



NUCLEAR SAFETY REFORM PLAN

FY2018Q1 PROGRESS REPORT

Tokyo Electric Power Company Holdings, Inc.
August 10, 2018

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 first quarter of FY2018¹(April~June, 2018).

Upon determining that allowing continued vagueness in regards to what to do with Fukushima Daini would only hinder recovery efforts in Fukushima, TEPCO stated on June 14 that it will move forward with examining detailed plans for the decommissioning of all reactors. The final decision in this matter must be made upon explaining all issues to stakeholders and identifying/resolving problems, and we believe it vital that the local community holds no anxiety about this proposal, which shall be viewed in total with the decommissioning of Fukushima Daiichi. We shall continue to keep in close communication with the local community and prioritize safety.

Furthermore, last autumn we clearly stated our intent to develop land that in the long-term will be the location of additional facilities at Higashidori and announced on June 29 that we will be conducting full-scale geologic surveys of these areas. TEPCO aims not only to conform to the new regulatory requirements that were issued after the Fukushima Daiichi nuclear power accident, but also employ the latest knowledge to design power stations that offer superior safety, and these surveys will help us to gather information required to assess the potential for building additional facilities. As part of this process, we will share the results of these geological surveys with domestic nuclear power operators if necessary to gain their cooperation and receive suggestions based upon their knowledge and experience.

¹ All dates hereinafter refer to 2018 unless otherwise noted.

1 PROGRESS WITH SAFETY MEASURES AT NUCLEAR POWER STATIONS

1.1 PROGRESS OF REACTOR DECOMMISSIONING

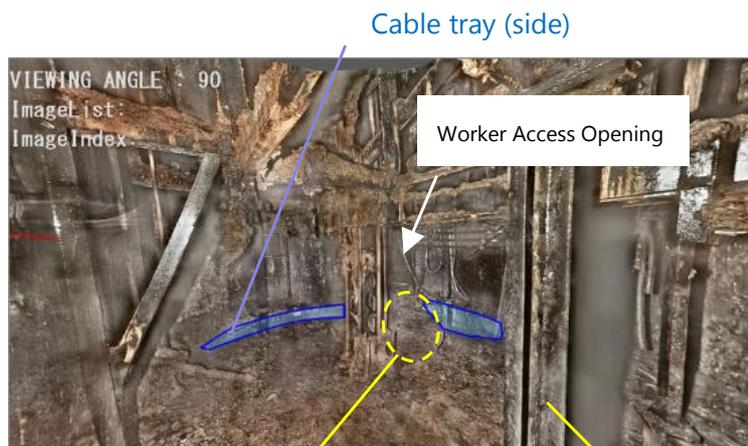
At Fukushima Daiichi, we are moving steadily and safely forward with decommissioning in accordance with the TEPCO Holdings, Inc. Mid-and-Long-Term Roadmap Towards Decommissioning of Fukushima Daiichi Nuclear Power Station Units 1 to 4 (September 26 revision).

(1) Fuel Debris Removal

In preparation for fuel debris removal we conducted investigations of the Unit 1-3 primary containment vessels (PCV) utilizing robots and muons. In preparation for fuel debris removal from the reactor prioritized for this process, we are examining removal methods based on a step-by-step approach that consists of removing the fuel in the open air and from the side. We shall start small and gradually enlarge the scope of operations in accordance with the Fuel Debris Removal Plan.

◆ Unit 2

By analyzing the images acquired during the internal investigation of the Unit 2 PCV implemented in January, we have discovered that deposits thought to contain fuel debris have accumulated on the bottom of the pedestal. In the background of the photos there are several locations where the deposits are higher than those in the surrounding area, and it is hypothesized that these indicate multiple locations where fuel debris fell. The images did not show any significant information or damage to structures on the bottom of the pedestal, such as support braces, etc., or the walls. We will continue to make preparations to conduct more investigations in order to gain a better understanding of the conditions inside the PCV.



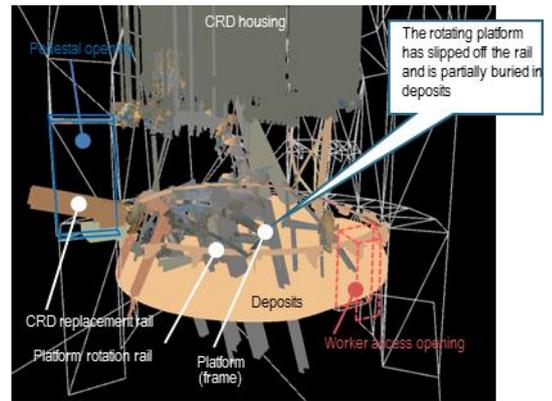
Deposits higher than surrounding deposits

Pillar

Image analysis from inside containment vessel

◆ Unit 3

At Unit 3 we have rendered a 3D image of the inside of the pedestal using images taken during the Unit 3 PCV internal investigation conducted in July 2017 in order to ascertain conditions inside the pedestal. The rendering has provided a visual representation of the relative position of structures inside the pedestal, such as the rotating platform which appears to have slipped off its rail and is partially buried under deposits. These results will be used to continue to deliberate fuel debris removal, such as in the design of fuel removal apparatus.



Rendered 3D image

(2) Removing fuel from the spent fuel pool

◆ Unit 1

On the south side of the operating floor (the spent fuel pool side) we are preparing to construct a protective covering over the spent fuel pool to prevent objects from falling into the pool and damaging the fuel when rubble is removed from this area. As part of these preparations we began removing some of the surrounding steel beams on May 10. In July we will take dose measurements from around the pool in order to draft a work plan for steadily moving forward with work to protect the spent fuel pool. As we move forward with this project we will continue to assess and manage risk, and implement thorough safety measures, such as measures to prevent the dispersion of radioactive substances, as we aim to commence fuel removal in FY2023.



Removal of surrounding steel trusses (left: before removal, right: after removal)

◆ Unit 2

Differing from Units 1 and 3, a hydrogen explosion did not occur at Unit 2 and such was spared from damage to its reactor building. Therefore, in preparation to remove fuel from the spent fuel pool, we began making an opening on April 16 to access the operating floor and completed the work on June 21. Going forward we shall use remotely operated robots to measure radiation levels and take photographs of primarily the area around the opening.



Opening in west wall of reactor building

◆ Unit 3

- At Unit 3, we have completed installation of the fuel handling machine, crane and all eight sections of the domed roof in preparation for fuel removal from the spent fuel pool, and trial operation of the fuel handling machine has begun.



Trial operation on Unit 3 R/B operation floor

- We have determined that the crane control panel nonconformance on May 11 was caused by the tripping of surge protectors inside the control panel that were still set to factory settings (380V) when subjected to the 480V current used at the power station. As a result, current flowed through the surge protectors for long periods of time thereby overheating the inside of the protective measure panel and melting insulation which resulted in short-circuits and ground faults. We shall ascertain the reason for the failure to reset the surge protectors to the current used at the power station. Other nonconformances, such as damage to some other pieces of equipment, that are assumed to have been caused by the faulty voltage setting had occurred since March when trial operation of the crane began, but the cause of these nonconformances was not fully ascertained thereby leading to this situation. The root causes of this failure to fully understand the situation shall also be analyzed.
- These nonconformances delayed our schedule approximately one to two months, but we will continue to closely examine the schedule and move forward with the project while prioritizing safety. We plan to commence fuel removal during the middle of FY2018.
- Fuel removed from the Unit 3 spent fuel pool will be stored in the common pool, so in order to secure space in the common pool we began relocating some of the fuel currently being stored in the on-site dry cask temporary storage facility on May 27. In order to prevent any impact on the environment around the site, the fuel will be stored in a stable state by putting it into special containers (dry casks) that are shielded and designed to remove heat through natural convection.

(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.

◆ Initiatives to prevent contaminated water from being generated during heavy rainfall

At Fukushima Daiichi we are implementing countermeasures to prevent increases in contaminated water caused when rain seeps into the building during heavy rainfall caused by typhoons, etc. Field investigations conducted to date have shown that one of the causes of the increase in contaminated water during heavy rainfall is rainwater that seeps into the buildings after flowing backward up drainage pipes connected to storm-water inlets. On June 22, a backwash prevention valve was installed on the west side of Unit 1 in order to prevent water from flowing backwards up drainage channel K. We will continue efforts to reduce the amount of contaminated water being generated by implementing countermeasures for other routes by which water enters the buildings.

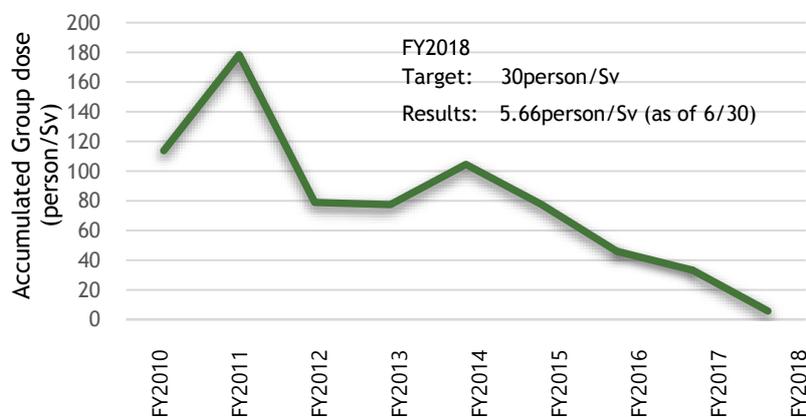


Installed backwash prevention valve

(4) Initiatives for reducing exposure dose

In accordance with the revised Mid-to Long-Term Roadmap, we are implementing optimal countermeasures for radioactive substances, which are potential sources of risk, after prioritizing them based upon current conditions. Based upon this approach, at Fukushima Daiichi we are making efforts to reduce exposure doses by estimating exposure doses for projects before they begin and deciding whether or not the project should be implemented upon assessing increases/decreases in risk.

The concentration of radioactive substances in the dust in the air along the roads around the Unit 1~4 buildings continues to fall below levels that require masks, so on May 8 the designation of this area was changed to a Green Zone thereby only requiring standard work uniforms and increasing the total percentage of the site that only requires standard work uniforms to 96%. In accordance with this change made during the first quarter, workers engaged in field patrols no longer have to change clothes and can wear standard work uniforms on all roads on-site thereby reducing workload and improving safety and efficiency.



Trends in accumulated group dose by fiscal year

(5) Introduction of automated EV buses

In order to improve infrastructure at the Fukushima Daiichi site and enable decommissioning to proceed smoother, we started using automated EV buses on April 18. Employees and contractors voted to select from one of three bus designs. The chosen design is meant to depict the “fresh breeze” at Hamadori by using colors, such as blue (the same color as work uniforms in the Green Zone), and green (a color symbolic of safety and the mountains of Hamadori) to illustrate the ocean and sky at Hamadori. The buses have been affectionately nicknamed “*Hamakaze-e*.” The “e” stands for EV, Ecology and Energy. Initially an operator will be present on the bus at all times, but eventually the buses will be left to complete automated operation. The buses continue to operate safely and after we have gained more experience with automated operation at Fukushima Daiichi we hope to expand the use of these vehicles off-site to contribute to the region.



Automated EV Bus being used



はまかせ^e

Design and nickname

(6) Conclusion of investigation by the TEPCO HD/Niigata Prefecture Joint Investigation Committee

On May 18, 2018, TEPCO received the final report from the TEPCO HD/Niigata Prefecture Joint Investigation Committee on the investigation into problems surrounding the reporting and notification of core meltdowns during the Fukushima nuclear accident. The final investigation report from the Joint Investigation Committee stipulates “lessons to learn” for each of the issues covered. We will seriously examine these lessons to learn noted in the final investigation report as we continue to strive to improve our ability to respond to accidents and to convey information by, for example, revising the content of training and education for emergency response personnel and cultivating in-house experts, etc., based upon the countermeasures for problems related to the reporting and notification of core meltdowns² during the Fukushima nuclear accident that were publicly announced as part of “TEPCO APOLOGIZES FOR PREVIOUS LEADERSHIP’S FAILURE” that was given in light of the final investigation report³ from the third-party investigation committee.

Furthermore, in an effort to gather more information an intranet site was created to enable all employees of the Nuclear Power Division to see the issues being investigated by the Joint Investigation Committee, and from July 7, 2016 employees have been asked upon to supply any relevant information they may have. No new information or opinions have been received since FY2017, and with the conclusion of the investigation by the Joint Investigation Committee the call for information will also be concluded.

