Nuclear Safety Reform Plan

FY2019Q1 Progress Report

Tokyo Electric Power Company Holdings, Inc.

August 20, 2019

TEPCO

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FOREWORD

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

On March 29, 2013, TEPCO announced its Reassessment of the Fukushima Nuclear Accident and Nuclear Safety Reform Plan to implement nuclear safety reforms. Since then we have provided quarterly updates on the progress of these reforms. The following is a report on the progress that we have made during the first quarter of FY2019[1](April~June, 2019).

During this quarter the Nuclear Regulation Authority released the assessment results of emergency training conducted last fiscal year (June 28). Training has been repeatedly implemented at each power station based upon the Emergency Response Improvement Plan (announced on August 27, 2018) that puts forth improvement measures. As a result of these efforts, Kashiwazaki-Kariwa received A-ratings for all 10 categories. And, Fukushima Daini and Fukushima Daiichi received A's in nine and eight categories, respectively. We shall not let ourselves feel satisfied with this assessment, but rather implement further improvements, such as increasing the number of personnel with honed emergency response skills, as we pursue excellence.

1 All dates hereinafter refer to 2019 unless otherwise noted.

1 PROGRESS WITH SAFETY MEASURES AT NUCLEAR POWER STATIONS

1.1 PROGRESS OF REACTOR DECOMMISSIONING

At Fukushima Daiichi, we are moving steadily and safely forward with decommissioning in accordance with the TEPCO Holdings, Inc. Mid-and-Long-Term Roadmap Towards Decommissioning of Fukushima Daiichi Nuclear Power Station Units 1 to 4 (September 26, 2017 revision).

(1) Fuel Debris Removal

◆ Unit 1

In preparation for the internal exploration of the primary containment vessel (PCV), three holes were bored into the outside door of the X-2 penetration (April 8), which is a doored penetration used for entering and exiting the primary containment vessel, in order to secure access route to the PCV. The bored holes made it possible to examine the inside of the X-2 penetration and deposits, which are assumed to be paint that has flaked off of the inside of the penetration, were found in front of the inside door. After the deposits were removed, holes were bored in the inside door (June 4). When this was done, the readings on a temporarily installed dust concentration monitor measuring the area in front of the filter, which is used to reduce the concentration of radioactive substances, spiked to values that exceeded work management values. It is hypothesized that high pressure water used during hole boring impacted the grating inside the PCV and caused dust to disperse. Going forward, the area of cutting shall be moved to an area with little impact in order to ascertain the impact that such relocation has on dust concentrations during hole boring. Work recommenced on July 31 and we shall gradually open up more holes in the inner door and cut away obstructions to the PCV upon increasing our knowledge about dust dispersion

Holes cut in outside door

Deposits in front of inner door

(2) Removing fuel from the spent fuel pools

◆ Unit 1

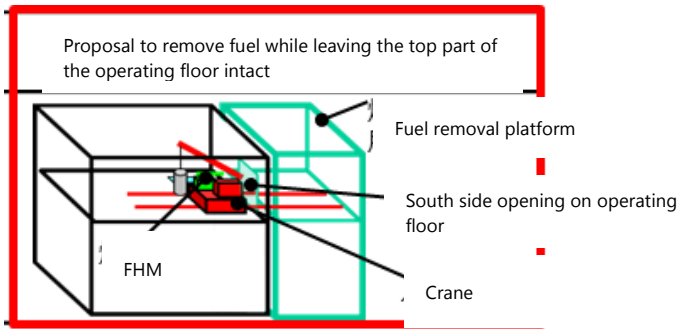
In order to secure an access route to the spent fuel pool we have been removing obstructions and covering openings (equipment hatches) since FY2018. During the first quarter we began removing rubble using remotely operated heavy machinery from the east

side of the spent fuel pool (April 2). As we move forward with this task we shall continue to assess and manage risks, prevent the dispersion of radioactive substances, and thoroughly implement safety measures as we aim to commence fuel removal in FY2023.

◆ Unit 2

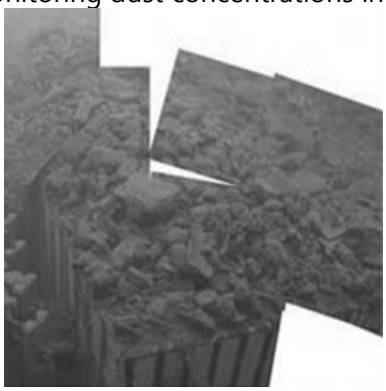
At Unit 2, we plan to perform an investigation of all areas of the operating floor in preparation to propose work plans, such as the dismantling of the top part of the reactor building. A comparison of the results from the February 2019 exploration (during which photos were taken with gamma cameras, and surface and air dose rates were measured) with the exploration results from 2011~2012 showed a decreasing tendency in air dose rates. This has shown that work on a limited scale may be possible on the operating floor. In order to reduce the risk of the dust dispersion during dismantling of the building and perform the task as safely as possible, we are deliberating accessing the building from the south side while dismantling as little as possible of the top part of the reactor building. In preparation for fuel removal we shall leverage this information as we deliberate shielding design and radioactive substance dispersion countermeasures.

◆ Unit 3



Concept drawing of fuel removal

In the Unit 3 spent fuel pool there were a total of 566 fuel assemblies (514 spent fuel assemblies, and 52 new fuel assemblies) and work to remove seven of the new fuel assemblies began on April 15. The seven new fuel assemblies were loaded into transport containers and relocated to the common pool building on April 23. In preparation for the next round of fuel assembly removal, we reflected upon how these first seven fuel assemblies were removed and made improvements to procedures and equipment. After removal of the rubble above the new fuel assemblies to be removed was completed, we repeatedly implemented training on the procedure of fuel removal, fuel relocation and the transport of transport containers, and commenced the second round of fuel removal on July 4. Removal of the 21 new fuel assemblies slated to be removed was completed on July 21. We shall continue fuel removal while prioritizing safety and monitoring dust concentrations in the vicinity.


New fuel prior to rubble removal (Dec. 2015)


New fuel after rubble removal (June 8)

(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.

◆ Flow of groundwater into the site bunker building

Groundwater has continued to flow into the site bunker building since the middle of November 2018 and an investigation found on May 23 that groundwater is flowing into the building from the inner side of the floor funnel in the subfloor 1 maintenance area. In order to find out where the water is flowing from, a camera was inserted into the drain pipe and no other sources of water aside from that mentioned above were found. The flow of water was controlled by opening a hole near the funnel and inserting a temporary plug in the aforementioned location. An investigation upstream shall be performed in order to deliberate more permanent countermeasures.

Floor funnel from which gushing water was found

Hole temporarily plugged to stop water flow

(4) Dismantling the Unit 1/2 exhaust stack

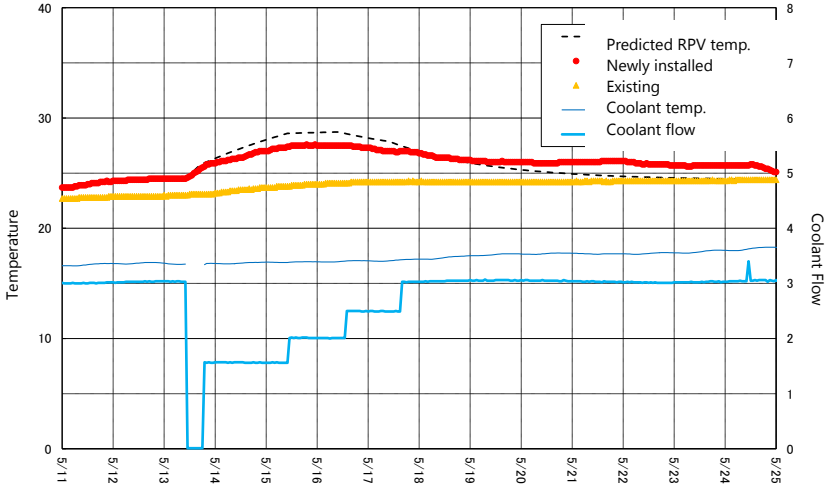
Damage and cracks have been found in the steel tower that supports the Unit 1/2 exhaust stack, so the top part of the steel frame shall be dismantled using remotely operated machinery in order to ensure seismic resistance margins. In order to dismantle the frame smoothly, a simulated exhaust stack approximately 18m tall that incorporates the major parts of the exhaust stack has been built off-site with the cooperation of ABLE Co., Ltd., a local company. This mockup has been used to confirm and deliberate work procedures. On May 11, a simulated dismantling mechanism was attached to the crane and hoisted over the actual exhaust stack at Fukushima Daiichi to confirm that the equipment can be installed on the top of it. It was found that there is a difference of approximately 3m between the planned and actual distance from the crane hook to the top of the exhaust stack. To ensure the correct hoisting height of the crane, the angle of the crane was increased and road renovations implemented in order to enable the crane to get closer to the exhaust stack after which it was confirmed that the crane can indeed hoist equipment high enough (July 18), so dismantling began on August 1.

Checking equipment fit on top of exhaust stack

Dismantling equipment

(5) Unit 2 reactor coolant injection shutdown test

Between May 13 and May 24 short-term reactor coolant shutdown tests (3.0 m^3/hour to 0.0 m^3/hour) were conducted in order to make improvements, such as adjusting emergency response procedures. During coolant injection shutdown, the temperature increase rate at the bottom of the reactor pressure vessel was less than 0.2°C/hr, as predicted, and the temperatures at the bottom of the reactor pressure vessel and in the primary containment vessel during the tests fluctuated within the predicted range. No abnormalities were seen with other parameters, such as dust concentrations. Going forward, we shall examine discrepancies between predicted data and test data, assess differences in behavior caused by the location of temperature gauges, and use this information to make suitable revisions to emergency response procedures.

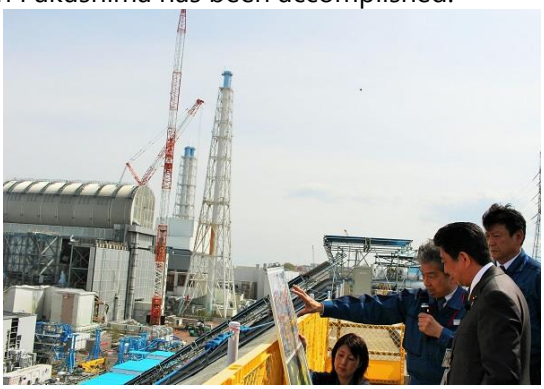


Temperature trends during reactor coolant injection tests

(6) Visit by Prime Minister Abe

On April 14 Prime Minister Abe visited Fukushima Daiichi. During the Prime Minister's previous visit (September 19, 2013), he needed to wear protective clothing and a full face mask, however during this visit he was able to view the status of decommissioning work up close from high ground on the west side of Units 1~4 where radiation reduction measures

are underway without the need for protective clothing or other equipment. During the visit the Prime Minister was given explanations of the state of contaminated water countermeasures and the preparations that are underway to remove fuel from Unit 3. After his visit, Prime Minister Abe said, "let's continue to work together until our mission of recovery in Fukushima has been accomplished."



Visit to Units 1~4

Past visit (September 19, 2013)

(7) Receiving letters of appreciation from the Prime Minister and the Minister of Economy, Trade, and Industry (METI Minister)

Letters of appreciation were given to contractors that have made outstanding achievements in the fields of decommissioning and contaminated water countermeasures. On April 14, Prime Minister Abe presented a Prime Minister's Letter of Appreciation to contractors involved in projects related to removing fuel from the Unit 3 spent fuel pool. At the reception following the presentation ceremony, the Prime Minister conveyed his respect and gratitude to all the workers. And, on April 16, the Minister of Economy, Trade, and Industry (Nuclear Disaster Local Countermeasures Office General Manager) presented the METI Minister's Letter of Appreciation and METI Deputy Minister's Letter of Appreciation (Nuclear Disaster Local Countermeasures Office General Manager) to contractors. We have great respect for the contractors involved in decommissioning/contaminated water countermeasures that have received these honors and shall move steadily forward with decommissioning together with all contractors while prioritizing safety. The letters of appreciation were awarded for the following work:

Prime Minister's Letter of Appreciation

- Installation of the fuel removal cover and dose reduction measures on the operating floor implemented in preparation for Unit 3 reactor building spent fuel pool fuel remove

METI Minister's Letter of Appreciation

- Unit 2/3 primary containment vessel internal exploration
- Frozen soil wall installation/construction

METI Deputy Minister's (Nuclear Disaster Local Countermeasures Office General Manager) Letter of Appreciation

- Dose reduction measures in order to remove accumulated water from inside the Unit 1 turbine building

・ Installation and removal of water drainage equipment to remove residual accumulated water from inside the Unit 1 turbine building

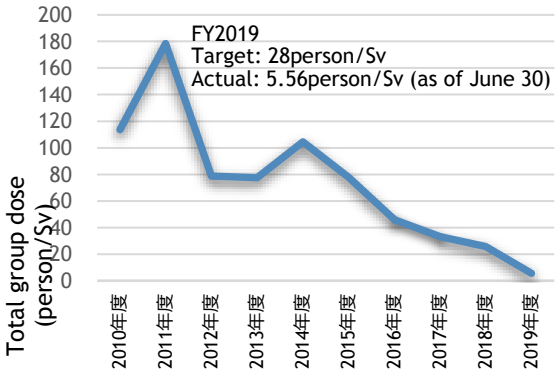
Presentation of letter of appreciation

Informal discussion

(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 during the planning stages and deliberating exposure reduction measures from an engineering standpoint upon assessing the increases or decreases in risk based upon this approach. We also implemented exposure dose reduction measures, such as exposure control countermeasures, during the work implementation stage, and in March 2019, we increased the number of remote monitoring systems being used in order to enhance means for managing high-dose work both within the reactor building and outdoors. During the first quarter, remote monitoring systems were used for a total of four projects, including dose surveys of the Unit 3 reactor building and the removal of rubble from the Unit 2 turbine building annex, etc., and exposure doses were reduced to the same extent (approximately 10%) as past achievements. These systems will be proactively leveraged during future work inside the reactor building and surrounding high-dose work environments.

Monitoring using remote monitoring system



Trends in total group dose by year

1.2 PROGRESS OF SAFETY MEASURES AT KASHIWAZAKI-KARIWA

(1) Progress with safety measures

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

＜Progress with Safety Measure Renovations＞

Safety Measures (※: Measures independently implemented by TEPCO		Unit 6	Unit 7
Preparations for tsunami and internal inundation	Tidal wall (seawall) construction	Completed	
	Installation of tidal walls for buildings (including flood barrier panels)	No openings below 15m above sea level	
	Installation of water-tight doors in reactor building, etc.	Completed	Completed
	Installation of tidal walls at switchyards※	Completed	
	Installation of tsunami monitoring cameras	Completed	
	Improving the reliability of flooding prevention measures (interior flooding measures)	Underway	Underway
	Dyke construction	Completed	Completed
	Installation of permanent bilge pumps in rooms housing important equipment	Completed	Completed
Preparations for power loss [Augmenting power sources]	Additional deployment of air-cooled gas turbine power supply cars	Underway	Underway
	Installation of emergency high voltage distribution panels	Completed	
	Laying of permanent cables from emergency high-voltage distribution panels to reactor buildings	Completed	Completed
	Preparation of substitute DC power sources (batteries, etc.)	Completed	Completed
	Reinforcement of transmission tower 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	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

[Measures to prevent damage to the PCV and hydrogen explosions]	Installation of H2 control and hydrogen detection equipment in reactor buildings	Completed	Completed
	Installation of top vents in reactor buildings※	Completed	Completed
	Installation of corium shields	Completed	Completed
Preventing the dispersion of radioactive materials	Deployment of large volume water dispersion equipment	Completed	
Preparing for fires [Countermeasures for external and internal fires]	Construction of fire belts	Underway	
	Installation of fire detectors in parking lots on high ground	Completed	
	Installation of fire detectors in buildings	Underway	Underway
	Installation of fixed firefighting systems	Underway	Underway
	Installation of cable wrappings	Underway	Underway
	Construction of fire-resistant barriers	Underway	Underway
Addressing external hazards	Countermeasures for building openings	Underway	Underway
	Removal of objects that could turn into flying debris as a result of a tornado	Underway	Underway
	Installation of spare bug filter for ventilation and air conditioning systems	Completed	Completed
Improvements to Main Control Room environments	Measures to reduce operator exposure in the event of a severe accident	Underway	
Strengthening emergency response	Construction and reinforcement of multiple access routes	Underway	
	Enhancement of communications equipment (installation of satellite phones, etc.)	Completed	
	Enhancement of environment monitoring equipment/additional deployment of monitoring cars	Completed	
	Construction of emergency materials and equipment warehouse on high ground※	Completed	
	Construction of Emergency Response Center in Unit 5	Underway	
Strengthening seismic resistance (including ground improvement measures to prevent liquefaction)	Seismic resistance assessment/renovations of outside equipment and piping	Underway	Underway
	Seismic resistance assessment/renovations of indoor equipment and piping	Underway	Underway

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

◆ Enhancing the seismic resistance of the Unit 7 reactor building's large freight entrance

The large freight entrance※attached to the Unit 7 reactor building constitutes a secondary containment boundary for the reactor building and as such must fulfill seismic resistance safety requirements for standard seismic motion Ss. A seismic resistance safety assessment revealed that the piles supporting the large freight entrance building and the roof of the structure do not satisfy seismic resistance tolerance limits. Since measures to enhance seismic resistance are therefore necessary, we began dismantling the large freight entrance in April.

After the large freight entrance is dismantled, ground improvements will be made and new piles inserted. After this is done, the structure will be rebuilt with thicker walls that contain more rebar in order to enhance seismic resistance. The reactor building has been built directly on top of bedrock or artificial bedrock, so there is no chance that the ground below it would be subject to liquefaction.

Waste concrete, etc., generated in conjunction with dismantling is not contaminated with radioactive substances and as such can be disposed of as reusable industrial waste in accordance with Japan's Non-Radioactive (NR) Waste system for the effective use of uncontaminated waste. This will mark the first time that the system has been applied to a TEPCO nuclear power station. Furthermore, we are deliberating reducing the number of workers that spray water [onto debris during dismantling] and measures to improve the operation rate of large crushers as Toyota-type kaizen activities as we move forward with this project while improving worker safety and work quality, and shortening work schedules.

※Large freight entrance: building used for carrying in and carrying out equipment and materials needed for work done inside the reactor building. (Width: Approximately 12m, Height: Approximately 8m, Depth: Approximately 24m)

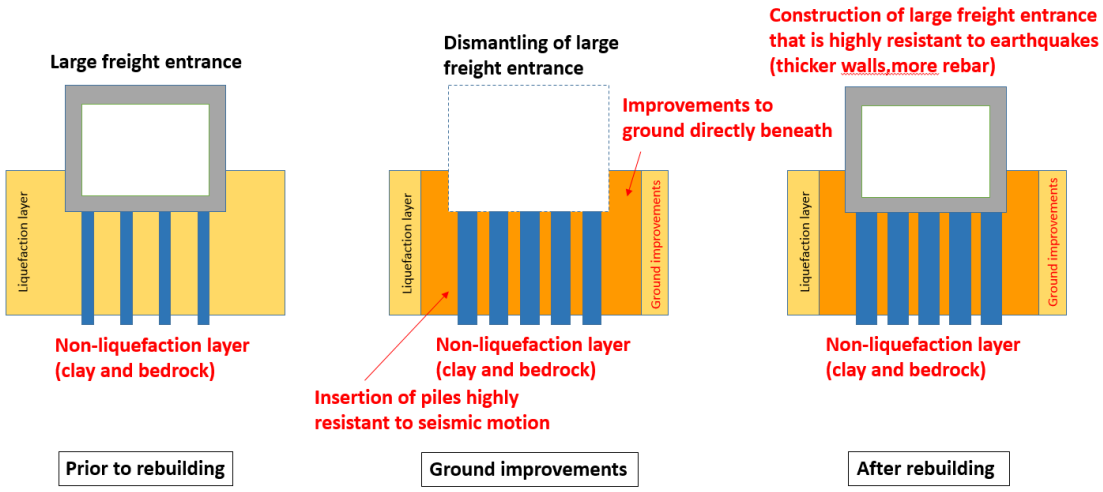


Diagram of seismic reinforcement renovations

Dismantling of large freight entrance

◆ Measures to prevent the collapse of fire belt slopes alongside the newly built access road

In order to further improve the safety of the newly built fire belt and access road, which was constructed to add redundancy to travel routes from the main administration building to the Unit 5 Emergency Response Center, measures have been implemented to maintain the function of fire belts by preventing surrounding slopes from collapsing in the event of an earthquake.

