CONVENTION ON NUCLEAR SAFETY
NATIONAL REPORT OF JAPAN
FOR 10TH REVIEW MEETING

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NRA , Japan
Nuclear Regulation Authority

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(NCP: International Affairs Office)

Convention on Nuclear Safety National Report of Japan
for the tenth Review Meeting

Contents

List of Abbreviations

ABWR	Advanced Boiling Water Reactor
Accident Analysis Committee Meeting	Committee on Accident Analysis of Fukushima Daiichi Nuclear Power Station
AEC	Atomic Energy Commission
ALPS	Advanced Liquid Processing System
APWR	Advanced Pressurized Water Reactor
ATENA	Atomic Energy Association
ATR	Advanced Thermal Reactor
BTC	Boiling Water Reactor Operator Training Center
BWR	Boiling Water Reactor
CAO	Cabinet Office
CAP	Corrective Action Program
CNO	Chief Nuclear Officer
ConvEx	Convention Exercise
CSNI	Committee on the Safety of Nuclear Installations
CV	Containment Vessel/ Primary Containment Vessel
DBA	Design Basis Accident
DEC	Design Extension Condition
DPC	Dual Purpose Cask
EAL	Emergency Action Level
ECCS	Emergency Core Cooling System
EPR	Emergency Preparedness and Response
FBR	Fast Breeder Reactor
FDMA	Fire and Disaster Management Agency
FINAS	Fuel Incident Notification and Analysis System
GCR	Gas Cooled Reactor
Human Resources Network	Nuclear Human Resource Development Network
IAEA	International Atomic Energy Agency
ICSA	Intensive Contamination Survey Area
ISF	Interim Storage Facility
Implementation Plan	Implementation Plan Pertaining to Specified Nuclear Facilities at the Fukushima Daiichi Nuclear Power Station
INES	International Nuclear and Radiological Event Scale
IRRS	Integrated Regulatory Review Service

IRS	Incident Reporting System
IRSRR	Incident Reporting System for Research Reactors
ITER	International Thermonuclear Experimental Reactor
JAEA	Japan Atomic Energy Agency
JANSI	Japan Nuclear Safety Institute
JAPC	Japan Atomic Power Company
JEAC	Japan Electric Association Code
JEAG	Japan Electric Association Guide
JNES	Japan Nuclear Energy Safety Organization, an incorporated administrative agency (former TSO, merged into the NRA in March 2014)
KEPCO	Kansai Electric Power Company Holdings, Inc.
LOCA	Loss of Coolant Accident
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MOE	Ministry of the Environment
NAC	National Assistance Capability
NCA	National Competent Authority
NISA	Nuclear and Industrial Safety Agency (former nuclear regulator dissolved in September 2012)
Notification on Doses	Notification to Establish Dose Limits in Accordance with the Provisions of the NRA Ordinance on Activity of Refining Nuclear Source or Nuclear Fuel Materials
NPS	Nuclear Power Station
NRA	Nuclear Regulation Authority
NRA EPR Guide	NRA Guide for Emergency Preparedness and Response
NRA Ordinance on Commercial Reactors	NRA Ordinance concerning the Installation and Operation, of Commercial Power Reactors
NRA Ordinance on Standards for Installation Permits	NRA Ordinance prescribing Standards for the Location, Structure, and Equipment of Commercial Power Reactors and their Auxiliary Facilities
NRA Ordinance on Quality Control Methods	NRA Ordinance on Technical Standards for Quality Control Methods Concerning the Design and Construction of Commercial Power Reactors for Licensees of Power Reactor Operation and Systems for their Inspection

NRA Ordinance on Technical Standards	NRA Ordinance prescribing Technical Standards for Commercial Power Reactors and their Auxiliary Facilities
NSC	Nuclear Safety Commission, former safety related governmental organization resolved on September 2013
NTC	Nuclear Power Training Centre
NUCIA	Nuclear Information Archives
Nuclear Emergency Act	Act on Special Measures Concerning Nuclear Emergency Preparedness
NuRO	Nuclear Reprocessing Organization
NWP	National Warning Point
OECD/NEA	the Organization for Economic Co-operation and Development Nuclear Energy Agency
OJT	On-the-Job Training
OIL	Operational Intervention Level
PAZ	Precautionary Action Zone
PCCV	Pre-stressed Concrete Containment Vessel
PI&M	Problem Identification and Resolution
PRA	Probabilistic Risk Assessment
PWR	Pressurized Water Reactor
QMS	Quality Management System
QST	National Institute for Quantum and Radiological Science and Technology
RANET	Response Assistance Network
R/B	Reactor Building
RCCV	Reinforced Concrete Containment Vessel
RPS	Reactor Protection System
Reactor Regulation Act	Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors
SCV	Steal Containment Vessel
SDA	Special Decontamination Area
SLAR	Specified Living Areas for Returnees
SRRBA	Specified Reconstruction and Revitalization Base Areas
SSC	Structures, Systems and Components
SSF	Specialized Safety Facility
Supervision and	Committee on Supervision and Evaluation of the Specified Nuclear Facilities

