these situations sharing information on work tasks and continuing the work started by the previous team is imperative. We will continue to be innovative in our training methods so as to be able to flexibly respond to various conditions.

Motor replacement training


Pump repair training (coupling removal)

◆ Kashiwazaki-Kariwa

In order to improve in-house technological capability and thereby prevent severe accidents from occurring, we are conducting various types of training such as on the operation of power supply trucks, the operation of mobile cranes, air-conditioning duct/pipe repair, welding/cutting/grinding, high-voltage cable terminal attachment/connection, and the assembly/disassembly of motors.

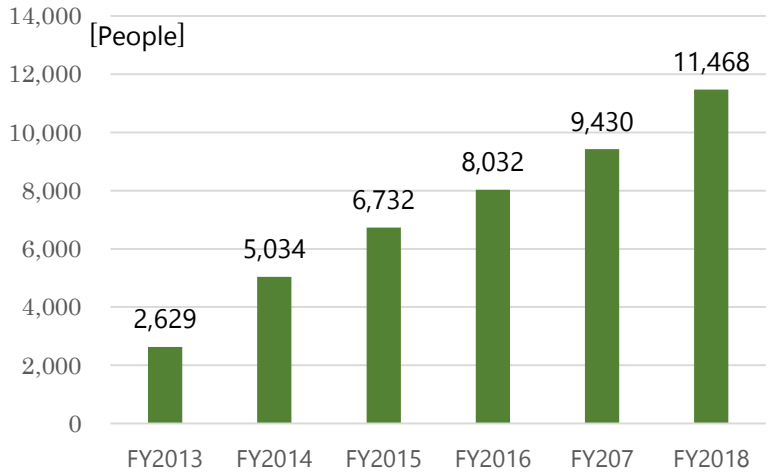
During the third quarter employees other than the members of primary training teams participated in repetitive high-voltage cable and operation/connection training that consisted of classroom study sessions on cable structures and also skill application training in order to gain skill. Repetitive training will continue in order to maintain and improve in-house technological capability.


Power supply truck operation training (High-voltage load truck connection)


Air conditioning duct repair training

High-voltage cable terminal preparation/connection training

Motor disassembly/assembly training



Trends in the number of maintenance personnel that have undergone in-house training (Total for 1F, 2F and KK)

2.4.2 Strengthening Technological Capability (during times of non-emergency)

(1) Improving nuclear safety and productivity through Toyota-type Kaizen

In order to improve nuclear safety and productivity, Toyota Motor East Japan, Inc. honorary advisor, Susumu Uchikawa, was invited to be a special advisor and create an improvement action team to promote improvements on the front lines (announced in December 26, 2014 press release. This team is currently referred to as the Kaizen Promotion Office).

In July 2017, a Chief Kaizen Officer (CKO) position was created and Toyota-type Kaizen activities began under the tutelage of the special advisor. Furthermore, since April 2018 CFAM supervisors have also acted as CKO in order to integrate management model activities with Kaizen activities and in October 2018 Kaizen Offices were established at both the Fukushima Daini and Kashiwazaki-Kariwa. We are currently promoting Kaizen activities for the purpose of "improving technical skill and reducing risks, workload, and costs in order to unearth the technical skills, safety margins, time, and resources necessary to improve safety by implementing Kaizen in all facets of our business."

Kaizen activities also commenced in November 2016 at the FDEC where a CKO was created in April 2017 and a Kaizen office established in September 2017.

One example of recent Kaizen activities is the undertaking of exhaust stack radiation sample pump disassembly inspections by TEPCO employees. Handling this task in-house eliminates the need and wastefulness of inspection work stations, and by using spare pumps for the off-line setting of disassembly inspections the number of inspection steps has been reduced by 1/10. Furthermore, by reducing inspection time needed for two pumps by half, the single pump operation time was shortened from 183 minutes to 70 minutes thereby contributing to improvements in safety and quality by reducing the amount of time needed for radiation measurements.

Guidance at the nuclear power station by the special advisor

During power equipment shutdown adjustments at Fukushima Daiichi, when power equipment is shut down for inspections, the equipment shutdown is listed and that information is conveyed to groups that manage the equipment. However, in order to make this process easier a database has been made of all equipment connected to power equipment and tools developed that enable the automatic creation of a list of equipment that will shut down when the aforementioned power equipment to be shut down is selected in the database thereby reducing man-hours by 98% from 190 man/hours to three man/hours. Furthermore, developing these tools has enabled better management of equipment that will shut down thereby improving safety and quality by enabling equipment management groups to make preparations for planned switchover to alternate power sources and the temporary installation of generators, which is done as preparation for power shutdown.

(2) Improving education and training programs based on SAT【Measure 6】

◆ Reconstructing education and training programs based on SAT

The Nuclear Education and Training Center has adopted the Systematic Approach to Training (SAT), which is recognized internationally as a best practice, and is providing education and training programs necessary for personnel development throughout the entire Nuclear Power Division. In order to continually improve education and training we have created three tiers of review bodies consisting of the Nuclear Power Division Education and Training Committee, Power Station Education and Training Committee, and Curriculum Review Meeting. These three bodies effectively put education and training programs through the PDCA cycle based upon SAT.

[STC] Nuclear Power Division Education/Training Meeting Chairperson: CNO/ CDO

[TAC] Power Station Education/Training Meeting Chairperson:Site Superintendent

[CRC] Curriculum Review Meeting Chairperson: Administrative GM

Tiered review bodies

In the Maintenance Division, more effort is being put into education and training aimed at preventing human error and equipment nonconformances. At Fukushima Daini and Kashiwazaki-Kariwa, we continue to offer human error prevention tool training for maintenance department personnel that act as work foremen, and skill training on foreign material exclusion (FME) is underway. During the fourth quarter training will be held on slinging and torque management.

Work foreman training was also given to new employees assigned to the Maintenance Division this fiscal year (Fukushima: November 5-9, Kashiwazaki-Kariwa: December 3-7). Participants underwent an intensive one-week training course that provided them with an overview of the responsibilities of work foremen, the mindset that work foremen must have, safety rules, and methods for communicating when engaging in work. By providing this training annually to new employees assigned to the Maintenance Division we will strive to enable these people to take on the responsibilities of work foremen as quickly as possible.

Work foreman training for new employees assigned to the Maintenance Division (Fukushima)
Left: Classroom study, Right: Group discussion wrap-up

In the field of nuclear safety, we have commenced accident response training that teaches trainees about plant behavior during a severe accident, such as reactor water levels, and containment vessel pressure and temperature, etc., and cultivate a natural ability to ascertain accident conditions and respond appropriately. In November, practical skill training on the containment vessel behavior analysis code MAAP was provided for 87 people from the emergency

response personnel planning team (all members), skill certification applicants (nuclear safety) and other station personnel (generation division, etc.). In December, engineering personnel other than operators at Kashiwazaki-Kariwa were given a chance to use the simulator to experience performing operations in the Main Control Room and see plant behavior during a reactor scram to give them a better understanding of the technical background behind their own duties and of plant behavior as seen by emergency response personnel.

◆ New employee training

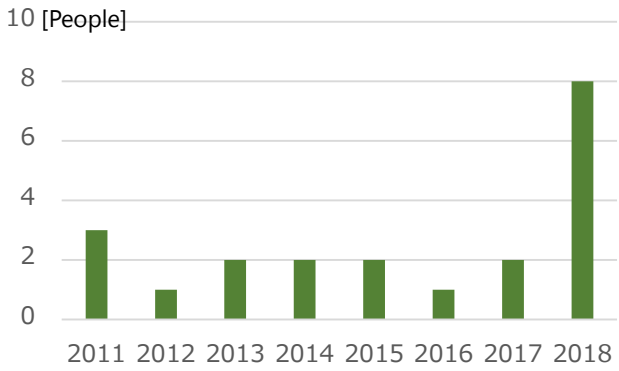
New employees to the Nuclear Power Division worked as actual shift members until October as part of shift training. During the last training session, trainees practically applied the knowledge they had gained, participated in school training where they learned methods for resolving problems, gave presentations, and were given basic education about Kaizen after which they were assigned to power station departments in November. At the end of December and effectiveness assessment was conducted of new employee training implemented this fiscal year in order to improve new employee training for the next fiscal year.

Heavy object handling training

Group discussion on problem resolution

(3) Support for gaining expert knowledge

As support for those taking the oral exam for senior reactor engineer (secondary exam), problem compilations were distributed to examinees and oral exam simulations were conducted in-house. As a result of this support, eight people passed this year's exam, which is a dramatic improvement over recent years. Assistance in the form of simulated exams and group study sessions is currently being provided for the written exam (March 2019).



Trends in the number of people that have passed the oral examination for senior reactor engineer

(4) Initiatives to Cultivate Nuclear Leaders

Since FY2015, management has been subjected to middle management training in order to foster sufficient awareness about each individual's responsibility to nuclear safety with the understanding that being conscious of, and having the ability to, thoroughly fulfill these responsibilities along with nuclear leaders is an absolute necessity. This training will continue into the future.

A total of 72 new group managers and shift supervisors resulting from periodic transfers during the summer participated in group manager training during September and November. Through lectures and discussions participants gained a better understanding of TEPCO's approach to leadership and the expectations of management.

Power station general manager training was implemented in order to reconstruct the roles and missions of general managers that head up departments of as many as 250 people and accelerate nuclear safety reforms. During this fiscal year, general manager training was held in October for 18 general managers that have been in their positions for two or more years, and in December training was held for 18 newly appointed general managers in an effort to improve leadership.

