

Summary of the Improvement Action Report on Unauthorized ID Card Use and Partial Loss of Function of Nuclear Material Protection Equipment

September 22, 2021

Tokyo Electric Power Company Holdings, Inc.

This document is a summary of the report submitted to the Nuclear Regulation Authority of Japan on September 22, 2021, to the extent that it can be disclosed for nuclear security purposes.

1. Summary of this report (1)

Survey system

1. Survey period: March 22, 2021 - September 22, 2021

2. Internal study system: A study system that integrates the head office and power plant with the proactive involvement of management

| Role | Name | Post |
|---|------------------|---|
| Person responsible for overall management | Shigenori Makino | General Manager, Nuclear Power and Plant Siting Division |
| Person in charge | Masaya Kitta | Niigata Headquarters Representative |
| Person in charge | Takeo Ishii | Site Superintendent, Kashiwazaki-Kariwa Nuclear Power Station |
| Management team | Fukashi Watanabe | General Manager, Nuclear Safety Management Department |
| Cause analysis team | Yutaka Furuhamo | Manager, Quality and Safety Assessment Group, Nuclear Safety Management Department |
| Work review team | Shigeru Oishi | Manager, Safety Research Group, Nuclear Seismic Engineering Center, Nuclear Asset Management Department |
| Management dialogue team | Toru Okada | Director, Nuclear Human Resource Development Center |

3. Third-party evaluation

On June 2, 2021, the "Independent Review Committee on nuclear material protection*" was established based on the instruction document of the Regulatory Agency.

- ✓ TEPCO Holdings requested the Committee to assess the validity of TEPCO Holding's fact-finding and root-cause analysis, assess its corporate culture (safety culture and nuclear security culture), and recommend measures to prevent recurrence, from a third-party perspective that includes areas that are difficult for TEPCO Holdings to notice on its own. TEPCO Holdings' report is also based on the opinions, evaluations and recommendations of the Committee.

*In order to ensure independence, the Committee members as well as the secretariat are outsourced. TEPCO Holdings has procedures in place to ensure that the Committee has access to all security information and has provided all requested materials. The Committee conducted 31 interviews with 29 people (including the president), a questionnaire survey of about 4,000 people in the nuclear power sector, and a field survey.

| | Name | Specialty | Career |
|-----------------------|-----------------|---|---|
| Committee chairperson | Toshihiko Itami | Governance, Risk and Crisis Management/Compliance | Attorney-at law Former Superintending Prosecutor, Osaka High Public Prosecutors Office |
| Committee member | Isao Itabashi | Nuclear security, Risk and Crisis management | Chief, Center for Analysis and Studies, Council for Public Policy (CPP) |
| Committee member | Kyoko Ooba | Safety culture, engineering ethics | Deputy Chief Engineer, Japan Atomic Energy Agency Associate Professor, Academia-Industry Research Center, Nagaoka University of Technology |

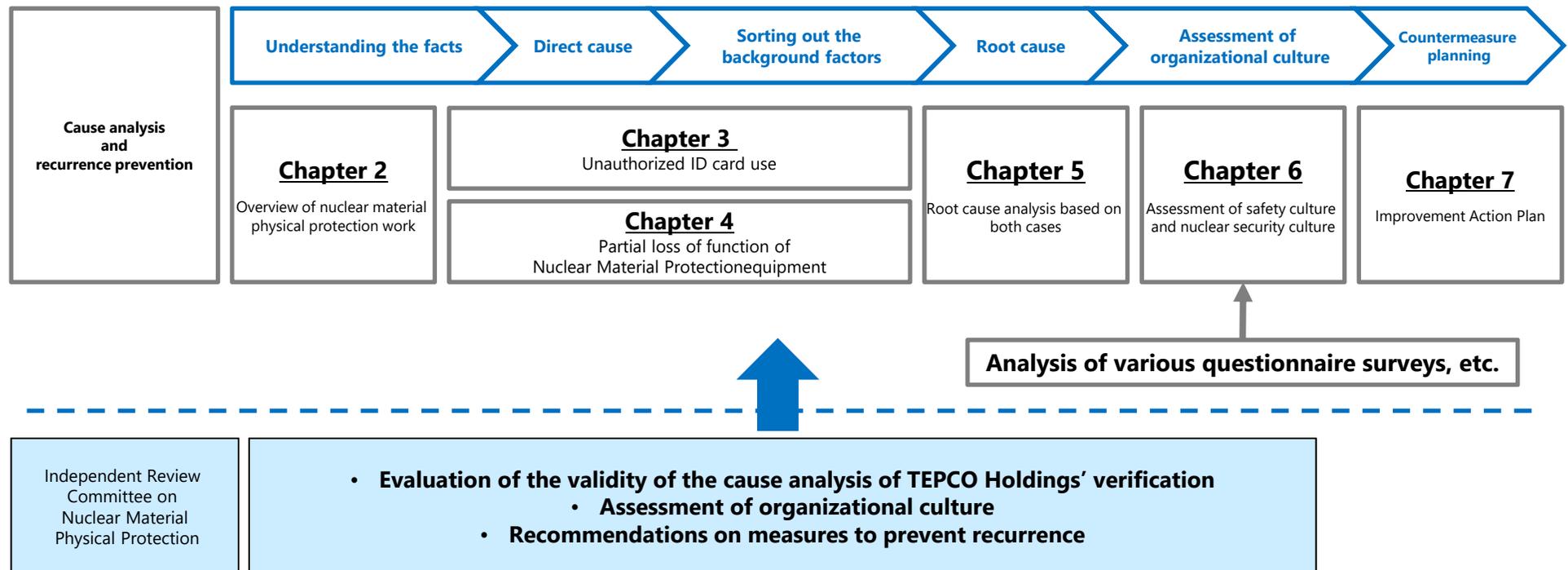
In addition to the above, TEPCO Holdings conducts mutual reviews with other electric power companies, utilizes them for investigation and cause analysis, and horizontally deploy good practices (reflects them in **improvement** action plans).

1. Summary of this report (2)

Report contents

Chapter 2: Overview of nuclear material protectionwork (for reference only in this document)
Chapter 3 : Unauthorized ID card use [sorting out of background factors based on the facts]
Chapter 4 : Partial loss of function of Nuclear Material Protection Equipmment (same as above)
Chapter 5: Root cause analysis based on both cases
Chapter 6 : Assessment of safety culture and nuclear security culture
Chapter 7: Improvement action plan

<Cause analysis and corrective action review process>



2-1. Unauthorized ID card use -Case summary and direct cause

Case summary

- On September 20, 2020, operator A, who was scheduled to work that day, took operator B's ID card, which was stored in operator B's personal locker, without permission because operator A could not find his ID card.
- Thereafter, operator A repeatedly misrepresented himself in personnel ID verification at several gates, slipped through, had the biometric information necessary for passage re-registered, and entered the main control room.
- Although the contractor guard and the employee guard felt uncomfortable with the difference in appearance, they did not stop operator A from entering the area.
- The next day, the fact of unauthorized entry was detected and immediately reported to the Nuclear Regulation Authority.
 - Assessed its significance as "White" by the Nuclear Regulatory Authority on February 8, 2021
 - On March 10 of the same year, the root cause analysis and countermeasures were compiled and reported to the Nuclear Regulation Authority.

Direct cause

- Operator A used another person's ID card, lied about his identity, and even re-registered himself on an identification device.
- The employee guard and the contracted guard failed to take appropriate action at their respective confirmation points.

2-2. Unauthorized ID card use - sorting out of background factors

- Identify the background factors based on the information obtained from the in-depth investigation of the direct cause of this case.
- **It was concluded that the deepest underlying factor was "the belief that employees cannot be an internal threat."**

| Direct cause | Background factor | Confirmed details |
|---|--|---|
| An operator used another person's ID card, lied about his identity, and even re-registered himself on an identification device. | The employee concerned and the responding security personnel lacked understanding of the importance of nuclear material protection of nuclear materials (human) | <ul style="list-style-type: none"> • The operator prioritized not being late over complying with the rules for the physical protection of nuclear materials, and misused another person's ID card, thereby deviating from the access control procedure. • Although the guards (employee and contractos) were uncomfortable with the discrepancy between the person in question and the photograph, they allowed him to enter the protected area, thus deviating from the access control guidelines. |
| | Shortfalls in process and equipment for entering a protected area, etc. (technical) | <p>[Shortfalls in process]</p> <ul style="list-style-type: none"> • Specific procedures for personnel ID verification are inadequate, and training is not standardized. • No description of when biometric re-registration should be performed in the guidelines. <p>[Shortfalls in equipment]</p> <ul style="list-style-type: none"> • Authentication errors occurred almost daily and were not a special condition. • Sometimes it was difficult to identify a person because the photo was old or unclear. |
| | Inadequate environment for rigorous security operations (organizational) | <ul style="list-style-type: none"> • Some of the contracted guards said that in the past, TEPCO employees had complained to the contracted guards, and that there was an atmosphere in which it was difficult to speak up even if they felt uncomfortable. • Contracted guards had reservations about confronting TEPCO employees. |
| | Managers of the Physical Protection Department do not have a clear understanding of the actual situation at the site (organizational). | <ul style="list-style-type: none"> • Managers of the Physical Protection Department (Physical Protection Manager, General Manager of the Disaster and Industrial Accident Prevention Department, and GM of Physical Protection) have few opportunities to visit the site and cannot grasp the on-site situation of equipment defects and security. |
| The employee guard and the contracted guard failed to take appropriate action at their respective confirmation points. | Underlying cause | Confirmed details |
| | The belief that employees cannot be an internal threat (both employees and security personnel) | <ul style="list-style-type: none"> • <u>In the security guidelines that can be formulated with the approval of the site superintendent, "abnormal situations" are assumed to be equipment malfunctions only (unauthorized use of ID cards and response to suspicious persons are not assumed).</u> • <u>The security guidelines do not specify how the ID cards should be stored (they were kept unlocked)</u> • <u>Some of the guards were lenient on the operators' entry (they did not think anyone would cheat)</u> |

3-1. Partial Loss of Function of Nuclear Material Protection Equipment – Case summary and direct cause

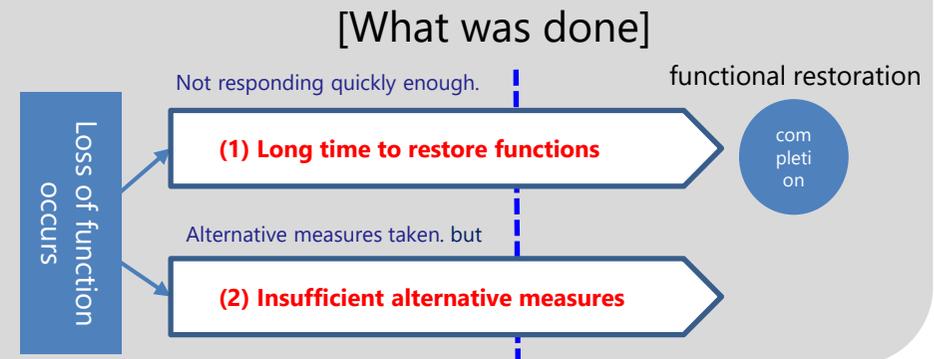
Case summary

- On January 27, 2021, following an incident in which a contractor accidentally damaged nuclear material protection equipment related to intrusion detection (hereinafter referred to as "intrusion detectors"), the Nuclear Regulation Authority instructed TEPCO Holdings to check the status of other facilities, and TEPCO Holdings reported on the status of Nuclear Material Protection facilities at Kashiwazaki Kariwa.
- In response to the above, on March 16 of the same year, the Nuclear Regulatory Authority issued a statement to the effect that: "With regard to maintaining and ensuring the physical protection of nuclear material, TEPCO Holdings is failing to satisfy the regulatory requirements. It is reasonably foreseeable that this could have been avoided if the regulations and procedures for the protection of nuclear material had been strictly observed, prompt countermeasures had been considered, and appropriate alternative measures had been taken, and this constitutes a deterioration in performance". Along with this notice, the significance assessment of "importance: red" was made.

The Nuclear Regulatory Authority pointed out that it took a long time to restore the equipment and that no effective alternative measures had been taken.

What should have been done

- (1) Promptly repair or replace** to maintain the function.
- (2) In the meantime, reinforce surveillance with alternative equipment.**

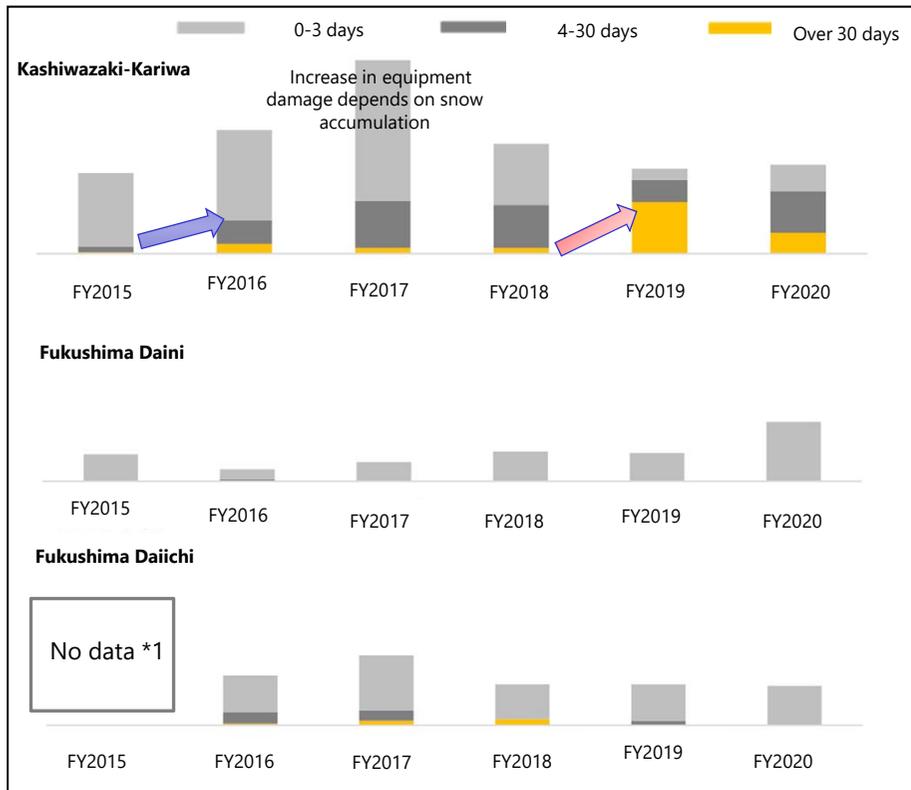


Direct cause

- (1) Failure to promptly restore the function of the intrusion detector when it failed, thinking that there would be no problem as long as alternative measures were taken.
- (2) Mistakenly believing that alternative measures were appropriate in the event of loss of function of the intrusion detector.