Evaluation Committee	
T/B	Turbine Building
TEPCO	Tokyo Electric Power Company Holdings, Inc.
TRM	Top Regulators Meeting
TRU Waste	Low Heat Production and a Long Half-life Waste
UPZ	Urgent Protective Action Planning Zone
USIE	Unified System for Information Exchange in Incidents and Emergencies

A Introduction

1 Overview of Nuclear Program in Japan

Based on the definition provided in the Convention on Nuclear Safety, Japan has a total of 42 nuclear reactors (16 pressurized water reactors (PWRs) and 26 boiling water reactors (BWRs)) as of March 2025. Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi Nuclear Power Station (NPS) Units 1 through 6 are currently undergoing decommissioning. In addition, decommissioning is underway for 20 other reactors (Tohoku Electric Power Company's Onagawa NPS Unit 1, TEPCO's Fukushima Daini NPS Units 1 through 4, Chubu Electric Power Company's Hamaoka NPS Units 1 and 2, Kansai Electric Power Company (KEPCO)'s Mihama Power Station Units 1 and 2, KEPCO's Ohi Power Station Units 1 and 2, Chugoku Electric Power Company's Shimane NPS Unit 1, Shikoku Electric Power Company's Ikata Power Station Units 1 and 2, Kyushu Electric Power Company's Genkai NPS Units 1 and 2, Japan Atomic Power Company (JAPC)'s Tokai Power Station and Tsuruga Power Station Unit 1, Japan Atomic Energy Agency (JAEA)'s Advanced Thermal Reactor (ATR) Fugen and Prototype Fast Breeder Reactor (FBR) Monju).

In Japan, following the accident at TEPCO Fukushima Daiichi NPS, "Atomic Energy Basic Act", "Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors" (Reactor Regulation Act), and related legislation were amended in 2012. As a result, the nuclear regulation regime was renewed, and the Nuclear Regulation Authority (NRA) was established in September 2012. The new regulatory requirements for nuclear power reactors came into force in July 2013. Under these requirements, licensees are required to obtain authorization from the NRA through a Conformity Review, which assesses whether the reactor meets the regulatory requirements prior to resuming operation.

The NRA accepted applications for Conformity Reviews for 27 reactor units across 16 sites by the end of March 2025. Following the completion of the conformity review process, commercial operation has resumed for: Tohoku Electric Power Company's Onagawa NPS Unit 2; KEPCO's Mihama Power Station Unit 3, Takahama Power Station Units 1 through 4; Ohi Power Station Units 3 and 4; Chugoku Electric Power Company's Shimane NPS Unit 2; Shikoku Electric Power Company's Ikata Power Station Unit 3; and Kyushu Electric Power Company's Genkai NPS Units 3 and 4; and Sendai NPS Units 1 and 2. On the other hand, in November 2024, the NRA decided not to grant permission for the application concerning JAPC's Tsuruga Power Station Unit 2. This decision was

based on the determination that the unit did not meet the requirements set forth in the NRA Ordinance. Specifically, the continuity between the fault located on the site and the fracture zone passing directly beneath the reactor building (R/B) could not be ruled out. To ensure transparency and improve the efficiency of the overall assessment process, the NRA has made Conformity Review Meetings open to the public through both in-person attendance and webcasting. Meeting materials and minutes are disclosed, and following each meeting, a list of remaining issues to be addressed is provided to licensees to facilitate efficient preparation for subsequent discussions.

With the amendment of the Reactor Regulation Act in June 2012, the operational period of a power reactor is, in principle, limited to 40 years. To date, the NRA has accepted applications for the extension of the operational period for the following units: Mihama Power Station Unit 3, Takahama Power Station Units 1 through 4, Sendai NPS Units 1 and 2, and Tokai No2 Power Station.