Group manager training

General Manager training

(5) Reflecting on the nuclear scandal (8.29) that occurred in 2002

It's been more than 15 years since the nuclear scandal occurred and as the number of new employees that joined the company after the scandal increases it is feared that this event will be forgotten as the memories of the employees that were at the company at the time fade. At Kashiwazaki-Kariwa, exhibits in the trouble encounter facility located in the Controlled Condition Training Center were used from September through December to foster group discussions amongst all station personnel in order to reflect upon the scandal. During these group discussions, participants discuss the impact of the scandal, learn about why it occurred, and discuss what each individual can do to prevent such an event from occurring again thereby preventing the scandal from being forgotten.

Learning from exhibits

Group discussion

(6) Establishment of a Nuclear Engineering Center【Measure 6】

By integrating the engineering functions of Headquarters and power stations to create a Nuclear Engineering Center under the direct supervision of CNO, we will be able to take responsibility for engineering work required to design and maintain plant functions thereby enabling us to make improvements.

Discussions over internal manual revision proposals continue during the third quarter. Furthermore, in preparation for department reorganization, internal preparations to apply for safety regulation modification approval began. This safety regulation modification application will be submitted in conjunction with the establishment of the Nuclear Power Company.

The Main Roles of the Nuclear Engineering Center

Design	Establish a process for taking responsibility for the management of design by enhancing the company's ability to design, as well as the ability to manage design work consigned to other companies
Plant Management	Enhance the process for managing plant systems and equipment, and improve the reliability of equipment.
Procurement	Guarantee a high level of reliability of procured items by ascertaining the skill of suppliers, and establishing a process for receiving and guaranteeing procured items
Nuclear safety	Re-examine internal/external hazards and risks based upon the latest knowledge and establish a process for continually improving plant safety
Fuel Management	Maximize the amount of energy that can be safely extracted from fuel, and handle fuel and operate the plant so as not to damage fuel. Ensure that security measures for nuclear fuel material are in place.

(7) Cultivating and certifying system engineers【Measure 6】

In order to promptly and safely stabilize a reactor when there is an emergency, personnel need to quickly ascertain the circumstances of the accident and make accurate decisions. Therefore, engineers are being trained to be proficient in design, laws and regulations, standards, operation, maintenance and other areas pertaining to facilities important for safety. System engineers formulate system monitoring programs, which stipulate monitoring targets and standards for

monitoring system performance degradation, in order to monitor whether or not primary plant systems are fulfilling design requirements. These monitoring activities also serve to identify areas in which reliability can be improved, which leads to overall improvements.

At current time five system engineers continually monitor 22 systems at Kashiwazaki-Kariwa Units 6 and 7 to confirm that there are no abnormalities with performance. During the third quarter education and training for two system engineers assigned during the second quarter continued, and training on monitor system configuration/interlocks began in December. The number of monitoring systems shall be increased, personnel secured and training continued with the objective of having at least five system engineers for each reactor.

At Fukushima Daini there are currently three system engineers that are responsible six systems at the Fukushima Daini Units 1~4, and there have been no abnormalities with performance. During FY2018 training will continue to increase the number of system engineers by two.

(8) Enhancing configuration management【Measure 6】

Configuration management is a process for maintaining the safety of the plant and ensuring that power station equipment has been manufactured, installed, and is being operated as designed. Deliberations continue on constructing a systematic process for maintaining and managing a state in which design requirements, actual equipment, and equipment schematics all match.

Design standard documents important for constructing configuration management processes are being prepared sequentially with a focus on systems that are very important for safety and during the third quarter. Document content pertaining to the main control rooms and reactor buildings was examined.

In regards to systems that support the use of configuration management processes, we are planning a task simulation that uses task manuals and the system operation procedures that have already been prepared. Simulation preparations continued during the third quarter.

In regards to human asset cultivation (education) we continue to prepare educational materials for the full-scale launch of engineer training. And, basic education on configuration management began during the third quarter.

Basic education on configuration management

(9) Improving project management skills

We have created a project for resolving problems that exist across all departments involved in decommissioning at Fukushima Daiichi and safety measure implementation at Kashiwazaki-Kariwa, and this project continued during the third quarter. During the third quarter we further developed education that commenced during the second quarter, narrowed in on methods for resolving problems that are common to the entire organization, and began basic education at Kashiwazaki-Kariwa. At Headquarters, projects that can be applied to project management were identified and put into trial use. Going forward we will continue to implement education in an effort to increase

the number of people that have knowledge about project management and solve companywide issues.

3 PROGRESS ASSESSMENT

3.1 OPINIONS OF THE PEOPLE

(1) Kashiwazaki-Kariwa cable service tunnel fire

On November 1 the fire occurred in a cable service tunnel at Kashiwazaki-Kariwa. The fire melted a splice in cables that provide power to the plant from emergency power generators located on high ground, so the aforementioned splice was removed and subjected to detailed inspection. At the same time, 99 other similar splices were checked but there were no abnormalities with appearance or the amount of heat being generated.

Due to the clumsiness with sending blanket faxes to related agencies and problems with the sharing of information between the TEPCO field commander and public fire department, Niigata Prefecture and the Kashiwazaki City requested that we ascertain the cause of these problems and thoroughly implement recurrence prevention measures. In order to make improvements, the procedures for sending blanket faxes were revised, the people in charge of sending these faxes were educated and joint review meetings/joint firefighting training was held with public fire departments. Nothing was pointed out during joint fire prevention training that aimed to fulfill the requests of the joint investigative committee. Training will be continually repeated in an effort to improve power station's ability to respond to fires.

Joint firefighting training with the public fire department (December 19)

(2) Inappropriate Instagram post about Fukushima Daiichi

In October an inappropriate hashtag (#factorylove) was used on pictures of the Fukushima Daiichi Nuclear Power Station facilities posted to the TEPCO Instagram account used to show pictures of TEPCO power facilities and technology. We regret the displeasure that this has caused the people of Fukushima Prefecture and society as a whole, and have received many opinions about the matter.

This incident occurred because employees were not sufficiently checking posts before they were uploaded. So, to prevent such an occurrence from ever happening again, a multifaceted and multilayered check system was created for posts to prevent recurrence.

(3) Visits to all households in Kashiwazaki City and Kariwa Village

Between August 1 and December 2 all the households in Kashiwazaki city and Kariwa Village were visited in order to directly hear the opinions and requests of community residents about the nuclear power stations and TEPCO. During these visits approximately 22,000 people were spoken to directly and more than 50,000 comments received. While some residents were encouraging saying things like, "I think of this visit by TEPCO was a good thing because I was able to directly convey my opinions," and "I want you to make Kashiwazaki City and Kariwa Village vibrant again by prioritizing safety," there were also many residents who voiced concern over natural disasters and accidents. Therefore, we plan to be more innovative with the details of explanations given through corporate communications magazines, communications booths, and power station visits, etc., and further develop the information disseminated by TEPCO and opportunities to give explanations.

Door-to-door visits in Kashiwazaki City and Kariwa Village

3.2 ASSESSMENT BY THE NUCLEAR POWER DIVISION

(1) Key Self-Assessments【Measure 2】

CFAM/SFAM in each of the areas defined by the Management Model are formulating key self-assessment plans (biannual) in order to become an organization with the world's highest levels of safety. During the third quarter key self-assessments were performed, gaps with excellence identified, and action to resolve these gaps will be implemented.

◆ Work Management（Kashiwazaki-Kariwa）

A key self-assessment of work management was performed at Kashiwazaki-Kariwa (September 25-27). With the assistance of experts from the United States, the work management performance of TEPCO employees and contractors was assessed through interviews and process reviews from the perspective of the Fundamentals. The assessment identified process adjustment improvements through the introduction of processes as a strength, but also discrepancies in regards to how issues are addressed by the organization as an area for improvement, so countermeasures shall be proposed and improvements made.

Interviews

Process reviews

◆ Operations（Kashiwazaki-Kariwa）

A key self-assessment of conduct of operations (COO) was conducted at Kashiwazaki-Kariwa (December 10-14). The objective of this assessment was to promote further performance improvements based upon WANO SOER2013-1 "Weaknesses in Regards to the Basic Skills of Operators." An assessment of COO expectations was performed based on the effectiveness assessment of the key self-assessment conducted last fiscal year, and gaps with excellence were identified. The assessment identified ODM (operational decision-making) process introduction as a strength, and the issues of the lack of comprehension about COO, low sensitivity to risk, the inaccurate use of human performance tools, and the ineffective functioning of performance management guides, as areas that require improvement, so countermeasures shall be proposed and improvements made.

Pre-work briefing observation

Observing team shift changes

◆ Chemistry（Kashiwazaki-Kariwa）

A key self-assessment of chemical agent management was performed at Kashiwazaki-Kariwa (November 14-16). Chemical agent management excellence put forth by WANO P&C was referred to in order to assess the power station's chemical agent management performance by TEPCO employees and contractors through interviews, field observation, and process reviews. The assessment identified systems for making chemicals brought into controlled areas more transparent as a strength, and unclear procedures for managing chemical agents brought into controlled areas as an area for improvement, so countermeasures shall be proposed and improvements made.

A key self-assessment of item delivery programs was also conducted at Kashiwazaki-Kariwa (December 11-13). Item delivery excellence put forth in WANO PO&C and JANSI guidelines was referred to in order to assess power station item delivery performance using the same methods employed for chemical agent management. As a result of the assessment it was recommended that repetitive education/training be implemented in order to maintain skill even though there are education/training mechanisms in place for providing knowledge and skills to members, so countermeasures shall be proposed and improvements made.

