NUCLEAR SAFETY REFORM PLAN

FY2018Q2 Progress Report

Tokyo Electric Power Company Holdings, Inc.

November 12, 2018

TEPCO

TABLE OF CONTENTS

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 FY2018[1](July~September, 2018)

In August, TEPCO met with Niigata Prefecture Governor Hanazumi, Kashiwazaki City Mayor Sakurai, and Kariwa Village Mayor Shinada to exchange opinions about the progress of safety measures at the Kashiwazaki-Kariwa Nuclear Power Station. In September, Niigata Prefecture Governor Hanazumi was given a tour of the Kashiwazaki-Kariwa Nuclear Power Station so that he could check the progress of safety measure renovations and observe emergency response training. Also, since August we have been visiting the residents of Kashiwazaki City and Kariwa Village in order to speak directly to members of the local community. We will continue to engage in dialogue with members of the community and disseminate information as we strive to improve the safety of the Kashiwazaki-Kariwa Nuclear Power Station.

1 All dates hereinafter refer to 2018 unless otherwise noted.

- To which of the six Nuclear Safety Reform Plan measures the initiative pertains is noted in brackets 【 】
- An explanation of abbreviations is on the last page of this report

1 PROGRESS WITH SAFETY MEASURES AT NUCLEAR POWER STATIONS

1.1 PROGRESS OF REACTOR DECOMMISSIONING

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

(1) Fuel Debris Removal

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. During FY2019 we shall conduct internal investigations of the Unit 1/2 PCV's and take small samples of deposits at the bottom of the PCV. During FY2020, we shall take larger fuel debris samples from Unit 2 and we are currently deliberating whether or not we need to perform further investigations of Unit 3 using the submersible ROV that was used previously.

(2) Removing Fuel from the Spent Fuel Pool

◆ Unit 1

In order to propose a plan for removing rubble around the spent fuel pool, we have measured the surface dose rates of rubble around the pool as well as air dose rates, and have also measured the dimensions of pieces of rubble using 3-D scanners (July 23 through August 2). From the investigation we were able to confirm atmospheric dose rates on site, whether or not there any objects that may hinder work, and also the dimensions of the work area. Going forward we will use this information to assess the impact of dust on work tasks as well as the workability of the area upon which we will propose a work plan for removing rubble from around the pool. Furthermore, in order to secure access route to the spent fuel pool, we started removing X-braces from the west side of the reactor building on September 19 and completed the task on September 25. In the future we plan to remove one X-brace from the south side and two X-braces from the east side. While continuing to strictly assess and manage risks while moving forward with work tasks, we plan to begin fuel removal in FY2023 while thoroughly implementing safety measures, such as measures to prevent the dispersion of radioactive substances.

Rubble, such as the fuel handling machine

X-brace removal

3-D scanner

After removal of X-brace

◆ 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 made an opening on the west side of the reactor building to access the operating floor. Between July 2 and July 18 remotely operated robots were used to measure radiation levels around the area where the opening was made and take photographs to check for objects that may still remain. Investigation results showed that compared with the February 2012 investigation air dose rates have decreased significantly and that there are no scattered objects on the floor that may hinder the mobility of the robots thereby confirming that there is nothing that will hinder the relocation/cleanup of objects remaining in the area. On August 23 we began cleaning up the area to remove objects that may hinder further investigations, and on September 10 we completed relocation of equipment (Warrior) that still remained inside the building from past investigations. Although there was no impact on the environment outside the building, since increasing trends in dust concentrations were seen on the operating floor during work, water will be sprayed over the work area to see if this helps to suppress the dispersion of dust. The scope of the investigations will be expanded to the entire operating floor going forward, and a plan for dismantling the top part of the reactor building, which is necessary in order to remove fuel from the spent fuel pool, proposed.

Using remotely operated robot to measure radiation levels

Relocating Warrior (left)

◆ 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. However, following the crane nonconformance that occurred in May, during the second quarter a nonconformance with fuel handling equipment occurred.

On August 8, during pre-use inspections of the fuel handling machine conducted in accordance with the Nuclear Regulation Authority, a control system abnormality alarm sounded and the fuel handling machine shut down after the fuel grasper (mast) of the fuel handling machine was lowered into the spent fuel pool. Results of an investigation found that control system cables connected to the device that handles the fuel were corroded and severed. When the condition of cables installed outside were examined, it was found that rainwater could easily find its way into the cable ducts. It is assumed that the nonconformance occurred because rainwater found its way inside the cable connections and the moisture resulted in corrosion and severed wires. The cable connection parts are water resistant, however since rainwater did indeed find its way inside the part and caused corrosion and severed wires, it was confirmed that the parts were manufactured in a way that made them defective.


Unit 3 Fuel Handling Machine

On August 15 when testing operation of fuel handling equipment, a control system abnormality alarm sounded and the crane shutdown when it was being used to clean up materials and equipment on the operating floor. Results of an investigation found that the combined weight of the test weight and the simulated fuel when hoisted was approximately 51 tons, which exceeded the 50-ton rating of the crane. It is assumed that the reason why the rated lifting capacity of the crane was exceeded is because originally the test weight and the simulated fuel were to be hoisted separately, however as a result of typhoon #12, work outside of the building was restricted and the plan was changed so that they would be hoisted simultaneously without checking to see if this would exceed the rated capacity of the crane. Furthermore, the alarm that sounded was a “control system abnormality” alarm and not a “excessive load” alarm that should sound when the rated capacity is exceeded. Since the same conditions could not be replicated using a test weight, we are still investigating the cause of the alarm.

Multiple nonconformances have occurred since test operation of the Unit 3 fuel handling equipment in March and it is assumed that the common cause is problems with quality management at the manufacturer and TEPCO. Fuel handling equipment is comprised of many components that are procured from many vendors and the manufacturer has checked the quality records of main components as well as the functionality of the fuel handling machine and crane. However, it is assumed that the rash of multiple nonconformances is the result of insufficient quality management and failure to check equipment specifications in consideration of the usage environment at Fukushima Daiichi. In order to identify any other hidden nonconformances, temporary repairs of all nonconformances were completed on September 27 and safety inspections

(operation checks, equipment inspections) will be performed before the end of the year. Quality management will also be examined.

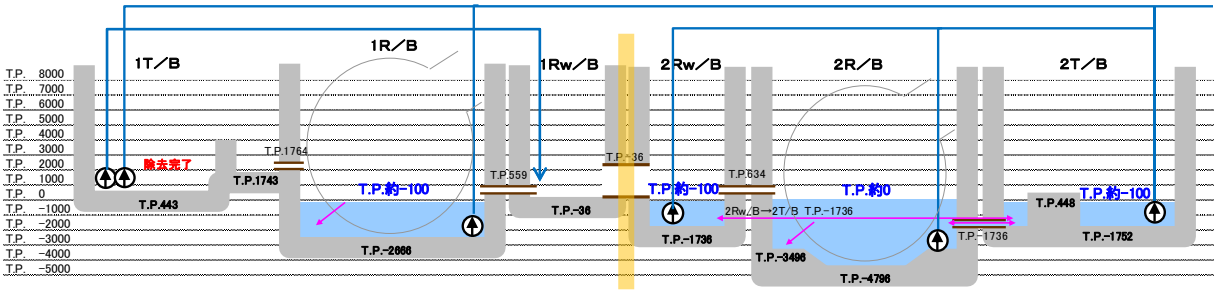
As a result, it will be difficult to commence fuel removal in the middle of November as originally planned, and to what extent the schedule will be impacted will be closely examined based upon the results of equipment integrity and quality management problem checks.

(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.

◆ Progress of Treatment of Accumulated Water in Buildings

In order to prevent the water that has accumulated in the Unit 1 through 4 reactor building (R/B), turbine building (T/B) and radioactive waste building (Rw/B) (accumulated water) from leaking outside of the building, water levels are being managed so that the level of groundwater around buildings is higher than that of accumulated water in the buildings. In order to complete treatment of all accumulated water by 2020 (exposure of the lowermost floor in all buildings except the Unit 1-3 reactor buildings where cooling water is being recirculated), the water level of accumulated water in buildings has been gradually reduced since the middle of July. The level of accumulated water on the Unit 1 and Unit 2 sides has fallen below the floor of the Unit 1 radioactive waste building (lower 36mm than sea level of Tokyo Bay) and we have confirmed that these low water levels can be controlled in a stable fashion so we have deemed the connection between Units 1 and 2 to have been cut off (September 13). The flow of accumulated water between Units 3 and 4 was cut off in December 2017 when water levels decreased to the point where the floor of the middle of the lowest floor and the turbine building was exposed. Therefore, we have achieved our 2018 objective of "cutting off the flow of water between Units 1 and 2 and Units 3 and 4." We will continue to thoroughly and carefully implement countermeasures while prioritizing safety in order to achieve the large objective of "completing treatment of all water accumulated in buildings during 2020."



T.P. ; Average sea level at Tokyo Bay

Cutting off connections between Units 1 and 2

◆ Deviation from limited conditions of operation due to inability to monitor subdrain water levels

On July 25 an alarm indicating an abnormality with data transmission from the digital recorder used to monitor subdrain water levels around the process main building and the miscellaneous solid waste volume reduction building was produced by the central monitoring system located in the main anti-earthquake building. Since the water levels of sub-drains around both buildings could

not be monitored, this incident was deemed to be a deviation from the limited conditions of operation stipulated in the implementation plan. After the alarm sounded recorders in the field were checked and it was confirmed that the level of accumulated water did not exceed the level of water in sub-drains around the buildings, and that the water level difference between accumulated water and water in sub-drains was approximately the same as it had been before monitoring became impossible. Furthermore, monitoring function of sub-drain water levels was restored so it was deemed that there was no longer a deviation from limited conditions of operation. The results of an investigation found that on the day the event occurred, work to add a new server to the central monitoring system network was being conducted and when the additional server was connected to the network, the signal feed from some digital recorders was lost. The digital recorders are only designed to be able to be connected to two server systems, but when the additional server was connected the resulting server system now comprised of four systems. This exceeded the specifications of the digital recorders and was directly responsible for the loss of signal. It is assumed that an underlying contributor is the fact that the impact on equipment when connecting the additional server was not sufficiently examined, so recurrence will be prevented by adding procedures to manuals that stat that impact assessments on existing equipment are to be implemented when adding new equipment to equipment in operation.

Furthermore, on August 12, an alarm sounded indicating an abnormality with the deviation between two water level gauges in sub-drain pit No. 206. Since the water level of sub-drain pit No. 206 could no longer be monitored this event was deemed to be a deviation from the limited conditions of operation stipulated in the implementation plan. A field inspection revealed that shock absorbing material on the inside of brackets used to secure the water gauges had fallen off causing the detecting part of the water gauges to drop slightly. Thereafter when trend data for the water level in sub-drain pit No. 206 was examined it was confirmed that there was no reversal in the level of accumulated water in buildings around the pit and the level of water in sub-drain pit No. 206, so the deviation from limited conditions of operation was lifted. The cause was a loss of adhesion of the shock absorbing material which caused the detecting part of the water gauge to drop. When this happened, the deviation between the two water level gauges exceeded settings thereby triggering the alarm. As an immediate countermeasure locking straps were added to all of the water gauges in sub-drain pits in order to further secure them, and in the future all water level gauges will be secured at two points on the horizontal plane in addition to the current one location on the vertical plane at which the water level gauges are secured as a permanent countermeasure.

(4) Status of Preparations to Dismantle the Unit 2 Exhaust Stack

The Unit 1/2 exhaust stack will be dismantled using remotely operated dismantling equipment since it has been found that the upper part of the steel tower that supports the stack is damaged/fractured in several locations. To ensure that dismantling goes smoothly, an 18m high mockup of the primary components of the exhaust stack has been constructed off-site (August 28). The simulated exhaust stack has been used to test the performance of remotely operated dismantling equipment and in October the mockup will be actually dismantled in order to examine work procedures and the amount of time required to perform them. Preparations at Fukushima Daiichi will begin in December with the aim of beginning dismantling of the actual exhaust stack during FY2018 while, of course, prioritizing safety.

Remotely operated dismantling equipment (Left), Mock-up exhaust stack (right)

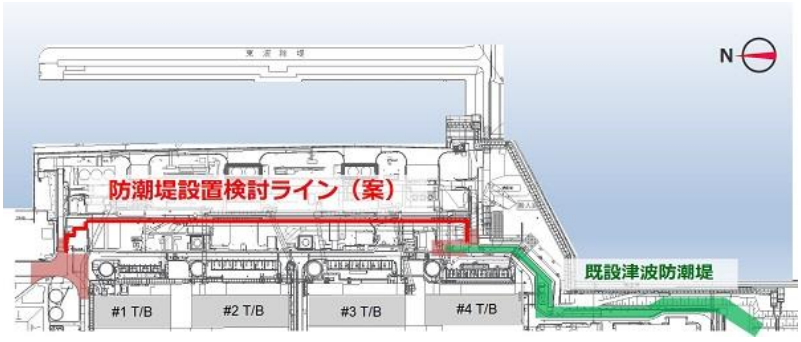
(5) Depressurization Tests on the Unit 2 Primary Containment Vessel

In order to prevent increases in hydrogen concentrations, the Unit 2 Primary Containment Vessel is being kept at pressures higher than atmospheric pressure by injecting nitrogen to keep the atmosphere inert. Primary Containment Vessel Depressurization tests (STEP1) were implemented in order to reduce the risks of a leak of radioactive substances from the Primary Containment Vessel and improve workability during containment vessel internal investigations (July 24 through August 31). During depressurization tests (STEP 1), the normal pressure (atmosphere + approximately 4.25 Pa) was depressurized by approximately 1 kPa and it was confirmed that there were no significant fluctuations with monitored parameters, such as hydrogen concentration. During the third quarter, based on the results from depressurization tests (STEP 1) and after confirming that there are no safety issues, further depressurization tests (STEP 2) are planned during which normal pressure will be reduced by approximately 2 kPa.

(6) Implementation Status of Tsunami Countermeasures

In order to prevent accumulated water in buildings from being sucked out by a receding wave, and more water from accumulating in buildings as a result of the leading wave, all the openings in buildings are being sealed and as of the end of the second quarter 61 out of 122 locations had been sealed. Furthermore, in order to minimize the damage to important equipment and mitigate the risk of delaying the decommissioning process, we are deliberating extending the existing seawall to the north side in preparation for a tsunami originating from the Kuril-Kamchatka Trench, for which the predicted probability of occurrence is high. We will continue to seal openings in buildings while prioritizing safety and move forward with detailed discussions on extension of the seawall so that the project can be completed quickly with as little impact on decommissioning work as possible.

Opening after sealing



Red: Planned seawall extension line
Green: existing seawall

(7) Handling Water Treated with ALPS

ALPS equipment has been operated with the objectives of quickly reducing risks associated with the storage of contaminated water and removing radionuclides to the point where concentrations are sufficiently low while ensuring there is no impact on the 1mSv/year effective dose rate at site borders. At current time, a committee of experts assembled by the government (Subcommittee on the Handling of Water Treated by ALPS) is comprehensively deliberating how to handle water treated by ALPS out of the need to sufficiently consider not only scientific and technical aspects but also social concerns and issues related to promoting recovery in Fukushima. In order to listen to the opinions of the people and further deliberations in the subcommittee, briefings/public hearings on the handling of water treated with ALPS were held in Fukushima and Tokyo (three locations in total) between August 30 and 31 during which a wide variety of opinions were obtained.

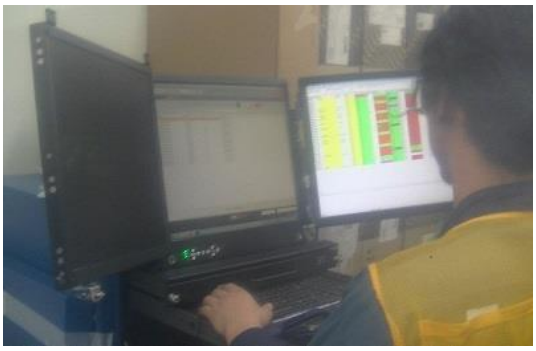
In light of the opinions received during the public hearings in August, we are in the process of compiling analysis results for treated water since FY2013 as well as the analysis results for each tank group since FY2017 in order to provide data on the nature of water treated with ALPS. Data on treated water has been disclosed via the TEPCO website, however we did not proactively explain that approximately 80% of treated water contains concentrations of radioactive substances that exceed limits that require public notification. In light of recent news stories and the opinions gathered during public hearings, we believe that is extremely important to be even more forthcoming with our information and provide that information in a manner that is easily understood. Furthermore, if water treated with ALPS is to be discharged into the environment, it will be subject to secondary processing to ensure that the sum of actual concentrations and concentrations that require public notification is below 1. TEPCO will continue to disclose information on water treated with ALPS as we wait for the subcommittee finish its deliberations/debate and reach a conclusion on the general direction in which we should head. Based on this conclusion and while respecting the opinions of all stakeholders, such as the residents of the local community, we shall develop a careful process for handling water treated with ALPS that not only ensures the safety of society but also gives it peace of mind.