Figure A-1 shows the location and operation status of nuclear power reactors in Japan.

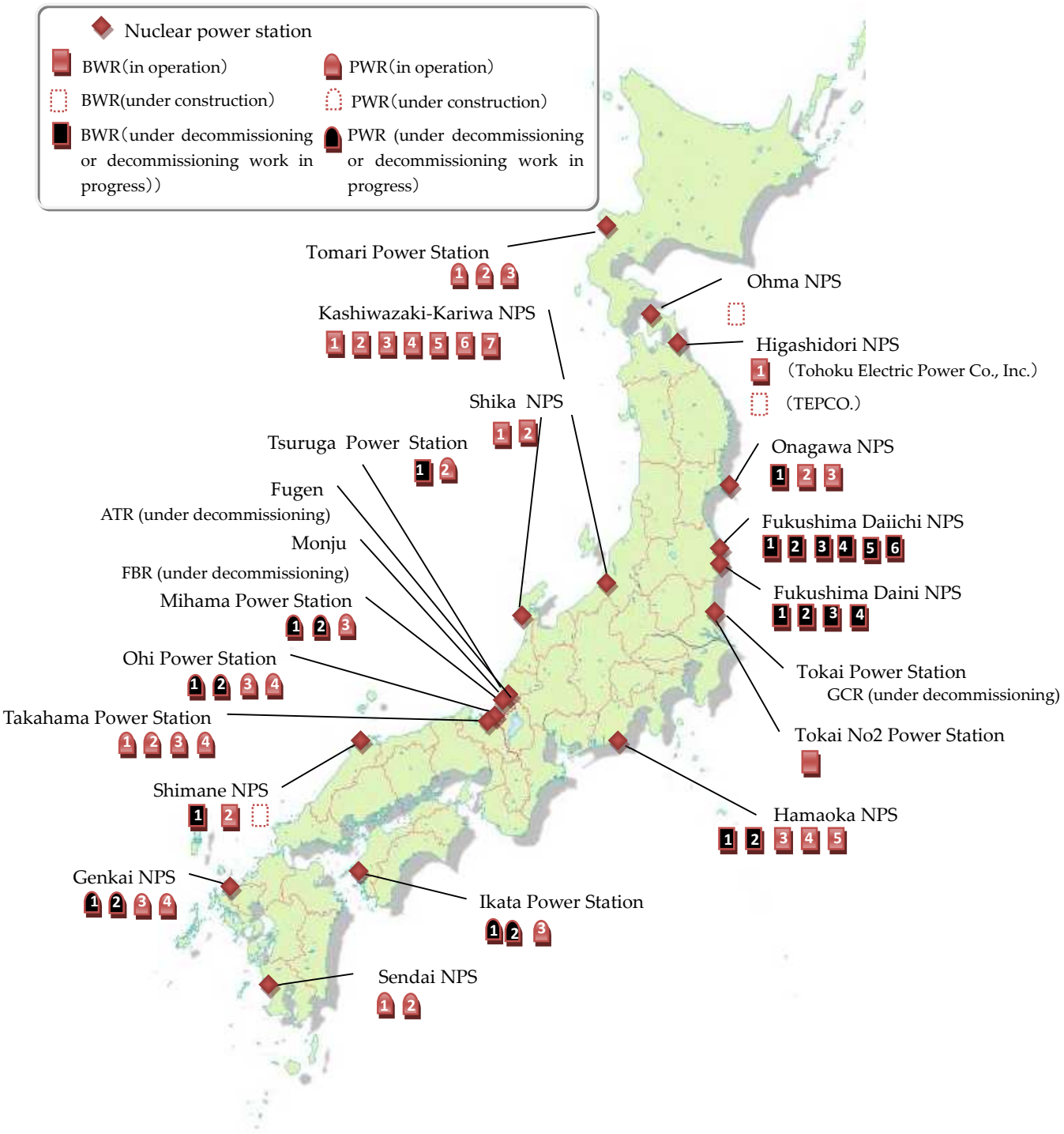


Figure A-1 Location and Status of Nuclear Power Reactors

2 Overview of Nuclear Energy Policy in Japan

The 7th Strategic Energy Plan was formulated in February 2025, taking into account the changes in domestic and international circumstances surrounding Japan. This plan builds upon Japan's commitment, established in October 2021, to achieve carbon neutrality by 2050, a 46% reduction in greenhouse gas emissions by fiscal year 2030, and continued efforts toward an even more ambitious 50% reduction target. The Plan expresses Japan's commitment to addressing nuclear energy policy based on the premise of ensuring safety, informed by the experiences, reflections, and lessons learnt from the accident at TEPCO Fukushima Daiichi NPS.