² Announced on June 21, 2016

³ Final investigation report; Third-Party Investigation Committee on Notifications and Reports Made during the Fukushima Daiichi Nuclear Power Station Accident; received on June 16, 2016

1.2 PROGRESS OF SAFETY MEASURES AT KASHIWAZAKI-KARIWA

(1) Progress with safety measures

At Kashiwazaki-Kariwa, safety measures are being implemented with a focus on Units 6 and 7 based upon the 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.)	Underway	Completed
	Reinforcement of transmission tower foundations※ and strengthening of the seismic resistance of switchyard equipment ※	Completed	
Preparing for damage to the reactor core or spent fuel	Preparation of large volume water pump trucks and installation of substitute seawater heat exchanger equipment	Completed	Completed

Safety Measures (※: Measures independently implemented by TEPCO)		Unit 6	Unit 7
[Augmenting heat removal and cooling functions]	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 PCV 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 hydrogen 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

Safety Measures (※: Measures independently implemented by TEPCO)		Unit 6	Unit 7
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	Underway

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

◆ Strengthening Emergency Response

- Construction and Reinforcement of Multiple Access Routes

An access road (length: Approx. 1.9km) to the Unit 5 Emergency Response Center from the Main Administration Building that is high enough to be safe from a standard tsunami (12m above sea level) was newly built (completed in March 2018). A fire belt approximately 20m wide and 1.6km long was also created to protect the newly built access route from forest fires. To enhance resistance to fire mortar was sprayed and the road was paved with asphalt to prevent vegetation from growing (completed in March 2018).

In order to further improve safety, we plan to implement countermeasures that will maintain the function of the fire belt even if the slope collapses as a result of an earthquake.



Access route (prior to landscaping)



Access route (after landscaping)



Fire belt (prior to construction)



Fire belt (after construction)

(2) Investigating and Implementing Corrective Measures for Penetrations in Firewalls

After it was found that the penetrations in firewalls in the Unit 2 reactor building had not been fireproofed (July 2017), an investigation was performed that covered all Units 1 through 7 and common facilities. The investigation revealed that there were 60 locations where penetrations in firewalls had not been fireproofed (November 2017).

In order to improve the accuracy of the results of this investigation, the inspection details were revised and it was decided that another field inspection would be conducted from the end of April.

After closely examining the 60 locations that were found to have not been fireproofed, it was discovered that only 26 did not comply with the Building Standards Act. All 26 locations had been fireproofed as of May 9.

The status of investigations and corrective measures are as follows.

<Status of investigation/corrective measures for penetrations in firewalls that do not comply with the Building Standards Act> (as of July 11)

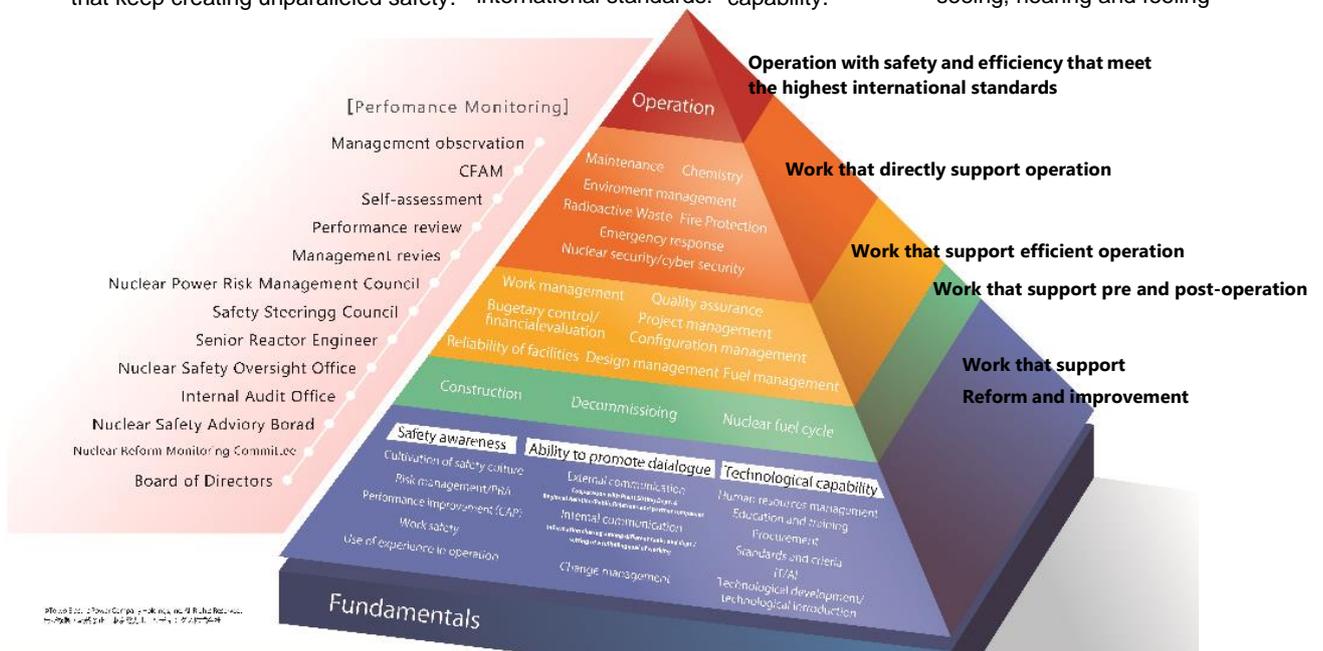
<i>Unit</i>	<i>Investigation Status</i>	<i>Investigation Progress Rate</i>	<i>Locations in need of fireproofing</i>	<i>Number of locations that have been fireproofed</i>
Unit 1	Preparations underway	—	19	19
Unit 2	Preparations underway	—	4	4
Unit 3	Preparations underway	—	—	—
Unit 4	Preparations underway	—	—	—
Unit 5	Preparations underway	—	2	2
Unit 6	Investigation underway	10%	1	1
Unit 7	Investigation underway	25%	0	0
Other	Investigation underway	5%	0	0
Total			26	26

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



Management Model concept diagram

2.1 ACTIVITIES TO BETTER ALIGN THE VECTORS OF ALL DIVISIONS

2.1.1 Enhancing 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 22, 2017). During FY2018 we shall engage in activities that aim for excellence upon creating a business plan based on the Management Model.

In order to ensure that the business plan formulated based on the Management Model is carried out, during the first quarter we used television conferencing systems to hold joint briefings between headquarters, each power station, and the Niigata Headquarters. General managers, site superintendents and all other nuclear leaders gave briefings on the initiatives being engaged in by their departments for those issues of particular importance noted in the business plan as well as their expectations, and exchanged opinions with workers in attendance. A questionnaire about the briefing was also distributed. We plan to create opportunities to report on the progress of initiatives to address these important issues during the second quarter based upon the results of the questionnaire.



Important issue briefing (left: HQ briefing, right: Live feed from Kashiwazaki-Kariwa briefing)

June 2018 marked one year since the beginning of initiatives to help the Management Model take root and permeate throughout the entire organization, so an effectiveness assessment of these initiatives was conducted. Results showed that more than 80% of management, who drive the organization and are the main users of the Management Model, periodically refer to the Management Model when engaging in their duties. Many workers in the field have mentioned that study sessions conducted within departments and groups on each functional area of the Management Model are effective, so methods for continuing to hold these study sessions will be examined.

One of the compositional elements of the Management Model is “Fundamentals” which have been compiled to convey the ideal behaviors desired of each position that each individual should be aware of when engaging in their daily duties. CFAM/SFAM⁴ are revising the expressions of these Fundamentals to be more appropriate and adding areas for which Fundamentals should be created based upon how they have been leveraged to date. The revision proposal was completed during the first quarter, so during the second quarter a revised pamphlet shall be created and distributed to employees and contractors as well.

(2) Improvement activities by CFAM/SFAM

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

Since FY2017, managers trained by US experts have been engaging in Management Observation (MO) in order to observe field conditions and accurately ascertain problems. Since it has been found that MO skills contribute to identifying field risks and implementing countermeasures, and aid with fieldwork management, maintenance CFAM have made the provision of these skills to general workers a priority for FY2018. The coaching of subordinates by managers on the skills of management observation is being promoted. These coaching sessions have taken place a total of

⁴ 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

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

81 times at Fukushima Daini and Kashiwazaki-Kariwa and the skills for making improvements are permeating through all levels of the company.

We have also received much valuable advice concerning CFAM-focused initiatives, etc. that will contribute to making improvements in the future from third-party reviews conducted by WANO⁵ and other organizations. CFAM's will lead the way in making further technical improvements by proactively incorporating this external advice without becoming complacent.



MO coaching of general workers by management

Based on third-party reviews and self-assessments performed up to last fiscal year, the following four issues have been identified as important issues that need to be addressed by all divisions. During the first quarter CFAM for all functional areas coordinated with SFAM to formulate comprehensive strategies and action plans that include implementation at power station sites, and have moved on to the execution stage. During the second quarter and thereafter we will continue to engage in activities based upon these strategies and action plans.

- ◆ 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 area, such as operations, maintenance, and engineering, etc., are being improved to ensure that foreseen risks for the Nuclear Power & Plant Siting Division, including power stations, are measured by the same ruler. In particular, an action plan is being formulated to enable risk management/PRA CFAM to coordinate with related CFAM/SFAM and systematically identify, assess, handle, and monitor risks.
- ◆ Permeation of operational focus
 - In order to support operations, which is the most important functional area 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 area will lead by example and become role models for other functional areas, operations CFAM are working together with education and training departments to develop educational materials that will help the idea of operational focus to permeate. From the second

⁵ WANO (World Association of Nuclear Operators)

quarter the focus of these education programs shall be expanded beyond the operations area.

- ◆ Improving corrective action programs (CAP)⁶
 - 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, such as MO results. Now that performance improvement CFAM/SFAM have worked together to create a reporting environment, during the first quarter the number of MO result-related reports increased dramatically. Contractors will be asked to participate in this initiative in the future. We have also started assigning classification codes (event code, process code, cause code, etc.) to gather information for trend monitoring. From the second quarter and onward the quality and improvement status of data entered shall be assessed.
- ◆ 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. CFAM and SFAM from various functional areas have coordinated to analyze the common causes of human errors that have occurred at Fukushima Daini over the last two years. Several issues, such as the fact that human performance tools created to prevent human error are not being sufficiently leveraged, were identified (March). As a countermeasure, activities were started to focus on the use of four important human error prevention tools, such as self-checks, etc., and monitor the use of these tools (May). From the second quarter plans to provide education on human error prevention to the entire Nuclear Power Division and contractors will be formulated and executed.

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 the aforementioned briefing on important issues noted in the business plan.

During the first quarter we held several briefings at Fukushima Daini, Kashiwazaki-Kariwa and Headquarters about safety measures and new regulatory requirement compliance inspections at Kashiwazaki-Kariwa Units 6/7, which were approved in December of last year, and broadcast videos of these briefings. In light of requests by many participants to have more of these briefings, communications teams at Headquarters will periodically plan opportunities for in-house briefings on different initiatives and important actions being taken by the Nuclear Power Division while taking into consideration the needs of employees. The next briefing, which is planned for July, will focus on the new inspection system that will be introduced.

⁶ 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.



Briefing on the New Regulatory Requirement compliance inspections and safety countermeasures (HQ)

At Fukushima Daiichi, a decommissioning information exchange meeting that provides an opportunity for site personnel to exchange opinions was held for the first time in June to discuss events of concern both inside and outside the company, and activities that site personnel should be aware of. Participants commented that they were able to learn about the activities of other departments, and a lively exchange of opinions ensued, so these meetings will be continued. Furthermore, content specially designed to improve communication within the power station was put on the Fukushima Daiichi intranet in May.



Decommissioning information exchange (Fukushima Daiichi)

In order to cultivate a sense of unity within the power station, sports competitions that include contractors are being held to transcend the borders of departments and companies. Participants commented that they were able to get to know other people working at the power station through sports and that they felt an increased sense of solidarity, so these types of opportunities will be proactively created in the future.

At Fukushima Daini, the TEPCO Research Institute Human Factor Group has been lending its cooperation to implement initiatives that help workers become aware of their communication tendencies and their own attitudes in the workplace. Participants commented that, "I'm glad I was able to become aware of my tendencies," and "I'll use these communication skills within my group." There were also requests to have similar seminars held on a regular basis. We will continue to create opportunities for interaction in order to invigorate communication.