If the top of the fire belt slope were to collapse due to an earthquake, the vegetation and the soil on the slope would collapse and cover the fire belt thereby narrowing the width of the fire belt. Therefore, as a measure to prevent the collapse of the fire belt slope, work has been underway since January to widen※the existing fire belt by approximately 37,000m^2 around the entire power station. As of the end of May, approximately 8,140m^2 (approximately 22%) of mortar had been sprayed as part of this process.

※Vegetation on the slope in fear of collapse is removed and the ground is sprayed with mortar to harden it.

Slope preparation

Mortar spraying

(2) Investigation of penetrations through fire zones and the status of corrective measures

In July 2017, it was found that two penetrations in the walls separating fire zones in the Unit 2 reactor building had not been fireproofed. In light of this, corrective measures are now being implemented at Kashiwazaki-Kariwa for fire zone penetrations at Units 1 through 7 and other common facilities. Corrective measures for penetrations that had not been fireproofed were completed on July 29.

The following chart shows the status of corrective measures. (As of June 12)

Unit		Investigation Status	Investigation Progress Rate	# of locations yet to be fireproofed	# of locations corrected	Notes
Unit 1		Completed	100%	53	28	
Unit 2		Completed	100%	6	4	
Unit 3		Completed	100%	5	1	
Unit 4		Completed	100%	1	0	
Unit 5		Completed	100%	14	8	
Unit 6		Completed	100%	7	1	
Unit 7		Completed	100%	2	2	Corrections completed
Other	Common Plant Facilities	Completed	100%	0	0	—
	Offices	Completed	100%	124	124	Corrections completed
Total				212	168	

(3) Laid cable investigation and status of corrections

Investigations into inappropriately laid cable under the main control room floors and in field cable trays were implemented and corrective measures taken at all units after "inappropriately laid cable under the main control room" was found at Unit 6. Corrective measures for inappropriately laid cables under the main control room floors and in field cable trays at Units 6 and 7 have already been completed and reported on to the Nuclear Regulation Authority in September 2016. Investigations of cables under main control rooms and in the field cable trays, and corrective measures, were underway at Units 1 through 5 and completed in March with reports given to the Nuclear Regulation Authority in May. In order to continually improve nuclear safety, we are going beyond countermeasures implemented in order to make improvements in light of this issue and implementing daily inspections while repeatedly providing education on the issue in an effort to improve safety awareness and technological capability.

The status of corrective measures for cables under main control room floors is as follows

Unit	# of cables traversing zones	# of corrections	Progress status of investigation/corrections
Unit 1	165	165	Corrections completed
Unit 2	180	180	Corrections completed
Unit 3	256	256	Corrections completed
Unit 4	55	55	Corrections completed
Unit 5	175	175	Corrections completed

The status of corrective measures for field cable trays is as follows

Unit	# of cables traversing zones	# of corrections	Progress status of investigation/corrections
Unit 1	454	454	Corrections completed
Unit 2	139	139	Corrections completed
Unit 3	115	115	Corrections completed
Unit 4	134	134	Corrections completed
Unit 5	376	376	Corrections completed

(4) Progress of countermeasures for the fire in the cable service tunnel

As a countermeasure for the cable splice fire that occurred in the cable tunnel on November 1, 2018, we have affixed brackets to both ends of 99 splices that are the same as the splice where the fire occurred in order to prevent the cable sheath from shrinking as a result of temperature changes.

This countermeasure will be implemented for all live splices during 2019 with brackets to be attached to the remaining locations by the end of FY2020. A detailed deliberation of methods for securing each splice was performed through factory and field tests. As a result, we found that 35 splices do not require countermeasures since the cable sheathing will not shorten as a result of heat due to the structure of the splice and therefore not cause a fire. In regards to the remaining 64 splices, we are currently in the process of procuring the materials and the corrective measures are to be implemented during September and October.

Furthermore, we continue to perform visual inspections of live straight-line spices and have found no abnormalities, such as burn marks or large deformation, etc., to date.

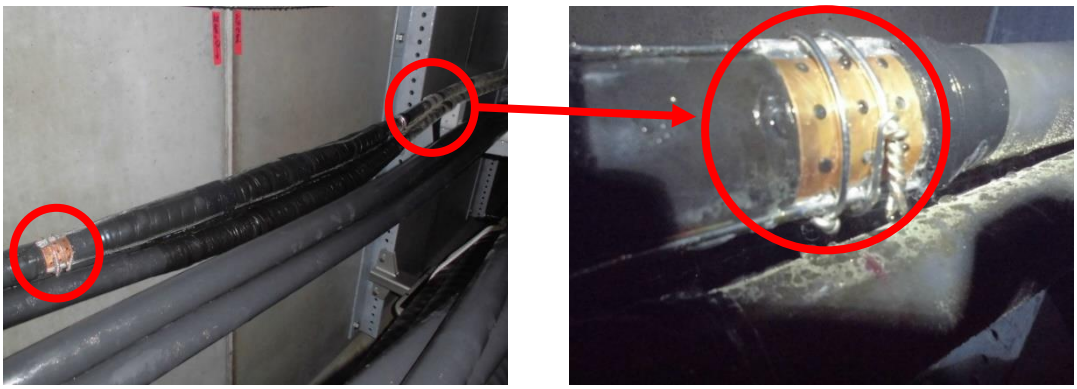


Image of bracket　　Enlarged photo

(5) Notification form errors during the earthquake that occurred off the coast of Yamagata Prefecture

After the delays in notifying local governments when the fire occurred in the cable service tunnel we implemented training that simulated the reporting of such events by telephone and fax under more realistic circumstances in order to maintain and improve the skill of shift members that initially respond to troubles (report the event) during the night and on holidays. However, when notification of the earthquake that occurred off the coast of Yamagata Prefecture on June 18 was given, an error was made on the notification form indicated that

cooling systems had shut down, and mechanisms to check the details of such notifications before they are sent were insufficient thereby resulting in the facsimiles being sent to the governments of the siting community and the surrounding communities without the error being caught.

Since the format of the notification form made it easy to make errors, the layout was revised in order to prevent human error such as misunderstanding the notification form format.

In regards to insufficient mechanisms for checking the details of notifications, since the shift member responsible for filling out the notification form was overwhelmed with phone calls and did not properly check the details of the notification form prior to being sent, the system for checking information disseminated to external parties, including notification facsimiles, has been enhanced by increasing the number of shift members from 6 to 8.

Furthermore, we are leveraging operating experience information to cultivate sensitivity to the thoughts and feelings of community residents and society while also enhancing initiatives related to improving the quality of external reports and eradicating legal infractions in an effort to not only improve the ability to disseminate information during an emergency, but also improve the quality of power station management. One example of these efforts is having all station personnel participate in household visits to create opportunities to directly hear the opinions of members of the community and thereby cultivate awareness about disseminating information from the perspective of the community residents.

Before

号機名	地震発生前後の運転状況				燃料プール冷却系の状況				燃料プール冷却に係る所内電源の異常	
	地震発生前		地震発生後		地震発生前		地震発生後			
	運転	停止	運転	停止	運転	停止	運転	停止	有	無
1										
2										
3										
4										
5										
6										
7										

After

号機名	地震発生前後の運転状況		燃料プール冷却系の状況		燃料プールの状況（湿水・漏えい）
	地震発生前	地震発生後	地震発生前	地震発生後	
1	運転・停止	運転・停止	運転・停止	運転・停止（　時　分）	正常・異常
2	運転・停止	運転・停止	運転・停止	運転・停止（　時　分）	正常・異常
3	運転・停止	運転・停止	運転・停止	運転・停止（　時　分）	正常・異常
4	運転・停止	運転			
5	運転・停止	運転			
6	運転・停止	運転			
7	運転・停止	運転			

Choice selection completely revised
(Safe selections on left/Unsafe

Notification form layout changes

Notification training (notification by telephone)

Notification training (notification form check)

1.3 PROGRESS WITH SAFETY MEASURES AT FUKUSHIMA DAINI

◆ The decision to decommission all reactors


Fukushima Daini

TEPCO announced on June 14, 2018 that we were engaged in detailed deliberations about the decommissioning of all reactors at Fukushima Daini (Units 1~4) after determining that failing to make a clear decision about how to handle Fukushima Daini would only impede recovery efforts in Fukushima. We thereafter examined this issue from multiple facets including securing human resources needed to decommissioning Fukushima Daiichi, the safe decommissioning of the power station, and the impact that such a decision would have on our operations. With the end to these deliberations in sight we comprehensively considered the wishes of the local communities to decommission all reactors at nuclear power stations in Fukushima Prefecture as part of recovery from the Great East Japan Earthquake and Tsunami, and the decision was made on July 31 to decommission all reactors (Units 1-4) at Fukushima Daini. With singleness of purpose we shall engage in this process along with the decommissioning of Fukushima Daiichi in accordance with our basic plan on decommissioning to bring complete peace of mind to the residents of the community.

Basic policy on decommissioning

1. Securing human resources including human resources needed to decommission Fukushima Daiichi

- As with other decommissioned plants we expect that it will take approximately 30 years to decommission each reactor, however considering that we will be simultaneously decommissioning Fukushima Daiichi, we need to give sufficient consideration to the distribution of human resources. Therefore, we predict that it will take more than 40 years to decommission all four reactors at Fukushima Daini.
- We will strive to shorten work schedules as much as possible and move forward while prioritizing safety and security.

2. Safe decommissioning

- We plan to move all the spent fuel stored in the power station (approximately 10,000 fuel assemblies) outside of the prefecture before the completion of decommissioning, and we will strive to remove this fuel as quickly as possible.
- In order to move smoothly forward with decommissioning, we shall build an on-site storage facility for dry casks, such as those being planned at other nuclear power stations, so as to remove fuel from the spent fuel pools in a planned manner. The actual scale of this storage facility has yet to be determined.
- We shall move through each stage of the process while ensuring worker safety and reducing worker exposure doses and complying with related laws and regulations, such as minimizing the discharge of radioactive substances, etc. and prioritizing safety.

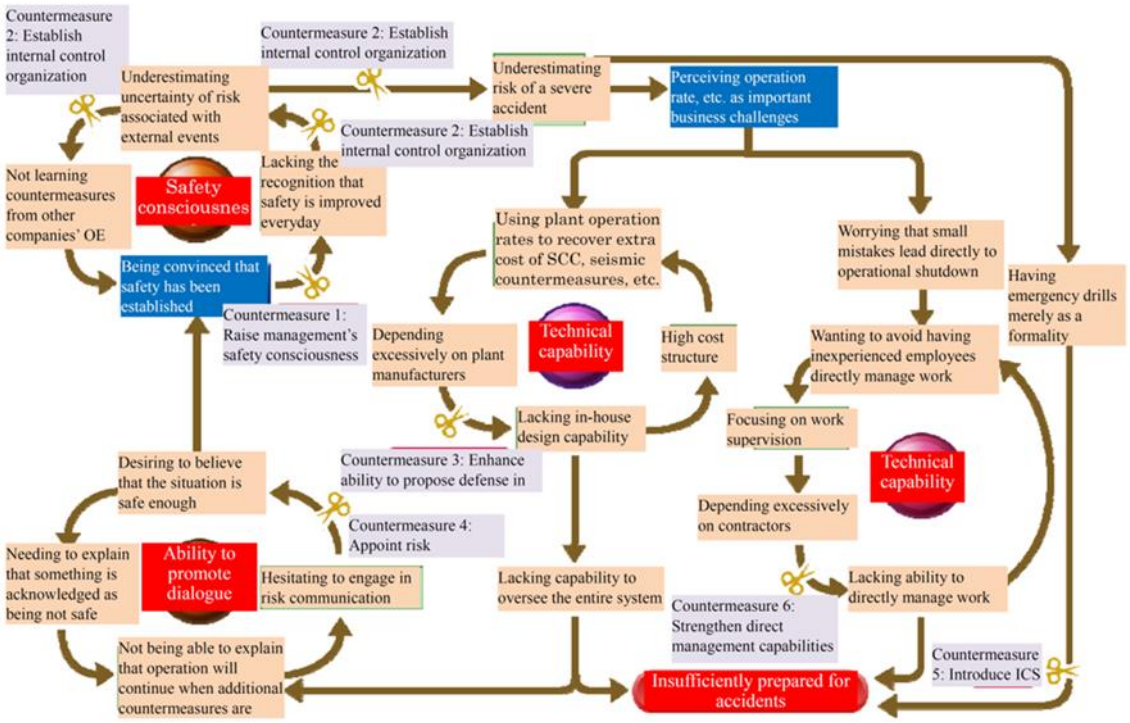
- Details will be noted in a decommissioning plan to be created and we will move forward with the plan upon carefully explaining the content to community residents and obtaining their understanding.

3. Contributing to industrial recovery in the region

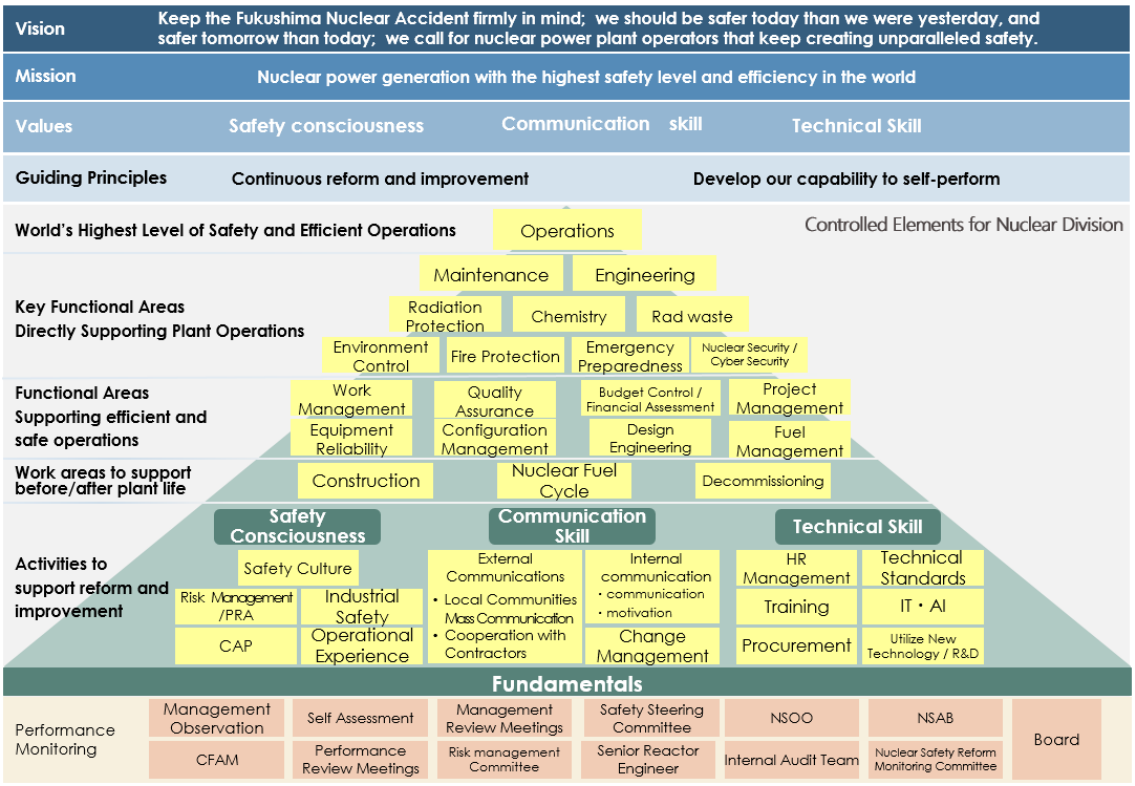
- As we move forward with the decommissioning of Fukushima Daini we shall create as many opportunities as possible for participation by local companies, including through the procurement of materials and equipment, as well as strive to contribute to recovery in the region by procuring storage containers for dismantled structures and promoting the effective use of usable materials.
- We shall hash out and deliberate the details of this project in conjunction with the decommissioning of Fukushima Daiichi and give careful explanations to community residents from the planning stages.

2 PROGRESS WITH 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.



As an initiative to strengthen governance the FDEC has created a Decommissioning Promotion Strategy (September 2016). And, in the Nuclear Power & Plant Siting Division, all duties are being carried out in accordance with the Nuclear Power Division Management Model, which was created in June 2017. The Nuclear Safety Reform Plan Progress Report gives updates on "Better Aligning the Vectors of the Organization (Strengthening Governance)," Decommissioning Promotion Strategy quality policies and on "safety awareness," "the ability to promote dialogue," and "technological capability," which are the main values of the Management Model.



2.1 Activities to Better Align the Vectors of All Divisions

2.1.1 Strengthening Governance

(1) 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 FY2019 we will continue to engage in activities that aim for excellence upon creating business plans based on the Management Model.

During the first quarter nuclear leaders gave an explanation to division personnel on April 2 about the FY2019 business plan. After this briefing, meetings were held at each power station and Headquarters during which each department explained the initiatives it is engaged in in order to cultivate a sense of unity amongst personnel about aiming for a common objective. A questionnaire about the April 2 briefing yielded good results with the satisfaction level of the entire briefing being 89% (last briefing: 90%), and the level of understanding about the positioning of the Management Model being 95% (last briefing: 92%, the questionnaire was given to managers deemed vital for permeation of the Management Model) thereby showing that understanding of the Management Model is spreading. There were, however, those that wish to see improvement in the communication methods employed during briefings, such as strengthening the power of leaders to appeal to workers, and providing more precise answers during Q&A sessions, so these opinions will be reflected during the business plan progress briefing planned for the third quarter.


Business plan briefing (Left: CNO, Right: Briefing room at Headquarters)

(2) Improvement activities by CFAM/SFAM

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. Progress reports are periodically given to sponsors and the Chief Nuclear Officer (CNO), and activities are being furthered while receiving advice and guidance from these parties (since April 2015).

During FY2019 we are treating the strengthening of risk management, permeation of the concept of operational focus, improvements to corrective action programs (CAP) and the development of human error prevention tools as activities for achieving excellence based upon the Management Model.

And, work is being carried out based upon the Fundamentals that stipulate the approach to, and general principles for, engaging in daily duties. We continue to spread and develop the fundamentals throughout the company while also engaging in activities to foster understanding of "Fundamentals for Contractors" and confirm the degree to which the Fundamentals have permeated throughout the organization through management observation.

During the key self-assessment implemented in April we found that performance indicators (PI) are biased towards result indicators in many fields and identified the inability of CFAM to provide sufficient oversight as a problem. In light of this we are deliberating whether or not PIs for each field need to be revised.