- Sincere reflection on the accident at TEPCO Fukushima Daiichi NPS as the Starting Point of Nuclear Energy Policy
  - Based on the new regulatory standards taken into account lessons learnt from the accident, safety measures are being strengthened, while the industry pursues safety voluntarily and tirelessly, and the Government will guide the efforts of operators.
  - While continuing to assume the incidents combined with natural disasters, the entire government will work in an integrated manner to promote measures to establish and enhance of the nuclear disaster prevention system.

- Coexistence with the regions and communication with all levels of the public
  - The Government will work to share the recognition and deepen the relationship of mutual trust through careful dialogue with local municipalities, promote local industry, and implement budget measures for disaster prevention and sustainable development of the region.
  - To build trust from the public towards nuclear energy, the Government administration and operators, the Government provides accurate and objective information on nuclear energy and promote careful hearing and public relations. Additionally, the Government should take the lead in strengthening efforts to foster understanding in a wide range of people.

- ·Acceleration of back-end processes
  - To promote the nuclear fuel cycle, the public and private sectors will work together to responsibly complete of the Rokkasho Reprocessing Plant and the MOX fuel plant, which will be the core of the nuclear fuel cycle.

- To expand the capacity to store spent fuel until it is reprocessed, the Government will promote the construction and utilization of interim storage facilities and dry storage facilities.
- To promote smooth and steady decommissioning of reactors nationwide, the Nuclear Reprocessing and Decommissioning facilitation Organization (NuRO) will be responsible for overall management of decommissioning and a system has been introduced whereby operators pay decommissioning contributions to the NuRO.
- To realize for the final disposal of high-level radioactive waste, the Government will take the initiative in the forefront of efforts to promote activities for understanding. Also, the Government will promote the use of appropriate support systems in the survey areas based on the importance of co-existence with the region.

• ·Maximum utilization of existing plants
- Only those nuclear power plants that are deemed by the NRA to be in compliance with the new regulatory standards will be allowed to resume operations.
- The existing framework of capping the operating period of nuclear power plants at a maximum of 60 years was maintained. On the other hand, from the perspective of utilization policy, a new system was developed that allows periods of shutdown due to external, non-operator-driven factors to be excluded from the counting of the 60-year permissible period.

• ·Development and installation of next-generation advanced reactors
- To utilize nuclear energy as a decarbonized power source, the Government will work on the development and installation of next-generation advanced reactors with built-in new safety mechanisms to improve the safety of nuclear energy.

• · Creating an environment for sustainable utilization, maintaining and strengthening supply chains and human resources
- The Government will work to improve the business environment so that the business can be operated stably, taking into account the characteristics of the nuclear energy business, such as large-scale and long-term investment, long project period, etc.
- To avoid disruption of industrial infrastructure and technology in the future

and shortage of nuclear human resources, including those to deal with regulatory issues, the Government will work to maintain and strengthen the nuclear energy supply chain.

- Contribution to solving common international issues
  - Based on the experience Japan has accumulated, Japan will make positive contributions to improve nuclear safety, peaceful use of nuclear energy, nuclear non-proliferation, and nuclear security in the world.

Regarding with energy mix in 2040, the target of nuclear energy share is approximately 20%. Additionally, in order to realize carbon neutrality in 2050, the Government will work to obtain public confidence in nuclear energy and to utilize the necessary scale in a sustainable manner on the major premise of ensuring safety.

3 Long-Term Recovery of the Contaminated Areas After the TEPCO Fukushima Daiichi NPS Accident

Decontamination and other measures have been implemented around TEPCO Fukushima Daiichi NPS to quickly reduce the environmental and human health impact due to radioactive materials discharged by the accident. The Government implemented decontamination and waste disposal in "Special Decontamination Areas" (SDA) and "Contaminated Waste Management Areas" designated by Act on Special Measures concerning the Handling of Environmental Pollution by Radioactive Materials. And in "Intensive Contamination Survey Areas" (ICSA) decontamination had been carried out by municipalities with the support of the government. The whole area decontamination was completed by the end of March 2018 except for the "Restricted Area 1" in 100 municipalities of eight prefectures (In the SDA, completed by the end of March 2017 and in the ICSA completed by the end of March 2018). In accordance with the fact that whole area decontamination was completed, the designation of ICSA of 39 municipalities have been lifted by the end of March 2025. (See Figure A-2)