(8) Initiatives Aimed at Reducing Exposure Doses

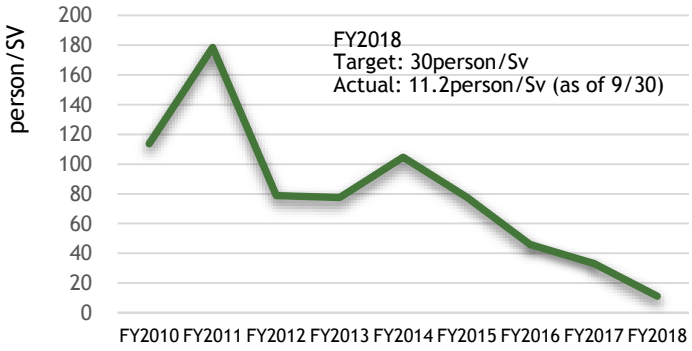
In accordance with the revised Mid-to Long-Term Roadmap, optimal countermeasures shall be implemented for radioactive substances that pose risks after prioritizing these substances based upon current conditions. At Fukushima Daiichi, we are striving to reduce exposure doses by predicting work-related exposure doses prior to commencing any task and determining whether or

not the task can be implemented upon assessing the increases or decreases in risk based upon this thinking.

During the second quarter, we conducted an investigation of the area around the opening in the Unit 2 reactor building that entailed using remotely operated robots to measure radiation levels and take photographs of objects that remain in the vicinity. During this investigation, the remote monitoring system used during the internal investigation of the Unit 3 primary containment vessel thereby reducing exposure by approximately 10%. This remote monitoring system is being continually used at Unit 2 where the relocation and cleanup of items remaining on the reactor building operating floor continues. Since we have been able to reduce exposure dose during work in the high-dose environment that exists at Unit 2 by approximately the same amount as exposure dose during work at Unit 3, we plan to add more remote monitoring systems and proactively leverage them during upcoming work in high-dose environments, such as inside and around the reactor buildings.



Remote monitoring system



Trends in total group dose by fiscal year

(9) Failure to Take Dust Measurements during the Handling of Spent Fuel

From August 20 through September 5, spent fuel in the Fukushima Daiichi spent fuel common pool was relocated within the pool. However, during the relocation of spent fuel on September 5, dust measurements, which are required to be taken in accordance with the implementation plan, were not taken. It is assumed that this is because instructions to take dust measurements noted on the analysis request form for September 5, which originally was supposed to be an extra day, were not conveyed to the contractors. Dust concentrations measured up until September 4 were below detectable limits, and the work performed on September 5 was exactly the same as that performed on September 4. Furthermore, no significant fluctuations were seen on September 5 with common pool area monitors, on-site dust monitors, or monitoring post trends, it does not appear that there was any impact on safety.

As a countermeasure, the method for conveying dust measurement instructions will be improved so that contractors can directly verify analysis request forms on the system. Furthermore, as a preventative measure, on the day prior to work, dust measurement plans for the following day shall be checked with contractors to confirm that information, such as dust measurement instructions and schedule changes, have not been left out. And from the second quarter, CFAM/SFAM in the Fukushima Daiichi Chemistry and Environment Control Areas shall proactively participate in proposing improvement measures for these types of incidents and strive to prevent recurrence.

1.2 PROGRESS OF SAFETY MEASURES AT KASHIWAZAKI-KARIWA

(1) Progress with safety measures

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

＜Progress with Safety Measure Renovations＞

Safety Measures (※: Measures independently implemented by TEPCO		Unit 6	Unit 7
Preparations for tsunami and internal inundation	Tidal wall (seawall) construction	Completed	
	Installation of tidal walls for buildings (including flood barrier panels)	No openings below 15m 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 [Augmenting heat removal and cooling functions]	Preparation of large volume water pump trucks and installation of substitute seawater heat exchanger equipment	Completed	Completed
	Installation of high pressure substitute for water injection systems	Underway	Underway
	Building of water sources (reservoirs)	Completed	
	Enhancement of the seismic resistance of pure water tanks on the Oominato side※	Completed	
Preparing for damage to the primary containment vessel or the reactor building [Measures to prevent damage to the PCV and hydrogen explosions]	Installation of filtered venting equipment (aboveground)	Underway	Underway
	Installation of filtered venting equipment (below ground)	Underway	Underway
	Installation of substitute circulation cooling system	Underway	Underway
	Installation of equipment for keeping the top of the PCV filled with water※	Completed	Completed
	Installation of hydrogen 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
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

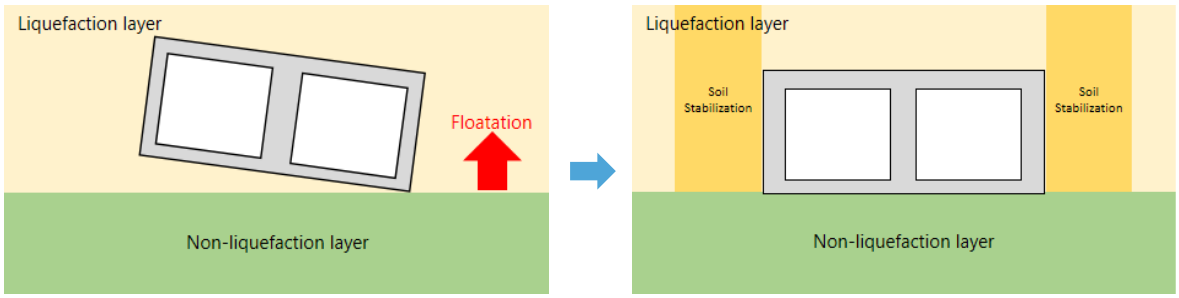
Safety measure progress that has been made during the second quarter is as follows:

◆ Seismic-Resistance Enhancements (including liquefaction countermeasures through soil improvements)

- Seismic-resistance assessment/renovations of outdoor equipment and piping, etc.

One of the safety measures we are currently implementing focuses on countering the effects of liquefaction, which is a phenomenon that has occurred during recent natural disasters. The liquefaction countermeasures currently being implemented for water intake channels consist of solidifying the ground using cement-based materials to make it more difficult for liquefaction to occur and prevent the structure from being lifted. We will continue to implement countermeasures, even during the detailed design of equipment, as we aim for higher levels of safety.

【Example of liquefaction countermeasures】 （Cross-section of the water intake channel）



Floatation　　Countermeasure by soil stabilization

【Water intake channel liquefaction countermeasures renovations】

① An excavator is used to dig a square hole into which ground improving agents are poured

② Sand in the ground is mechanically agitated/mixed with cement milk to improve the ground

(2) Visit to the power station by Niigata Prefecture Governor Hanazumi

Niigata Prefecture Governor Hanazumi visited the power station and observed station personnel engage in training designed to strengthen their ability to respond to emergencies as well as the safety measures that have been put in place in light of the regrets and lessons learned from the Fukushima Daiichi Nuclear Power Station accident (September 6). The governor made the following comments.

- "*It was the first time I had visited a nuclear power station and I got a better understanding of the facility.*"
- "*I understand that efforts are being made to implement safety measures, but I would like the investigation committee to further debate whether these initiatives are sufficient or not.*"

We were also requested to strive to further disseminate information on safety measures in which TEPCO is currently engaged. Along with moving steadily forward with safety improvement initiatives, we shall provide more information about these initiatives to the regional community as well as the prefecture's investigative committees in order to cooperate to the fullest and enable sufficient examination by all three sub committees.

Visit to the Main Seismic Isolation Building

Visit to the Unit 7 R/B Operating Floor

(3) 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).

After closely examining the 60 locations that were found to have not been fireproofed, it was discovered that only 24 did not comply with the Building Standards Act and as of May 9, all 24 locations, plus the two locations that were discovered in July 2017, had been fireproofed. And, in order to improve the accuracy of the results of this investigation, the inspection details were revised and another field inspection was conducted from the end of April during which two penetrations in Unit 7 were found to have yet to be fireproofed. Corrective measures for the aforementioned two locations were completed on September 21.

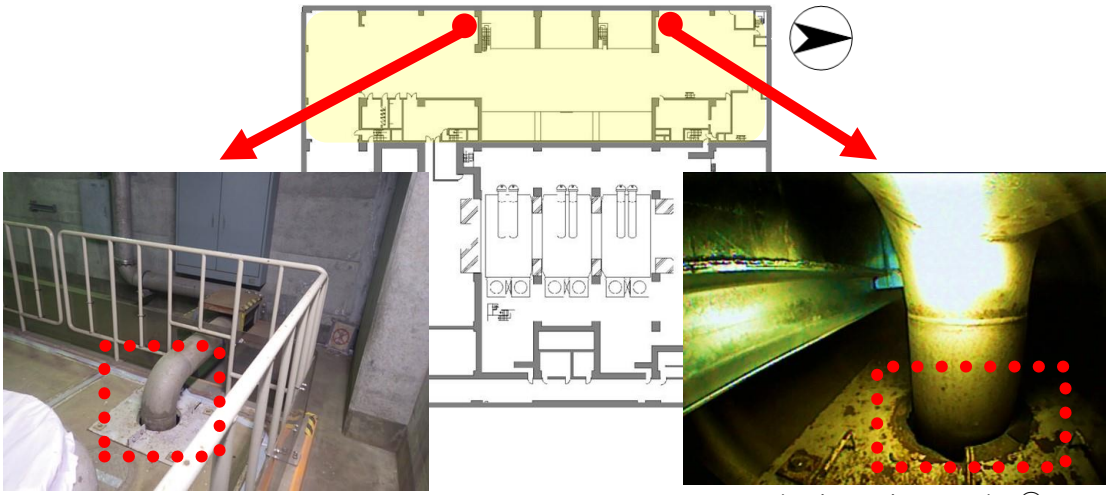
The status of investigations and corrective measures are as follows

<Status of investigation/corrective measures for penetrations in firewalls that do not comply with the Building Standards Act> (as of October 10)

Unit	*Investigation Status*	*Investigation Progress Rate*	*# of locations yet to be fireproofed*	*# of locations that have yet to be fireproofed but have been subjected to corrective measures*
Unit 1	Preparations underway	–	19	19
Unit 2	Preparations underway	–	4	4
Unit 3	Investigation underway	0%	–	–
Unit 4	Investigation underway	0%	–	–
Unit 5	Investigation underway	0%	2	2
Unit 6	Investigation underway	65%	1	1
Unit 7	Investigation underway	90%	2	2
Other	Investigation underway	85%	0	0
Total			28	28

<Two locations that have yet to be fireproofed> (August 9)

Unit 7 T/B 1Fl Heat Exchanger Area (Non-controlled zone)



Water intake tank vent pipe ①

Water intake tank vent pipe②

(4) Assisting HEPCO

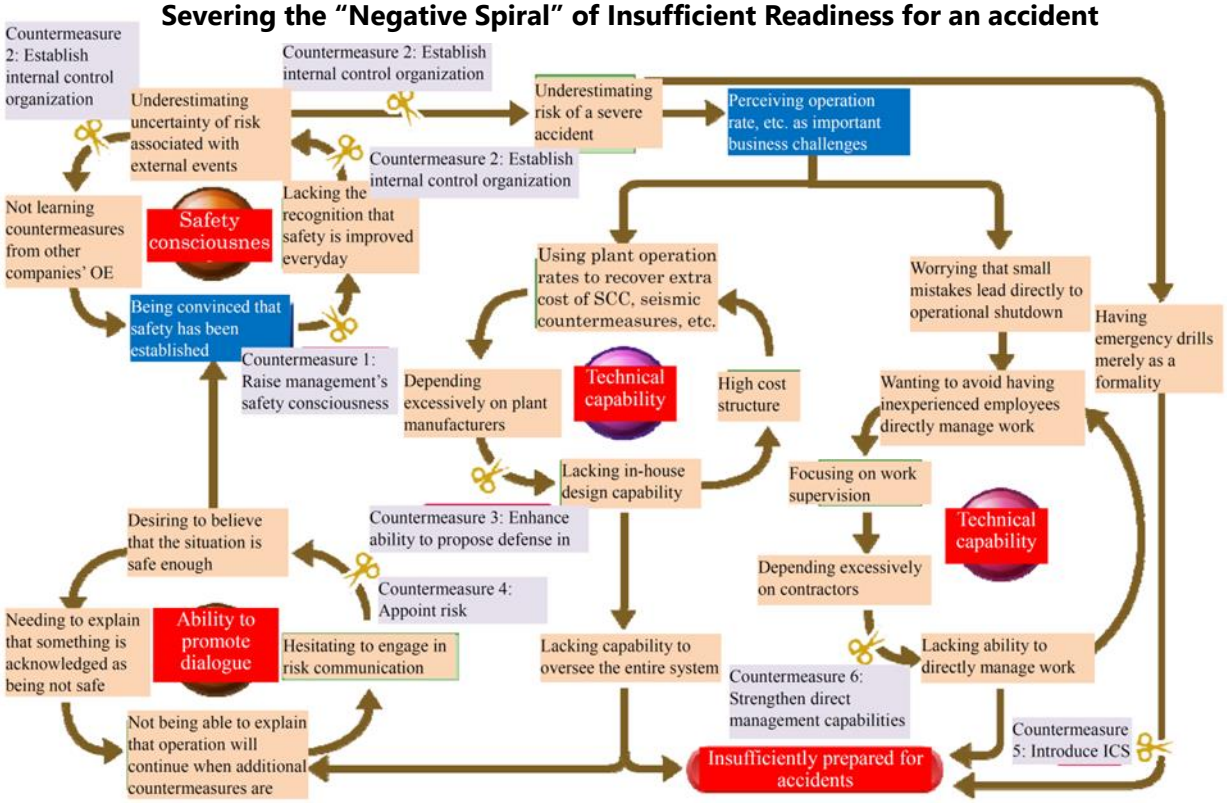
The earthquake that occurred on September 6 in the East part of Iburi, Hokkaido resulted in a total blackout of all areas covered by the Hokkaido Electric Power Company, Inc. (HEPCO). So, we dispatched assistance from the Fukushima Daiichi, Fukushima Daini and Kashiwazaki-Kariwa Nuclear Power Stations. After ensuring that vehicles required to ensure the safety of each power station remained on-site, 40 workers, including personnel from Headquarters, were dispatched along with five power supply trucks, one tanker truck, and six work vehicles in order to provide assistance to HEPCO. In accordance with HEPCO's request, personnel checked differences in power supply truck specifications, such as refueling methods, etc. and prepared for the emergency situation.

Power supply trucks and personnel dispatched from the three power stations

2 THE PROGRESS STATUS OF THE NUCLEAR SAFETY REFORM PLAN

In addition to the six measures for stopping the "negative spiral" that has exasperated structural issues faced by the Nuclear Power Division implemented based upon the Nuclear Safety Reform Plan announced in March 2013, TEPCO is engaged in initiatives to strengthen governance and develop internal communication after these areas were identified as needing further improvement in the self-assessment implemented in FY2016.