3-2. Background of the event (1) - Comparison with other TEPCO Holdings' sites and other power companies' sites

- At Kashiwazaki-Kariwa, signs of delays in functional restoration (exceeding 3 days) began to appear in FY2016, and **the number of cases requiring more than 30 days increased from FY2019** [Functional restoration was promptly implemented at Fukushima Daiichi and Fukushima Daini] (Figure 1)
- Compared to Fukushima Daiichi and Fukushima Daini, Kashiwazaki-Kariwa has a longer age of protective equipment, a wider scope of coverage, and more equipment failures. In contrast to this situation, the number of local technical staff and spare parts of Japan Nuclear Security System Co., Ltd. ("JNS"), which is entrusted with the maintenance and management of the facilities, is relatively small (Table 1).
- The time required to restore Kashiwazaki-Kariwa's functions is outstanding, even when compared with other electric power companies (Figure 2).



1: Non-conformity management system for nuclear material protection has not been introduced.

Figure 1 Number of failures and number of days required to restore equipment

Table 1: Comparison of three power plants for intrusion detectors (FY2020)

| | Kashiwazaki-Kariwa | Fukushima Daiichi | Fukushima Daini |
|--|---------------------------------------|-------------------|-----------------|
| Age of equipment (years) | About 15 | approximately 7 | About 10 |
| Number of facilities*2 | 1.61 | 1.72 | 1 |
| Power plant site area*2 | 2.86 | 2.38 | 1 |
| Number of equipment failures*2 (2018-2020 average) | 2.62 | 1.08 | 1 |
| Number of failures per facility*2 | 1.63 | 0.63 | 1 |
| JNS | Number of local engineers (persons)*3 | 3 | 5 |
| | Reserve supply situation | few | many |

2: Relative value when Fukushima Daini is set as 1 *3: Number of people including local site superintendents

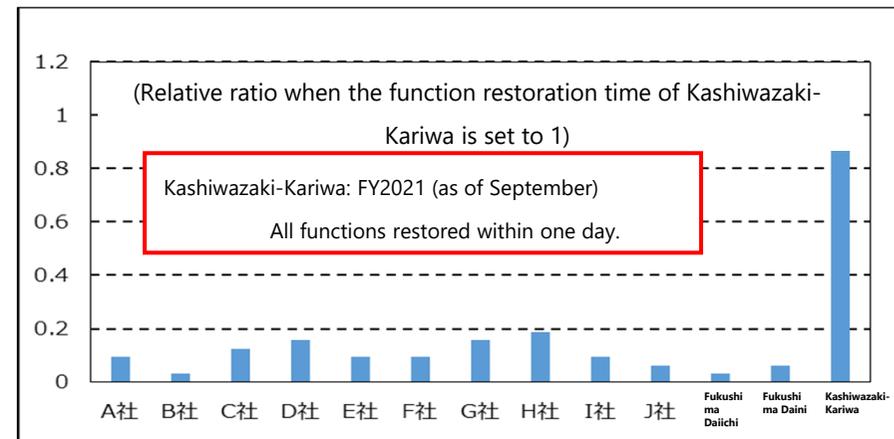


Figure 2 Comparison of functional restoration time (FY2020) with other electric power companies

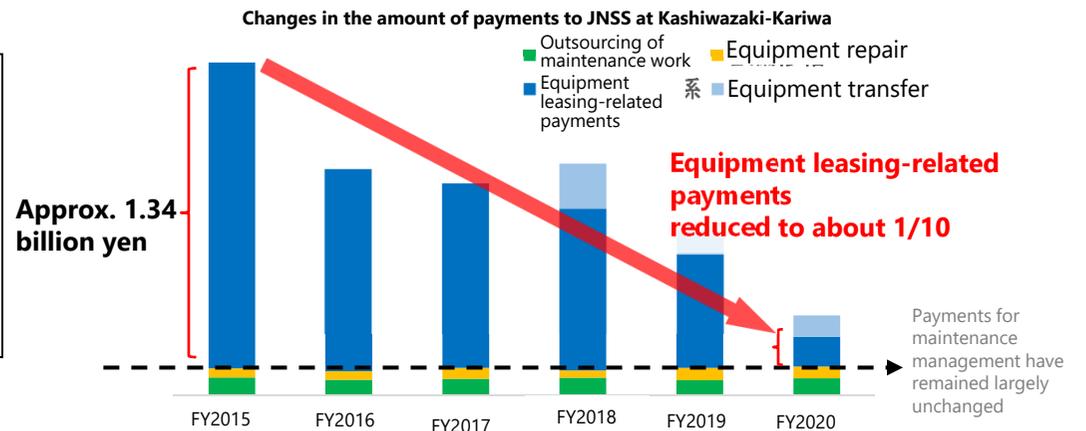
Changes in lease contracts

- ① 1984-: Even before the loading of fuel at Kashiwazaki-Kariwa, JNSS established a system to promptly respond to TEPCO Holdings' requests and demands through a special order package for the lease and maintenance of nuclear material protection equipment.
 - ② In 2011, in light of the business situation after the accident at the Fukushima Daiichi Nuclear Power Station, the Kashiwazaki Kariwa Disaster and Industrial Accident Prevention Department Manager*1 renewed the contract (re-lease) without renewing the equipment. After that, the director of the Kashiwazaki-Kariwa Safety Center*1 leased the equipment again without conducting a technical review, and the equipment aged more than other sites (from around 2015)

According to the hearing, there was a common understanding within the company about the necessity of reviewing the lease contract, because the lease contract is a unique form of ownership for electric power facilities, and it is difficult to respond flexibly when the need for equipment renewal arises.
 - ③ In 2015, at a meeting of the Technology and Business Innovation Promotion Subcommittee, the Head Office Technology and Business Innovation Office, the Procurement Department, and the Kashiwazaki-Kariwa Physical Protection Group proposed and received approval for a plan to terminate lease contracts and replace equipment with their own equipment, taking into account the need to reduce lease fees.*2
 - ④ From 2016 onwards, we shifted to in-house facilities for additional equipment. From 2019 onwards, for equipment with expiring lease terms, we gradually purchased the equipment from JNSS (transfer for a fee) and replace it with our own equipment.
- [Lease contracts: Decreased by approximately 1/10 from 14 contracts (approx. 1.34 billion yen) in FY2015 to 3 contracts (approx. 130 million yen) in FY2020]

Maintenance outsourcing and equipment repairs

- Equipment maintenance management is carried out through outsourcing of maintenance work (daily equipment inspections and initial response in the event of a breakdown) and repair work.
- Since 2015, payments for maintenance of equipment have remained largely unchanged (see chart at right)

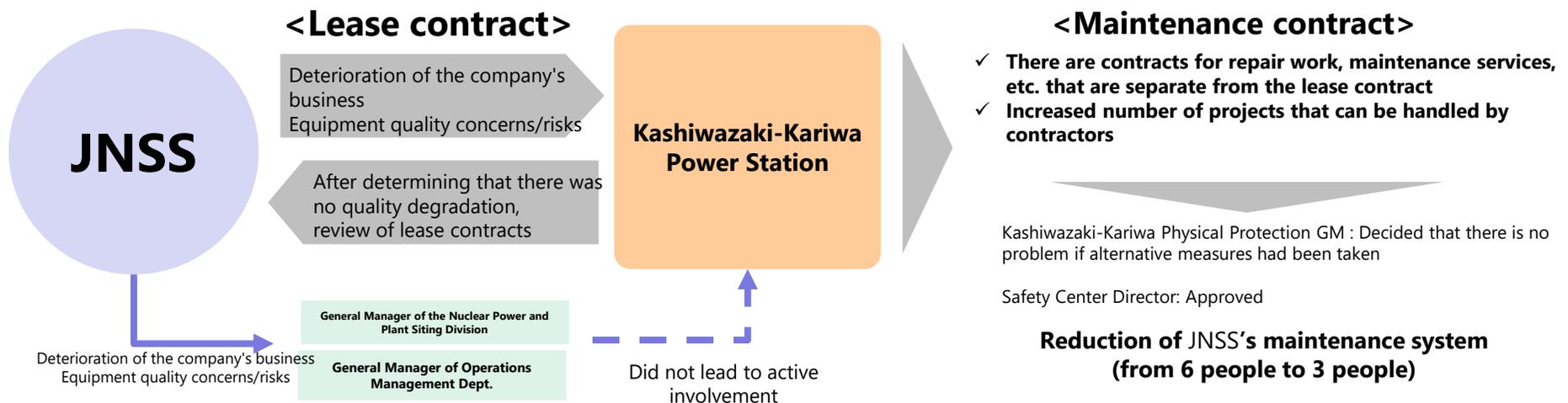


1 Decision maker at the time
 2 However, priority is given to the expansion of equipment according to regulatory requirements, and equipment renewal is not implemented.

3-2. Background of the event (2) - Changes in lease contracts and maintenance contracts

Background of the contract review

- JNSS requested the Kashiwazaki-Kariwa Physical Protection Group to "continue the contract (maintain the system) by considering the lease contract and the maintenance contract as one and the same thing", but Kashiwazaki-Kariwa (the Site Superintendent and below) asked JNSS to review the contract based on the idea that "the lease contract and the maintenance contract are separate, and there is a problem with JNSS's income and expenditure structure itself, which depends on lease income".
- While JNSS repeatedly explained its concerns about maintaining the quality of maintenance work when changing the lease contract (to in-house equipment), Kashiwazaki Kariwa thought that it would be possible to manage the equipment without quality deterioration by reviewing the management system at the plant, and shifted to in-house equipment. ⇒ No evidence of review of the management system was confirmed.
- JNSS communicated its concerns about the deterioration of its own business and the quality of its equipment due to the contract review to the Head Office (General Manager of the Nuclear Power and Plant Siting Division and General Manager of the Nuclear Power Plant Management Department), but the Head Office only asked JNSS to consult with Kashiwazaki-Kariwa and did not take an active role.
- In the midst of the above lease contract review, the Kashiwazaki-Kariwa Physical Protection GM has also scaled back the maintenance contract for FY2019, according to a technical review based on the contracting procedures, and under the belief that in the event of a failure, alternative measures are acceptable until the function is restored. As a result, JNSS reduced its maintenance system (from 6 people to 3 people).



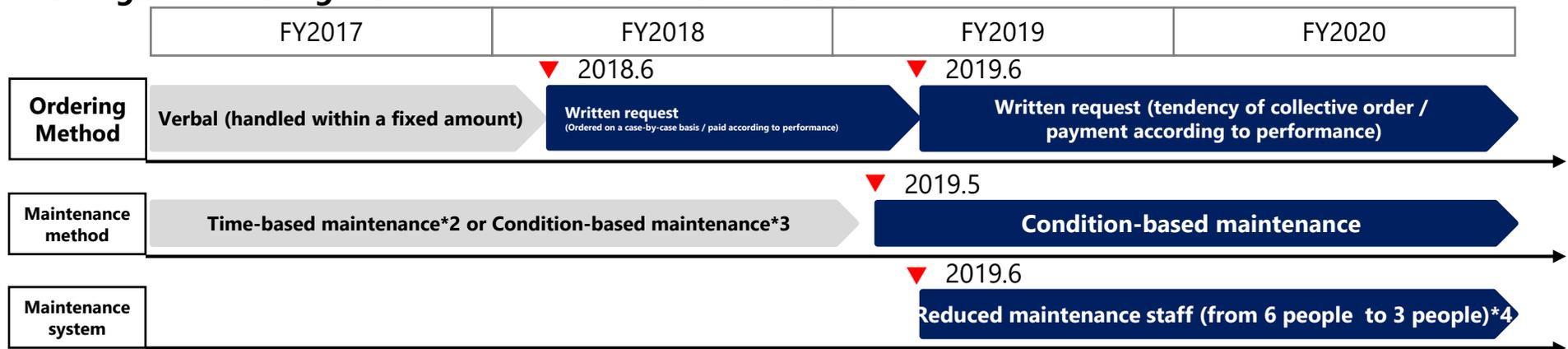
Change in ordering method and maintenance method

- During the contract review process, in FY2018, at the request of JNSS, the Physical Protection GM changed the ordering method for functional restoration from verbal orders to written requests. As a result, contract processing work for the Group members increased.
- Based on the above situation, in FY 2019, the maintenance method was shifted to condition-based maintenance with the approval of the Physical Protection Manager from the viewpoint of optimizing equipment maintenance, mainly by the members of the Physical Protection Group office*1 who have experience in maintenance work, and the periodical inspection items of equipment were reduced (no evidence of evaluation or review of equipment quality due to the review could be confirmed).
- In the same year, due to the downsizing of the maintenance system at JNSS, it was decided that JNSS 's first response engineers would be dispatched from Tokyo. As a result, the Kashiwazaki-Kariwa Physical Protection Group members tended to place orders only after several failures had occurred.