In the "Restricted Area", a framework for designating "Specified Reconstruction and Revitalization Base Areas" (SRRBA), where evacuation orders can be lifted, and residence can be permitted was established in May 2017. Since then, decontamination and infrastructure development have been implemented intensively to improve the environment in the SRRBA, and evacuation orders were lifted in all six municipalities

by the end of November 2023. In June 2023, a framework for designating "Specified Living Areas for Returnees" (SLAR) was established to enable residents who wish to return to their homes to do so over the course of the 2020s. This framework was created to implement the government's policy of carefully assessing the intentions of individual residents regarding their return, decontaminating areas necessary for their return, and lifting evacuation orders. Decontamination and demolition of houses and other buildings in the SLAR began in December 2023.

In Fukushima Prefecture, in accordance with laws and regulations, the Interim Storage Facility (ISF) is being developed to manage and store soil and wastes containing radioactive materials generated in a large amount from decontamination activities in a safe and concentrated manner until the final disposal. As of the end of March 2025, approximately 14.09 million cubic meters of removed soil and waste had been transported to the ISF. Regarding the final disposal of removed soil and waste generated in Fukushima Prefecture transported to the ISF, it is the responsibility of the national government to take necessary measures to complete the final disposal outside Fukushima Prefecture within 30 years after the start of interim storage as stipulated in the law. To realize final disposal outside Fukushima Prefecture, efforts are being promoted based on the "Technology Development Strategy for Volume Reduction & Recycling of the Removed Soil and Waste under Interim Storage" (formulated in April 2016, revised in March 2019). In March 2025, the "Results of Initiatives to date towards Final Disposal Outside Fukushima Prefecture and Approaches beyond FY2025" was announced, compiling the status of achievement of the targets of the Technology Development Strategy and indicating the approach to be taken beyond FY2025.

With regard to the managed recycling of removed soil, data on safety and other aspects has been accumulated through demonstration projects in Fukushima Prefecture. Based on the results of these projects and advice from the International Atomic Energy Agency (IAEA), standards and guidelines for managed recycling were announced in March 2025.

In addition, based on evaluations of volume reduction technologies implemented to date, combinations of technologies were considered, and multiple options for the structure and required area of final disposal sites were presented. Standards for landfill disposal were also established in March 2025.

Furthermore, in March 2024, the Cabinet decided on a policy to "promote efforts to

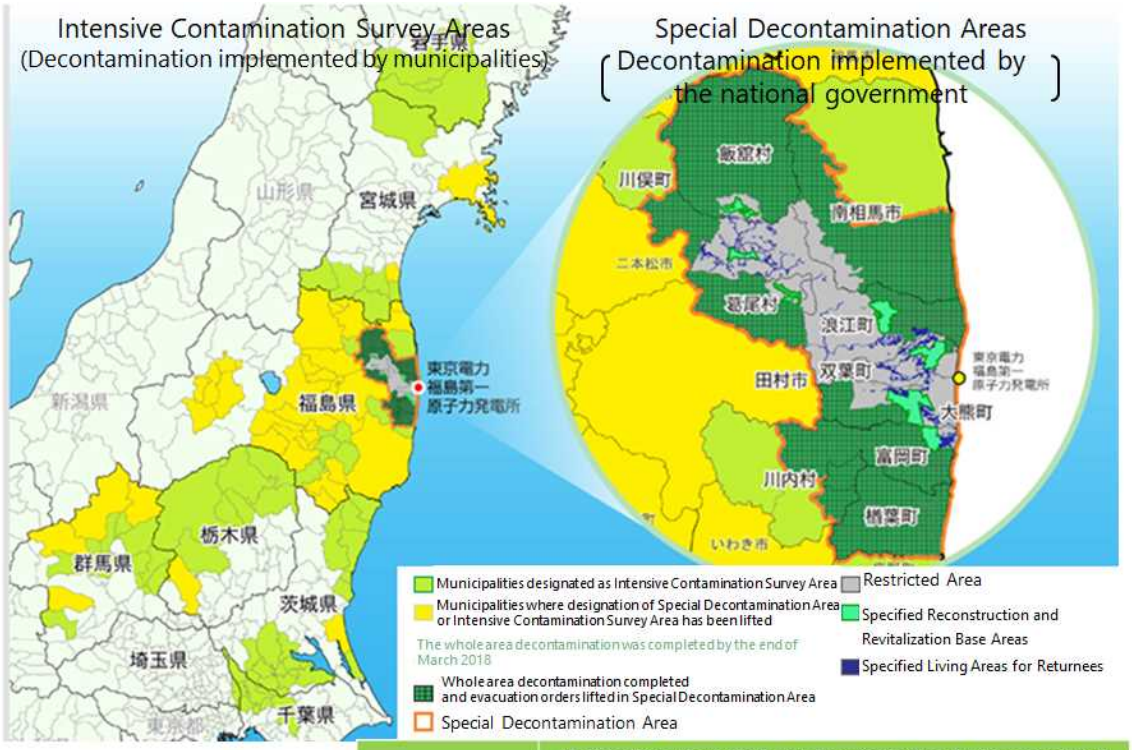
establish a unified government-wide system for creating new uses for recycled materials through closer cooperation among relevant ministries and agencies" in the review of the "Basic Policy of Restoration from the Great East Japan Earthquake for the Second Restoration and Reconstruction Period and Beyond." Based on this policy, the "Council for the Promotion of Managed Recycling for the Realization of Final Disposal of Removed Soil and Waste Outside Fukushima Prefecture," consisting of all Ministers of State excluding the Prime Minister, was established to promote measures to reduce the volume of removed soil by implementing measures such as managed recycling, and to mitigate reputational damage, with the aim of achieving final disposal of outside Fukushima Prefecture. The first meeting was held in December 2024.