Process review (item delivery)

Field observation (item delivery)

◆ Safety Culture Cultivation（Kashiwazaki-Kariwa）

A key self-assessment of safety culture cultivation was conducted at Kashiwazaki-Kariwa (December 10-14). While referring to the ideal state of nuclear safety culture as put forth by the "10 Traits and 40 Behaviors Indicative of Robust Nuclear Safety Culture," and with the assistance of experts from the United States, the state of safety culture at the power station was assessed using methods put forth in the US assessment guide (NEI09-07), such as a prior review of documents, interviews with TEPCO and contractor employees, and field observation. The assessment identified the fact that all employees, from managers to general workers, are aware of the importance of the Fundamentals as a strength, but also identified missed opportunities for coaching as a weakness. Since this assessment focused on operations, maintenance, and safety, the scope of the assessment shall be expanded to administration during the fourth quarter and the assessment results will be reflected in safety culture cultivation activities for next fiscal year upon conducting an assessment of the entire power station.

Field observation

3.3 SELF-ASSESSMENT OF KEY ISSUES

The Nuclear Reform Monitoring Committee (NRMC) has requested an assessment and report on the status of improvements and on the rooting of measures implemented to address the five key issues (strengthening governance, improving human resource training, improving communication, cultivating nuclear safety culture, strengthening internal oversight functions) identified by the self-assessment of the progress of the Nuclear Safety Reform Plan (implemented in FY2016) and comments made by the NRMC.

During the third quarter the results of a self-assessment of the five key issues and an action plan aimed at making improvements was reported during the 15th meeting of the Nuclear Reform Monitoring Committee held on October 5. The Nuclear Reform Monitoring Committee reviewed the self-assessment results and presented its review results during the 16th Nuclear Reform Monitoring Committee meeting held on January 29, 2019.

3.4 MONITORING RESULTS FROM INTERNAL OVERSIGHT DEPARTMENTS (NUCLEAR SAFETY OVERSIGHT OFFICE)【MEASURE 2】

The following are the opinions of the Nuclear Safety Oversight Office (NSOO) about observations made during several months with a focus on mainly on the third quarter that were reported to the executive officer committee on January 29 and the Board of Directors on January 30.

NSOO -18–28
January 30, 2019

Quarterly Oversight Evaluation Report - Nuclear Safety Oversight Office FY2018 Q3

Introduction

This report summarizes the evaluation results of the third quarter (October to December) of the 2018 fiscal year of Nuclear Safety Oversight Office (hereafter, "NSOO"). NSOO discussed with the departments concerned about the recommendations, advice and observations described in this report when they were recognized. The NSOO's proposals are accepted by the line division management, and the measures have been taken (or being studied.) The details are beyond the objective of this report.

1. Safety performance

The reports by each team of NSOO and Senior Reactor Engineers in each site (SRE) continue to suggest steady improvement in the safety aspect in many areas.

The observations and the main recommendations for future issues are summarized below.

1.1 Fukushima Daiichi

An evaluation team carried out the following observation and evaluation on the themes of Units 1/2 stack dismantlement project, examination of the new inspection system, and emergency responses:

- Using trouble (Operating Experience) information

  Good practice was observed in the Units 1/2 stack dismantling project, such as using trouble experience of trial run of the Unit 3 fuel handling machine and enhancing the review of TEPCO and contractor engineers for dismantling equipment. It is desired that good practices be disseminated to other projects under the activity of enhancing quality control that the Fukushima Daiichi Decontamination and Decommissioning Engineering Company has been considering.

  The use of trouble (operating experience) information is effective in reducing risks in decommissioning for which there are many new topics to be examined. To make the most of it, NSOO requests the head of the Decommissioning Promotion Office to improve information retrievability and accumulation, as well as to establish the method of using information at each phase from procurement through operation.

- Improving autonomous nuclear safety by studying the new inspection system (ROP)

  The new inspection system encourages operators to improve nuclear safety autonomously. Its application to 1F is an important opportunity to clarify the ideal form of each operational process that has been improving since the Accident and to facilitate the improvement. In ongoing discussions for the new inspection system, although progress is made for studying performance indicators, attention is not adequately paid to individual inspections that are deeply related to the operation processes.

  The new inspection system will start in April 2020. NSOO requests the ROP project supervisor to analyze the information related to the ongoing trial

operation by the operating reactor side (draft guide, findings, etc.) from the viewpoint of decommissioning 1F and use it to improve their own operation processes.

・ Enhancing organizational competence for emergency responses quantitatively and qualitatively

Emergency exercise subject to the evaluation of the Nuclear Regulation Authority was conducted on December 4. NSOO confirmed the repeated training of skilled team at 1F in this term, enhancing the team's competence. Substitute personnel of skilled members need to be provided with education and training promptly in the future, and the power station has started studying the matter.

In this series of training, the coordination of the Technical Support Center by dispatching personnel to the field was tabletop simulation, instead of actual operation. Ensuring safety of the personnel in the field and checking the progress status of work are important factors in emergency responses. With the aim of verifying these competencies, NSOO requests the General Manager of the Disaster & Industrial Accident Prevention Department to include the actual field operations in the overall training for the power station.

Observation result sheets are prepared by the SRE and are presented to the site management. Key points in the sheets are as follows:

・ Addressing the new inspection system

Towards the new inspection system (ROP), the Fukushima Daiichi Decontamination and Decommissioning Engineering Company has launched five working groups. The Cornerstone WG is making progress in the preparation by suggesting indicator proposals for the safety of reactor facilities.

In the new inspection system, operators will be inspected for their autonomous activities to improve nuclear safety. The power station needs to organize Corrective Action Program (CAP) and Configuration Management (CM) processes that would become platforms for the activity, and urge its working-level staff to proactively address on-site safety and quality improvement using these platforms. SREs request General Managers and Group Managers to implement measures to help the working-level staff understand the effects of CAP and CM.

・ Responses to the failures of Unit 3 fuel handling machine

In the Unit 3 fuel handling machine, many failures were observed in trial run, causing significance delay in the process. Quality control is being checked and the safety inspection is underway towards the start of actual work within the fiscal year.

We are going to take all measures for detected failures and check the operation again, as well as provide training which serves as verification of procedures and the trouble response training in the future. With the involvement of SREs, the framework and procedures in case of failures will be established toward the actual work.

・ Recent nonconformity

In November, three nonconformity events occurred as follows: the system information was not reflected in the drawings; a crew forgot closing the valve due to failure to confirm the procedure; and failure to enforce safety measures because of not using the appropriate procedure. These are all due to the weak basic actions for fulfilling operational responsibilities. Working-level staff needs to recognize that there is always a risk in the work, and that they need to conduct work with the feeling of tension and responsibilities. Although it is not a directly related, SREs have proposed the implementation of the 5S approach in the field as it will help the personnel conduct work more carefully in the aspect of discipline as nuclear power facilities.

1.2 Fukushima Daini

An evaluation team carried out oversight and evaluation for fire protection area, in particular to the activity of enhancing response capabilities of the self-defense fire brigade.

・ Lack of practical education and training for self-defense fire brigade members

Tasks expected in the self-defense fire brigade members who directly deal with hazards in relation to personal safety are not clarified, and education and training are only set for basic items, and practical education and training corresponding to actual fire extinguishing are not prepared.

Self-defense fire brigade members need to be competent in extinguishing fire without trouble on assumptions that they should ensure their own safety. NSOO requests CFAM/SFAM (HQ/Site Functional Area Manager) to clarify the tasks

expected in fire extinguishing in the field specific to nuclear plants (closed space, small space, difficult access, inherent risks, such as radiation and hazardous materials) and the corresponding requirements (knowledge, skills, and experience), and provide the members with practical education and training through collaboration of HQ and each power station.

Senior Reactor Engineers prepare detailed performance evaluation sheets in light of a functional area and provide them to power station executives. Key points in the sheets are as follows:

・ Management leadership

Site policies are disseminated in the daily activities of ensuring safety and risk mitigation, such as Operating Experience discussion. On the other hand, as to the activities that require drastic reassessment of approach and concept, such as emergency responses and new Corrective Action Program (CAP), although the site senior management has been sending out the message of the necessity, the timeframe to achieve the target is not clarified.

To facilitate safety improvement activities to be in line with changes in management environment, SREs request continued sharing awareness across the entire power station, such as the senior management and working-level staff having a face-to-face dialogue and "digesting" the power station policies by General Managers and Group Managers level, and disseminating them among their own organization.

・ Radiation protection

The activity to improve the management and behaviors in highly contaminated areas has begun under the leadership of the head of the Nuclear Safety Center. We found that the behavior of contractors has been improved through TEPCO's direct approach by providing guidance at pre-review session before the start of work and intensive work observation.

However, the inertia force of the improvement by the Radiation Control Department at TEPCO is not sufficient. SREs request the Department to continue activities to increase on-site visits and improve observation skills under the guidance of senior officials.

・ Emergency response

Through the Working improvement activities that began in the last term, a wider variety of response capabilities are enhanced, such as map exercise with newly anticipated events and training for shift personnel with the scenario of night-time accidents. In addition, an improvement plan towards the emergency drill in this February was formulated, and training is conducted with using information sharing tools under the framework that reflects the experiences of Kashiwazaki Kariwa and Fukushima Daiichi NPSs .

SREs request that the power station will enhance the personnel's skill of grasping and predicting plant status, formulating and implementing strategy by using infrastructures such as information sharing tools (COP) under the framework in collaboration with HQ, such as by creating the scenario that contributes to verifying the actual skills of emergency response organization and by sharing improvement targets and providing debrief.

1.3 Kashiwazaki-Kariwa

An evaluation team observed the progress management of safety measures for Units 6 and 7, and the emergency responses, and performed the following oversight and evaluation:

・ Weak configuration management in implementing safety measures at Unit 7

In Unit 7 fire protection systems under construction, we found there are different drawings for the same system, and a drawing that is not consistent to the location of equipment in the field. It is assumed that this was caused by not following the basic document control rules in the process of repeated system changes, such as approving system documents before the execution of construction and managing the latest documents.

If a situation like this persists, document control rules may be neglected and there may be similar inconsistencies between the system documents and the real configuration in the field. NSOO requests the system installation department to inform the importance of document control and to observe the rules.