1: Personnel engaged in desk work other than those working at the Physical Protection Headquarters (in the field)

⇒ From the comparison with TEPCO Holdings' other sites as well, it is inferred that these changes at Kashiwazaki-Kariwa were the background that influenced the prolongation of functional restoration.

<Changes in ordering methods and maintenance methods



(FY2016~) Decrease in lease revenue

2: A form of maintenance in which the time and content of maintenance are predetermined based on calendar time intervals or operation and service times.

3: A form of maintenance in which the timing and content of maintenance are planned and implemented based on the condition of the equipment.

4: First-response technicians dispatched from Tokyo

Understanding of prolongation of functional restoration

- The majority of Kashiwazaki-Kariwa Physical Protection Group members said that they thought that it was not necessary to restore functions promptly if alternative measures were taken to restore functions in the event of an intrusion detector failure.
⇒ It is assumed that the reason behind this is that the Kashiwazaki-Kariwa Physical Protection Group members lacked understanding of the legal requirement of "prompt repair" under the regulations for the protection of nuclear material, and there were no specific rules for "prompt functional restoration".

Understanding of alternative measures

- From interviews with Kashiwazaki-Kariwa Physical Protection Group members, many said that they thought that alternative measures were being implemented adequately. On the other hand, some of the employee guards had doubts about the situation (since around the end of fiscal year 2018) where the intrusion detectors were increasingly malfunctioning and being monitored alternatively on multiple screens, and whether they were being monitored correctly.
- The specific operation of alternative measures has not been clearly defined, and there was a common understanding that the alternative measures that have been taken over orally and through guidance in practice are sufficient.
- In the event of equipment failure, the time sequence, including alternative measures, is documented in writing and reported to the Nuclear Regulation Authority by e-mail or fax each time. Monthly written reports, which also include alternative action methods, were submitted to the Nuclear Regulation Authority on all nonconformities. Since there was no particular response from the Nuclear Regulation Authority, it was assumed that there was no problem, etc.
- Many managers of the Physical Protection Department (two GMs of Physical Protection since 2014 and three managers of the Disaster and Industrial Accident Prevention Department since 2010) said that they did not have a sufficient grasp of the monitoring status of the Physical Protection Headquarters, and it is inferred that they did not have an accurate grasp of the content of the regulations and procedures, nor did they have an accurate grasp of the actual situation on site.
- I thought that alternative surveillance by camera is sufficient if it is available. I did not directly check the implementation status of the site.
- We were taught that they were operating alternative surveillance with cameras and thought that this was being accomplished. I'd never seen an actual surveillance situation before.

- In the internal reporting and review, the Physical Protection GM, who judges whether or not the information is “nonconformity information related to the protection of nuclear material under the operational guidelines*1”, did not report the prolonged failure and the status of alternative measures as serious problems, and the actual situation at the site regarding this incident at Kashiwazaki-Kariwa was not shared. As a result, including the head office, it was not used as an opportunity for awareness and improvement.
- At the power plant, from the hearing, it can be inferred that the Kashiwazaki-Kariwa Physical Protection Group members did not see the prolonged failure as a serious problem if alternative measures had been taken without any problem, and prioritized other responses to the Nuclear Regulation Authority's remarks.
In response, upper management at the power plant assumed that field operations were being conducted properly and failed to identify and correct problems.

| Monitoring | Details on nuclear material protection equipment (prolonged failure and alternative measures) | Report sender | Report recipient |
|--|---|---|---|
| (1) PP – PIM**2 | Only confirming the individual recovery schedule (without confirming the actual completion) | Physical Protection GM | Chief: Disaster and Industrial Accident Prevention Group Section Chief |
| (2) Quarterly Report | No consideration of the number of days elapsed and no reference to whether or not action is required, including for other nonconformities. | Physical Protection GM | Nuclear Material Protection Manager |
| (3) Nuclear Security Measures Subcommittee | No discussion has been held on nuclear material protection equipment | Disaster and Industrial Accident Prevention GM | General Manager of the Nuclear Power and Plant Siting Division (several times a year) |
| | No reports related to nuclear material protection equipment have been made. | Disaster and Industrial Accident Prevention GM | President (about once/year) |
| (4) Annual Report*3 | With regard to the remaining cases of equipment non-conformity and the number of days elapsed, there is no consideration of the number of days elapsed as part of the large number of documents and no mention of whether or not action is required. | Physical Protection GM | Site Superintendent |
| (5) Other-site evaluation (from other sites) | In FY2015, other sites pointed out to Kashiwazaki Kariwa that the recovery was prolonged, but a member of the Kashiwazaki Kariwa Physical Protection Group explained that the company had started stocking spare parts in order to determine the mode of equipment degradation and remaining life. Since each site believed that the alternative measures were being implemented without any problem, an observational assessment focusing on alternative measures was not conducted. | – | Chief: Disaster and Industrial Accident Prevention Group Section Chief |
| (6) Performance review meeting | No discussion has been held on nuclear material protection equipment | Physical Protection GM | Site Superintendent |
| (7) Management review | Same as above | Physical Protection GM Site Superintendent General Manager of the Nuclear Power and Plant Siting Division | Site Superintendent (once / 6 months) General Manager of the Nuclear Power and Plant Siting Division (once/ 6 months) President (once/year) |

1: Specific tasks related to the protection of nuclear materials are carried out in accordance with the guidelines for the protection of nuclear materials established by the authority of the head of each power station.
 2: Performance Improvement Conference on Physical Protection of Nuclear Material. A meeting body to share and discuss information on non-conformities in the protection of nuclear materials (Physical Protection - Performance Improvement Meeting)
 3: Periodic evaluation and improvement of protective measures (implementation in accordance with the regulations for the protection of nuclear material)

3-2. Background of the event (6) -Internal audits and operator liaison meetings (opportunities for awareness)

Internal audit

- During a special audit conducted in FY2017, the Internal Audit Office noted and notified conditions with prolonged functional recovery in the audit report, but the audit recommendations did not encourage a shorter recovery period.
- The FY2018 special audit also did not include continued monitoring focused on the number of recovery days, resulting in the prolonged restoration of functions in the power plant not being corrected even after receiving audit recommendations.

Operator liaison meeting (a place for the Nuclear Regulation Authority and operators to exchange opinions)

- At the "operator liaison meeting", **it was pointed out that all operators should maintain and manage equipment for the protection of nuclear materials.**

| fiscal year | Main points |
|-------------|--|
| 2014 | I am concerned that a major problem may occur sooner or later if the nuclear material protection division is isolated and the management is not communicating closely with the field. |
| 2015 | Even if an intrusion is reliably detected and promptly indicated, if it takes time before it is recognized, the relevant authorities will not be contacted promptly and reliably. |
| 2017 | Management should allocate the necessary resources. |
| 2019 | It must be an appropriate alternative measure to be acceptable. Inappropriate content, such as an apparent shortage in the number of guards for alternative measures, is not acceptable. |

- At these meetings, points were made that led directly or indirectly to correcting "prolonged restoration of functions" and "insufficient alternative measures," but the content of these points was only **shared (via email, etc.) within the Disaster and Industrial Accident Prevention Group at the Head Office and with the Physical Protection Managers and Physical Protection GMs at each power station.**
- In addition, these points were **not reported to the Site Superintendent or the General Manager of the Nuclear Power Plant Management Department as important issues, nor were they reported to the General Manager of the Nuclear Power and Plant Siting Division at meetings within the Nuclear Power and Plant Siting Division**
- **In the background, from past interviews, there is a common understanding among TEPCO Holdings' Physical Protection Managers that "alternative measures are being implemented in the same way at each power station. In addition, the Kashiwazaki-Kariwa Physical Protection Group believes that there is no need to hasten the restoration of functions if alternative measures are in place.** Therefore, it is thought that the Head Office Disaster and Industrial Accident Prevention Group and the Kashiwazaki-Kariwa Physical Protection Group did not consider these points to be important issues for their own organizations.

3-3. Partial loss of function of Nuclear Material Protection Equipment -sorting out of background factors

- Based on the following background factors: restraint of capital investment and change of system without technical evaluation; lack of understanding of legal requirements; and inability to understand and correct the actual situation at the site; and also because of the special nature of the underlying nuclear material protection work, this case is **analysed as "the Nuclear Power and Plant Siting Division (Head Office and Kashiwazaki-Kariwa) should have voluntarily addressed new threats related to the protection of nuclear materials, but did not take any action beyond what was pointed out by the Nuclear Regulation Authority"**.

| Direct cause | Background factors | Confirmed details |
|---|--|--|
| It was thought that there was no problem as long as the alternative measures were being taken, and functional restoration was not promptly carried out. | Physical Protection Group does not assess the impact and changes the maintenance management system (technical and organizational) | <ul style="list-style-type: none"> Based on the belief that there is no need to hasten functional restoration if alternative measures are in place, the Physical Protection GM did not conduct an impact assessment of the change to in-house facilities and maintenance management system. |
| | The Nuclear Material Protection Division*1 did not renew the equipment (equipment) | <ul style="list-style-type: none"> The nuclear material protection division promoted the ageing of equipment through repeated leases without renewal (partly due to the priority given to the expansion of equipment in response to regulatory requirements). |
| | Power plant upper management*2 did not allocate personnel appropriate to the work (organizational) | <ul style="list-style-type: none"> The Physical Protection Group responded with a limited number of personnel midst a shortage of personnel who are familiar with the entire facility and who have the ability to prepare contract documents. |
| | The Physical Protection Group, Head Office Operations and Management Department, and Power Plant Senior Management failed to identify and correct issues (organizational) | <ul style="list-style-type: none"> The Physical Protection Group did not listen to the questions of employee guards (communication issues) The upper management of the power plant rarely went to the protection headquarters and failed to grasp the situation in the field. The Head Office Operations Management Department failed to identify and point out the multiple and prolonged failures in the PP-PIM. Site superintendent and the Director of the Nuclear Power Operation and Management Division lacked practical experience and education on the protection of nuclear materials. |
| | The Physical Protection Group's understanding and knowledge of legal requirements is limited and failed in rule making, documentation, and operation over the long term (human and organizational) | <ul style="list-style-type: none"> The specific operation of alternative measures was not clearly defined in the Physical Protection Group, and it was thought that it would not be a problem as long as the alternative measures were implemented according to the conventions that were passed down orally The Physical Protection Group mistakenly thought that the alternative measures were accepted by the Regulatory Authority The Physical Protection Group did not provide enough knowledge and education necessary to ensure that the work was carried out. |
| It was mistakenly assumed that the alternative measures were appropriate | Underlying cause | Confirmed details |
| | The Nuclear Power and Plant Siting Division (Head Office and Kashiwazaki-Kariwa) should have voluntarily taken action against new threats to the protection of nuclear materials, but took no further action than indicated. | <ul style="list-style-type: none"> Assumed that the lack of response from regulation meant that alternative measures were sufficient In response to suggestions from inside and outside the company, the report by Kashiwazaki-Kariwa Protection Management Group was accepted, and efforts to understand the actual situation were not made. Focused on other departments where issues had become apparent, such as enhancement of facilities and systems for emergency preparedness and training Some have said that the Physical Protection Division was not respected and that there was a lack of sensitivity to the importance of security operations, among other things. |

*1 Director General of the Nuclear Safety Center, Director General of the Nuclear Emergency Preparedness and Safety Department, GM of Physical Protection Management *2 Director General of the Power Plant, Director General of the Nuclear Safety Center, Physical Protection Manager, Director General of the Nuclear Emergency Preparedness and Safety Department (hereinafter the same)

4-1. Root cause and responsibility for both cases

- Three root causes for both incidents were identified: "**Lack of understanding and attention to the risks of physical protection of nuclear material (1) Weakness in risk recognition,**" "**Lack of understanding of problems at the site (2) Weakness in understanding of actual conditions at the site,**" and "**Failure to take advantage of external findings (3) Weakness in the ability of the organization to take corrective action.**"
- With regard to the above three points, as a result of consideration from the perspectives of: the "Nuclear Material Protection Division", which is directly responsible for the work related to the protection of nuclear material, and its supervisor, the "**Site Superintendent and the General Manager of the Nuclear Operation and Management Department,**" and the "**Power Plant Employees and Contractors,**" who are in a position to observe the rules, inaction or inadequate response is recognized in each.

Assessment of root causes

- Nuclear material protection division at power plants (including contracted guards) **lack an understanding of the risks of nuclear material protection, and have inadequate confirmation of on-site operations and failure to determine the need for rapid functional restoration.** (1) Weakness in risk recognition, (2) Weakness in understanding the actual situation at the site, and (3) Weakness in the ability to correct the situation as an organization.
 - ✓ Lack of understanding of internal threat risks (anomalies in security procedures do not include handling suspicious persons), not speaking up to TEPCO Holdings employees... (1)
 - ✓ Not understanding the actual situation at the site (not visiting the site) ... (2)
 - ✓ No systematic renewal of equipment (thought there was no need to hasten restoration if alternative measures were in place), etc. (3)
- **Site Superintendent and the General Manager of the Nuclear Power Operation and Control Division assumed that the on-site work was being handled appropriately and did not check it themselves.** In response to suggestions from inside and outside the company, **no efforts commensurate with the requirements for Nuclear Material Protection were made over the long term.**
 - ✓ No appropriate attention was paid to the importance of the protection of nuclear materials (no recognition of the importance of this task)... (1)
 - ✓ No understanding of the actual situation at the site (failure to visit the site) ... (2)
 - ✓ Failure to identify and correct problems (failure to recognize prolonged failure as a serious problem) ... (3)
- **Power plant employees and contractors (who are not involved in the protection of nuclear materials) have not been able to pay appropriate attention to the importance of the nuclear material protection.**
 - ✓ Lockers not locked, complaints against contracted guards, etc. ... ①

4-2. Management involvement

- Under the regulations for the protection of nuclear materials, the direct role of management (the President and General Manager of the Nuclear Power and Plant Siting Division in the protection of nuclear materials is not stipulated, and their role is to receive reports on the status of compliance with relevant laws and regulations and the status of activities to foster a nuclear security culture, and to issue instructions as necessary.
- Based on the results of the verification, and in light of the above, each involvement is organized as follows.

