Nuclear Safety Reform Plan

FY2020 Q2 Progress Report

Special Issue

～Improving Safety and Quality by Correctly Ascertaining Field Conditions and the Conditions of Equipment in the Field～

TEPCO

Tokyo Electric Power Company Holdings, Inc.

November 17, 2020

Foreword

We would like to offer our 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. TEPCO 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 second quarter of FY2020 (July~September)

It is with great sorrow that we announce the passing of Nuclear Safety Reform Committee Deputy Chair, Lady Barbara Judge, on August 31. Lady Judge closely monitored our efforts from the time the Nuclear Safety Reform Plan was created until her passing, and all of us at TEPCO would like to take this opportunity to express our gratitude for her service, and offer our condolences to her family. She will be greatly missed.

T1

You will notice that in some of the photographs, employees are not wearing masks. At TEPCO, we are requiring all employees to wear masks at all times, but in order to show you the facial expressions of our employees, we have taken these photographs upon implementing thorough measures to prevent the spread of Covid-19. Some of the photographs were also taken prior to December 2019, and predate the pandemic.

Special Issue~Improving Safety and Quality by Correctly Ascertaining Field Conditions and the Conditions of Equipment in the Field~

Director, Managing Executive Officer,
Nuclear Power & Plant Siting Division GM/
Nuclear Reform Special Task Force Acting Director/
Nuclear Reform Special Task Force Secretary General

Shigenori Makino

In this special issue I would like to introduce our initiatives to improve safety and quality by correctly ascertaining field conditions and the conditions of equipment in the field.

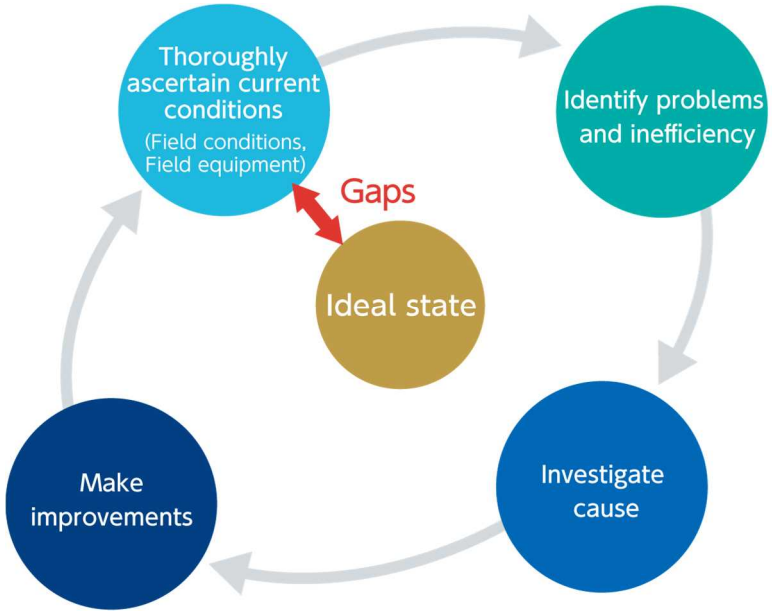
Maintaining and improving safety and quality is indispensable, no matter what task we engage in. In light of our regrets and the lessons learned from the Fukushima Nuclear Accident, we continue to improve safety and quality based on the idea of “never-ending reform and improvements,” which is the fundamental principle of the Management Model that embodies the spirit of the Nuclear Safety Reform Plan.

Headquarters and power stations are engaged in activities along with contractors to improve safety and quality. Going into the field, observing actual pieces of equipment and thoroughly ascertaining current conditions is how these activities begin. After that, problems are identified by finding gaps between current conditions and ideal conditions, and the true reason for these conditions is investigated. We are striving to improve safety and quality by engaging in this cycle of actions that aims to achieve an ideal state. Furthermore, we believe that engaging in these activities will lead to the cultivation of human resources with excellent skills that can carry out required tasks because they are intimately familiar with the field and fieldwork.

These initiatives to improve safety and quality are based upon Toyota-type kaizen methods and we are trying to enable the Division to make a fresh start by not only receiving guidance from experts, but also proactively incorporating good practices from other departments and industries.

The government’s new inspection system that went into effect this fiscal year requires operators to identify problems on their own and continually engage in initiatives to improve safety. One of the most important lessons we learned from the Fukushima Nuclear Accident is that complacency leads to degradation. I strongly believe that the essence of our job is to continually make improvements, and we will continue to engage in these initiatives.

Safety/Quality Improvement Cycle



“I want us to turn our attention to the field and proactively engage in efforts to improve safety and quality”

Managing Executive Officer, President of Fukushima Daiichi Decontamination and Decommissioning Engineering Company (FDEC), Chief Decommissioning Officer

Akira Ono

Q What was the impetus that made safety and quality improvements a key issue?

I was Site Superintendent at Fukushima Daiichi for three years from June 2013 until June 2016. At the time, the priority was quickly building equipment to respond to the accident, but at the root of our actions was awareness about having to improve quality.

The specific event that led me to believe that we have to further elaborate quality was the series of troubles that we had with Unit 3 spent fuel pool fuel removal equipment in 2018. Rather than merely solving each problem, we decided to temporarily suspend all work in the fall of 2018 to conduct a general quality inspection so that we could once again confirm that quality has really been improved overall, and that all our i’s and t’s have been dotted and crossed.

Q In particular, what are you focusing your attention on now?

You need to be motivated to take on challenges if you’re going to improve safety and quality. In order to do this one must understand and accept what their own job consists of, and why procedures are laid out as they are. You have to understand why equipment is configured the way it is. You have to start from these basics. If the inner workings remain a mystery, or a “black box,” as we say, you’ll never accept them. By deepening our understanding, we can engage in more serious discussions with manufacturers and contractors, and offer suggestions to make improvements. Engaging in kaizen activities and in-house manufacturing enables us to improve our engineering ability and deepen our understanding about our own jobs. I believe this is an excellent way to promote discussion and suggestions.

Q You reorganized departments in April. Is there any relationship to improving safety and quality?

A department is like a piece of fabric. It doesn’t consist of only warp threads, which symbolize functions in this case, but also of weft threads,

which are the actual working units that cross through the department. It's the addition of these weft threads that complete a piece of fabric. In April, we established the Decommissioning Safety and Quality Office as a department for comprehensively examining safety and quality throughout the entire FDEC. Taking action to actually improve safety and quality is the job of line departments, but the Decommissioning Safety and Quality Office looks across the whole organization to ensure that this is actually taking place and that safety is being guaranteed.

We are also changing and incorporating various initiatives aimed at ensuring safety that have been implemented to date, and we will begin putting these initiatives into trial use.

We've made department changes and developed mechanisms, and are finally at the point where we've just begun to head towards our ideal state. I think by rooting this behavior we can reduce troubles and human error.

Q What are your expectations for employees?

I'd like them to focus more attention on the field. If you don't go into the field you won't completely understand the work that you are responsible for. You won't know where the places are in which it is easy to engage in unsafe behavior, or in what environments tasks are extremely difficult to carry out unless you go into the field.

It's only after going into the field that you notice these issues and can think about how to change procedures and equipment configurations in order to solve them. I'd also like to see employees take steps to improve their technical skills and abilities. I want each employee to feel like they know their job better than anyone.

I'd also like employees to think and behave with the awareness that society is watching them. Fukushima Daiichi is under close scrutiny by society and they've been given a difficult task, so in various respects they have to be better than employees at other sites. That's the spirit I'd like them to have as they engage in their duties.

Q Could you say something to your new employees, and also talk about how you feel about cooperating with local companies?

I had a chance to speak with 41 new employees in July. I was reassured to learn that they are optimistic about decommissioning and feel that it is a new business opportunity. I want them to go about their job with a sense of curiosity. Being able to ask anything without care is a privilege of a new employee, so I'd like them to go into the field with curiosity and ask questions about anything they don't understand. Decommissioning continuously requires new skills. In that respect, I think it's a field in which curious people can achieve great things. It's our job to provide education and a work environment in which these employees can be highly motivated to engage in their duties.

Proactively working with local companies that have various technical expertise will contribute to

recovery in Fukushima. In March, we created the Mid/Long-Term Decommissioning Action Plan that shows what work needs to be done when at Fukushima Daiichi over the next 10 years.

Sharing this plan with local companies will enable them to start making preparations to provide the technical skills that will be required in the future. The skills of local companies will be cultivated through the decommissioning process, and when that takes root Fukushima will become the birth place of that technology as it spreads to other regions. By creating an environment such as this we can balance recovery with decommissioning and accelerate recovery in Fukushima.

A word from one of our leaders

“Weave safety and quality into the process and approach it like it’s a personal responsibility”

Director, Nuclear Power & Plant Siting Division
Deputy GM, CFAM Supervisor

Takeyuki Inagaki

Embodying the Management Model

The mission of the Nuclear Power & Plant Siting Division is to “provide efficient nuclear power at the world’s highest levels of safety” in accordance with the Management Model, which carries on the spirit of the Nuclear Safety Reform Plan. We are employing Toyota-type kaizen activities as a means for embodying the objectives of the Management Model. Our basic plan is to move forward with the awareness that kaizen “is what our work is all about.”

We intend to reach a point where we have weaved safety and quality into the process to a degree that if we are abiding by the process, we can guarantee safety and quality on our own and not have to depend on inspections to identify problems. To achieve this, I have asked all Division personnel to create a visual representation of their duties. Upon clarifying who does what in regards to individual tasks, and examining how safety and quality are being guaranteed, it is important to identify problems and move forward with activities to resolve these problems. Furthermore, we are proactively learning from, and incorporating, precedents set by other divisions and other companies as well as other power stations and JERA, which runs our thermal power business.

Get out into the field and think about issues with workers

In order to make these activities prevalent throughout the company department leaders need to display leadership. I have continued to frequently go to power stations to see conditions in the field and the condition of actual equipment with my own eyes, and then engage in deep discussions with general managers and group managers about individual issues. About three years after these activities were started, I began to see younger employees eagerly participate. This made me fully realize that when supervisors display leadership and department members fully comprehend the meaning of that action and approach their duties as a “personal responsibility,” things go in a better direction.

Currently, CFAM/SFAM※, who are responsible for leading us to the world’s highest levels of safety in each functional field of the Management Model, are also responsible for driving kaizen activities. At Kashiwazaki-Kariwa there are five CFAM and a kaizen officer from Headquarters who patrol the field to ascertain the state of worker behavior and equipment conditions. They then come together with power station personnel to discuss issues, identify problems and formulate solutions. My intention is to have personnel from Headquarters also go out into the field in order to see conditions with their own eyes, think along with workers, and discuss issues in order to achieve our ideal state.

Conveying to younger employees the true meaning of “Never forgetting Fukushima”

I would like younger employees who are not shackled by conventional norms to ask questions without hesitation if they feel that there is something unusual about equipment status, the behavior of workers, or the way that their own duties are to be carried out. And, leaders have to create an environment in which employees can speak up about irregularities.

It’s been approximately 10 years since the disaster and the number of younger employees who were not at the company when the accident occurred is increasing. In order to ensure that the lessons we learned from the accident are not forgotten, I will continue to convey to younger employees why their job is important and the importance of our ultimate objective of achieving the world’s highest levels of safety.

※CFAM（Corporate Functional Area Manager: HQ）/SFAM（Site Functional Area Manager: Power stations）: Leaders in each functional field of the Management Model that engage in activities aimed at achieving the world’s highest levels of safety.

A word from one of our leaders

Improving safety and quality by developing activities that focus on field conditions and the condition of actual equipment in the field

Decommissioning Engineering Company, Fukushima Daiichi Nuclear Power Station

Kazuo Yashiro

Kaizen and safety/quality are two sides of the same coin

The basic idea is how to move forward with kaizen without lowering safety and quality. Kaizen and safety/quality are two sides of the same coin, and by promoting kaizen activities we can ultimately improve safety and quality.

However, at current time we are still in the process of conveying this idea to each and every employee. Since the degree to which we can get employees to engage in kaizen activities with a certain objective in mind is important, the Kaizen Office will formulate measures that make it easier to engage in these initiatives while upper management displays strong intent and leadership. These two elements will be inseparable as we move forward with these activities.

Leveraging things noticed in the field in the course of kaizen activities

This is the third year of kaizen activities and various kaizen have been implemented throughout the organization. Up to now we have focused our energies on raising the flag of action and getting everyone to act. However, recently we've been able to have detailed discussions about exactly what type of activities we should engage in.

Currently, I go into the field with two group managers on Monday and Tuesday of every week to discuss things that we notice in the field and identify areas for kaizen. Furthermore, we are also providing guidance briefings to primarily department heads. We also participate in guidance briefings given at other power stations and in other divisions, such as the thermal power division, and proactively share information with the Headquarter Improvement Promotion Office and other industries. Good initiatives in these other industries, etc., are also referenced in the course of our kaizen activities. Since we have been confined to the Nuclear Power Division in certain ways until now, it's very helpful for us as we move forward with these activities to be able to leverage various benchmarks.

Aiming to improve engineering skills as we promote in-house manufacturing and in-house maintenance, etc.

As we aim to improve safety and quality, one of the ideal states we are looking to achieve involves strengthening our engineering skills. In order to improve safety and quality we must be intimately familiar with the field and equipment in the field, as well as actual work being done in the field. There are still many places where kaizen is required in the field. In order to ascertain these areas for improvement, we are currently promoting in-house manufacturing and in-house maintenance, etc., in the Nuclear Power Division so that we can engage in tasks ourselves. Moving forward with these activities will ultimately lead to an improvement in engineering skill.

I want younger employees to learn the skills they need to engage in in-house work, and carry out their daily duties with the motivation to overcome future challenges that they will face during the decommissioning process. In order to do this, we are focusing on helping each individual to set objectives and cultivate human resources.

Examples of Initiatives underway at Fukushima Daiichi

All personnel are uniting to explore the possibilities of remotely operated equipment in order to improve safety

Project Explanation

Since cracks in the exhaust stack tower caused by the Great East Japan Earthquake and Tsunami were found the top half of the stack is being dismantled in order to reduce the risk of injury to personnel or damage to equipment if the tower were to topple.

Remotely operated equipment is indispensable for decommissioning, but this was the first time that it had been used for this type of project. Therefore, everything from examining the dismantling method and procedures, to solving problems, was attempted for the first time. The knowledge and experience gained from this project will be leveraged during decommissioning work still to come.

T7

When we heard from TEPCO about dismantling the Unit 1/2 exhaust stack, our first thought was the fact that we wouldn't be able to get people close to the bottom of the exhaust stack to erect scaffolding as usual in these circumstances due to high radiation levels. So, in consideration of worker safety, we decided to explore the possibility of dismantling the exhaust stack using remotely operated equipment, something that had never been done anywhere in the world. ABLE Co., Ltd. is a local company located in Oguma Town, Fukushima Prefecture, and we've been involved in work at Fukushima Daiichi from prior to the disaster. In a way we consider Fukushima Daiichi "our plant" as well, and were strongly motivated to do anything we could to help.

Prior to beginning construction, we repeatedly ran tests on an 18m tall mockup of the exhaust stack. However, since the actual exhaust stack was 120m tall, the conditions, such as the impact of wind and warping caused by the age of the structure, etc., differed, and the project did not go as smoothly as we had anticipated. In particular, when we were cutting the first block, we got about one fourth of the way through and then were unable to cut any further. When it ultimately took a month to finish cutting one block, people around us started to get worried and asked, "Will you be able to finish this job?" We heard some harsh opinions that made a lasting impression.

It also took considerable effort to get each and every person actually working on the project in the field to understand their role and the objectives of the project. In spite of that, however, as a result of having all parties involved from different fields and occupations express their honest opinions with each other, find optimal methods through trial and error and work together as one, from the fourth month work went unimaginably smoother than the previous three.

Executive Director and Sales Department General Manager, ABLE Co., Ltd.

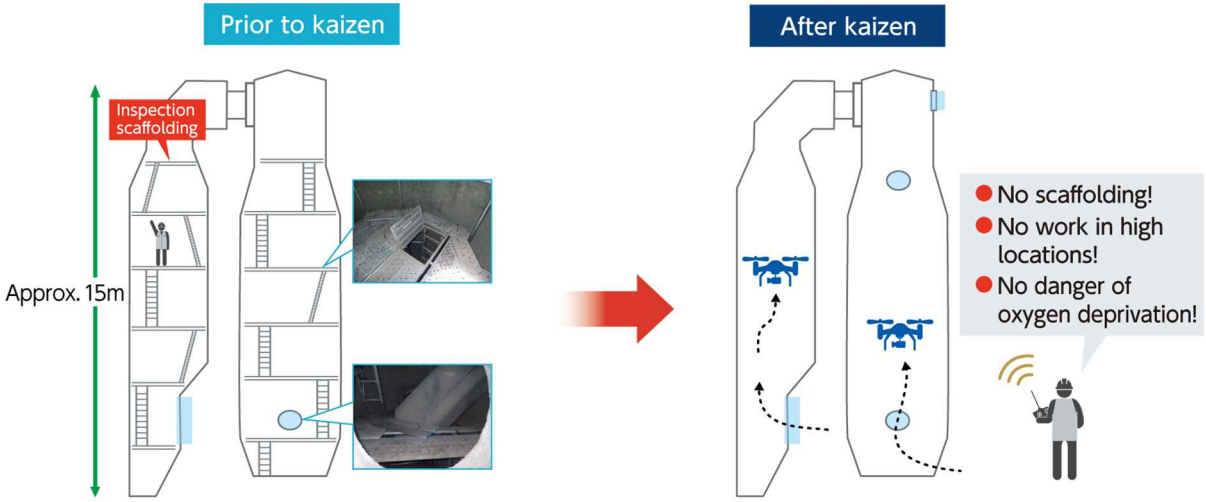
Isamu Okai

Section Chief, Daiichi Construction PJ Group GL, Daiichi Construction Department, ABLE Co., Ltd.

Tetsuo Sato

Examples of Initiatives underway at Fukushima Daiichi

Having workers feel a sense of ownership of the plant



Examining whether drones can be used to perform internal inspections

Project Explanation

Waste, such as personal protective equipment used in the course of work, is turned into ash by incinerating it in the miscellaneous solid waste incinerator facility thereby reducing its volume, after which it is stored as radioactive waste. During inspections and repairs of this incinerator facility workers are exposed to radiation, and the necessity to inspect equipment at high locations where it is dark and there is poor ventilation, increases the risks associated with this task.