・ Enhancement of emergency responses

In last October emergency drill by skilled teams of emergency response personnel, there was a significant improvement in communication of information from the power plant, such as timely report of plant status and reliable report of

strategies and target times, resulting in well-controlled good responses in general. On the other hand, in the following emergency training by non- skilled team members, we confirmed that there was room for improvement in basic behaviors, such as verbal communication methods and communicating accurate information.

In the debrief after the training, issues were also identified by the participants. NSOO expects each personnel to repeat training and try to make improvement in the future.

Senior Reactor Engineers prepare detailed performance evaluation sheets in light of a functional area and provide them to power station executives. Key points in the sheets are as follows:

・ Management and governance

In the new inspection system (ROP), we are required to essentially and autonomously enhance safety as nuclear operators. There is a weakness in not practicing the process effectively in the field despite that it has been established. Based on this, the working-level staff needs to improve operations by clearly understanding connection between the operation and the improvement in safety and quality.

Judging from the previous cases in the station, the success factors are (1) “leadership,” (2) “in-process support of experts”, (3) “the establishment of issues with a sense of distance that resonate with the site,” and (4) “feeling of performance improvement.” SREs request that these success factors be incorporated in nonconformance management, fire protection, flooding control, and configuration management, and overall discussions be carried out under the cross-organizational framework.

・ Human resource development

It is important that line managers who are responsible for developing human resources will make an “intentional,” “planned,” and “continuous” approach to work-level staff. In this term, we confirmed the management’s efforts to enhance its governance for competence management of individuals, such as the activity of clarifying achievement goals and coaching policy for each position in the Maintenance Dept.

We need a logical approach to define required competence, analyze and find out individual competence gaps, the development of the activity with enthusiasm, and the verification of these situations. SREs request that these activities be implemented through collaboration between the line department and the human resource department.

With regard to reactor core technology, although there are learning opportunities for basic knowledge, including core analysis code training, the number of opportunities to learn actual experience is significantly reduced after almost 8 years from the Fukushima accident. Under such circumstances, SREs request that working level staff be provided with intentional, planned and continuous OJT opportunities.

・ Risk management

Daily activities, such as identifying reactor safety risks inherent in each onsite work, have been established. The power station is also considering the activity of connecting operational plans to risk maps to see whether the operational plan action is improving “frequency” or “severity” of risks.

For risk management in the future, SREs request that risks be checked extensively for deterioration signs, and processes and competence issues by focusing on checking whether risks are effectively reduced or not, rather than being complacent with establishing the process only.

1.4 HQ

An evaluation team performed the evaluation for the effectiveness of competence management as an organization related to the development of human resources. Following the previous term, the team continued observing HQ’s efforts for enhancing the skill of providing information in emergency responses.

・ Issues of individual competence management

The purpose of competence management is to develop the competence of individuals as well as to secure the required human resources for achieving organizational goals. However, as a result of sample survey, NSOO found a case of management based on allocating actual operations in a single fiscal year for individuals, instead of considering the future for individuals and organization goals. In addition, coordination between competence management and

education and training is inadequate, and the management depends on the provision of actual operations called OJT.

For the development of competence of individuals and for ensuring necessary human resources, NSOO expects that “opportunities will be provided for developing competence from a medium- to long-term perspective with the involvement of the person himself/herself" and "opportunities will be provided for developing competence based on the needs of each division's priorities.” NSOO also expects that education and training measures will contribute to the timely and planned development of competence by improving OJT techniques, using existing education and training programs, and developing new education and training menus.

To enhance the technical skills of individuals, the Nuclear Human Resources Development Center is working on proactive support to qualify individuals various areas. NSOO has confirmed that this has led to good results, such as significant increase in the number of passing Senior Reactor Engineers exams.

・ Improvement of information communication capability of HQ in emergency responses

There were significant changes in HQ response organization towards 1F emergency exercise in last December compared to the personnel in Kashiwazaki-Kariwa exercise. However, with attentive coaching of response personnel of Kashiwazaki-Kariwa exercise, issues were identified and improvement was made. As a result, NSOO confirmed that there was a significant improvement in HQ communicating information to the Nuclear Regulation Authority compared to the beginning of the activity (early October).

NSOO will continue observing training and evaluate emergency response capabilities and support the improvement for the line.

2. POVs of General Manager of Nuclear Safety Oversight Office (NSOO) based on evaluations

2.1 Knowledge transfer among projects concerning the decommissioning work of Fukushima Daiichi NPS

There is a certain similarity in the design of high reliability device to the implementation of remote operation work that remove major hazards such as spent

fuels and debris in the accident plant. Therefore, it is extremely important that we use the information of each important operating experience of the preceding project in the subsequent projects from the viewpoint of ensuring nuclear safety.

Based on the wide variety of trouble in the past, the Fukushima Daiichi Decontamination and Decommissioning Engineering Company established a policy to enhance safety and quality based on the analysis of differences in quality levels between the present and before the Accident. Based on the trouble of Unit 3 fuel handling machine, etc., we are also considering clarifying the specifications for suppliers and enhancing the involvement of TEPCO. However, we have not had enough discussion for the effective use of our trouble (operating experience) information. We have not evaluated the effectiveness of using operating experience information and nonconformance management from the viewpoint of knowledge transfer between projects.

The nuclear division at TEPCO has been strictly managing design changes in the design activities of nuclear power plants for many years and has reflected trouble in them. The Director of the Nuclear Safety Oversight Office (NSOO) requests the Director of the Decommissioning Promotion Office to establish specific methods for accumulating and using our own experience to continue decommissioning at 1F with high reliability.

The following subjects are introduced to the Decommissioning Promotion Office as examples of using operating experience information beyond the notification of trouble cases:

(1) Structuring and accumulating information as reusable knowledge

1. Failures in components and elements:

   Describe applicable targets (equipment, components, and design attributes), failure modes, causes (stress and tolerance) and countermeasures.

2. Operation process failures:

   Describe applicable targets (operation processes and sub-processes), failure modes, causes (constraints for implementation, and stringency) and countermeasures.

(2) Clarify and enhance processes for using accumulated information

1. Prevention of inherent failures:

Use of information for establishing safety and reliability in planning, design, and test manufacturing

2. Failure detection:

Use of information to eliminate errors during in-process inspection, element testing, and system commissioning.

*To make up for insufficient comprehensiveness of operating experience information, it is effective to develop good activities of each project as a method to enhance the process, such as external expert reviews.

*It is a good practice that the Decontamination and Decommissioning Engineering Company is benchmarking JAXA's (Japan Aerospace Exploration Agency) component and parts procurement process, etc.

2.2 Common issues through the oversight in this term

The following is an overall insight for common issues based on the oversight results of three power stations and HQ:

・ Strengthening practical capabilities in responding to emergency situations

Based on the examples of 1F emergency responses and 2F self-defense fire-brigade, the practical skills of TEPCO personnel in responding to disasters need to be enhanced.

The challenge would be to improve and verify the competence of the executor according to procedures, the commander of front actions, and the controller in back office operation through practical training with actual operations after establishing complete procedures for the activity required in hazardous situations.

・ Establishment of values of autonomy in safety improvement

Based on examples of using operating experience information at 1F and the review of the new inspection system, it is necessary to establish autonomous safety improvement as values.

The challenge would be to prevent the same mistakes by actively using good practices and internal and external operation experiences and for the practitioner to actually and promptly experience the achievement of process improvement.

・ Becoming an intelligent customer in procurement

Based on the use of operating experience information of 1F, and configuration management of Kashiwazaki-Kariwa, we need to clarify the responsibilities of TEPCO and contractors.

TEPCO's challenge would be for the working level staff with knowledge and experience to well understand safety requirements and verify the development from requirements to contractors' outcome (work, the supply of systems, submission of technical information, etc.) without fail.

(Note) An intelligent customer is an operator capable of recognizing what is important for nuclear safety, identifying requirements in management of all purchased goods, services received and contractors in the field, supervising work, and performing technical reviews in outcomes and construction as an organization.

3. POVs by Adviser Crofts based on evaluations

3.1 Fire protection

・ Nuclear power plants implement fire protection programs to provide a high level of protection to plants and personnel by preventing, detecting, controlling and extinguishing fires (excerpts from WANO "Performance goals and criteria" fire protection (FP.1)). However, such programs have not been systematized at TEPCO from the perspective of defense in depth.

This is an urgent and important issue, and I would like to highlight the vulnerability of the self-defense fire brigade observed especially at 2F. Their range of roles is not defined, the members have no actual extinguishing experience, and the content of training is extremely limited. With this, they may get injuries or lose their lives when needed to cope with fire in the difficult situation of nuclear facilities. A fire is common as an industrial accident, and the lack of fire protection programs increases its possibility.

TEPCO management should be responsible for the injuries and deaths of fire brigade. I urge the management to take immediate steps to reduce the risks faced by the fire brigade. The NSOO has not yet grasped the situation of Fukushima Daiichi and Kashiwazaki-Kariwa, but I request the management investigate the current status of these sites as soon as possible and take immediate actions to protect the fire brigade.

3.2 Intelligent customer

In the previous report, in response to the trouble of the spent fuel removal project of 1F Unit 3, the need of intelligent customer process has been described, which ensures nuclear safety in the procurement of equipment and operation.

In the Units 1/2 stack dismantling project, we are carrying out proactive oversight for the standards, procedures, and quality control of contractors to reduce the risk of failure and accidents, using lessons learned from Unit 3. I am quite pleased with this. It is requested to continue using such lessons and establish appropriate processes for ensuring nuclear safety in procured equipment and operation.

4. Status of completion of recommendations presented by NSOO

In general, the line division has shown good performance continuously towards the completion of NSOO recommendations.