The following explains the status of steps taken this quarter in regards to key issues being addressed throughout the entire division.

◆ Enhancing risk management

In FY2018 a systematic mechanism for managing risk was created in order to enhance risk management. During FY2019 we shall provide risk management education and implement effectiveness assessments. During the first quarter provided education in order to increase sensitivity to risk such as by teaching power station employees at Kashiwazaki-Kariwa about troubles that occurred at domestic and overseas power stations and recommendations put forth in the Significant Operating Experience Report (SOER 2015-2 risk management challenges) issued by the World Association of Nuclear Operators (WANO). Going forward we shall develop educational programs, such as providing risk management education to new and transferred employees, as we aim to become an organization that systematically

manages risks while having all station personnel remain highly sensitive to risks.

- Permeation of operational focus (Prioritizing the safe and stable operation of power stations)

In order to support operations, which is the most important functional area of the entire organization, the concept of "operational focus" is being spread while strengthening existing mechanisms to ensure that the requirements of the Operations Division are considered when making operations-related decisions and when setting work priorities.

Since it is expected that workers in the operations area will lead by example and become role models for other functional areas, education that will help the idea of operational focus to permeate continues to be provided. We are also continuing to provide human performance tool training and Operations Management Division managers engage in management observation (MO) to check to see if these tools are being leveraged in the course of daily duties. By observing and giving feedback in regards to weaknesses during education, training, and the application of these tools, we aim to systematically improve operator performance.

We've also engaged in activities to help spread the concept of operational focus amongst employees that do not work in the area of operations. This is being done by providing briefings on operational focus for non-operations field employees given by power station executives and operations CFAM, and engaging them in group discussions that explain the relationship between their duties and operational focus. Furthermore, operational focus-related items have been added to the Fundamentals so that employees can use these operational focus fundamentals as reference when reflecting upon their daily duties thereby cultivating an organization that revolves around operations.

- Improving corrective action programs (CAP)

2.2.2 To be noted in performance improvement (CAP)

- Activities to reduce human error

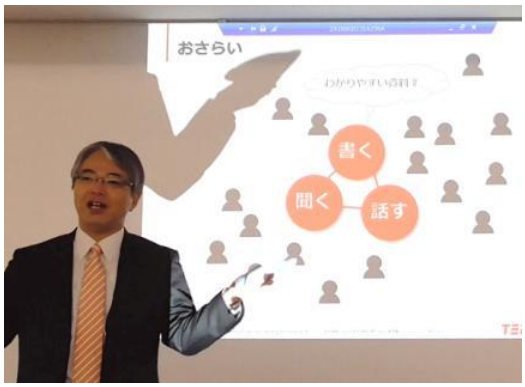
The Nuclear Power Division is engaged in efforts to minimize human error, such as by deepening understanding of human performance tools (human error prevention tools). During the first quarter each power station analyzed the causes of human errors that have occurred and implement countermeasures for these causes, and we began creating educational materials for work team leaders in order to provide education to contractors about human performance tools.

(3) Permeation of the Decommissioning Promotion Strategy

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

Following the second revision to the aforementioned strategy on December 20 of last year,

two large-scale internal forums attended by the FDEC president were held in order to promote and spread information about the strategy, and small-scale mini-forums have been continually held since then. We will continue to revise the strategy and in preparation for the next revision are planning to hold a large-scale internal forum in July or August during the second quarter.

Mini-forum

(4) Strengthening project management and securing human resources

Since the focus of the FDEC is not operation and maintenance, but rather construction projects, it has been using the project system since the company was established in April 2014. The project management system has been gradually strengthened and improvements have been seen, but project management needs to be further enhanced in conjunction with the increasing complexity of decommissioning work. Going forward the FDEC shall make a drastic transition to a project-oriented company by clarifying the responsibility and authority of project managers, employing serious project management methods and management tools, and reorganizing departments. In conjunction with this, we shall secure the human resources needed to support decommissioning over the long-term by training/promoting project managers in a planned manner and securing/cultivating human resources needed for decommissioning over the mid to long-term.

2.1.2 Internal Communication

(1) Communication through dialogue

Briefings on topics thought to be important are given in order to share information and increase internal awareness throughout the company about key issues and problems in each department. In May, a briefing was held on the "TEPCO's state of business operations (2018 Financial Results and 2019 Business Plan)" in light of the announced FY2018 Financial Results. A briefing on our business status is given every year to managers at each power station, but this year the briefing was also given to general employees in order to enable them to accurately understand the harsh business environment that we are currently facing and make them aware of the need for thorough cost reductions (kaizen, etc.) and the recommencement of operation of nuclear power stations. A total of close to 100 people participated in the briefing that was given at Headquarters and each power station, and a post-briefing questionnaire revealed that most of the participants understood what was discussed and felt that it was a good opportunity to learn about the harsh circumstances that the company finds itself in currently. More opportunities will be taken in the future to hold briefings on topics of internal importance.

Internal info sharing meeting (Headquarters main building, May 29)

At Fukushima Daiichi, a 1F Community Square has been set up on the station's intranet. In order to cultivate the ability to look at issues from the perspective of society, in June, a "Liberal Salon" was set up in the community Square to teach about liberal arts. Information about events and books that we want station personnel to know about is put on the site to spread information throughout the station. Five posts have already been made, and people are saying that it is "helpful." We will continue this initiative in an effort to improve internal communication at the power station.

At Fukushima Daini, a "Compliment Square" has been set up on the station's intranet. The bulletin allows station personnel to post short comments about good behaviors they have noticed or things that they are grateful for, and station personnel that viewed the site can click a "like" button to indicate their agreement. 28 posts were made between April and June and a total of 1,118 "likes" were received. Best practices from among these posts and personnel that are referred to often (complimented often) are given a commendation by the Site Superintendent each quarter. This initiative will be continued in the hopes that it will improve internal communication.

At Kashiwazaki-Kariwa, a total of five briefings on the business plan have been given for departments since May 8 in order to convey the FY2019 vision for the power station to each and every worker. A total of approximately 700 people attended these briefings. At the briefing, the Site Superintendent discussed the ideal state that the power station is seeking to achieve during FY2019 and talked about his own feelings while also giving detailed explanations of the instructions and expectations that each general manager has for

department members. Participants commented that, “we’ve never had something like this. I really got a sense of the passion that the Site Superintendent has for these issues. I’m glad I attended.” We will continue to strive to improve internal communication by creating opportunities such as these during which power station executives can convey their own feelings about operations to station personnel in their own words.

Task plan briefing at Kashiwazaki-Kariwa

(2) Using in-house media to share information

In-house media is being used as follows to share the current of the Nuclear Division between TEPCO HD and core company employees.

- Company intranet videos
  - Ibaraki Branch Offices 3.11PJ Project F Activities Report (April 1)
  - Special Advisor Seminar ~Proactively Employing in Kaizen at Fukushima Daiichi~ (April 4)
  - President’s Office Visit Journal ~Fukushima Daiichi Nuclear Power Station~ (April 4)
  - Mr. Hamada “Continuing to Talk about 3.11” (April 15)
  - Special Advisor Procurement Seminar ~Casks and Transformers~ (April 17)
  - Special Advisor Seminar ~Construction to Build a New Emergency Response Center at Kashiwazaki-Kariwa~ (April 22)
  - Tour of Fukushima Daiichi and J-Village given to Representatives from Foreign Embassies (May 7)
  - Special Advisor Seminar ~Good Efforts at Fukushima Daini To Check Work In-House~ (May 8)
  - Welcome to the TEPCO Decommissioning Archive Center(May 9)
  - Mr. Watabe “Continuing to Talk about 3.11” (May 20)
  - Conveying the Facts and Lessons Learned from the Fukushima Nuclear Accident ~The Determination of New Employees~ (May 23)
  - Special Advisor Seminar ~Kaizen Underway at Kashiwazaki-Kariwa Nuclear Power Station~ (May 31)
  - Chairman visits Hamadori and engages in dialogue with personnel at Fukushima Daiichi (June 21)
- TEPCO Group News Letter
  - 13th Decommissioning Project Report Commencement of Fuel Removal from the Unit 3 Spent Fuel Pool (issued in May)

- VOICE~Listening to the Opinions of People from outside the Company　Visit to Fukushima Daiichi by Anna Ogino (issued in May)
- Announcement of Aomori Action Plan, Visit to Higashidori NPS Construction Site (issued in May)

◆ "Messages from Management" sent via the intranet
- Workers in the field, tell me what you think! ~Fukushima Daiichi Nuclear Power Station~ President (April 5)
- Lecture Given on the East Coast in the US　Deputy Chairman (April 24)
- Lecture in Indonesia　Deputy Chairman (May 27)
- Lecture in the UK　Deputy Chairman (April 24)

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.

Internal intranet video stream
(Welcome to the TEPCO Decommissioning Archive Center)

TEPCO Group newsletter
(Decommissioning progress at 1F)

(3) Sharing of information on important tasks

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. During the first quarter we continued to disseminate information while also addressing work issues brought up by readers as part of initiative that began in FY2018.

Examples of information conveyed during the first quarter.
- Information on creation of the "Aomori Action Plan ~ Building, nurturing and moving forward together here" (Plant Siting Division Deputy General Manager)
- Removing Fuel from the Fukushima Daiichi Unit 3 Spent Fuel Pool (Project Planning Department General Manager)
- Current situation in Oguma Town (Fukushima Daiichi Deputy Site Superintendent)

2.2 SAFETY AWARENESS IMPROVEMENTS

2.2.1 Cultivating Nuclear Safety Culture

(1) Improving Safety Awareness【Measure 1】

◆ Direct Dialogue between Nuclear leaders

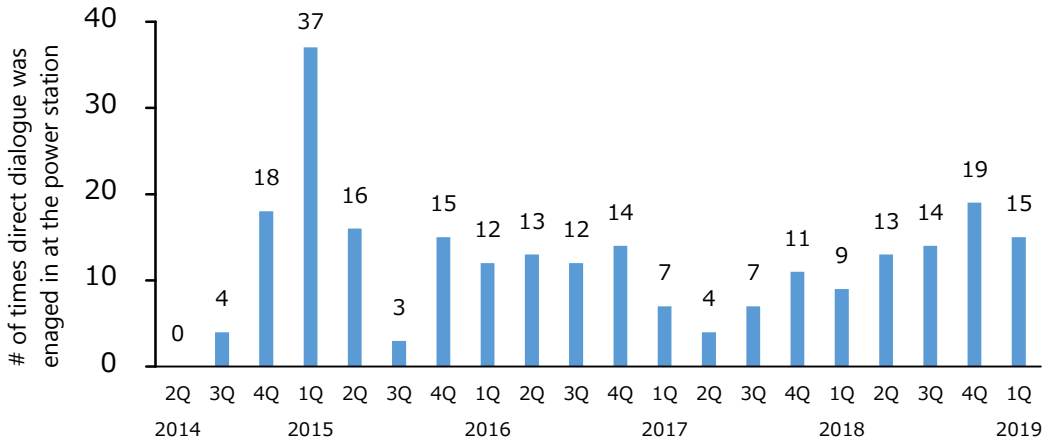
Since the fourth quarter of FY2015, nuclear leaders at Headquarters (General Manager of the Nuclear Power & Plant Siting Division and other Headquarter General Managers) have been visiting power stations to engage in direct dialogue with power station executives (site superintendent, unit superintendents, Nuclear Safety Center director, power station general managers) in order to improve the safety awareness of the entire organization. During the first quarter discussions were held about headquarter and power station engineering functions and about improving law/regulation compliance. (Kashiwazaki-Kariwa: April 24, June 20; Fukushima Daini: May 24)

Executives used case examples from each department to discuss realistic and effective measures for promoting the use of the "Duty and Law Relationship Chart ("12 laws and regulations")," which is an auxiliary work tool created after reflecting upon past legal infractions as well as methods for further strengthening adherence to laws other than the "12 laws and regulations" that apply to work being done in each group. An issue that was brought up is the creation of a database for saving knowledge, such as the experience of veterans, etc., in each department.

Dialogue between CNO and young employees (Fukushima Daiichi)

In regards to engineering functions at Headquarters and power stations, it was discussed how to make design engineering, plant engineering, nuclear safety engineering, fuel management engineering, and procurement engineering as defined in the Management Model a reality. In regards to large-scale equipment infrastructure, while some expressed the idea to concentrate engineering functions at Headquarters to comprehensively manage these functions, others said that engineering function deeply related to equipment operation should be located at power stations. The opinion was also expressed in regards to the location of engineering functions that this matter also impacts the training of human resources that can handle various issues at the power station.

These opinions will be further analyzed and discussions will continue in regards to how to make these engineering functions a reality. Furthermore, the CNO engaged in direct dialogue with the Fukushima Daiichi team leaders and members in order to foster a common awareness about the use of human error prevention tools, the roles of individuals and departments, and the significance of risk management (Fukushima Daiichi: June 27).



Number of times the CNO engaged in direct dialogue with each department

◆ Messages from Nuclear leaders

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

April 22 A Harsh Baptism to Quality Issues (FDEC President)

On Monday of last week, I became the first person from TEPCO to ever attend the Nuclear Regulation Authority's Designated Nuclear Facility Monitoring and Assessment Meeting. As I am in charge of safety and quality, the topic of progress with Unit 3 pool fuel removal pertained to me most.

(omitted)

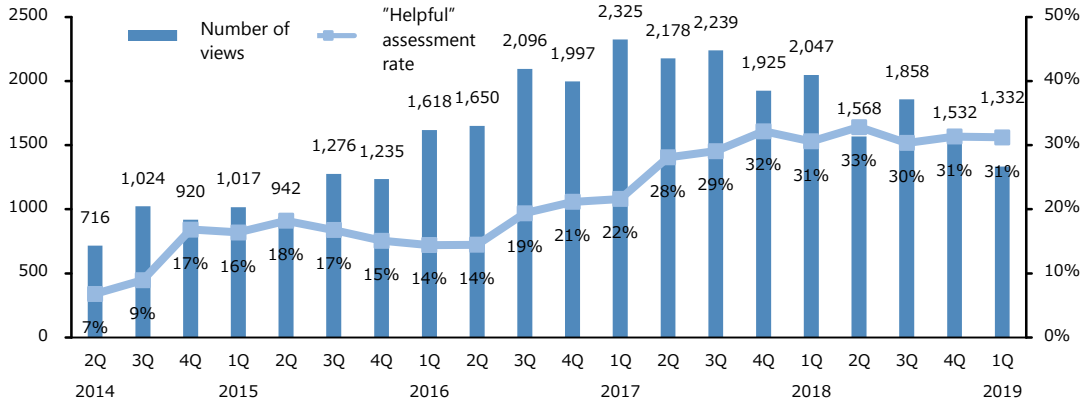
In short, I had thought we had quality issues with items procured from overseas, but it was pointed out that the fact that nonconformances have occurred with equipment that has been manufactured domestically by leading manufacturers raises suspicions that there are problems with quality management as a whole.

(omitted)

We have to consider the unique characteristics of the decommissioning of Fukushima Daiichi. At normal nuclear power stations, quality management systems are constructed by defining quality as equaling safety, which is a relatively simple way of orienting with nuclear safety. In terms of the decommissioning of Fukushima Daiichi, whereas nuclear safety is, of course, of vital importance, we also have to pay attention to quality that has no direct relationship to nuclear safety. This is because the mission of the decommissioning of Fukushima Daiichi is to quickly reduce nuclear risks that have manifested in conjunction with the accident, and having risk reduction measures prolonged as a result of quality issues in turn prolongs a state of high risk, which is a safety issue. Therefore, this issue relates to schedule management and risk management within our program/project management framework.

The more we think about this issue the larger becomes, but it's important that everyone swiftly do what we can while remaining aware of the big picture. Work safely! (rest of

message omitted)



Number of views per message sent via the intranet/"Helpful" assessment rate
(2019Q1 does not include result for March, which was shorter than the viewing period of one month)

◆ Commendations given by the CNO and the President of the FDEC (CDO)

Since FY2015, the CNO and the 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 the CNO and the CDO

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

Period	HQ	F1	F2	KK
FY2015	24(2)	47	19	24
FY2016	25(1)	19	14	25
FY2017	21(2)	5	15	22
FY2018	16(2)	13	16	15
FY2019				
Q1	7	0	3	5

(2) Training for Management/Nuclear Leaders【Measure 1】

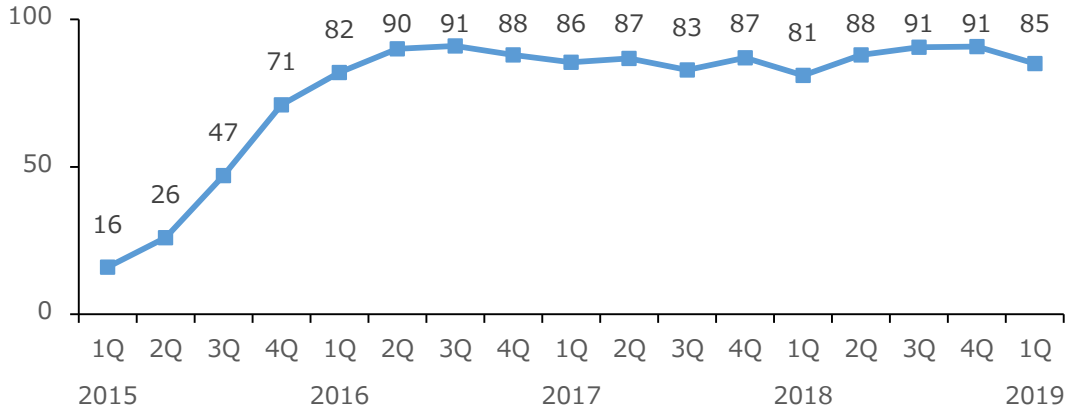
Training is being provided for management so that they have the technical knowledge required in the event of a nuclear disaster. During the first quarter five new executive officers took office in April 2019 and underwent management training (May 25).

During training, the trainees were taught about the causes and countermeasures for the Fukushima Nuclear Accident, and the basic principles of nuclear safety design, and were given knowledge about cultivating nuclear safety culture and nuclear preparedness. Trainees also improved their understanding of nuclear risks through discussions.

FY2019 management training

(3) Reflecting on the Traits【Measure 1】

The Nuclear Power Division engages in activities aimed at making the act of reflecting upon the 10 traits and 40 behaviors (10 Traits) for robust nuclear safety culture a natural occurrence. All Nuclear Power Division personnel use the intranet system to reflect on whether or not they are embodying the Traits. Group discussions are held once every two weeks based on these results and recent performance information in order to deliberate and implement improvement actions as we continually strive to fill in the gaps between the Traits and our own behavior. The major focus of 2019 safety culture cultivation activities is strengthening the link between daily tasks and the Traits, and as part of these activities continuous revisions were made to Internet systems. During the first quarter, questions that allow retrospection about, "were you able to act while being aware of your behavior to abide by laws and regulations?" were added to work planning/management (WP) retrospection in light of law/regulation abidance-related nonconformance countermeasures, and messages from leaders related to this issue were posted in order to further awareness about the link to daily tasks.



Implementation rate of group discussion

(4) Enabling the permeation of nuclear safety culture【Measure 1】

◆ Safety Steering Council

The 12th Safety Steering Committee meeting was held (June 3) in order to ascertain, and make improvements to, the status of achievement of nuclear safety during the second half of FY2018. The meeting was attended by the president, the CNO, Decommissioning and Contaminated Water Countermeasures Chief Director, Safety Promotion Office General

Manager, and the Nuclear Safety Oversight Office Director who discussed assessing nuclear safety based upon the results of nonconformances that have occurred as well as nuclear safety KPI analysis results, and the direction of future improvements. The focus of discussion was the analysis results for the number of nonconformities that have occurred over the past 15 years, and it was confirmed that the annual number of nonconformances is on the decline. Furthermore, high-grade nonconformances are also on the decline, thereby indicating that a certain degree of improvement has been made since the introduction of nuclear QMS. In order to make further improvements going forward, attendees confirmed the importance shifting the weighting of tasks from correction to risk management-focused prevention, and further developing educational programs to teach employees and contractors how to use human performance tools.