So, we are revamping procedures and reducing risks by having employees thoroughly understand the structure of incinerator equipment and how it is inspected, go into the field to observe equipment and work being done on it, and having them perform inspections themselves. Furthermore, we are looking back at past nonconformances to thoroughly ascertain the causes. Recurrence prevention measures are proposed through coordination with in-house research departments, and the effectiveness is examined.

T8

Miscellaneous solid waste incinerator equipment inspections have always been delegated to contractors. Due to the vast amount of equipment that needs to be inspected, and the content of those inspections, the facility would have to be shut down for several days. In addition, the facility also needs to be shut down if there are nonconformities, so daily adjustment and management was a task that we struggled with. When a detailed examination of inspection records was conducted, we found that criteria for requiring inspections and replacing consumables were vague, and began to think that if we were a little more innovative the workload, and the risks associated with it, such as injuries, etc., could be reduced.

So, we began to take a second look at the requirements for inspections, perform inspection work in-house, thoroughly ascertain the cause of nonconformities, and examine recurrence prevention and recovery measures. For example, we tried to incorporate new technology, such as using drones to inspect locations that are high off the ground instead of assembling scaffolding as usual.

Frequently going into the field and conducting in-house work became beneficial as we are able to invigorate communication with managers from contractors. And, our awareness of safety and quality was also heightened. Going forward we will attempt to perform other work in-house with a sense of ownership of the plant. In the future it would be wonderful if we could approach tasks with the same knowledge and technical expertise as an engineering company.

Manager, Shared Equipment Group, Machinery Department,
Construction/Operation/Maintenance Center,
Fukushima Daiichi Nuclear Power Station

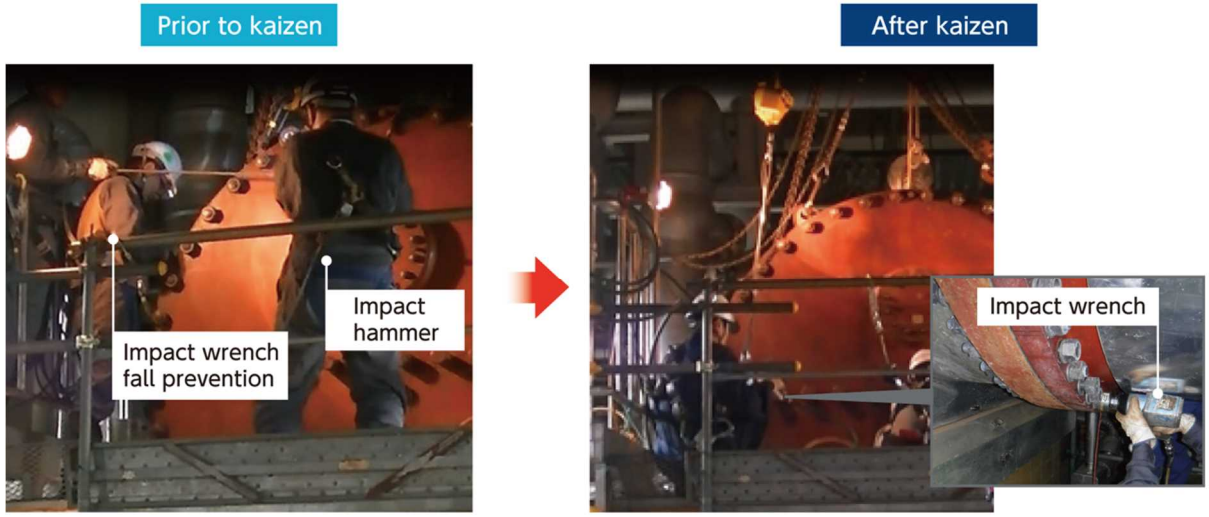
Ryoichi Endo

Team Leader, Shared Equipment Group,
Machinery Department,
Construction/Operation/Maintenance Center,
Fukushima Daiichi Nuclear Power Station

Akira Imafuku

Examples of Initiatives underway at Kashiwazaki-Kariwa (Contractors)

Examine issues along with field personnel and deepen understanding



Kaizen for the removal and tightening of water chamber bolts/nuts

Project Explanation

There are many pieces of equipment required to produce power that generate heat, such as motors and lubrication, so cooling is necessary. A heat exchanger is used to remove this heat using water cooled by seawater, and this heat exchanger is periodically disassembled for inspection.

Massive bolts and nuts are used to tighten equipment used for feeding seawater, and conventionally a hammer was used to strike a wrench in order to accomplish this. By using an impact wrench instead of this combination of a hammer and a wrench, which required strength, experience, and a feel for the tools, we were able to not only reduce the risk of injury and equipment damage, but also enable the nuts to be loosened appropriately. This also reduced the burden on the worker having to swing the hammer.

Since TEPCO wants to revamp the seawater heat exchanger work we are examining possibilities while talking to workers and team leaders in the field engaged in these duties to find out if there are any tasks that take time, or are difficult to complete. We've been formulating various ideas with the attitude of attempting whatever we can think of.

There were people who considered revamping procedures bothersome, but we repeatedly explained our position carefully until they understood that worktime would be shortened and that workload would be reduced. After they experienced for themselves that workload had been reduced, they commented that they were glad the changes had been made and participated more proactively in the process with the feeling that it is worthwhile.

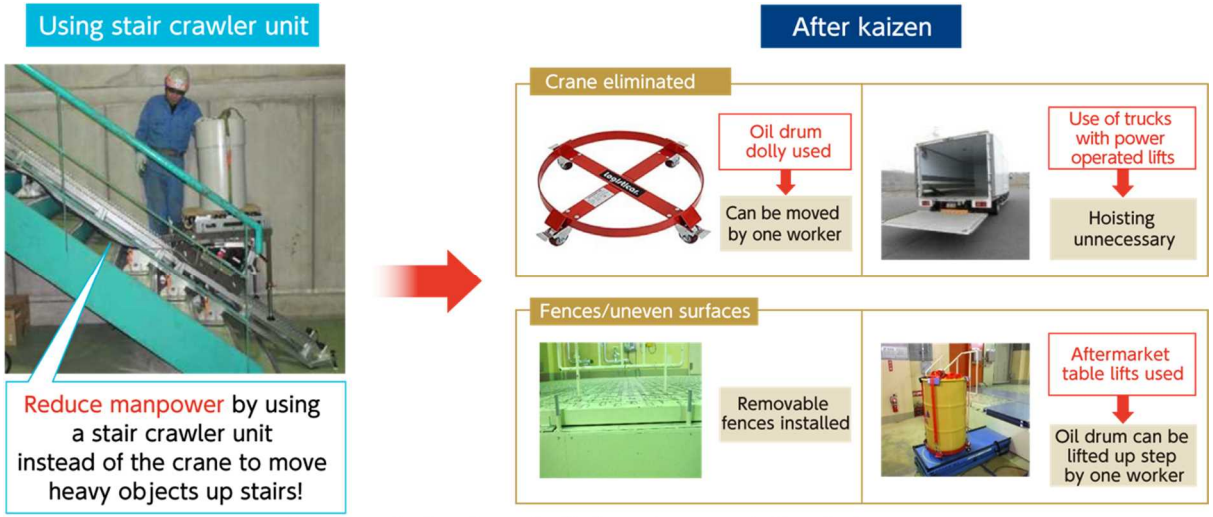
One task that left a lasting impression on me was the removal of large bolts and nuts. Conventionally, a large hammer was used to strike a wrench which posed the risk of injury if a worker missed, as well as the risk of damaging equipment. By using a pneumatic impact wrench, we were not only able to reduce the risk of injury associated with using a hammer, but also reduce the number of workers and the time needed to perform the task, and ensure quality.

Going forward, we will make various changes along with TEPCO, such as replacing scaffolding with movable work platforms thereby eliminating the need to assemble and disassemble scaffolding.

Chief, Daini Machinary Group, Niigata Brach, Nuclear Power Division, Tokyo Energy & Systems Inc.
Yasutsuna Watanabe

Examples of Initiatives underway at Kashiwazaki-Kariwa (Contractors)

Sharing information on objectives creates stronger team awareness



Solid waste treatment oil drum transportation kaizen

Project Explanation

Radioactive solid waste generated at the power station is put into oil drums and transported to the solid waste storage warehouse for storage. The stored oil drums are opened in the waste treatment building where the contents is sorted. After this the waste is solidified using mortar and put into transport containers that are transported through the site and put onto ships. The ships then carry the waste to the Japan Nuclear Fuel Limited low-level radioactive waste reclamation facility located in Rokkasho Village, Aomori Prefecture.

By examining the processes used to handle radioactive waste and heavy objects, and making changes to the equipment and procedures used, we have been able to reduce the number of workers needed to engage in these tasks, as well as the time required to complete them. As a result, we've been able to eliminate the risk of reductions in safety and quality, and improve productivity.

When we looked at the entire series of processes required for treating radioactive solid waste, we noticed inefficient aspects, such as the facts that many workers were involved, and that waste was sorted several times and being touched frequently. So, for each individual step we engaged in kaizen activities from the perspectives of, "Is this process necessary?" and "Have we merely convinced ourselves that this can't be done a different way?"

We are engaging in these activities in coordination with TEPCO, which is providing various types of information. Some of the information provided by TEPCO Power Grid was on a stair crawler unit for carrying transformers up and down stairs. Up until now, multiple workers would use a crane to lift oil drums, but after watching the video on this device, we altered procedures to use this stair crawler to carry oil drums up the stairs. This has enabled the task to be carried out by only one worker, and also eliminates risks associated with dropping heavy loads and the dispersion of radioactive substances. Furthermore, by standardizing this work through a series of initiatives, we have eliminated discrepancies in procedures that will lead to improvements in work safety and human error prevention.

Workers from TEPCO and TEPCO Power Technology have become better team players as they have worked together towards a common goal. The atmosphere in the field is one of unity and everyone wants to make things easier. I would like to see everyone work to "make work even easier," with the attitude that, "kaizen are not special activities, but rather the primary objective of our jobs."

Safety Management Group Manager, Niigata Nuclear Power Office, Tokyo Power Technology Ltd.

Takashi Hasegawa

Examples of Initiatives underway at Fukushima Daini

Improving our ability to perform tasks in-house has deepened our relationship with contractors

Project Explanation

Since FY2013 we have been engaged in initiatives to provide employees with the skills to inspect and repair important equipment needed to cool reactors in the event of emergency, such as pumps. In light of the lessons learned from the Fukushima Nuclear Accident, our objective is to be able to move quickly forward with repairs without depending on external help and minimize damage in the event of an emergency.

These initiatives started with learning how to conduct simple tasks in-house and have evolved into being able to conduct disassembly inspections of large, complicated equipment, such as emergency seawater system vertical pumps. Now that employees can engage in these tasks with a deep understanding of equipment structure, we have been able to shorten the time periods during which important equipment is inoperable due to inspections.

When the Fukushima Nuclear Accident happened, we were dependent upon contractors for equipment repairs and became painfully aware of the need to improve our ability to perform tasks in-house during an emergency. This led us to conduct training to strengthen in-house technical field skills, after which in-house repair teams were created within maintenance departments. Team members include workers with proficiency in mechanical/electrical equipment and instruments in anticipation of enlarging the scale of work managed in-house.

Recently, we are engaged in disassembly inspections of emergency seawater system vertical pumps. In order to learn how to disassemble and inspect vertical pumps, team members trained with manufacturers for three weeks disassembling and assembling spare parts while receiving advice and instruction thereby obtaining the required skills. During this training we realized that manufacturers had different methods and procedures for pump inspections. So, members engaged in discussion and revised procedures by comparing these different methods. The resulting suggestions were presented to contractors and adopted.

Obtaining the skills required to conduct these difficult vertical pump inspections in-house has enabled us to engage in technical discussions with contractors about equipment and inspection work thereby deepening our relationship. Furthermore, contract workers now engage in tasks with the awareness that they are being watched by people who know what they are doing, which has led to behavioral changes of everyone in the field.

Going forward we shall pass on the in-house technical skill that we have obtained to the next generation and increase the scope of in-house manufacturing to meet the needs of the power station, such as being able to conduct emergency inspections.

Daiichi Machinary Group Manager, Maintenance Department,
Fukushima Daini Nuclear Power Station
Yasunori Arakawa

Progress Report


Professionalism
Being self-critical
Helping colleagues
Safety Awareness
Technological Capability
Ability to Promote Dialogue
Business Plan
Management Model
Decommissioning Strategy
Fundamentals

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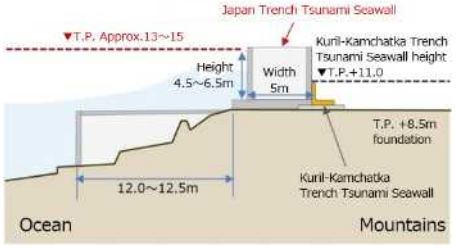
Progress Overview

Progress with Safety Measures at Power Stations

■ Fukushima Daiichi

In April, the Cabinet Office held a meeting to examine models that simulate massive earthquakes originating near the Japan Trench/Kuril–Kamchatka Trench and it was newly determined that a tsunami in the Japan Trench caused by one of these earthquakes may be imminent. Therefore, at Fukushima Daiichi we conducted a tsunami analysis that reflects newly built structures along the coast. Analysis results indicated that a tsunami originating from the Japan Trench (tsunami height: 11.8m above sea level) would inundate the Unit 1 and Unit 4 reactor buildings to a height of 0.3m, and the Unit 1 turbine building to a height of approximately 1.4m. In light of this assessment, from FY2021 through FY2023 we will newly build a Japan Trench Tsunami Seawall in order to mitigate the risk of having decommissioning work delayed due to a tsunami. Since the Kuril–Kamchatka Trench Tsunami Sewall was completed during the second quarter (September 25), we shall start construction to reinforce the seawall this fiscal year based on the results of the Japan Trench tsunami assessment. In conjunction with this, we aim to reduce tsunami-related risks by sealing all openings in buildings in order to prevent the accumulated water in R/B, etc. from being pulled out by tsunami drawback.

Kuril–Kamchatka Trench Tsunami Seawall



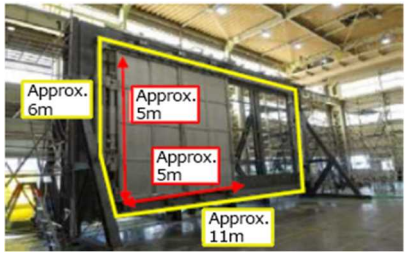
Japan Trench Tsunami Seawall (Concept drawing)

■ Kashiwazaki-Kariwa

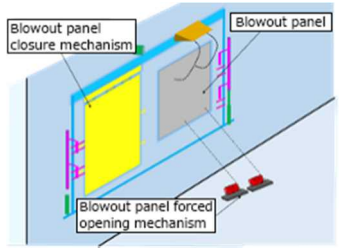
On September 25, a revised construction plan permit application for Unit 7 that included detailed design, updated work schedules, review meeting discussions, and changes made in conjunction with revisions to the Nuclear Reactor Regulation Law, was submitted and the permit was received on October 14.

The safety regulations (authorized on October 30), which also state how to apply for an installation permit, note the seven promises made by the President in his reply to the Nuclear Regulation Authority. In these promises it notes that the president is responsible for the decommissioning of Fukushima Daiichi and for improving the safety of all nuclear power stations under the major premise that TEPCO is responsible for the Fukushima Nuclear Accident. Furthermore, these promises incorporate a mechanism in which the president is instrumental when it comes to being involved in serious risk-related decisions based on various types of risk-related information gathered by each department, and must fulfill his/her responsibility for safely operating nuclear power stations.

Based on the installation modification permit, we are in the process of making safety measure renovations and meticulously designing various pieces of equipment to reflect the lessons we learned from our experience during the Fukushima Nuclear Accident. At Unit 7, we started to install a mechanism that will allow us to quickly and remotely close blowout panels in the event that they open in order to counteract rising pressure inside the reactor building (July 8). Going forward we will continue to listen to the opinions and concerns of local residents, and prioritize safety in accordance with our policy of accurately ascertaining field conditions and the actual condition of equipment in the field.



Blowout panel closure mechanism (before installation)



Blowout panel closure mechanism overview

■ Aomori Region

In conjunction with revisions made to the Nuclear Reactor Regulation Law concerning the introduction of the new inspection system, which took effect on April 1, safety regulations for the Higashidori Nuclear Power Station Construction Site were submitted and approved (September 16). These safety regulations stipulate mechanisms required to maintain safety and manage quality from the design and construction stages of a nuclear reactor facility. Even at the construction site, we shall comply with safety regulations and prioritize safety as we move forward with the design and construction of this power station.

Progress Report (Management)

Visit to Fukushima Daiichi by Prime Minister Suga【External Communication】

On September 26, Prime Minister Suga visited Fukushima Daiichi for the first time since taking office. The Prime Minister was shown welded tanks where treated water is being stored, and was also given a close look at decommissioning work underway from high ground on the west side of the Units 1~4, where radiation level reduction measures are being implemented. The Prime Minister was also briefed on the characteristics of treated water resulting from the purification of contaminated water using multi-nuclide removal equipment. The Prime Minister commented that, "I know this is a very difficult task, but I'd like you to continue safely and steadily. The government will continue to do all it can to help you and provide support."

Visit by Prime Minister Suga (Fukushima Daiichi)

Emergency response training (HQ)

Joint training between Fukushima Daiichi and Fukushima Daini 【Responding to Emergencies】

During general training held on September 11, a joint training session was held between Fukushima Daiichi and Fukushima Daini personnel based on a simulated large-scale earthquake with a hypocenter in Hamadori, Fukushima Prefecture. During training, which was conducted amidst thorough Covid-19 prevention measures, such as having the Headquarter EDRC Commander give instructions from a different room outside of the Emergency Disaster Response Center (EDRC), trainees responded to a harsh scenario that simulated simultaneous disasters at multiple sites. During general training held in FY2019, problems were identified with how information was shared with the Nuclear Regulatory Agency during meetings to determine whether the simulated accident conditions met Clause 10 and Clause 15 requirements. In preparation for this, several scripts were written to convey various situations and during training these scripts were used to explain various necessary pieces of information, such as future repair strategies and repair forecasts, etc. However, although explanations given to the Nuclear Regulatory Agency were provided within the timeframe allotted between determining that accident conditions met Clause 10 and Clause 15 requirements, and confirming/certifying this decision, we will aim to further shorten the amount of time necessary to certify this decision based upon the required sufficient explanations.