- Among 158 recommendations that have been presented, 140 cases have been completed, and three cases have been completed in this quarter.
- In this term, 7 recommendations were presented.

5. Benchmarking and training

In this term, NSOO learned how fire protection is implemented in the U.S. through JANSI for the oversight and evaluation of fire protection area. This was the first attempt as NSOO, and we could expand the range for oversight methods.

The following activities were implemented in January:

*Benchmarking emergency response training at Torness Nuclear Power Station of EDF Energy in the U.K. (viewpoint of independent oversight activities)

*Third-party review for independent safety oversight function by WANO

NSOO will continue improving its oversight function through these activities.

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3.5 ASSISTANCE FROM THE NUCLEAR SAFETY ADVISORY BOARD【MEASURE 2】

Since 2017 the Nuclear Safety Advisory Board (NSAB) has continued to provide advice and instruction to nuclear power division general managers and site superintendents from perspective of overseas experts who have experience as nuclear power division general managers and site superintendents in overseas. In October the fourth review of Kashiwazaki-Kariwa and Headquarters was implemented, and the fifth review of Fukushima Daini and Headquarters was implemented in December. Also, during emergency response training held on October 2, one member of the board focused observations on improvements that have been made to the sharing of information with the NRA at Headquarters. Although the assessment was mostly positive, it was suggested that there is room for further improvement in regards to interactions with the NRA and mechanisms for sharing information. The assessment and suggestions shall be given as feedback to departments responsible for emergency response training, and these departments are in the process of formulating improvement plans.

◆ 4th Meeting

During the fourth meeting (October), the progress with key issues that need to be addressed at power stations, which were determined by power station executives during the second NSAB meeting, and the progress with past issues that were pointed out, were examined, and the Board said that, "A certain amount of progress has been seen in all fields, which is positive. Observation will continue."

◆ 5th Meeting

During the fifth meeting (December) emergency response training at Fukushima Daini was observed. At Headquarters a focused debate once again was held on the new regulatory system that was put into trial operation in October by the Nuclear Regulatory Agency, and advice was received about improvements that should be focused on going forward.

Observing emergency response training (front row)

Discussion with NSAB members

NSAB suggestions from the 4th and 5th meetings and improvement plans pertaining those suggestions are as follows:

	Suggestions from the NSAB	Improvement Plan
HQ	Comprehensive and suitable action plans for "permeating and rooting the concept of operations-led", and "plant knowledge and Fundamentals integrated into operators," however there are also uncompleted action plans.	Study sessions for fostering understanding of the concept of operations-led throughout the entire organization are underway. Education is also being provided in coordination with education and training departments.

	Suggestions from the NSAB	Improvement Plan
	Power stations should take ownership of configuration management and Headquarters should formulate processes and engage in screening and matching.	Initiatives to prepare configuration management for renovations underway, and education to foster understanding of configuration management by all the power station workers, are being implemented.
	Being too tolerant of the fact that contractor eligibility requirements are not as stringent as international standards is an issue.	Education is being provided for all personnel engaged in maintenance. A training plan for contractors that spanned several years have been created and executed.
	The direction being taken to root and permeate CAP is correct but development is slow. More focus should be put on important issues.	We will move forward with the created development programs while improving coordination with power stations.
	In regards to risk awareness/mitigation/elimination, there is room for improving risk mitigation policies that balance the degree of risk, time margins, and cost.	A detailed self-assessment based upon WANO significant operating experience reports (risk management challenges) has been implemented and action plans are being executed.
Fukushima Daini	In regards to clarifying the direction of Fukushima Daini, workers should come together and focus on achieving goals.	Effort is being made to maintain worker motivation through continual dialogue between power station executives and power station personnel while coordinating with related departments.
	In regards to the emergency response departments and large-scale evacuation training, emergency response training was observed. There are issues that need to be addressed with information sharing tools, the layout of the emergency response center and behavior.	Some of the suggestions are the same that were made during observation at Headquarters so efforts to improve information sharing shall be made in coordination with Headquarters.
	It was pointed out in regards to ownership of maintenance work that TEPCO should take responsibility for the quality of work consigned to contractors. Since necessary initiatives have been appropriately implemented at the power stations, monitoring of Fukushima Daini will conclude. However, Headquarters' handling of the entire division will continue to be monitored.	

3.6 COMMENTS, GUIDANCE, AND ASSESSMENT BY NUCLEAR POWER RELATED AGENCIES

◆ Headquarters: Insufficient preventative measures at HQ

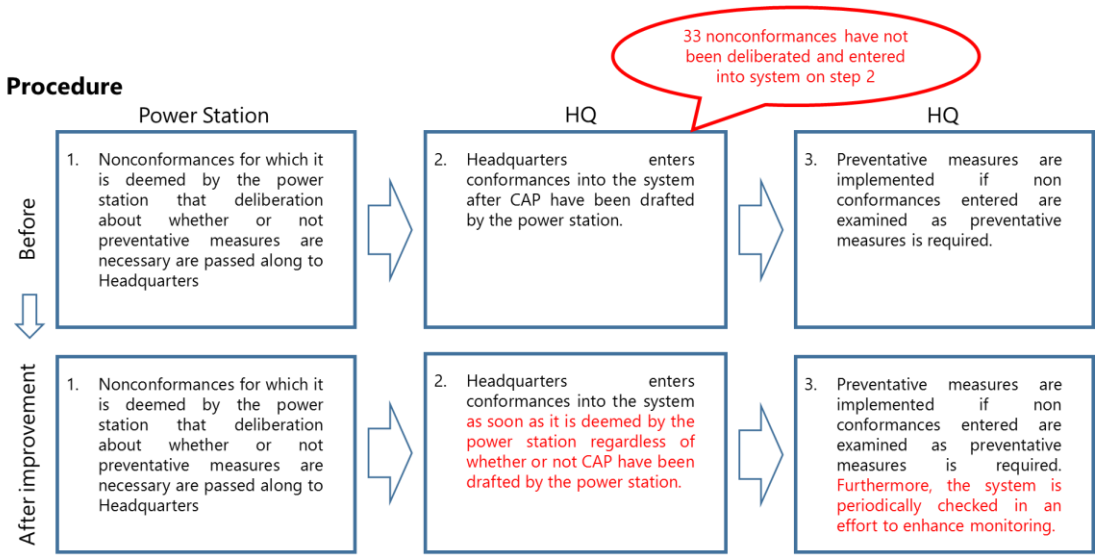
Even though CAP have been drafted for the four issues for which the deliberation of preventative measures was deemed required during the FY2018 third safety inspection of Fukushima Daini conducted on November 27, it was pointed out that corrective measures have not been deliberated at Headquarters. An internal investigation found that a total of 33 issues had not been deliberated.

Nuclear safety is ensured by implementing 1. nonconformance measures (which eliminate nonconformances and prevent nonconformances from being ignored) in accordance with the level of importance of nuclear safety-related nonconformances, 2. corrective measures (which prevent recurrence by removing causes), and 3. preventative measures (that horizontally disseminate corrective measures).

Nonconformances for which it is deemed by the power station that deliberation about whether or not preventative measures are necessary are passed along to Headquarters where the decision is made whether or not to implement preventative measures. However, whether or not preventative measures are necessary has not been examined for some nonconformances.

One reason for this is the fact that even though task processes are noted in manuals and guides, there is no detailed mention of deadlines, procedures, or how to proceed in regards to entering issues for which preventive measures need to be examined into the system. Another reason is the fact that detailed task procedures and deadlines are not clear, so management progress is not being effectively monitored. As a result, nonconformances for which the need for preventative measures has not been examined are being overlooked.

As a recurrence prevention measure issues for which preventive measures need to be deliberated are quickly entered into the system as soon as it is deemed by the power station that deliberation over the need for preventative measures is required, regardless of whether or not CAP have been drafted, in order to prevent a situation where preventative measure activities are never started. In addition, data entry into the system is periodically checked in an effort to enhance monitoring (see diagram below).



Problem cause and recurrence prevention measures

◆ Kashiwazaki-Kariwa: International Physical Protection Advisory Service (IPASS) follow-up mission

An advisory service by which a team of IAEA experts provide advice to enhance a nation's nuclear security system was provided for Japan over approximately two weeks starting on November 26 (IPASS). The team of experts visited Kashiwazaki-Kariwa, which was chosen as a power station representative of Japan, on November 29 to examine nuclear security measures.

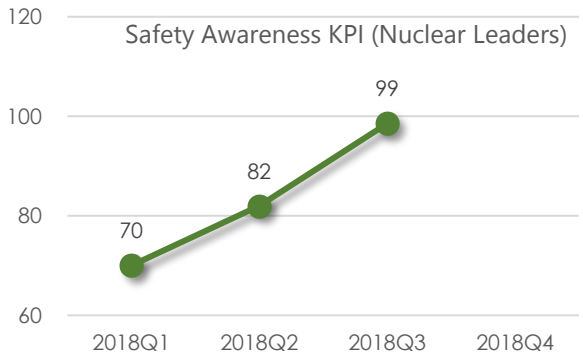
4 KPI/PI RESULTS

Upon looking back on the FY2017 KPI/PI measurement/monitoring results, the decision was made to make revisions so as to enable the degree of rooting of improvement/reform efforts to be monitored even better. So, the FY2018 nuclear safety Reform KPI/PI were revised (FY2017Q4 Progress Report). In regards to KPI, new PI related to KPI (five new PI) were added so that safety reform progress is reflected in KPI based upon the approach of a "mean value for achievement level of related PI targets." Furthermore, FY2018 targets were increased 10 points above FY2017, and we aim to achieve these targets by the end of the fiscal year.