2.2.2 Performance Improvements (CAP)

(1) Promoting improvement through CAP【Measure 3】

We aim to make efficient and effective improvements by using CAP to completely manage not only nonconformance and OE information, but also information useful for improving nuclear safety performance (such as management observation (MO) results, benchmarking results, third-party assessment results, near-miss information, etc.), and formulate even more fundamental countermeasures.

During the first quarter, weaknesses were identified and corrective action was continuously implemented in the form of quarterly performance assessments by analyzing and assessing information inputted into CAP for the major fields at Kashiwazaki-Kariwa and Fukushima Daini. Furthermore, when assigning importance levels to nonconformance information, in addition to managing nonconformances as they have been, an attempt was made at Kashiwazaki-Kariwa to categorize information while focusing on nuclear safety. (To be put into full-scale operation next fiscal year)

(2) Improvements through Management Observation【Measure 2】

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

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

	1F	2F	KK
# of times implemented	1,004	750	1,147
# of times per month per manager	3.6 times/month/person	4.1 times/month/person	3.5 times/month/person
Good MO rate＊	–	82%	63%

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

(3) Improvement through benchmarking

◆ Radiation control

Radiation Control Department CFAM visited the St. Lucie Nuclear Power Plant and the Monticello Nuclear Generating Plant in the U.S. and engaged in benchmarking with a focus on the remote monitoring system being used at Fukushima Daiichi, the state of ALARA activities, and radiactive substance control. At the power stations, concentrated remote monitoring systems were used when engaging in high-dose rate work as a communication tool and to remotely monitor exposure doses of workers in order to reduce exposure. Each and every worker engaged in their tasks while being aware of radiation exposure and a high awareness of ALARA activities was observed throughout the entire power stations. Furthermore, initiatives to minimize radioactive substances and to strictly manage high dose rate areas were also observed. Best practices will be proactively employed at TEPCO facilities.


Monticello Nuclear Generating Plant (Left: Field tour (reactor building), Right: Opinion exchange)


Remote monitoring system (Left: Monticello Nuclear Generating Plant, Right: St. Lucie Nuclear Power Plant

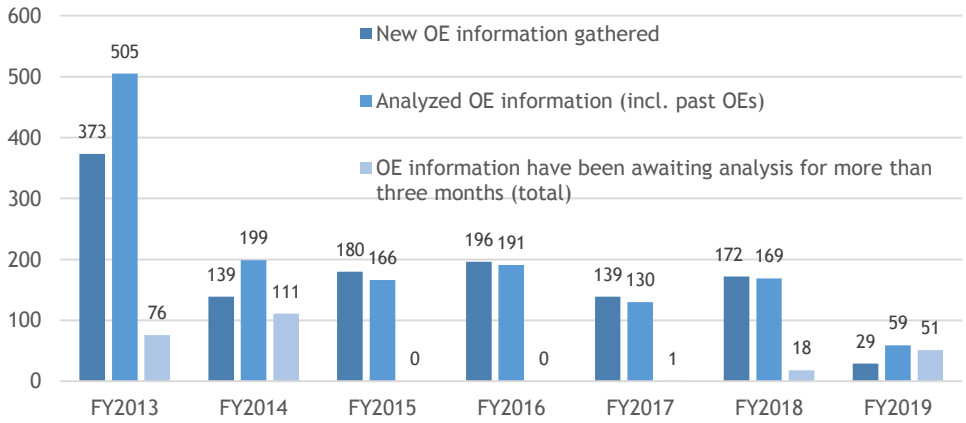
2.2.3 Leveraging Operating Experience【Measure 3】

In regards to leveraging operating experience, at its meeting held on April 3, the Nuclear Regulation Authority determined "insufficiencies with preventive measures at Headquarters identified at the Fukushima Daini Nuclear Power Station" during the third safety inspection of FY2018 constitute a safety regulation infraction. Further cause analysis of these infractions is underway and countermeasures are being implemented.

(1) Gathering and sharing OE information

One of the lessons learned from the Fukushima Nuclear Accident is that we must "learn from the failures of others." Lessons to be learned are being identified and countermeasures deliberated/implemented under the premise that something that has occurred somewhere else in the world can also occur at TEPCO power stations. Prior to the Fukushima Nuclear Accident, the gathering of operating experience from within and outside of Japan, and the deliberation of countermeasures, were put off. Therefore, efforts are being made to promptly engage in these activities and enable everyone in the Nuclear Power Division to leverage this information.

During the first quarter, 29 pieces of OE information were newly gathered, and 59 pieces of information, including OE information gathered in the past, were analyzed. Furthermore, the results of a detailed investigation into the past OE information from inside the company performed in light of the third safety inspection of FY2018 revealed that 42 new pieces of information need to be processed, and 51 pieces of OE information have been awaiting analysis for more than three months.



OE data gathering and analysis performance trends

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

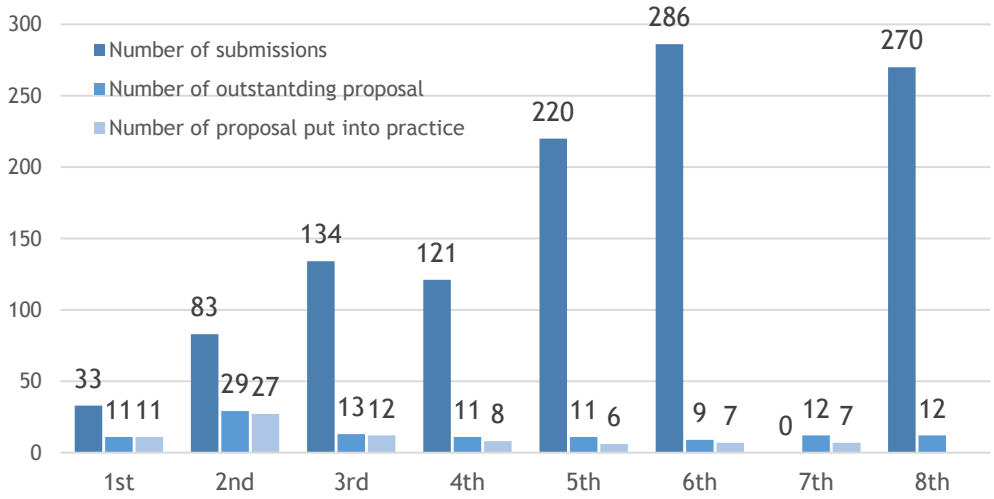
2.2.4 Improving the Ability to Propose Defence-in-Depth Measures (Risk Management)

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

◆ The status of competition initiatives

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. In order to encourage safety improvement efforts, the people who made proposals that were selected as outstanding proposals during the eighth competition were given a commendation along with local specialties from Fukushima. The ninth competition is being planned for FY2019, and we will begin accepting proposals during the third quarter.

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



Number of submissions to the Safety Improvement Proposal Competitions/Number of outstanding proposals/Number of proposals put into practice
(Note 1: During the 7th competition we conducted a repechage for unselected proposals so the number of new proposals submitted was 0.)

◆ Outstanding proposals that have been put into practice

During the first quarter one outstanding proposal from both the 2nd and 6th competitions were put into practice as noted below.

- Creation of emergency diesel generator repair procedures that utilize substitute heat exchangers (Kashiwazaki-Kariwa)

Procedures were created to connect emergency diesel generators to substitute heat exchangers in order to secure enough coolant for generator operation in the event of a loss of all AC power and final heatsink functions, thereby enabling the emergency diesel generators to be used to restore power.

- Implementation of reactor coolant injection shutdown tests in order to optimize prioritization procedures during an emergency (Fukushima Daiichi)

In order to improve and optimize prioritization procedures during an emergency, the Unit 2 reactor coolant injection system was shut down for approximately eight hours and the temperatures inside the primary containment vessel and the reactor pressure vessel were monitored to observe the cooling status of fuel debris.

Field check of reactor coolant injection systems

Main Control Room

Reactor coolant injection shutdown tests implemented to optimize task prioritization during emergencies

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

We have created approaches to, and mechanisms for, accidents and hazards that have high "cliff-edge potential" (Potential for a calamitous situation resulting from a simultaneous and wide-scale loss of function caused by common factors) and are engaged in proposing and implementing countermeasures under the assumption that these accidents will occur.

During the first quarter training on how to respond to a power loss caused by an electromagnetic pulse from a high-altitude nuclear explosion was implemented at Kashiwazaki-Kariwa. Refer to 2.4.1 Strengthening Technological Capability (during times of emergency) for details.

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

It is important to identify plant vulnerabilities using risk information, such as knowledge obtained through probabilistic risk assessments (PRA) and maintain/improve plant safety by implementing security measures to make up for these vulnerabilities.

During the first quarter an action plan that leverages risk information was deliberated and compiled. We are currently examining detailed measures for making this plan a reality. For example, we will use PRA results to identify equipment and operations that are important for nuclear safety, and help to improve technological capability by educating the Operations and Maintenance Divisions on this subject. In addition, we are examining how to improve the reliability of operations by reflecting information on important operations in operations procedures. And, we shall implement equipment maintenance by leveraging the latest risk information and focusing on important equipment.

2.3 IMPROVING THE ABILITY TO PROMOTE DIALOGUE

2.3.1 Communication with the Siting Community【Measure 4】

(1) Activities in the Fukushima region

◆ Providing information that is easily understood

- Decommissioning Archives Center

As of May 21, 20,000 people have visited the TEPCO Decommissioning Archives Center, which opened on November 30, 2018. This greatly exceeds our original expectations of 20,000 visitors per year and as of May 21, 20,134 people had visited the archives. Out of this number, 14,294 were "general visitors" and 5,840 were tour participants who had visited the archives either before or after taking a tour of the Fukushima Daiichi.

The exhibits at the TEPCO Decommissioning Archives Center are updated approximately once every six months in conjunction with the progress of decommissioning, and during the second quarter we plan to add videos taken in February during the internal exploration of the Unit 2 primary containment vessel when an attempt was made to make direct contact with sediments assumed to be fuel debris (molten fuel that has solidified). Going forward, the videos and display panels will be used to proactively convey the facts of the Fukushima Daiichi Accident and disseminate information in a timely manner in accordance with the progress of decommissioning.

1st Floor exhibit
(Decommissioning Archive: F Cube)

2nd Floor exhibit
(Memories and records/Regrets and Lessons learned) Theater Hall

◆ Communication with stakeholders

- Fukushima Daiichi tours

At Fukushima Daiichi many visitors from the siting community, educational institutions and overseas have been able to deepen their understanding of the decommissioning process, fuel debris, and the work environment through tours of the site. On May 14, 16 students from the literature department at Keio University were given a lecture on the Fukushima Daiichi accident and the current state of progress after which they were given tours of the Fukushima Daiichi and Fukushima Daini on June 1 and June 3, respectively. This was done as part of the "Society and Emotions in the Wake of the Great East Japan Earthquake and Tsunami" class

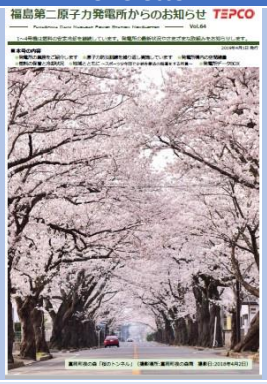
that Keio University professors Anna Ogino and Juko Ando taught for the first time in FY2019. The objective is to deepen the students' understanding of the decommissioning process by actually having them visit the site and study about the incident in advance in order to enable them to identify things that should be learned from the accident. After the tour students commented that, "the radiation levels were lower than what I had imagined. I feel like the most dangerous thing is making unfounded assumptions."

Inside PCV of 2F Unit 4

◆ Press conferences

	HQ	Fukushima Daiichi		Fukushima Headquarters
Name of Press Conference	Nuclear Safety Reform Plan Progress Report	Regular press conference	Mid/Long-Term Roadmap press conference	Revitalization Headquarter President press conference
Date	May 13	Every Monday and Thursday	April 25, May 30, June 27	April 23, May 28, June 25

◆ Published Info Magazines

	Hairomichi	Monthly 1F	Fukushima Daini Newsletter
			
Release Date	April 10, June 10	April 26, May 29, June 28	April 1, June 3
Circulation	Approx. 35,000 copies	Approx. 500 copies	Approx. 14,000 copies
Overview	The future of decommissioning work Living with radiation Efforts to reduce risks associated with contaminated water leaks Introduction of young employees	・1F today ・Dedication to safety ・The people that protect 1F ・Fukushima Quiz	・Introduction of work underway at the power station ・New employee training update ・J-Village total reopening

(2) Activities in the Niigata area

◆ Providing information that is easily understood

We have begun airing television and radio commercials that talk about communication booths in order to inform as many people as possible in the prefecture about the activities we are engaged in to hear the opinions of the people. People that have visited the booths have commented that, "I happened to see the commercial on TV and found out you were doing this nearby." We will continue to engage in PR activities through various forms of media to let as many people as possible know about TEPCO's efforts.

Example of VR content video

Communication booth commercial

◆ Communication with stakeholders

- Communication booth activities

TEPCO set up a communication booth during the "Peach Flower Viewing Festival: April 14" held by Kariwa Village in the spring (visitors: 141). Visitors to TEPCO communication booths last year commented that, "we'd like you to continue activities to engage in dialogue with the local residents and enlarge our regional community," so this year in addition to using virtual reality (VR) to explain the safety measures being implemented at the power station, we also had a hand-powered generator at the booth for visitors to try. Questionnaires filled out by visitors to the booth showed a 96% satisfaction rate. Town office employees from Kariwa Village commended our efforts saying, "it was innovative, and visitors to the TEPCO booth looked like they were having fun, which is the most important thing. It was a good idea."

In the Kashiwazaki region, a communication booth was set up during the "Kashiwazaki Wind Camp: May 25/26," which is attended/run by many Kashiwazaki City residents and marks the beginning of the tourist season. After giving explanations of the safety measures being implemented to members of the local community and event attendees from both within and outside of the prefecture, some commented that, "the VR made it feel like I was really at the power station. I'd like you to do more activities that brings TEPCO closer to the community." We will continue to engage in activities to foster understanding while considering the areas of concern of local residents.

In the Niigata Prefecture region, we set up new communication booths in three areas (Agano City, Kamo City, Itoigawa City) during the first quarter. At the booth in Agano City we had a new area where we explained TEPCO's efforts to conserve the Oze region. Along with explaining the allure of Oze by using picture boards and backdrops that symbolize the natural

environment of Oze, we also explained the history of TEPCO's natural conservation efforts in Oze as an example of how we are involved in activities in Niigata Prefecture that don't related to our nuclear power stations. Visitors to the booth commented that, "I didn't realize that TEPCO was involved in conservation efforts in Oze," and, "I'm glad you told me this, I've been wanting to go to Oze."

To date we have set up 57 booths in Niigata Prefecture that have had a total of 11,990 visitors. We shall continue these initiatives and reflects the comments and desires we have heard from the people in TEPCO's operations.

Explaining natural conservation activities in Oze

Oze panel display

Areas in which booths have been set up

- Golden Week events in Service Hall

Service Hall events held over Golden Week were attended by 3,848 people over four days who participated in activities to promote understanding, such as guided tours of the power station. In response to visitor requests, the petting zoo invited last fiscal year was asked back this year and the number of visitors exceeded last year by 850 people. Tourist attractions were put on each floor of the exhibit hall, where a 1/5 size model of a nuclear reactor is on display, and 645 people came to the virtual reality area. Furthermore, a different riddle was presented each day as a way to get first-timers and repeat visitors to understand the need for nuclear power. 450 people participated in the guided tours of the power station. And, in outdoor facilities, the Nuclear Waste Management Organization of Japan (NUMO) set up a mobile exhibit called the, "SS Geo Mirai (3-D communication theater)" that was used to explain the geological disposal of reactor waste to 674 people who visited the theater.


Communication booths at regional

Golden week events in Service Hall

According to a questionnaire, 90% of visitors were satisfied with the event, and more than 70% indicated positive feelings towards TEPCO. Approximately 30% of the visitors were first-timers, so it was a good opportunity to get more people to learn about TEPCO initiatives. We will continue to strive to hold fun events during which visitors can deepen their understanding of nuclear power.

◆ Press Conference Stats

	Niigata HQ	Kashiwazaki-Kariwa
Name	Niigata HQ President's press conference	Kashiwazaki-Kariwa Superintendent's press conference
Date	June 6	April 11, May 16, June 13

◆ Info Magazine Stats

	News Atom	
Date of Issue	April 7, May 12, June 2	
Circulation	Approx. 32,000 copies	
Overview	Monthly power station news Update on nuclear monitor activities Introduction of new employees at Kashiwazaki-Kariwa	

(3) Activities in the Aomori region

◆ Establishment of Aomori Office

An Aomori Office was newly established on July 1 as an organization that will implement the Aomori Action Plan created in March. And, a Higashidori Head Office was established in Higashidori Village in order to strengthen efforts to engage in business from the perspective of the local community. Having Headquarter functions in Aomori will enable quick decision-making and enable Headquarters to become one with construction contractors thereby enabling us to promote grassroots nuclear-related initiatives and contribute to the continued expansion of the region.

The Aomori Office and Mutsu Office, which will be newly established, will enable us to further develop activities to foster understanding in an effort to disseminate information as we strive to build trust with regional residents. Each and every employee shall listen earnestly to the various opinions and requests of the people as members of the community themselves, as we "build," "nurture," and "move forward together."

◆ Providing information that is easily understood

- Creation of Aomori Office website

In conjunction with the establishment of the Aomori Office we have added a page to the TEPCO website for the office (July 1). We will also post information about the Aomori Office on Facebook and strive to proactively convey information that is easily understood through not only our activities to engage in dialogue with the community, but also our website and social media platforms.

◆ Communicating with stakeholders

- Visits to all households

In May, all station personnel participated in visits to all homes in Higashidori Village, the siting community, which consists of approximately 2,300 residents, companies, and stores. This is done to foster understanding and cooperation about our daily activities as well as express our feelings of gratitude and convey information about the progress of work being done. Additionally, the visits are used to reflect the opinions of the local community in our own business operations. During the visits in May, explanations were given about the Aomori Action Plan announced at the end of March, and the Aomori Office that was established in July. And, our PR magazine "Yukishiromizu," which was issued at the same time that the visits were made, was used to explain the progress of geological surveys that have been implemented since last year. Residents expressed their gratitude for, "always bringing us a copy of Yukishiromizu," and some also said that, "the nuclear power station should be restarted as quickly as possible," thereby expressing expectations for progress with TEPCO's business. As we continue these biannual visits, we hope to build trust with the region and, "proactively disseminate information and engage in dialogue while taking more independent action," which is one of the pillars of the Aomori Action Plan.