Severing the "Negative Spiral" of Insufficient Readiness for an accident



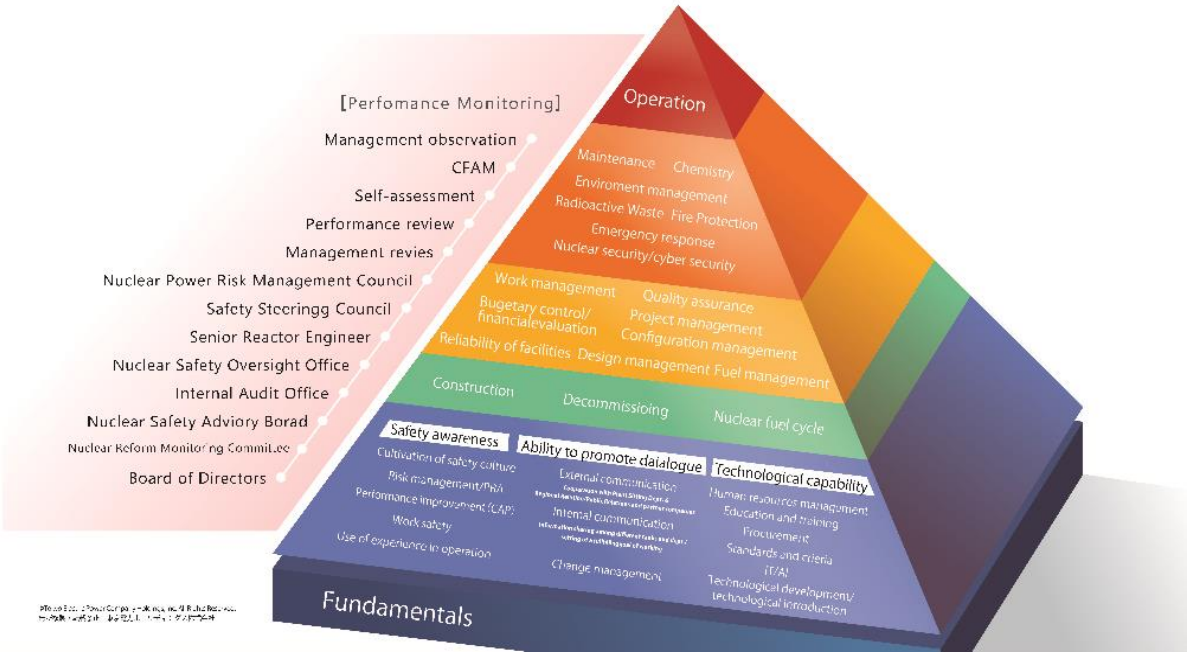
Furthermore, employees engage in duties based upon the Nuclear Power Division Management Model that was created in June 2017 as part of initiatives to strengthen governance. The Nuclear Safety Reform Plan Progress Report gives updates on "Better Aligning the Vectors of the Organization (Enhancing Governance)"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

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

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

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

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



2.1 Activities to Better Align the Vectors of All Divisions

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

In June of this year we used television conferencing systems to hold joint briefings on key issues between headquarters, each power station, and the Niigata Headquarters in order to ensure that the business plan formulated based on the Management Model is carried out. The briefings were videotaped on in-house TV and shown to employees that could not participate in the briefing, and also personnel that were newly transferred in July. More than 70% of participants replied on a questionnaire given out after the briefing that, "I received information that will be helpful when engaging in my own duties," thereby showing a favorable opinion by readers of the information directly given. At the same time, suggestions for making improvements to future briefings were also given, such as receiving explanations or more detailed explanations of how the issues were selected, and receiving information on the progress made with each issue.

On September 24, the 4th Nuclear Leader's Session was held and participants discussed the future state that the Nuclear Power Division is aiming for and organizational management issues, as well as issues that should be addressed during FY2019. During the third quarter, work plan outlines for FY2019 shall be created based upon these discussions, and opportunities shall be created for nuclear leaders to brief station personnel in conjunction with reports on the progress made with key issues during FY2018.

4th Nuclear Leaders' Session

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/SFAM 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. At current time preparations are being made to print and distribute the revised booklet, and during the third quarter the booklet will be distributed to the Nuclear Power Division and contractors while formulating a communication plan.

(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.

During the second quarter a JANSI peer review was conducted following the WANO follow-up review that was conducted during the first quarter. CFAM have been involved in these third-party assessments from the preparatory stages to give support to the power stations and ensure that explanations and discussions about improvement activities implemented by primarily CFAM/SFAM, such as activities to develop management observation (MO) and foreign material exclusion activities, etc., happen smoothly. During the review our foreign material exclusion initiatives were assessed and we received valuable advice that will contribute to making further improvements. Going forward we will continue to resist self-satisfaction, and proactively seek advice from outside parties while CFAM lead initiatives to further improve technical skill.

In light of third-party assessments and self-assessments conducted until last fiscal year, the four following issues will be focused on by the entire division this fiscal year. During the first quarter, CFAM in each functional area coordinated with SFAM to formulate overall strategies and action

plans, that include development on site, and during the second quarter these action plans will be gradually executed. The following explains the initiatives that are to be implemented.

◆ 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. We have already moved on to the execution stage and have commenced progress management. Examples of initiatives that are being implemented in each functional area are given below.

In the operations area operators are installing equipment guards to protect important equipment from be affected by work being performed in the vicinity. In regards to Work Management, operators reflect the protection status of important equipment in work schedules and are implementing measures to avoid risk during the creation of work schedules. Furthermore, system configuration data is used to assess the risk of LCO deviations, EAL events, and core damage on a weekly basis and these risk assessments are shared with management during information sharing meetings, and conveyed to company personnel via the company's intranet.

Furthermore, the introduction of standard design processes (engineering) are being deliberated, project management related procedures and educational materials are being created (project management), and processes common to each functional area (Basic Risk Management Manual) are being deliberated.

◆ Permeation of operational focus

In order to support operations, which is the most important functional field of the entire organization, the concept of "operational focus" is being spread while strengthening existing mechanisms to ensure that the requirements of the Operations Division are considered when making operations-related decisions and when setting work priorities. Since it is expected that workers in the operations farea 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. Furthermore, operators are providing training on human performance tools so that the actions and behaviors of operators become the model for power station personnel. By refining these skills through daily use and retrospection, human errors have decreased and operator performance is improving.

An example of activities outside of the operations area is the commencement of training on operational focus for new employees. A questionnaire on the degree to which operational focus is understood and has permeated through the organization has been distributed to power station personnel and the results will be analyzed in detail starting in the third quarter. By providing feedback using these results we hope to make activities aimed at improving the understanding operational focus by power station personnel more effective. Items related to operational focus will also be added to the fundamentals in order to accelerate the permeation of operational focus amongst all workers through daily use and retrospection.

◆ Improving Corrective Action Programs (CAP)

We aim to make efficient and effective improvements by using CAP to manage not only nonconformance and OE information, but also information useful for improving performance that can contribute to nuclear safety, such as management observation (MO) results. During the second quarter, attempts were made to analyze information inputted into CAP and make corrections after identifying weaknesses, and from the third quarter the same shall be done in other fields as well. Furthermore, during the second quarter contractors started officially issuing Condition Reports (CR) that note requests and recommendations by contractors, thereby adding to reports that will lead to improvements in the field.

◆ Human Error Prevention

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

2.1.2 Internal Communication

(1) Initiatives for promoting internal communication

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

At Headquarters, one of the activities of the internal communication team is to hold briefings on topics that are thought to be of great concern and importance to many employees. In July a briefing was held on the Reactor Oversight Process (ROP), and in September a briefing was held on tritium. The briefings were broadcast to Fukushima Daini and Kashiwazaki-Kariwa via teleconferencing systems. Many participants commented that they would like to continue to have opportunities such as these so going forward, we will create more opportunities to hold in-house briefings.

Briefing on nuclear regulatory inspections (HQ)

We are also creating opportunities for people from different departments to participate in recreational activities in order to transcend departmental boundaries and foster wider connections. Participants have commented that they have been able to develop friendships with people in other

departments and that it is easier to communicate as a result. Such opportunities will be continually created during the next quarter and onward.

At Fukushima Daini, two groups participated in group discussions as part of "8.29 Reconstruction Day," activities aimed at reflecting on the nuclear scandals that occurred during 2002 (groups were matched using a lottery system). A frank exchange of opinions was held about what things were like in 2002 and a workplace in which anything can be said. Participants also said that it was a worthwhile experience because they had a chance to talk with people they had never met before in the course of their own duties. We will continue to create opportunities to interact in order to invigorate communication.

As part of internal communication activities at Kashiwazaki-Kariwa, information on how community residents feel about the power station, and opinions obtained through our daily interactions with the community are being compiled and shared with all station personnel on a monthly basis so that everyone can engage in their duties from the perspective of society and the local community. In July, a survey about this initiative was distributed to station personnel and approximately 90% of respondents said that, "hearing the opinions of the community is helpful," and that "I now see why it is necessary to engage in my duties in a way that does not betray the expectations of the community residents." These types of communication activities will be continued so that station personnel will continue to engage in their duties while being aware of the community.

(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

- Hearing the thoughts of those engaged in decommissioning ~Reform policy briefing~ (run on August 21)
- Heat countermeasures at the Kashiwazaki-Kariwa Nuclear Power Station ~Using Air-cooled vests~ (run on August 21)

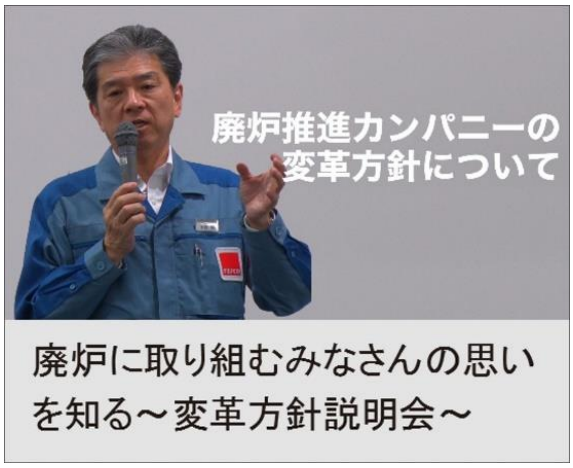
◆ TEPCO Group News Letter

- 8th Decommissioning project report
  Unit 2 operating floor radioactive substance condition investigation (issued on July 30)
- 9th decommissioning project report
  The Unit 2 operating floor investigation is proceeding (issued on September 26)

◆ "Messages from Management" sent via the intranet

- "The Commencement of Training for All Companies that Conveys the Facts and Lessons Learned from the Fukushima Nuclear Accident" Naohiro Masuda, Executive Vice President (uploaded on July 27)
- "A Virtual Tour that Shows What's Going on Now" Naomi Hirose, Executive Deputy Chairman (uploaded on August 6)
- Results of an employee questionnaire on the group newsletter issued on July 27 showed that employees want to hear more information about Fukushima Daiichi and Kashiwazaki-Kariwa.

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



Videos on company intranet
(What people engaged in decommissioning think)

TEPCO Group News Letter
(9th Decommissioning Project Report)

(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. Since two years have passed since this initiative began, an effectiveness assessment was conducted. The content distributed to date has for the most part matched countermeasures, and the response rate to online questionnaires that gather opinions about the content of emails and of the degree of understanding of them, as well as the number of people who are reading the emails, is increasing. Therefore, whereas this may be one effective means at solving the problem, it is also possible that the intended messages are not reaching all that should be receiving them.

Therefore, barriers to disseminating information have been lowered and improvements have been made to create opportunities for as many people as possible to learn about work issues that should be shared. In particular, a mechanism was created that allows issues that each site department and group, and each Headquarter group, want other departments to know about, and receive advice concerning a solution about, to be shared. To combat stagnant response rates, a request column in which readers can note the issues they want to hear about, and information they want shared, was added to the questionnaire in an attempt to identify as many issues that should be shared as necessary and strengthen two-way information sharing.

Furthermore, in regards to information sharing, during FY2018 the methods for sharing information and PI will be revised in order to match information sharing with actions based on the results of gap analysis by Internal Communication CFAM.

2.2 INITIATIVES TO IMPROVE SAFETY AWARENESS

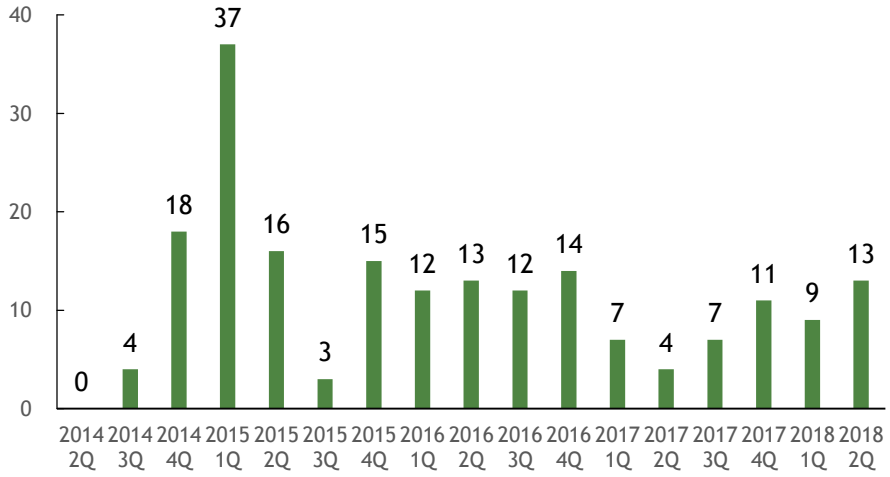
2.2.1 Cultivating Nuclear Safety Culture

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

◆ Direct Dialogue between Nuclear leaders

Since the fourth quarter of FY2015, nuclear leaders at Headquarters (General Manager of the Nuclear Power & Plant Siting Division (hereinafter referred to as "Chief Nuclear Officer (CNO)") and other Headquarter General Managers) have been visiting power stations to engage in direct dialogue with power station executives (site superintendent, unit superintendents, Nuclear Safety Center director, power station general managers) in order to improve the safety awareness of the entire organization. During the second quarter, a discussion was held on methods for leveraging third-party assessments in order to improve methods for promoting the sharing of risk information. (Kashiwazaki-Kariwa: July 27, August 22, Fukushima Daini: July 24, September 25)

For example, in regards to sharing risk information, there are many cases where existing routes for conveying information are not stipulated in manuals, so we are in the process of creating a standard information flow that enables information to flow between engineering departments and departments responsible for handling external parties. Furthermore, during discussions about leveraging third-party assessments, it was mentioned that the issues pointed out by experts from external agencies should not just be subject to individual passive reviews, but rather that these reviews should be seen as opportunities to learn, such as by incorporating the viewpoints of reviewers from external agencies into TEPCO MO, and leveraged to improve the capabilities of the company; an issue that nuclear leaders and executives agreed upon.



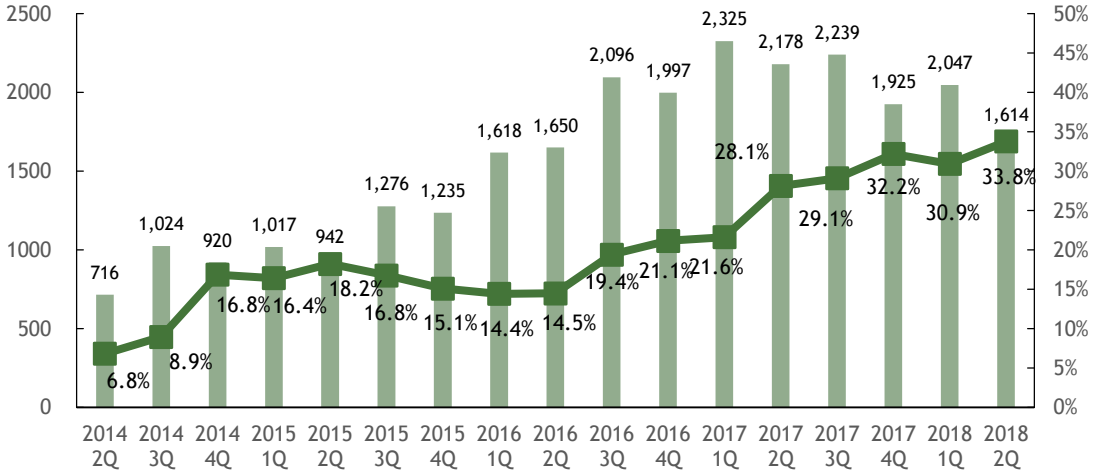
No. of times direct dialogue was engaged in by the CNO and each department

Direct dialogue between CNO and Kashiwazaki-Kariwa
Left: Group managers　　Right, Young employees

◆ Messages from Nuclear leaders

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

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



Number of views per message sent via the intranet/"Helpful" assessment rate
(2018 2Q does not include result for September, which was shorter than the viewing period of one month)

During the second quarter, the number of employees that read each message fell to approximately 1,614, however the percentage of these people that felt that the messages were "helpful" was approximately 34%, thereby exceeding results for FY2017Q4, which had set a record as a result of messages concerning 3.11.