<Consideration of management involvement based on the results of the verification>

| Item | Title | Details |
|---|---|--|
| Violation of regulations on nuclear material protection | President, General Manager of the Nuclear Power and Plant Siting Division | The periodic reports did not contain any information that would have made us aware of the problem, and it was difficult to issue instructions as prescribed in the regulations for the protection of nuclear material to prevent the occurrence of an incident*1. |
| Understanding the actual situation on site | President | As a person in charge of setting basic policies to ensure compliance the regulations for the protection of nuclear material and activities to foster a nuclear security culture, the President could have requested the General Manager of the Nuclear Power and Plant Siting Division to grasp the situation on site and given instructions to respond appropriately to the actual situation. |
| - Compliance with related laws and regulations - Fostering and penetration of nuclear security culture | General Manager of the Nuclear Power and Plant Siting Division | The General Manager of the Nuclear Power and Plant Siting Division was responsible for giving appropriate instructions and supervision to the Site Superintendent and was in a position to monitor the actual situation at the site more frequently. In particular, being directly informed by JNSS of the concerns about the quality impact of the review of the lease contract, it can be said that the General Manager of the Nuclear Power and Plant Siting Division could have taken the following actions: informing the Site Superintendent and the general manager of the nuclear operation and management department at the head office of JNSS's concerns, instructing them to conduct an investigation, confirming the results of the investigation, and promptly taking corrective measures. There is no denying that the incident could have been prevented by the General Manager of the Nuclear Power and Plant Siting Division. |

*1 For both cases, pursuant to the regulations on nuclear material protection, the Physical Protection Managers should have managed the work comprehensively, but there was a lack of information from the Kashiwazaki-Kariwa Protection Management GM, who was responsible for making decisions on reported content. It was confirmed that there was no explicit report to the President or General Manager, and that there was no information reported that would suggest the possibility of a problem like this occurring or that the President or General Manager may have been aware of.

5-1. Evaluation of nuclear security culture - questionnaire (awareness) evaluation

- As part of the activities to foster a nuclear security culture, periodic questionnaire surveys are conducted once a year targeting nuclear departments (about 3,500 people), along with education (e-learning) to foster a nuclear security culture.
- Analysis of the degree of fostering in terms of self-evaluation and evaluation of the organization by the nuclear material protection section and other power plant employees using periodic questionnaires was carried out.
- In addition to the above, a special questionnaire survey on nuclear security (FY2021) was additionally conducted based on both cases.

<Summary of the questionnaire>

Self-evaluation: "Individual" is the subject, and the questions are mainly about "recognition of threats," "understanding of inappropriate cases," and "personal responsibility" in nuclear security.

Evaluation of the organization: "Organization" is the subject, and the question is mainly about "organizational atmosphere", "education", and "communication of importance" in nuclear security.

▼ Examples of questions

- I believe that terrorism and other nuclear security threats are real.
- I consider myself responsible for our company's nuclear security.
- There is an open atmosphere in my organization where we can express our opinions and ideas.
- Management and administrators explain the importance of nuclear security culture to staff.

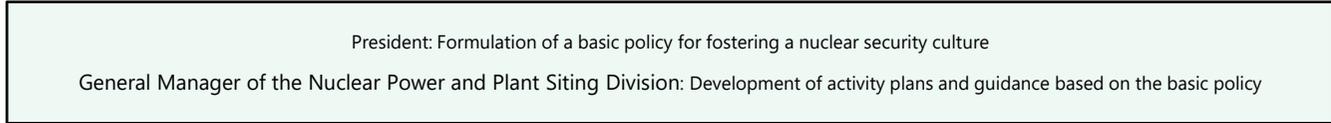
- The results of the analysis of both questionnaires are as follows
 - Many employees at each power plant commonly felt that **there was a lack of organizational efforts (e.g., communication of the importance of nuclear security by management and administrators) to foster a nuclear security culture.**
 - **In particular, weaknesses in "open atmosphere" and "respect for security" were identified in the Kashiwazaki-Kariwa Nuclear Material Protection Division** compared to the same sectors in Fukushima Daiichi and Fukushima Daini.

5-2. Evaluation of nuclear security culture -performance (behavior) evaluation

- With regard to nuclear security culture, based on the basic policy formulated by the President and the activity plan formulated by the General Manager of the Nuclear Power and Plant Siting Division, activities to foster nuclear security culture are implemented at each power plant for the Nuclear Material Protection Division and power plant employees.
- Awareness-raising activities such as dissemination of information and reminders to continuously foster a culture of nuclear security are conducted, while periodically checking the status based on behavioral indicators*1 of power station employees and contractors, including those not in the Nuclear Material Protection Division.
- On the other hand, in the Nuclear Material Protection Division, although training related to nuclear security is conducted, the lack of opportunities to impart knowledge related to the interpretation of laws and regulations is regarded as an issue.

1: Refer to (1) to (4) in the table below.

Activities to foster a culture of nuclear security



Sending out messages to management

<Fostering activities at each power plant>

| | |
|--|---|
| <p>Activities of power plant personnel (other than those in the Nuclear Material Protection Division)</p> <ul style="list-style-type: none"> • Sharing of nuclear security information • E-learning on fostering a nuclear security culture | <p>Activities of the Nuclear Material Protection Division (in addition to the activities listed on the left)</p> <ul style="list-style-type: none"> • Training on nuclear material protection equipment and field equipment • Nuclear Security Training • Improvement of site by patrolling nuclear material protection equipment |
|--|---|

Performance of each power plant

(1) Permit (ID card/entry pass) presentation rate (Figure 1)
 ⇒ We are working to improve the presentation rate by encouraging employees at the Physical Protection headquarters.

(2) Number of lost permits
 ⇒ Inform and alert visitors to the causes of loss and countermeasures via bulletin boards at the Physical Protection headquarters.

(3) Number of cases where knives and other unnecessary items were brought onto the premises
 ⇒ Continue efforts such as requesting temporary visitors to check the checklist for prevention of bringing in unused items in advance

4) Locking rate of parked cars in the premises (random check)
 ⇒ When a lock is found to be unlocked, the main contractor is immediately contacted and made fully aware of the situation.

| Plant | Year | Employees (%) | Contractors (%) |
|--------------------|------|---------------|-----------------|
| Fukushima Daiichi | 2019 | ~98 | ~95 |
| | 2020 | ~98 | ~95 |
| Fukushima Daini | 2019 | ~95 | ~92 |
| | 2020 | ~95 | ~92 |
| Kashiwazaki-Kariwa | 2019 | ~75 | ~70 |
| | 2020 | ~80 | ~75 |

Figure 1: Permit (ID card/entry card) presentation rate

(Random checks in the cafeteria, etc., to see if the permit is being presented at all times)

- Considering the results by level according to the roles and positions in nuclear material protection work, it was confirmed that the nuclear material protection division at Kashiwazaki-Kariwa considers "the lack of an open atmosphere (not being able to express one's opinions and ideas)" and the three power plant employees as a whole consider "insufficient efforts for nuclear security as an organization (especially internal threats)" to be issues. These are thought to have an impact on the root causes common to both cases (weakness in risk recognition, weakness in understanding the actual situation at the site, and weakness in the ability to take corrective action as an organization).

Evaluation according to role and position based on performance and the questionnaire survey

❑ Nuclear Material Protection Division

- ✓ From the results of the questionnaire, **weaknesses were identified in "open atmosphere" and "respect for security" at Kashiwazaki Kariwa** (the same trend of "respect for security" was also found at Fukushima Daiichi).

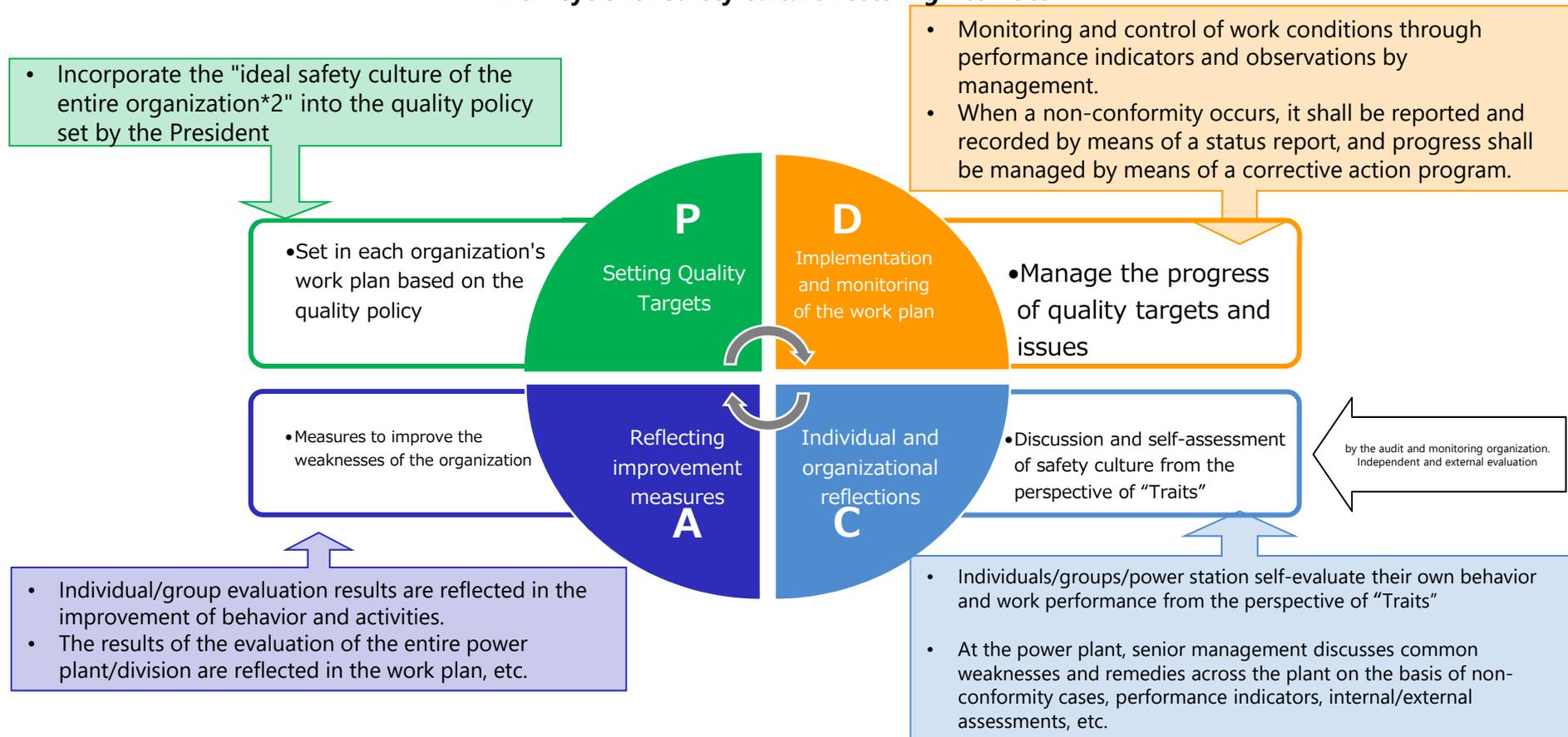
❑ Power station employees

- ✓ Considering the result that "power station employees as a whole think that the organization lacks efforts for nuclear security" and the weakness of "respect for security" was confirmed at Fukushima Daiichi and Kashiwazaki Kariwa, it is considered that there is a lack of understanding of nuclear security not only in the Nuclear Material Protection Division but also among each power plant employee.

- **In summary, there is a low level of awareness of nuclear security in the entire nuclear power sector, and in particular at Kashiwazaki-Kariwa, compared to Fukushima Daiichi and Fukushima Daini, the lack of openness in nuclear material protection organizations was confirmed. We must take seriously the possibility that these factors have led to a significant deterioration in the nuclear security performance of the Kashiwazaki-Kariwa nuclear material protection organization.**
- **In light of these circumstances, it is necessary to improve knowledge related to the interpretation of laws and regulations for the nuclear material protection division, and to reiterate the awareness and understanding of nuclear security in the entire nuclear division, including the nuclear material protection division and other divisions.**
Therefore, it is important to further develop a nuclear security culture through education and confirmation of the penetration status, as well as hardware measures, when formulating a improvement action plan.