Communication training (Fukushima Daini)

(2) Using in-house media to share information on nuclear power

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

- ◆ Company intranet videos
 - Tour of Fukushima Daiichi Nuclear Power Station by the Nuclear Reform Monitoring Committee (tour held on March 23, video uploaded on April 19)
 - Commencement of Use of Automated EV Buses at Fukushima Daiichi (uploaded on April 19)
 - How Does the New Heat Removal System Work? (Technical explanation) (uploaded on April 27)
- ◆ TEPCO Group News Letter
 - Removal of rubble from the upper floors of the Unit 1 reactor built (issued on May 28)
- ◆ "Messages from Management" sent via the intranet
 - Message from the New President of the FDEC, Akira Ono (uploaded on April 9)
 - Regarding the Future of the Fukushima Daini Nuclear Power Station by President Tomoaki Kobayakawa (uploaded on June 14)



Group Newsletter (Decommissioning Project Report #7)

According to the results of the employee questionnaire printed in the January 29 issue of the Group newsletter, employees want more information about Fukushima Daiichi and Kashiwazaki-Kariwa. In addition to providing information that fills the needs of employees, we shall continue to share information while leveraging the merits of each type of in-house media.

(3) Enhancing the 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. Results from electronic questionnaires designed to gather opinions about the messages that were conveyed and also confirm the level of understanding⁷ of these messages and whether or not they were received, show that during the first quarter response rate was 52.0% (target: over 70%), and the level of understanding was 2.5 points (target: more than 2.5 points). Response rate decreased by -3.5 points and the level of understanding increased by +1 point over the fourth quarter. Improvements shall be made in light of the fact that response rate declined.

Furthermore, in regards to sharing information, during FY2018, methods for conveying messages and performance indicators (PI) shall be revised in order to match them with actions implemented based upon the results of gap analysis by internal communication CFAM.

2.2 INITIATIVES FOR IMPROVING SAFETY AWARENESS

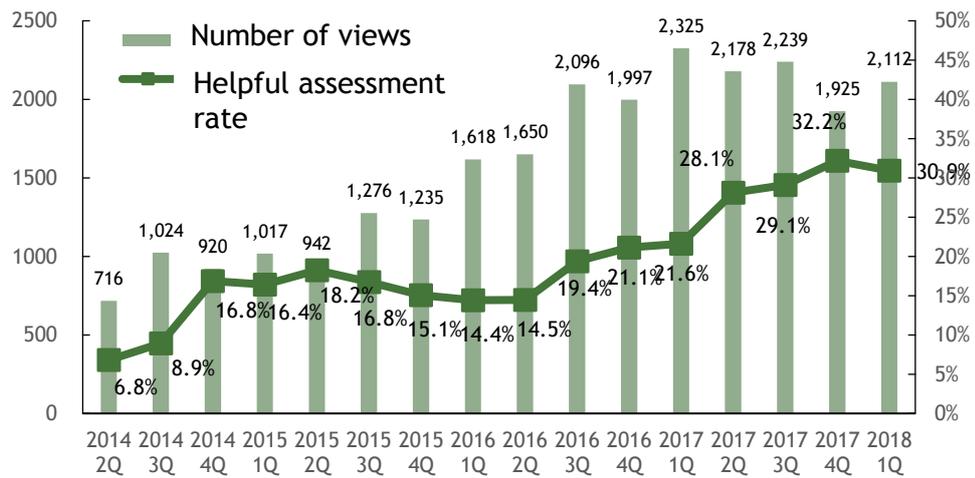
2.2.1 Cultivating nuclear safety culture

(1) Improving the Safety Awareness of Management and the Entire Organization 【Measure 1】⁸

- ◆ Direct Dialogue between Nuclear leaders
 - Since the fourth quarter of FY2015, nuclear power leaders at headquarters (CNO and other Head Office 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 first quarter, discussions were held about engaging in duties based upon the Management Model, balancing business with improvement activities, and improving internal communication. (Kashiwazaki-Kariwa: May 23, Fukushima Daini: April 24, May 15)
- ◆ Messages from Nuclear leaders
 - In order to promote nuclear safety reforms, nuclear power 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 power 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 power leaders have been read by employees via the intranet.

⁷ Assessed on a four-step scale ranging from "well understood" to "not understood at all"

⁸ Corresponding measure from the Nuclear Safety Reform Plan noted in 【 】

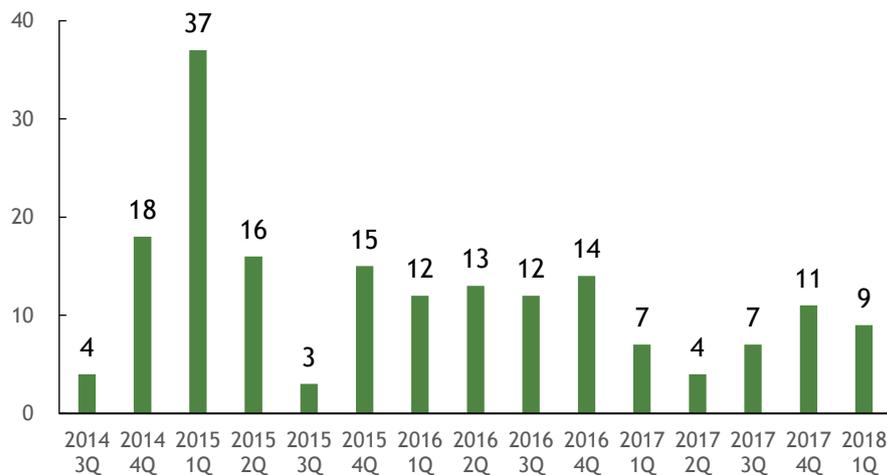


Number of views per message sent via the intranet/"Helpful" assessment rate

- During the first quarter, the number of employees that read each message was approximately 2,112, however the percentage of these people that felt that the messages were "helpful" fell slightly to about 30%. This is because more people read the messages concerning 3.11 that were sent during the last quarter.
- In order to convey "thoughts" that cannot be completely conveyed through written messages over the intranet, the Chief Nuclear Officer (CNO) has been engaging in direct dialogue with power station personnel and Headquarter employees since February 2014 and this initiative is being continued by the new CNO since June 2017 when he was appointed.
- For example, during the dialogue with group managers at Kashiwazaki-Kariwa, the general manager conveyed that a strong organization needs lively communication and that they must be passionate about self-improvement if they are to train the next generation, and he listened to the opinions of each group manager. In addition, he also spoke to younger employees about problems they might have at work, and with general workers at Fukushima Daini about initiatives to address important issues facing the Nuclear Power Division and the decommissioning of Fukushima Daini.



Direct dialogue with the CNO
(Kashiwazaki-Kariwa) left: Group managers, right: Young employees)



Number of times direct dialogue was engaged in between the CNO and each office

- ◆ Commendations given by the CNO and the president of the Fukushima Daiichi Decontamination & Decommissioning Engineering Company (FDEC)
 - Since FY2015, the CNO and the president of FDEC 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 the CNO and the president of FDEC

Period	HQ	1F	2F	KK
FY2015	24(2)	47	19	24
FY2016	25(1)	19	14	25
FY2017	21(2)	5	15	22
FY2018				
Q1	4	0	6	4

(Numbers in parentheses indicate the number of commendations given at Higashidori)

(2) Enabling Nuclear Safety Culture to Permeate throughout the Entire Organization 【Measure 1】

- ◆ Safety Steering Council
 - The President, CNO and FDEC president referenced nuclear safety KPI to discuss nuclear safety management initiatives currently underway and to reflect upon nuclear safety related activities. (May 23).
- ◆ Assessing the state of nuclear safety culture
 - The field diagnostic initiatives⁹ we have been conducting since last fiscal year with the cooperation of the Japan Nuclear Safety Institute (JANSI) were continued at

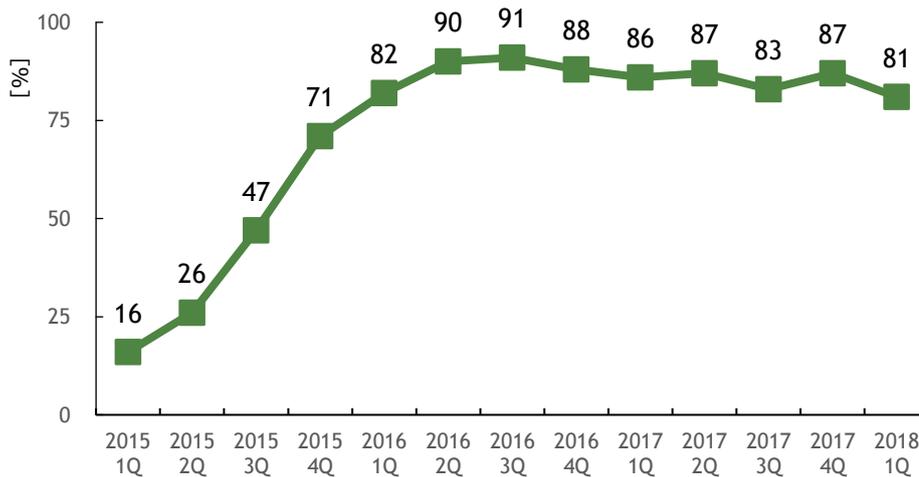
⁹Field diagnostics: JANSI Safety Culture Cultivation Support Department personnel interview everyone at the power station being examined, from general personnel all the way up to the site superintendent, in order to ascertain the state of awareness of the power station personnel and provide operators with a list of "things noticed" from a third-party perspective in an effort to assist with the cultivation of safety culture.

Fukushima Daini (May 21~May 25). 49 people in seven departments, from the site superintendent down to general personnel, were interviewed.

- Based upon the reports submitted we shall examine and implement initiatives aimed at better cultivating safety culture.

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

In the Nuclear Power Division, we have stipulated, “individual, leader and organizational traits needed to embody robust nuclear safety culture (10 traits and 40 behaviors for robust nuclear safety culture).” By using these traits to reflect on and compare one’s own actions with ideal behavior on a daily basis, we are encouraging employees to notice the differences and naturally adopt the same traits. From 2014 until 2017, we promoted understanding of the expression “traits” and developed activities that enabled individuals to compare these traits with her own behavior and reflect upon it as the first step of this initiative. However, from FY2018 we moved on to the next step which consists of “filling in the gap between the traits and one’s own behavior” as part of retrospection activities. In particular, workers engage in group discussions to “reflect,” “adopt different behaviors,” and “assess how adopting a different behavior has had impact.”



Group discussion implementation rate

(4) Activities to develop communication and understanding amongst contractors 【Measure 1】

In order to improve nuclear safety at TEPCO’s nuclear power stations, contractors must understand nuclear safety reforms and cultivate nuclear safety culture. During FY2018, we will continue our initiatives from last fiscal year to engage in dialogue about safety culture with people that work at the headquarters of contractors and the factories from which products are procured in addition to reaching out to operators consigned with the task of managing waste treatment equipment at power stations in order to cultivate safety culture.

2.2.2 Performance Improvements (CAP)

(1) Promoting improvement through CAP 【Measure 3】

◆ Enhancing CAP processes

- We aim to make efficient and effective improvements by using CAP to manage not only nonconformance and OE information¹⁰, 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 first quarter we began using classification codes, such as event codes, process codes, and cause codes, etc., in order to monitor trends and identify the signs of degradation.



PICO screening meeting (Kashiwazaki-Kariwa:)

- Furthermore, PICO's¹¹ from each the power station department are spearheading activities to analyze data entered into CAP to identify and correct common weaknesses. As a result, for example, the fact that "human error prevention tools are not being sufficiently used" was identified as a problem in the Maintenance Division at Kashiwazaki-Kariwa. From the second quarter a comprehensive assessment of various information shall be implemented.
- At Kashiwazaki-Kariwa briefings on how to fill out CR¹² were provided for contractors since they will be filling out CR from the second quarter (June 19-20: attended by 31 companies).

(2) Management Observation 【Measure 2】

- Management Observation (MO) (inputted into CAP)
 - In order to promote nuclear safety reforms and improve nuclear safety, TEPCO engages in management observation (MO), which is proactively employed by the

¹⁰ Operating Experience : Information on troubles at other power stations and in other industries that is shared in order to learn from mistakes.

¹¹ Performance Improvement Coordinator

¹² Condition Report: Intended to help share information on things noticed and not form is by entering the data into the database

best nuclear operators overseas. Through MO, managers can observe actual conditions in the field and accurately identify problems.

- Since the fourth quarter condition reports have been issued for issues pointed out during MO at Fukushima Daini and Kashiwazaki-Kariwa in order to input this information into CAP.
- MO results for the first quarter are as follows:

	1F	2F	KK
No. of times implemented	538	699	1,039
No. of times per person/month	1.80times/month/person	3.43times/month/person	3.43times/month/person
Good MO rate*	—	46%	48%

* Good MO rate: Percentage of MO that PICOs (performance improvement coordinators) have deemed to be good examples

(3) Changes to nonconformance management at Fukushima Daiichi

Since the nuclear accident at Fukushima Daiichi, it is been difficult to manage nonconformances as they had been, and we have been forced to constantly make changes to nonconformance management in conjunction with the progress of decommissioning and changes to the field environment. We have also once again started disclosing information on nonconformances (August 2018).