Explanations to local residents

◆ Issuing of informational magazines

	Yukishiromizu	
Date of Issue	April	
Circulation	3,200 copies	
Overview	Information on the progress of geological surveys, Creation of the Aomori Action Plan, Establishment of the Aomori Office and an overview of preparations to be done in the surrounding area in FY2019	

2.3.2 Communicating with overseas partners【Measure 4】

(1) Communication activities by management

The Deputy Chairman gave lectures about the current conditions in Fukushima and the lessons learned from the nuclear accident. During the first quarter, lectures were given in the United States (Harvard University, Massachusetts Institute of Technology, Columbia University (April 16-18)), Indonesia (East Asia/ASEAN Economic Research Center (May 16)), and the UK (EDF Energy, Oxford University, Cambridge University (May 22-23)). A total of 450 people attended the lectures in all three countries with students, professors, general visitors and members of the press attending in the United States, university officials and economists

attending in Indonesia, and mainly students and professors attending in the UK. Following the lecture many questions were asked and a lively exchange of opinions ensued. One attendee commented that, "it's wonderful that you have a leader that can emphatically talk in his own words about the accident, which is of concern to so many people in the world." We will continue to be innovative in how we convey the current conditions at Fukushima Daiichi while considering the countries/regions that lectures are given in as well as the concerns and interests of the people listening.

Lecture at Columbia University in the US

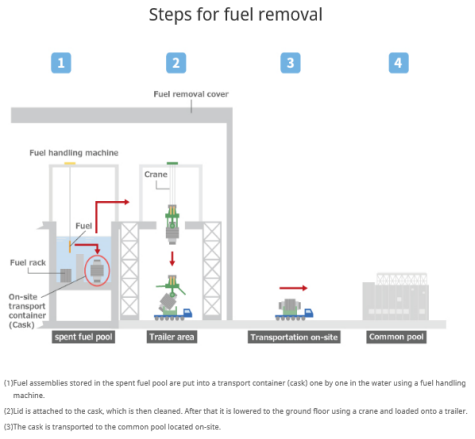

Lecture in Indonesia

(2) Disseminating information overseas

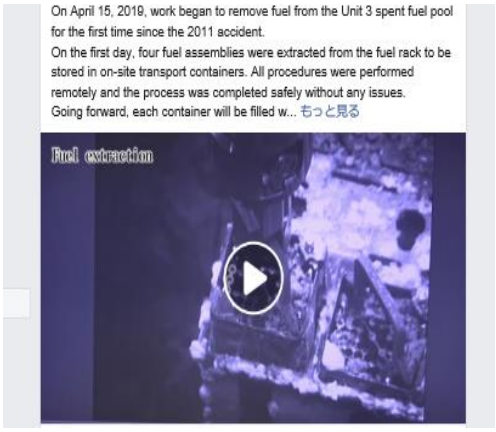
◆ Conveying information that is easily-understood

- Disseminating information via press releases and social media

In an effort to proactively disseminate information we continue to convey information through English press releases, social media platforms, such as Facebook and Twitter, etc., and email magazines were sent to overseas media outlets and intellectuals. During the first quarter, 16 press releases and two email magazines were issued, nine posts were made to Facebook, and 11 tweets were made on Twitter. Particular efforts were made to foster understanding amongst as many people as possible when the removal of fuel from the Fukushima Daiichi Unit 3 spent fuel pool commenced by using diagrams on our website to explain the procedure in addition to conveying information via announcements and email magazines. We will continue to disseminate information at appropriate times while paying attention to the concerns of overseas media outlets and trends concerning the attitude of overseas media towards TEPCO.



TEPCO Website



English posts on Facebook

2.4 IMPROVING TECHNOLOGICAL CAPABILITY

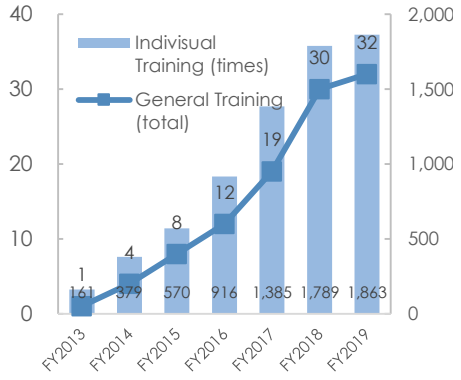
In light of our inability to examine current equipment and work processes and make improvements on our own even though initiatives to improve technological capability have been underway, we have commenced efforts aimed at further improvement.

2.4.1 Strengthening Technological Capability (during times of emergency)

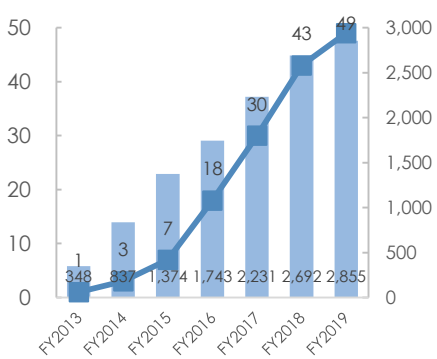
(1) Enhancement of Power Station and Headquarter Emergency Response (Organizational) Capabilities【Measure 5】

In the results of training assessments for each nuclear power station by the Nuclear Regulation Authority conducted during FY2017, 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 this harsh assessment and training has been repeatedly implemented. The Nuclear Regulation Authority's preparedness training assessment results (announced on June 28) gave all A-ratings (10 categories) to Kashiwazaki-Kariwa, which started implementing the aforementioned improvements quickly. And, Fukushima Daini and Fukushima Daiichi received A's in nine and eight categories, respectively, thereby showing great improvement over FY2017. We shall not let ourselves be content with this assessment, but rather implement further improvements, such as increasing the number of personnel with honed emergency response skills, as we pursue excellence.

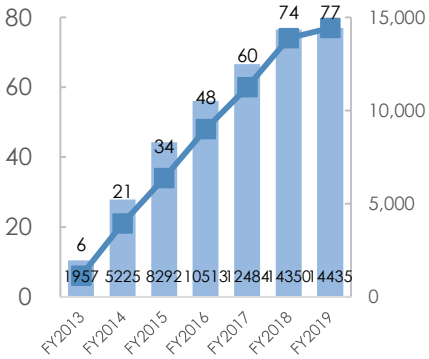
Training was performed at each power station as follows:



1F



2F



KK

◆ Fukushima Daiichi; First Quarter General Training: May 27, June 24

The training implemented during FY2018Q4 based on the scenario of responding to an emergency caused by a tsunami resulting from an earthquake originating along the Kuril-Kamchatka Trench was implemented again in order to hone skills further. This training placed emphasis on "proposing strategies and tactics to respond to field conditions after a tsunami." As a result, trainees were able to respond after the large tsunami alert was withdrawn while prioritizing safety, such as conveying to all personnel precautions related to worker safety and radiation safety that needed to be taken prior to heading out into the field. On the other hand, problems were seen with the process leading up to setting objectives during the objective setting meeting, at which power station strategies and tactics are to be determined, so improvements will be made to explain objective setting meeting procedures in more detail.

Emergency Response Center
(Fukushima Daiichi)

◆ Fukushima Daini; First Quarter General Training: April 4, April 25, May 20, May 29, June 12, June 27

Training on April 4 was conducted at the emergency response center (ERC) located on high ground based on a scenario in which a large tsunami alert had been issued in conjunction with an enormous earthquake. In response to a simulated loss of sea water cooling system function as a result of the tsunami, trainees responded by switching over to substitute means for cooling the spent fuel pool. Each functional team took actual action in the field, such as performing simple diagnoses of corporate office buildings, using monitoring cars to assess environmental radiation levels, and flying drones to inspect field conditions. Additionally, limitations were put on methods for conveying information between the ERC and each functional team (PHS: unusable/radios: usable) in order to train on conveying information using various means of communication. Furthermore, in order to improve the skill of ERC members, team leaders and above were divided into three teams that participated in repetitive training on scenarios based on the Tsunami Accident Management Guide. Each of the groups assessed the training of the other groups and the results will be given as training feedback during the next training session.

Emergency Response Center on high ground (Fukushima Daini)

Field checks using drones

◆ Kashiwazaki-Kariwa; First Quarter General Training: April 19, May 24, June 7

The "proficiency training on basic scenarios (two continuous sessions, one set)" that has been implemented since December of FY2018 concluded during general preparedness training conducted in April and May, and the emergency response skills of ERC members other than teams that participated in FY2018 emergency response drills was greatly improved. Trends in the lack of understanding and communication mistakes of response personnel that participated in proficiency training shall be assessed and the results used when creating future preparedness training scenarios and to create procedural rules thereby continually fostering skilled personnel and enhancing our response capabilities.

During general preparedness training on June 7 at Kashiwazaki-Kariwa, training was held for the first time on responding to a high-altitude electromagnetic pulse (hereinafter referred to as, "HEMP"), which is a crisis scenario. According to the scenario employed, the HEMP caused a loss of all AC power to Unit 7, which was in operation, and trainees had to respond to a shutdown of coolant injection pumps and a loss of cooling functions to all the spent fuel pools while multiple pieces of electronic equipment and communications equipment were rendered unusable, and without knowing whether or not the reactor had scrammed. In the emergency response center, the HEMP was simulated by turning off the lights and limiting communications equipment that could be used, which helps to identify problems when responding amidst such conditions. Problems were seen with a lack of materials/equipment, methods for evacuating personnel off-site, and methods for communicating with other departments, so improvements will be made in preparation for the next HEMP training.

Emergency Response Center in the wake of a HEMP (Kashiwazaki-Kariwa)

Reactor scram check test during HEMP (Field deployment)

◆ FY2018 preparedness training assessment results

The Nuclear Regulation Authority's FY2018 preparedness training assessment results (announced on June 28) gave all A-ratings (10 categories) to Kashiwazaki-Kariwa, which had received a "C" assessment in regards to sharing information with the Nuclear Regulation Authority in the FY2017 assessment. Fukushima Daini received A's in nine categories and a "B" for "diversity and level of difficulty of scenarios." Fukushima Daiichi received A's in eight categories and "B's" for "leveraging tools to share information," and "diversity and level of difficulty of scenarios," thereby showing great improvement over FY2017. We shall not let ourselves be content with this assessment, but rather implement the following measures as we pursue excellence.

- Increase the number of experienced emergency response personnel
- Conduct emergency training that simulates simultaneous disasters at both the Fukushima Daiichi and Fukushima Daini
- Improve COP to improve ease-of-use
- Clarify the objectives of each training session and implement post-training reviews to confirm the level of achievement of objectives
- Improve the reliability of information transmission systems by promoting the use of information technology for information sharing tools

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

◆ Fukushima Daiichi

Since FY2014 Unit 5/6 operators have been trained on the use of fire trucks and power supply trucks. As of the end of June, 39 people had been trained on fire trucks thereby fulfilling our goal of 31 certified personnel (80% of field personnel (39 workers) (one person increase over quarter four)), and 38 people had been certified on the use of power supply trucks (see the chart below for details). Acquiring skills needed to manage the operation of reactor cooling water injection equipment and contaminated water treatment equipment has been prioritized for Unit 1~4 equipment operators and water treatment equipment operators.

◆ Fukushima Daini

Training on fire engines and power supply cars commenced in FY2014. As of the end of June, 29 operators have been certified on the operation of fire engines thereby meeting our 29-operator goal (80% of the 36 operators in the field (increase of three operators over quarter four)), and 30 operators had been certified on the operation of power supply cars (see the chart below for details). During the first quarter we held another field skill competition (June 21) for auxiliary operators, which were started during FY 2018. The field skill competition is intended to increase the level of professionalism and maintain/increase operator skill/motivation by having participants compete to solve common technical issues (confirm that procedures and human error prevention tools are being used correctly through field checks and that participants can determine whether or not the status of a piece of equipment is good or bad), and commending individual competitors that excel in such tasks.

Field operations competition

◆ Kashiwazaki-Kariwa

Fire engine and power supply car operation training commenced during FY2013. As of the end of June, 108 operators have been certified on the operation of fire engines thereby exceeding our 98-operator goal (80% of the 123 operators in the field (decrease of ten operators since the fourth quarter)), and 102 operators had been certified on the operation of power supply cars (see the chart below for details). As of the end of June, the number of instructors in shift departments was 143 (decrease of six since the fourth quarter) thereby achieving first quarter goals. Also, a field operations competition for auxiliary operators like the one that was held first at Fukushima Daini is also planned for the second quarter. Operators from each unit competed in common field tasks, such as pre-startup checks after pump inspections, in order to learn points for improvement thereby maintaining/improving and standardizing field skills.

Power Station	Fire Engines		Power Supply Trucks	
	No. of certifications (comparison with last quarter)	Fill rate	No. of certifications (comparison with last quarter)	Fill rate
1F	39 (+1)	126%	38 (±0)	123%
2F	29 (-4)	100%	30 (-2)	103%
KK	108 (-5)	110%	100 (±0)	102%

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

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

◆ Fukushima Daiichi

We are continually implementing training on responding to a loss of on-site power (cooling water injection equipment operation training, such as training on the operation of power supply cars, emergency generator operation training, and concrete pump truck operation training) in order to improve the ability to respond to emergencies. During the first quarter repeated emphasis was put on power supply truck operation training in order to ensure that on site power sources can be secured in the event of a loss of external power. Furthermore, during concrete pump truck operation training, skills needed in an emergency were maintained by practicing extending and retracting the outriggers on the truck as well as raising and lowering the boom, which are tasks that need to be completed before coolant can be injected.

Outrigger extension/Retraction operation training

Boom extension/retraction operation training

◆ 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). During the first quarter we improve awareness about in-house emergency response training by confirming procedures and the objectives of training with all teams during classroom study in order to return to the fundamentals in light of the increase in the percentage of response personnel accounted for by transferred and new employees. We will continue to implement innovative and creative training so as to be able to flexibly respond amidst various conditions.

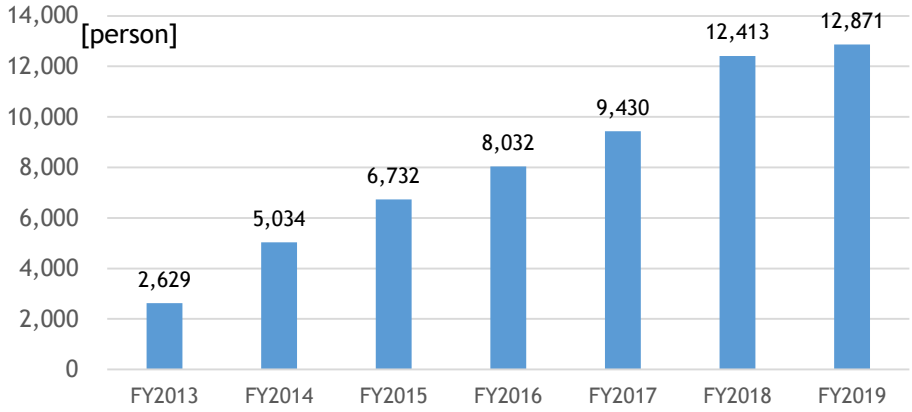
◆ Kashiwazaki-Kariwa

In order to improve in-house technological capability to prevent severe accidents from happening, we implemented various types of training, including training on switching circuit breakers, connecting high-voltage/low-voltage cables, operating mobile cranes, and assembling/disassembling scaffolding. During the first quarter, we aimed to improve skills related to the operation of mobile cranes, which are frequently needed during times of emergency to lift heavy objects, and the assembly/disassembly of scaffolding to ensure that these tasks can be performed without errors and while, in particular, paying attention to

safety in the vicinity. We will continue to implement repetitive training in order to maintain and improve in-house technological capability.

Mobil crane operation training

Scaffold assembly/disassembly training



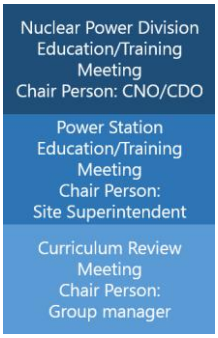
Trends in the number of maintenance personnel that have undergone in-house training (Total for 1F, 2F and KK)

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

(1) Improving 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

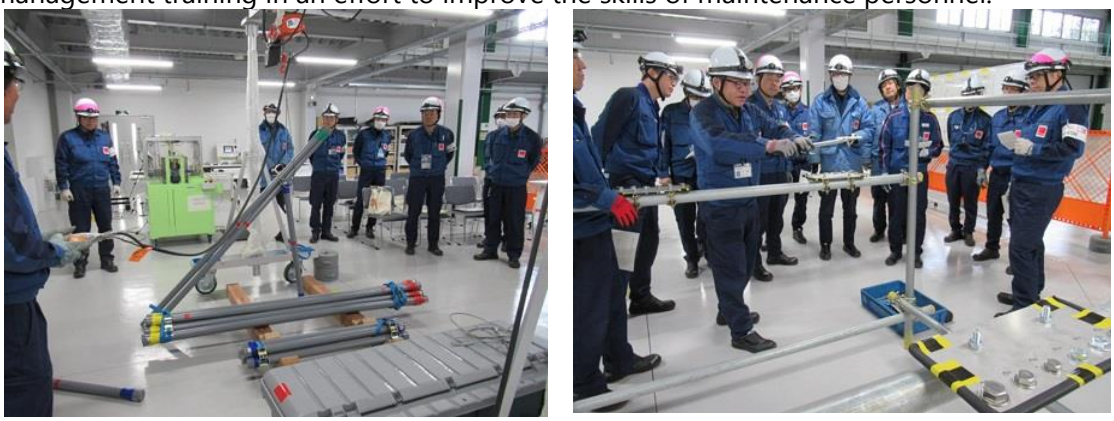


Tiered review committees

Committee, and Curriculum Review Meeting. These three bodies effectively put education and training programs through the PDCA cycle based upon SAT.

At the curriculum review meetings for each area, such as operations and maintenance, etc., key issues related to education training that need to be solved in order to improve power station performance during FY2019 were identified. Going forward, the progress of initiatives to deal with these key issues will be checked during curriculum review meetings and each primary power station department shall work together with the Nuclear Human Resource Training Center in an effort to improve performance in each area. Furthermore, a standard format will be used for curriculum review meeting and power station education/training meeting agendas to ensure that important topics are not left undiscussed.

In the Maintenance Division, more effort is being put into education and training aimed at preventing human error and equipment nonconformances. At Fukushima Daini and Kashiwazaki-Kariwa, we continue to offer human factor/human error prevention tool training and skill training on foreign material exclusion (FME) for Maintenance Division personnel that act as work foremen, and since March we have been implementing slinging/torque management training in an effort to improve the skills of maintenance personnel.



Hoisting (left) and torque management (right) training (Kashiwazaki-Kariwa)

◆ Training for nuclear leaders and middle management

Since FY2015 training has been provided for middle managers in order to accelerate nuclear safety reforms and reconstruct the roles and mission of general managers in charge of departments with as many as 250 people. During power station general manager training, general managers that have been in their positions for two years or more identified issues that need to be resolved at each entire power station, and by the entire power station, after undergoing training in October 2018. For six months teams worked to solve these issues, and reports on the results were given in May. During Headquarter group manager training in May, 16 Headquarter group managers that had not undergone training participated in order to deepen their understanding of the expectations of TEPCO leadership and management through lectures and discussions. Participants divided into teams to identify common issues that need to be solved by both the Nuclear Power & Plant Siting Division and the FDEC. The teams worked to solve these issues for two months and reported their results in June.

Power station GM training report meeting

HQ group manager training report meeting

◆ New employee training

After going to general training for all companies, new employees hired during FY2019 were assigned to Fukushima Daiichi (38 employees), Fukushima Daini (15 employees) and Kashiwazaki-Kariwa (47 employees). After receiving their assignments, the new employees are sent to the Nuclear Human Resource Training Center where they learn about nuclear safety, radiation safety, work safety, basic theory, and acquire knowledge about plant equipment and facilities. Following their time at the Training Center, new employees are then subjected to field training and shift training where they learn skills that are more applicable to actual situations and aim to improve individual technological capability.