◆ Commendations given by CNO and the president of the Fukushima Daiichi Decontamination & Decommissioning Engineering Company (herein after "Chief Decommissioning Officer (CDO)")

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

Commendations given by CNO and CDO

Periods	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	3[2]
Q2	5(1)	4	4	4

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

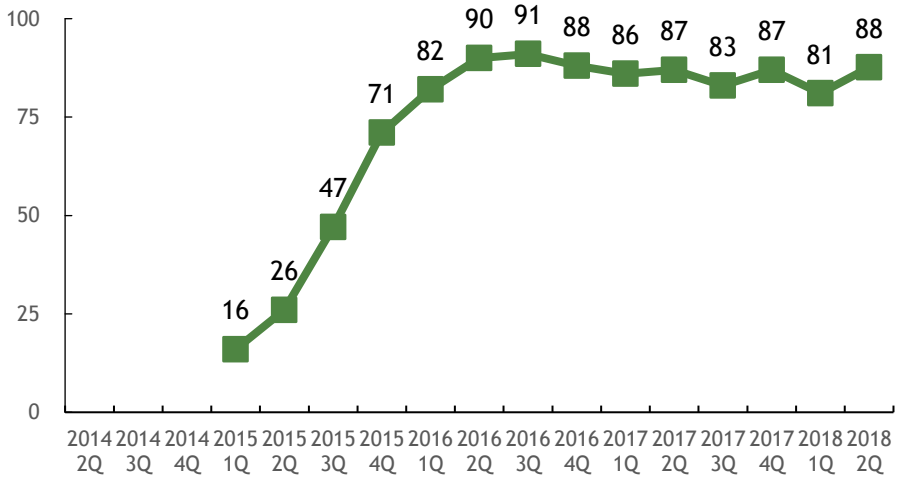
CNO's commendation

CDO's commendation

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

The Nuclear Power Division engages in activities aimed at making the act of reflecting upon the 10 traits and 40 behaviors (10 traits) for robust nuclear safety culture a natural occurrence. In continuation from last fiscal year, all Nuclear Power Division personnel used the intranet system to reflect on whether or not they are embodying the Traits. Group discussions on these results and recent performance information are held once every two weeks in order to deliberate and implement improvement actions and close the gaps between the Traits and one's own behavior. Activities are continually being implemented as follows

2 Correction made from last report



Implementation rate of group discussion [%]

(3) Activities to develop communication and understanding amongst contractors

In order to improve nuclear safety at TEPCO's nuclear power stations, contractors must understand nuclear safety reforms and cultivate nuclear safety culture. In particular, since it is important for people that do not have opportunities to work directly at nuclear power stations (such as personnel at contractor headquarters and people that work in the factories of product vendors) to understand the connection between their own duties and nuclear safety, we have created explanatory materials for the products and services delivered to power stations and are engaged in dialogue with these parties. We have received a positive response with such parties commenting that, "I was able to reaffirm how quality improvements lead to safety improvements," and "I was able to learn how activities to foster safety culture at my company will improve the reliability and safety of the products and services delivered."

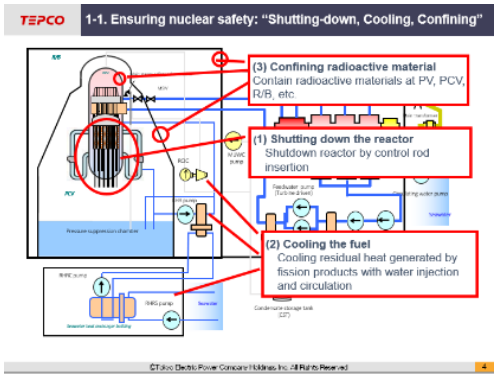
(4) Initiatives to share regrets and lessons learned from the Fukushima Nuclear Accident

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

◆ 1st IAEA Technical Working Group Conference

A new IAEA technical working group has been established and the first meeting was held in September. The objective of the working group is to assemble all of the world's nuclear leaders in one place to give advice and support for IAEA activities related to nuclear power station safety and sustainability. The CNO represented TEPCO at the conference. After giving a greeting during the opening ceremony, the general manager provided an overview of the Fukushima Nuclear Accident and talked about our regrets and the lessons that were learned from it. The general manager also suggested that initiatives to increase the reliability of equipment and minimize malfunctions, and corrective measures, are important, and engaged in opinion exchanges with the world's nuclear leaders.

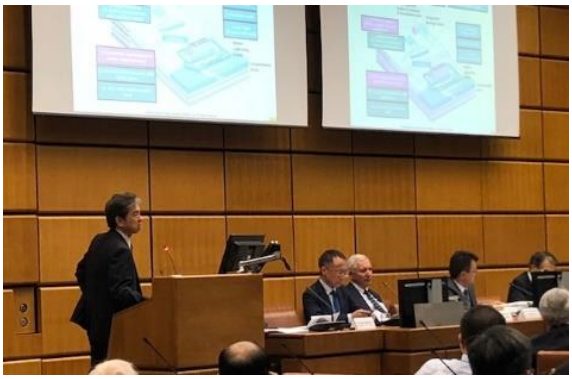
Presentation by the CNO



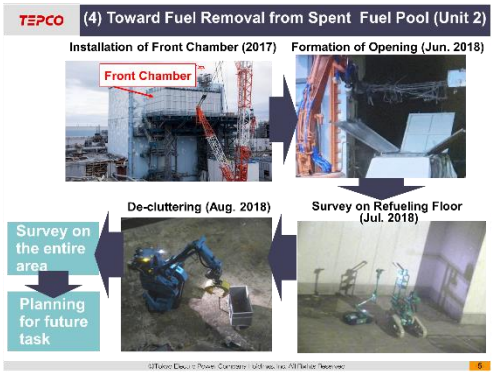
Example from presentation

◆ IAEA Annual Convention Panel Discussion "Fukushima Daiichi D&D Today"

The CDO participated in a panel discussion entitled "Fukushima Daiichi D&D Today" that was held in September as a side event to the IAEA annual convention. The president used videos from the company's website to explain the current conditions at Fukushima Daiichi and plans for the future. During the lively discussion that followed participants asked questions about additional tsunami countermeasures, contaminated water countermeasures, the number of people that reside around Fukushima Daiichi and soil contamination.



Presentation by CDO



Example from presentation

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 information, but also information useful for improving performance that can contribute to nuclear safety (management observation (MO) results, benchmarking results, third-party review results, near-miss information, etc.), in a unified manner, and implement fundamental countermeasures.

During the 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 in MO result reports. During the second quarter PICO (performance improvement coordinators) will continue code training in order to improve the accuracy of analysis.

CR code training given by PICO (Kashiwazaki-Kariwa)

Furthermore, PICO's from each power station department continue to spearhead activities to analyze data entered into CAP to identify and correct common weaknesses. The maintenance department at the Fukushima Daini Nuclear Power Station analyze the data on a trial basis. During the third quarter a comprehensive assessment of various other pieces of information in other fields will be implemented.

Contractors began inputting data into CR during the second quarter and information for making improvements, such as "the desire for work site improvements" have been reported.

During the third quarter nonconformance data will be categorized by importance level in addition to conventional nonconformance management, and an attempt will be made at Kashiwazaki-Kariwa to categorize the data based on nuclear safety. We hope that this will enable nuclear safety improvements to be promoted even further.

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

Since the last quarter, issues pointed out during MO at Fukushima Daini and Kashiwazaki-Kariwa have been inputted into CAP in order to create condition reports and make improvements to the problem, and this data analysis is being continued.

MO results for the second quarter are as follows:

	1F	2F	KK
# of times implemented	1,122	792	1,277
# of times per month per manager	3.90 times/month/person	4.26 times/month/person	3.98 times/month/person
Good MO rate*	–	67%	64%

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

2.2.3 Leveraging Operating Experience

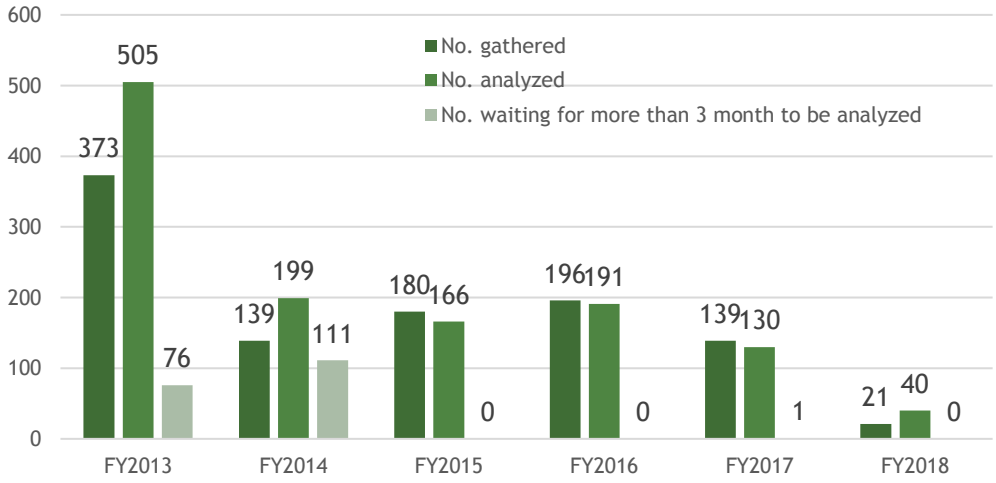
(1) Leveraging operating experience (OE) from within and outside of Japan【Measure 3】

◆ 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 OE 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 second quarter, 28 pieces of new OE information were gathered and 26 pieces of OE information, that include information gathered in the past, were analyzed. There was one piece of OE data that has been waiting for more than three months to be analyzed.



OE data gathering and analysis performance trends

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

Recent OE information is posted on the company's intranet thereby providing an environment in which all Nuclear Power Division personnel can easily access newly arrived OE information. The viewing rate of new OE information, which is a nuclear safety reform PI, during the second quarter for the entire Nuclear Power Division was 55%.

◆ SOER and severe accident information study sessions

Focused study sessions on OE information[3] SOER of particular significance are being held to provide an overview of these accidents and troubles, and understand the lessons learned from them.

3 22 accidents and troubles including the cable fire at the Browns Ferry Nuclear Power Plant

– "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)

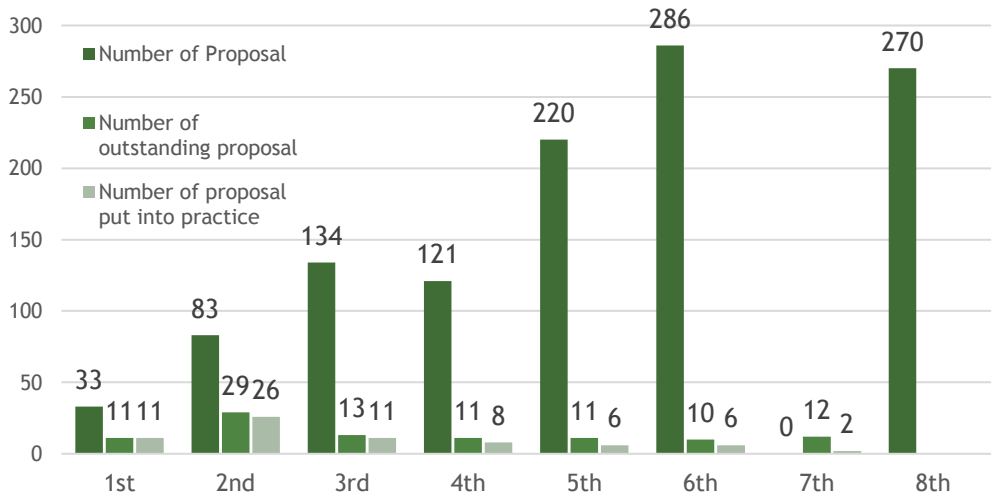
(1) Competitions to Enhance the Ability to Propose Safety Improvement Measures【Measure 3】

◆ 8th Competition

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

During FY2018 the 8th competition to newly gather suggestions from the field and input on risks will be held and proposals were gathered between May 21 and July 27. A total of 270 proposals were received from not only power stations and the Headquarter Nuclear Power Division, but other departments as well. The proposals will be reviewed by the Secretariat, and voted on by all of the employees in the Nuclear Power Division after which they will be reviewed by nuclear leaders and outstanding proposals selected.

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



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

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

◆ Outstanding proposals that have been put into practice
  – One of the 11 outstanding proposals from the 4th competition was put into practice during the second quarter.
  – (Fukushima Daiichi) In order to improve safety when carrying hoses needed to cool the spent fuel pool, etc. in the event of a tsunami, temporarily installed diesel generators and jib cranes have been put on site in order to lower equipment and materials through the large freight entrance thereby saving energy and time.

Installing temporary diesel generator and jib crane at Fukushima Daiichi

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

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

We are creating approaches to, and mechanisms for, accidents and hazards that have high "cliff-edge potential"[4] 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.

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

2.3 INITIATIVES TO IMPROVE THE ABILITY TO PROMOTE DIALOGUE

2.3.1 Improving Risk Communication Skills【Measure 4】

(1) Merging of the Corporate Communications Department and the SC Office

On July 1 the functions of the Global Communication Group Social Communication (SC) Office for making suggestions to department heads and management, and providing oversight of Nuclear Power Division communications activities were merged with the Global Communication Group Corporate Communications Department thereby further enhancing information dissemination.

(2) Training to improve and maintain the skill of Risk Communicators (RC)

Four new RC were given presentation training (July) in order to improve communication activities. Each participant gave presentations in front of instructors invited from outside the company who in turn assessed their skills and gave feedback thereby enabling each participant to become aware of their problem areas.

Case studies from both within and outside the company were used during discussions by RC held in the course of training in order to increase sensitivity to presentation risks (all personnel participated in training on either August 24, August 31, or September 14).

2.3.2 Engaging in Risk Communication【Measure 4】

(1) Communicating with the siting community【Measure 4】

◆ Activities in the Fukushima area

Fukushima Revitalization Headquarters President Okura and CNO Ono exchanged opinions with high school students participating in the International High School Student Radiation Protection Workshop about the progress of decommissioning at Fukushima Daiichi and activities to promote recovery in the region. During this workshop that was sponsored by Fukushima Prefectural High School in cooperation with NPO's and other companies, a total of 17 students from 10 high schools, including high schools outside of the prefecture and high schools in France and the Philippines, etc., were given a tour of Fukushima Daiichi (August 8). Students commented that, "it was very significant to be able to see the site with our own eyes and directly talk to people involved," and "we haven't heard much about the site since the accident so it was very impressive to actually see it. When I get back home to my own country, I will talk about what I saw and felt with my parents and classmates."

Tour of Fukushima Daiichi by high school students participating in the International High School Student Radiation Protection Workshop

Also, on September 3, Fukushima Restoration Headquarters President Okura and CDO Ono attended a meeting of the Prefectural Committee on Ensuring the Safety of Decommissioning of the Fukushima Prefecture Nuclear Power Stations that was established to enable Fukushima Prefecture to ensure that Fukushima Daiichi decommissioning initiatives implemented by the government and TEPCO are moving forward steadily and safely "in the eyes of the prefectural residents." Okura and Ono gave an update on the status of decommissioning.

Prefectural Resident Council

Example of briefing materials

The following publications were distributed in order to foster communication with the community and contractors.

- Hairomichi (9th issue, August 10)
  Distributed to each home and the local communities (eight cities, towns, and villages) in order to provide information on the status of decommissioning of the Fukushima Daiichi Nuclear Power Station and introduce the people involved in the work, and their feelings about it.
- Announcements from Tokyo Electric Power Company Holdings, Inc. (July, August, September)
  Distributed to each home in the local communities (10 cities, towns, and villages) to explain decommissioning in an easy-to-understand manner.
- Monthly 1F (July, August, September)
  Distributed to contractors in order to enhance the dissemination of information on the progress status of decommissioning to workers that work at Fukushima Daiichi, and cultivate a sense of unity. The number of users of the 1 FOR ALL JAPAN website, the online counterpart for Monthly 1F, has increased by approximately 1.75 times YoY, and the number of hits to the site has greatly increased.

Hairomichi (Issue 9, August 10)

Notice from TEPCO HD (September)

Monthly 1F (September 2018 issue)

◆ Activities in the Niigata area

Between August 1 and December 2, TEPCO representatives visited the homes of all residents of Kashiwazaki City and Kariwa Village in order to directly listen to their opinions about nuclear power and TEPCO, and any requests they may have. This is the fourth visit of its kind and the visitation method has been improved as follows in the hopes that we can meet as many people as possible. The honest opinions and requests from the community shall be leveraged in our future business activities.

- The number of homes and businesses visited has been greatly increased (from approximately 41,000 last year to approximately 48,000)
- The regions to be visited have been meticulously demarcated and advance notice of visits given
- Postcards asking if the resident would like to be revisited also distributed

Giving explanations to community residents

The number of opinions received from residents of the local community through these public hearing activities was 20,480 (Kashiwazaki/Kariwa region) as a result of the explanations given during home visits, which were more detailed than usual, thereby greatly exceeding the number of opinions received during last fiscal year. Furthermore, from FY2018, questionnaires have been distributed to people who have participated in activities aimed at improving the understanding of nuclear power, such as tours and communication booths, etc., in order to assess the degree of trust

and familiarity that participants feel towards TEPCO. Questionnaire assessment targets for each type of activity aimed at promoting dialogue has been set as "60% positive," and during the second quarter results were 76% with an achievement rate of 126 points, three points higher than the first quarter.

(2) Management communication initiatives【Measure 4】

In the Fukushima area, Fukushima Restoration Headquarters President Okura and CDO Ono will continue to hold regular press conferences at the end of each month to give updates on the activities of the Fukushima Restoration Headquarters and the progress of Fukushima Daiichi decommissioning and contaminated water countermeasures.