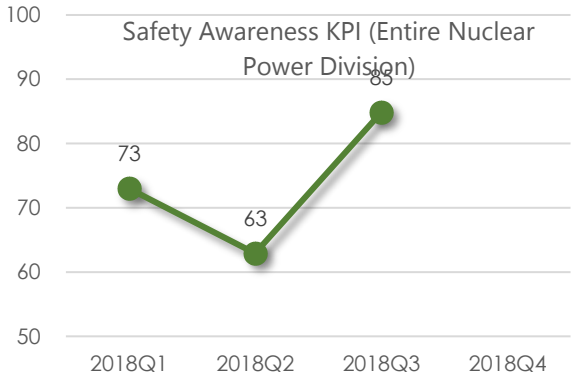
4.1 KPI RESULTS

Safety Awareness KPI ····· Target

Safety Awareness（Nuclear leaders）80 Points

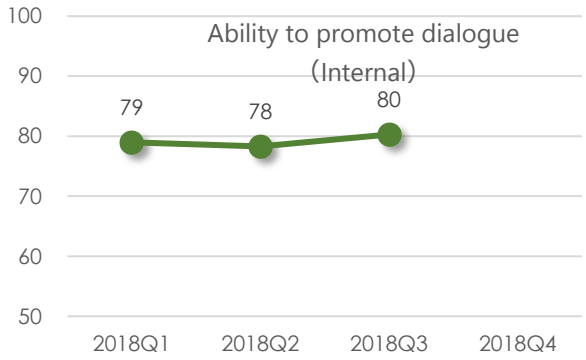


Safety Awareness（Entire Nuclear Power Division）····· 80 Points

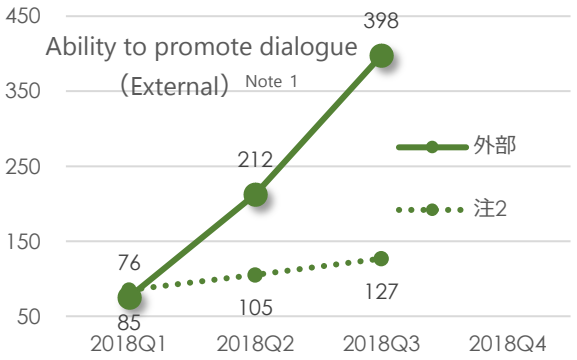


Ability to promote dialogueKPI ····· Target

Ability to promote dialogue（Internal）·····80 Points



Ability to promote dialogue（External）·····80 Points



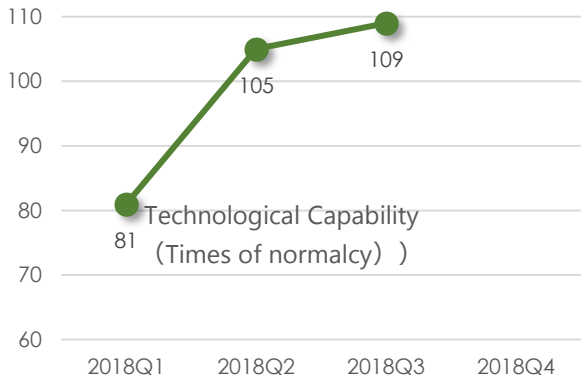
Note 1: Ability to promote dialogue KPI (external) for Q3 increased dramatically due to over 50,000 opinions received during home visits in the Kashiwazaki-Kariwa region.

Note 2: The dotted line indicates reference values for the ability to promote dialogue (external) excluding the opinions gathered during home visits.

Technological Capability KPI·····Target

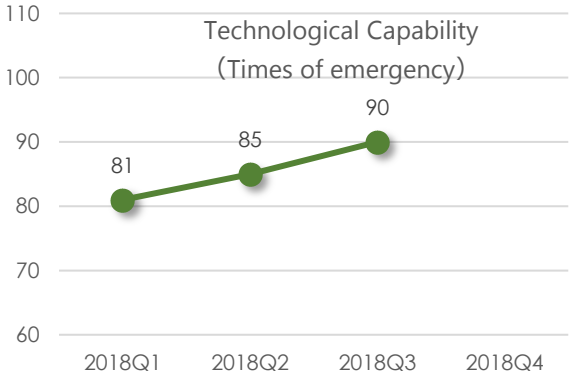
Technological Capability（Times of normalcy）

·····110 Points



Technological Capability（Times of emergency）

·····110 Points



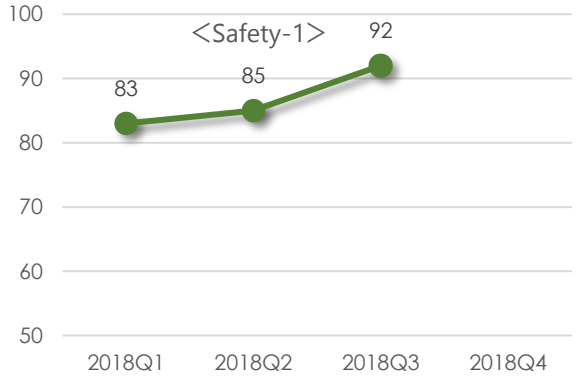
4.2 PI Results

Safety Awareness PI·····Target

Nuclear leaders

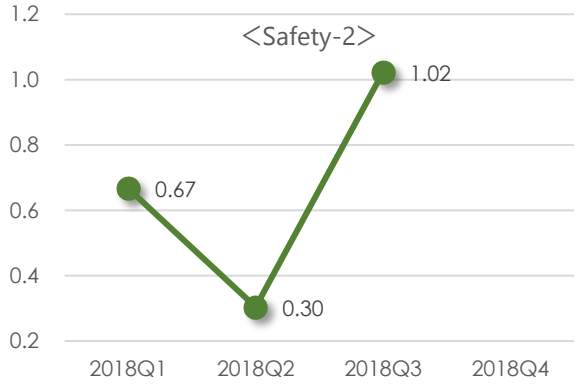
＜Safety-1＞ Rate of implementation of retrospection leveraging the traits by Nuclear leaders

····· 100%

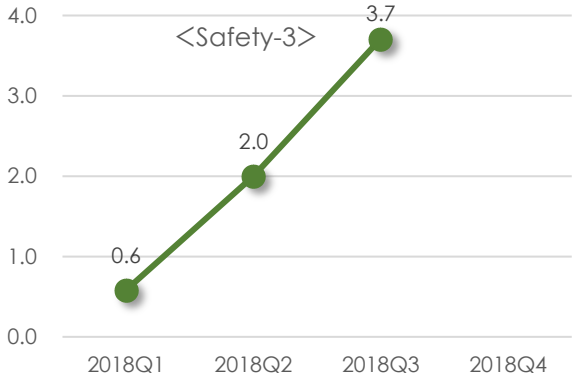


＜Safety-2＞Number of times emails have been sent by nuclear leaders in order to share information

····· Once a week/person

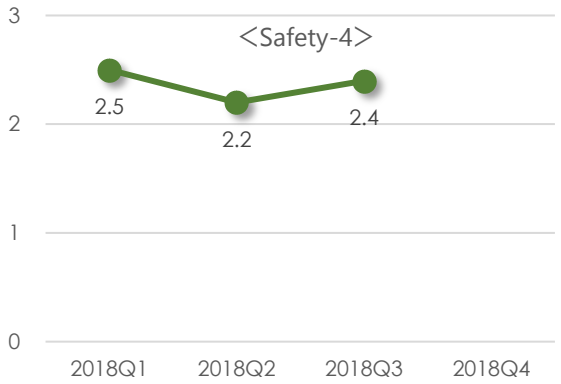


＜Safety-3＞Number of times nuclear leaders participated in training according to plan
Twice/year/person

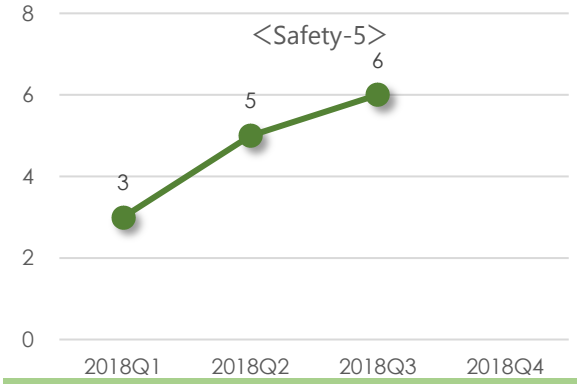


Note: Leader increases/decreases have been corrected going back to Q1

＜Safety-4＞Number of times nuclear leaders went into the field
……Twice a month

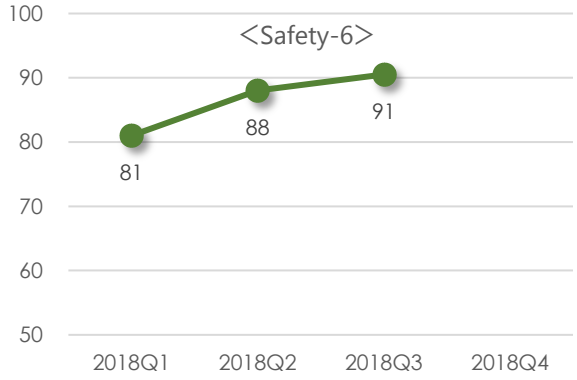


＜Safety-5＞Number of benchmarked issues for which nuclear leaders are responsible for were put into practice…… 4 times/year