New employee training (Left: Fukushima Daini, Right: Kashiwazaki-Kariwa)

◆ Initiatives aimed at acquiring advanced expert knowledge

Pre-exam group training and group study sessions are held to support those looking to pass the licensed reactor engineer exam. Two people passed the written portion of the licensed reactor engineer exam in March.

(2) Training on an actual reactor at a PWR plant

In the Operations Division, operators are sent to domestic PWR plants in operation as part of “real reactor training” so that they can directly experience and cultivate a sense of what it feels like to work at a plant in operation. This training is a valuable opportunity for young operators, in particular, who have little experience working on a plant in operation.

Five operators from the Operations Division at Kashiwazaki-Kariwa participated in real reactor training at the Kyushu Electric Genkai Nuclear Power Station (February) and the Shikoku Electric Nuclear Power Station (June). Trainees were able to use their five senses to experience the heat, sound, vibrations, and smells from equipment and systems, something that is impossible to experience at a plant in long-term shutdown. At the same time, trainees also observed patrol inspection methods at other companies, mechanisms for implementing various periodic tests, and took notice of the differences in procedures, etc., and best practices. There were also opportunities to engage in discussions with operators from the other companies about the difference in their methods and approach to their duties, thereby providing an opportunity for mutual

Opinion exchange with operators from other electric companies during real reactor training (Shikoku Electric Ikata Nuclear Power Station)

Real reactor training will be continually implemented into the future and the useful information and know-how obtained this training shall be shared internally, reflected in operational duties, and leveraged to make improvements.

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

In order to promptly and safely stabilize a reactor when there is an emergency, personnel need to quickly ascertain the circumstances of the accident and make accurate decisions. Therefore, engineers are being trained to be proficient in design, laws and regulations, standards, operation, maintenance and other areas pertaining to facilities important for safety. System engineers formulate system monitoring programs, which stipulate monitoring targets and standards for monitoring system performance degradation, in order to monitor whether or not primary plant systems are fulfilling design requirements. These monitoring activities also serve to identify areas in which reliability can be improved, which leads to overall improvements.

There are currently four system engineers at Kashiwazaki-Kariwa that monitor 22 systems at both Units 6 and 7, and there have been no abnormalities with system performance. During the first quarter, education and training was continued in order to confirm the skills of four new system engineers with the aim of adding three systems to be monitored. We will continue to increase the number of systems being monitored and secure/train personnel with the objective of assigning five system engineers to each operational plant.

Currently at Fukushima Daini four system engineers continuously monitor six systems at each of reactor units 1~4 and there have been no abnormalities with performance.

(4) Enhancing configuration management【Measure 6】

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

equipment schematics all match.

Design management documents important for constructing configuration management processes are being prepared sequentially with a focus on systems that are very important for safety and during the first quarter documents pertaining to the main control rooms, reactor buildings, and eight systems, such as the emergency AC system, were created.

In regards to systems that support the use of configuration management processes, during the task simulation we conducted last fiscal year we found areas of need of improvement with both processes (task manuals) and systems, so corrective measures were deliberated. Going forward we shall revise task manuals and improve systems as we create an environment that enables suitable task handling.

In regards to human resource training (education), an e-learning course for design engineers has been created and design engineers systematically take the course. A post-course questionnaire distributed to course participants is used to make improvements to educational materials as necessary and improve the quality of education.

(5) Improving project management skills

We have created projects for resolving problems that exist across all departments involved in decommissioning at Fukushima Daiichi and safety measure implementation at Kashiwazaki-Kariwa, and are striving to resolve trans-departmental issues. During the first quarter, we created e-learning materials in addition to the conventional classroom education and proposed real-world educational plans in order to apply this education to actual projects and spread knowledge about project management methods to all personnel. During the second quarter we shall cultivate "experienced project management personnel" by using e-learning to provide education to all personnel and providing real-world education as we increase the amount of human resources that have acquired the means to think in a project-oriented manner.

(6) Improving nuclear safety and productivity through Toyota-type kaizen

We are engaged in Toyota-type kaizen in order to balance nuclear safety with productivity improvements. During kaizen coaching at Kashiwazaki-Kariwa on May 14, we shared information on initiatives being carried out at thermal power stations and explained kaizen related to in-house circuit breaker maintenance which included innovations made to work platforms by workers. Coaching session participants commented that, "I feel like TEPCO personnel are making the field their own," and we shall engage in more kaizen as we strive to improve safety and quality.

Kaizen guidance at Kashiwazaki-Kariwa

◆ Kashiwazaki-Kariwa: Dismantling of the large freight entrance building

There are many safety measure-related projects underway at Kashiwazaki-Kariwa, and kaizen is being used to improve field efficiency and prevent disasters before they happen. For example, during dismantling of the large freight entrance building several workers have been placed around the dismantling site in order to spray water on debris and prevent the dispersion of dust. However, by attaching automatic spray hoses to the ends of heavy equipment we have been able to reduce the number of workers that need to spray water by hand, and increased safety while also improving work methods and the layout of heavy machinery. As a result, we aim to shorten the work schedule from 93 days to 46 days. This has enabled us to balance field safety with efficiency.

Before kaizen: Workers spraying water

After kaizen: Installing automatic water spraying hose on end of heavy equipment

◆ Fukushima Daiichi: Pulling up subdrain pumps

Since some work at Fukushima Daiichi needs to be done in high-dose environments, we are using kaizen to make work more efficient and reduce exposure. For example, when inspecting the 42 subdrains located around Units 1~4 that are used to pump up water from around the buildings, hoisting frames needed to be assembled in these high-dose environments in order to pull up the pumps for each inspection. Now, Unic crane trucks are used to hoist the pump thereby reducing the amount of time that workers need to be in the field and allowing pump inspections and cleaning to be done in low-dose areas. As a result, exposure has been reduced to approximately 3mSv per pump. This has enabled exposure dose reductions and work efficiency improvements.

Before kaizen: Lifting pump using hoisting frame

After kaizen: Lifting pump with Unic crane truck

3 PROGRESS ASSESSMENT

3.1 SELF-ASSESSMENT OF KEY ISSUES

A self-assessment of the five key issues (strengthening governance, improving human resource training, improving communication, cultivating nuclear safety culture, strengthening internal oversight functions) that were identified through the self-assessment of the progress of the Nuclear Safety Reform Plan (implemented in FY2016) and issues pointed out by the Nuclear Reform Monitoring Committee (NRMC) was implemented and the results were reported along with action plans aimed at improvements at the 15th meeting of the NRMC on October 5, 2018. Additionally, at the 16th meeting of the Nuclear Reform Monitoring Committee held on January 29, 2019, TEPCO gave a report on the action plan intended to fill in the current gaps that exist between reality and the expectations that the NRMC has for "technological capability" and "communication," which was created based on the results of the self-assessment.

The Nuclear Reform Monitoring Committee reached the conclusion that, "progress is being made but there are still issues to address." TEPCO has taken this conclusion to heart and is working further develop the action plan

In regards to technological capability, we are aiming to prevent troubles before they happen by proposing and implementing countermeasures that fill the gap between the current level of quality of equipment and work processes and what it should be ideally in order to make improvements to our current situation where facility and work nonconformances that stem from a lack of technological capability continue to occur.

In regards to communication, a lack of professional awareness and awareness about information that is easily understood has been deemed the reasons why we have not been able to eradicate errors and half measures even though we have proposed and implemented individual countermeasures that make up for a lack of our ability to engage in dialogue, so we have created and are implementing an action plan.

3.1.1 Improvement Initiatives based upon Self-Assessments

(1) Improving human resource training (technological capability)

◆ Developing safety/quality improvement kaizen activities

At Fukushima Daini in order to improve methods for inspecting heat exchangers we are examining brushing where personnel enter the water chamber to access the inside of the lid. And, employees are making their own improvements to the field such as by attaching ropes to fire prevention dampers in high places, which are subjected to operational tests once a year, so that the dampers can be closed from the ground without the need for scaffolding. Furthermore, in regards to leveraging IT in order to improve safety and quality, we have focused on tasks that risks have a large impact on when they manifest, and closely examined whether or not risks can be reduced through the use of IT. During the first quarter we moved forward with deliberations that will enable us to complete the task of identifying those work processes for which kaizen are required this fiscal year.

◆ Constructing education/training programs

We are continuing to construct engineer education curriculum that covers seven areas (design, systems, equipment/programs, equipping diagnostics, procurement, safety, and fuel) and in April a seven-course design engineer program was started for the Headquarter Nuclear Asset Management Department. Systems, safety, and fuel engineers are continuing their education under the new curriculum.

◆ Procurement improvement benchmarking

In May we benchmarked procurement against other industries. We were able to obtain knowledge that needs to be incorporated as we move forward with the decommissioning of Fukushima Daiichi, such as "managing the quality of overseas products and general industrial products," and "defining the mission and creating comprehensive required specifications after clarifying the usage concept." External consulting companies have also been leveraged as external mentors.

◆ Checking for gaps in equipment/task quality

We are currently identifying equipment that is feared to be frail in terms of design. We shall prioritize this equipment, and re-examine design/engineering attributes in order to make improvements that improve equipment reliability. Furthermore, in April, the Vice President was given the task of supervising/providing suggestions/taking command of general quality at the FDEC, which includes assisting the FDEC president in improving procurement, and he shall engage in continuous improvements.

(2) Communication improvements

◆ Improving awareness at the source of information (Nuclear Power Division)

From this fiscal year we have started group discussions in the Nuclear Power Division that focus on conveying information and utilize "past cases of incompetent information dissemination." In April we implemented training that included group work on "disseminating information that is easily understood." And, as a kaizen activity to improve internal/external communication, each power station is in the process of formulating kaizen measures based on the cause analysis of nonconformances, which should be completed by the beginning of July, after which a plan shall be solidified and implemented.

At Kashiwazaki-Kariwa, we are having all station personnel participate in visits to all households in Kashiwazaki City and Kariwa Village to provide an opportunity for them to directly hear the opinions of the community residents in order to cultivate awareness about disseminating information from the perspective of community residents as a countermeasure for the notification form errors that were made when the earthquake occurred.

◆ Improving the awareness of corporate communications departments

From last year we have been using case studies for new public relations officers during training in order to provide them with the knowledge and skills necessary to "disseminate information that is easily understood."

◆ Using case studies for information disclosure training

The Nuclear Power Division and Corporate Communications Division have teamed up to use case studies and periodically implement information disclosure training to ensure that

information flows smoothly in the event of an unforeseen incident. This training will be continually implemented anywhere from once a week to once a month.

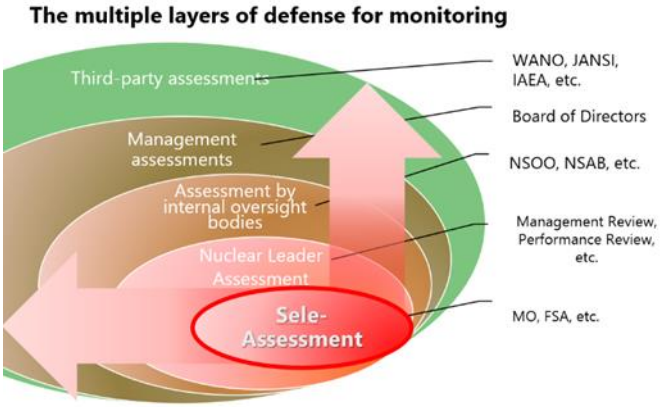
◆ Strengthening monitoring by risk communicators

Risk communicators (RC), who serve as liaisons between the Nuclear Power Division and corporate communications, shall be further trained in order to better monitor each department with a heightened awareness of society's concerns.

3.2 ASSESSMENT BY THE NUCLEAR POWER DIVISION

(1) Key self-assessments【Measure 2】

As part of defence-in-depth for assessments, each CFAM/SFAM in the Management Model create biannual key self-assessment plans for each business area and perform self-assessments based upon the policy of performing self-assessments that take a critical look at one's own actions.



Detect problems quickly and prevent them through strengthening self-assessments

◆ Reactivity management (Kashiwazaki-Kariwa)

In the operations field, a key self-assessment of reactivity management that controls fuel fission was implemented at Kashiwazaki-Kariwa (April 22-25). This assessment evaluated the behavior of operators in regards to reactivity and assessed the overall effectiveness of reactivity management. The objective of the assessment is to enable operators to engage in the best reactivity management in the nuclear power industry by improving identified gaps. In addition to Kashiwazaki-Kashiwa personnel, assessment members also included Fukushima Daini Operations Division representatives, Headquarter operations CFAM, and consultants from the United States. The assessment identified "good communication between the fuel group and operators" as a strength and "…a lack of systematic processes for managing reactivity. The shift supervisor, who is the 'last man' has poor awareness [of the process]" as an area for improvement. However, shift supervisors also participated as assessment members and having it pointed out that they are the "last men" was eye-opening and tremendously beneficial. An action plan will be put into practice in order to improve the identified gaps as we aim to raise reactivity management performance to the top levels of the nuclear industry and enable the power station to achieve the world's highest levels of


Reactivity management self-assessment attended by shift supervisors

safety.

◆ Design management process (Kashiwazaki-Kariwa)

A key self-assessment of Kashiwazaki-Kariwa's design management was commenced. When equipment design changes are made, it is necessary not only to think about the piece of equipment in question, but also expand our view to include the impact on related areas to prevent the function and operation of surrounding equipment from being inhibited, for example. Internal experts intimately familiar with each area always participate in these deliberations, but this time we also referenced check sheets leveraged by the US nuclear power industry so as to ensure that the scope of deliberations is sufficient. This assessment is currently underway with help from Kashiwazaki-Kariwa and Headquarter experts.

◆ Foreign material exclusion (Kashiwazaki-Kariwa)

In the maintenance area a key self-assessment of foreign material exclusion was implemented at Kashiwazaki-Kariwa (Units 1 through 4) (May 28-29). The self-assessment was implemented by Kashiwazaki-Kariwa personnel with help from personnel from Fukushima Daini and Headquarters.

The objective of this self-assessment was to identify gaps between the state of rooting of foreign material exclusion programs and excellence that will lead to further improvements. In particular, the assessment looked to confirm that the action plan implemented in light of the self-assessment of Kashiwazaki-Kariwa Units 5-7 in FY2018 has been carried out suitably and that the program has been improved as a result.

Self-assessment results showed that there have been improvements in the level of awareness compared to the last assessment, but that related departments need to continue to work together to achieve new heights.

Meeting

Meeting

◆ Radiological protection ALARA (Fukushima Daini)

In the area of radiological protection, a key self-assessment of radiation protection was implemented at Fukushima Daini (April 8-12). Radiation protection performance at the power station was assessed from the perspective of the Fundamentals by conducting interviews with TEPCO employees and contractors and engaging in field observation. Assessment results pointed out "fundamentals are being proactively leveraged and the awareness amongst not

only TEPCO personnel, but also contractors, is high" as a strength and "dose optimization plan (exposure reduction measures) procedures exist but they are still not sufficient compared to the world's highest standards for these procedures" as an area for improvement. Therefore, countermeasures shall be proposed and improvements made during FY2019.

Interviews

Field inspections

◆ Equipment reliability (Fukushima Daini)

In regards to equipment reliability, a key self-assessment was performed at Fukushima Daini with a focus on critical key intentions. In conjunction with long-term shutdown of the plant, the conditions at Fukushima Daini differ from those of a normal plant in operation. Therefore, this assessment checks to see if equipment reliability is being maintained effectively upon identifying important equipment based upon consistent understanding.

The assessment results indicated the "strength" of "human resources with sufficient knowledge are engaged in assessing equipment at high levels (identifying important equipment, etc.)."

Meanwhile, "rules for setting maintenance importance levels for a plant in long-term shutdown are not consistent" was identified as a "weakness." The causes for this are analyzed as including the facts that plant shutdown has continued longer than originally foreseen, there is no process for revising importance level in accordance with equipment configuration changes, and overseeing departments have been left with the responsibility of identifying important equipment. The need to establish consistent understanding in regards to what system equipment and functions are important was reaffirmed. In order to unify our approach to this matter, we have started revising/examining manuals/guides to reflect these issues.

3.3 OPINIONS OF THE PEOPLE (ASSESSMENT BY THE LOCAL COMMUNITIES)

(1) Earthquake notification form errors

The second notice sent to government and related agencies following the earthquake that occurred off the coast of Yamagata Prefecture on June 18 mistakenly stated problems with "site power sources used for fuel pool cooling." A corrected notification was sent immediately after, but in the days that followed TEPCO received requests from the mayor of Kashiwazaki City and the Kashiwazaki City Council to ascertain the cause of this error and make improvements. We should thoroughly implement recurrence prevention measures and

strive to improve our ability to convey information during emergencies. (Refer to 1.2 Progress of Safety Measures at Kashiwazaki-Kariwa for details on recurrence prevention measures)

3.4 MONITORING RESULTS FROM 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 first quarter that were reported to the executive officer committee and the Board of Directors.

Nuclear Safety Oversight Office - Quarterly Oversight Evaluation Report FY2019 Q1

Introduction

This report summarizes the evaluation results of the first quarter (April to June) of the 2019 fiscal year of Nuclear Safety Oversight Office (hereinafter, "NSOO"). The NSOO has discussed the recommendations, advice, and observations described in this report with competent departments when they noticed each case, and the proposals made by the NSOO have been accepted by line department managers and countermeasures have been taken (or under consideration.).

1. Top three recommendations in response to which improvement should be made from the perspective of nuclear safety

The reports of the NSOO teams, Senior Reactor Engineers of sites (hereinafter, "Senior Reactor Engineers") are showing that safety level is improving step by step in many areas.

In this chapter, we present some particularly important suggestions that were made through observations in this period.

1.1 Tightening the reflection of technical review results in inspection plans (Kashiwazaki-Kariwa)

[Issues verified]

At maintenance management by Maintenance Department, some of the content of technical review were not reflected in inspection plans.

If the status continues, necessary inspections will not be implemented appropriately and it is feared that the plant facility reliability may not be maintained.

[Considerations and possible causes]

(Cases)
- Based on the technical review of lubricant leakage countermeasures, the frequency of replacing the component of rotating equipment bearing was decided, but it was not reflected in the inspection plan.

It is considered that it was caused by the fact that the formulation of inspection plan depended on the knowledge and experience of the person in charge, because there is no consistent control method to identify the technical review document that should be referred to and reflect the content in the inspection plan.

NSOO verified that Maintenance Department had introduced a process* of system control to reflect the content of technical review in inspection plans about two years ago, and this case occurred before the introduction of the process.

* It is a process that facility maintenance sections control the reflection with the use of Condition Report (CR). The status of reflection is followed by system engineering group.

[Recommendations]

NSOO recommends the following:

- The General Manager of Maintenance Dept. needs to make sure that Group Managers of Maintenance Dept. are checking whether all the contents of technical review that should be reflected in the inspection plan have been incorporated or not.
- The General Manager of Maintenance Dept. should assess the effectiveness of the management process introduced and make sure that it will be established in each group of Maintenance Dept.
- Site superintendent should oversee the above two items and approve the completion as the overall manager in charge of ensuring safety.

1.2 Clarification of the perspective for assessing the extent to which nonconformance countermeasures should be applied
(Fukushima Daini, Kashiwazaki-Kariwa)
[Issues verified]

Investigation was carried out on how the countermeasures of the internal and external nonconformities were applied to the other areas in the last five years. As a result, there was no area of improvement related to the prevention of similar events, however, we confirmed the occurrence of several similar events that could not be stopped because the extent of the application of

countermeasures and the extent of causes to be removed was too limited. (In NSOO assessments, 5 cases / 155 cases)
If this kind of situation persists, we are worried that it becomes impossible to effectively prevent critical troubles that could have been avoided and it may lead to similar events that impair the reliability of plant system and management.