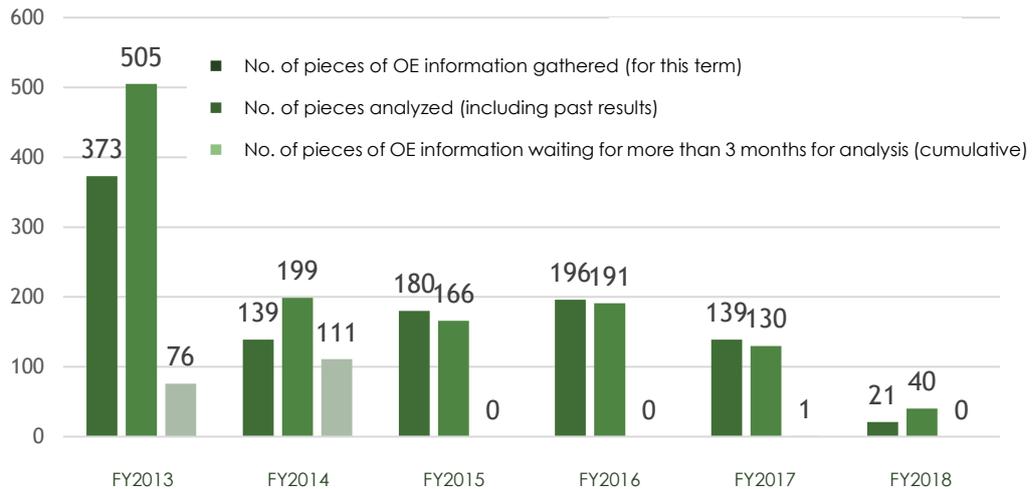
Since April 2017, nonconformances that did not require corrective measures, such as nonconformances with corrective maintenance equipment that would not result in the loss of equipment/system functions, etc., were excluded from nonconformance management. However, it was found that excluding these nonconformances prevented information on corrective maintenance equipment malfunctions from being accumulated and that it was hard to determine whether a nonconformance report was required. Therefore, during the first quarter changes were made to include all nonconformances discovered in conjunction with equipment operation and inspection/maintenance in nonconformance management in order to further improve nuclear safety performance during decommissioning (June).

2.2.3 Leveraging Operating Experience

(1) Leveraging operating experience (OE) from within and outside of Japan 【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.
- Prior to the Fukushima Nuclear Accident, the gathering of operating experience from within and outside of Japan, and the deliberation of countermeasures, were put off. Therefore, efforts are being made to promptly engage in these activities and enable everyone in the Nuclear Power Division to leverage this information.
- During the first quarter, 21 pieces of new OE information were gathered and 40 pieces of OE information, that include information gathered in the past, were analyzed. There was no OE data that has been waiting to be analyzed for more than three months.



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, which is a nuclear safety reform PI. The viewing rate of new OE information during the first quarter for the entire Nuclear Power Division was 56%.
- ◆ SOER¹³ and severe accident information study sessions
 - Focused study sessions on OE information of particular significance¹⁴ (severe accidents from both within and outside of Japan and SOER) are being held to provide an overview of these accidents and troubles, and understand the lessons learned from them.
 - "SOER overview study sessions" are designed to enable all Nuclear Power Division employees, including general personnel, to understand a wide variety of SOER, and study sessions have been provided for all SOER issued to date.
 - A study session on learning lessons from Chernobyl is planned for the third quarter as part of initiatives to study severe accidents that have occurred both within and outside of Japan.

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】

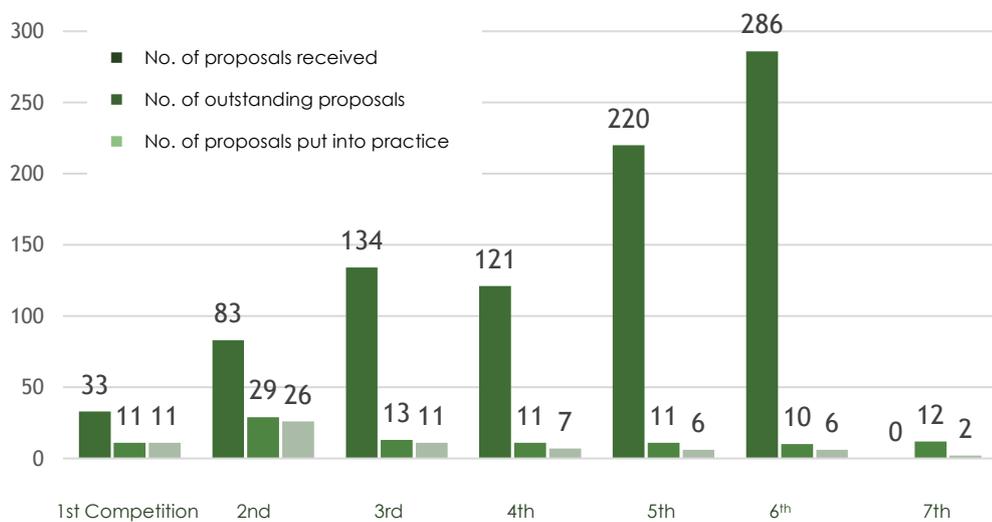
TEPCO has been holding Safety Improvement Proposal Competitions so that personnel may, in addition to conducting multi-faceted reviews from the perspective of defence in depth, acquire the

¹³ Significant Operating Experience Report : Significant operating experience report issued by WANO (World Association of Nuclear Operators)

¹⁴ 22 accidents and troubles including the cable fire at the Browns Ferry Nuclear Power Plant

technical ability to propose cost-effective safety measures and have these proposals put promptly into practice.

- During FY2018 we shall hold the 8th competition to elicit proposals and ideas about potential risks from the field. In order to promote employee participation, we have decided to introduce mechanisms to assess the attitude that employees have about improving nuclear safety and give products made in Fukushima Prefecture as prizes.
- The eighth competition will begin on May 21 (deadline for proposal submittals is July 20). After the proposal submission deadline, the proposals will be examined by the Secretariat and nuclear leaders, and subjected to a vote by all employees in the Nuclear Power Division to select outstanding proposals.
- The following chart shows 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)

- The outstanding proposals to date that were put into practice during the first quarter are as follows:
 - 7th Competition: Two of the 12 outstanding proposals have been put into practice since the last report (Cumulative total: two proposals)
- <7th Competition>
 - When equipment trouble is discovered, field operators use tablets with Skype function to contact the Emergency Countermeasures Office and quickly explain the situation in the field. (The Fukushima Daiichi).



Using tablets with Skype function to explain field conditions (Fukushima Daiichi)

- Computers dedicated for emergency response use are kept on standby at all times to enable chat systems to be immediately used to share information when personnel assemble in the event of an accident/disaster (Kashiwazaki-Kariwa)
- We will continue to monitor the process by which outstanding proposals are put into practice and follow-up in instances where proposals are not put into practice 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 potential¹⁵” 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.
- Hazards identified since FY2015 (electromagnetic pulse caused by high-altitude nuclear explosion) are being additionally deliberated.

(3) Improving periodic safety assessment processes (safety reviews) 【Measure 3】

In order to proactively and continually improve nuclear safety, TEPCO is not only engaging in improvements to respond to nonconformances and issues pointed out during safety inspections and third-party reviews, but also implementing safety reviews that examine underlying contributors.

Based upon our experience last fiscal year, at Fukushima Daini and Kashiwazaki-Kariwa we examined how to logically approach safety reviews and integrated them with focused self-assessments. “Focused self-assessments” refers to activities for assessing certain topics in order to identify gaps between the current performance of the Nuclear Power Division and the world’s

¹⁵ Potential for a calamitous situation resulting from a simultaneous and wide-scale loss of function caused by common factors

highest levels of performance, and making continual improvements (refer to 2.2.5 Improving Self-Assessments for details).

Furthermore, at Fukushima Daiichi, integration with focused self-assessments is not possible because unique industry standards for decommissioning have not been fully determined, so the same safety reviews as always will be implemented. During the first quarter, we examined how to improve the risk management process while focusing on rectifying the things noticed during last fiscal year's safety review and addressing requests by internal/external experts.

2.2.5 Improving Self-Assessments

(1) initiatives to improve self-assessments 【Measure 2】

Briefings on implementing focused self-assessment were held for CFAM/SFAM at Headquarters and Kashiwazaki-Kariwa as a first-quarter initiative for the performance improvement field. (Headquarters: May 25 and June 14, Kashiwazaki-Kariwa: May 30 and June 6)

During the briefing, the process for acting to identify and resolve gaps with excellence in a planned manner upon determining the scope of gap analysis that should be conducted in each expert field in order to continuously make improvements, and for preparing analysis mechanisms, was explained.

To date, focused self-assessments have been conducted on the following topics, excellence gaps identified and action taken to resolve those gaps.

- WANO-SOER15-2 "Risk management challenges"
Kashiwazaki-Kariwa: March 27-31, 2017, Fukushima Daini: January 23-26, 2018
- Contaminant Management in the Maintenance Division
Kashiwazaki-Kariwa: May 24-25, 2018



SOER15-2 self-assessment (Fukushima Daini)



Contaminant management self-assessment
(Kashiwazaki-Kariwa)

2.2.6 Oversight by the Nuclear Safety Oversight Office

(1) Report on oversight activities by the Nuclear Safety Oversight Office 【Measure 2】

Nuclear Safety Oversight Office (NSOO) Director John Crofts resigned from his position as Managing Executive Officer on June 27 and shall now act as a nuclear safety advisor to TEPCO HD. Dr. Crofts will continue to help us improve nuclear safety through nuclear safety oversight.

The NSOO shall continue to diligently monitor safety with the passion, sense of values and methodology instilled by Director Crofts. The following are the opinions of the Nuclear Safety Oversight Office (NSOO) and Advisor Crofts about observations made during several months with a focus on mainly on the first quarter that were reported to the executive officer committee and the Board of Directors on July 30.

NSOO -18-012

July 30, 2018

Quarterly Oversight Evaluation Report - Nuclear Safety Oversight Office

The first quarter of 2018 fiscal year

Introduction

This report summarizes the evaluation results of the first quarter (April to June) 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 the site Chief Engineer of Reactors (hereafter, "Chief Engineer of Reactor" (SRE)) continue to suggest steady improvement in the safety aspect in many fields.

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

1.1 Fukushima Daiichi NPP

The evaluation team carried out the following observation evaluations under the themes of fuel removal from the spent fuel pool of unit 3, radiation control and nonconformance control.

- Lessons learned related to the procurement management of products that were manufactured outside Japan.

Trouble of smoke occurred in the crane control panel during the test operation of unit 3 fuel handling facility. This facility is a product manufactured outside Japan, which was introduced by the prime contractor who had no experience of crane production, and in the past, several nonconformance events had occurred due to design, and this time, the trouble was caused by the product parameter setting operation failure to suit the local power voltage and the lack of check.

Although the background was that this facility was ordered in emergency at the early stage following the accident, as the management of prime contractor, there were problems with the exchange of input information (required specifications, such as test items) and output information (drawings and test records, etc.) with the foreign manufacturer. TEPCO need to explicitly ask its responsibility to the prime contractor. In addition, as to TEPCO's response to the trouble, at the stage when TEPCO could not identify damaged areas, behaviors and causes, parts were replaced one after another, proceeding with operation check, which resulted in the repeated abnormal condition that could lead to fires in the unit 3 reactor building. There is room for improvement in TEPCO's cause investigation method.

In this event, there are lessons learned and the matters to be reflected on in various aspects, including the procurement management of products manufactured outside Japan, risk management for test operation and the method of responding to trouble. In the future, in order to diversify our suppliers including overseas manufacturers, TEPCO need to analyze this case in detail, organize the learns obtained and make lessons learned.

- Improved safety consciousness towards exposure dose reduction

Through the application of the individual dosage target introduced in the last fiscal year, improvement has been seen in the consciousness of the construction department and the cooperation companies in the Fukushima Daiichi NPP to reduce exposure dose. This improvement is achieved by the clarification of expectations and the positive participation of plant management, and the close cooperation with the radiation control department and the construction department (such as the measures for dosage reduction based on the workers' flow line and the study of remote equipment introduction). On the other hand, since cooperation companies' workers frequently come and go in the Fukushima Daiichi NPP, it is necessary to continue to work and comprehend effectiveness.