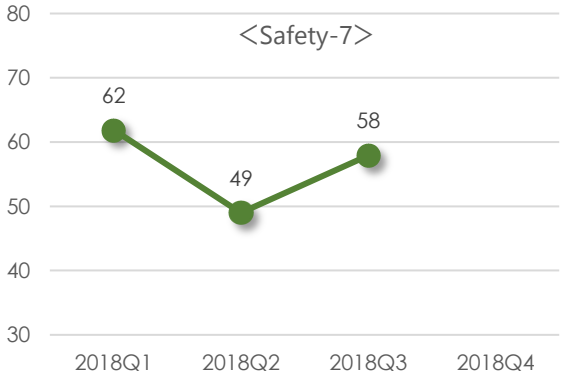


Entire Nuclear Power Division

＜Safety-6＞Implementation rate of group discussion about Traits …… 100%

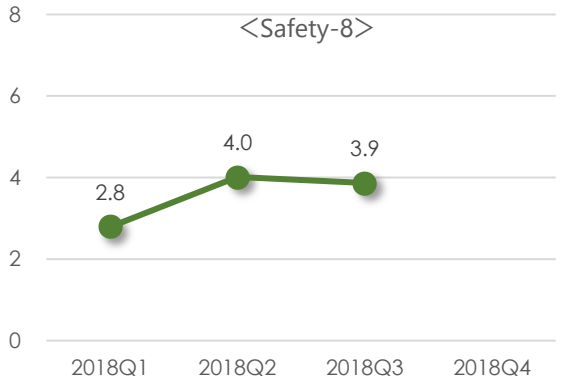


＜Safety-7＞Percentage of intranet messages from nuclear leaders that have been read……80%



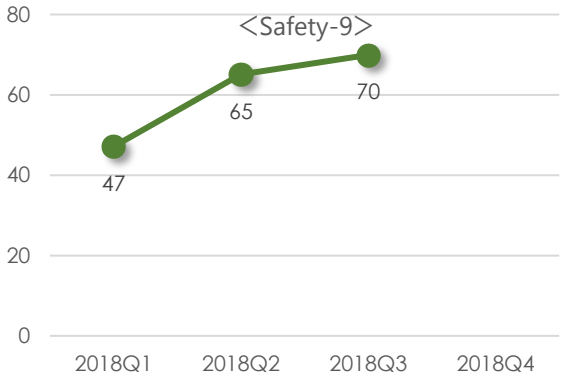
Note: Values for Q3 are the most recent but do not include the last month which is not a full month since the message was sent. Q2 values are fixed and include the last month.

＜Safety-8＞Number of times managers engaged in management observation at power stations‥ times/month/person （Determined by each dept.）



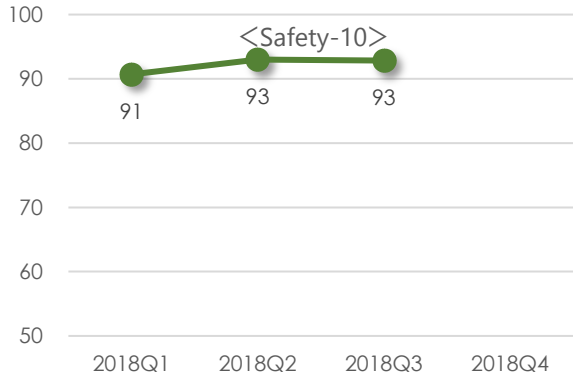
Reference: Weighted average for Fukushima Daiichi, Fukushima Daini and Kashiwazaki-Kariwa

＜Safety-9＞Good MO reporting rate ……50%



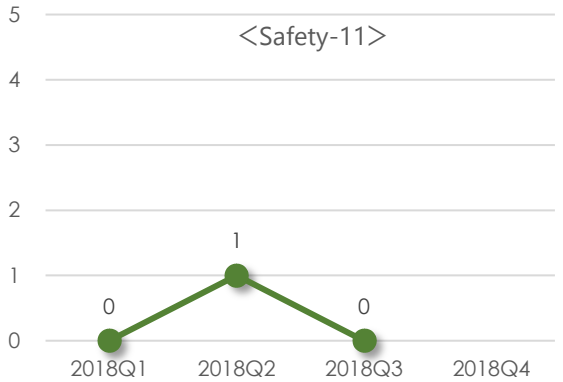
Reference: Weighted average for Fukushima Daini and Kashiwazaki-Kariwa

＜ Safety-10 ＞ Completion rate of GII or higher corrective measures within the deadline100%



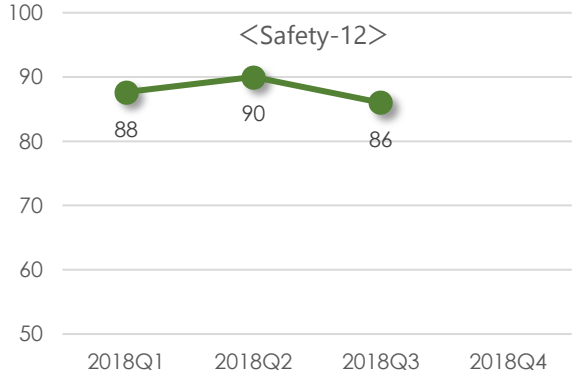
Note: Weighted average for HQ, 2F and KK

＜Safety-11＞No. of nonconformance recurrences (GII or higher) ……0/month

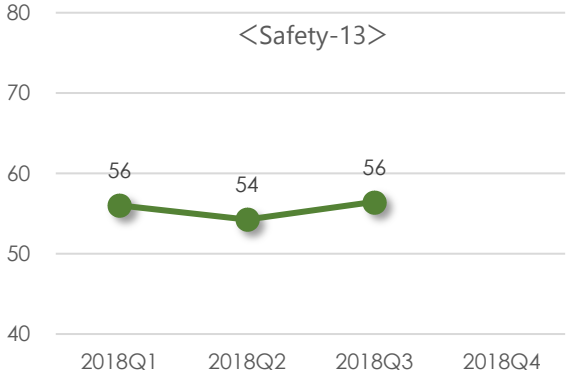


Note: Total for HQ, 2F and KK

＜ Safety-12 ＞ Nonconformance voucher period achievement rate……80%

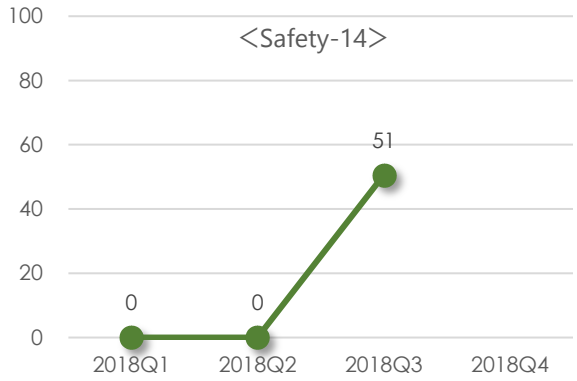


＜Safety-13＞New OE information viewing rate‥‥75%



Note: Weighted average for HQ, 2F and KK

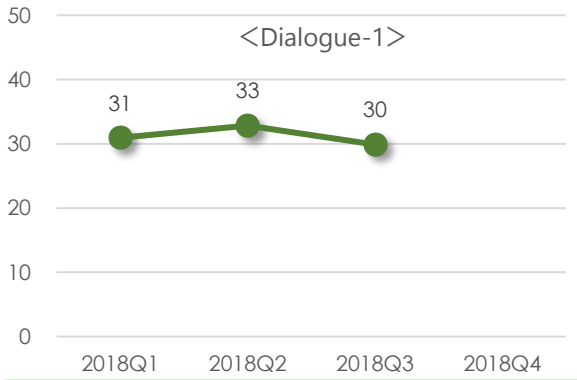
<Safety-14> Significant OE training participation rate 60%



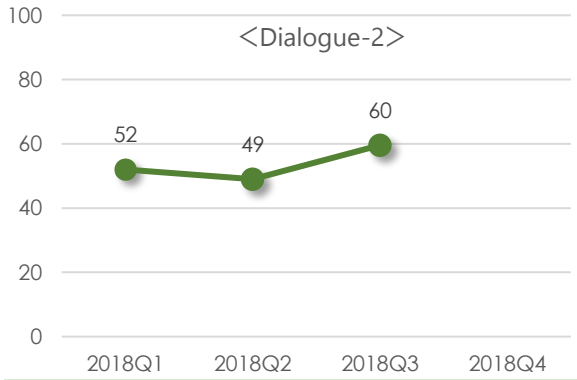
Ability to promote dialoguePI ..... Target

Internal

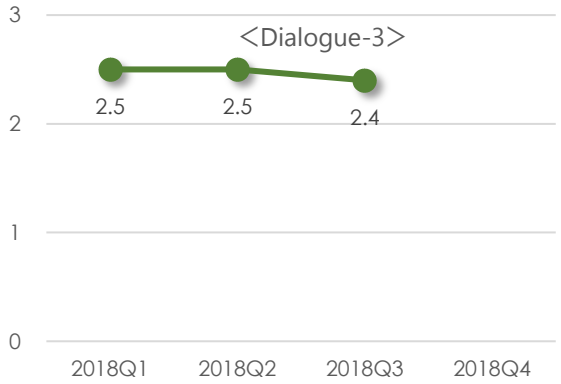
< Dialogue-1 > Percentage of employees that feel that intranet messages from nuclear leaders are "helpful" 50%



<Dialogue-2> Response rate to e-mail questionnaire on the information conveyed by nuclear leaders 70%



<Dialogue-3> Degree of understanding of information conveyed by nuclear leaders ..... 2.5 Points



External

＜ Dialogue-4 ＞ Questionnaire results on the quality/quantity of disseminated information ……Positive increase over last fiscal year

—

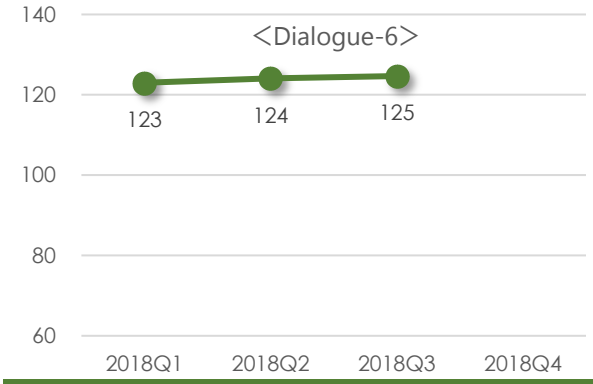
Reference: To be reported in Q4

＜Dialogue-5＞ Questionnaire results on the approach to and awareness of, public relations and public opinion gatheringPositive increase over last fiscal year