Monitoring by the Nuclear Safety Oversight Office【Performance Monitoring】

Monitoring activities performed by the Nuclear Safety Oversight Office during the first and second quarters resulted in the following three recommendations:

- Detailed reviews of inspection procedures performed in preparation for the Unit 7 pre-use operator inspection yield valuable knowledge and know-how that should be organized and leveraged during inspections at other units to come. (Kashiwazaki-Kariwa)
- When designing new equipment, the requirement management process for taking stakeholder expectations from technical requirements and incorporating them into equipment specifications should be standardized. (Fukushima Daiichi)
- Headquarters and Fukushima Daiichi should coordinate to establish a process for the planned implementation of ALARA activities, and plan and implement awareness promotion activities in regards to eye lens exposure. (Fukushima Daiichi)

Kaizen examples【Implementing unending reforms and improvements】

At Fukushima Daini, on average approximately 1,000 pieces of clothing that require washing are generated each day by workers that must temporarily wear special work uniforms, gloves, and socks in radiation control zones inside reactor buildings, etc. There are 18 washing-related processes, and multiple workers must engage in each process. Therefore, we have adopted the slogan of, "Reduce work and say goodbye to the large trucks, large containers, and large washing machines." By replacing large dewatering washing machines and dryers with household washers and dryers, we have reduced the amount of clothes in each load thereby rendering storage and accumulation processes unnecessary. Furthermore, through kaizen, such as using wheeled trunks instead of trucks to move around clothing, each process now requires only one worker and we have been able to standardize work procedures and improve quality.

Post-Kaizen (Left: Household washer/dryer; Right: Wheeled-trunks)

Refer to 4 PI Results (p.33) for information on FY2030 PI results.

1 Progress with Safety Measures at Power Stations

1.1 Decommissioning Progress

At the 4th Cabinet Meeting on Decommissioning and Contaminated Water Countermeasures Held on December 27, 2019, the decision was made to revise the Mid/Long-Term Roadmap for the Decommissioning of the Fukushima Daiichi Nuclear Power Station. In conjunction with this decision, the decommissioning schedule was closely examined and it was determined that the "entire decommissioning process has been optimized." Furthermore, a Mid/Long-Term Decommissioning Plan 2020 was formulated to stipulate the "major work processes for the entire decommissioning process that shall be carried out by 2031" in order to achieve the objectives set forth in the Mid/Long-Term Roadmap and the Nuclear Regulation Authority's risk map. In accordance with our fundamental principle of "balancing recovery with decommissioning," we shall move forward with the decommissioning process while obtaining the understanding of regional residents and society, and carefully explain future forecasts for decommissioning work in an easy-to-understand manner.

(1) Fuel debris removal

■ Unit 1

In the reactor building we have started cutting away obstructions inside the primary containment vessel in order to secure an access route for inserting investigation equipment as we prepare to perform an internal investigation of the primary containment vessel (May 26). During the second quarter, we replaced nozzle units due to a nonconformance with an abrasive feed unit that occurred on July 7. Work recommenced on August 2 after confirming that there were no abnormalities, and we completed cutting away the grating on August 25. Thereafter, we noticed a nonconformance with the machine used to cut away steel underneath the grating and are currently investigating the cause. In addition to the grating that was cut away, another obstruction we face is electric wire conduits, which we will also cut away in accordance with future plans. Prior to cutting these obstructions away, the obstructions will be washed in order to suppress the generation of dust during cutting as we move forward while prioritizing safety with the goal of conducting an internal investigation during the second half of FY2020.

■ Unit 2

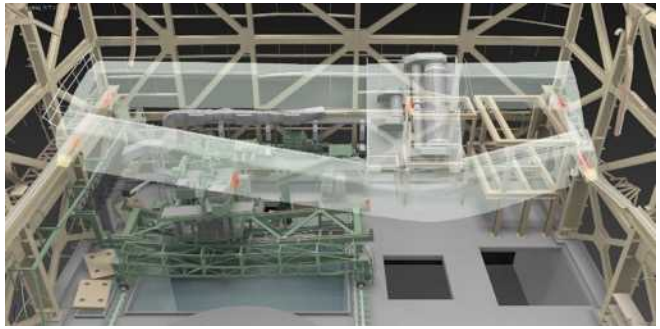
In May 2019, we stopped cooling water injection into the reactor for approximately eight hours in order to examine temperature trends at the bottom of the primary containment vessel all for the purpose of optimizing emergency response procedures. During the second quarter, we conducted tests of shutting off reactor cooling water injection for a longer period of time (three days between August 17 and August 20). Through these tests we were able to confirm that the rise in temperature at the bottom of the primary containment vessel is consistent with temperature assessment models, and we have been able to expand our knowledge that will aid us in examining cooling water injection in the future. Test results showed that temperature at the bottom of the reactor pressure vessel while cooling water injection was suspended rose approximately 11.5°C, and the temperature in the primary containment vessel rose approximately 0.5°C. These temperature changes were in the predicted range of fluctuation.

Going forward, we shall examine the suitability of our temperature assessment model by examining the discrepancy between actual and predicted temperature rises, the difference in behavior of temperature gauges, and also radiation data sampled before and after reactor cooling water injection was shut off. Furthermore, we will use this information to continue to examine cooling water injection, such as the possibility of conducting cooling water injection suspension tests over an even longer period of time.

(2) Removing fuel from the spent fuel pool

■ Unit 1

In order to remove fuel from the spent fuel pool we must first remove rubble, such as the collapsed steel frame of the roof. We plan to install supports underneath the ceiling crane and the fuel handling machine in order to reduce as much as possible the risk of having these two pieces of equipment fall due to changes in position and load balance when the collapsed sections of the roof on the south side of the reactor building are removed. During the second quarter, we began installing the supports under the fuel handling machine (October 6). Going forward we shall install supports underneath the ceiling crane. We will continue to steadily remove rubble while prioritizing safety as we prepare to remove fuel during FY2027 or FY2028.



Installing supports under the fuel handling machine (bottom left) and the ceiling crane (upper right)

■ Unit 3

The Unit 3 spent fuel pool contains 514 assemblies of spent fuel and 52 assemblies of new fuel (total: 566 fuel assemblies), and we began removing the spent fuel during FY2019. During the second quarter we continued to remove fuel and completed removal of 336 out of 566 fuel assemblies. This task had been going smoothly until September 2 when the cable used to send signals for displaying the open/closed status and seating status of the gripping tool was damaged after it got hung up on an object near the wall on the south side of the pool when fuel was being relocated inside the pool. The damaged cable was replaced with a spare and the gripping tool was also repaired at the same time. After confirming operability, we recommenced fuel removal on October 8.

Furthermore, to date we have found 16 fuel assemblies with handle deformations. On August 24 we confirmed that two of these fuel assemblies could be hoisted and a further investigation revealed that nine out of 16 of these fuel assemblies with deformed handles can be hoisted. Going forward, we will examine the degree to which these fuel assemblies are stuck and carefully examine how to proceed. We also plan to conduct hoisting tests on the remaining fuel assemblies. We will continue to move forward with this task while prioritizing safety and monitoring the concentration of dust in the surrounding environment as we aim to complete fuel removal by the end of FY2020.

(3) Contaminated water countermeasures

We continue to implement countermeasures to prevent contaminated water from leaking into the power station harbor and also prevent leaks of contaminated water from storage tanks based on the three basic principles of isolating groundwater from contamination sources; preventing contaminated water leakage; and, removing contaminated water.

■ Commencement of tests to confirm the performance of the secondary treatment of ALPS-treated water

ALPS-treated water stored in welded tanks at the Fukushima Daiichi site for which the sum of ratios of concentrations required by law, with the exception of tritium, equals or exceeds 1, is being subjected to secondary treatment to reduce the concentrations of radioactive substances to below legally allowed limits. Since we have completed the treatment of Sr-treated water (August 8), we are using approximately 2,000m³ of ALPS-treated water that had relatively high radiation concentrations prior to treatment to confirm the performance of secondary treatment through tests that we commenced on September 15. During these performance confirmation tests, the water is subjected to secondary treatment using additionally installed ALPS equipment to examine whether or not radiation concentrations have been reduced to levels that fall below legally allowed limits. Furthermore, in conjunction with these tests we examined nuclide analysis procedures and processes as secondary treatment was conducted (October 9). The treated water will be sampled and subjected to analysis and assessment. We shall continue forward with this task while prioritizing safety.

Secondary treatment performance confirmation tests

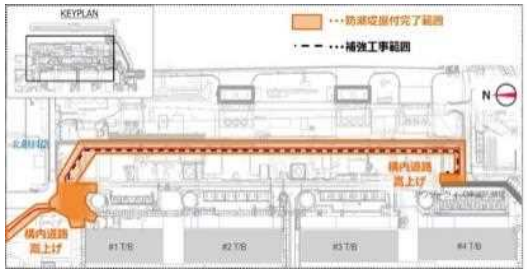
Additionally installed ALPS

(4) Construction of the Kuril–Kamchatka Trench Tsunami Sewall

On September 23, 2019, we began construction of the Kuril–Kamchatka Trench Tsunami Seawall in order to mitigate the risk of any delays to decommissioning caused by a tsunami originating in the Kuril–Kamchatka Trench, an event which is considered to be highly probable. This seawall is intended to reduce damage to important equipment caused by this tsunami and prevent an increase in accumulated water in conjunction with building flooding. This Kuril–Kamchatka Trench Tsunami Seawall was not built to satisfy regulatory requirements, but rather as an independent safety

measure, and our aim was to construct the wall and have it functioning as quickly as possible. During the second quarter we completed construction of this approximately 600m seawall (September 25). This seawall, which anticipates a tsunami originating in the Kuril–Kamchatka Trench, was designed to prevent flooding of areas around Unit 1~4 facilities that lie 8.5m above sea level from a tsunami with a maximum height of 10.3m above sea level after taking tide levels into consideration. Going forward, we shall reinforce the Japan Trench Tsunami Seawall in the third quarter in light of Japan trench tsunami assessment results (to be discussed later) as we continue to reinforce tsunami countermeasures.

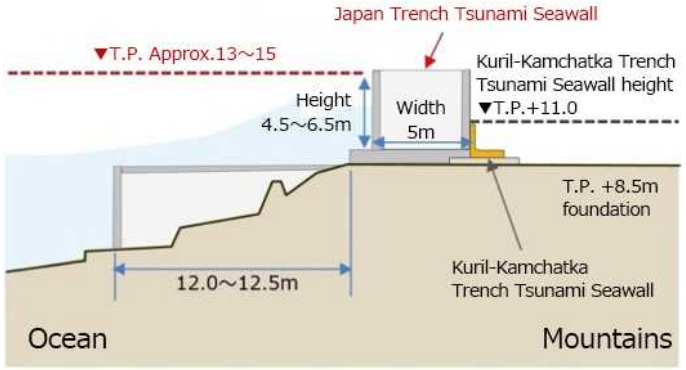
Kuril–Kamchatka Trench Tsunami Seawall



Scope of seawall construction

(5) New construction of a Japan Trench Tsunami Seawall

In April, the Cabinet Office held a meeting to examine models that simulate massive earthquakes originating near the Japan Trench/Kuril–Kamchatka Trench and it was newly determined that a tsunami in the Japan Trench caused by one of these earthquakes may be imminent. Therefore, at Fukushima Daiichi we conducted a tsunami analysis that reflects newly built structures along the coast. Analysis results indicated that a tsunami originating from the Japan Trench (tsunami height: 11.8m above sea level) would inundate the Unit 1 and Unit 4 reactor buildings to a height of 0.3m, and the Unit 1 turbine building to a height of approximately 1.4m. In light of this assessment, from FY2021 through FY2023 we will newly build a Japan Trench Tsunami Seawall in order to mitigate the risk of having decommissioning work delayed due to a tsunami. Since the Kuril–Kamchatka Trench Tsunami Seawall was completed during the second quarter (September 25), we shall start construction to reinforce the seawall this fiscal year based on the results of the Japan Trench tsunami assessment. In conjunction with this, we aim to reduce tsunami-related risks by sealing all openings in buildings in order to prevent the accumulated water in R/B, etc. from being pulled out by tsunami drawback.



Concept drawing of the Japan Trench Tsunami Seawall

(6) Visit to Fukushima Daiichi by Prime Minister Suga

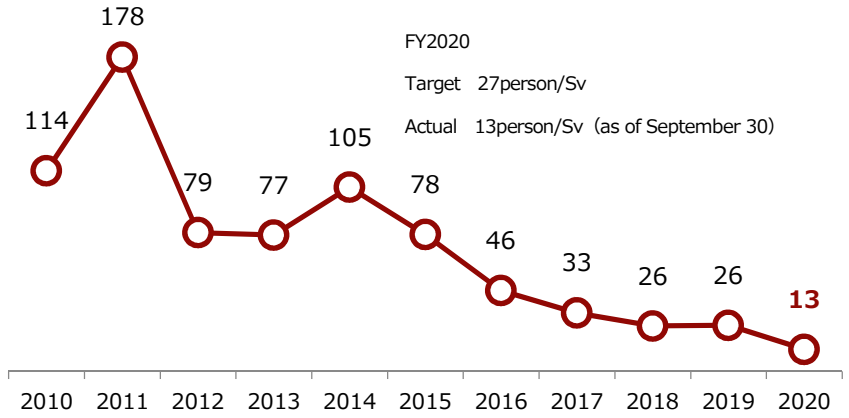
On September 26, Prime Minister Suga visited Fukushima Daiichi for the first time since taking office. The Prime Minister was shown welded tanks where treated water is being stored, and was also given a close look at decommissioning work underway from high ground on the west side of the Units 1~4, where radiation level reduction measures are being implemented. The Prime Minister was also briefed on the characteristics of treated water resulting from the purification of contaminated water using multi-nuclide removal equipment. The Prime Minister commented that, "I know this is a very difficult task, but I'd like you to continue safely and steadily. The government will continue to do all it can to help you and provide support."

High ground on the west side of Units 1~4

Examining treated water

(7) Initiatives aimed at reducing exposure dose

At Fukushima Daiichi, we are examining countermeasures to reduce exposure from an engineering perspective upon estimating during the planning stages the degree of exposure that will be experienced during various tasks, and assessing the increases or decreases in exposure risk in accordance with the Mid/Long-Term Roadmap. Furthermore, during the work implementation stage, remote monitoring systems are being used (March 2019) as a means for strengthening the management of high-dose work, etc. During the second quarter, this remote monitoring system was newly employed for 14 tasks including, "consignment of rubble removal from the Unit 2 waste treatment building," thereby bringing the total number of tasks to which the remote monitoring system has been applied since March 2019 to 23. Since these systems can monitor worker exposure doses and work area dose rates in real time, they enable work orders and high-dose area evacuation orders to be given remotely thereby serving as an effective tool for reducing exposure. We will continue to proactively use these systems inside the reactor buildings and for high-dose work projects in the vicinity.



Trends in total group dose by fiscal year

1.2 Progress at Kashiwazaki-Kariwa, Fukushima Daini and Aomori

1.2.1 Progress with Safety Measures (Kashiwazaki-Kariwa)

(1) Progress with Safety Measures

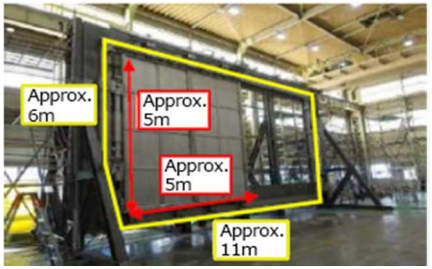
At Kashiwazaki-Kariwa, permission to modify the reactor installation permits for Units 6 and 7 was received from the Nuclear Regulation Authority on December 27, 2017 after which we established a basic design plan. Since then, we have moved forward with safety measure renovations and the detailed design of various pieces of equipment at primarily Units 6 and 7 based on lessons we learned during the Fukushima Nuclear Accident and in accordance with this plan.
The progress we have made with safety measures during the second quarter can be seen in the chart on page 9.

(2) Status of Unit 7 design and construction plan permit application and the application to modify safety regulations

On September 25, a revised construction plan permit application for Unit 7 that included detailed design, updated work schedules, review meeting discussions, and changes made in conjunction with revisions to the Nuclear Reactor Regulation Law, was submitted and the permit was received on October 14. The safety regulations (authorized on October 30), which also state how to apply for an installation permit, note the seven promises made by the TEPCO President in his reply to the Nuclear Regulation Authority. In these promises it notes that the TEPCO President is responsible for the decommissioning of Fukushima Daiichi and for improving the safety of all nuclear power stations under the major premise that TEPCO is responsible for the Fukushima Nuclear Accident. Furthermore, these promises incorporate a mechanism in which the TEPCO President is instrumental when it comes to being involved in serious risk-related decisions based on various types of risk-related information gathered by each department, and must fulfill his/her responsibility for safely operating nuclear power stations. We are engaged in efforts to make this a reality while prioritizing safety and making sure to verify actual conditions in the field and the conditions of actual equipment.

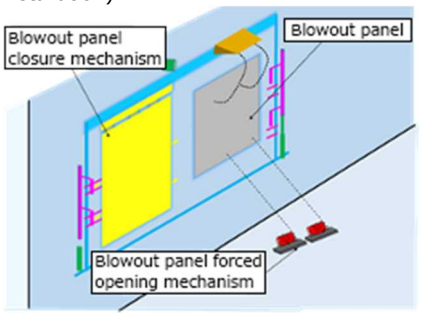
(3) Unit 7 blowout panel remote closure mechanism

On July 8, we started to install a mechanism at Unit 7 that will allow us to quickly and remotely close blowout panels. Blowout panels are installed in the walls on the upper most floor of the reactor building and designed to automatically open in order to counteract rising pressure inside the reactor building by allowing leaking gases during an accident to escape outside. The new regulatory requirements require that all openings be immediately closed after the building has been depressurized in order to reduce the exposure dose of operators responsible for responding to the accident. Up until now blowout panels were not able to be closed remotely. However, we have made improvements to this mechanism so that opened panels are ejected using a forced ejection mechanism and the openings are closed by sliding panels thereby enabling the openings to be closed via remote operation. Going forward, we shall steadily continue these renovations while prioritizing safety.