- Weak consciousness on nonconformance control

In the Fukushima Daiichi NPP, they had performed their own application in the nonconformance control process, for example, of not including nonconformances of break-down-maintenance equipment and nonconformances at the time of trial operation. As a result, the personnel's consciousness that they try to lead nonconformance control to

medium- to long-term work improvement became weak. At present, although their own application was reviewed and improved, such consciousness still remains in the personnel's mind. It is necessary to enhance the governance of this process by referring to the coping state at other NPPs, such as setting a leading person in each department, as well as by educating the personnel about the meaning of nonconformance control.

An SRE prepares an observation sheet and provides it for planting management. Out of all of these, the points to which special attention should be paid are as follows:

- Independent response to the new inspection system

It is necessary to reorganize the nuclear risk at the Fukushima Daiichi NPP, such as what is an accident that must not occur, by taking into consideration in the decommissioning of a Fukushima Daiichi NPP that the generating mechanism of the accident at the NPP differs from a power generation reactor. Based on the result, it is recommended that the operator side should provide the proposal to give shape to the new inspection system appropriate for the Fukushima Daiichi NPP.

- Weak field operation management

There are troubles which were able to be prevented by appropriate field management (rainwater leakage in the tank area) and faults of control for field display. The construction supervision members of our company are expected to utilize the "field time" (Tuesday and Friday morning every week), which has started since June, to confirm the field situation by their own eyes, and to prevent nonconformances beforehand.

- The progress of anti-flooding measures at Units 5 and 6

For the risk of water being poured on a power system due to the groundwater and a large-scale rainfall, which has been continuing at Units 5 and 6 since the earthquake disaster, the plant has established the measures, such as the drainage of a building and a power source room and prevention from rainwater flooding, some of which have been already implemented. Thanks to these measures, the power system risk has been decreasing. However, it is still required to continue to study and carry out reliable measures.

1.2 Fukushima Daini NPP

The evaluation team conducted the following observation evaluations for the efforts by the plant in the activities of CFAM/SFAM (head office and site functional area managers) pursuing what the nuclear power plant management should be.

- Aspiring efforts towards vitalization of SFAM activities

The Fukushima Daini NPP conducts the "SFAM information sharing meeting" and the "CFAM supervisor/SFAM supervisor meeting" independently and initiatively, identifies the stagnant field of CFAM/SFAM activities, and presents the problems to the CFAM supervisor, a responsible person on the head office side. The efforts towards vitalization of the activities centering on the SFAM supervisor, a responsible person on the plant side, also give impetus and a good influence to the activities at Kashiwazaki Kariwa NPP and the head office.

An SRE prepares a detailed performance evaluation sheet in light of a functional area and provides it for planting management. Out of all of these, the points to which special attention should be paid are as follows:

- Management's leadership

In the area of management, operation management and maintenance management of the whole plant, the improvement examples with independency have increased, such as the establishment of MO (field observations by senior management), and the director's ability to deploy expectations has been improving.

On the other hand, for the areas such as radiation protection, performance improvement, and emergency response, the progress of improvement is relatively delayed. In addition to the appropriate resource allocation to these areas, the enhancement of involvement of senior management, and the support from the head office by CFAM activities are expected.

- Improvement of maintenance management

They are improving the behavior in the field by the infiltration of the "fundamentals" (basic points to be understood) involving cooperation companies, the establishment and infiltration of COM (expectations concerning maintenance implementation), and enhancement of MO activities.

For the directly managed technical capabilities, it is at the stage of accumulating work experience, and they are improving their skills starting with the fundamental part such as teamwork, procedure improvement, and risk management. In the future, the compatibility of safety improvement and streamlining is expected.

- Weak radiation protection

The behaviors on the assumption that "there is no contamination" are repeated by the employees and the cooperation companies' workers, and the risk of the spread of contamination and the internal exposure is not eliminated. Although SFAM has established the improvement program, the progress of efforts is delayed.

Besides efficiency evaluation to the improvement program established by SFAM, the involvement of and support by senior management and CFAM to the radiation control department are required.

1.3 Kashiwazaki Kariwa NPP

The evaluation team observed the progress management of safety measures for Units 6 and 7, the enhancement of medium- to long-term engineering capabilities, and the emergency response, and carried out the following monitoring evaluations.

- Issues of safety measures engineering of Units 6 and 7

The head office and the plant are jointly carrying out an extensive and a large amount of engineering from basic design to detailed design. In this work, it is important to certainly maintain and develop the safety requirements including the creation of the application for approval of a construction plan and the implementation of pre-service inspection. For establishing the good governance to these activities, it is effective to clarify and share the target for each stage, such as the decision of detailed design and the creation of an application, and the risk response policy. As for confirmation of the application for construction plan approval, improvements are seen in the immediate vicinity such as establishment of procedures.

- Issues for enhancement of medium- to long-term engineering capabilities

They are studying the reorganization towards the effective utilization of human resources for engineering and the enhancement of engineering functions. In this work, while the study about competence setting has progressed, there is room for improvement in the strict implementation of change management including the correction of the insufficient range of study of the risk associated with change. It is necessary to extract and study all the risks, and after sufficiently decreasing them, to put the reorganization in practice.

- Enhancement of emergency response

They are carrying out activities proactively to improve the competence of emergency response personnel. For the emergency response personnel playing an important role, they are carrying out various education and training such as the prior training and the looking and listening of training videos before a comprehensive emergency drill. Their activities are good for enhancing nuclear safety.

An SRE prepares a detailed performance evaluation sheet in light of a functional area and provides it for planting management. Out of all of these, the points to which special attention

should be paid are as follows:

- Management and Governance

The improvement for autonomous operations is found in various areas of the plant. The clear individual cognition in each organization and the good leadership are the success factors.

On the other hand, the following points are the areas to be improved.

- The way of doing work that the purpose of work is not sufficiently understood and it is limited to the achievement of a superficial numerical target as before is also seen.
- The quality of cross-organizational project management largely varies depending on the person.
- There are the cases where operating experience information stays at the level of "knowledge" and does not reach the level of "utilization" to enable the change of the behavior for preventing nonconformance.

- Human resource development

The framework of discussion to focus on the personnel's performance and improve it jointly by a line organization and the human resource development center was proposed. It is necessary for both departments to understand the meaning of this operation and make efforts in cooperation so that it will be effective.

- Risk management

In addition to extracting the nuclear risk hidden in the field operation since November last year, they started to extract the radiation control risk in April. The efforts to extract the risk hidden behind daily work are being continued and established. For further improving risk extraction sensitivity, it is important that working members get motivation from their coworkers' good activities and repeat thinking themselves how the work relates to nuclear safety.

1.4 Head office

The evaluation team conducted the following observation evaluations for the governance of the head office in CFAM activities.

- The expectation for work development

CFAM is required to play a central role for the development of a work plan and the confirmation and change of progress management. In pursuing excellence, the response to a new issue is required in some cases. Even in the observation of this term, the examples of a line requesting CFAM to respond to a new issue, such as a regulatory requirement and an external indication, were confirmed. Although a problem has not necessarily occurred so far, in this kind of situation, it is expected that CFAM and a line will cooperate and make a clear decision for the priority of work, the consistency of resources and the clarification of responsibility under a sponsor so that work also can be smoothly developed to a plant for improving safety.

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

2.1 Staged implementation of safety design requirements at Kashiwazaki-Kariwa

For application for construction plan approval (detail design) which is a main issue in current activities at Kashiwazaki-Kariwa related to safety measures, it is important to understand it as staged implementation of safety design requirements: application for establishing permit (basic design) in the upstream stage, and pre-operation inspections (design validation) in the downstream stage.

If activities related to application for approval of construction plan by persons in charge are separately performed in both stages due to a huge deal of works for preparing the written application for approval of construction plan, it may eventually affect works to secure the safety of site facilities.

To ensure the implementation of safety design requirements, NSOO will continue monitoring so that nuclear leaders will clarify expectations on cooperation between persons in charge at each stage.

2.2 Establishment of approaches to determine the safety in decommissioning of Fukushima Daiichi

Fukushima Daiichi is in a stage to start proceeding with activities to reduce risks in future activities, such as debris removal, in addition to contaminated water control and spent fuel removal. Securing the safety in decommissioning of the damaged plant differs from securing the safety based on the design concept for healthy plants. It requires us to consider changes in the status of the progress of cooling, try to understand the plant status, while raising the precision of such understanding.

From this viewpoint, it is important to reassess the implementation plan prepared after the accident to raise the safety effectively, continuously, and in a staged manner. For the new inspection system, moreover, it is necessary for the operator to clarify its approaches to the judgment of the safety which is more objective.

In this discussion, judgement by specialists of the nuclear safety is more effective than that by facility specialists. NSOO will continue monitoring the progress of the system establishment regarding it, and of discussion.

2.3 Safety culture [The former General Manager, Mr. Crofts]

I was very impressed with the Safety Steering Meeting, led by the President and the Presidents of the FDEC and the Nuclear Power Company. The fact that we now have comprehensive and useful KPIs and the fact that the senior management discuss them in depth as an aid to improving safety, are both significant credits to TEPCO.

Also impressive was the realisation that if KPIs are used to drive improvement, then they must be continuously reviewed and updated to focus on the areas needing improvement at any time.

I suggest that more time should be allowed for this meeting in the future, in order to fully capitalise on the valuable information and expertise around the table.

2.4 Guardian/advocate of safety [The former General Manager, Mr. Crofts]

Following on from the useful KPI meeting, I have noted before that the Nuclear Power Company has, or will soon, have a VP for safety - a Safety Advocate or Champion for Safety in the executive team. I regard this as crucial. There needs to be a loud, independent and committed voice for safety at the executive level to counterbalance the efficiency and austerity drives necessary in any business; and particularly in TEPCO at this time.

I note that there is still no such VP or advocate for safety at the executive level in FDEC. At a time of great change and development I regard this as a risk to safety and remind FDEC of my previous recommendation in this area.

As backing to my opinion on the need for a VP for Safety in each nuclear business, I refer to the Dounreay safety accident in the late 1990s. In this quarterly report, NSOO have used this accident as a useful benchmark for the need for careful management of change with respect to nuclear safety. It is a very good study and I commend the NSOO team for it.

The accident occurred following several years of restructuring, efficiency drives and cost and resource cutting with no effective management of change procedures. By 1998 the site had lost the competence to do or control nuclear work, the contractors did not have the competence or culture to do the work safely, and the site no longer had the control of its intellectual property, even its site drawings.

On a Friday evening, uncontrolled work by contractors led to the excavation of the site 11 KV cable and a site blackout. The Back Up Power Supplies failed to start and all monitoring of the site failed; this was in a situation with a tripped operating nuclear fuel reprocessing plants. Finally, as it was the weekend, and a separate contractor held all the site drawings, these drawings could not be accessed by the management during the emergency or by the regulators.

The resultant investigation by the regulators led to the closure of all operations for about five years while resource and competence was rebuilt. It also led to the removal of the company's executive team.

One important factor was that there was no effective Safety Advocate or Champion at the executive or board level. People at the site who expressed concern were suppressed and in extreme cases removed.

Whereas I am sure that this would not happen in TEPCO, I repeat, in the nuclear business, in order to be safe, there must be a strong, independent (of the operating line) and committed advocate or champion for safety to balance all the usual and necessary financial and efficiency measures for business.

If we can bring efficiency to the executive level, we should also bring safety to the executive level if safety really is our top value.

3. Status of Completion of Recommendations Presented resented by NSOO

The line departments have shown excellent performance continuously toward the completion of NSOO recommendations.

- Among 153 recommendations that have been presented, 135 have been completed, and 10 have been completed in this quarter.
- In this period, 2 recommendations are presented.
- Regarding cases (three cases) evaluated as stagnated response, NSOO is providing follow-up for improvement by explaining the content of findings again, etc.

4. Benchmarking and Training

NSOO exchanged information on comprehensive trainings for emergency responses with independent oversight experts of EdF Energy of the U.K. who visited Japan. At EdF Energy of the U.K. (owning 8 power stations), each station actually cooperates with police, fire, and first-aid organizations in Level 1 exercises implemented once per year under the oversight of regulators. In addition to monitoring by an independent monitoring assessor from the power station, emergency response peer groups support and monitor the status. Currently a benchmarking visit to check the site implementation status is being adjusted.

Moreover, TEPCO accepted interns from Sellafield of the U.K. for about 1 week, and provided information on the status of Fukushima Daiichi, power station operation (system engineering, emergency response) as well as improvement activities (management models) and independent oversight activities.