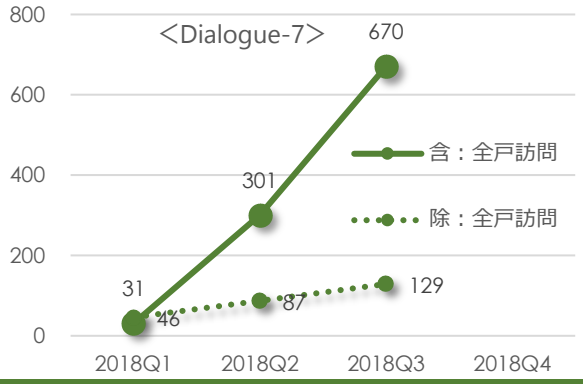
—

Reference: To be reported in Q4

＜ Dialogue-6 ＞ Dialogue activity questionnaire assessment……100 Points



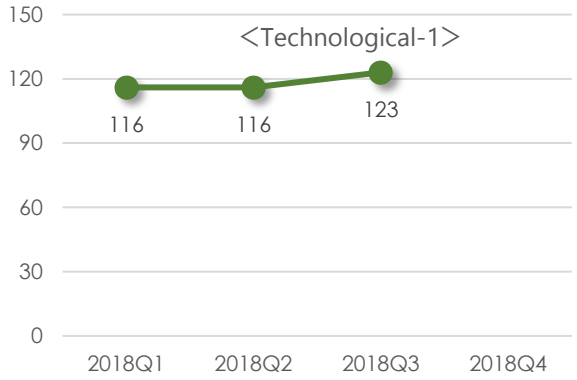
＜ Dialogue-7 ＞ No. of opinions from community members……Positive increase over last fiscal year



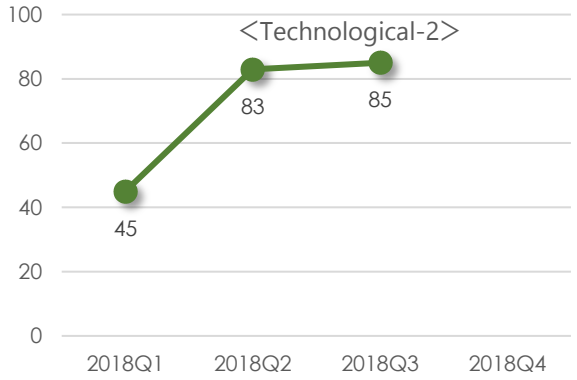
Technological CapabilityPI……Target

Times of non-emergency

＜ Technological-1 ＞ No. of workers certified in operations/maintenance/engineering/radiation and chemistry/fuel/safety, no. of external certification holders …… 110 Points



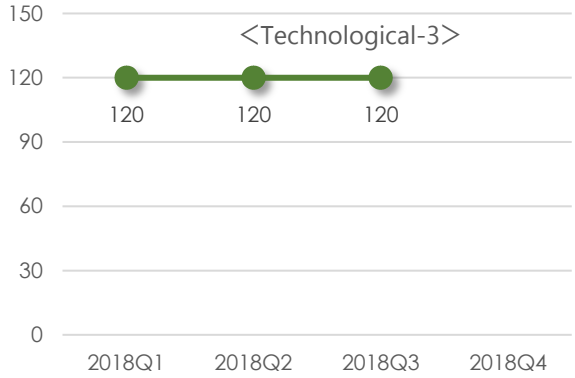
＜ Technological-2 ＞ Rate of reflection of education/training program improvements requested by line departments……80%



Times of emergency

＜ Technological-3 ＞ No. of in-house certified emergency personnel (fire trucks, power supply trucks, cable splicing, radiation surveys, wheel loaders, Unic trucks, etc.) 120%

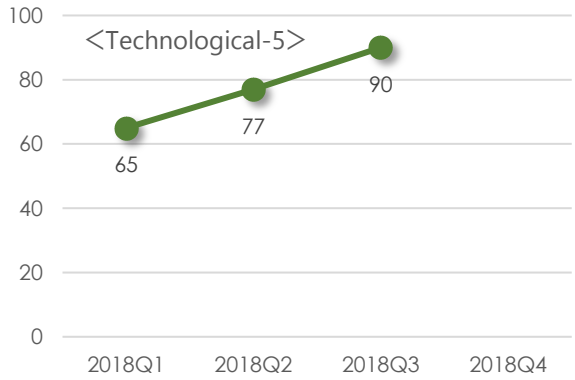
＜ Technological-4 ＞ Percentage of "A" assessments given by the Nuclear Regulatory Agency for emergency response training categories 80%



56%

Note: Assessment is conducted annually. Assessment results are for training from the previous fiscal year

<Technological-5> Training participation rate····90%



CONCLUSION

On November 30, 2018 TEPCO opened the TEPCO Decommissioning Archive Center which provides a place for not only the residents of Fukushima Prefecture and the local communities around the power stations, but also people from all over Japan and overseas, to learn the facts of the Fukushima Nuclear Accident and see the current state of decommissioning. Preserving the memories and records of the Fukushima Nuclear Accident and passing down the regrets and lessons learned to parties both within and outside the company to prevent such an accident from ever happening again is an important responsibility of TEPCO. We also believe that carefully explaining the long-term decommissioning process and progress with it is indispensable for providing residents of the local communities with peace of mind. TEPCO has opened the TEPCO Decommissioning Archive Center with the determination to never forget the regrets and the lessons learned from the accident, pass down this information to later generations, and fulfill our obligations to complete the decommissioning process and help Fukushima recover.

In TEPCO's response to the NRA about the seven basic issues that must be addressed in order to confirm TEPCO's stance on engaging in the nuclear power business, we made seven public promises[i] that include, "taking the lead in completing the decommissioning of Fukushima Daiichi," and "endlessly striving to improve nuclear safety." One of these seven promises includes creating an internal company that does not result in any changes to the assignment of responsibility that would affect review requirements. We therefore submitted an application to make modifications to the safety regulations in conjunction with organizational reforms on November 20, 2018. However, during review meetings (November 29, December 6) many points of debate were brought up in regards to where the president's responsibility lies and the relationship with the Fukushima Daiichi Decontamination & Decommissioning (D&D) Engineering Company. We took these opinions to heart and after careful consideration throughout the company we stated during the review meeting on December 11 that we would submit a new application to modify the safety regulations in order to move forward with creating an internal company in a better fashion.

Going forward we will continue to move steadily ahead with recovery in Fukushima and the complete decommissioning of the Fukushima Daiichi Nuclear Power Station, which are the reasons why our company still exists, while also establishing a corporate culture that endlessly pursues safety and continuing deliberations about creating an internal nuclear company to achieve our goal of becoming a nuclear operator that is trusted by the siting communities and society as a whole.

With firm resolution to, "**keep the Fukushima Nuclear Accident firmly in mind; we should be safer today than we were yesterday, and safer tomorrow than today**," we continue to promote nuclear safety reforms while subjecting ourselves to objective assessments by the Nuclear Reform Monitoring Committee. We are more than happy to hear any comments or opinions you may have about these reforms.

ABBREVIATIONS

ALARA：As Low As Reasonably Achievable

CAP：(Corrective Action Program) Programs for improving the performance of the organization by identifying nonconformances and problems that may have an impact on safety as well as areas where the quality of safety has not reached world standards, analyzing causes, and quickly taking corrective action while also implementing recurrence prevention measures.

CAQ： condition Adverse to Quality. Used as a criterion for classifying CAP response level in consideration of nuclear safety.

CDO: Chief Decommissioning Officer

CFAM：(Corporate Functional Area Manager) Leader at the Head Office that aims to achieve the world's highest level of excellence for each aspect of power station operation

COP：Common Operational Picture

CP：Construction Permission

CR：Condition report. Used to enter things noticed and nonconformance information in a database in order to share it.

CRC：Curriculum Review Committee

EAL： Emergency Action Level. Standards for declare an emergency in the case of an abnormal event at a nuclear power facility

EP：Establishment Permission. Reactor installation modification permission

ERC：Emergency Response Center

IAEA：International Atomic Energy Agency

JANSI：Japan Nuclear Safety Institute

KPI：Key Performance Indicator

LCO：Limiting Conditions for Operation

MAAP：Modular Accident Analysis Program

MO：Management Observations

NSAB：Nuclear Safety Advisory Board

NSOO：Nuclear Safety Oversight Office）

OE Information: Operating Experience Information. Information on troubles at other power stations and in other industries is shared in order to learn lessons from it.

PCV：Primary Containment Vessel

PI：Performance Indicators

PICO：Performance Improvement Coordinator

PRA：Probabilistic Risk Assessment

RC：Risk Communicator

RIDM：Risk-Informed Decision Making

ROP：Reactor Oversight Process (in the United States)

SAT：Systematic Approach to Training (proposed by the IAEA)

SC Office:　Social Communication Office

SFAM：(Site Functional Area Manager) CFAM counterpart at power stations

SOER：Significant Operating Experience Report stipulated by WANO

TBM-KY：　Tool Box Meeting-*Kiken-Yochi (predicting danger)*. Prior to engaging in work, small groups gathered to predict orc dangers and decide on methods to complete the task safely

Traits：10 Traits and 40 behaviors indicative of robust nuclear safety culture

WANO：World Association of Nuclear Operators

WM：Work Management