- Based on the basic idea that "the quality and performance of the work of each employee and related parties in the nuclear power division is in itself an expression of safety culture," the PDCA cycle for fostering safety culture is handled as an integral part of quality assurance activities.
- Self-evaluation of the status of the safety culture at the power station is conducted through multifaceted discussions among senior management from the perspective of Traits*1 using various operational performance data such as non-conformity cases, performance indicators, and internal/external remarks

PDCA Cycle for Safety Culture Fostering Activities

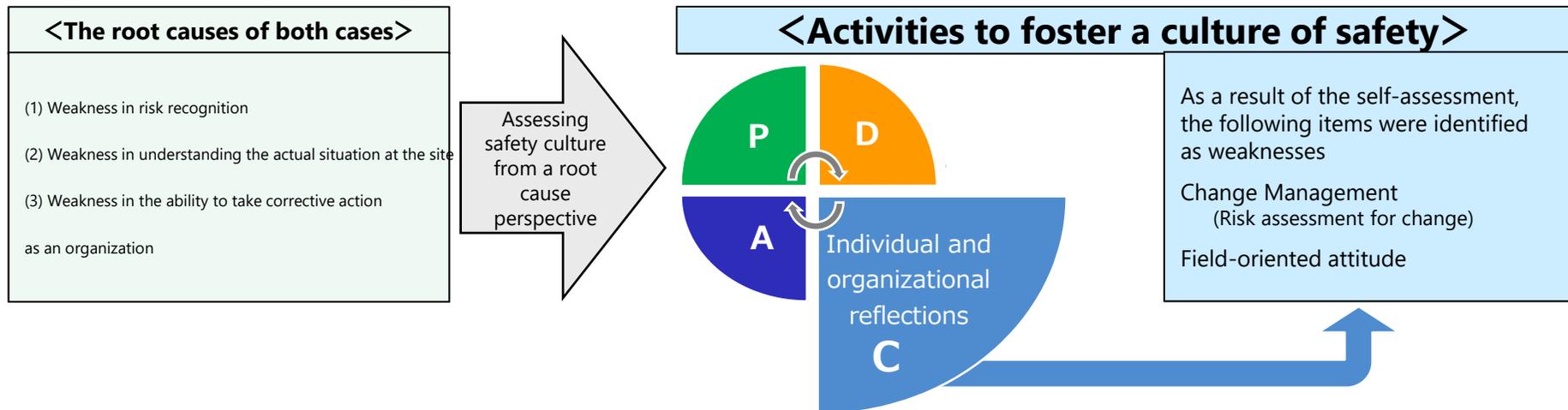


1 "Characteristics of each person, leader, and organization that embodies a sound nuclear safety culture" which has been conducted since 2014 as a perspective for fostering and evaluating safety culture.

2 "Never forgetting the accident at the Fukushima Daiichi Nuclear Power Station, we will continue to create unparalleled safety by improving the level of safety today more than yesterday and tomorrow more than today."

5-5. Evaluation of safety culture - Consideration of the root causes of both cases

- The root causes common to both cases (weakness in risk recognition, weakness in understanding the actual situation at the site, weakness in the ability to take corrective action as an organization) were evaluated based on the results of activities to see if similar problems have arisen in terms of safety culture.
- **As a result, it was confirmed that the company evaluates its own weaknesses in fostering a safety culture and makes continuous improvements, but it is important to make continuous improvements in "change management" and "field-oriented attitude," which the company evaluated as weaknesses, in order to further foster a safety culture.**



<An assessment of the safety culture related to the root causes of both cases.

(1) **Weakness in risk recognition**

In last year's Traits self-evaluation, "change management (risk assessment for change)" was listed as a weakness. On the other hand, the "rate of noticing less than non-conformity*" is gradually increasing.

(2) **Weakness in understanding the actual situation at the site**

In last year's Traits self-evaluation, "field-oriented attitude" was listed as a weakness item. On the other hand, observation and correction of actual work conditions by managers is becoming a well-established practice, and the number of reports by recording items noticed in on-site and desk work and managing the status of correction is on the rise.

(3) **Weakness in the ability to take corrective action as an organization**

In the event of a non-conformity, the status of the incident and countermeasures are discussed and confirmed at a performance improvement meeting by senior executives of the power plant and managers from various fields, and the completion of the countermeasures is ensured.

Rate of noticing less than non-conformity: Number of less than non-conformity notices / Total number (number of non-conformities + number of less than non-conformity notices)

5-6. Evaluation of safety culture -Examples of other efforts and considerations from the viewpoint of organizational culture

Major efforts to date (nuclear safety improvement: systems and equipment)

- Based on the reflections and lessons learned from the accident at the Fukushima Daiichi Nuclear Power Station, we are aiming to become an organization that continuously improves nuclear safety, and we are taking a series of initiatives while focusing on improving the competence of each and every staff member, such as strengthening emergency response capabilities, developing equipment to cope with severe events, proposing measures to improve safety, and developing highly specialized human resources.

Emergency drill during COVID-19 pandemic (Kashiwazaki-Kariwa)



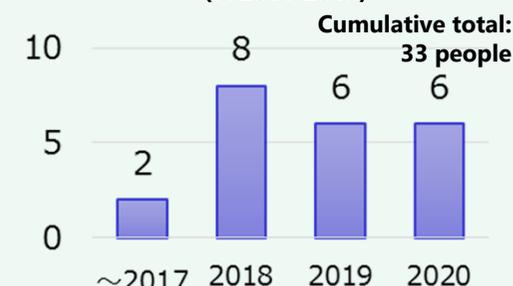
Training in water injection using a fire engine



Safety Improvement Proposal Strengthening Competition (FY2013-2020)

| | |
|------------------------|-------|
| Number of applications | 1,400 |
| Number accepted | 88 |

Chief Nuclear Reactor Engineer Number of Successful Candidates (FY2011-2018)



Until FY2017, the average number of successful candidates was about 2 per year.

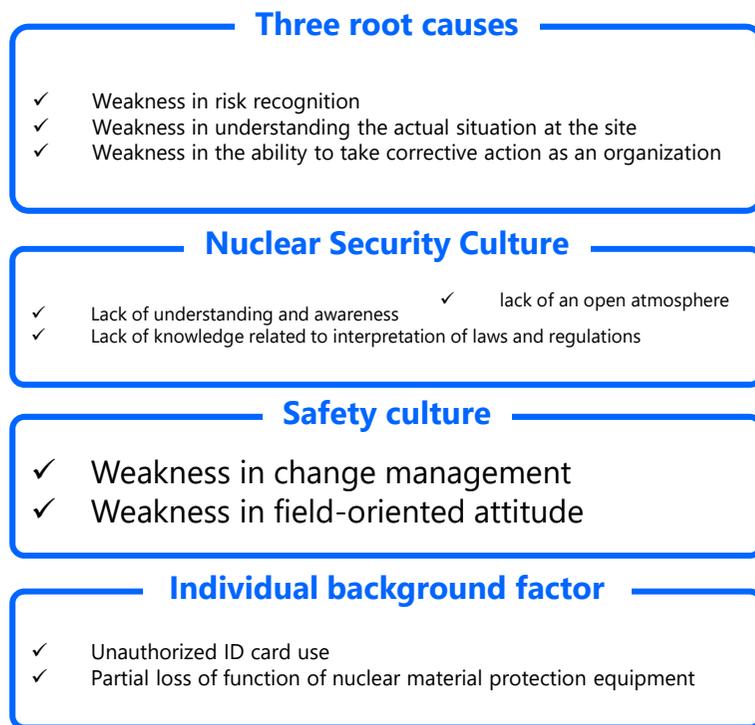
Aspects that need to be addressed in the future

- In the course of the above efforts, a dialogue and questionnaire survey between Kashiwazaki-Kariwa employees and management, conducted in light of both cases, revealed many opinions about the workplace atmosphere and daily feelings, as well as an awareness of the need for better relations with the local community.
- Based on these opinions, we accept the importance of efforts that focus more on organizational cultural aspects, such as promoting communication between upper and lower levels in the workplace and inter-organizational cooperation, communication with the local community, restraining measures that take precedence over mechanisms that do not match the capabilities of the organization, and improving the tendency to be reluctant to speak up due to superiority and control.

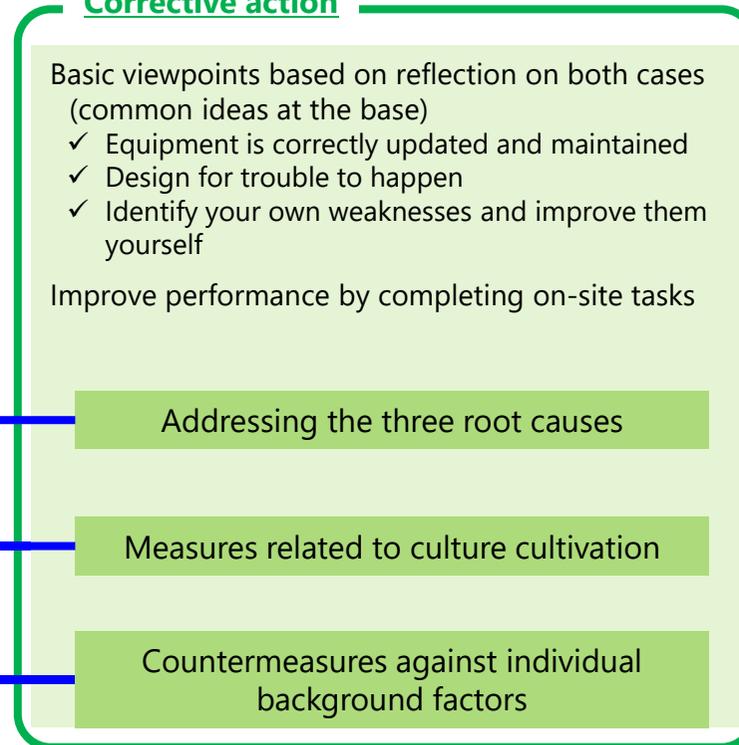
6-1. Corrective action plan - planning

- **Ensure that measures are taken to address the three root causes, i. e. "weakness in risk recognition," "weakness in understanding the actual situation at the site," and "weakness in the ability to take corrective action as an organization," and individual underlying factors identified in both cases.**
- **Based on this and past reflections, we formulated a corrective action plan based on the three basic perspectives of "updating and maintaining equipment correctly," "problems always occur," and "improving our own weaknesses on our own".**
- In addition, in order to continue to improve quality and ensure safety, and to reassure the local community and society, it is important to ensure that on-site operations are completed and that performance is maintained.
- **The improvement action plan will incorporate reviews and good practices by other operators, as well as the Independent Verification Committee's recommendations on measures to prevent recurrence, and the opinions and knowledge of external experts and specialists (third parties).**