2.2.7 Support from the Nuclear Safety Advisory Board (NSAB)

(1) Nuclear Safety Advisory Board Performance Report 【Measure 2】

Last year, we invited former nuclear power operator general managers and power station site superintendents from overseas to be part of a Nuclear Safety Advisory Board that provides advice and guidance to TEPCO Nuclear Power Division leaders.

The suggestions and improvement plans that resulted from the second review performed in December of last year and the third review performed in April of this year are as follows. These results were given to CNO by the chairman of the NSAB and in return CNO presented an improvement plan to the chairman which will be used for reference during the next review.

During the third review conducted in April of this year, discussions focused on the new regulatory system being deliberated by the Nuclear Regulatory Agency, and in particular the US reactor oversight process (ROP) which is the basis for design of this new system. The NSAB pointed out that if the US ROP system is introduced as it is, the burden on operators would be too great thereby rendering the system less effective. The Board decided that discussions should continue while exchanging information about the ideal state of an effective ROP.

	Suggestions from the NSAB ¹⁶	Improvement Plan
HQ	<ul style="list-style-type: none"> Check how CFAM are coordinating in regards to "coupling the line and education/training in regards to the concept of 'operations-led'" 	<ul style="list-style-type: none"> This issue was deemed closed after it was confirmed during the third review that operations CFAM are coordinating with education/training CFAM. Since it was observed that there is a "lack of integrated knowledge about operations and fundamentals," this issue is being addressed as a problem that affects the entire Division.
	<ul style="list-style-type: none"> Power stations need to take ownership of configuration management, and Headquarters needs to formulate processes, engage in screening, and make sure things match 	<ul style="list-style-type: none"> Based on the fact that issues observed during the first review that need to be addressed by Kashiwazaki-Kariwa were also pointed out as Division issues resulting from the progress with safety renovations, Headquarters and Kashiwazaki-Kariwa shall coordinate to address this issue.
	<ul style="list-style-type: none"> "Contractor suitability standard requirements" are insufficient compared with international standards. It is recommended that expectations be clarified and that improvement plans for several years be formulated. 	<ul style="list-style-type: none"> This was an observation pointed out during the first review as needing attention at Fukushima Daini, and it was pointed out again as a department issue in light of the fact that much fieldwork is being done by contractors. Headquarters and power stations will coordinate and get involved in initiatives underway by Tokyo Power Technology, Ltd.

¹⁶ NSAB : Nuclear Safety Advisory Board

Suggestions from the NSAB ¹⁶		Improvement Plan
KK	<ul style="list-style-type: none"> In regards to emergency response departments and large-scale evacuation training, power station executives should take the lead in implementing education for response personnel and large-scale evacuation training. 	<ul style="list-style-type: none"> The issues concerning Kashiwazaki-Kariwa pointed out by the chairman during the second review have already been addressed, but we shall continue to seek guidance, such as by asking the NSAB to perform a third-party review of training, and improve our response. Headquarters and power stations shall coordinate to address observations made during the third review about making the emergency response at Fukushima Daini more efficient in consideration of risk.
	<ul style="list-style-type: none"> In regards to making schedules visible and promoting understanding amongst related parties, project managers should point out latent risks, identify critical paths, and confirm that in-house/contractor personnel understand the situation. 	<ul style="list-style-type: none"> This was pointed out during the first review and was an issue for continual monitoring during the second review. We will continue to make improvements by, for example, learning from examples that other companies presented by the NSAB.
Fukushima Daini	<ul style="list-style-type: none"> At Fukushima Daini the concept of "operations-led" is spreading. However, throughout the entire Division there is a lack of "integrated knowledge about operations and fundamentals." 	<ul style="list-style-type: none"> This issue was addressed at Fukushima Daini during the third review, but the entire Division will address this issue since "integrated knowledge about operations and fundamentals" continues to be an observation pointed out at Kashiwazaki-Kariwa.
	<ul style="list-style-type: none"> "Being aware of, mitigating and eliminating risks" is being subject to a detailed self-assessment based upon the WANO SOER (risk management challenges), and an action plan is underway. 	<ul style="list-style-type: none"> This issue was addressed at Fukushima Daini during the third review and the initiative will continue at Kashiwazaki-Kariwa.



Discussion with operators after finishing simulator training (Fukushima Daini)



Field work observation (Fukushima Daini emergency D/G)

2.3 INITIATIVES TO IMPROVE THE ABILITY TO PROMOTE DIALOGUE

2.3.1 Training Risk Communicators

- (1) Merging of the Corporate Communications Department and the SC Office 【Measure 4】
 - In order to strengthen governance, Headquarters communications functions are being restructured and roles and authority clarified. A Decommissioning Communication Center was established to handle communications related to decommissioning. By integrating the functions of the Social Communication Office (SC Office) for making suggestions to other departments and the management executives, and functions for overseeing the communications activities of the Nuclear Power Division into the Corporate Communication Office, we have further strengthened our ability to disseminate information.
- (2) Training to improve and maintain the skill of risk communicators (RC) 【Measure 4】
 - Study sessions on the new inspection system were held for risk communicators and SC Office, Corporate Communication Office and Plant Siting & Regional Relations Department personnel (June 25, 28). Participants learn the fundamentals of the inspection system that will be introduced so that they may leverage that knowledge when giving explanations to external parties.

2.3.2 Developing Risk Communication

- (1) Communicating with the siting community 【Measure 4】
 - Activities in the Fukushima area
 - When it was first published approximately 10,000 copies of magazine "Hairomichi," the magazine that provides information on decommissioning to the community, were being printed. However, we have obtained approval from surrounding cities, towns and villages to distribute the magazine to all households and are in the process of gradually expanding distribution. On April 10, 34,000 copies of issue #7 were distributed and on June 10, 40,000 copies of issue #8 were distributed. Recipients have commented that the magazine is "easy-to-understand," and "from the perspective of the local community."
 - The Monthly 1F magazine for workers and their families was distributed in April, May and June (2,000 copies each month), and the website is up and running.
 - At the meeting of the Prefectural Council on Ensuring the Safety of Decommissioning of Fukushima Prefecture Nuclear Power Stations an explanation was given of remotely operated equipment used to remove rubble, and of the mid-term risk reduction map (May 22).
 - Activities in the Niigata area
 - We have been engaging in more dialogue with the local community in accordance with the Niigata Headquarters Action Plan "Mamoru, Sonaeru, Kotaeru" and have assigned 14 employees that are experts in preparedness and

evacuation assistance to the Kashiwazaki City *Mamoru, Sonaeru, Kotaeru* Office in order to promote initiatives aimed at developing evacuation assistance.

- We have updated our virtual reality (VR) software and equipment used at communication booths to explain power station safety measures in an easy-to-understand manner to those people who cannot visit the Kashiwazaki-Kariwa Nuclear Power Station. And, based on received comments we have added content, such as movies that use a combination of computer graphics, 360° panorama views, and animation, as well as an overall view of the safety measures at the power station. Those that have used the VR has commented that they, "now want to actually visit the site" and "felt like they were actually there."



Updated VR



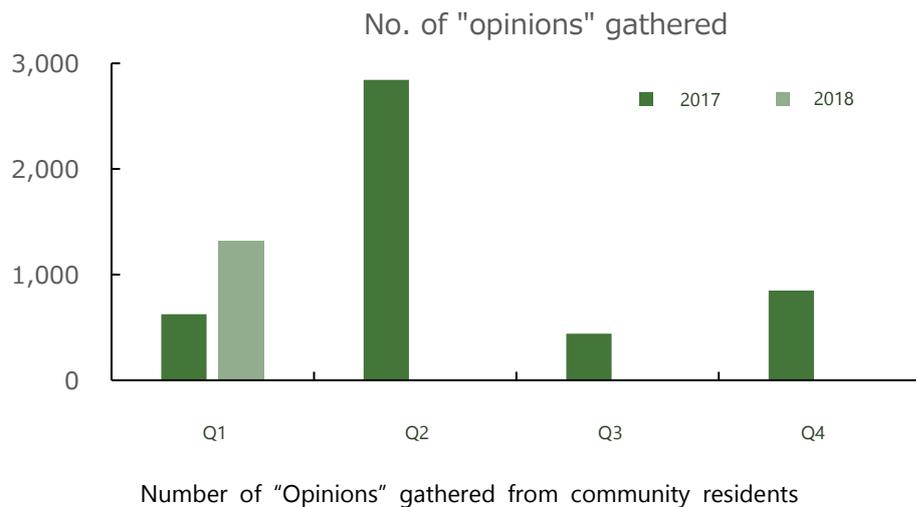
Explanations using VR

- In the Kashiwazaki-Kariwa region we have set up communication booths on the district level in order to make regional briefings more compact in an effort to respond to the request of community residents for briefings that are "easier to participate in" (20 locations, number of visitors: 1,240). According to questionnaires given to visitors this initiative has closed the distance felt between community residents and TEPCO, so this initiative will continue as it appears to be having a positive impact.



Explanation being given at a communication booth

- During FY2018 questionnaires will be distributed to community residents that have participated in activities to foster understanding about nuclear power in order to assess the trust and sense of familiarity that community residents have in TEPCO. TEPCO's target for good response rate is 60% and during the first quarter good response rate was 73.8% thereby making our target achievement rate 123.1%.
- During the first quarter, 1318 opinions were received from community residents through activities to listen to the community thereby resulting in a YoY increase of 29.2%.



(2) Management communication initiatives 【Measure 4】

- In the Fukushima area, new FDEC President Ono and Fukushima Daiichi Nuclear Power Station Site Superintendent Isogai held a press conference to talk about their ambitions and determination as they settle into their new roles (April 5). Fukushima Restoration Headquarters President Okura and FDEC President Ono will continue to hold regular press conferences at the end of each month to give updates on the activities of the Fukushima Revitalization Headquarters and the progress of Fukushima Daiichi decommissioning and contaminated water countermeasures.

(3) Communicating with overseas partners 【Measure 4】

- We are proactively inviting foreign journalists to see the progress of decommissioning and the conditions here in Japan so that they will have a correct understanding of the situation.
 - Deputy Chairman Hirose was interviewed about the current state of decommissioning and recovery since the disaster (June 12). We plan to present articles to overseas media outlets and influencers that are interested in the many large international events to be held in Japan in the near future, such as the Rugby World Cup.
- Information continues to be disseminated to overseas news agencies and experts through e-mail magazines and Facebook/twitter accounts (first quarter results: e-mail magazine: two articles, Facebook posts: 5 posts, Twitter accounts: 3 tweets, YouTube videos: 2).
- A tour of Fukushima Daiichi was given to Harvard University History Department Professor Andrew Gordon (June 19). Since March 11, 2011, Prof. Gordon has held Japan assistance symposiums at Harvard and he was the first to independently set up a digital archive (JDA: Japan Disaster Archive) to preserve records and footage from the Great Eastern Japan Earthquake and Tsunami. Therefore, in conjunction with his tour, opinions were exchanged with Prof. Gordon about passing on lessons learned and leveraging these lessons for education and preparedness.

(4) Leveraging social network services and disseminating information in an easy-to-understand manner 【Measure 4】

- We continue to create and post videos that explain nuclear power-related technology and the progress of decommissioning in an effort to deepen understanding.
 - Fuel removal cover installation project: “Unit 3 reactor building” (April 3)
 - Preventing contact with contamination sources: “Multilayered contaminated water countermeasures” (May 31)
 - Protecting fieldworkers from heatstroke: “Heatstroke prevention and countermeasures at the Fukushima Daiichi Nuclear Power Station” (June 22)

And, we have uploaded online content called “INSIDE FUKUSHIMA DAIICHI ~A Virtual Tour of Decommissioning~” that enables users to feel as if they are actually visiting the site of decommissioning. (March). We are planning to localize this content into different languages and develop smartphone applications based upon user response.