At the 3rd Fukushima Daiichi Decommissioning International Forum sponsored by the Nuclear Damage Compensation and Decommissioning Facilitation Corporation and held in Hamadori, Fukushima Prefecture, CDO Ono took the platform (August 5, six). On the first day, the CDO exchanged opinions with residents of the community and students about how the dissemination of information on decommissioning can be improved and how decommissioning can help the region to recover. On the second day, at the session for engineering experts from both within Japan and abroad, videos and slides were used to provide information on the latest conditions at Fukushima Daiichi.

Lecture by CDO Ono

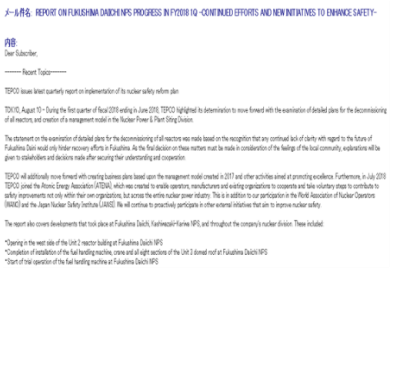
On September 1 a chief spokesperson was selected in order to increase opportunities for management to give explanations. This person will be responsible for giving press conferences in the event of a disaster and for explaining important company events.

(3) Communicating with overseas partners【Measure 4】

In order to directly convey information to overseas stakeholders, Deputy Chairman Hirose (Fukushima supervisor) gave a lecture at the Chung-Hwa Nuclear Society in Taiwan (August 16).

At the Kashiwazaki-Kariwa Nuclear Power Station, 60 Minutes from Channel 9 in Australia did a story focusing on safety countermeasures (September 21).

We continue to leverage email magazines, Facebook, and Twitter in order to proactively convey information directly to overseas media outlets and experts. During the second quarter, one email magazine was sent, and 16 posts were made on Facebook and Twitter, respectively.



Example of e-mail magazine sent to overseas parties

TEPCO - Facebook

#tepco hashtag on Twitter

(4) Disseminating information in an easy-to-understand manner, and leveraging social networking services【Measure 4】

The following explanatory videos and web content were used to deepen understanding about the progress of decommissioning and nuclear power-related technology.

- The Fukushima Daiichi Nuclear Power Station Today ~From That Fateful Day, and into Tomorrow~ (ver.2018.7) (Japanese/English) (July 2)
- Investigation of the uppermost floor of the Unit 2 reactor building begins (August 14)
- Fukushima Daiichi Timeline (updated) (Japanese/English) (September 25)

The Fukushima Daiichi Nuclear Power Station Today ~From That Fateful Day, and into Tomorrow ~

https://www4.tepco.co.jp/library/movie/detail-j.html?catid=61709&video_uuid=cdfg9424

Investigation of the uppermost floor of the Unit 2 reactor building begins

https://www4.tepco.co.jp/library/movie/detail-j.html?catid=61709&video_uuid=ddn278cr

Fukushima Daiichi Timeline

http://www.tepco.co.jp/f_ima/im06_decommissiontraject.html

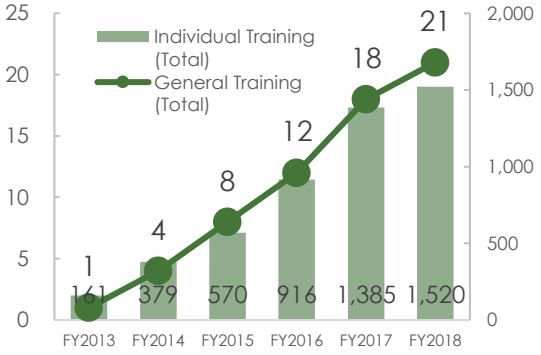
2.4 Initiatives to Improve Technological Capability

2.4.1 Strengthening Technological Capability (during times of emergency)

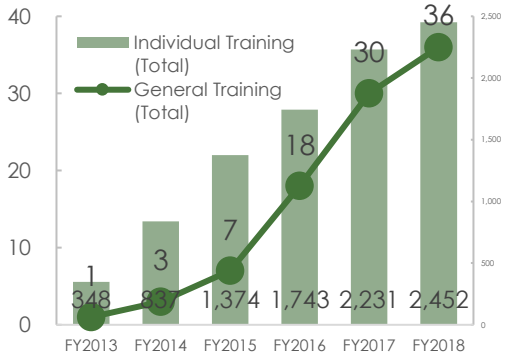
(1) Enhancement of Power Station and Headquarter Emergency Response (Organizational) Capabilities【Measure 5】

In the results of training assessments for each nuclear power station by the Nuclear Regulation Authority conducted during FY 2017, it was pointed out in regards to sharing information with the Nuclear Regulation Authority that explanations from TEPCO are insufficient, and that handling in the case that information from the plant data system cannot be transmitted is insufficient. An Emergency Response Improvement Plan, which includes reorganizing experienced teams, assigning personnel responsible for sharing information, and improving the knowledge and skills of personnel, etc., was compiled (disclosed on August 27) in light of the harsh assessment of FY2017 training. During the second quarter, individual and general training sessions were repeated at Headquarters and Kashiwazaki-Kariwa based upon this improvement plan, and during the general training session at Kashiwazaki-Kariwa conducted on October 2, Nuclear Regulation Authority representatives in attendance observed emergency response training and verified that functions to share information have been improved.

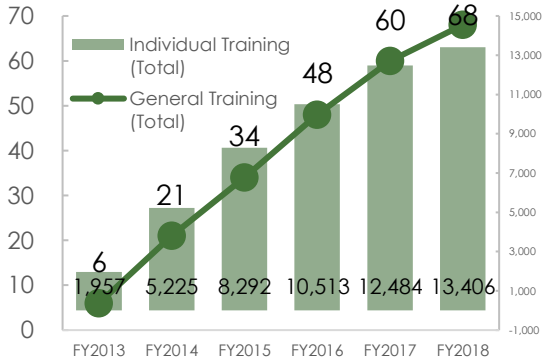
Results for each power station are as follows:



<Fukushima Daiichi>



<Fukushima Daini>



<Kashiwazaki-Kariwa>

◆ Fukushima Daiichi; Second Quarter General Training: July 20, September 18

On July 20, training was held based on the scenario that trouble with electric power systems resulted in the shutdown of important equipment during the night on a weekday. During training it was confirmed that there are no problems with sharing information via television conferencing systems with personnel on standby in the dorms, or with assembling support personnel from the dorms. An issue to address is the fact that information on the scope of the power outage and the status of important equipment that had shut down was not sufficiently shared, so the behavior of each functional unit shall be improved, such as by deciding in advance how frequently information is to be reported and how the information is to be handled.

General training was held on September 18 based on the scenario that an earthquake caused a leak of water from the spent fuel pool and an increase in the water levels of accumulated water in reactor buildings. Due to revisions to the rules for leading objective determination meetings (meetings for determining the response plan by the power station), and who is to lead these meetings, the meetings went smoothly and a power station response plan was able to be decided on much quicker than during earlier training sessions. At the same time, risks that might hinder the achievement of objectives set by the objective setting meeting were not fully discussed, so the methods for identifying risks shall be improved.

Objective determination meeting

◆ Fukushima Daini; Second Quarter General Training: July 26, August 28, September 27

On August 28 training was held based on the scenario that a tornado caused a loss of all AC power which led to a loss of spent fuel pool cooling function thereby causing an increase in radiation levels on site. The objective of the training was to improve the skills of personnel in responding amidst a discharge of radioactive substances, such as temporarily evacuating personnel engaged in repair work on site. During the training, contamination surveys were performed on personnel being evacuated, entry/exit control centers were established and operated, and personnel wearing radiation protection equipment engaged in power source repair work. Issues to address include methods for sharing information when checking increases in radiation levels, establishing methods for quick evacuation, methods for surveying personnel not involved in repairs, and procedures for evacuating from the power station. Improvements will be made so that these methods/procedures are clearer.


Repairing power source in radiation protection gear

◆ Kashiwazaki-Kariwa; Second Quarter General Training: July 19, August 17, August 20, September 14, September 20

Site Superintendent Shitara in command at th e power station (right)

General training during the second quarter was repeated using veteran teams comprised of personnel with the required knowledge and skills that had been selected in accordance with the roles to be performed during an emergency. The training sessions on August 17 and 20 focused on setting objectives for plant repairs, and the sharing of information between power stations and Headquarters. Training sessions on September 14 and 20 were used to examine improvements that have been made in light of things that had been noticed/reflected upon during the training sessions in August. In particular, in regards to sharing information between power stations and Headquarters, personnel in charge of hotlines between the power stations and Headquarters were assigned in accordance with the Emergency Response Improvement Plan, and it was confirmed that information was shared smoothly as a result of clarifying individual roles at the power stations and Headquarters in regards to the flow of information.

◆ Headquarters; second quarter general training results: August 17, August 20, August 31, September 14, September 20, October 2

During training conducted during the second quarter the status of improvements made based on the Emergency Response Improvement Plan were examined. By repeatedly implementing training based upon various scenarios, the skills of the veteran team members were confirmed along with the fact that the sharing of duties between government agency liaison unit and other related units have been clarified. Furthermore, during its meeting on October 3 of the Nuclear Regulation Authority commented that the organizational response to a disaster, such as information sharing between the power stations and Headquarters, etc., has markedly improved. At the same time, it was also mentioned that it is not always the case that an accident will be handled by the most capable members, and it is important that anyone in such position should be able to act the same way. We will continue to make improvements during training at the Fukushima Daiichi and Fukushima Daini conducted in the future.

HQ Commander Kobayakawa (left) and Deput y Commander Makino (right)

(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 September, 38 operators had been certified on the operation of fire engines thereby exceeding our 31-operator goal (80% of the 39 operators in the field (no change over 2017Q4)), and 3 operators had been certified on the operation of power supply cars (see the chart below for details). The priority for operators working at Unit 1~4 and with water treatment equipment is to acquire skill in operation management, such as the use of reactor coolant injection equipment and contaminated water treatment equipment, etc.

- Fukushima Daini

Training on fire engines and power supply cars commenced in FY2014. As of the end of September, 27 operators have been certified on the operation of fire engines thereby meeting our 27-operator goal (80% of the 34 operators in the field (decrease of two operators since the first quarter)), and 30 operators had been certified on the operation of power supply cars (see the chart below for details). Certified personnel targets for power supply cars was not met during the first quarter but was achieved during the second quarter. Furthermore, in light of the conditions at Fukushima Daini, from the second quarter work management teams that used to be split between Units 1 and 2, and Units 3 and 4, have been merged so that they can handle any unit. This diversity should improve not only the handling of ordinary tasks but also emergencies.

- Kashiwazaki-Kariwa

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

Field skill competition (power source check)

Field skill competition (pump startup check)

Power Station	Fire Trucks		Power Supply Cars	
	No. of certifications (comparison with last quarter)	Fill rate	No. of certifications (comparison with last quarter)	Fill rate
1F	38 (-1)	123%	38 (-1)	123%
2F	27 (-2)	100%	30 (+3)	110%
KK	102 (-9)	109%	103 (-4)	110%

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

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

- 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.

- 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 since July 2016 the rubble removal/road repair team has been trained on the use of drones. During nuclear material protection inspection demonstration training conducted in September 2018, a drone was flown outside the power station site to simulate the approach of a suspicious object thereby creating a different environment in which normal flight training is conducted (remote operations location, flight route) in an attempt to further develop training content. We will continue to be innovative in our training methods in order to be able to respond flexibly to various situations.

Manipulating drones (nuclear material security inspection training)

Drone in flight

- Kashiwazaki-Kariwa

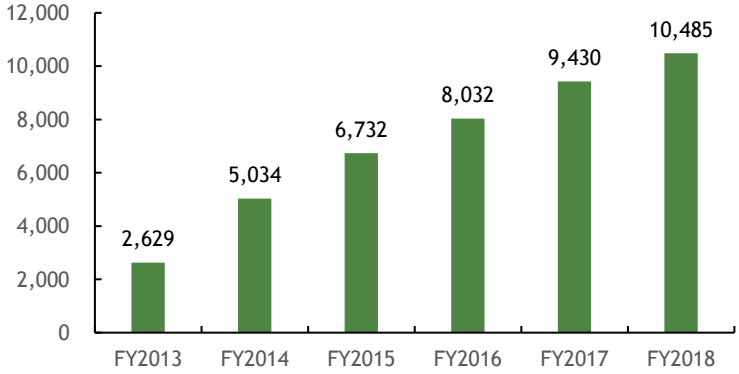
In order to improve in-house technological capability and thereby prevent severe accidents from occurring, we are conducting various types of training such as on assembling and disassembling scaffolding, mobile crane operation training, bucket truck operation, heavy machinery operation, forklift operation, valve/drive mechanism inspection training, and cable terminal attachment and connection. During the second quarter, we provided training on the operation of reach stackers, which are large vehicles required for carrying equipment and materials to substitute heat exchanger trucks, to more people as part of a new initiative. Training participants will act as in-house instructors and teach as many employees as possible about how to operate such special vehicles. We will continue to provide repetitive training in order to maintain and improve in-house technological capability.

Valve/Drive mechanism inspection training

Cable terminal attachment and connection training

Heavy equipment operation training (wheel loader)

Heavy machinery training (reach stacker)



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

2.4.2 Strengthening Technological Capability (during times of normalcy)

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

◆ Reconstructing education and training programs based on SAT

The Nuclear Education and Training Center has adopted the Systematic Approach to Training (SAT), which is recognized internationally as a best practice, and is providing education and training programs necessary for personnel development throughout the entire Nuclear Power Division.

In order to continually improve education and training we have created three tiers of review bodies consisting of the Nuclear Power Division Education and Training Committee, Power Station Education and Training Committee, and Curriculum Review Meeting. These three bodies effectively put education and training programs through the PDCA cycle based upon SAT.

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

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

[CRC] Curriculum Review Meeting Chairperson: Administrative GM

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 field. 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 field.

In the Maintenance Department, more effort is being put into education and training aimed at preventing human error and equipment nonconformances. At Fukushima Daini and Kashiwazaki-Kariwa, we continue to offer human error prevention tool training for maintenance department personnel that act as work foremen, and in September we will begin skill training on foreign material exclusion (FME). By providing training to managers first and then having managers become instructors for other team members, we can improve the skills of individuals and strengthen the observational abilities required to engage in foreign material exclusion in the field.

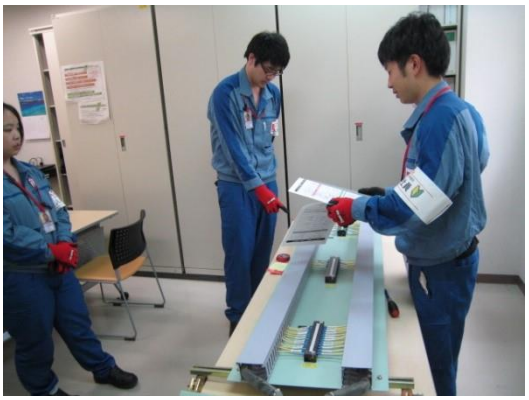
Maintenance Department FME training (2 F)

In the field of nuclear safety, we have commenced accident response training that teaches trainees about plant behavior during a severe accident, such as reactor water levels, and containment vessel pressure and temperature, etc., and cultivate a natural ability to ascertain accident conditions and respond appropriately. In August, approximately 113 workers including the emergency response personnel Planning Team (all members), workers that will be taking proficiency exams (nuclear safety) and other plant personnel (unit teams, power generation departments, etc.) participated in training at Kashiwazaki-Kariwa. During the second half of FY2018, skill training using MAAP, which is an analysis code for containment vessel behavior, will be conducted to further deepen understanding of severe accidents.


Nuclear safety personnel accident handling training (KK)

◆ New employee training

New employees that have joined the Nuclear Power Division have transitioned from classroom-focused training to training that more resembles actual work conditions and are participating in shift training that allows them to come in actual contact with a wide variety of plant equipment at each site. During shift training, trainees gain actual experience with operation management and acquire greater knowledge about the plants thereby enabling them to ascertain system equipment functions and location of actual equipment, and learn behaviors required in the field for work and equipment safety. Shift training concluded at the beginning of October and during the rest of October trainees will participate in final assembly training during which they will learn about Kaizen activities and give individual presentations after which they will be assigned to power station departments in November.