Cause analysis



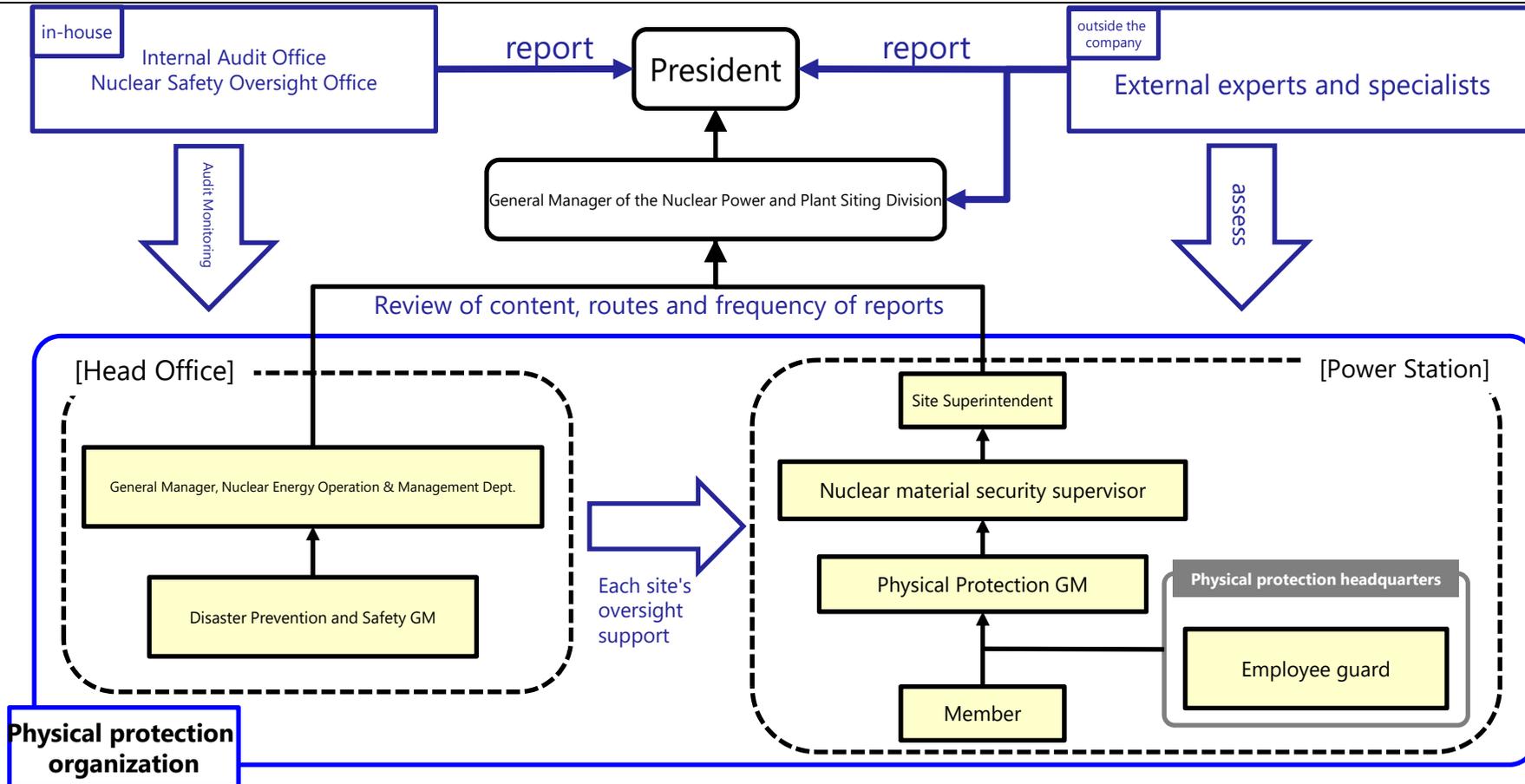
Corrective action



Internal and external third parties assess

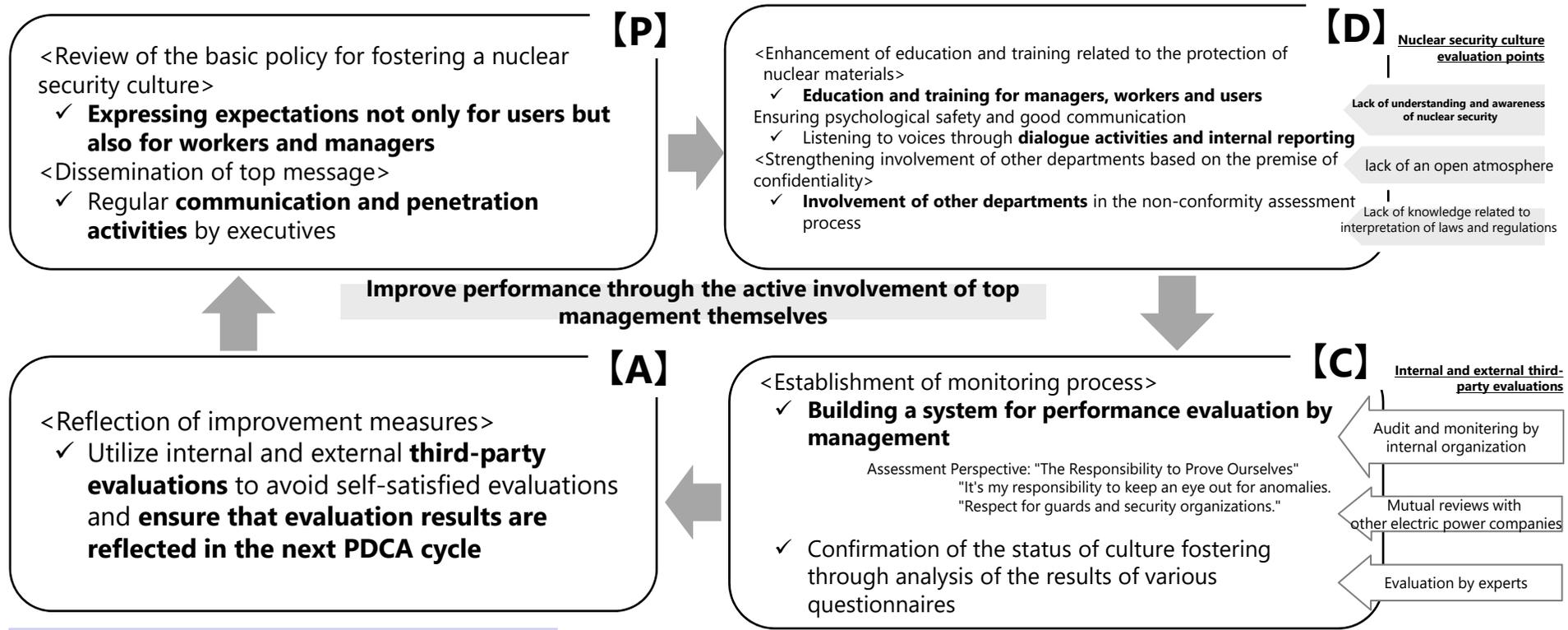
6-2. Corrective action plan - Measures to address the three root causes (overall governance review)

- Based on the reflection that we could not understand the actual situation at the site and could not take corrective actions as an organization, we will consider reviewing the regulations for the protection of nuclear material from the following perspectives and rebuild the governance of the protection of nuclear materials.
 - ✓ From the perspective of strengthening the involvement of management, head office and upper management of power station, reorganize the roles and responsibilities of each
 - ✓ Regarding information transmission and chain of command for nuclear material protection, establish a system that enables prompt correction of issues at the site by reviewing the contents of reports (non-conformity, trouble, budget execution status, etc.), routes, and frequency of reports
 - ✓ Arrange a conference body for deliberation of important matters related to the protection of nuclear materials
- Furthermore, based on the recommendations of the Independent Review Committee on Nuclear Material Protection, external perspectives (third parties, internal audits, etc.) will be introduced



<Fostering a culture of nuclear security>

● Based on the recommendations of the Independent Review Committee, the effectiveness of the Improvement Action Plan will be ensured by implementing the PDCA cycle as follows, and not only the President and the General Manager of the Nuclear Power and Plant Siting Division, but also managers on site will be actively involved in spreading the plan to workers and users, thereby improving the performance of the organization.



<Fostering a culture of safety>

● Further fostering a culture of safety through continuous improvement of our own weaknesses, with an emphasis on improving the ability of on-site managers to understand real operations on site and on education and monitoring of change management

- Formulate improvement action plans based on the factors behind unauthorised ID card use
- In particular, the processes related to entering the protected area have already been corrected and are working effectively as follows

| Background factors and underlying factors | Main measures (see end slide for others) |
|--|---|
| 1. Lack of understanding of the importance of protection of nuclear materials | Qualification of operators/guards |
| 2. Deficiencies in the processes and equipment involved in entering the protected area | Deactivation of on-site registration devices/confirmation of personnel status when re-registering Addition of personal authentication device |
| 3. Inadequate environment for rigorous security operations | Strengthen the system to support the Protection Headquarters |
| 4. Managers do not understand the actual situation on site | Include in measures related to root causes and culture fostering |
| 5. Belief that employees cannot be an internal threat | Include in measures related to root causes and culture fostering |

Hardware

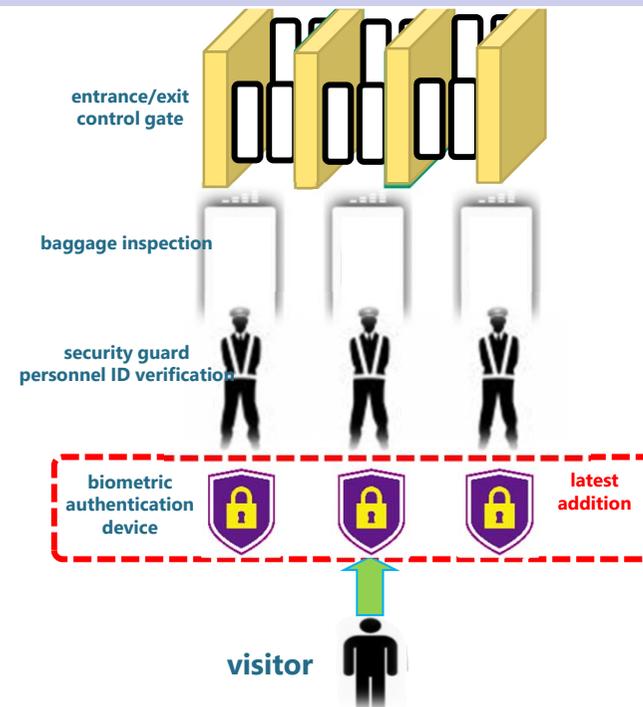
Install additional personal authentication device

- ✓ **Biometric authentication device** installed at the entrance/exit control gate of the perimeter protection area (see the figure on the right)

Software

<Stop using the registration device at the site>

- ✓ **Prohibits the rewriting of information at the discretion of the site when an abnormality occurs in the biometric device.**
- ✓ The information is rewritten at the registration center in the main office building after the personnel ID verification is carried out.



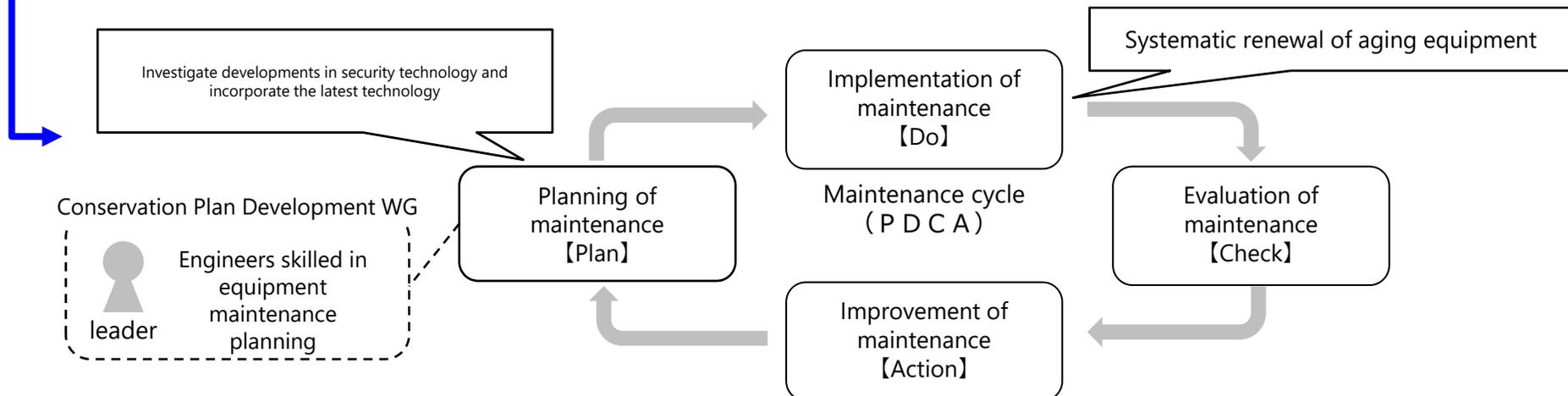
6-5. Corrective Action Plan - Countermeasures for individual background factors (partial loss of function of nuclear material protection equipment)

- Plan for corrective action based on the background factors behind the partial loss of function of nuclear material protection equipment
- In particular, in response to the aging of equipment without renewal, the following maintenance plans have been developed

| Background factors and underlying factors | Main measures (see end slide for others) |
|---|---|
| 1. Physical protection G changes maintenance management system without impact assessment | Improvement of equipment maintenance system (changed maintenance contracts with contractors) |
| 2. Nuclear Material Protection Division of the power plant did not renew the equipment | Development of maintenance plan (inspection plan, replacement plan) |
| 3. The upper management of the power plant did not assign personnel commensurate with the nature of the work | Strengthening of personnel in the Nuclear Material Protection Division / Preparation of personnel rotation policy |
| 4. Head Office Nuclear Operations and Management Department and Power Plant Senior Management failed to recognize and correct the issues | Review of functions/responsibilities between head office and sites in the area of security |
| 5. Physical Protection G has limited understanding and expertise of legal requirements and has not reviewed rules, documentation, and operations for a long period of time. | Clarification of rules on alternative measures |
| | Clarification of the estimated recovery period for functional restoration |
| 6. Nuclear Power and Plant Siting Division (Head Office and Kashiwazaki-Kariwa) should have voluntarily taken action against new threats to the protection of nuclear materials, but took no further action than indicated. | Included in measures related to root causes and culture fostering |

Development of maintenance plan (inspection plan, replacement plan)

- ✓ The "Maintenance Plan for Nuclear Material Protection Equipment WG" was established to develop a maintenance plan according to the characteristics of the equipment and the specification environment.



7. TEPCO Holdings' response to the recommendations on recurrence prevention measures by the Independent Verification Committee on Nuclear Material Protection

| Independent Verification Committee's recommendations on recurrence prevention measure | TEPCO Holdings' improvement action plan Bold: Measures to be further examined based on the recommendations of the Independent Verification Committee |
|---|---|
| (1) Ensuring a sense of tension against nuclear security led by leaders who embody the goal | <ul style="list-style-type: none"> ○ Review of the Basic Policy for Fostering Nuclear Security Culture, etc. ○ Dissemination of top messages and penetration activities by power plant upper management ○ Improved understanding of local operations by managers |
| (2) A thoughtful attitude that focuses on the goal of maintaining nuclear security | <ul style="list-style-type: none"> ○ Preparation of basic manuals and other documents for unification of operations among sites related to the protection of nuclear materials ○ Strengthening of education on the protection of nuclear materials ○ Improvement of the manual to ensure its effectiveness in line with the actual situation in the field |
| (3) Smooth communication for understanding the actual situation | <ul style="list-style-type: none"> ○ Strengthening of the system to support the Physical Protection Headquarters ○ Improvement of communication between the Nuclear Material Protection Division and other departments ○ Improved understanding of local operations by managers ○ Car seat meeting / management dialogue meeting ○ Listening to opinions related to nuclear security and nuclear safety (using internal reporting) |
| (4) Improving Engagement | <ul style="list-style-type: none"> ○ Dissemination of top messages and penetration activities by power plant executives ○ Strengthening of personnel in the Nuclear Material Protection Division ○ Preparation of personnel rotation policy for the Nuclear Material Protection Division ○ Sit in a circle Meeting / Management Dialogue Meeting ○ Creation of Kashiwazaki-Kariwa's purpose (raison d'être and goals) |
| (5) Risk Management for Nuclear Security Enhancement and strengthening | <ul style="list-style-type: none"> ○ Involvement of members of other disciplines in the corrective action program, and process improvement of monitoring to ensure that management is aware of issues ○ Continuation of mutual reviews with other electric power companies ○ Enhancement and strengthening of risk management |
| (6) Appropriate monitoring by the internal audit department | <ul style="list-style-type: none"> ○ Internal Audit Office: audits the adequacy of business quality ○ Nuclear Safety Oversight Office: continues to investigate nuclear security culture and oversee performance |
| (7) Further enhancement and reinforcement of education and training | <ul style="list-style-type: none"> ○ Strengthen education on the protection of nuclear materials ○ Training on the Fukushima Daiichi Nuclear Power Plant accident (additional efforts to disseminate understanding of the lessons learned from both incidents) |
| (8) Introduction of a mechanism to supervise the implementation and effectiveness of recurrence prevention measures | <ul style="list-style-type: none"> ○ Monitoring and evaluation (self-evaluation and third-party evaluation) to ensure the spread of improvement measures |

1. Overview of nuclear material protection work

Physical protection work of nuclear materials is carried out according to the regulations for the protection of nuclear material under the responsibility of each site superintendent. However, due to the nature of the work, confidentiality is required to be ensured.