On top of that, efforts to foster nationwide understanding of the necessity and safety of volume reduction and managed recycling have been implemented. For example, information has been widely disseminated through panel displays at events to the public both inside and outside Fukushima Prefecture, and through TV programs produced in collaboration with TV stations. In addition, site visit to the ISF and Demonstration Project in Nagadoro District, Iitate Village were held, as well as lectures on environmental restoration projects for university students and other activities to promote understanding among the younger generation. Furthermore, since March 2020, potted plants using the removed soil with the surface covered with topsoil has been transported and sorted at the ISF have been installed at facilities related to the Ministry of the Environment (MOE), the Prime Minister's Office, and relevant ministries and agencies. Since the potted plants were placed, no changes in the air dose rate have been observed in periodic radiation monitoring.

As for cooperation with overseas countries, at the request of the Ministry of the Environment, the IAEA held three meetings in 2023 to provide international assessment and advice from technical and social perspectives on the Ministry of the Environment's initiatives for the managed recycling and the final disposal of removed soil in the future. The final report summarizing the results of these meetings were submitted to the Minister of the Environment in September 2024 and published by the IAEA. The final report of the IAEA Expert Meeting concluded that "Approach and activities implemented by the MOE to date for the managed recycling and the final disposal are consistent with the IAEA Safety Standards" and "Looking ahead, with continuous efforts to meet fully the advice provided by the team of experts, MOEJ's evolving approach will be consistent with the IAEA Safety Standards. This can be confirmed by

future follow-up assessments."

Radiation monitoring related to the TEPCO Fukushima Daiichi NPS accident has been made by relevant government ministries and agencies, local governments, etc. in cooperation based on the "Comprehensive Radiation Monitoring Plan" set up by the government (decided in the Monitoring Coordination Meeting on 2 August 2011 and revised on 30 March 2022).



	Municipalities where whole area decontamination has been completed		
		Intensive Contamination Survey Area (93)	Special Decontamination Area (11)
Fukushima Pref.	43*	36	11
Outside Fukushima Pref. (7 prefectures)	57	57	—
Total	100	Completed in March 2018	Completed in March 2017

* Minamisoma, Tamura, Kawamata, and Kawauchi were designated as both Special Decontamination Areas and Intensive Contamination Survey Areas.

Figure A-2 Result of Whole Area Decontamination

4 Implementation of the Convention on Nuclear Safety in Japan

Japan has been fulfilling its obligations under Article 6 through Article 19 of the Convention on Nuclear Safety (CNS), including improvements in nuclear regulation

through the revision of the "Reactor Regulation Act", and the establishment of the NRA to ensure the independence of the regulatory body. The status of Japan's implementation of these obligations of the CNS is reported in Chapter C.