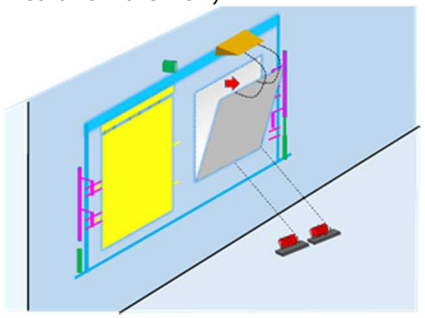


Blowout panel closing mechanism (Prior to installation)

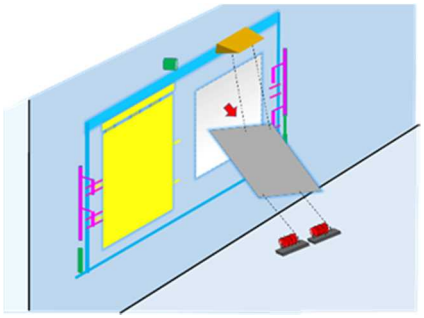
Bottom diagram (Blowout panel closing mechanism overview)



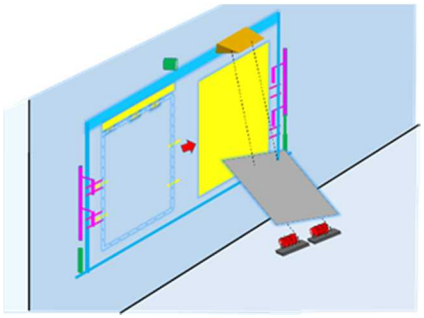
① Blowout panel in regular positions



②Panels open in conjunction with reactor building internal pressure levels



② Forced ejection by forced ejection mechanism



③ Opening closed by closing mechanism

(4) Seminar given to TEPCO in-house fire brigades by the Kashiwazaki City Fire Department

A seminar was given by the Kashiwazaki City Fire Department to TEPCO in-house fire brigades in order to improve their skills as part of measures to improve personnel-related aspects of safety countermeasures (August 20, 21). During the seminar, participants learned how to use fire trucks and hoses, and how to put on and take off breathing apparatus. The Kashiwazaki City Fire Department commented that, “Coordination is crucial in the event of a disaster. Having everyone convey information loudly even during training improves mutual coordination, and is something that fire brigades should strive to do when responding to a disaster in the event of an emergency.” Training will be continually implemented to ensure that in-house fire brigades can respond to emergencies.

Instruction on putting on breathing apparatus

Instruction on using fire trucks

1.2.2 Progress with safety measure renovations (Fukushima Daini)

(1) Impact assessment of a tsunami caused by a massive earthquake in the Japan Trench/ Kuril–Kamchatka Trench

In April, the Cabinet Office held a meeting to examine models that simulate massive earthquakes originating near the Japan Trench/Kuril–Kamchatka Trench and it was newly determined that a tsunami in the Japan Trench caused by one of these earthquakes may be imminent. Therefore, we conducted a tsunami analysis that reflects newly built structures along the coast. The analysis results showed that whereas the north side of the area in which primary buildings and facilities are located (12m above sea level) would be slightly flooded, no water would enter the reactor. Furthermore, whereas the possibility that the seawater heat exchanger building would be flooded cannot be denied, in addition to training on equipment repairs, we are also implementing training to ensure integrity by using portable equipment stipulated in emergency response procedures, such as fire trucks, to inject cooling water (active response) into the spent fuel pools to cool fuel.

1.2.3 Progress with construction preparations (Aomori)

(1) Safety regulation authorization

In conjunction with revisions made to the Nuclear Reactor Regulation Law concerning the introduction of the new inspection system, which took effect on April 1, safety regulations for the Higashidori Nuclear Power Station Construction Site were submitted on May 28. Thereafter, we submitted a revised application on August 31 that reflected the issues pointed out during the review meeting and received approval of the application by the Nuclear Regulation Authority on September 16.
These safety regulations stipulate mechanisms required to maintain safety and manage quality from the design and construction stages of a nuclear reactor facility. Even at the construction site, we shall comply with safety regulations and prioritize safety as we move forward with the design and construction of this power station.

Chart: Status of Progress with Safety Measure Renovations at Kashiwazaki-Kariwa (A ※ marks measures independently implemented by TEPCO)

Safety Measures		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

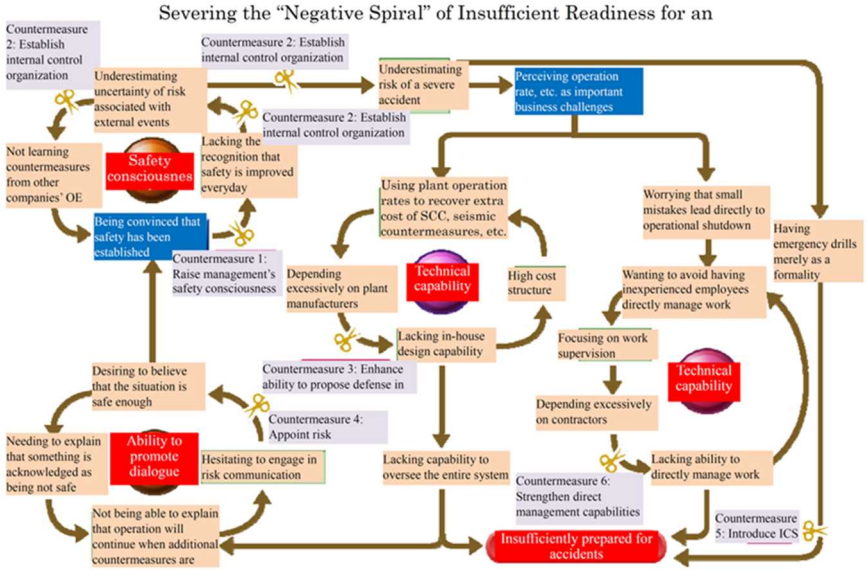
Safety Measures		Unit 6	Unit 7
	Installation of permanent bilge pumps in rooms housing important equipment	Completed	Completed
Preparations for power loss [Augmenting power sources]	Additional deployment of air-cooled gas turbine power supply cars	Underway	Underway
	Installation of emergency high voltage 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	Completed	

Safety Measures		Unit 6	Unit 7
	seismic resistance of switchyard equipment※		
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 water injection systems	Underway	Completed
	Building of water sources (reservoirs)	Completed	
	Enhancement of the seismic resistance of pure water tanks on the Oominato side※	Completed	
Preparing for damage to the primary containment vessel or the reactor building [Measures to prevent damage to the PCV and hydrogen explosions]	Installation of filtered venting equipment (aboveground)	Underway	Underway
	Installation of filtered venting equipment (below ground)	Underway	Underway
	Installation of substitute circulation cooling system	Underway	Underway
	Installation of equipment for keeping the top of the PCV filled with water※	Completed	Completed
	Installation of H2 control and 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	
	Blowout panel remote operation renovations	Completed	
Preparing for fires [Countermeasures for external and internal fires]	Construction of fire belts	Completed	
	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

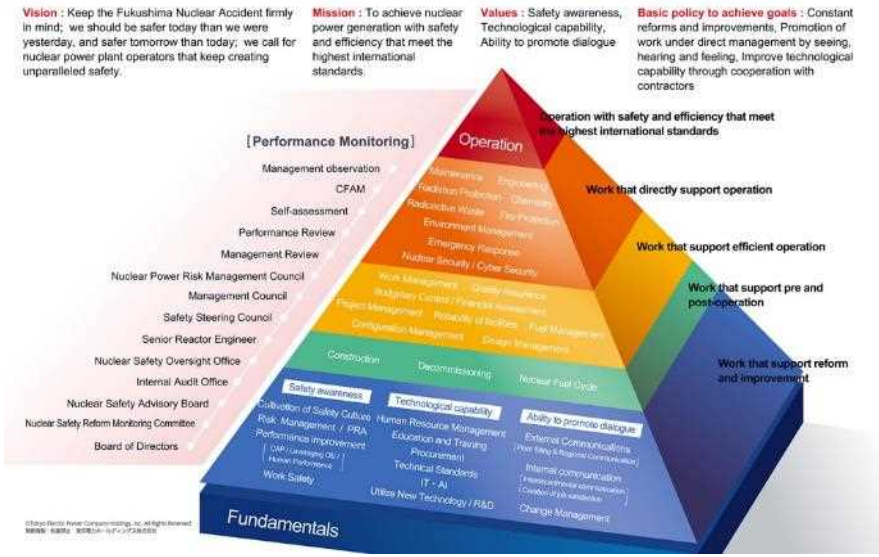
Safety Measures		Unit 6	Unit 7
	Installation of cable wrappings	Underway	Underway
	Construction of fire-resistant barriers	Underway	Underway
Addressing external hazards	Countermeasures for building openings	Underway	Underway
	Removal of objects that could turn into flying debris as a result of a tornado	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 (Intake channels, gas turbine generators, above-ground filter vents, etc.)	Underway	Underway
	Seismic resistance assessment/renovations of indoor equipment and piping	Underway	Underway

2 Nuclear Safety Reform Plan Progress

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, revised annually) and a 1F Decommissioning Management Model (February 2020). 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. In combination with these management models and the Decommissioning Promotion Strategy, the Nuclear Safety Reform Plan Progress Report gives updates on initiatives that focus on "Better Aligning the Vectors of the Organization (Strengthening Governance)," as well as "safety awareness," "the ability to promote dialogue," and "technological capability," which are the main values of the Decommissioning Management Model and the Nuclear Power & Plant Siting Division Management Model.



2.1 Aligning the Vectors of All Divisions

2.1.1 Strengthening Governance

(1) Permeation of the Management Model

The 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 FY2020 we will continue to engage in activities that aim for excellence upon creating business plans based on the Management Model.

■ Developing the Management Model and enabling it to permeate throughout the organization

In July, we revised the Management Model, which stipulates our basic policies for Nuclear Power & Plant Siting Division activities and how to move forward with projects in order to achieve our objectives, in accordance with changing conditions and

environmental changes. During the second quarter, we engaged in awareness activities, such as study sessions, designed to help each and every employee at Headquarters and each power station understand his/her own duties and proactively leverage the Management Model in the course of those duties. In particular, in addition to showing good examples of how the Management Model can be used and ways to reference the Management Model when reflecting upon work achievements and when proposing work plans, we are also conveying our expectations to managers and explaining how we want them to lead by example and be seen using the Management Model by subordinates. In the third quarter we shall distribute a questionnaire on the level of understanding and use of the Management Model in order to examine the effectiveness of the Management Model and also further identify issues and make improvements.

■ Improvement activities by CFAM/SAFM

CFAMs and SFAMs (Corporate Functional Area Manager/Site Functional Area Manager) have been assigned to each field of the Management Model to ascertain excellence achieved domestically and in other countries, identify key issues to be resolved, and formulate and implement improvements. Progress reports are periodically given to sponsors and the General Manager of the Nuclear Power & Plant Siting Division, and activities are being furthered while receiving advice and guidance from these parties (since April 2015).

Primary area CFAMs have been assigned to Kashiwazaki-Kariwa in accordance with the president's policies/instructions to "focus on actual field conditions and actual pieces of equipment" so that they can coordinate with power station personnel to resolve field issues. In regards to the project on kaizen to better manage temporarily installed field equipment that has the potential to impact safety in the event of a fire, flood, or earthquake, etc., (minimize the quantity of temporarily-installed equipment and optimize management), CFAM have been working together with the power station and we are seeing a decrease in condition reports (CR) that express concerns about temporarily-installed equipment. Going forward we shall create and develop kaizen projects in accordance with field issues as we solve these issues with the power station.

(2) 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.

Activities have been limited this fiscal year in order to prevent the spread of Covid-19, but from the third quarter we shall examine what kind of activities that can be engaged in while preventing the spread of Covid-19 in light of the opinions received from the questionnaire on the Decommissioning Strategy in an effort to promote permeation of the Decommissioning Strategy throughout the entire organization.

(3) Initiatives to reduce nonconformances at Fukushima Daiichi

The Nuclear Safety Oversight Office is the driving force behind the FDEC's efforts to reduce nonconformances by engaging in initiatives for improving safety and quality that focus on issues of concern noticed in the field and kaizen. In particular, due to numerous nonconformances related to radiation production, on September 25 decommissioning work was suspended as group education on radiation protection was provided to all contractors. Furthermore, in order to reduce later safety-related infractions, on September 24, a lecture on law compliance was given to contractors in cooperation with the Fukushima labor Office.

(4) Nuclear Power Division initiatives to prevent the spread of Covid-19

Since February 17, all Group companies have been enhancing initiatives to respond to risks associated with the Covid-19 pandemic based upon an action plan for handling novel influenza.

In the Nuclear Power Division, various measures have been implemented since the declaration of a state of emergency. For example, since the end of July, when the number of infections in the Tokyo Metropolitan area began to quickly rise again, employees were asked to work from home and to commute at different times to avoid congested public transportation. In addition, Headquarter general managers and higher were instructed to work from home and harsh restrictions were put on traveling to and from the Tokyo Metropolitan area during times when local governments have issued warnings and alerts (business trips to the Tokyo Metropolitan area from power stations, and business trips to power stations from the Tokyo were prohibited, etc.).

Furthermore, now that PCR testing is available, all personnel newly assigned to power stations or construction sites from outside of the prefecture are required to take a PCR exam prior to coming to the prefecture. As a result of these thorough Covid-19 prevention measures, we have had no new infections at TEPCO since May. TEPCO employees, partner companies and contractors will continue to work as one and engage in thorough countermeasures to prevent the spread of Covid-19 in order to eliminate any concerns that regional residents may have.

2.1.2 Internal communication

(1) Activities to promote dialogue

■ "August 29 Awareness Day" initiative

As we approached August 29, the day in 2002 when a TEPCO scandal involving falsified data came to light, each nuclear leader sent out messages detailing their expectations for improving awareness about corporate ethics. In addition to these expectations, employees also look through videos and documents explaining the details of the scandal, the countermeasures that were put in place, the impact that the scandal had on society, as well as the sense of crisis and hardship felt by all employees at the company at the time. Opportunities to engage in group discussion about how each and every employee should behave were also created. Going forward, we shall strive to improve awareness about corporate ethics through these types of activities as we approach August 29 every year.

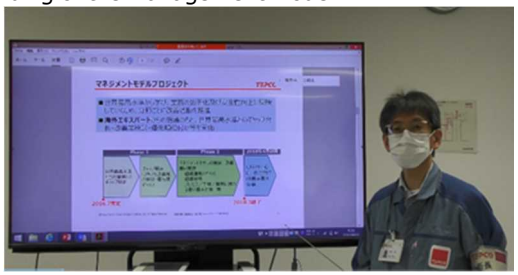
■ Promoting internal communication

Internal information sharing meetings at Headquarters, which is one of the activities we engage in to widely share information within the company, were temporarily suspended due to Covid-19, but on September 14 these meetings recommenced via online conferencing systems with discussion of the topic of "nuclear power in the future." There was particular interest in this meeting about the future of nuclear power because it included a report on the results of joint research on the topic with the Massachusetts Institute of Technology, and close to 100 power station and construction site employees participated. A questionnaire distributed after the meeting elicited many positive comments such as, "it was good to learn about our vision for nuclear power in the future," and "attending via an online conferencing system made it easy to participate." We will continue to hold meetings via online cup systems to enable every employee to obtain vital information about the Nuclear Power Division.

At Fukushima Daini, a symposium was held for personnel on our future vision for Fukushima Daini in light of the decision to decommission all reactors. And, working groups have been formed to hash out the details of opinions and ideas elicited from participants. In the decommissioning working group, a decommissioning newspaper is being published to answer the questions of personnel about decommissioning, and in the regional symbiosis working group, take-out menus for local restaurants are being provided to introduce them to personnel and to create opportunities to actually eat there. The happiness working group is in the process of building flowerbeds. These activities are being engaged in as part of Fukushima Daini's activities policy and we plan to further expand the breadth of these activities.

At Kashiwazaki-Kariwa, briefings were held for personnel on September 8 and 15 in order to further improve understanding of the Management Model, which was revised in July, and help them to permeate through the organization. During the briefings, the number of participants in the conference rooms was restricted in order to prevent the spread of Covid-19 and online briefings were also offered to enable employees working from home to participate. Participants listened intently to information on the details and objectives of Management Model revisions.

At the Aomori office and the Higashidori nuclear power station construction site, a briefing was given to personnel by the Site Superintendent on August 5 in order to improve understanding about the July revision of the Management Model and help it to spread through the workplace (live streaming of the briefing was also provided). Furthermore, each worker was given a pamphlet on the Management Model and SFAM hold regular study sessions for managers in order to further improve understanding of the Management Model. Group managers use the information they gained during these study sessions to promote understanding amongst subordinates as we strive to further improve understanding of the Management Model.



Management Model briefing (Higashidori Nuclear Power Station Construction Site)

The intention of the Sunflower Project, which was started at the FDEC last year, is to promote lively communication between generations and departments, fulfill the needs of employees and promote reforms from the ground up thereby improving job satisfaction.

(2) Using in-house media to share information

In-house media is being used as follows to share information within TEPCO HD and between TEPCO HD, core company employees and the Nuclear Power Division.

■ Company intranet videos

- "The Future Handling of Contaminated Water at Fukushima Daiichi Part 1 (Proposals being examined by TEPCO)" (July 2)

- “The Future Handling of Contaminated Water at Fukushima Daiichi Part 2 (Contaminated water and treated water)” (July 2)
- “The Future Handling of Contaminated Water at Fukushima Daiichi Part 3 (Tritium)” (July 2)
- “Conducting tours of the nuclear power stations (Covid-19 countermeasures)” (July 14)
- “The Whats and Whys of Energy ~Safety Measures at the Kashiwazaki-Kariwa Nuclear Power Station~ Part 1 Earthquake Countermeasures~” (September 2)
- “Nuclear Preparedness Training during Covid-19 ~Preventing Cluster Outbreaks in the Emergency Response Center~” (September 16)

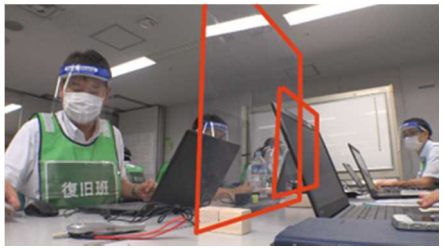
■ TEPCO Group newsletter

- “Frontrunners” An interview with employees that worked on the 1F exhaust stack dismantling project (July issue)
- “VOICE” Listening to Opinions from outside the Company Comments from neuroscientist, Dr. Kenichi Motegi, upon visiting the decommissioning archives and Fukushima Daiichi (July issue)
- The Renovated Service Hall Opens at the Kashiwazaki-Kariwa Nuclear Power Station (July issue)
- Decommissioning Project Report #20 “Battling Covid 19 and Heatstroke” (July issue)

■ “Messages from Management” sent via the intranet

- Participation in “Learning from the Fukushima Nuclear Accident” (September 23)

Going forward we will disseminate information that fulfills the desires of employees and leverages 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.