(Roles of the President and General Manager of the Nuclear Power and Plant Siting Division)

- Under the regulations for the protection of nuclear material, the President and the General Manager of the Nuclear Power and Plant Siting Division are supposed to receive reports on the status of activities at the power plant and issue instructions as necessary.

| Roles of the President and General Manager | |
|--|--|
| President | <ul style="list-style-type: none"> ① To establish basic policies to ensure compliance with relevant laws and the regulations for the protection of nuclear material, and activities to foster a nuclear security culture, and to review them as necessary ② To receive reports on the status of compliance with relevant laws and regulations and the status of nuclear security culture fostering activities, and to issue instructions as necessary |
| General Manager | <ul style="list-style-type: none"> ① In order to ensure compliance with relevant laws and regulations, and to foster a nuclear security culture, to formulate a "Guide to Activities Related to Compliance with Laws and Regulations and the Fostering of a Nuclear Security Culture" and disseminate it to employees. ② To formulate guidelines for activities to improve nuclear security in response to the basic policy set by the President. ③ To comply with relevant laws and regulations and the regulations for the protection of nuclear material , and approve plans and performance evaluations for nuclear security culture fostering activities |

(Outline of physical protection organization)

- In the above regulations, a "physical protection organization" is defined as an organization responsible for the physical protection of nuclear material. Specifically, at the power plant, the organization consists of the "Site Superintendent – Nuclear Material Protection Manager - Physical Protection GM", and at the head office, the General Manager of the Nuclear Operation and Management Department is responsible for the control of operations, and from the viewpoint of ensuring confidentiality, operations are carried out by a limited organization at the head office and the power plant.

(Outline of physical protection organization (continued))

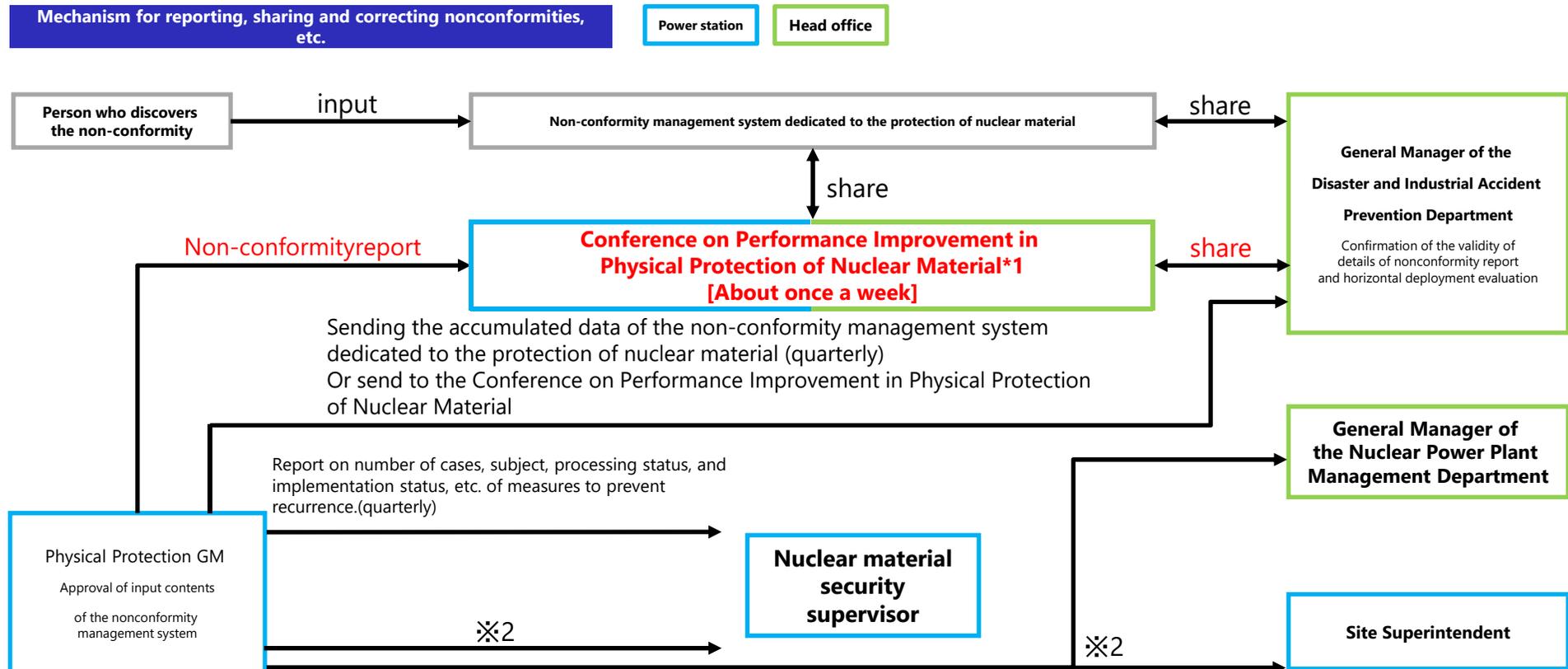
- In the power plant, the role and responsibility of the physical protection organization is assigned to the site superintendent as the operational supervisor, and the actual on-site execution responsibility is entrusted to the GM under the unified management of the Nuclear Material Protection supervisor. Specific tasks are carried out in accordance with the operational guidelines for the protection of nuclear materials established by the authority of the site superintendent of each power station.
- Unlike non-conformities in the field of nuclear safety, non-conformities in the relevant work are limited to those related to the protection of nuclear material, such as inputting into a non-conformity management system dedicated to the protection of nuclear material, when the GM determines that the non-conformity relates to confidential information or controlled information that must be kept confidential.

2. Changes in the operational structure at Kashiwazaki-Kariwa

- Kashiwazaki-Kariwa has been under a maintenance management contract integrated with a finance lease by special order to JNSS since before the fuel loading.
 - ⇒ From the viewpoint of maintaining the quality of leased assets, it is necessary for JNSS to Maintain measures and systems for functional preservation by making repair plans and preparing spare parts, etc.
(Kashiwazaki-Kariwa until around 2019, still maintained as of now at Fukushima Daiichi and Fukushima Daini)
- Since 2016, we have been converting to in-house equipment for additional installations, and from 2019 we will purchase leased facilities and change maintenance and management contracts.

[Reference] Reporting line for the nuclear material protection work (1)

- Non-conformities related to the protection of nuclear material are inputted to the Non-conformity Management System which can be accessed only by relevant personnel at the discretion of the plant's Physical Protection GM and reported to the Nuclear Material Protection Performance Improvement Council.
- The Physical Protection GM sends the data to the above Council and the GM for Disaster Prevention and Safety at the head office on a quarterly basis, and reports the status of processing, etc. to the Physical Protection Manager.
- The Physical Protection GM reports annually on the analysis of nonconformity trends, countermeasures, and management methods to the Physical Protection Manager, the Site Superintendent, and the General Manager of the Nuclear Safety Management Department.
⇒This case has not been reported as a serious problem by any of the above.

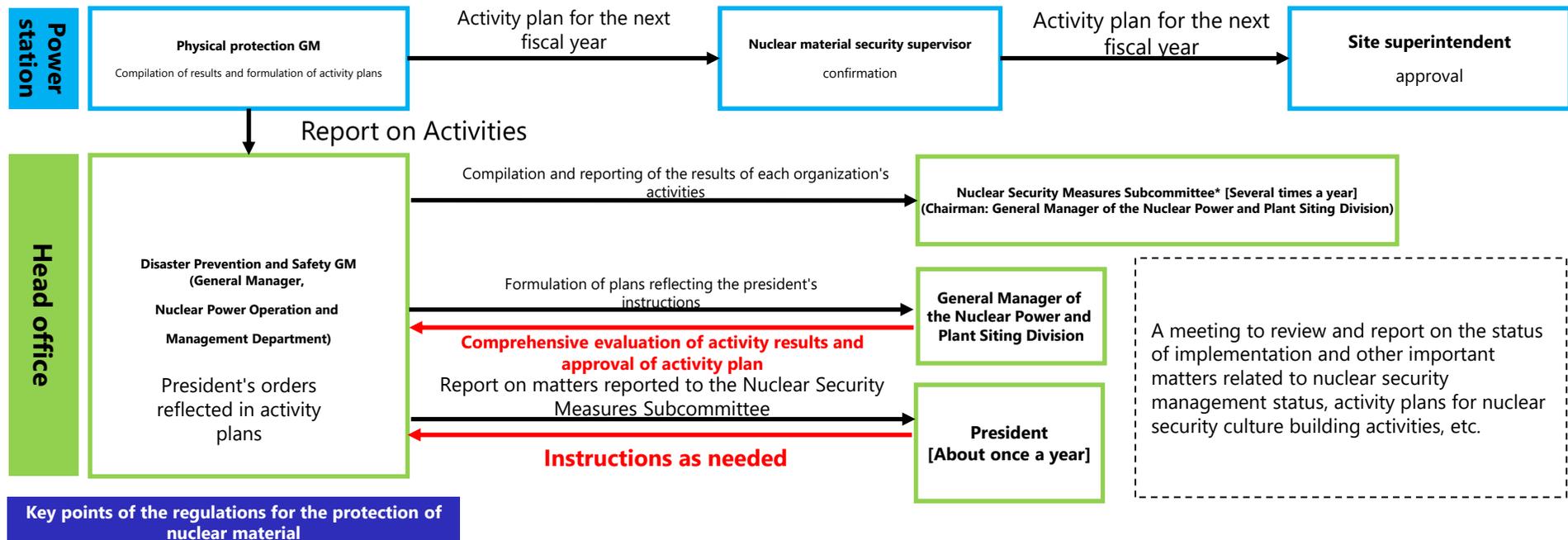


1: A meeting to manage non-conformity cases related to the protection of nuclear materials by the Disaster and Industrial Accident Prevention Group of the Head Office, the section chief in charge of the physical protection of nuclear materials, and the GM of the power plant protection management.
 2: Consolidates and analyzes trends in nonconformities, and reports the results of studies on drastic measures and improvement of nonconformity management methods (once a year)

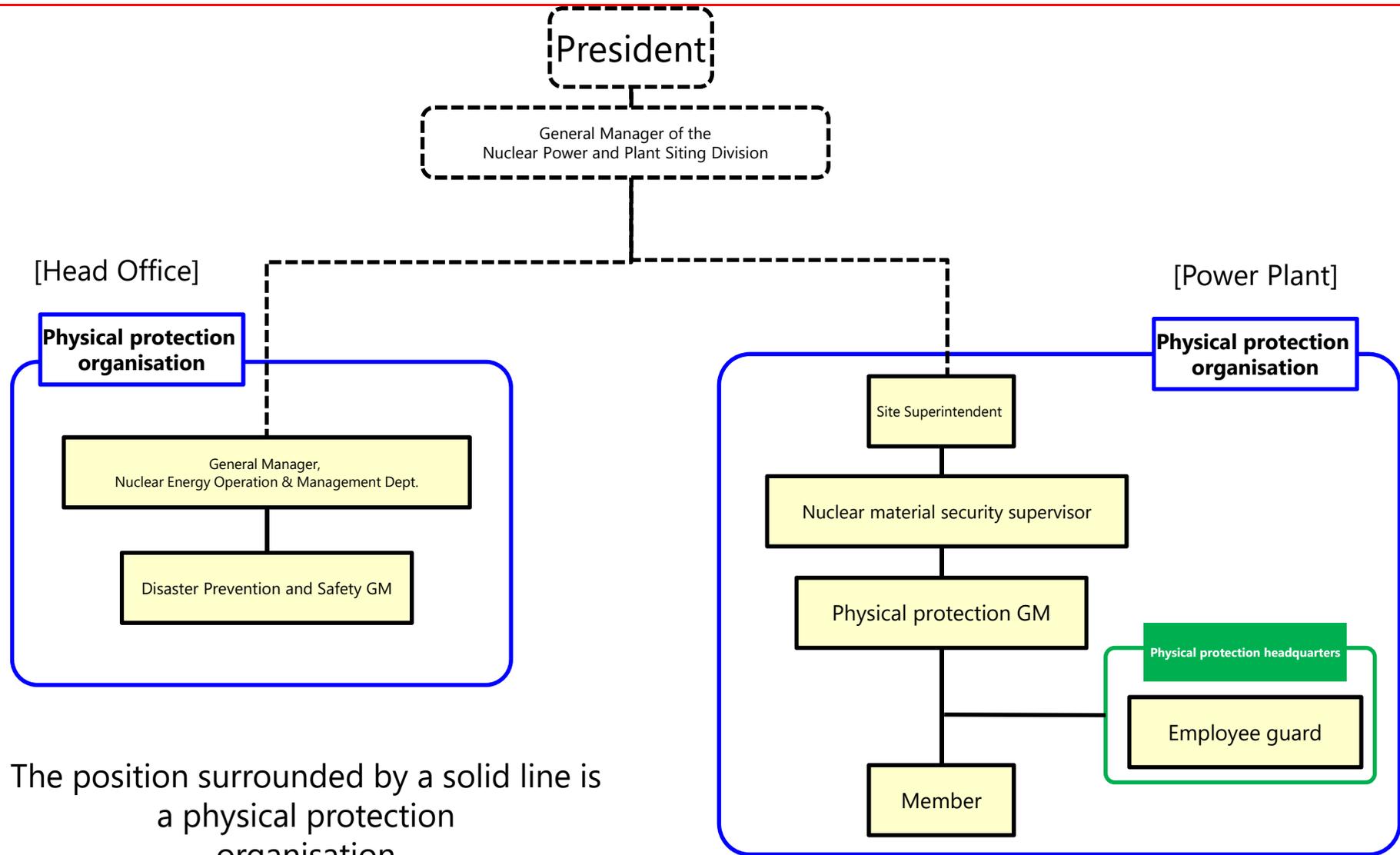
[Reference] Reporting line for the physical protection of nuclear material(2)

- The General Manager of the Nuclear Power and Plant Siting Division confirms the effectiveness of the activities by receiving reports from the GM for Disaster Prevention and Safety on important matters related to nuclear security management, the results of activities for fostering a nuclear security culture, and activity plans, etc., at the Nuclear Security Measures Subcommittee (several times a year).
- The President receives a report from the GM on the matters reported by the Subcommittee about once a year and gives necessary instructions.