[Considerations and possible causes]
(Cases)
- In 2007, a component of Fukushima Daiichi Unit 6 Fuel Handling Machine, an air hose winding spring was broken. Countermeasures for the relevant spring were applied to the other power stations and the other units in accordance with the instructions from the HQ. However, springs used in different parts were not included in the scope of application of countermeasures. Therefore, a spring in the cable reel, which is the other part of Kashiwazaki-Kariwa Unit 6 Fuel Handling Machine was broken in 2016.

It is considered that when planning and deciding the application of the countermeasures, the point of view was not clarified for assessing the "extent of potential impact" and it depended on the discretion of the assessor.
In evaluating the extent of potential impact when applying the countermeasures to the other area, U.S. business operators introduced the concept of "the extent where the same conditions should be assumed (Extent of Condition)" and "the extent where the cause should be assumed (Extent of Cause)" and established a viewpoint of assessing environment, equipment, people, organizations, and processes.

[Recommendations]
The NSOO recommends that the Quality and Safety Assessment Group Manager at HQ implement the following to further prevent the occurrence of similar events:
- Define the viewpoint of assessing the "extent of potential impact" that serves as the basis for the extent of the application of countermeasures to other areas and the validity of countermeasures.
- This viewpoint should be shared among planners, decision-makers and implementers of countermeasures, and the decision-makers should practice the verification through the viewpoint.

1.3 Strengthening of operation analysis at design stage from the perspective of surveillance and control (Fukushima Daiichi)

[Issues verified]
In the design of the new facility, we observed a case in which the function of the facility was not adequate from the perspective of operational surveillance and control.

If this condition continues, appropriate surveillance and control will not be ensured in the new facilities to be introduced at Fukushima Daiichi in the future, and there remains a concern that safety will be lowered due to increased burden on operators and human error.

[Considerations and possible causes]
(Cases)
- Regarding the difference in stagnant water levels, there was no specific function in the subdrain pit that hit the alarm and the measurement area in the building. (Sub-drain facility. After that, a specific function was added.)

This is because operational analysis was not carried out in the cooperation of operation department and design department at each stage from the conceptual design stage to the detailed design.

[Recommendations]
NSOO recommends the following:
- The quality enhancement program leader should clarify the operational surveillance and control requirements from the conceptual design stage (operational analysis) and reflect that in the function of the facility to enhance the design process.
- The persons in charge pf operation department at HQ and the power station should establish a system to participate in the operational analysis from the perspective of operational expertise, and participate in and contribute to design as the operation department.

2. Other recommendations made during this quarter

Among the observation results reported by NSOO teams and Senior Reactor Engineers at sites during this term, noteworthy suggestions except for those described in Chapter 1 are as follows:

2.1 Fukushima Daiichi

The following matters have been pointed out for Fukushima Daiichi by the HQ assessment team and Senior Reactor Engineers of the site:

(1) The necessity of verification of the effectiveness according to progress in

the work of highly contaminated environment
(HQ team)

(2) Correcting the behavior of workers further through "Observation by Management*"
(*: MO (Management Observation)) (HQ team)

(3) The necessity of optimizing the maintenance method for important equipment (Senior Reactor Engineer)

(4) The necessity of reviewing the implementation plan according to the actual situation (Senior Reactor Engineer)

2.2 Fukushima Daini

The following matters have been pointed out for Fukushima Daini by Senior Reactor Engineers of the site:

(1) The necessity of materializing fire risk reduction plans (Senior Reactor Engineer)

(2) The necessity of establishing means to develop competence for the emergency response personnel (Senior Reactor Engineer)

2.3 Kashiwazaki-Kariwa

The following suggestions were made for Kashiwazaki-Kariwa by the HQ assessment team and Senior Reactor Engineers of the site:

(1) The necessity of specifying technical basis for formulating inspection plans (HQ team)

(2) Performance improvement meeting system leading to promoting preventative actions, and the use of Conditioning Report
(Senior Reactor Engineer)

(3) Security culture assessment process leading to the improvement of operational performance (Senior Reactor Engineer)

3. Perspective of General Manager of Nuclear Safety Oversight Office

(NSOO) based on evaluations

3.1 Common causes that can be found in the NSOO recommendations

About 45 recommendations given by NSOO in the past 2 years, the common cause was analyzed from the perspective of nuclear security culture based on "traits of a sound security culture" (Traits). As a result, there were many cases with weak four traits: "expectations*", "education and training", "continuous surveillance" and "documentation". Between these four traits, there is a potential relationship that if "expectations" is not defined as the starting point or if it is not well understood, the other three traits are not well associated in favorable manner.

(Note*: this report does not refer to the conceptual purpose of the operation, but to the exact and rigorous way of doing the work that is required in practice.)

Fukushima Daiichi and Kashiwazaki-Kariwa have been continuously carrying out construction and remodeling operation in the large volume that they have not experienced before. The General Manager of the NSOO believes that in these transitory tasks with the control of deadlines, the result of completing the task itself tends to be emphasized as an achievement goal, and that the importance of a high level of behavior and strict discipline in the execution of the task as "expectations" has weakened.

The above-mentioned construction and remodeling will continue for the time being, but in the future, we will enter the stage where we should return to steady tasks, such as safe operation management of installed facilities. Though TEPCO is quick to introduce the advanced business process, the process is not well implemented. To increase the reliability of the steady operation which supports the management of the power plant, working level staff needs to clearly understand and practice a high level and strict discipline of the behavior in the execution of tasks as "expectations".

For the past eight years after the Fukushima Daiichi accident, with the loss of previous operating and periodic inspection cycle, steady tasks with a high level of discipline were deteriorated, including for operation management, facility reliability engineering, work management, maintenance management, and radiation protection. For recovery, each group manager and team leader need to learn the state of high level and strict discipline of the task they are in charge of, from the examples of internal and external practices, and lead the member as the role model of practicing the "expectations". The General Manager of the NSOO expects the site superintendent to demand and supervise the group

managers and others with high standards and strict discipline as the overall manager of security. The NSOO itself will continue to learn the world level standards and disciplines in each field of work and make recommendations that are useful to TEPCO.

3.2 Weak operations related to facility reliability

HQ team carried out its observation for Kashiwazaki-Kariwa in this period, and found a case that the management activity of continued maintenance of facility reliability (inspection plans and the maintenance of its technical basis) was inadequate as an organizational activity. In the case of Kashiwazaki-Kariwa, the cause is presumed to be as follows:

- Managers and working level staff thought they could depend on the experience and knowledge of individuals to achieve the management activity of ensuring the facility reliability and did not adequately recognize the importance of sustaining a sound operation in the future.
- They were concerned about a possible increase in the workload for safety inspections and nonconformance management if they enhanced the management activity.

In Europe and the United States, the section in charge of engineering the maintenance of facility reliability is organized as a separate section from the section in charge of implementing the maintenance work. The concept is that the separation of the responsibilities ensures the facility reliability in a sound manner.

At TEPCO, there is a plan of engineering center at the power station side and a plan of engineering company in the decommissioning side, and the General Manager of NSOO considers that it is effective to clearly separate the function of engineering the facility reliability from the function of implementing the maintenance work as above.

4. Status of completion of recommendations presented by NSOO

The line departments are generally performing well on a continuous basis towards the completion of recommendations by the NSOO.

- Of the 173 recommendations which have been presented so far, 151 cases have been completed. In this quarter, nine recommendations were

completed.

- In this period, 5 recommendations are presented.

5. Benchmarking and training

As NSOO's oversight and evaluation activity in this term, benchmark was conducted on the effort of facility development activity by the Japan Aerospace Exploration Agency (JAXA) and the "efforts to prevent recurrence of nonconformities" in U.S.A. through JANSI, and good practices were obtained, and suggestions are made based on them.

Based on the recommendation during the third person review by World Association of Nuclear Power Operators (WANO) in February, NSOO has been coordinating education and training for oversight evaluators in October with technical support of WANO. This training is intended to offer HQ functional area managers the opportunity to participate so that it can contribute to improving the oversight skills of the working-level staff.

End of document

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

Since 2017, TEPCO Nuclear Power Division leaders have received advice and guidance from the Nuclear Safety Advisory Board (NASB), which is comprised of people from overseas that have experience as general managers or site superintendents at nuclear power companies who have been invited to participate in the NSAB. During the first quarter, the NSAB checked the status of preparations being made by TEPCO in advance of a third-party review and gave lectures and advice in regards to the desirable conduct and behavior of leaders. Subsequent lectures are planned for the second quarter as well.

Lecture

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

(1) Headquarters: Insufficient preventative measures at Headquarters

In light of the discovery that preventative measures for nonconformances that were deemed to require preventative measures had not been deliberated at Headquarters, an investigation into the past three years was implemented and it was discovered that a total of 33 nonconformances that required preventative measures had been overlooked. These safety regulation infractions were labeled by the Nuclear Regulation Authority (NRA) as "Infraction 3" at the April 3, 2019 meeting of the NRA[2].

Since implementing appropriate preventative measures is of extreme importance for maintaining and improving nuclear safety, TEPCO is taking the situation very seriously and responding in earnest.

Further cause analysis has revealed that the failure to deliberate preventative measures was caused by a failure to clearly document detailed work procedures and deadlines, a failure by management to engage ineffective monitoring (supervision) and insufficient organizational change management that resulted in the aforementioned failures.

To date we have been revising work procedures that allow these infractions to occur and clearly documenting the changes. Furthermore, we have introduced a mechanism that allows managers to regularly check status along with support tools that enable more effective monitoring by allowing managers to check at a glance whether or not an entered task has been completed.

Checking using support tools

Going forward, we shall strengthen support tools aimed at further improving work quality in conjunction with further improving work procedures and commencing the introduction of measures to support organizational change management.

(2) Nuclear material protection infraction at Fukushima Daiichi (key management)

At Fukushima Daiichi protective measures are in place for areas where nuclear fuel is stored (protected zones) in accordance with the Fukushima Daiichi Nuclear Power Station Action Plan (Specified Nuclear Fuel Material Protection) to prevent the theft of nuclear material and the sabotage of facilities storing nuclear material. However, during FY2018 there were two instances where the entry/exit to protective zones were left unlocked. These were caused by insufficient methods for storing/managing keys used for nuclear material protection so we have implemented countermeasures in the form of replacing keys and locks with suitable

2 Access the following page for details on the Nuclear Regulation Authority's decision and Infraction 3: http://www.nsr.go.jp/data/000266400.pdf

substitutes, implementing reeducation on nuclear material protection and revising guidelines that stipulate methods for managing keys used for nuclear material protection. On April 26, the Nuclear Regulatory Agency deemed these incidents to be infractions of action plan (Specified Nuclear Fuel Material Protection) compliance and as such issued a warning to TEPCO (Fukushima Daiichi Nuclear Power Station Nuclear Material Protection Manager). This has been a sobering incident for us and we shall thoroughly implement nuclear material protection measures so as to prevent similar incidents from ever happening again.

(3) Safety culture assessment by the Nuclear Regulatory Agency

A "Comprehensive Assessment of Initiatives Related to Measures to Prevent the Degradation of Safety Culture and Organizational Climate" was received from the nuclear power station's Nuclear Regulation Secretariat in regards to safety culture cultivation activities implemented at nuclear power stations during FY2018. The comprehensive assessment stated in regards to initiatives related to preventing the degradation of safety culture and organizational climate that, "initiatives based on plans have been implemented and an improving trend has been seen" at both Kashiwazaki-Kariwa and Fukushima Daini. Furthermore, the report stated in regards to signs of degradation of safety culture and organizational climate that, "further continued monitoring is necessary to watch trends" at both Kashiwazaki-Kariwa and Fukushima Daini. We shall create safety culture cultivation action plans based upon basic safety culture policies and ensure that the Traits are expressed through our thinking and behavior at all times.

4 KPI/PI RESULTS

4.1 KPI/PI REVISIONS

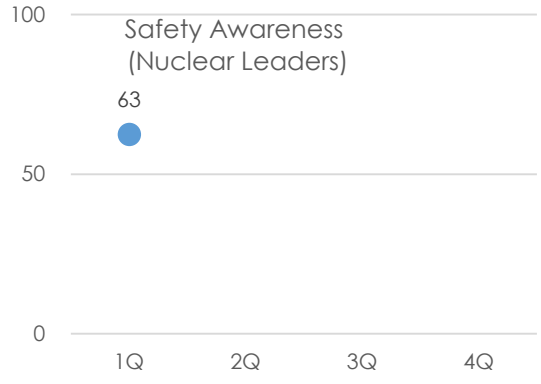
As reported in the FY2019Q4 report, FY2018 KPI targets for safety awareness (Nuclear Leaders/Entire Nuclear Power Division), ability to promote dialogue (external), and technological capability (times of non-emergency) have been reached, the targets for ability to promote dialogue (internal), and technological capability (times of emergency) were not reached, so a revised plan has been made. During the first quarter, four new PI were added and monitoring commenced in accordance with the revised plan. The revised plan and the newly added PI are as follows. These PI will be monitored so as to enable targets to be achieved by the end of FY 2019.

KPI	Revision Plan	New PI
Safety awareness (nuclear leaders)	Target shall be revised since the 80-point target was achieved	—
Safety awareness (entire Nuclear Power Division)	The 80-point target was reached however, in light of the fact that safety awareness-related nonconformances (insufficient implementation of preventative measures at Headquarters) was deemed as a safety regulation infraction, it is apparent that the high level of safety consciousness indicated by the KPI has not been achieved, so related PI will be revised.	<Safety-13> Percentage of preventative measures completed before deadline
Ability to promote dialogue (internal)	Continual monitoring	—
Ability to promote dialogue (external	The 80-point target was reached however, in light of the fact that improvements to communication have been requested by the Nuclear Reform Monitoring Committee (transitioning from "conveying information" to "conveying information that is easily understood"), it is apparent that the exceptional ability to promote dialogue indicated by the KPI has not been reached, so related PI will be revised.	<Dialogue-5> Promotion rate of activities to promote dialogue aimed at improving relationships
Technological capability (times of non-emergency)	The 110-point target was reached however, in light of requests from the Nuclear Reform Monitoring Committee to strictly assess human resource training in departments, it is apparent that the high level of technological capability during times of non-emergency has not reached the level indicated by KPI, so related PI will be revised.	<Technological-3> Percentage of attendance in design-related educational programs <Technological-4> Safety/quality improvement kaizen implementation rate
Technological capability (times of emergency)	Continual monitoring	—

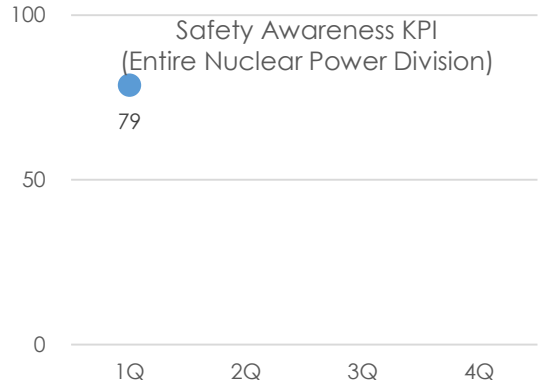
4.2 KPI Results

Safety Awareness KPI ····· Target

Safety Awareness（Nuclear leaders）·····90 Points

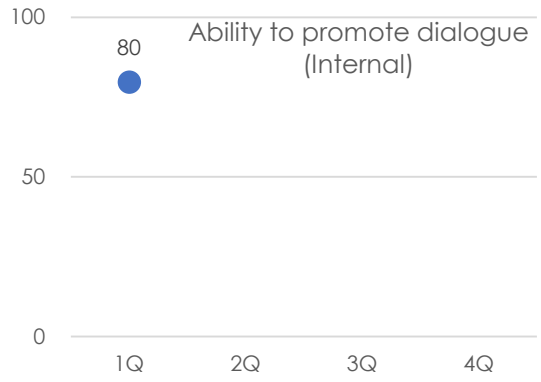


Safety Awareness（Entire Nuclear Power Division）····· 80 Points

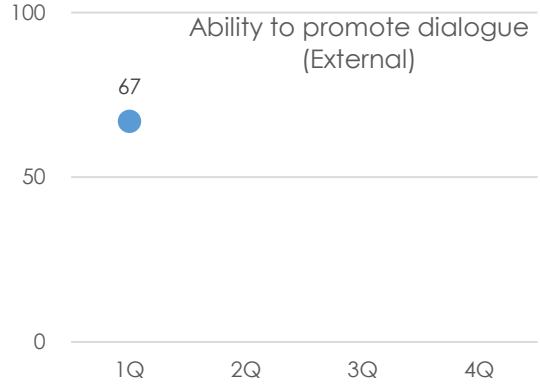


Ability to promote dialogue KPI ·····Target

Ability to promote dialogue（Internal）··80 Points

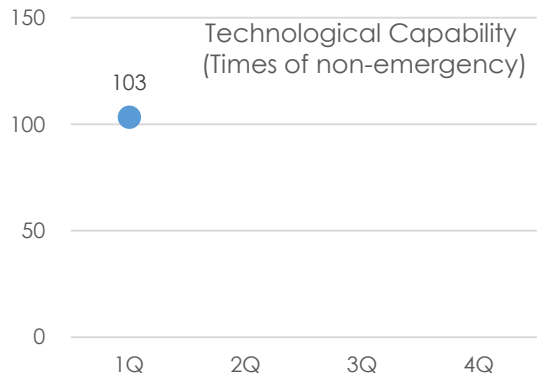


Ability to promote dialogue（External）100 Points

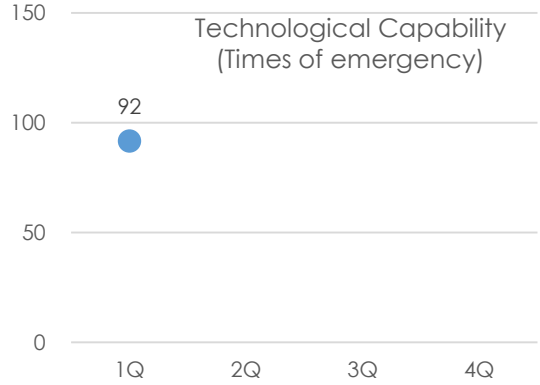


Technological Capability KPI ·····Target

Technological Capability (Times of non-emergency)····· 110 points



Technological Capability (Times of emergency) 110 points

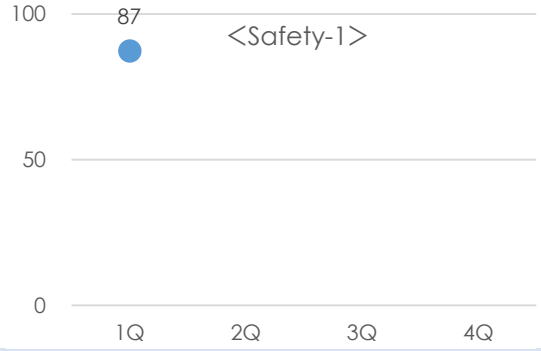


4.3 PI RESULTS

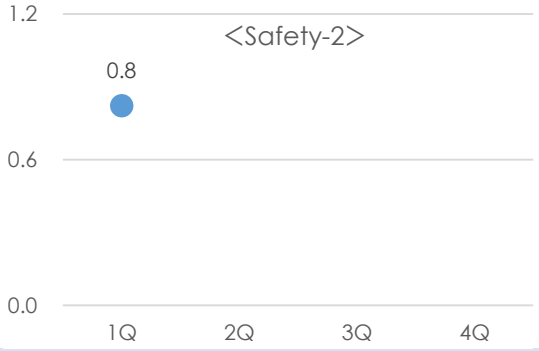
Safety Awareness PI ····· Target

Nuclear Leaders

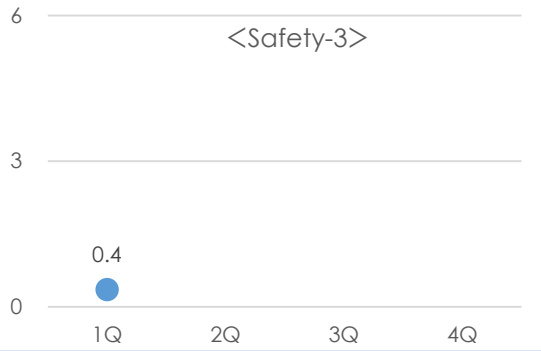
Rate of implementation of retrospection leveraging the traits by Nuclear leaders ····· 100%