New employee training (2F)

(2) Initiatives to Cultivate Nuclear Leaders

◆ Middle Management Training

Since FY2015, management has been subjected to middle management training in order to foster sufficient awareness about each individual's responsibility to nuclear safety with the understanding that being conscious of, and having the ability to, thoroughly fulfill these responsibilities along with nuclear leaders is an absolute necessity. During group manager training held in September, group managers newly appointed in conjunction with regular summer transfers and shift supervisors attended lectures and discussions during which they deepened their understanding of the expectations of TEPCO leadership and management. Similar training is being planned for November.

Group manager training

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

(3) Other Activities

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

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

8.29 reflection activities (Left: Group discussion, right: Learning though exhibits)

(4) 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 second quarter we continued to discuss internal manual revision proposals. Furthermore, in-house preparations to apply for permission to alter the safety regulations have begun in preparation for department reorganizations.

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.

(5) 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.

In regards to system engineers at Kashiwazaki-Kariwa, during the second quarter two more people were newly selected and are currently undergoing training. At current time, 22 systems at Kashiwazaki-Kariwa Units 6 and 7 are being continually monitored, and there have been no abnormalities with performance. These system monitoring initiatives will be continually developed and improved. Going forward, education and training will be continued in order to increase in the number of systems being monitored with the goal of having at least five system engineers for each reactor.

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

(6) 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.

Design standards are vital for constructing configuration management processes. During the second quarter, drafts of design standards for the residual heat removal system and the high pressure substitute coolant water injection system, for which the creation of design standards has been prioritized, were completed.

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 second quarter, deliberations began on introducing a check tool for standardizing the review of design blueprints submitted by contractors that have been hired to perform renovations.

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), educational pilot programs continue to be implemented while making corrections to the educational materials that have become apparent through the course of the same pilot programs in order to ready educational materials that will be used when engineering training is fully launched. At the same time, during the second quarter we also continued with the creation of basic training/education materials for non-engineer plant employees in order to improve their general understanding of configuration management.

(7) 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 second quarter, project management education was provided to project management group personnel based upon the project management basic education plan formulated during the first quarter. This educational program aims to improve the management skills of group personnel by teaching methods for schedule creation, which is the foundation of project management, through Q&A.

3 PROGRESS ASSESSMENT

3.1 ASSESSMENT BY THE NUCLEAR POWER DIVISION

(1) Nuclear Safety Culture Assessment【Measure 1】

A field diagnosis[5] of safety culture by the Japan Nuclear Safety Institute (JANSI) was performed at Fukushima Daini (May 21~May 25). The details of the assessment are currently being discussed with JANSI in order to compile a final report on the assessment results. Improvement actions will be deliberated based on the final report.

(2) Initiatives to Enhance Self-Assessments【Measure 2】

As part of performance enhancement initiatives during the second quarter, each CFAM/SFAM created key self-assessment plans (two-year plans) based on key self-assessment processes.

Key self-assessments will be implemented based on these two-year plans, excellence gaps identified, and actions implemented to resolve these gaps.

- September 2018 topic "WM Process" (Kashiwazaki-Kariwa)
- December 2018 topic "Conduct of Operations" (Kashiwazaki-Kariwa)

3.2 SELF-ASSESSMENT OF KEY ISSUES

The Nuclear Reform Monitoring Committee (NRMC) has requested an assessment and report on the status of improvements and on the rooting of measures implemented to address the five key issues identified by the self-assessment of the progress of the Nuclear Safety Reform Plan (implemented in FY 2016) and comments made by the NRMC.

The managers of each department responsible for initiatives aimed at improving the five key issues of strengthening governance, improving human resource training, improving communication, cultivating nuclear safety culture and strengthening internal oversight functions have discussed with the Nuclear Reform Special Task Force Secretariat the gaps that exist between the expectations for these initiatives and the current status of them.

With partial exception, the results of the assessment have shown that the cycle for making improvements to these key issues is functioning and that continuing these initiatives will have an impact. At the same time, action plans aimed at further improvement have been formulated for situations that are unsatisfactory at current time and have already been executed

The following is an overview of the assessment for each issue, the grounds for such assessment, and the action plans aimed at further improvement.

1. Strengthening Governance (Assessment Rating: IV　Rooted and possibly effective)

5 Field Diagnostics: JANSI Safety Culture Cultivation Support Department personnel interview everyone at the power station being assessed, from general personnel all the way up to the site superintendent, in order to ascertain the state of awareness of 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.

Rooted: Basic action plans for the organization have been documented and leaders give regular explanations.

Effective: Work improvements have progressed and examples of improvement, such as an improvement in the quality of MO, etc., has been seen in multiple fields.

Issues to address going forward: in light of the fact is that we were not able to thoroughly fulfill promises made publicly, the mechanism for managing the fulfillment of promises will be revised while at the same time confirming the status of fulfillment and assessing effectiveness.

2. Improving human resource training (Education and training Assessment Rating: IV Rooted and possibly effective)

Rooted: Progress and effectiveness based on the systematic approach for training (SAT) is being implemented.

Effective: Examples of improvement, such as an increase in the number of people who have passed the first licensed reactor engineer exam, etc., have been seen.

Issues to address going forward: Efforts to promote more cooperation between leading departments and education/training departments must be enhanced in order to improve the comprehension and the level of acceptance of education and training by trainees.

(Strengthening engineering skills Assessment Rating: II Not rooted)

Rooted: Some training programs have been put into trial use but the formulation of comprehensive training programs has been delayed

Effective: The effect has been limited due to a failure to allocate sufficient resources to engineer cultivation.

Issues to address going forward: Establishment of the job requirements and training plans for engineers, and construction of a training program. Manage education and training programs based on SAT.

3. Improving communication (Assessment Rating: IV Rooted and possibly effective)

Rooted: Departments have been reorganized in order to strengthen the governance of public relations functions, such as the Decommissioning Communication Center. Third-party assessments will be continued in order to make improvements.

Effective: Areas for improvement pointed out by third parties have been reflected in fiscal year business plans, and recent problems have been corrected at the next possible opportunity thereby showing examples where mid/short term improvement cycles have been effective.

Issues to address going forward: The number of departments subjected to third-party assessments will be increased, and the effectiveness of department reorganization will be examined along with the degree to which SC Office and RC functions have been passed along, and improvements made as necessary.

4. Cultivating nuclear safety culture (Assessment Rating: IV Rooted and possibly effective)

Rooted: Dialogue with contractors about safety culture has been promoted in a planned manner by leveraging opportunities such as contract signings and daily meetings to exchange information.

Effective: According to the results of a questionnaire about dialogue activities distributed to contractors, 92% of contractors feel that such activities are “helpful,” or “slightly helpful.”

Issues to address going forward: In order to even more effectively cultivate safety culture based upon the self-assessments, mechanisms shall be revised based upon standard safety culture assessment processes utilized in the United States.

5. Strengthening internal oversight functions (Assessment Rating: IV Rooted and possibly effective)

Rooted: Progress has been monitored by issuing recommendation notices and follow up sheets.

Effective: The percentage of recommendations that have been put into practice as improved from 37% three years ago to 88%.

Issues to address going forward: Nuclear power business internal oversight functions will be subjected to third-party assessments in order to fill in gaps with excellence.

These results were reported to the Nuclear Reform Monitoring Committee on October 5 and will be reviewed by the committee.

3.3 Monitoring Results from the Nuclear Safety Oversight Office

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

The following are the opinions of the Nuclear Safety Oversight Office (NSOO) about observations made during several months with a focus on mainly on the fourth quarter that were reported to the executive officer committee on October 17 and the Board of Directors on October 30.

NSOO -18–20
October 30, 2018

Quarterly Oversight Evaluation Report - Nuclear Safety Oversight Office
FY2018 Q2

Introduction

This report summarizes the evaluation results of the second quarter (July to September) 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, "Senior Reactor Engineer" (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

The evaluation team carried out the following observation evaluations under the themes of fuel removal from the spent fuel pool of unit 3, non-conformance control and emergency response.

- Strengthening work supervising method in Unit 3 fuel removal operation

  Unit 3 fuel removal operation was delayed due to the trouble in the commission stage for fuel handling facility. The power station continues activities for restoration. NSOO will also continue oversight to lead it to future improvement.

  In addition to confirmation of the status of the above response, NSOO checked the system to share information with contractors that will perform operations in fuel removal which is currently at the planning stage in this quarter. Unit 3 fuel removal operation will be operated remotely, which is the first experience for our company. NSOO requests to strengthen supervising methods for TEPCO works to understand and improve problems such as abnormal signs in facilities, risks in operation, and competence of operators, among others, at an early stage.

- Strengthening effectiveness reviews related to preventing work management non-conformance

  Measures established as a result of station-wide working activities aiming to reduce human errors related to work management were commenced in July. It is good to continue working for around 1 year and then perform effectiveness review.

  Meanwhile, we found cases where improvement was limited to individual departments, since a method to share problems and improvement plans found among persons in charge through operating measures were not clarified. NSOO requests to clarify processes of

collecting and utilizing opinions for improvement from persons in charge to heighten the effectiveness of measures against potential concerns, in addition to verification of the effect of measures against past non-conformance cases.

- Weakness in adding competence to emergency response personnel

  Low performance in emergency response personnel (team leaders or higher levels) having less experiences in station-wide major emergency exercises has repeatedly occurred in line with personnel shift. Participating in trainings by personnel not having sufficient individual competence hinders achieving goals of emergency exercises "to improve organizational competence of Technical Support Center." Discussions have been made to strengthen individual competence, but the progress is slow.

  NSOO requests to establish education and training to add necessary competence to personnel prior to participation in emergency exercises, as well as clarify roles expected to individual personnel.

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:

- Weakness in the deadline management in non-conformance management

  In non-conformance management, some cases where action was not taken by the deadline due to insufficient deadline management were seen from time to time in the previous fiscal year. Though the status of observing deadlines for review and completion was once improved by strengthening management at a group level, but violation of the deadline recurred in the 1st half of this fiscal year, which was pointed out in the second safety inspections.

  In particular, deadline violation tended to occur at departments in charge of many facilities. It is necessary for departments in charge to tackle with non-conformance management with responsibility, as well as for the Performance Improvement Meeting, who instructs and advises departments for non-conformance management to improve processes, to check the progress of the improvement plan for responsible departments having problems prior to deadlines, and warn them earlier.

- Weakness in risk management for facility changes

  The event where the subdrain water levels were unable to be monitored (deviation from the limit of operation) occurred on July 25, when a new server was connected to improve the reliability of the network in charge of water level monitoring. This is due to output requests exceeding facility specifications for the digital recorder issued from both of the existing and new servers. This case might be avoided if specifications of existing facility and work procedures were evaluated in detail. We obtained lessons that it is necessary to perform risk evaluation by checking facility specifications and work procedures in detail in risk evaluation of facility change.

- Optimization of safety requirements at Units 5 and 6

  Based on the safety evaluation on emergency diesel generators at Units 5 and 6, we changed the limiting conditions for operation (LCO) from the standby of conventional 3 units to 2 units, one each for Units 5 and 6. This review was achieved by steadily performing evaluation of required power source capacity during disaster, and confirming operation with

actual machines through cooperation with related parties such as groups in charge of safety, facility, etc.

At Units 5 and 6, radioactive iodine in fuel had been attenuated, so there is room to consider the positioning of standby gas treatment systems. The SRE requests that the HQ and power stations will continue reviewing to appropriately maintain requirements on the nuclear safety to be focused depending on changing plant statuses.

1.2 Fukushima Daini

The evaluation team performed oversight assessment for activities for improvement in the radiation protection area.

- Clarification of goals to be achieved in behaviors in the radiation protection area

  It is good to analyze the cause of weakness in behavior in terms of radiation protection at sites, and commenced strengthening leadership at sites by TEPCO's radiation protection and safety managers and penetration activities for ALARA (As Low As Reasonably Achievable) to all station employees.

  However, goals to be achieved through improvement are not clarified. Also, ownership and crisis awareness have not been fostered as long as specific expectations are presented to and recognized by persons in charge. We request that a sustainable instruction system is established to provide specific expectations, and opportunities to learn from experience (such as experience at Fukushima Daiichi), thereby securing competence enough for TEPCO's radiation protection and safety managers to not only handle current improvement but also future decommissioning and further direct management works.

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 leadership

  Activities have started in the areas of radiation protection, performance improvement, emergency response, all of which were pointed out as slow in improvement by SRE in the previous quarter, involving line organization which is in charge of each of these areas. Continuous instructions on more concrete descriptions of action plans by the top management at power stations are good.

  Meanwhile, cases of personnel accident or facility damage occurred during the period. They were caused by non-compliance to rules or insufficiency in STAR (Stop, Think, Act, Review) activities, indicating TEPCO's expectations have not been penetrated in contractors. Management observation (on-site observation by TEPCO executives) and activities to penetrate fundamentals to penetrate expectations are underway, but it is necessary to continue them and to perform effectiveness review for them.

- Radiation protection

  Insufficient area management and behaviors assuming "no contamination" continues. Activities for improvement were strengthened, such as ALARA (As Low As Reasonably Achievable) training or utilizing OE (operational experience), but the effect has not been shown at sites. It is necessary for the Radiation Control Department to strengthen its leadership in thoroughly observing ALARA at sites, and clarify the things to be done by the

work management department. It is also necessary for top management at power stations to link these departments to thoroughly penetrate ALARA at sites.

- Emergency response

  Working activities to enhance emergency response capabilities has launched. Discussions focusing on gaps between goals to be achieved in a medium- to long-term and the current situation are being made, but substantiation of a short term action plan for this fiscal year is not progressed. Confirmation and strengthening of procedures through preparation for and retrospect of open-scenario trainings are good, but issues remain in confirmation and strengthening of response capabilities depending on situations by combining with closed scenario trainings.

  Site superintendents or their subordinates are implementing benchmarking for Kashiwazaki-Kariwa or HQ that strengthens emergency response ahead of others, so it is expected that they will develop concrete action plans based on the benchmarking results, implement the plans, and perform effectiveness reviews for them to ensure that improvement is made.

1.3 Kashiwazaki-Kariwa

The evaluation team observed the progress management of safety measures for Units 6 and 7, the enhancement of medium- to long-term engineering capabilities, as well as the strengthening of human resource development function, and carried out the following oversight assessments.

- Strengthening securing the quality in preparing application for approval of construction plan for Unit 7.

  NSOO partially confirmed the consistency of the application for construction plan approval (CP) being developed with safety requirements in the request for modification of facility (EP). The result showed some minor inconsistencies requiring modification, while no critical inconsistency. Such inconsistencies were caused by insufficient understanding of explanations at EP review by the CP preparer.

  To further strengthen activities to secure the quality of CP and fully achieve the consistency in safety requirements and design approach, we request that the CP preparer will check descriptions related to EP review materials, and department in charge of EP review to check CP at an early stage.

- Absence of rules to revise facility documents considering a long-term shutdown of plants

  For the safety measure work for Unit 7, some modification affecting existing facilities having functional requirements related to safety were not reflected to facility documents. It was caused by the absence of rules to modify facility documents when a part of modification is to be partially shared during a long-term plant shutdown. When facility documents are not maintained up to date, it may cause an obstacle in trouble responses or operation management.

  We therefore request to establish rules to modify facility documents when existing facility is modified/shared by the facility maintenance department during a long-term plant shutdown. The facility documents in question have been modified promptly after pointed out by NSOO.

- Weakness in education and training programs based on competence required

  NSOO checked the status of establishing education and training program on the new regulatory standards targeting the Maintenance Dept. The department leading human resource development (Nuclear Human Resource Development Center) started preparing education and training materials, but has not indicated the direction of reviews based on required competence, so has not drawn a full capability to analyze the competence of the Maintenance Dept. to establish education programs. If the status continues, there may be a risk of not obtaining necessary competence of persons in charge in the Maintenance Dept. to maintain safety requirements and perform regulatory-related operations.

  NSOO requests that the Nuclear Human Resource Development Center present the policy for review based on necessary competence, and promote CRC (education and training Curriculum Review Committee) at power stations to determine the policy, as well as Maintenance Dept. to analyze their competence by themselves so as to establish an education and training program.

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 leadership

  ROP (new inspection system) tends to be considered as "response to inspections", but it actually ask about the success or fail in actual "self security system" according to basic approaches in the U.S. Therefore, it is important for general managers to look back the purpose of their works (essential values and meanings of works), and to appropriately instruct subordinates to heighten the quality and safety, not only in ROP but also management models and kaizen activities. To overcome the following weaknesses observed, SRE requests to strengthen instructions by General Managers.

  - Understanding of intrinsic issues and goals is poor
  - Narrow perception of the responsibilities of one's organization
  - Unable to anticipate risks
  - Unable to review one's performance demonstration in the past

- Risk management

  Risk management for the reactor safety risks hidden in on-site operations that was launched in last November is progressing smoothly. The success factors are establishment of realistic process based on the real trouble cases in their power stations and improvement in the operation where effect can be realized.