Company intranet videos
“Nuclear Preparedness Training during Covid-19 ~Preventing Cluster Outbreaks in the Emergency Response Center~”

TEPCO News Letter
“Frontrunners” An interview with employees that worked on the 1F exhaust stack dismantling project

(3) Sharing 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. We continue to disseminate information while also addressing work issues brought up by readers as part of initiatives that began in FY2018.

Questionnaires are distributed to ascertain the level of comprehension of emails sent to readers and results for the second quarter were good at 2.4 points (if half of the respondents’ rate of comprehension is 3 points (“well understood”) and, the other half of the respondents’ rate of comprehension is 2 points (“understood for the most part”), then the average is 2.5 points). 96% of employees that responded to the questionnaire indicated that they are comprehending the messages.

The following are some examples of emails sent during the second quarter.

- The President’s Expectations in the FY2019 Management Review (Nuclear Safety Management Department General Manager)
- FY2019 Operator Preparedness Training Assessment and This Year’s Training (Nuclear Power Plant Management Department Manager)
- Nuclear Safety Reform Plan – Public Release of FY2020Q1 Progress Report- (Nuclear Safety Management Department General Manager)

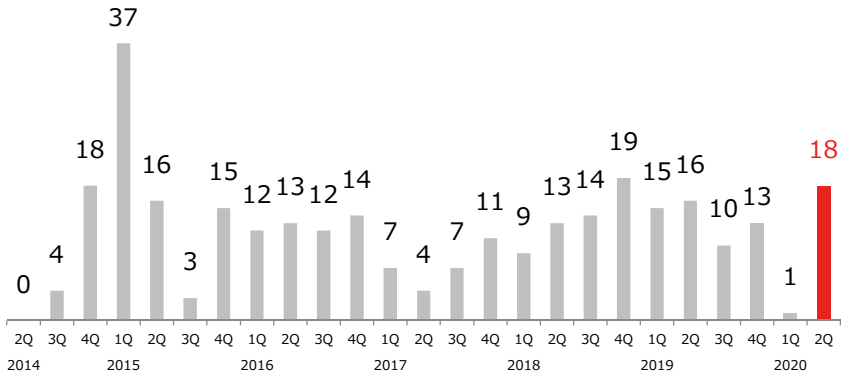
2.2 Improving Safety Awareness

2.2.1 Cultivating Nuclear Safety Culture

(1) Improving safety awareness

■ 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 FY2020, in order to prevent the spread of Covid-19, managing executive's at Headquarters and power stations engaged in dialogue via online conferencing systems. During the second quarter, discussions were held about how to effectively use human resources in conjunction with the progress of decommissioning being made at Fukushima Daini, information was shared about issues concerning safety measure renovations and inspections at Kashiwazaki-Kariwa, and how Headquarters should provide support was discussed (September 18).

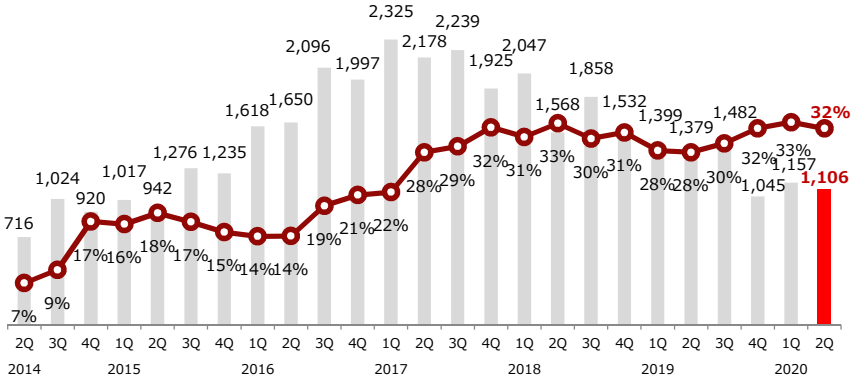


Number of times the Nuclear Power & Plant Siting Division GM engaged in direct dialogue with each department

■ 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 are examples of messages sent by nuclear leaders via the intranet during the second quarter.

- "Let's get focused once again!" Kashiwazaki-Kariwa Site Superintendent (July 1)
- "The information sharing trap" Project Management Office General Manager Matsumoto (July 7)
- "We are not striking out, we are doing batting practice! ~Preparing for natural disasters~" Higashidori Construction Site Superintendent (August 3)
- "Asking why and how" Fukushima Daiichi Site Superintendent (August 3)
- "Upon finishing the BCP examination period amidst Countermeasure #3 conditions" Fukushima Daini Site Superintendent (September 1)
- "Understanding and learning from distances, and making changes!" FDEC President (September 25)



Number of views per message sent via the intranet/"Helpful" assessment rate
(The last quarter does not include results for the last month of the quarter, which was shorter than the viewing period of one month)

■ Commendations given by the General Manager of the Nuclear Power & Plant Siting Division and the President of the Fukushima Daiichi Decontamination & Decommissioning Engineering Company

Since FY2015, the General Manager of the Nuclear Power & Plant Siting Division and

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

Commendations given by the General Manager of the Nuclear Power & Plant Siting Division and the President of the Fukushima Daiichi Decontamination & Decommissioning Engineering Company

Year	HQ	1F	2F	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	16(2)	33	10	14
FY2020				
Q1	0	0	0	0
Q2	5	0	4	5

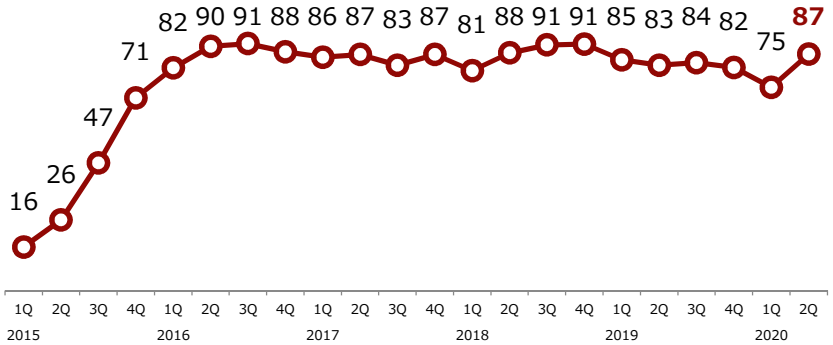
(Numbers in ( ) indicate the number for Higashidori from the total

(Note: No commendations were given during FY2020Q1 or Q2 because the initiative has been suspended due to Covid-19 countermeasures)

(2) Enabling the permeation of nuclear safety culture

■ Reflecting on the 10 Traits

In the Nuclear Power Division all personnel use the intranet system to reflect on whether or not they are embodying the Traits so that the act of reflecting upon the 10 traits and 40 behaviors (10 Traits) for robust nuclear safety culture will become second nature. Group discussions are held once every two weeks to discuss 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.
During the second quarter we assessed and discussed performance data, such as the status of implementation of work plans, etc., in light of the results of the management review from the perspectives of the Traits, and changed the frequency of group discussions from once every two weeks to more than once a month. Furthermore, even though group discussion implementation rate decreased during the first quarter as more employees worked from home and self-quarantined in accordance with Covid-19 prevention measures, during the second quarter the implementation rate recovered to approximately what it was last year. We will continue to strive to fill in the gaps between the Traits and our own behavior.



Group discussion implementation rate (%)

(Note: Some numbers for Headquarter departments are not included in the numbers for 2020Q1 due to Covid-19 prevention measures)

■ Activities to promote understanding through basic education

We have been engaging in activities to promote understanding about nuclear safety culture through reflecting on the 10 traits, however a self-assessment of safety culture conducted last fiscal year has shown that "there is no common awareness about safety culture," and a third-party review conducted thereafter by the World Association of Nuclear Operators (WANO) arrived at the same conclusion. Therefore, during this fiscal year we shall create standardized educational materials to provide basic education on safety culture while also moving forward with construction of mechanisms to provide this education to employees and contractors in order to achieve our goal of "having common basic educational materials on safety culture and a mechanism for providing such education."
During the second quarter drafts of educational materials for leaders and for practical application were created, and basic education commenced on a trial basis at Fukushima Daini. Since we have identified the necessity for all employees to be able to interpret the 10 Traits the same way, educational materials will be revised in order to further deepen comprehension. We will continue to examine standard educational materials and mechanisms for implementing basic education.

2.2.2 Performance Improvements (CAP)

(1) Promoting improvements corrective action programs (CAP)

We aim to make efficient and effective improvements by using corrective action programs (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 second quarter as well, we will perform a quarterly performance assessment of activities to identify common weaknesses and make corrections by analyzing and assessing the various data inputted into corrective action programs (CAP) at Fukushima Daiichi, Fukushima Daini, Kashiwazaki-Kariwa and the Higashidori nuclear power Station construction site.

(2) Making improvements through management observation

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 management observation (MO) at Fukushima Daiichi, Fukushima Daini, Kashiwazaki-Kariwa and the Higashidori nuclear power station construction site have been noted in condition reports to solve the problems and also inputted into corrective action programs (CAP) for continual analysis. Management observation (MO) results from each power station for the second quarter are as follows:

	1F	2F	KK
# of times implemented	867	589	1,064
# of times per month per manager	3.6 times/person/month	3.4 times/person/month	3.3 times/person/month
Good MO rate＊	–	56%	70%

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

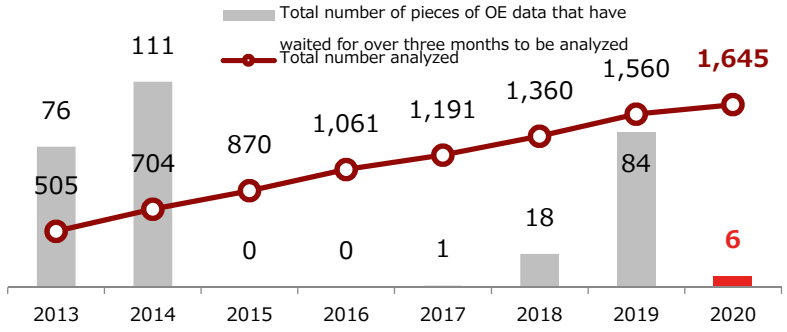
2.2.3 Leveraging operating experience

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.

(1) Gathering and sharing OE data

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, so a target period of "3 months to completion" was set for countermeasure deliberation in order to accelerate action. Furthermore, as a measure to prevent the recurrence of safety regulation infraction's like in the one found during the FY2018 safety inspection (insufficient preventative measures), we are implementing countermeasures such as IT tool-based monitoring.

During the second quarter, countermeasure deliberation was completed for 30 pieces of operating experience (OE) data (line graph), bringing the total to 85 when added to the 55 pieces of data from the first quarter. This brings the cumulative total since 2013 to 1645 pieces of OE data. However, two pieces of data were not processed within the allotted three-month time period (bar graph) thereby bringing the cumulative total for FY2020 to six when added to the four pieces of OE data from the first quarter.



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) Significant Operating Experience Report (SOER) and severe accident study sessions

All Nuclear Power Division employees, including general workers, attend intensive study sessions on World Association of Nuclear Operators (WANO) significant operating

experience reports (SOER) and important operating experience, such as the Browns Ferry Nuclear Power Plant fire, which has been selected as an example of "severe accidents that have occurred within and outside of Japan," to enable them to learn about these accidents, get an overview of the troubles that occurred, and understand the lessons that have been learned.

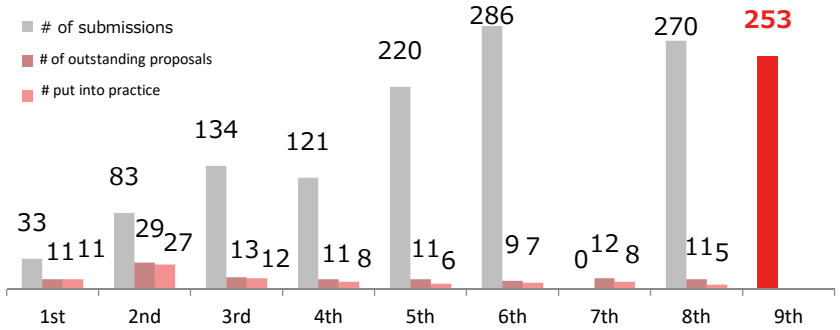
This fiscal year we plan to hold training on the KEPCO Mihama Nuclear Power Station Unit 3 pipe rupture accident, and have already implemented training sessions during the second quarter at the Higashidori Nuclear Power Station Construction Site (August 6) and Fukushima Daiichi (September 3). Going forward, we will continue to regularly hold study sessions on important operating experience (OE).

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

(1) Competitions to enhance the ability to propose a safety improvement measures

■ 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 thereby improving safety awareness and improve their technical prowess by having these proposals put promptly into practice. We have been accepting submissions for the 9th Safety Improvement Proposal Competitions from the third quarter of last fiscal year until the end of the first quarter of this year, and have received a total of 253 submissions. Furthermore, during the second quarter, final candidates were selected through a vote by all employees in the Nuclear Power Division. A final review by nuclear leaders will now be conducted to determine the most outstanding proposals.
The number of submissions and outstanding proposals through the eighth competition is as follows.



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. The number of outstanding proposals from the 9th competition will be selected going forward.)

■ Status of implementation of outstanding proposals

During the second quarter, one of the outstanding proposals from the 7th Competition to Enhance the Ability to Propose Safety Improvements was put into practice thereby reducing fuel risks.

● Improving the monitoring performance of area radiation monitors (Kashiwazaki-Kariwa)

In the event of an accident involving the rupture of pipes containing radioactive substances, it would be necessary to select access routes to the location of the accident and also to quickly evacuate workers from areas where radiation doses have increased. Therefore, we will be employing high resolution digital recorders that can monitor areas in which radiation doses are increasing in a timely manner for area radiation monitors used to monitor radiation doses in the field. Digital recorders for the aforementioned area radiation monitors were procured during the second quarter and will be gradually installed.

(2) Using hazard analysis to construct improvement processes

We have created approaches to, and mechanisms for, accidents and hazards for which the frequency of occurrence is largely uncertain and that have the potential to create a calamitous situation as the result of simultaneous and wide-scale loss of function caused by common factors when large enough loads are added, such as massive tsunami. In order to prepare for these hazards, we are engaged in proposing and

implementing countermeasures under the assumption that these accidents will occur. During the second quarter, we continued to use risk data to perform case studies on hazards (tsunamis, volcanoes, typhoons, etc.) that exceed design standards to propose and select required countermeasures in order to continually improve the process used to navigate obtained information that has a high potential to greatly impact the safety of nuclear facilities.

(3) Risk Informed 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. The Risk Informed Decision-Making (RIDM) process is extremely effective for managing power station risk and entails making decisions related to plant renovations and operation based on knowledge from conventional deterministic evaluation mixed with the knowledge obtained from probabilistic risk assessments.

During the second quarter, we continued to hold opinion exchanges on how to leverage risk information between the power station operations and maintenance divisions. One of the activities we have started in the operations division in light of these opinion exchanges is an initiative to optimize the protection of important equipment (protective fences, signage, keeping rooms locked, etc.). In particular, we have used probabilistic risk assessment (PRA) to identify (extremely important) equipment that should be protected because a loss of function to such equipment would have a great impact on the frequency of core damage.

Meanwhile, we are examining equipment (with low levels of importance) that would not have a great impact on the frequency of core damage if function was lost, and considering the safety regulations and other risks to determine whether or not this equipment should be removed from the list of "equipment to be protected" if in fact protective measures have been put in place. Furthermore, we have employed the risk informed decision-making (RIDM) process that leverages risk information for proposing countermeasures upon obtaining risk information that has the potential to greatly impact the safety of nuclear facilities, and reflected this process in in-house manuals as promised in the seven answers noted in the safety regulations.

Going forward, we will continue to promote the use of risk information and apply the knowledge (equipment and operations vital for nuclear safety) we gain through probabilistic risk assessments (PRA) to the operations and maintenance fields as we aim to further improve nuclear safety.

2.3 Improving Technological Capability

2.3.1 Strengthening technological capability (during times of emergency)

(1) Enhancement of Power Station and Headquarter Emergency Response (Organizational) Capabilities

- Fukushima Daiichi and Fukushima Daini; Second quarter general training: July 9, July 21, August 4, August 20, August 26, September 3, September 8, September 11

During general training held on September 11, a joint training session was held between Fukushima Daiichi and Fukushima Daini personnel based on a simulated large-scale earthquake with a hypocenter in Hamadori, Fukushima Prefecture. During training, which was conducted amidst thorough Covid-19 prevention measures, such as having the Headquarter EDRC Commander give instructions from a different room outside of the Emergency Disaster Response Center (EDRC), trainees responded to a harsh scenario that simulated simultaneous disasters at multiple sites. At Fukushima Daiichi, focus was put on ensuring the accuracy of notifications, and at Fukushima Daini focus was put on clarifying evacuation orders given in conjunction with rising radiation levels, both of which were issues identified during FY2019. At Fukushima Daiichi, the accuracy of notifications was improved as a result of assigning a dedicated notification checker, and we confirmed that there were no problems with determining strategies and tactics with a socially distanced, smaller number of personnel than usual. At Fukushima Daini, non-veteran personnel were able to share information within the command center amidst Covid-19 prevention measures, and we confirmed that personnel were able to appropriately give evacuation instructions in conjunction with rising radiation levels.

Furthermore, during general training held in FY2019 at Headquarters, problems were identified with how information was shared with the Nuclear Regulatory Agency during meetings to determine whether the simulated accident conditions met Clause 10 and Clause 15 requirements. In preparation for this, several scripts were written to convey various situations and during training these scripts were used to explain various necessary pieces of information, such as future repair strategies and repair forecasts, etc. However, although explanations given to the Nuclear Regulatory Agency were provided within the timeframe allotted between determining that accident conditions

met Clause 10 and Clause 15 requirements, and confirming/certifying this decision, we will aim to further shorten the amount of time necessary to certify this decision based upon the required sufficient explanations.