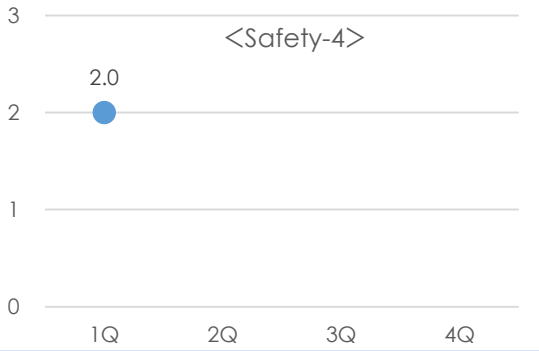
Number of times emails have been sent by nuclear leaders in order to share information ····· Once a week/person



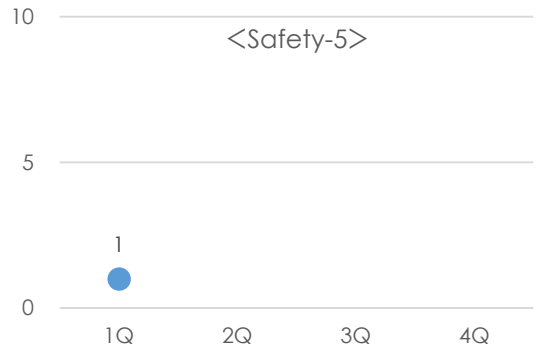
Number of times nuclear leaders participated in training according to plan Twice/year/person



Number of times nuclear leaders went into the field ····· Twice a month

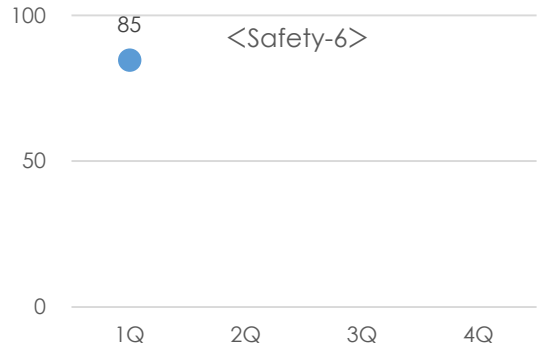


Number of benchmarked issues for which nuclear leaders are responsible that were put into practice ····· 4/year

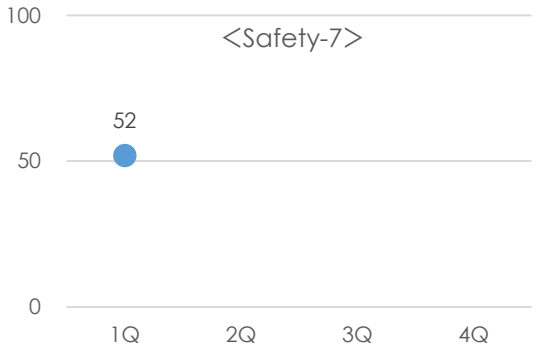


Entire Nuclear Power Division

Implementation rate of group discussion about Traits ····· 100%

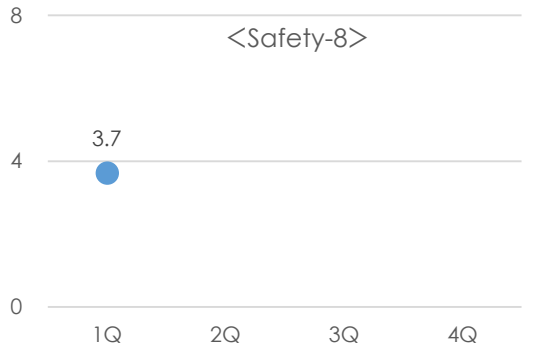


Percentage of intranet messages from nuclear leaders that have been read ····· 80%



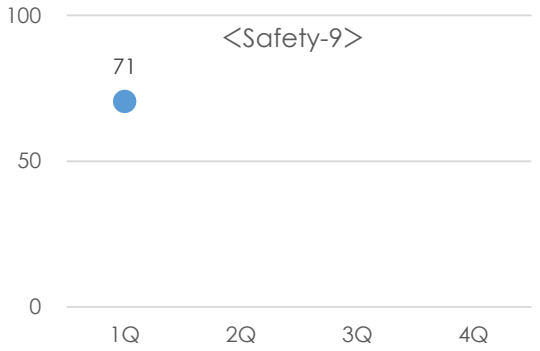
Note: Values for Q4 are the most recent but do not include the last month which is not a full month since the message was sent. Q3 values are fixed and include the last month.

Number of times managers engaged in management observation at power stations ····· ·····Fukushima Daiichi/Fukushima Daini 4.0 times, Kashiwazaki-Kariwa 3.1times/person
Note: Target revised from 8 times/month/person



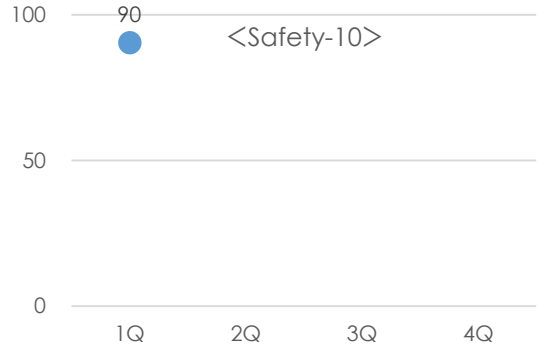
Reference: Weighted average for Fukushima Daiichi, Fukushima Daini and Kashiwazaki-Kariwa

Good MO reporting rate ····· 50%



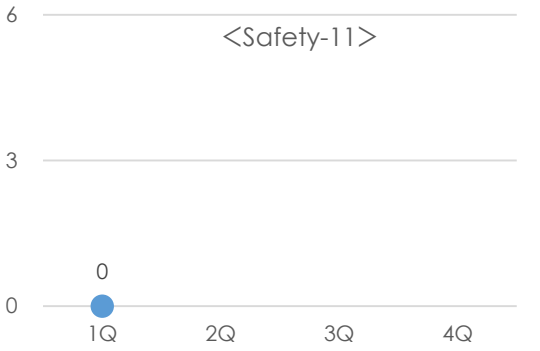
Reference: Weighted average for Fukushima Daini and Kashiwazaki-Kariwa

Completion rate of GII or higher corrective measures within the deadline ····· 100%



Note: Weighted average for HQ, 2F and KK

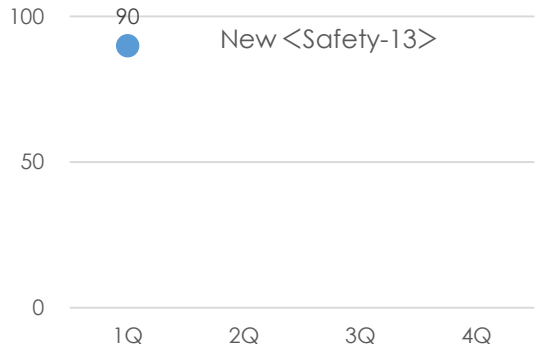
No. of nonconformance recurrences (GII or higher) ····· 0/month



Note: Total for HQ, 2F and KK

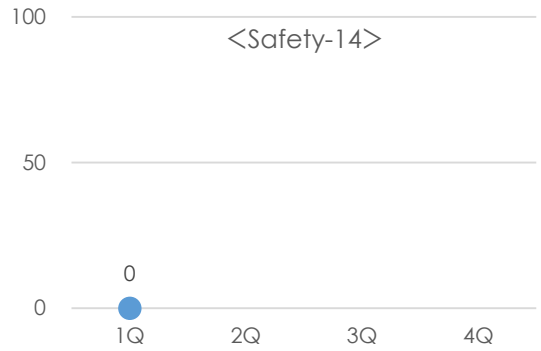
Nonconformance voucher period achievement rate ·····80%

(New) Preventative measures completion rate (within deadline) ·····90%



Note: Weighted average for HQ, 2F and KK

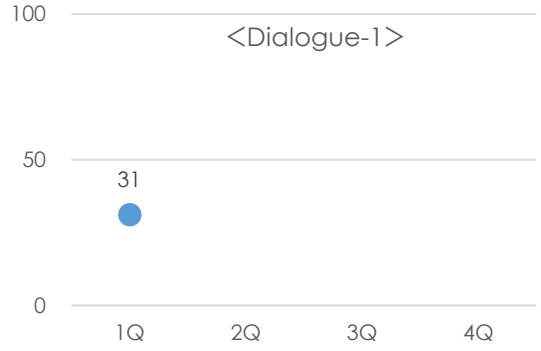
Significant OE training participation rate·····60%



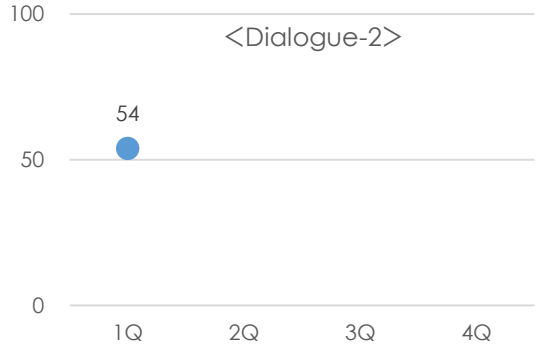
Ability to promote dialogue PI ····· Target

Internal

Percentage of employees that feel that intranet messages from nuclear leaders are "helpful" ···· 50%

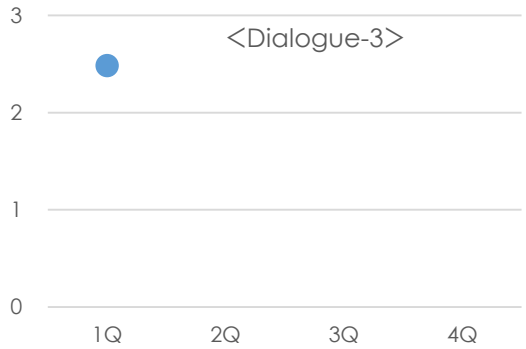


Response rate to e-mail questionnaire on the information conveyed by nuclear leaders·····70%



Note: Values are the most recent and do not include the last month which had not ended at the time of tabulation

Degree of understanding of information conveyed by nuclear leaders……2.5 Points



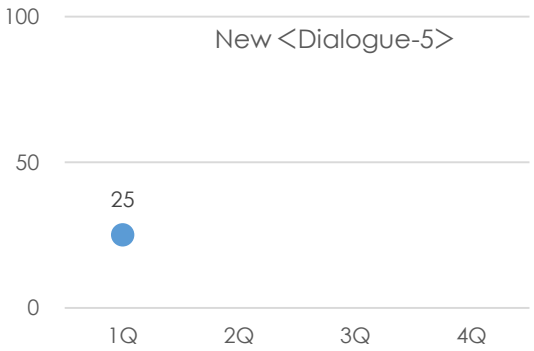
External

（Integrated）Ability to promote dialogue assessment questionnaire results ……Positive increase over last fiscal year

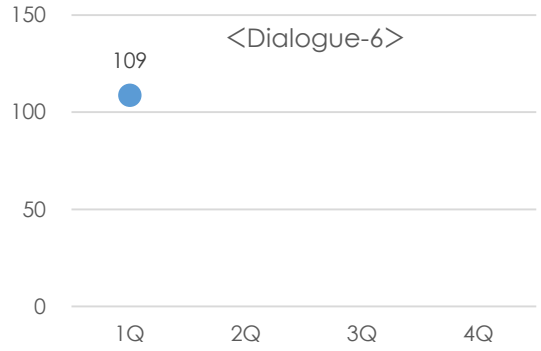
—

Note: Assessment is conducted annually (to be reported on in Q3)

（New）Progress rate of dialogue activities aimed at furthering relationships……100%



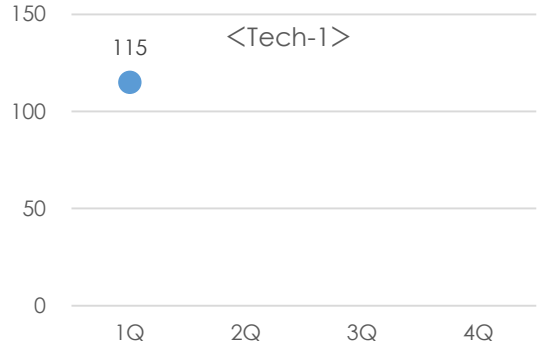
Dialogue activity questionnaire assessment…… 100 points



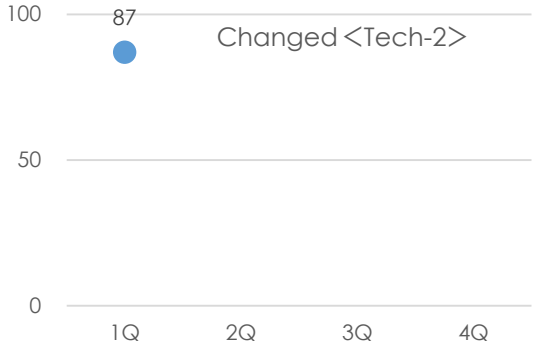
Technological Capability PI ····· Target

Times of non-emergency

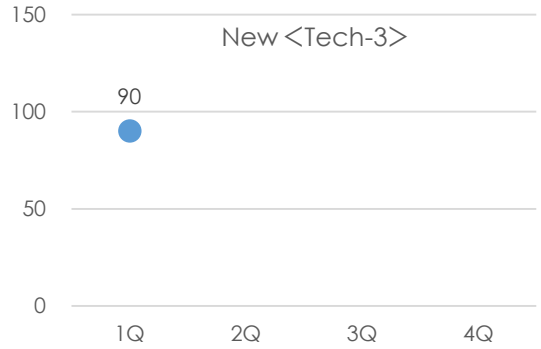
No. of workers certified in operations/maintenance/engineering/radiation and chemistry/fuel/safety, no. of external certification holders ····· 110 Points



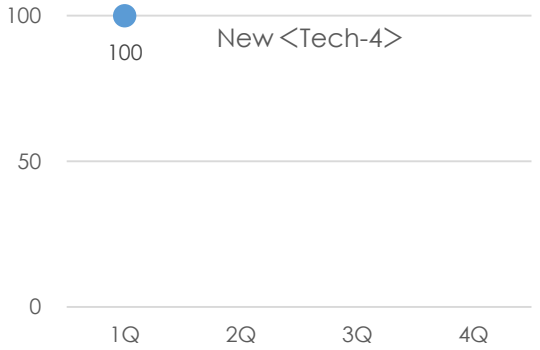
(Changed) Education/training issue resolution rate ····· 80%



(New) Rate of participation in design-related educational programs ····· 90%

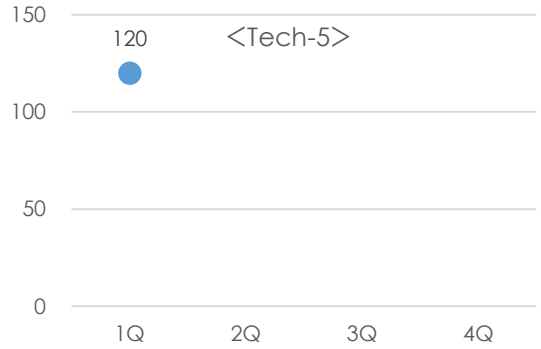


(New) Safety/quality improvement kaizen implementation rate ····· 90%



Times of emergency

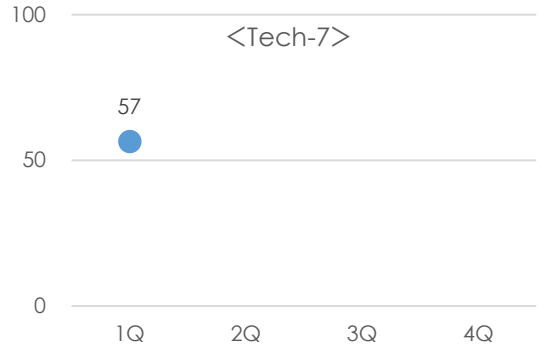
No. of in-house certified emergency personnel (fire trucks, power supply trucks, cable splicing, radiation surveys, wheel loaders, Unic trucks, etc.) ····· 120%



Percentage of "A" assessments given by the Nuclear Regulatory Agency for emergency response training categories ····· 80%

90%
Note: Assessment is conducted annually. Assessment results are for training from the previous fiscal year

Training participation rate ····· 90%



CONCLUSION

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, and become an operator that continues to create unparalleled levels of safety**," we continue to promote nuclear safety reforms while subjecting ourselves to objective assessments by the Nuclear Reform Monitoring Committee[3]. We are more than happy to hear any comments or opinions you may have about these reforms. Please visit our website[4] for more information.

The second notice sent to government and related agencies following the earthquake that occurred off the coast of Yamagata Prefecture on June 18 mistakenly stated problems with "site power sources used for fuel cooling," which prompted the mayor of Kashiwazaki City and the Kashiwazaki City Council to request that the causes be ascertained and improvement measures implemented. As countermeasures, revisions were made to the notification form and the number of people on a shift increased. Furthermore, by having all station personnel participate in household visits and leverage operating experience information, we aim to cultivate sensitivity to the thoughts and feelings of community residents and society. In conjunction with this, we've also enhanced efforts to improve the quality of external reports and eradicate legal infractions. The President and the CNO, as well as other representatives from Headquarters and the power stations, have come together to make ceaseless improvements.

[3] http://www.nrmc.jp/index-j.html

[4] https://www4.tepco.co.jp/ep/support/voice/form.html

ABBREVIATIONS

ALARA： As Low As Reasonably Achievable

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

CAP： Corrective Action Program

COP： Common Operational Picture

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

HE Prevention tools: Human error prevention tools

HEMP： High altitude Electro Magnetic Pulse

JANSI： Japan Nuclear Safety Institute

KPI： Key Performance Indicator

MO： Management Observation

NR System：Clearance system for Non-Radioactive Waste

NSAB： Nuclear Safety Advisory Board

NSOO： Nuclear Safety Oversight Office

NUMO： Nuclear Waste Management Organization of Japan

OE： Operating Experience

PI： Performance Indicators

PICO： Performance Improvement Coordinator

PRA： Probabilistic Risk Assessment

PWR plant：Pressurized Water Reactor

QMS： Quality management system for safety activities at nuclear power stations (Quality Management System)

RC： Risk Communicator

SAT： Systematic Approach to Training proposed by the IAEA

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

SNS： Social Networking Service

SOER： Significant Operating Experience Report stipulated by WANO (World Association of Nuclear Operators)

Standard seismic intensity (Ss): Seismic intensity standard used when designing nuclear power stations to be earthquake-resistant

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

VR： Virtual Reality

WANO： World Association of Nuclear Operators

WP： Work Processes (planning and management)