Regarding the obligation under Article 4 of the CNS, Japan recognizes the CNS as having the same legal binding power as domestic laws, through its approval and promulgation by the National Diet. In addition, necessary measures have been taken under domestic and legal frameworks such as the Reactor Regulation Act, as described in Chapter C. The obligation under Article 5 of the CNS is fulfilled through the submission of this national report.

With respect to Article 24, Japan has actively participated in meetings of the Contracting Parties of the CNS and continues to fulfil its obligations as a Contracting Party to the CNS.

5 Development of the National Report

The National Report of Japan for 10th Review Meeting is prepared in accordance with the relevant guideline[1], and consists of the following sections: Introduction, Summary, Reporting Article by Article and Annexes.

In principle, the reporting period covers the timeframe from 1 April 2022 to 31 March 2025.

The reports for each article of the CNS are primarily intended to explain Japan's compliance with the obligations set forth in the CNS and to provide comprehensive information on the country's regulatory system.

[1] INFCIRC/572/Rev.8

B Summary of Major Activities During the 10th Reporting Period

1 Activities Related to Nuclear Regulation

1-1 Review of Compliance with Regulatory Requirements

Licensee are required to submit applications demonstrating compliance with current regulatory requirements to the NRA and obtain authorization for reactor operation.

The NRA conducts Conformity Reviews through Conformity Review Meetings, in which Commissioners participate. A total of 93 meetings were held in FY2022, 111 meetings in FY2023, and 89 meetings in FY2024. During the reporting period, eight review meetings were held for the Decommissioning Plan of nuclear fuel facilities related to ATR Fugen, and nine meetings were covered by the Safety Oversight Team for FBR Monju.

In addition to Conformity Review Meetings in which Commissioners participate, the NRA staff also holds meetings and hearings with licensees, as appropriate, for regulatory purposes such as confirming facts related to matters included in applications. Summaries of these proceedings, along with related materials, are made publicly available. Furthermore, the transcription results generated by automatic speech-to-text software have been disclosed on a trial basis since April 2019, followed by the start of full-scale implementation in February 2020. In FY 2022, a total of 1,418 transcriptions were published on the NRA website; followed by 2,043 in FY2023, with continued disclosure thereafter.

As of the end of March 2025, applications for amendments to Reactor Installation Permits, demonstrating compliance with the current regulatory requirements (revised following the accident at TEPCO Fukushima Daiichi NPS Accident in March 2011), have been submitted by licensees for 27 units across 16 nuclear power plants. Of these, permits have been granted for a total of 17 units. On the other hand, in November 2024, the NRA decided not to grant permission for the application concerning JAPC's Tsuruga Power Station Unit 2. This decision was based on the conclusion that the unit did not meet the requirements set forth in the NRA Ordinance, as the continuity between the fault on the site and the fracture zone passing directly beneath the R/B could not be ruled out.

Regarding the Specialized Safety Facilities (SSF) required under the regulatory requirements, Conformity Reviews are being conducted in parallel with the reviews for the respective power reactors. During the period from April 2022 to March 2025, amendments to Reactor Installation Permits were granted for four reactors:

Kashiwazaki-Kariwa NPS Units 6 and 7 (TEPCO), Onagawa NPS Unit 2 (Tohoku Electric Power Company), and Shimane NPS Unit 2 (Chugoku Electric Power Company).

1-2 Decommissioning of Power Reactors

As of the end of March 2025, a total of 18 commercial power reactors and 2 research reactors are undergoing decommissioning. No Decommissioning Plans were approved during the reporting period. (Refer to Section 4, Article 6)

1-3 Operation Status of Nuclear Regulatory Inspections

In April 2017, the Reactor Regulation Act was amended to further enhance safety by introducing a more flexible inspection system. This system enables the NRA to oversee all safety related activities of licensees, with a focus on safety issues and concerns. Specifically, it allows the NRA to conduct inspections "at any time" and "on any matter" related to safety. Under this framework, licensees are also obligated to conduct self-check to ensure compliance with regulatory requirements. In addition, a performance-based regulation approach was introduced. This approach involves comprehensively evaluating the level of operational safety at each nuclear facility and appropriately reflecting the results in the inspection plan for the following fiscal year. Through this system, the NRA encourages licensees to voluntarily maintain and improve their safety performance. Following a trial phase that began in April 2018, full-scale implementation of the Nuclear Regulatory Inspection system commenced in April 2020. The results of these inspections are reported quarterly at NRA Commission Meetings. Based on these results, along with safety performance indicators, a comprehensive annual assessment is published for each nuclear facility.