  For RIDM (Risk Information-based Decision Making), it is important to aim for achieving advanced decision making in process development, operation management, and design management by adding risk information. Reviewing based on actual cases leads to improvement in terms of personnel competence and risk management tools through cooperation between the reactor safety and operation/maintenance departments.

- Performance Improvement

  Regarding CR (Condition Report: findings of issues not reaching a level of non-conformance) , it is also effective to utilize trend analysis of multiple CRs, but even single CR

can be a source of valuable information for the leaders to understand the status frontline on the site. To understand gaps between expectations of power stations and actual site situations, it is important for General Managers to check CR daily, and lead in utilizing them aiming for direct performance improvement.

1.4 HQ

The evaluation team observed the status of cooperation and involvement with HQ in terms of human resource development for power stations, taking the Radiation Control Department at Fukushima Daini as an example. It also observed activities for strengthening information providing capability at HQ in emergency response.

- Involvement of HQ in human resource development

  The Radiation protection and safety Corporate Functional Area Manager (HQ functional area manager) is increasingly involved with human resource development, and strengthening supports to power stations by providing advices for the direction of education to Fukushima Daini, and examples of activities at other power stations, which is a good practice.

  Meanwhile, the department in charge in Fukushima Daini did have concerns in maintaining competence required currently or in the future, but had not developed a plan to maintain competence (prediction of periods requiring such competence, and plan to develop human resources).

  The absence of a human resource development plan clarifying the time scale for activities may hinder the maintenance of competence in the future. Such status may be seen in other fields, so NSOO will continue to perform oversight assessment for both HQ and power stations to identify causes and to give advices for them.

- Information communication capability of HQ in emergency response

  NSOO confirmed that the information communication function of HQ to Nuclear Regulation Authority ERC (emergency response center) has significantly improved compared to the start of activities for improvement (early August). The framework (system and tools) of providing information to ERC and site information collecting capability have been strengthened, causing the operational flow being entrenched.

  NSOO will continue to focus on the improvement in emergency response capability.

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

2.1 Maintaining governance in strengthening emergency response capability

In this period, activities to strengthen emergency response capability, mainly information sharing with the Nuclear Regulation Authority, were performed, participated by HQ, Kashiwazaki-Kariwa and the Nuclear Regulation Authority. In this process, President and Manager of Nuclear Power and Plant Siting Division (CNO) presented a clear goal of obtaining a high evaluation in Emergency Exercises, so training personnel and training hours were secured, putting the utmost priority on this goal. As a result, information provision capability such as judgment of precise emergency action level (EAL) was improved. It was a good practice where enhanced governance brought a specific result, which improved the nuclear safety.

Meanwhile, important issues for the future still remains such as transmission of skills/competence held by experienced personnel participating in such activities to other personnel, application of information sharing tools and others to Fukushima Daiichi and Fukushima Daini, enhancing capability to develop medium- to long-term strategy at the department in charge at HQ. General Manager of Nuclear Safety Oversight Office requests lines to maintain good governance, and clarify important issues in emergency response, and try to solve them.

2.2 Practicing education and training establishment method based on competence

The Nuclear Power Division has introduced a systematic training method (SAT) based on analyses of competence necessary for operations, aiming for establishing education and training programs and continuous improvement. The necessity of this method was shared in the division when the Nuclear Human Resource Development Center was established 2 years ago. Then the Center proceeded with the establishment of guides detailing global standard processes.

On the other hand, NSOO HQ team and SRE at Kashiwazaki-Kariwa observed cases where review of competence was not progressed in establishing new education/training programs (such as for education and training related to respond to new regulatory standards at Kashiwazaki-Kariwa, and radiation protection at Fukushima Daini). This was caused by insufficient understanding of SAT at power station lines, as well as a sense of burden of works analyzing competence (knowledge, skills, experience, qualification) held by both the center and power station lines.

The level of competence analysis can be varied depending on the quality required by education and training program. General Manager of Nuclear Safety Oversight Office requests that the Center familiarizing with methods lead works to draw analysis capability from power station lines familiarizing work details, thereby promptly establishing education and training programs.

3. Opinion by Adviser Crofts based on evaluation

3.1 Emergency arrangements at Fukushima Daiichi

After point-out by the Nuclear Regulation Authority, attention has been paid to emergency arrangements at Kashiwazaki-Kariwa and Fukushima Daini, in particular to cooperation between HQ and the Authority. Moreover, we recognized that not only participating in drills but also providing intensive trainings is required.

However, training does not attract attention at Fukushima Daiichi, nor is provided frequently, though currently it has a higher possibility of event occurrence that might lead to damages to personnel or radiation release. My concerns has become larger as Fukushima Daiichi will introduce multiple simulation trainings to prepare for trainings in the presence of the Authority. This additional training seems to be a good practice, but actually show a weakness in nuclear safety culture. Rather than preparing for training considering only passing regulatory reviews, they should prepare for a wider range of scenarios to acquire competence to any emergency.

With this in mind, I recommend that the site superintendent and CDO (Chief Decommissioning Officer) re-confirm the emergency exercise programs.

3.2 Safety standards during long-term shutdown (Fukushima Daini)

Fukushima Daini has a weakness in radiological protection (basic radiation control practices and ALARA). Managers are tackling with countermeasures to improve such situation.

However, issues still remains related to general safety standards such as fire prevention, works at closed places, or at high places, from reports by the Oversight Office. The Oversight Office has observed the same situation for last 5 years. Then, is focusing radiation protection a correct resolution, or is there a more general issue in conformance to safety standards? If so, what is a cause of this?

The Oversight Office told that a part of this issue was caused by undetermined clear goals for the future of Fukushima Daini. Though a high quality level of leaders is maintained, but missions of the power plant is unclear. resources have been continuously reduced, and there is a recognition of the absence of critical risks (compared to Fukushima Daiichi and Kashiwazaki-Kariwa). As a result, it has become difficult for employees to maintain a standard of nuclear safety with a high level of attention, according to the Oversight Office.

Establishing a policy of Decommissioning Fukushima Daini is a good start point. But it will take many years to complete decommissioning, making it difficult for employees to have a high motivation, in a short term, against risks involved in future decommissioning. Instead, I recommend that they will define the minimum operation, work standards, No. of personnel, and competence required for maintaining "safety" during shutdown (nuclear power baseline) until the future of decommissioning is actually clarified, and maintain them strictly.

4. Status of Completion of Recommendations Presented by NSOO

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

- Among 158 recommendations that have been presented, 137 have been completed, and 2 have been completed in this quarter.
- In this period, 5 recommendations are presented.

5. Benchmarking and Training

NSOO held independent nuclear power safety oversight trainings from September 10 to 14, under technical supports from World Association of Nuclear Operators (WANO), like the last year. Not only new members including SREs, but also conventional members participated in trainings, trying to obtain and improve competence through desktop learning and actual technical guidance at Kashiwazaki-Kariwa Nuclear Power Station, among others. The completion of these trainings are an official requirement to be certified as an NSOO Oversight Evaluator.

Moreover, at the time of emergency exercise for improving information sharing between HQ/ERC implemented in this period, all personnel at NSOO watched a highly-evaluated video of trainings by other company to understand gaps with TEPCO. They performed observation activities after clarifying points for oversight.

End of document

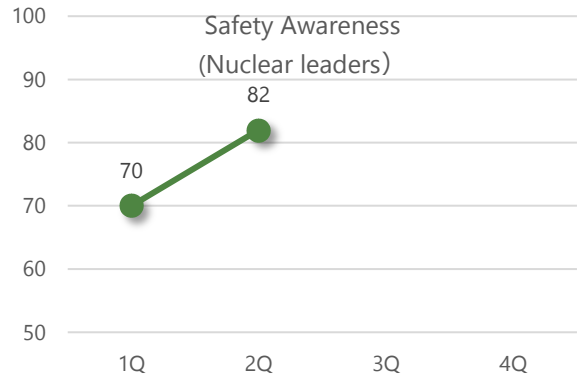
4 KPI/PI RESULTS

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

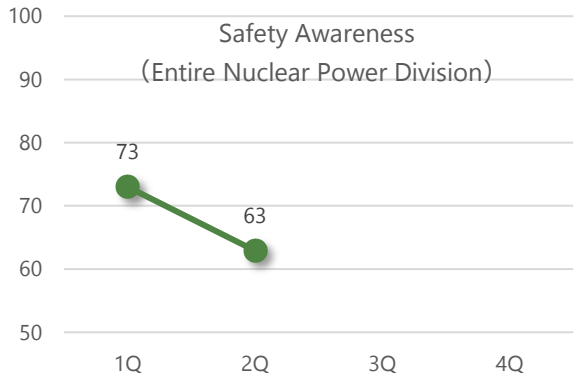
4.1 KPI RESULTS

Safety Awareness KPI ····· Target

Safety Awareness（Nuclear leaders）80 Points



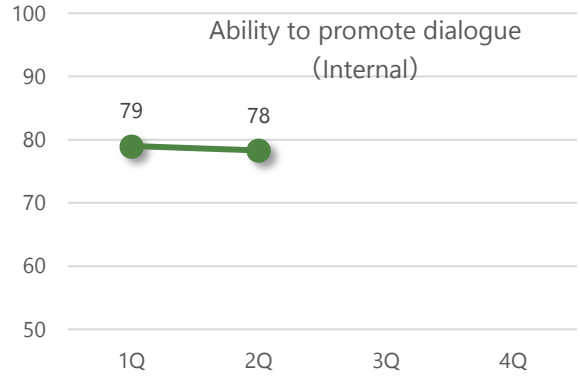
Safety Awareness（Entire Nuclear Power Division）·····80 Points



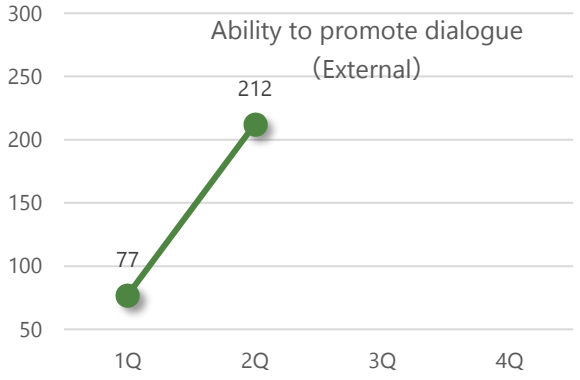
Note: KPI calculation method revised, 1Q results correctd from 85 to 70

Ability to promote dialogueKPI ····· Target

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

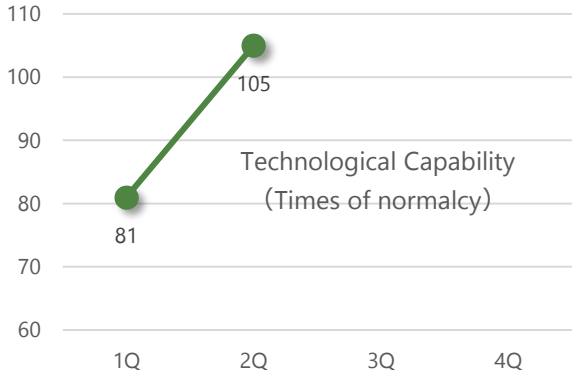


Ability to promote dialogue（External）····· 80 Points

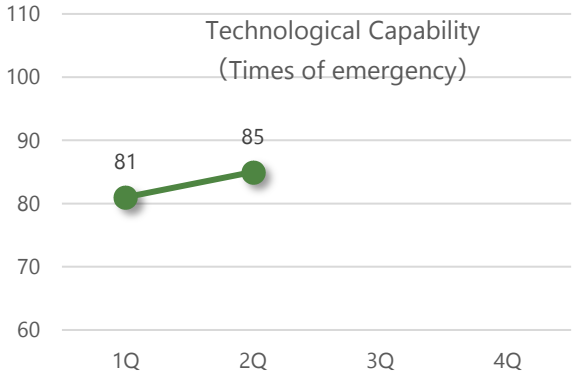


Technological CapabilityKPI ····· Target

Technological Capability（Times of normalcy） ····· 110 Points



Technological Capability（Times of emergency） ····· 110 Points

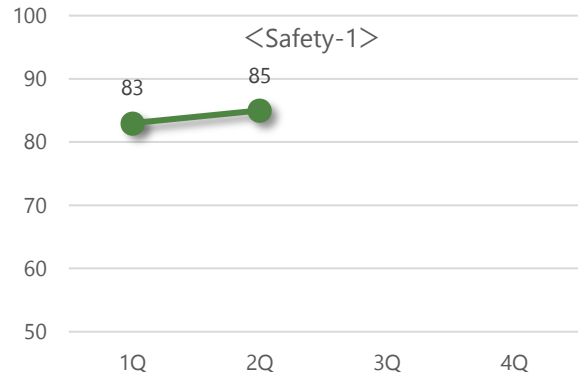


4.2 PI RESULTS

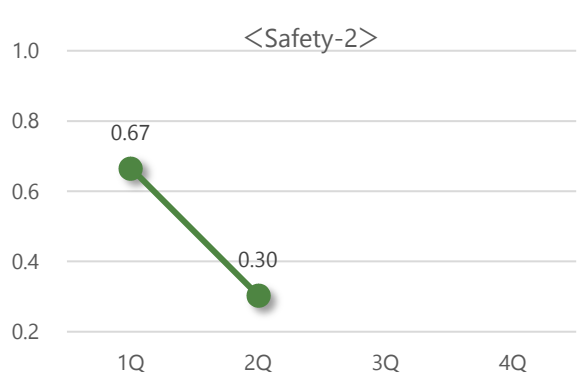
Safety Awareness PI ····· Target

Nuclear leaders

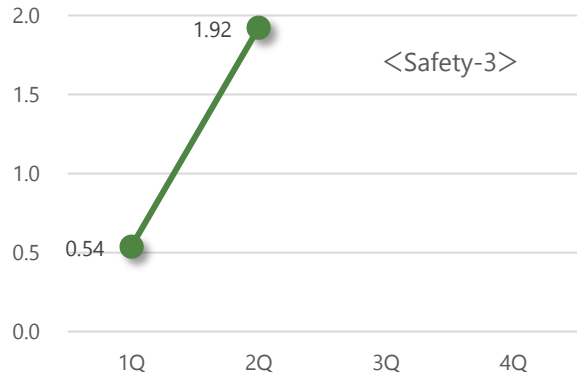
<Safety-1> Rate of implementation of retrospection leveraging the traits by Nuclear leaders ····· 100%



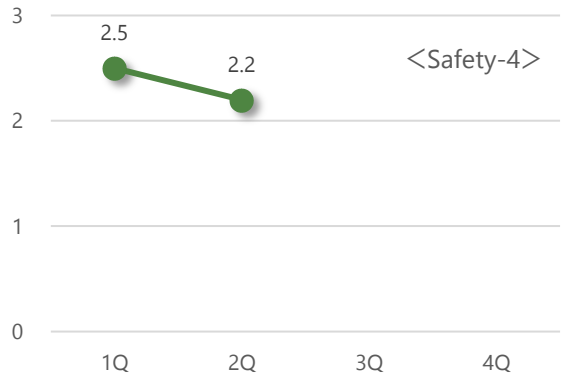
<Safety-2> Number of times emails have been sent by nuclear leaders in order to share information ····· More than once a week



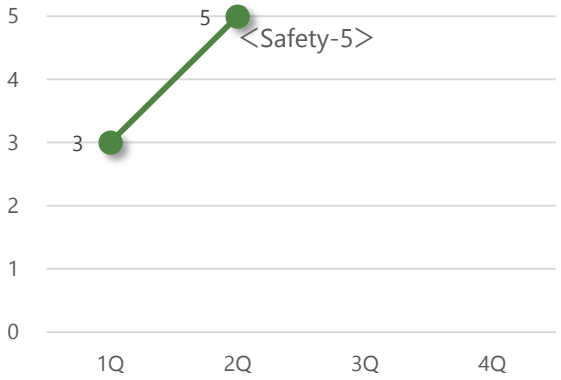
<Safety-3> ····· Number of times nuclear leaders participated in training according to plan More than twice/year/person



<Safety-4> ····· Number of times nuclear leaders went into the field ····· More than twice a month

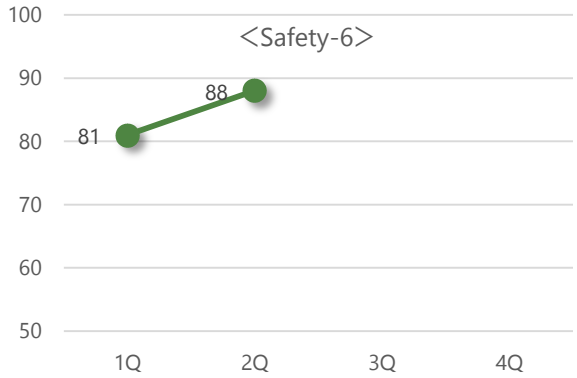


<Safety-5> Number of benchmarked issues for which nuclear leaders are responsible for were put into practice ····· More than 4 times/year