Emergency response training (Fukushima Daiichi)

Emergency response training (HQ)

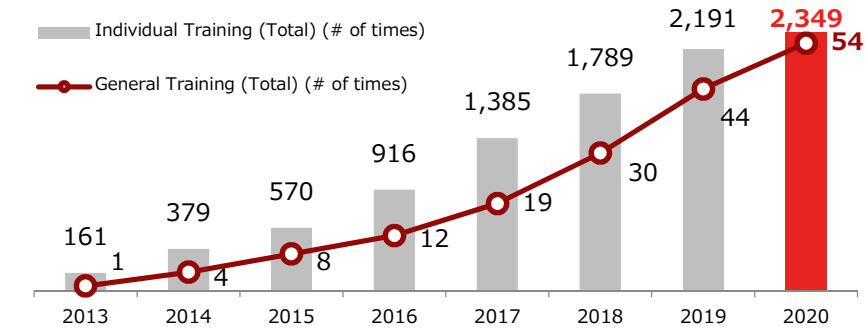
- Kashiwazaki-Kariwa; Second quarter general training: August 5, September 18

During general training held on August 5, training was held on responding to widescale destruction in coordination with field personnel upon implementing measures to prevent the spread of Covid-19. Prior to training, classroom study was provided in preparation for training on handling widescale destruction (widescale destruction study session stipulated in the safety regulations). During this classroom study, participants learned about each type of procedure and response flow for handling widescale destruction, after which they examined case studies containing actual scenarios of widescale destruction. The training scenario simulated the crash of a large airliner into the Unit 7 reactor building that caused widescale destruction and fires, and cut off access routes due to the fires and debris thereby leading to an accident that conforms with Clause 10 and Clause 15 of the Nuclear Emergency Preparedness Act. In-house fire brigades trained alongside repair teams in order to train in coordination with field personnel. Going forward we will continue to implement training and ensure the skill of personnel through education while improving our technological capability during times of emergency in order to be able to handle widescale destruction.

Emergency response training (Kashiwazaki-Kariwa)

Joint training with in-house fire brigade (Kashiwazaki-Kariwa)

Training was held at each power station as follows:



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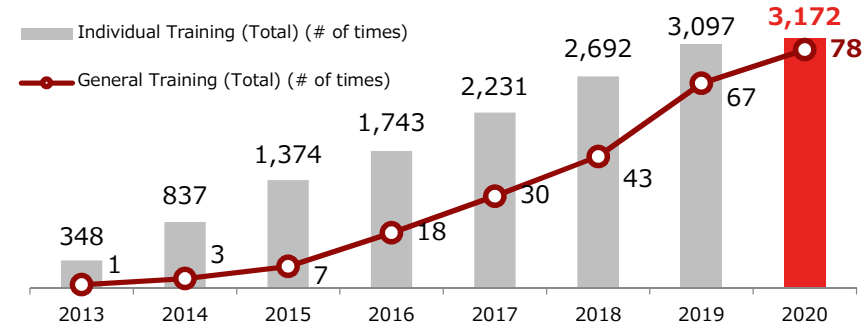

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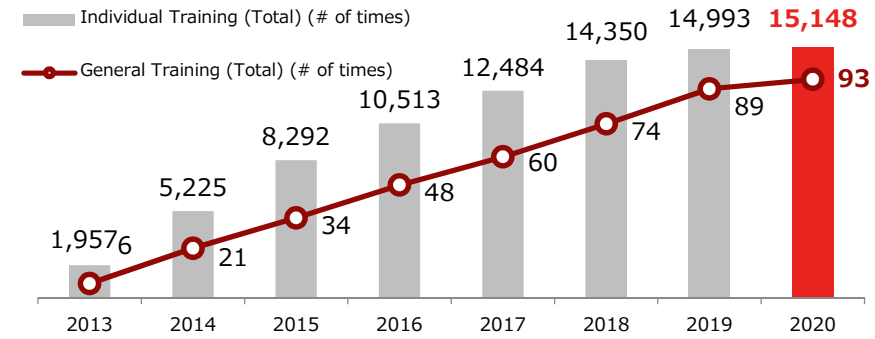


<Kashiwazaki-Kariwa>

(2) Improving the in-house technological capability of power stations (operations)

In the operations field, we are certifying workers on the operation and connection of power supply trucks and fire trucks to ensure that there are people available to take the place of injured repair team personnel if such action becomes necessary during an emergency. At Kashiwazaki-Kariwa, such training began in FY2013, and at Fukushima Daiichi and Fukushima Daini the training began in FY2014. The number of people certified during the second quarter of FY2020 is as follows. The lack of certified personnel caused by personnel transfers will be made up through regular training.

Power Stations	Fire Trucks		Power Supply Trucks	
End of Sep 2020	Number of certification holders (QoQ)	Fill rate	Number of certification holders (QoQ)	Fill rate
1F	37名 (-3)	112%	37名 (-2)	112%
2F	30名 (-2)	97%	27名 (-5)	87%
KK	105名 (-2)	109%※	100名 (+6)	104%
	Number of instructors within shifts: 142 (+2)			

※Fill rate for the first quarter was mistakenly noted as 124%. The correct number is 109%.

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

(3) Improving the in-house technological capability of power stations (maintenance)

■ Fukushima Daiichi

We are continually implementing training on responding to a loss of on-site power in order to improve the ability to respond to emergencies. During the second quarter, training was held on the operation of power supply trucks, repairing power to instrumentation in the main control rooms, restoring power for lighting and paging systems, and operating equipment to inject cooling water using concrete pump trucks, etc. During training on repairing power to operate instrumentation in the main control room implemented under a simulated plant blackout, the risk of cable connection errors in the absence of light was identified. Therefore, in order to reduce the burden on field personnel and improve work efficiency, we are planning to have the cables connected at all times and install connectors and switches that will enable simple circuit reconfiguration.

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 second quarter, conventional training could still not be implemented due to the Covid-19 pandemic, just like the first quarter, but training was implemented for a limited number of days in small groups on the operation of heavy equipment used by the rubble removal/road repair team. Meanwhile, during training on how to repair fire pumps (motor-driven), which is an important piece of equipment, in-house teams were able to quickly make repairs thereby confirming that technological capability is being improved through training. We will continue to conduct training to the extent possible as we aim to maintain and improve in-house technological capability.

Fire pump repair training (hoisting)

Fire pump repair training (overhaul)

Kashiwazaki-Kariwa

In order to improve in-house technological capability so that we can prevent severe accidents from happening, we are implementing various types of training after separating field personnel into their respective teams, such as the coolant water injection team, refueling team, power supply team, and the adsorbents team (this team would place radioactive substance-absorbing materials in the drainage channel if there is a possibility that contaminated water is leaking into the ocean), etc.

During the second quarter, the coolant water injection team engaged in training on deploying and connecting hoses from fire trucks to the feedwater port; the refueling team engaged in training on connecting hoses that simulated the refueling of tanker trucks from the fuel truck; the power supply team engaged in training on the operation of gas turbine generator trucks and high-voltage power trucks; and the adsorbents team engaged in training on coupling and decoupling the adsorbent transport container to the transport vehicle, and also practiced inserting adsorbents into a mockup of a catch basin.

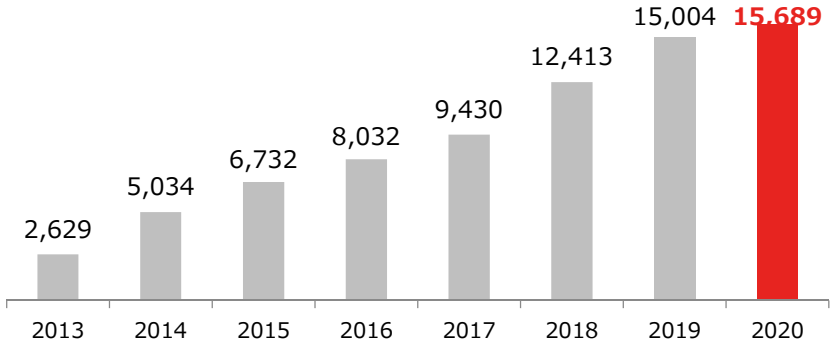
We will continue to implement repetitive training as we aim to maintain and improve in-house technological capability.

Hose deployment/connection training (cooling water injection team)

Hose laying training (refueling team)

High voltage generator truck operation training (power supply team)

Container coupling/decoupling training (adsorbents team)



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

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

(1) Improving education and training programs based on SAT

■ Reconstructing education and training programs based on the Systematic Approach to Training (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 striving to provide education and training programs necessary for personnel development throughout the entire Nuclear Power Division. In order to continually improve education and training, we have created three tiers of review bodies consisting of the Nuclear Power Division Education and Training Committee, Power Station Education and Training Committee, and Curriculum Review Board. These three bodies effectively put education and training programs through the Plan-Do-Check-Act (PDCA) cycle based upon SAT.

The Curriculum Review Board has identified key issues related to education and training that should be solved in order to improve performance at power stations during FY2020, and overseeing departments at power stations are coordinating with the Nuclear Education and Training Center to increase performance in each field. The status of progress with these initiatives is reported to the power station's Education and Training Board which then assesses that progress.

Furthermore, Nuclear Power Division team leaders are taking part in "soft skill training for team leaders" which is designed to provide them with soft skills, such as communication and leadership skills required to solve problems, upon having trainees understand their roles and identify problems in the workplace with a heightened sense of responsibility. During the second quarter, 20 team leaders at Headquarters took part in training on listening skills and problem solving.

Soft skill training for team leaders (Left: Listening training; Right: Problem solving training)

■ New employee training

New employees hired this fiscal year have been taking part in remote classroom study via online conferencing systems since April, and during the second quarter they participated in practical training in the field. Real-world training is being provided in preparation for assignment to power stations, such as practical training with front-line groups at the power station, training to cultivate knowledge and a feel for the field, such as shift training where trainees work together with operator shifts, and problem-solving training during which operating experience (OE) information, etc., is used by trainees as they think about how to solve problems by themselves. The new employee training plan for this fiscal year shall be carried out as planned while thoroughly implementing Covid-19 prevention measures.

When learning about equipment schematics that are frequently used in the course of actual fieldwork, such as exploded wiring diagrams and pipe instrument wiring diagrams, the amount of training time was doubled during FY2020 and trainees used these equipment diagrams to carry out actual tasks on mockup equipment. Furthermore, training unique to Fukushima Daiichi is being provided in the form of training on the current status of decommissioning and study about equipment unique to the decommission process. At Fukushima Daini, in addition to learning about the decommissioning plan in accordance with which decommissioning approval has been requested, trainees visited the Tokai Power Station, which is currently being decommissioned, to prepare for decommissioning at Fukushima Daini. At Kashiwazaki-Kariwa, training was provided on the safety measure renovations underway at the plant. New employees shall be assigned to front-line groups at each power station from September.

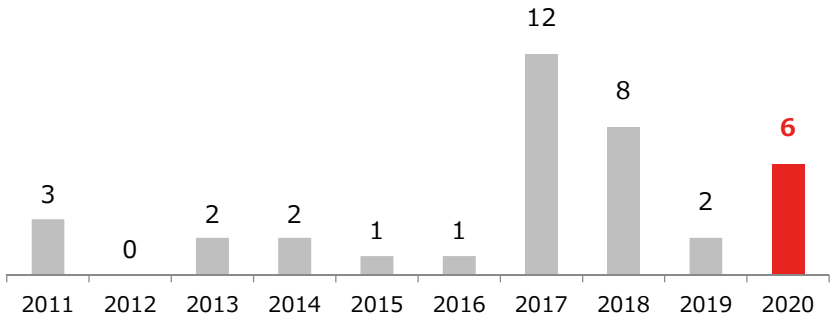
Problem solving training

Training aimed at cultivating field knowledge and famliarity

■ Initiatives aimed at acquiring advanced expertise

We continued to provide support for those people taking the licensed reactor engineer written exam (primary exam) in the form of in-house study sessions and simulated

exams. Six people passed the written exam given in March (August 3). Furthermore, we distributed problems from past exams and held mock oral exams in-house for those people that took the oral portion of the licensed reactor engineer exam on September 25 (secondary exam). We are currently providing support for those people taking the next written exam scheduled for March 2021. Going forward we will proactively provide support for those people looking to become certified as licensed reactor engineers.



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

(2) Training and certifying system engineers

In order to promptly and safely stabilize a reactor when there is an emergency, personnel need to quickly ascertain the circumstances of the accident and make accurate decisions. Therefore, engineers are being trained to be proficient in design, laws and regulations, standards, operation, maintenance and other areas pertaining to facilities important for safety. System engineers formulate system monitoring programs, which stipulate monitoring targets and standards for monitoring system performance degradation, in order to monitor whether or not primary plant systems are fulfilling design requirements in the short term and make suggestions about requirements for maintaining system reliability. Furthermore, system engineers are also expected to identify areas for improvement to system reliability over the long term, and make such improvements.

There are currently eight system engineers at Kashiwazaki-Kariwa that monitor 40 systems at both Units 6 and 7. During the second quarter, regular assessments of 23 systems in use were conducted and it was reported that there are no abnormalities with system performance and that additional measures are unnecessary. We will continue to increase the number of systems to be monitored and train personnel with the objective of having five system engineers for each operational plant.

Currently at Fukushima Daini four system engineers continuously monitor six systems at each of reactor Units 1~4. During the second quarter, no abnormalities with performance were found, and it has been reported that additional measures are unnecessary.

(3) Enhancing configuration management

Configuration management is a process for maintaining the safety of the plant and ensuring that power station equipment has been manufactured, installed, and is being operated as designed. Deliberations continue on measures required for maintaining and managing a state in which design requirements, actual equipment, and equipment schematics all match. In order to improve accessibility to information on design requirements and design basis, we are compiling this information into design standard documents.

During the second quarter, we began creating design documents for 19 systems vital for safety at Kashiwazaki-Kariwa Unit 6, and finished such documents for 16 systems. And, at Fukushima Daini we are also creating design documents within the scope required to maintain safe plant shutdown of Unit 4 and have completed drafts for all nine systems. Going forward, we will conduct a review along with plant manufacturers in order to further optimize the content of these documents and develop basis-forming information.

In regards to the configuration management process (design change management process), we launched a new process in April that puts strong emphasis on matching design requirements, with actual equipment and equipment schematics. In particular, this process includes creating a detailed list for examining what impact design requirements will have during the design and planning stage, and examining what impact design changes will have on equipment schematics so that the scope of impact can be thoroughly managed during designing thereafter. During the second quarter, we examined areas for improvement to make this new process even smoother by reflecting upon how it has been used to date. At current time we have not identified any significant problems with this new process, but we will continue to monitor usage status in order to make further improvements.

(4) 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.

At the FDEC, we implemented department organization on April 1 by which we created program departments for such tasks as contaminated water countermeasures,

pool fuel removal, and fuel debris removal, etc., and also established A Project Management Office that will provide oversight and assistance for each program department thereby transforming the company into an organization that focuses on carrying out projects. Basic project management training has been provided for project managers who are the central figures behind these projects in order to improve their understanding about practical project management. During the second quarter, 10 e-learning classes were provided for each project department manager and as of the end of August, all 53 managers had finished training. Going forward, we plan to provide classroom study starting in November with construction by overseas experts with experience in decommissioning projects. Furthermore, basic project management training will be provided via e-learning to the Nuclear Power & Plant Siting Division.

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

The basic flow of kaizen in the Nuclear Power Division is as follows. Firstly, the objective of the task is understood by all parties involved, and what needs to be done to achieve that objective is identified. Next, the gaps between what is being done currently, and what needs to be done, are put into visual form. Then, what is currently being done is dismissed in order to return to a clean slate and identify what needs to be done to fill in these gaps. Upon doing this, kaizen measures are formulated while also incorporating measures to improve safety and quality through creative vision.

Examples of activities that have been engaged during the second quarter are introduced below.

■ Examples of activities at Fukushima Daini

At Fukushima Daini, on average approximately 1,000 pieces of clothing that require washing are generated each day by workers that must temporarily wear special work uniforms, gloves, and socks in radiation control zones inside reactor buildings, etc. There are 18 washing-related processes, and multiple workers must engage in each process. Therefore, we have adopted the slogan of, “Reduce work and say goodbye to the large trucks, large containers, and large washing machines.” By replacing large dewatering washing machines and dryers with household washers and dryers, we have reduced the amount of clothes in each load thereby rendering storage and accumulation processes unnecessary. Furthermore, through kaizen, such as using wheeled trunks instead of trucks to move around clothing, each process now requires only one worker and we have been able to standardize work procedures and improve quality.

Going forward, we shall even out the number of people entering radiation control zones annually, equalize the daily amount of articles that require washing, and improve the quality of work by standardizing these processes as we move forward with kaizen while considering the balance between washing clothing articles and incinerating them.


Prior to kaizen (Left: Large washing machines; Right: Large dryers)

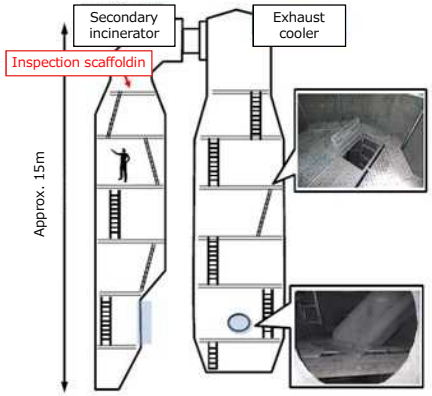

After kaizen (Left: Household washing machine; Right: Wheeled trunks

■ Examples of activities at Fukushima Daiichi

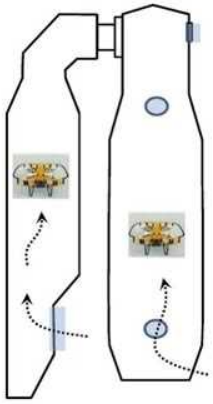
At Fukushima Daiichi, we commenced operation of a newly built miscellaneous solid waste incinerator facility in March 2016 to handle the large amount of waste equipment and materials generated from field work that is stored on site. The miscellaneous solid waste incinerator contains many parts and pieces of equipment that need to be inspected and the shut down time required for these inspections is lengthy, which has prevented a reduction in the amount of waste stored on site. Furthermore, we also needed to reduce exposure doses during the equipment inspection periods. That’s why we have started to perform in-house operation and maintenance of the miscellaneous solid waste incinerator and also benchmark with external companies that own incinerators with high operating rates. Upon doing this, we have examined inspection details and implemented kaizen, such as performing inspections in accordance with

certain objectives. We have also been able to shorten the inspection period by utilizing drones to perform internal visual inspections of the incinerator, which up to now had taken a great deal of time because scaffolding had to be assembled and disassembled.