Activities to promote awareness of compliance with relevant laws and regulations and to foster a nuclear security culture



- **The President** shall establish basic policies to ensure compliance with relevant laws and regulations, and review them as necessary.
- **The General Manager of the Nuclear Power and Plant Siting Division** shall formulate a "Guide for Activities Concerning Compliance with Laws and Regulations and Fostering a Culture of Nuclear Security" and disseminate it to employees to ensure that the above is carried out.
- In accordance with such procedures, the following shall be implemented.
 - ✓ Formulate an annual plan and implement activities
 - ✓ Evaluate the status of activities, report the results to the president, and receive instructions as necessary*
 - ✓ Reflect evaluation results and instructions in activity plans



The position surrounded by a solid line is a physical protection organisation

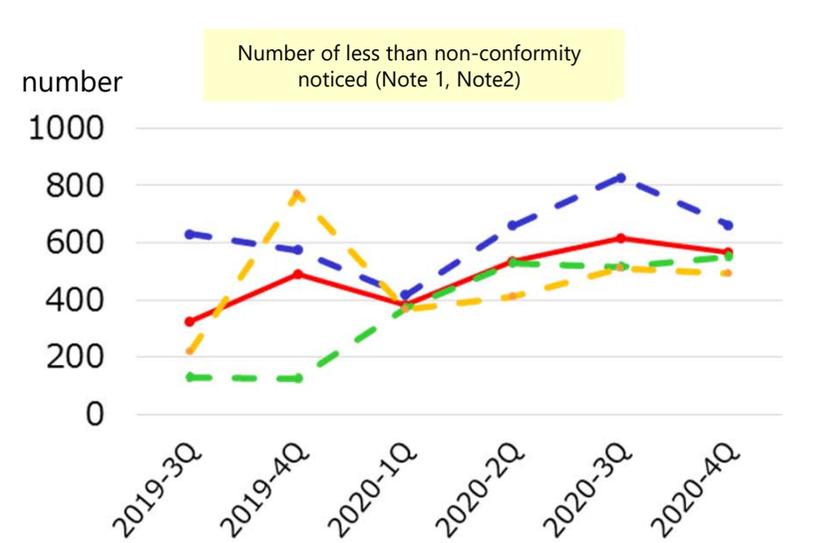
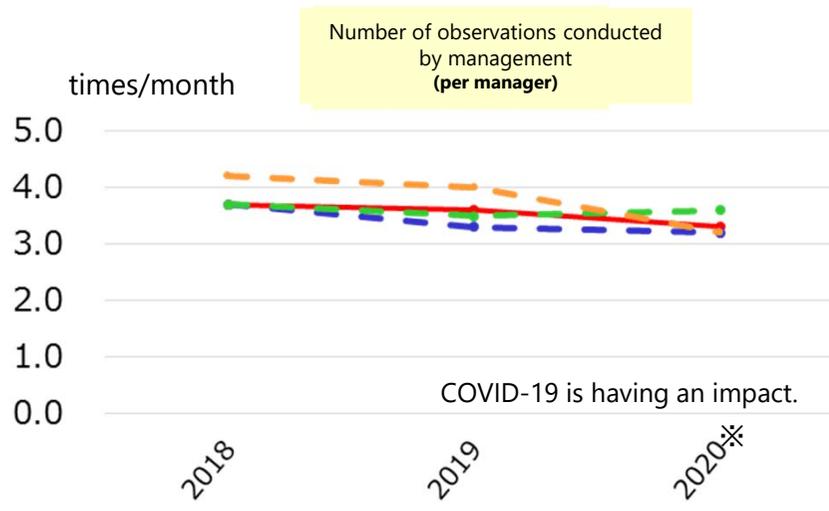
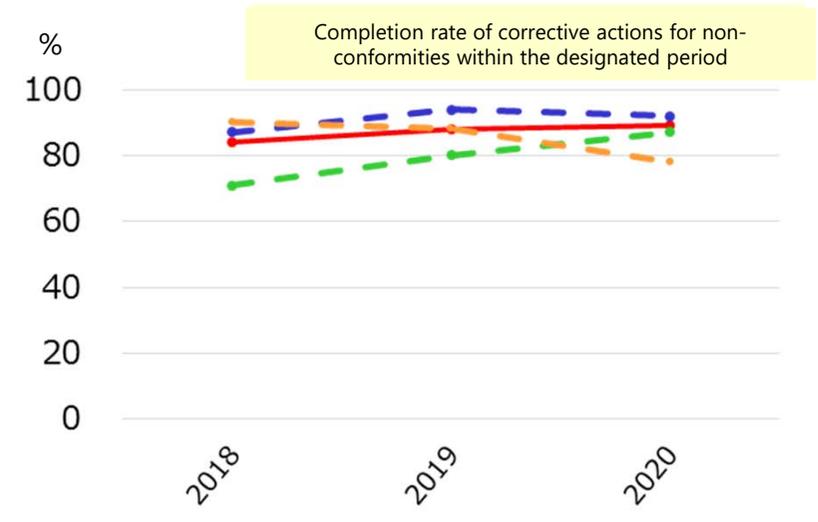
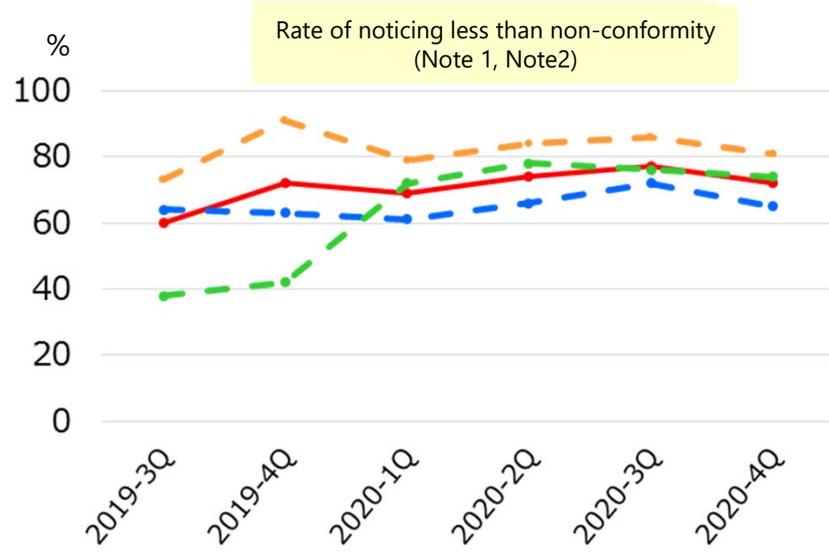
* As an organizational structure, the confidentiality of information related to the work is required due to the characteristics of the work of nuclear material protection, and information on non-conformity is distributed only to those related to nuclear material protection through a different route from the nuclear safety field under the judgment of the GM. From this verification, it can be said that the structure made it difficult for the actual situation and information of Kashiwazaki-Kariwa Physical Protection G to be conveyed to other departments in the power plant and the Head Office.

Nuclear safety culture

- **"Safety Culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance." (from IAEA INSAG-4).**
- Therefore, in order to foster and evaluate the safety culture, it is necessary to take a multifaceted view from various perspectives, rather than a one-dimensional view such as "there is a safety culture/there is no safety culture (there is/there is not).
- On the other hand, "traits" by INPO (Association of Nuclear Power Operators in the U.S.) and other organizations is widely used as a substantial global standard, and TEPCO Holdings has been using them as a perspective for fostering and evaluating safety culture since 2014.

Nuclear security culture

- **"Defined as "a collection of characteristics, attitudes, and behaviors of individuals, organizations, and institutions that serve as a means to support, enhance, and maintain nuclear security" (from the Guide to Activities Related to Compliance with Laws and Regulations and Fostering a Culture of Nuclear Security)**
- **More simply, it is interpreted as "a culture that emphasizes nuclear security, such as recognizing the roles expected of individuals and organizations in ensuring nuclear security and the importance of these roles and acting accordingly," based on the description in the regulations for the protection of nuclear material.**



● : Average of all sites ● : Fukushima Daiichi ● : Fukushima Daini ● : Kashiwazaki Kariwa

Note 1 Noticing less than non-conformity: Discovering signs that may lead to non-conformity.
 Note 2: Rate of less than non-conformity = Number of less than non-conformity notices / Total number (number of non-conformities + number of less than non-conformity notices)

[Reference] Improvement action plan (root causes and measures for fostering culture)

| Root cause | Countermeasure | Status of implementation |
|---|---|--|
| 1. Weakness in risk perception | (Review of the regulations for the protection of nuclear material) | In preparation (scheduled from 2021.12) |
| 2. Weakness in understanding the actual situation on the site 3. Weakness in the ability to correct the situation as an organization | Involvement of members of other disciplines in corrective action programs for nonconformities / Improvement of monitoring processes to enable management to identify issues | Short term |
| Measures for fostering a nuclear security culture | | Status of implementation |
| Strengthen education on the protection of nuclear materials (power plant executives and management) | | Short term |
| Strengthening of education on the protection of nuclear materials (specialized education) | | Medium term |
| Strengthen education on protection of nuclear materials (importance of security, disciplinary punishment, information leakage (power plant employees, contractors)) | | Completed (continued) |
| (Review of the Basic Policy for Fostering Nuclear Security Culture, etc.) | | In preparation (scheduled from 2021.12) |
| Dissemination of top management messages and penetration activities by power plant upper management | | Short term |
| Sit in a circle Meeting / Management Dialogue Meeting | | Completed (continued) |
| Improved understanding of local operations by managers | | Completed (continued) |
| Raising voices related to nuclear security and nuclear safety (using internal reporting) | | Short term |
| Efforts to improve understanding and awareness of nuclear security and to understand the status of improvement in creating an open atmosphere | | Short term |

Short term: Measures to be taken within six months Medium term: Measures to be taken within one year Long term: Measures to be taken over one year

| Back factors and deeper factors | Countermeasure | Status of implementation |
|--|--|--------------------------|
| 1. Lack of understanding of the importance of protection of nuclear materials | Qualification of operators/guards | Being carried out |
| 2. Deficiencies in the processes and equipment involved in entering the protected area | Stopping use of on-site biometric re-registration devices | Completed |
| | Personnel verification by a guard at the time of biometric re-registration | Completed |
| | Installation of additional biometric devices | Completed |
| 3. Inadequate environment for rigorous security operations | Unannounced drills for guards | Completed (continued) |
| | Easing traffic congestion at various gates | Completed (continued) |
| | Strengthen the system to support the Protection Headquarters | Completed (continued) |
| | Strict control, cross-checking and monitoring of ID cards | Completed (continued) |
| | Clarification of personal management matters other than ID cards and establishment of management | Completed (continued) |
| 4. Managers do not understand the actual situation on site. | Include in "root causes and measures for fostering culture" | |
| 5. Belief that employees cannot be an internal threat | Include in "root causes and measures for fostering culture" | |

| Background (of an episode) | Countermeasure | Status of implementation |
|---|---|--------------------------|
| 1. Physical Protection G changes maintenance management system without impact assessment | Improvement of equipment maintenance system (changed maintenance contracts with contractors) | Completed (continued) |
| | Review of change management processes and creation of educational programs | Short term |
| 2. The Nuclear Material Protection Division did not renew the equipment | Development of maintenance plan (inspection plan, replacement plan) | Short term |
| 3. The upper management of the power plant does not allocate personnel suitable for the work. | Strengthening of personnel in the Nuclear Material Protection Division | Short term |
| | Preparation of personnel rotation policy for Nuclear Material Protection Division | Short term |
| 4. Head Office Nuclear Power Operation and Management Department The upper management of the power plant is aware of the challenges cannot be corrected | Review of functions/responsibilities between head office and sites in the area of security | Short term |
| | Establishment of a policy for publication of non-conforming cases related to the protection of nuclear material | Short term |
| | Continuation of mutual reviews with other power companies | Being carried out |
| | Improvement of communication between the Nuclear Material Protection Division and the Site | Short term |
| 5. Physical Protection G does not have a good understanding or knowledge of the regulatory requirements, and weaknesses exist in rules, documentation and operational review in the long term. | Clarification of rules on alternative measures | Completed |
| | Clarification of the estimated restoration period for functional restoration | Completed |
| | Development of basic manuals and other documents for unified operation among sites | Medium-term |
| 6. The Nuclear Power and Plant Siting Division (Head Office and Kashiwazaki-Kariwa) should have voluntarily taken action against new threats to the protection of nuclear materials, but took no further action than indicated. | Include in "root causes and measures for fostering culture" | |

Short-term: Measures to be taken within six months

Medium-term: Measures to be taken within one year

Long-term: Measures to be taken over one year