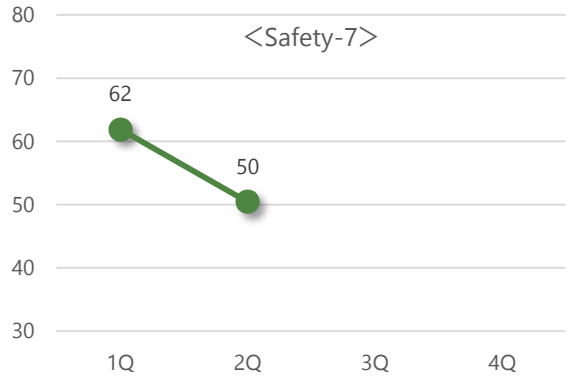


Entire Nuclear Power Division

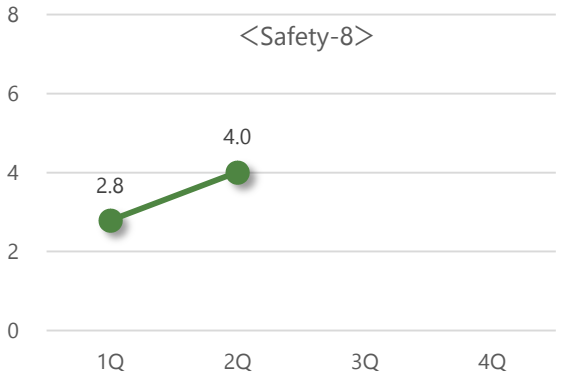
<Safety-6> ·Implementation rate of group discussion about Traits ····· 100%



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

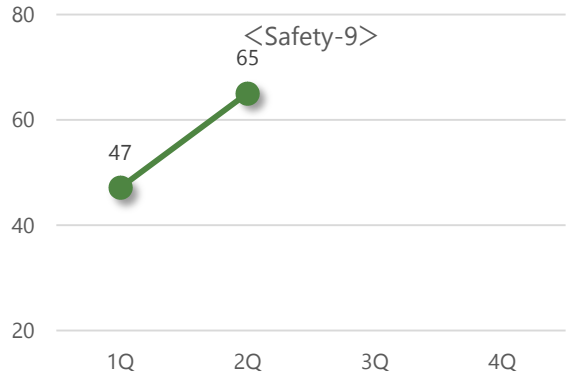


<Safety-8> ····Number of times managers engaged in management observation at power stations····times/month/person（Determined by each dept.）



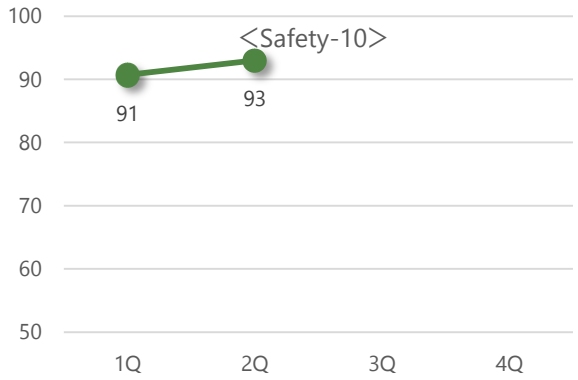
Note: Weighted average for 1F, 2F and KK

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



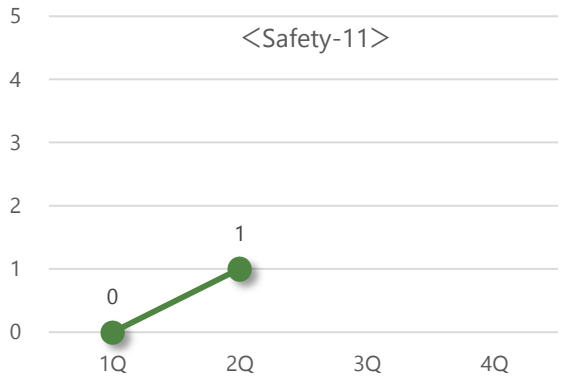
Note: Weighted average for 2F and KK

<Safety-10> Completion rate of GII or higher corrective measures within the deadline 100%



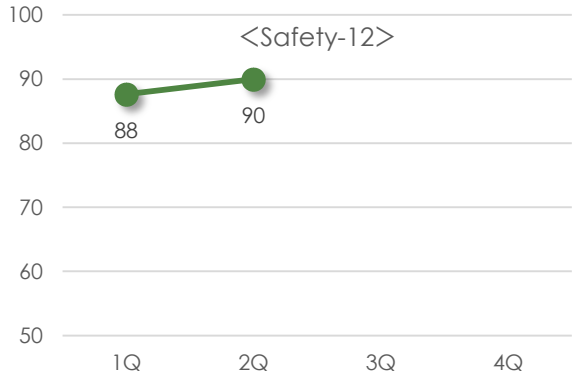
Note: Weighted average for HQ, 2F and KK

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



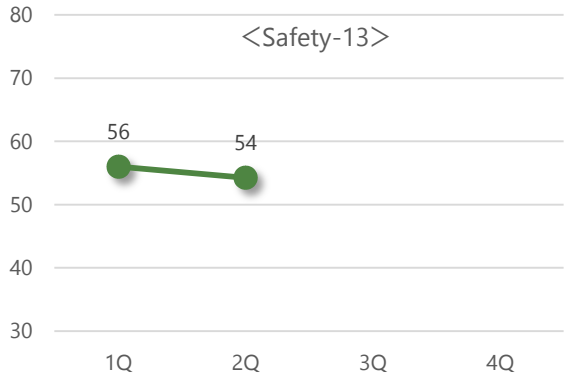
Note: Total for HQ, 2F and KK

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

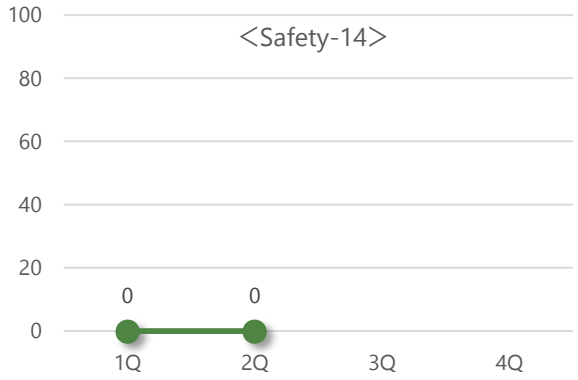


Note: Weighted average for HQ, 2F and KK

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



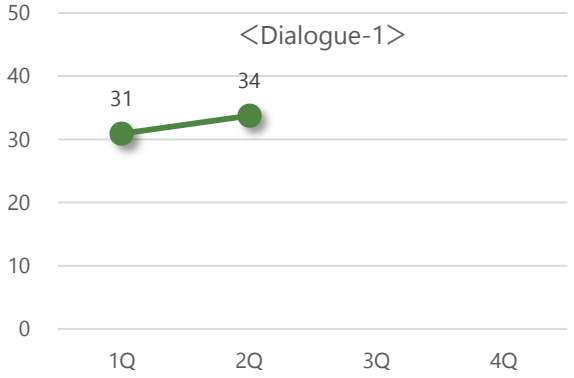
<Safety-14> Significant OE training participation rate 60%



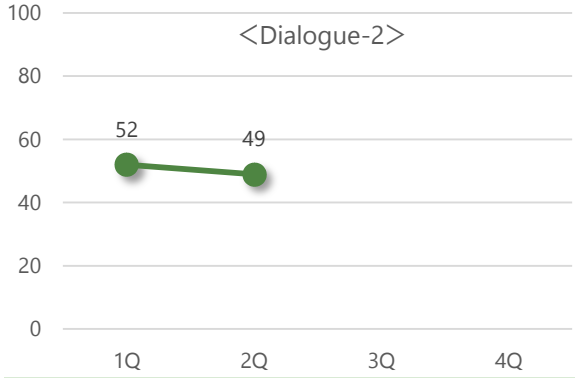
Ability to promote dialoguePI ..... Target

Internal

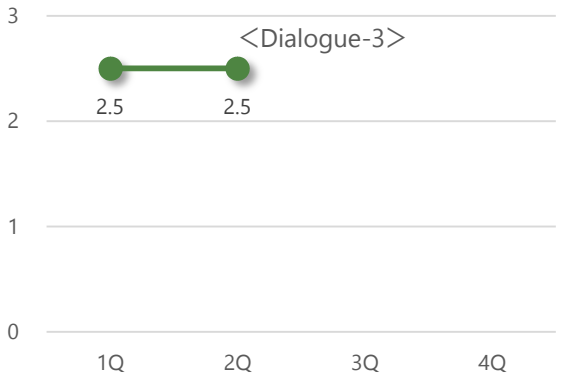
<Dialogue-1> Percentage of employees that feel that intranet messages from nuclear leaders are "helpful" 50%



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



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



External

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

–

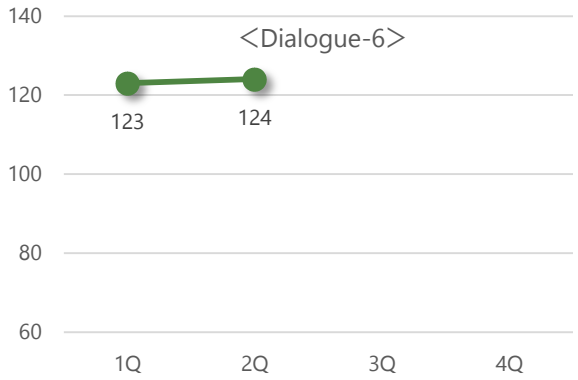
Note: To be measured during Q3

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

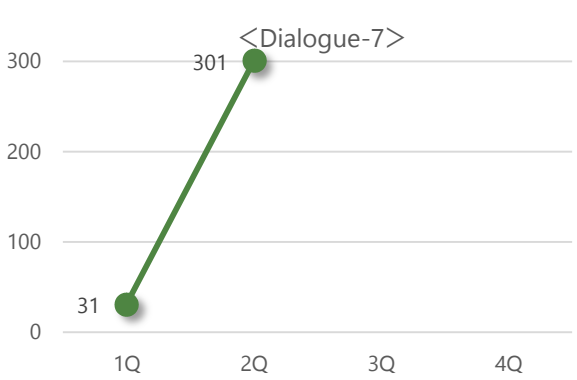
–

Note: To be measured during Q3

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



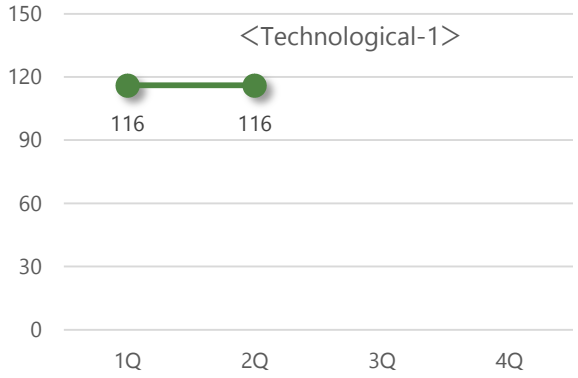
<Dialogue-7> No. of opinions from community members ..... Positive increase over last fiscal year



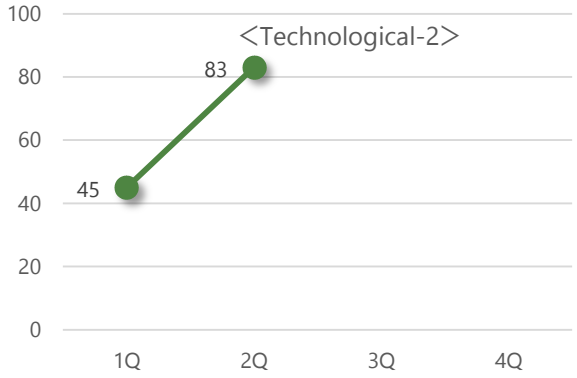
Technological CapabilityPI ..... Target

Times of normalcy

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

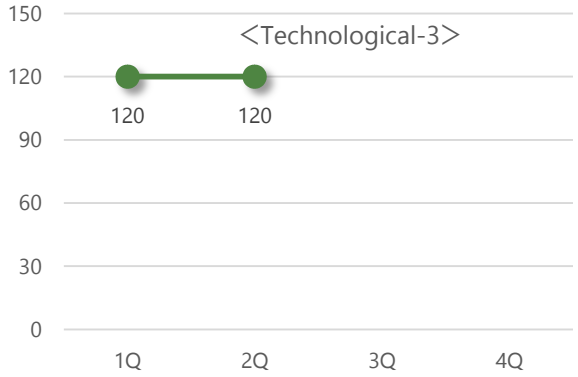


<Technological-2> Rate of reflection of education/training program improvements requested by line departments 80%



Times of emergency

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

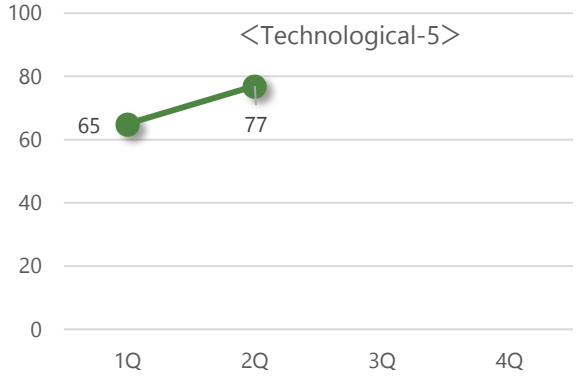


<Technological-4> Percentage of "A" assessments given by the Nuclear Regulatory Agency for emergency response training categories 80%

56%

Note: Assessed once a year. Assessment results for training during last fiscal year reported

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



CONCLUSION

At the end of November 2018 (tentative) we shall be opening the TEPCO Decommissioning Archives which will provide a place for not only the residents of Fukushima Prefecture and the local communities around the power stations, but also people from all over Japan and overseas, to learn the facts of the Fukushima Nuclear Accident and see the current state of decommissioning (announced in a press release dated July 27). One of TEPCO's responsibilities is to preserve the memories and records of the Fukushima Nuclear Accident, which caused significant damage on not only the people of Fukushima Prefecture, but society as a whole, and continues to inconvenience a significant number of people even to this day, and pass down the regrets and lessons learned to parties both within and outside the company to prevent such an accident from ever happening again. The process of decommissioning is an immense undertaking that will take many years, so making the entire process visible and explaining progress in an easy-to-understand manner is vital for continuing to gather wisdom from both within and outside of Japan and maintaining motivation. While continuing to cooperate with related facilities and surrounding communities, TEPCO will pass on the lessons learned from the Fukushima Nuclear Accident to later generations and strive to bring peace of mind to those engaged in recovery efforts.

Group discussions and employee activity declarations

At TEPCO, all employees systematically learn about what has happened since the accident through training during which they engage in discussion and declare what they will do so that they can talk about the facts and lessons learned in their own words, and promise to completely fulfill their obligations to Fukushima. The training facilities built at Kashiwazaki-Kariwa have been used to pass down knowledge about the Fukushima Nuclear Accident to the Nuclear Power Division. These training sessions and other activities will be used to thoroughly share the facts about, and lessons learned from, the accident in order to build unwavering safety culture and ensure that the determination to fulfill our obligations is passed down to future generations.

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 website[6] for more information.

6 https://www4.tepco.co.jp/ep/support/voice/form.html

ABBREVIATIONS

ALARA：As Low As Reasonably Achievable

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

CDO: Chief Decommissioning Officer

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

CP：Construction Permission

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

CRC：Curriculum Review Committee

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

EP：Establishment Permission. Reactor installation modification permission

ERC：Emergency Response Center

IAEA：International Atomic Energy Agency

JANSI：Japan Nuclear Safety Institute

KPI：Key Performance Indicator

LCO：Limiting Conditions for Operation

MAAP：Modular Accident Analysis Program

MO：Management Observations

NSAB：Nuclear Safety Advisory Board

NSOO：Nuclear Safety Oversight Office）

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

PCV：Primary Containment Vessel

PI：Performance Indicators

PICO：Performance Improvement Coordinator

PRA：Probabilistic Risk Assessment

RC：Risk Communicator

RIDM：Risk-Informed Decision Making

ROP：Reactor Oversight Process (in the United States)

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

SC Office: Social Communication Office

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

SOER：Significant Operating Experience Report stipulated by WANO

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

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

WANO：World Association of Nuclear Operators

WM：Work Management