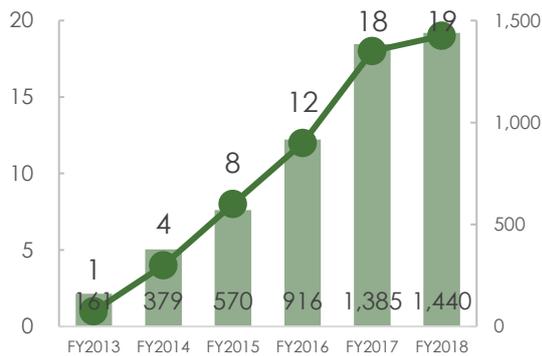
2.4 INITIATIVES TO IMPROVE TECHNOLOGICAL CAPABILITY

2.4.1 Strengthening Technological Capability (during times of emergency)

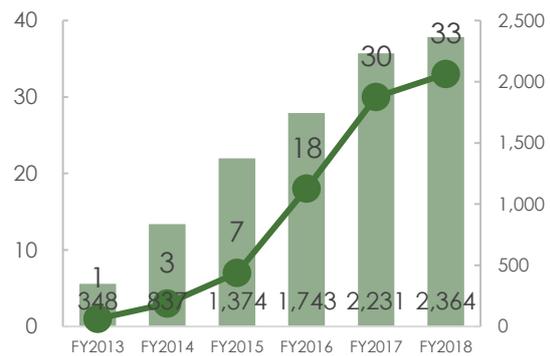
(1) Enhancement of Power Station and Headquarter Emergency Response (Organizational) Capabilities 【Measure 5】

The FY2017 training assessment results for each power station were announced at the ninth Nuclear Regulation Authority Nuclear Operator Preparedness Training Report Briefing held on July 2, 2018. “<Technological 4> Rate of A assessments for preparedness training by the Nuclear Regulatory Agency” has been set as a performance indicator (PI) to assess technological capability (in times of emergency), and the average for all three power stations based upon FY2016 training assessment results (FY2017 PI) was 76%. However, according to FY2017 training assessment results (FY2018 PI), this average has fallen to 56%. This is largely due to the fact that four of the 13 assessment indicators used until FY2016, for which each station received high assessments, were deleted from the FY2017 assessment thereby resulting in a decrease in the number of areas for which A assessments had been given. Furthermore, when the areas for which A’s were not given were examined, it was pointed out in regards to sharing information with the Nuclear Regulation Authority that explanations given by TEPCO were insufficient, and that there was insufficient handling of problems when data could not be transmitted from plant data systems. During this fiscal year **information sharing specialists shall be assigned** to improve the situation and ensure that information is shared between power stations, Headquarters and the Nuclear Regulation Authority in a timely manner.

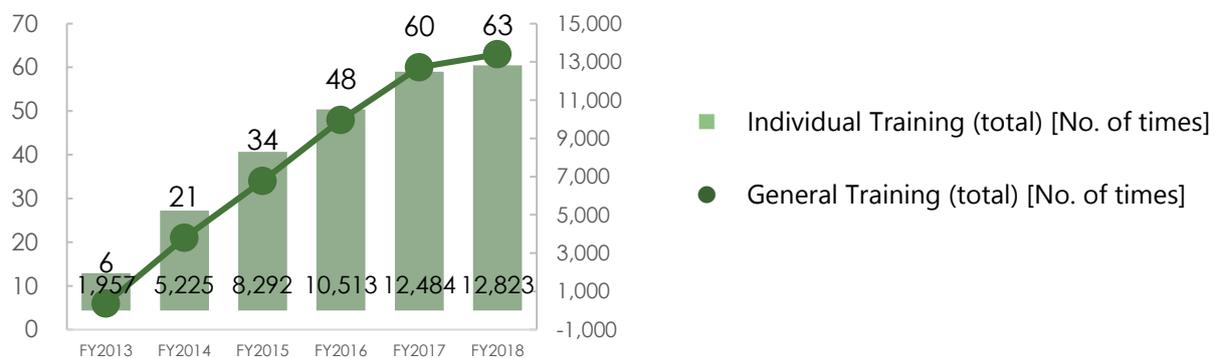
Training results for each power station are as follows:



<Fukushima Daiichi>



<Fukushima Daini>



<Kashiwazaki-Kariwa>

◆ Fukushima Daiichi; First Quarter General Training: April 27

- On April 27, general training was held based on a scenario where an earthquake caused leaks from the spent fuel pool, a discharge of contaminated water outside of the system, and power source troubles. Basic EAL¹⁷ event handling and rule compliance, such as evacuation from the new main administration building in the event of an earthquake, assembly in the anti-earthquake building emergency response center, notification after determination of an EAL event, and response plan formulation during the objectives determination meeting, were examined along with improvements made to information sharing during assembly at the anti-earthquake building emergency response center, which was identified during general training on November 29, 2017 as needing improvement.
- It was confirmed that using emergency mobile phones and mobile speakers enable information to be shared smoothly during assembly at the anti-earthquake building emergency response center. Also, in regards to the accuracy of reports made after an EAL event, which was also identified as a problem, the use of the newly created “EAL Reporting and Notification Chart” helps to prevent mistakes with EAL numbers and occurrence times.
- During the simulation, the safety of workers who had headed into the field was not confirmed when an aftershock was simulated halfway through the training, and there

¹⁷ Emergency Action Level

were also delays in handling equipment malfunctions caused by the aftershock, so these are areas for improvement that will be addressed during future training sessions.

◆ Fukushima Daiichi; First Quarter General Training: April 26, May 24, June 21

- During general training on May 24, participants practiced evacuating the main administration building and establishing a temporary response center on high ground in response to a training scenario where an earthquake occurred and a large tsunami alert was issued. A temporary response center was established in trailers located on high ground, and satellite phones and transceivers were used to gather information. Information, such as plant status, was written on white boards posted inside and outside the trailer. An air tent was also erected in the parking lot to train on setting up first aid centers.
- The abundance of channels on transceivers used for communication between parking lot personnel and personnel in the temporary response center in the trailer caused confusion, so when engaging in activities on high ground, the transceiver channel to be used shall be clarified in order to resolve this problem.



White boards posted on the trailer house

◆ Kashiwazaki-Kariwa; First Quarter General Training: April 23, May 29, June 18

- For training conducted on May 29th, we used the simulated Unit 5 Emergency Response Center (ERC) that was built in the Unit 5 service building for the first time. Training was conducted based on a scenario where both Unit 6 and Unit 7 were damaged by an earthquake. It was confirmed that nuclear preparedness personnel from the power station were able to assemble, establish command in the ERC, share information and make decisions about repair plans and priorities for repair.
- The simulated ERC in the Unit 5 service building can be used to practice assembling in times of emergency and shall be proactively leveraged until the Unit 5 ERC is finished.



Training in the simulated ERC

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

- ◆ Status of initiatives to improve the in-house technological capability of power stations (operations area)
 - Fukushima Daiichi
 - Unit 5 and 6 operators have engaged in fire engine and power supply truck training since FY2014. As of the end of June, 39 operators had been certified on the operation of fire engines thereby exceeding our 31-operator goal (80% of the 39 operators in

the field (decrease of one operator over 2017Q4)) (fill-rate: 126%, decrease of one operator over 2017Q4), and 39 operators had been certified on the operation of power supply cars (fill-rate: 126%, decrease of one operator over 2017Q4). 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 June, 29 operators have been certified on the operation of fire engines thereby meeting our 29-operator goal (80% of the 36 operators in the field (increase of eight operators since 2017Q4)) (Fill-rate: 100%, increase of one operator from the end of last fiscal year), and 27 operators had been certified on the operation of power supply cars (fill-rate: 93%, increase of one operator from the end of last fiscal year). As a result of an increase of personnel in the field we were unable to achieve our goals for the number of certified personnel, however we expect that this issue will be resolved during the second quarter through our power supply truck training plan. Furthermore, like at Kashiwazaki-Kariwa, operators have received certification through in-house programs in equipment diagnostics and began in-house data sampling from primary system major rotating machinery in FY2018. The number of certified personnel and the number of systems being sampled will be increased as we aim to improve technological capability.

- Kashiwazaki-Kariwa

Fire engine and power supply car operation training commenced during FY2013. As of the end of June, 111 operators have been certified on the operation of fire engines thereby exceeding our 101-operator goal (80% of the 126 operators in the field (increase of six operators since the end of last fiscal year)) (Fill-rate: 110%, decrease of nine operators since the end of last fiscal year), and 107 operators had been certified on the operation of power supply cars (fill-rate: 106%, decrease of seven operators since the end of last fiscal year). During power supply car training, in addition to the normal start-up of power supply cars, training was also implemented on manual switching in the event of an intake exhaust damper malfunction. Efforts have also been made to cultivate certified instructors within operator training teams and as of the end of June, 157 instructors (increase of one operator since the end of last fiscal year) had been trained. Efforts are also being made to improve the ability of not only maintenance personnel but also operators to diagnose equipment troubles in conjunction with the increase in the number of operators that has occurred in order to handle emergencies. These operators have obtained internal certification on equipment diagnostics and are now continually sampling data for approximately 140 pieces of rotating equipment at Unit 7. This has led to an improvement in the abilities of field workers, such as the acquisition of a wide variety of knowledge related to equipment and also an increased interest in equipment status.

Power Station	Fire Engines		Power Supply Trucks	
	Number of skill certifications (compared with the last quarter)	Fill rate	Number of skill certifications (compared with the last quarter)	Fill rate
1F	39 people (-1)	126%	39 people (-1)	126%
2F	29 people (+1)	100%	27 people (+1)	93%
KK	111 people (-9)	110%	107 people (-7)	106%

Initiatives to improve the in-house technical skill of operators
(Number of skill certifications)

◆ Status of initiatives to improve the in-house technological capability of power stations (maintenance area)

- 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 concrete pump truck operation training, the pump trucks were actually brought near the Unit 3 reactor building to simulate an actual emergency situation, and similar training will be periodically conducted in the future based upon the operations training conducted in March 2018. Training will be continually conducted based upon foreseen risks at the Fukushima Daiichi NPS.

- 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) and from May 2018 employees that were hired during FY2017 were added to the training roster in order to cultivate new emergency response personnel.

July 2016 the rubble removal/road repair team was trained on the use of drones. As a result, during the May 2018 site preparedness training, these drones were used to check field conditions after everyone had evacuated to high ground in response to a simulated tsunami. The drones were also used to deliberate procedures for removing rubble and repairing roads thereby showing that the training has had an effect. We will continue to utilize creativity and innovation when conducting training in order flexibly adapt to various conditions.



Drone operation training



Evacuating to high ground

- 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 assembling and disassembling scaffolding, welding/thermal cutting/grinding, bucket truck operation, fire truck operation, air conditioning duct/pipe repair training and forklift operation. We are also conducting various types of training such as on assembling and disassembling scaffolding, bucket truck operation, and forklift operation training at the newly opened controlled condition training center. During forklift operation training, we are improving the skill of operators by gradually increasing the difficulty of training, such as by making the forklift routes narrower. We will continue implementing repetitive training in an effort to maintain and improve technical skill.



Scaffolding assembly training



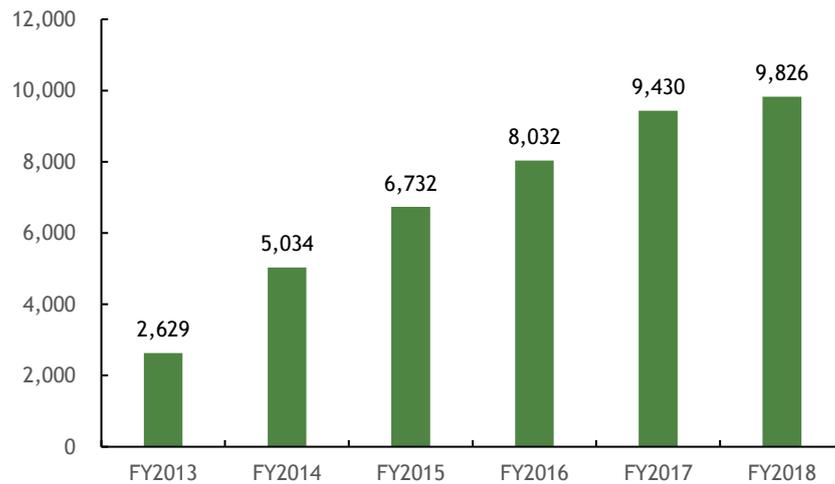
Bucket truck training



Forklift operation training



Air ventilation duct repair training



Trends in the number of maintenance personnel that have undergone in-house training
(Total for Fukushima Daiichi, Fukushima Daini and Kashiwazaki-Kariwa)

2.4.2 Strengthening Technological Capability (during times of normalcy)

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

- ◆ Reconstructing education and training programs based on SAT¹⁸
 - 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 Meeting, Power Station Education and Training Meeting, and Curriculum Review Meeting. These three bodies effectively put education and training programs through the PDCA cycle based upon SAT.
 - In order to reflect the needs of personnel that work at power stations even more accurately, education/training-related problems that need to be solved in order to improve power station performance were identified during the Curriculum Review Meetings for each area. The progress of resolving these issues will be checked during future Curriculum Review Meetings as power station department heads work together with the Nuclear Education and Training Center to improve performance in each area. Furthermore, at the Curriculum Review Meetings for each field and the Power Station Education/Training Meetings, a standard format is being used for agendas in order to ensure that important topics are covered.