This has resulted in reductions in exposure and improvements in radiation safety. We also coordinated with the TEPCO Management Skill and Strategy Research Center to reduce operating temperature thereby eliminating filter clogs.



Conventional inspection method using scaffolding (prior to kaizen)



Using drones for inspections (after kaizen)

■ Examples of activities at Higashidori

At the Higashidori Nuclear Power Station construction site, we had been using two on-site distribution line circuits, but when one circuit was being inspected or needed to be changed, all power on site would be shut off and we needed to perform integrity checks with bucket trucks (insulation resistance measurements). The scope of the on-site blackout can be reduced by using a special tool (earthing kit) on aerial high-voltage line switching equipment (multi-circuit switch), however this special tool (earthing kit) is no longer being manufactured. So, we examined whether or not the current tool being used (closed-circuit kit) could be modified. In cooperation with a local company in Rokkasho Village, we modified this tool (closed-circuit kit) and manufactured our own dedicated tool (earthing kit). As a result of this kaizen, we were able to avoid having to use bucket trucks (improvement) and also reduce the scope of the power outage (thereby mitigating the impact on other work).

Top: Currently used tool (Closed-circuit kit)
Bottom: Modified tool (earthing kit)

Full view of modified tool (earthing kit)

2.4 Improving the Ability to Promote Dialogue

2.4.1 Communication with the Siting Community

(1) Providing information that is easily understood

■ Disseminating information in a timely manner by using Facebook and Twitter

At Fukushima Daiichi we are using Facebook and Twitter to convey information about the progress of decommissioning and safety measures in a timely manner. During this quarter we conveyed information on the progress of decommissioning as events happened, such as when we exceeded 50% progress with fuel removal at Unit 3 (August 3) and when we began tests to confirm the performance of secondary treatment of contaminated water (September 15). Furthermore, as the whole country is wearing masks to prevent the spread of Covid-19, during the summer we implemented heat stroke countermeasures since workers needed to wear masks in conjunction with radiation protection equipment, and posted a three-part series on this matter during August. In September, we also conveyed information on power station typhoon countermeasures in conjunction with the approach of Typhoon Dolphin.

We will continue to use Facebook and Twitter to convey information on decommissioning in a timely and easy-to-understand manner.

Progress with Unit 3 fuel removal (Facebook)

Commencement of secondary treatment performance confirmation tests (Twitter)

■ Virtual tours

At Fukushima Daiichi, we used our online content “Virtual Tour INSIDE Fukushima Daiichi,” which was developed to give a tour of the decommissioning field to people that find it difficult to actually come and visit Fukushima Daiichi, to provide a virtual tour of the power station that could be viewed on computers and smart phones (September 28). 79 people from companies in the Kansai area participated in the tour. Participants commented that, “we didn’t have to travel, and many people could participate, so it was very useful,” and “the use of the videos enabled explanations of locations that we would not have been able to enter on an actual tour thereby deepening our understanding.”

We will leverage this feedback to further develop our online tour content so as to enable even better understanding of the conditions at Fukushima Daiichi.

■ Release of online video, “The Whats and Whys of Energy ~Safety Measures at the Kashiwazaki-Kariwa Nuclear Power Station (Earthquake Countermeasures)”

At the Niigata Headquarters we are engaged in corporate communications activities using various types of media in order to get as many people as possible to learn about TEPCO initiatives. On August 7, we uploaded a movie to our website entitled, “The Whats and Whys of Energy ~Safety Measures at the Kashiwazaki-Kariwa Nuclear Power Station (Earthquake Countermeasures)” so as to get as many people as possible to understand the safety measure initiatives being implemented at Kashiwazaki-Kariwa. To date, the videos in this series have explained Japan’s energy situation and the importance of an energy mix, and viewers have commented that the videos are, “easy-to-understand,” and that, “the anime format makes it easy to watch.”

Going forward we will continue to strive to convey information in an easy-to-understand manner while listening to the opinions of regional residents.

Online video “The Whats and Whys of Energy ~Safety Measures at the Kashiwazaki-Kariwa Nuclear Power Station (Earthquake Countermeasures)”

■ Initiatives to convey information that is easily understood during regular Site Superintendent press conferences

At Kashiwazaki-Kariwa the Site Superintendent utilizes regular press conferences held every month as an important opportunity to convey information about the power station to regional residents. These press conferences enable us to convey information directly and carefully to many reporters thereby fulfilling our objectives of leveraging mass media to convey important messages to the regional community.

When holding these monthly press conferences, younger members of the company have started kaizen aimed at providing high-quality information, such as exchanging opinions before and after these press conferences in an “accurate,” “timely,” and “easy-to-understand” manner, and leveraging the opinions received to improve the next press conference.

Furthermore, at these press conferences we are taking full advantage of photos and videos with strong awareness of switching from merely “conveying information” to “conveying information that is easily understood.” We will continue to strive to carefully convey information about the power station to regional residents.

Press conference by the Site Superintendent

(2) Communication with stakeholders

■ Service Hall renovations completed

At Kashiwazaki-Kariwa, Service Hall was opened in 1979 as a corporate communications facility and since then we have added to and partially renovated exhibits. In September 2019, we began renovations at the facility, which reopened on July 23. During the renovations, we asked people to submit their recommendations for nicknames for the exhibit hall via our corporate communications letter News Atom and our website, etc., and received over 200 suggestions thereby showing great interest in the project on behalf of regional residents. We have decided to nickname the exhibit hall, “Eco-ron Forest,” to conjure an image of the power stations mascot and also a “rich natural environment where people can gather.”

We want to make sure that “Eco-ron Forest” is a place for visitors can relax, enjoy themselves, and easily understand the information being presented, and we have added exhibits that explain the current conditions at Fukushima, initiatives that we have implemented since the Fukushima Nuclear Accident, and also the safety measures being implemented at Kashiwazaki-Kariwa in light of the opinions we received from people that have visited the facility to date. As part of the renovations, we have installed interactive digital exhibits that promote learning through games and also a baby room complete with a nursing area on the lounge floor. Through these renovations we have created a center for learning about energy, and nuclear power in particular, that can be utilized by people of all ages.

Renovation celebration events were held every weekend from the date of reopening until August 30, and during this period approximately 3,100 people visited the facility and learned about the inner workings of nuclear power stations and the safety measures being implemented at TEPCO power stations.

Upon entering the facility, visitors have their body temperatures checked by a thermography device and are asked to wear masks and to sterilize their hands with alcohol. During power station tours, we make sure that the tour buses are thoroughly ventilated and that they are only filled to approximately one-fourth capacity in order to prevent the spread of Covid-19. Facility staff are also required to wear masks and face shields to prevent the spread of droplets, and the event was held over a course of weekends in order to prevent large crowds on a single day in an effort to prevent the spread of the virus. Furthermore, at the end of September we held an event in front of Service Hall to showcase the vehicles used at the power station and allowed participants to sit in the vehicles and take pictures around them thereby enabling participants to feel what it’s like to use safety equipment employed at Kashiwazaki-Kariwa. The event was proactively promoted through the power stations PR magazine News Atom and also on local community FM radio and our website in order to get as many people to come to Service Hall for the event, and over the two days (Saturday/Sunday) we welcomed approximately 900 visitors to the facility.

Responses to an event questionnaire indicated that participants enjoyed the event with some commenting that, “Being able to sit in specialized fire trucks was enjoyable for children and adults alike. The renovations at Service Hall made it easier to use.” Going forward, we shall strive to proactively disseminate and disclose information while listening to the opinions of regional residents so that they become more familiar with the company.

Display of main control room at Eco-ron Forest

Letting visitors sit in “work vehicles at the power station”

(3) Info magazines published by TEPCO

■ Niigata Region

News Atom		
Date of Issue	July 12, August 8, September 13	
Circulation	Approximately 30,400 copies	
Overview	-Monthly power station news -"The Whats and Whys of Energy" • -"What? Why? Science for Kids"	

■ Fukushima Region

	Hairomichi	Announcements from Fukushima Daini
		
Date of Issue	August 10	August 3
Circulation	Approximately 45,000 copies	Approximately 14,000 copies
Overview	-Scientific Analysis Done at the Fukushima Daiichi Nuclear Power Station • -Facility introduction Regional research facilities in Hamadori, Fukushima Prefecture	-Overview of authorization of the decommissioning plan • -Fuel storage and cooling status

2.4.2 Communicating with overseas parties

(1) Disseminating information overseas

■ Disseminating information through press releases, and social networking services (SNS)

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 are being sent to overseas media outlets and intellectuals. During the second quarter, 10 press releases and one email magazine were issued, 25 posts were made to Facebook, and 25 tweets were made on Twitter. We will continue to disseminate information at appropriate times while paying attention to the concerns of overseas media outlets and trends in the overseas media coverage of TEPCO.

Twitter tweet example
(Fukushima Daiichi: Commencement of secondary treatment performance confirmation tests

Facebook post example
(Fukushima Daiichi: Visit by Prime Minster Suga)

3 Progress Assessment

3.1 Self-Assessment of Key Issues

At the 15th Meeting of the Nuclear Reform Monitoring Committee (NRMC) held on October 5, 2018, a report on our self-assessments was given. In addition, at the 16th Meeting of the Nuclear Reform Monitoring Committee Held on January 29, 2019, a report was given on an action plan to fill in the gaps between reality and expectations in regards to technological capability and communication, which has been formulated in order to revamp self-assessments. Furthermore, at the 17th Meeting of the Nuclear Reform Monitoring Committee held on February 4, 2020, a report was given on the status of efforts to strengthen self-assessments and handle key issues (improving safety/quality and improving the quality of communication).

Chairman Klein will not be able to visit Japan this fiscal year due to Covid-19, so in anticipation of the next meeting to be held in January 2021 we are providing midterm reports of the status of our initiatives to be presented to the Nuclear Reform Monitoring Committee via online conferencing systems.

The Nuclear Power & Plant Siting Division has reported on the status of progress with both equipment and personnel countermeasures, such as safety measure renovations at Kashiwazaki-Kariwa, and initiatives that focus on actual field conditions and the conditions of actual equipment in the field in order to improve field skills need to respond to emergencies and improve safety and quality.

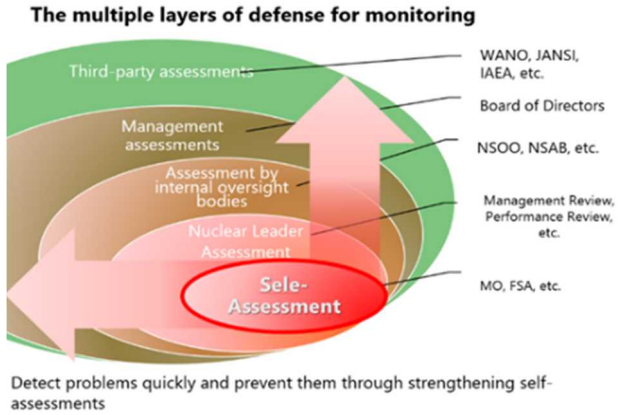
The Fukushima Decontamination and Decommissioning Engineering Company has reported on the status of progress with decommissioning, management initiatives to strengthen governance, and the status of initiatives to improve work quality by strengthening field management through the enhancement of monitoring and department reorganization.

After receiving these reports, Chairman Klein and member Mr. Sakurai commented that, “Since the committee has previously recommended that improvements be made to field skills, it is encouraging to see that the Site Superintendent and other leaders at Kashiwazaki-Kariwa are leveraging their plethora of operating experience to lead by example at the power station,” and that, “It is important that the Nuclear Safety Oversight Office observe activities at the power station with its own eyes and provide oversight as a third-party under the direct authority of the Chief Decommissioning and Contaminated Water Measures Officer.”

3.2 Self-Assessment by the Nuclear Power

(1) Focused self-assessments

In the pursuit of excellence, and in order to identify issues and make improvements on our own, we’ve created a Focused Self-Assessment Guide for performing self-assessments using standard methods employed by the world’s best operators, such as having experts from outside the company and from other offices serve as assessors, and we are performing self-assessments in accordance with this guide.
The focused self-assessments performed during the second quarter are as follows:



Assessment defence-in-depth and self-assessments

■ Risk management (Kashiwazaki-Kariwa)

In the field of risk management, we systematically developed mechanisms for managing risk in FY2018, and since FY2019 we have focused efforts on providing risk management education and assessing the effectiveness of this education. During the second quarter, we performed a focused self-assessment of risk management at Kashiwazaki-Kariwa. We performed an effectiveness assessment in light of the risk management processes that had been strengthened since the last focused self-assessment (FY2016), and also assessed risk management using the World Association of Nuclear Operators' Performance Objectives and Criteria (PO&C), which is an industry standard. Upon doing this we reflected upon our own issues and discussed new strengths as well as areas that are fulfilling industry standards but for which there is still room for improvement. In particular, we performed an assessment that focused on behavior in the field and evaluated how information on high-risk work shared during daily meetings attended by power station executives resulted in risk reductions in the field. As part of the assessment, field observation of contract workers was performed and TEPCO employees (from departments in charge of the tasks in question) were interviewed. The assessment found that risk management processes that have been strengthened since the previous focused self-assessment have taken root in the field. Furthermore, we found that there is further room for improvement in regards to, "the need to increase opportunities to learn from people who are highly sensitive to risk in order to improve sensitivity to risk due to the individual discrepancies in risk awareness and the ability to notice risks." Going forward we shall further effectively improve risk management processes for the writer implementation of self-assessments.

3.3 Monitoring by the Nuclear Safety Oversight Office

In the pursuit of excellence, the Nuclear Safety Oversight Office (NSOO), which is an independent internal oversight department, has reported its observations for primarily the first and second quarters to the executive officer committee and the Board of Directors.

Nuclear Safety Oversight Office Monitoring Assessment Report First Half FY2020

1. Best practices and the top two improvement recommendations for nuclear safety

1.1 Being fully prepared for pre-use operator inspection (Kashiwazaki-Kariwa)

[Best Practices]

The Nuclear Safety Oversight Office examined the inspection chart* (hereinafter referred to as, "chart"), which is the basis for the pre-use operator inspection manual, as well as the chart review board for Unit 7 fire protection equipment and flood protection facilities. It was found that due to the strong leadership provided by the Inspection Secretariat, highly accurate discussions about identifying inspection criteria are taking place, inspection methods are being generalized (standardized throughout departments, etc.), and instructions are being given to make revisions as necessary.

*Detailed chart showing inspection criteria and methods based upon design and workplan authorization (hereinafter referred to as, "design and work authorization") application details.

(Case Example)

The Inspection Secretariat is writing multiple chart creation manuals in accordance with design work authorization applications, meticulously defining work processes, and providing them to front-line workers.

- Review board assessors use the chart to analyze and check each and every requirement identified from the design work authorization applications to confirm the comprehensiveness of inspection criteria and the suitability of inspection methods, and order revisions as necessary.
- The Inspection Secretariat requires review board attendance of not only groups preparing for inspections, but also multiple groups that must conform with and implement inspections.
- The Inspection Secretariat has been giving guidance and assistance as much as possible in

regards to performing inspections in the field and on actual pieces of equipment. Strict guidance was also given to the group preparing for inspections in regards to matching records with actual pieces of equipment using inspection records in order to ensure traceability, and revisions were ordered in regards to those issues for which it was feared that handling would be insufficient.

In addition to being effective preparations for the recommencement of operation of Unit 7, these measures are also best practices for maintaining nuclear safety that should be implemented at units to be inspected in the future. In particular, since the comments made by the Unit 7 review board consist of vital know-how that can be applied, not only to the various work processes, but also to units to be inspected in the future, the Nuclear Safety Oversight Office expects them to be compiled and leveraged for the future review of Unit 6.

Furthermore, "chart" creation is one of the first processes of inspection preparations. The Nuclear Safety Oversight Office shall continue to monitor pre-use operator inspection preparations and implementation status to ensure that comments by the review board have been accurately reflected in inspection record preparation and the creation of inspection manuals, which are later stage processes for the implementation of inspections.

1.2 Weaknesses in managing requirements for new equipment design (Fukushima Daiichi)

[Identified Issues]

The FDEC is striving to introduce and improve new procurement/design processes that strengthen risk analysis and manufacturing design reviews in light of past equipment nonconformances. However, while conceptual equipment usage ideas are being shared during this process between related parties in response to expectations from stakeholders (mission requirements), the process for incorporating technical requirements into equipment specifications has not been standardized. If this situation continues, comprehensive and consistent technical requirements from the conceptual stage through the operational stage will not be maintained, which may lead to schedule delays resulting from the need to revisit design.

[Considerations and Assumed Causes]

(Case Example)

- During the "Decontamination Equipment Sludge Extraction Project"*, technical requirements related to functions/material reliability and natural disaster countermeasures were identified during the basic design stage. However, technical requirements for fire protection and maintenance were not sufficiently clarified. (Requirement comprehensiveness issue)
- During the same project* when design work progressed using the designs of existing equipment, which had different maximum system usage pressures, equipment design and system design were not integrated thereby preventing some progress with design. (Requirement consistency issue)

*These two examples are from six months ago. Since then, external cooperation has been enlisted to help with design and improvements are currently being made.

- The "fuel debris small-scale removal project" is currently preparing detailed designs in preparation for device manufacturing now that concept deliberations and basic design have been established for requirements that are the basis for design. (Good example of requirement comprehensiveness/consistency)

We believe the reason for this is as follows:

- The FDEC's design management process is based heavily upon experience with nuclear power station design changes, and the company is not able to strictly manage on its own the process for managing the comprehensiveness and consistency of requirements for new equipment needed to repair a damaged reactor.

[Recommendation]

The Nuclear Safety Oversight Office recommends that the officer in charge of design management processes (Planning/Design Center Director) engage in the following.