[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

¹⁸ SAT (Systematic Approach to Training) : Standard education training method advocated by the IAEA

- Human factor and human performance tool training implemented at Fukushima Daini last fiscal year began for maintenance department team leaders at Kashiwazaki-Kariwa that are responsible for field work supervision and concluded at the end of June. (Training for the maintenance department at Fukushima Daini concluded during the third quarter).
- At Kashiwazaki-Kariwa and Fukushima Daini, *Kashiwazaki-Kariwa Unit 6/7 reactor installation modification permit training* was held as part of training on the New Regulatory Requirements in order to give an overview of the installation modification permit and deepen understanding about the finer points of safety inspections. This fiscal year we have expanded training to site managers and representatives of more than 40 contractors in addition to TEPCO employees in order to foster an understanding of the legal basis for safety countermeasure renovations.



Training for contractors on the New Regulatory Requirements (Kashiwazaki-Kariwa)

◆ New employee training

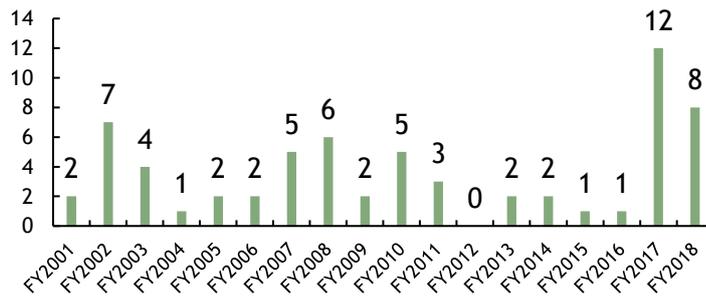
- New employee training was conducted for new Nuclear Power Division employees at Fukushima Daiichi (30), Fukushima Daini (12), and Kashiwazaki-Kariwa (36) to give them knowledge about nuclear safety, radiation safety, worker safety, basic logic, and plant facilities. The new employees will now be subjected to more detailed training in the form of field training and shift training.



New employee training (Fukushima Daini)

◆ Initiatives aimed at acquiring high levels of expert knowledge

- Lectures on expert fields are being given and support is being offered in the form of, for example, creating group study sessions in different offices for willing participants, in order to help those studying for the licensed reactor engineer exam to pass with flying colors. As a result, eight people passed the 60th licensed reactor engineer written exam offered in March.



Trends in the number of people that have passed the licensed reaction engineer written exam

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

◆ Deliberation of the Establishment of a Nuclear Engineering Center

- 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.
- During the first quarter we continued to discuss internal manual revision proposals. We will continue to diligently make the required preparations, such as revising manuals, and engaging in awareness activities, etc.

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.

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

◆ Cultivating system engineers

- 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.
- There are currently six system engineers at Kashiwazaki-Kariwa responsible for continually monitoring 22 systems at Units 6 and 7 and it has been confirmed that there are no performance abnormalities. We will continue to develop our system monitoring initiatives and make improvements.
- There are currently three system engineers at Fukushima Daini responsible for continually monitoring six systems at Units 1~4 and it has been confirmed that there are no performance abnormalities. During FY2018 we will move forward with education and training to newly train two more system engineers.
- Going forward we shall continue education and training to increase the number of systems monitored and continually train personnel in order to reach our objective of having five system engineers for each reactor.

(4) Enhancing configuration management 【Measure 6】

◆ Enhancing configuration management

- 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.
- In regards to the design standards document that is vital for constructing configuration management processes, during the first quarter, the requirements and tests/inspections/maintenance that should be implemented by operators for equipment required to enable residual heat removal systems (power equipment, air supply equipment, cooling equipment, etc.), which have been prioritized as the top issue to address, to function and perform, were identified.
- A detailed review of the work manual that explains configuration management procedures is underway and we are currently writing detailed procedures and identifying with whom responsibility lies. During the first quarter we began deliberating the introduction of a design attribute review, a tool for checking what fields and impacts should be considered, and for accurately identifying what experts in which fields should be consulted when engaged in design during the initial stages of design changes.
- In regards to systems that support the operation of configuration management processes, documents, such as operational procedures, required for system user operation training are being compiled.
- In regards to human resource training (education), teaching materials that will be used when engineer training goes into full force are being readied (corrections identified during the pilot education program are being reflected). At the same time, we have also started creating basic training/education materials for non-engineer plant employees in order to improve their general understanding of configuration management. During the second quarter the contents of these educational materials will be solidified and educational programs gradually started.

(5) Improving project management skills

◆ Improving project management skills

- We have created a project for resolving safety measure-related problems that exist across all departments at Fukushima Daiichi and Kashiwazaki-Kariwa. During the first quarter we decided on a project management basic education plan. The project management skills of all personnel shall be improved so that education can be provided for each class of worker.

3 SELF-ASSESSMENTS OF KEY ISSUES

During FY2016 we implemented a self-assessment of our progress with the Nuclear Safety Reform Plan that was subsequently reviewed by the Nuclear Reform Monitoring Committee¹⁹. One of the expectations expressed by the committee is that TEPCO, *"continues to perform self-assessments that will yield significant input for nuclear safety reforms as part of its initiatives to achieve the world's highest levels of nuclear safety."* Furthermore, at the 14th Nuclear Reform Monitoring Committee meeting held on November 20th the committee commented that, *"forming the habit of performing self-assessments is extremely important to enable a culture of self-improvement and learning to permeate throughout the entire organization"* and requested that improvement progress be assessed and reported on again by this fiscal year.

We are currently conducting self-assessments of five key issues that need to be addressed; strengthening governance, improving human resource training, improving communication, cultivating nuclear safety culture and strengthening internal oversight functions. Each department manager will discuss the expectations concerning the important issues and the current gaps that exist with the Nuclear Reform Special Task Force Secretariat, formulate action plans to make improvements, and report on these initiatives during the next meeting of the Nuclear Reform Monitoring Committee.

¹⁹ http://www.nrmc.jp/report/_icsFiles/afieldfile/2017/07/31/01_4J.pdf

http://www.nrmc.jp/report/_icsFiles/afieldfile/2017/07/31/01_5J.pdf

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 the FY2017, and we aim to achieve these targets by the end of the fiscal year. Trends have been monitored since FY2018 Q1.

4.1 KPI RESULTS

Safety Awareness	Ability to Promote Dialogue	Technological Capability
Nuclear leaders : 85 points (Target: 80 points)	Internal: 79 points (Target: 80 points)	Times of normalcy: 81 points (Target: 110 points)
Entire Nuclear Power Division : 73 points (Target: 80 points)	External: 76 points (Target: 80 points)	Times of emergency: 81 points (Target: 110 points)

4.2 PI RESULTS

PI	Results	Notes
Safety Awareness		
Nuclear leaders		
<Safety-1> Rate of implementation of retrospection leveraging the traits by Nuclear leaders	83% (Target: 100%)	
<Safety-2> Number of times emails have been sent by nuclear leaders in order to share information	0.7 times/week (Target: More than once a week)	
< Safety-3 > Number of times nuclear leaders participated in training according to plan	Total 7 times/quarter (117%) (Target: More than twice/year/person)	
<Safety-4> Number of times nuclear leaders went into the field	2.5 times/month (Target: More than twice a month)	
<Safety-5> Number of benchmarked issues for which nuclear leaders are responsible for were put into practice	3 times/quarter (Target: More than 4 times/year)	
Entire Nuclear Power Division		
<Safety-6> Implementation rate of group discussion about Traits	81% (Target: 100%)	
< Safety-7 > Percentage of intranet messages from nuclear leaders that have been read	62% (Target: More than 80%)	

PI	Results	Notes
<Safety-8> Number of times managers engaged in management observation (MO) at power stations	Fukushima Daiichi: 538 times (1.80 times/month/person) Fukushima Daini: 699 times (3.43 times/month/person) Kashiwazaki-Kariwa: 1,039 times (3.43 times/month/person) (Target: Determined by each dept.)	
<Safety-9> Good MO reporting rate	Fukushima Daini: 46% Kashiwazaki-Kariwa: 48% (Target: More than 50%)	
<Safety-10> Completion rate of GII or higher corrective measures within the deadline	Fukushima Daiichi: 63% Fukushima Daini: 80% Kashiwazaki-Kariwa: 92% Headquarters: 100% (Target: 100%)	
<Safety-11> No. of nonconformance recurrences (GII or higher)	Fukushima Daiichi: 3 Fukushima Daini: 0 Kashiwazaki-Kariwa: 0 Headquarters: 0 (Target: 0/month)	
< Safety-12 > Nonconformance voucher period achievement rate	Fukushima Daiichi: 89% Fukushima Daini: 97% Kashiwazaki-Kariwa: 84% Headquarters: 64% (Target: More than 80%)	New Nonconformance examined within 3 business days of discovery Definition differs at Fukushima Daiichi
<Safety-13> New OE information viewing rate	56% (Target: 75%)	Moved from Technological Capability
<Safety-14> Significant OE training participation rate	0% (No training implemented) (Target: More than 60% of management)	Moved from Technological Capability Training shall be conducted in Q3
Ability to Promote Dialogue		
Internal		
<Dialogue-1> Percentage of employees that feel that intranet messages from nuclear leaders are "helpful"	31% (Target: More than 50%)	
<Dialogue-2> Response rate to e-mail questionnaire on the information conveyed by nuclear leaders	52% (Target: More than 70%)	
<Dialogue-3> Degree of understanding of information conveyed by nuclear leaders	2.5 points (Target: More than 2.5 points)	
External		
<Dialogue-4> Questionnaire results on the quality/quantity of disseminated information	Measured during Q3 (Target: +0.9 increase over last fiscal year)	Frequency: Once a year

PI	Results	Notes
<Dialogue-5> Questionnaire results on the approach to and awareness of, public relations and public opinion gathering	Measured during Q3 (Target: +0.9 increase over last fiscal year)	Frequency: Once a year
<Dialogue-6> Dialogue activity questionnaire assessment	123 points (Target: 100 points)	New
<Dialogue-7> No. of opinions from community members	Achievement rate: 31% (Target: Positive increase over last fiscal year)	New
Technological Capability		
Times of Normalcy		
< Technological-1 > No. of workers certified in operations/maintenance/engineering/radiation and chemistry/fuel/safety, no. of external certification holders	116 points (Target: 110 points)	
< Technological-2 > Rate of reflection of education/training program improvements requested by line departments	45% (Target: 80%)	New
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% (Target: 120%)	
< Technological-4 > Percentage of "A" assessments given by the Nuclear Regulatory Agency for emergency response training categories	56% (Target: More than 80%)	Frequency: Once a year FY2017 training assessment results
<Technological-5> Training participation rate	65% (Target: 90%)	New

CONCLUSION

Decommissioning of Fukushima Daiichi is proceeding safely and steadily based upon the Mid-and-Long-Term Roadmap Towards Decommissioning of Fukushima Daiichi Nuclear Power Station Units 1 to 4. And, we have clearly stated our intention to examine the decommissioning of all reactors at Fukushima Daiichi. At Kashiwazaki-Kariwa, we are moving safely and steadily ahead with safety measure renovations as we aim to enhance our engineering and emergency response capabilities. At each power station we continue to move forward with renovations while prioritizing safety, but we have received strong requests from the local community concerning these projects. TEPCO will seriously consider the requests of the local community in regards to these projects and make it a point to visit the members of the community to promote dialogue in order to fulfill our responsibilities while considering their feelings and without becoming complacent.

In regards to the Nuclear Safety Reform Plan (management aspects), we shall make further improvements while setting our sights on this fiscal year's important objective of "*rooting the habit of self-assessment [because it] is of vital importance for self-improvement and for enabling a culture of learning to permeate throughout the entire organization,*" as advised by the Nuclear Reform Monitoring Committee. Our current self-assessment focuses on five issues that have been deemed of vital importance and through these initiatives we aim to become an organization that can autonomously, quickly and effectively improve nuclear safety.

Furthermore, in order to contribute to improving not only our own safety, but also the safety of the entire nuclear power industry, in addition to our participation in the World Association of Nuclear Operators (WANO) and the Japan Nuclear Safety Institute (JANSI), we have also been a member of the Atomic Energy Association (ATENA) (since July 2018), which was created to enable operators, manufacturers and existing organizations to cooperate and make voluntary nuclear safety improvements, since its establishment. We will continue to proactively participate in other external initiatives that aim to improve nuclear safety.

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. Please visit our website²⁰ for more information.

End of Document

²⁰ <https://www4.tepco.co.jp/ep/support/voice/form.html>