- The process for sharing conceptual equipment usage ideas between related parties in response to expectations from stakeholders (mission requirements), and incorporating technical requirements into equipment specifications should be standardized.

1.3 Establish a regular eye lens ALARA* implementation process (Fukushima Daiichi)

*As Low As Reasonably Achievable

[Identified Issues]

Deliberations on a new basic approach to dose monitoring that reflects related academic guides* and preparation of a monitoring implementation process are underway in light of the lowering of domestic legal limits for eye lens exposure to occur in FY2021.

However, during preparations to launch the new process at Fukushima Daiichi, we have found that detailed change management plans are not sufficient from the perspective of establishing monitoring methods specialized for eye lenses and activities to improve comprehension amongst front-line workers.

If this situation continues, it may hinder ALARA efforts in the form of a lack of precision of eye lens dose monitoring and delays in enabling these initiatives to permeate throughout the front lines as work in fields with large dose inclines increases in future.

*"Eye Lens Dose Monitoring Guidelines" Japan Health Physics Society

[Considerations and Assumed Causes]

(Case Example)

- Existing research into general radiation work at nuclear facilities has shown that eye lens exposure differs remarkably from core body (chest and abdomen) doses measured with normal instruments. However, at Fukushima Daiichi, where unique work conditions exist that include large dose inclines caused by the accident, etc., there are instances in which this knowledge cannot be practically applied. Therefore, in addition to measuring core body parts there is a great need to engage in separate dose monitoring of the areas around the eyes.
- Whereas Headquarters is examining how to implement such monitoring, nothing has been established. Therefore, no progress has been made at the power stations in regards to discussing the implementation process.
- Activities to foster understanding about the lowering of eye lens dose rate limits has been limited to radiation control departments, and a detailed plan to promote understanding amongst the workers who are actually being exposed about the importance of ALARA when it comes to the impact of radiation on eye lenses, has yet to be formulated.

The reasons for this are as follows:

- The Nuclear Health and Safety Center Group at Headquarters has not set handling requirements and deadlines for implementing this new process at Fukushima Daiichi, and has not agreed to anything with Fukushima Daiichi.
- The Nuclear Health and Safety Center Group at Headquarters has not stipulated who is to be the target of activities to foster understanding about process changes (including individual workers) nor has it clarified the issues that need to be understood (the importance of the impact of radiation on eye lenses).

[Issues Noticed]

The Nuclear Safety and Oversight Office expects that the Nuclear Health and Safety Center Group Manager at Headquarters will engage in the following:

- Establish a method for managing eye lens exposure at Fukushima Daiichi (methods for determining whether separate eye lens monitoring is necessary, etc.), and coordinate with Fukushima Daiichi radiation control departments to plan and implement definitive measures for engaging in activities to foster understanding amongst workers.

Furthermore, when deliberating these issues, consideration should be given to avoiding unconservative dose assessments and the ease of understanding of tasks to be implemented in the field.

2. Status of completion of recommendations given by the Nuclear Safety Oversight Office

For the most part line departments continue to engage in good activities aimed at completing recommendations given by the Nuclear Safety Oversight Office.

- To date, 185 out of 197 recommendations have been completed. 11 recommendations were completed during the first half of this year.
- Two new recommendations were given this term.

Furthermore, this term there were no recommendations for which the Nuclear Safety Oversight Office has seen unremarkable progress in the last six months, or for which action has not been taken for over a year for unjust reasons.

End of document

4 PI Results

4.1 FY2020 PI

As put forth in Nuclear Safety Reforms for the Next Generation, work mechanisms and procedures that include nuclear safety reforms shall be systemized by the Management Model and incorporated into daily duties through work plans. The Management Model states performance indicators (PI) for measuring to what extent "important success factors" and "ideal state after achieving improvements" have been achieved for each "management factor" of performed tasks. The following "management factor" PI related to "safety awareness," "technological capability," and "ability to promote dialogue," which comprise the sense of values of the management model, were identified from the Nuclear Safety Reform Plan and selected from "management factor" PI set for the management model as PI for FY2020. Furthermore, as was the case for FY2019, Fukushima Daiichi was not included in the "number of nonconformance recurrences." The "number of nonconformance recurrences" for Fukushima Daiichi are being recorded and will be noted along with results for the Nuclear Power &Plant Siting Division from the second quarter as part of FDEC achievements.

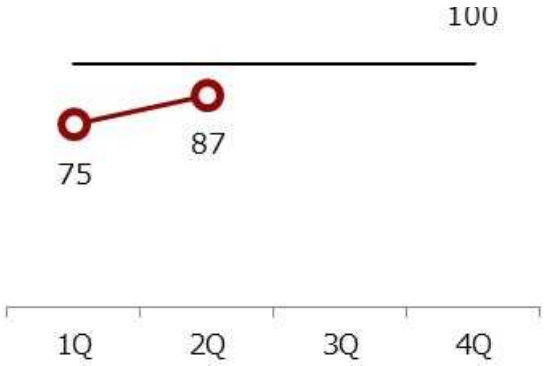
	Management Model management factors from which PI were selected
PI	The following "management factor" PI related to "safety awareness," "technological capability," and "ability to promote dialogue" were selected from PI set for each "management factor" in the Management Model. • Safety awareness: safety culture cultivation, performance improvement, leveraging operating experience • Ability to promote dialogue: external communication, internal communication • Technological capability: education/training, emergency response

4.2 PI Results

Management Model PI are used to monitor performance in various ways, and there are a great number of PI being monitored. Therefore, the FY2020 PI included in this quarterly report are PI with high importance levels selected from the "management factor" PI shown in the chart above.

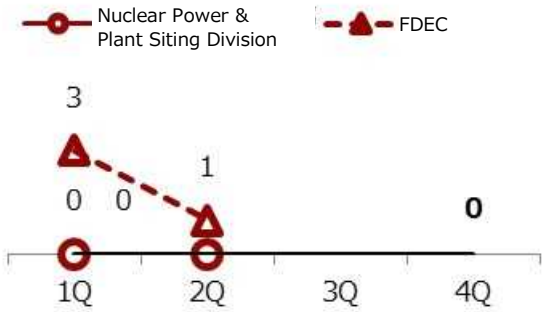
■ Safety Awareness/Safety Culture Cultivation: ※Safety Culture Cultivation may overlap other management factor PI since it relates to many fields

<Safety-1>
Group discussion implementation rate



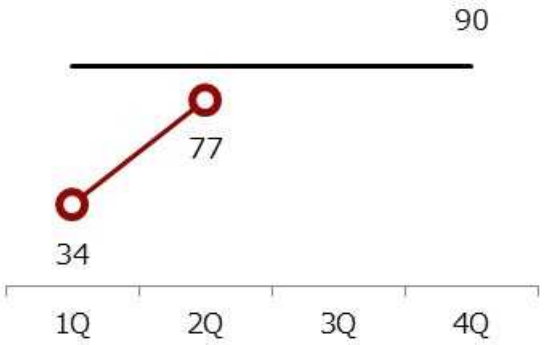
Target: Revised to 100% per quarter from this term

<Safety-2/Safety-4>
# of nonconformance recurrences



Target: 0/month Note: FDEC also reporting from this term

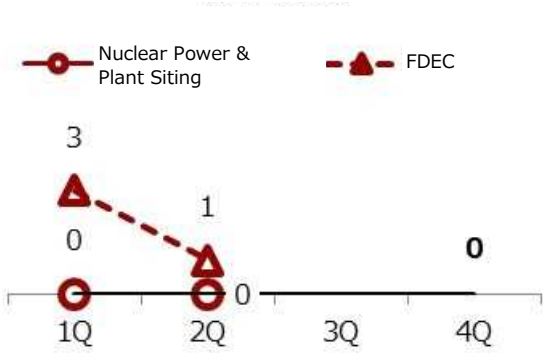
<Safety-3/Technology-3>
Training participation rate



Target: 90%

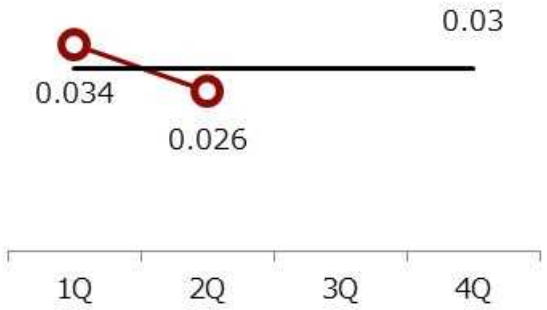
■ Safety Awareness/Performance Improvements

<Safety-4/Safety-2>
# of nonconformance recurrences



Target: 0/month Note: FDEC also reporting from this term

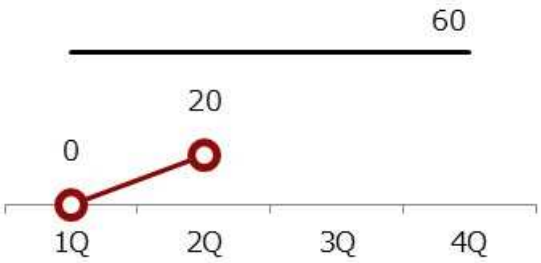
<Safety-5>
Human error occurrence rate



Target: 0.03/person/10,000 hours Note: 1Q figures revised

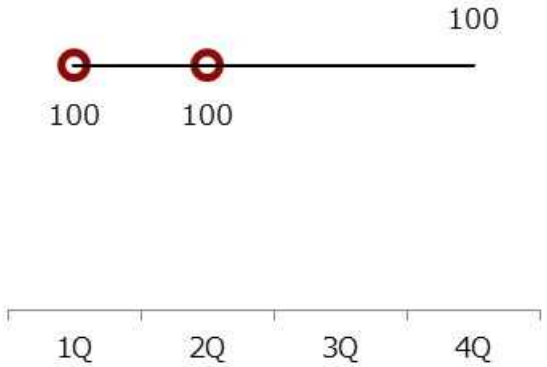
Safety Awareness/Leveraging Operating Experience

<Safety-6>
Significant operating experience training participation rate



Target: 60% of managers

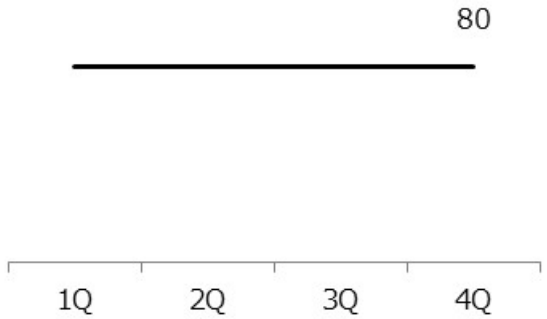
<Safety-7>
Completion rate of preventive measures within deadline



Target: 100%

Ability to Promote Dialogue/External Communication

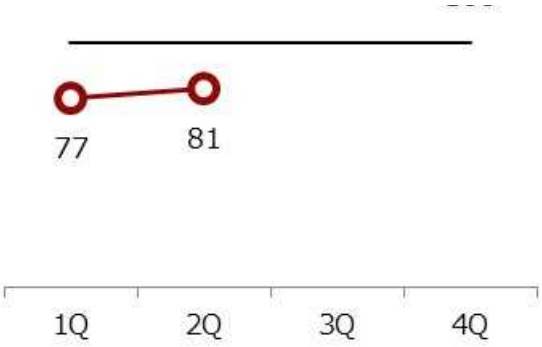
<Dialogue-1>
Results of questionnaire on communication



Target: 80% affirmative attitude towards disseminated messages Note: To be implemented during Q3

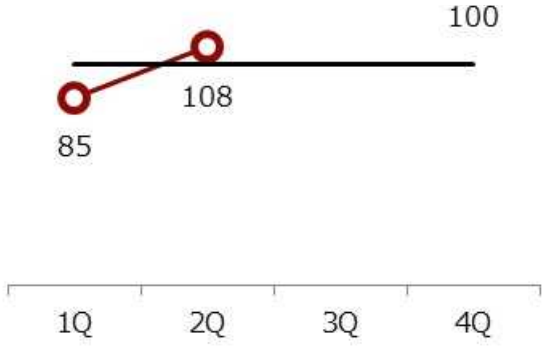
Ability to Promote Dialogue/Internal Communication

<Dialogue-2>
Progress rate of activities to promote dialogue aimed at deepening relationships



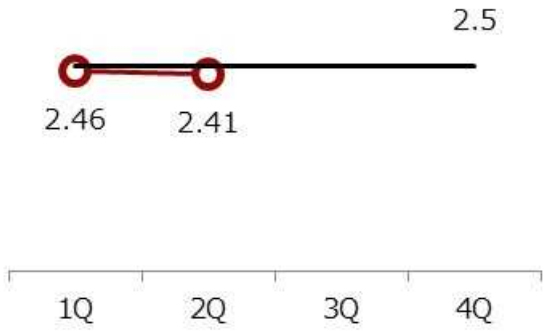
Target: 100%

<Dialogue-3>
Assessment of questionnaires on each type of activity to promote the ability to engage in dialogue



Target: 100%

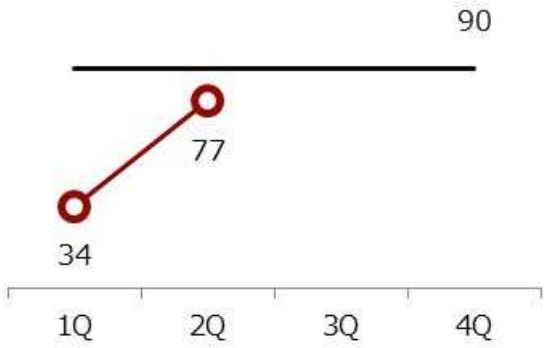
<Dialogue-4>
Degree of understanding of information sharing emails



Target: 2.5 points

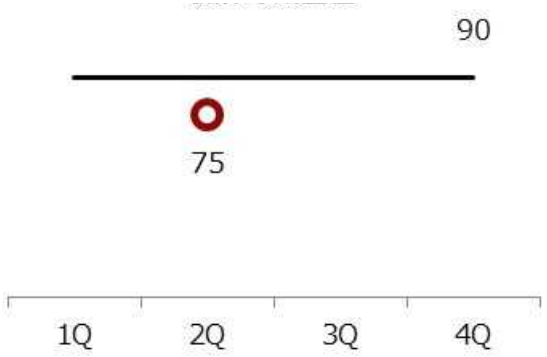
Technological Capability/Emergency Response (Continued)

<Technology-3/Safety-3>
Training participation rate



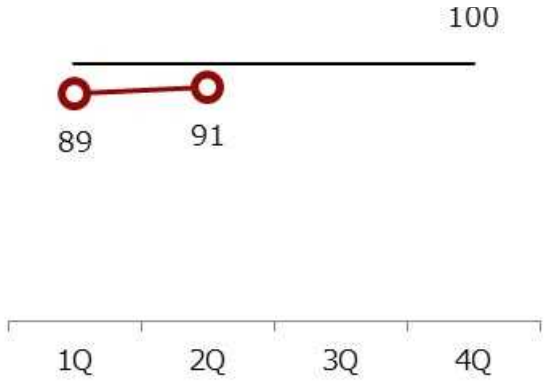
Target: 90%

<Technology-4>
Feasibility of operations to counteract a severe accident



Target: 90% Monitored: KK during training Note: Assessed

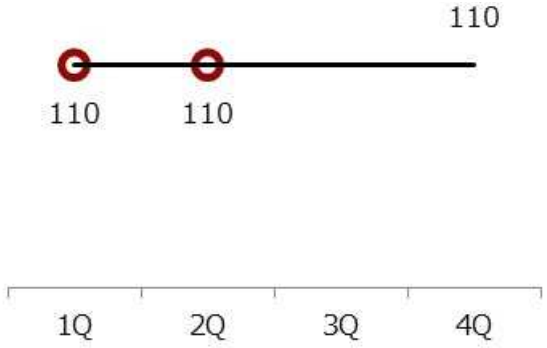
<Technology-5>
Rate of accurate notifications given during training



Target: 100%

Technological Capability/Education & Training

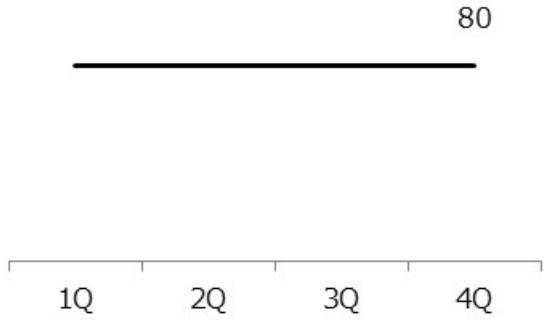
<Technology-1>
# of skills certifications/# of external certification holders



Target: 110 points

Technological Capability/Emergency Response

<Technology-2>
Training participation rate of personnel that handle large-scale damage and severe accidents



Target: 80% Monitored: KK Note: Assessed during training

Conclusion

We hope you enjoyed the “Special Issue ~Improving Safety and Quality by Correctly Ascertaining Field Conditions and the Conditions of Equipment in the Field~,” which aims to shed further light on a specific topic. The field condition and equipment condition-focused initiatives covered in this special issue are intended to make employees more sensitive to potential risk in the course of their daily duties, and embody a work style that elicits results. In these articles, the Chief Decommissioning Officer and nuclear leaders, Site Superintendents, and contractors instrumental in promoting these initiatives speak in their own words about the measures being taken. 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.

Please visit our website if you have any opinions and comments about nuclear safety reforms.

Abbreviations

ALARA ..... As Low As Reasonably Achievable
BCP ..... Business Continuity Plan)
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
CR ..... Condition Report
MO ..... Management Observations
NSAB ..... Nuclear Safety Advisory Board
OE ..... Operating Experience
PDCA ..... Plan-Do-Check-Act management cycle
PI ..... Performance Indicators
PICO ..... Performance Improvement Coordinator
PJ ..... Project
PO&C ..... World Association of Nuclear Operators (WANO) Performance Objectives and Criteria (PO&C)
PRA ..... Probabilistic Risk Assessment
RIDM ..... Risk-Informed Decision Making
SAT ..... Systematic Approach to Training. Standard education and training method proposed by the International Atomic Energy Association (IAEA)
SFAM ..... Site Functional Area Manager. CFAM counterpart at power stations
SOER ..... Significant Operating Experience Report issued by the World Association of Nuclear Operators (WANO)
Traits ..... 10 Traits and 40 Behaviors indicative of robust safety culture
WANO ..... World Association of Nuclear Operators

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