At TEPCO's Kashiwazaki-Kariwa NPS, an incident involving unauthorized use of ID cards occurred in September 2020. Subsequently, in January 2021, a case of partial loss of function in physical protection equipment was identified. In response, the NRA assessed in March 2021 that the NPS had experienced "significant deterioration of safety activities over a long period of time" and decided to conduct supplemental inspections. These inspections continued until December 2023, requiring a total number of 4,268 man-hours. On 27 December 2023, the NRA confirmed that safety activities had improved and that TEPCO's "autonomous improvement can be expected" based on the results of the Supplemental Inspections, an on-site investigation conducted by NRA Commissioners, and an exchange of views with TEPCO's president. In May 2025, it was confirmed that the particularly focused items had been integrated into the daily physical

protection activities at Kashiwazaki-Kariwa NPS. Accordingly, the NRA decided not to designate any particularly focused items in the FY2025 inspection plan, and instead to verify these activities through baseline inspection items.

2 Regulation of Long-Term Operation of Nuclear Power Reactors

The "System of Approval for Extension of Operational Period" was introduced in 2012 through the revision of the Reactor Regulation Act. Under this system, the operational period of a commercial power reactor was set at 40 years from the start of operation, with a one-time extension permitted for a period not exceeding 20 years. As a part of the approval process, licensees are required to evaluate whether compliance with the technical requirements for ensuring safety can be maintained, even when considering deterioration factors such as low-cycle fatigue and neutron irradiation embrittlement. The NRA reviews and confirms the details of these evaluations to ensure continued compliance.
This system has been succeeded by System of Approval for Long-Term Facility Management Plan, which comes into effect on 6 June 2025, as detailed in Section 2-3.

2-1 Review of Extension of Operational Period of Commercial Power Reactors

During the reporting period, the NRA approved the extension of the operational period for Kyushu Electric Power Company's Sendai NPS Units 1 and 2 in November 2023, and KEPCO's Takahama Power Station Units 3 and 4 in May 2024. To date, the NRA has approved the extension of the operational period for a total of eight reactor units, including those listed above.

2-2 Establishment of Electricity Supply System toward Realization of Decarbonized Society

Japan established the "GX Implementation Conference" at the Prime Minister's Office in July 2022 to execute "GX", a transformation of the entire economic and social system, shifting from a fossil energy-centred economy and industrial structure, which has been in place since the Industrial Revolution, to a clean energy-centred one. Then, the Government made a cabinet decision on the "Basic Policy for Achieving GX" (GX Basic Policy) to realize a stable and affordable energy supply and demand structure in February 2023. Furthermore, in order to promote the use of decarbonized power sources

while ensuring a stable supply of electricity, it was deemed necessary to promote the maximum introduction of renewable energy in coexistence with local communities and to utilize nuclear power with safety as a fundamental premise, based on the GX Basic Policy. This led to establish "Act to Partially Amend the Electricity Business Act and Others to Establish an Electricity Supply System for the Realization of a Decarbonized Society" (GX Decarbonized Power Supply Act), which amended relevant laws in May 2023. Within this framework, the Electricity Business Act was amended to set the operational period for nuclear power generation at 40 years. However, an extension of the operational period will be permitted only with the approval of the Minister of Economy, Trade and Industry (METI), based on considerations such as ensuring stable supply and contributing to GX. While the existing framework, of "capping the operating period of nuclear power plants at a maximum of 60 years" was maintained. On the other hand, from the perspective of utilization policy, a new system was developed that allows periods of shutdown due to external, non-operator-driven factors to be excluded from the counting of the 60-year permissible period. Additionally, the Reactor Regulation Act was amended to require the operators to conduct a technical assessment of equipment degradation every 10 years if they intend to operate beyond 30 years from the start of operation. Operators must also establish a plan to manage that degradation and obtain approval from the NRA. (See Section 2-3)

2-3 Safety Regulation for Aging Reactors

(1) System of Approval for Long-Term Facility Management Plan

At the 72nd NRA Commission Meeting in FY2022 (13 February 2023), the NRA adopted the Overview of Safety Regulations on Aging Power Reactors and compiled a bill to partially amend the Reactor Regulation Act (Revised Act) based on this outline. The Revised Act was incorporated into the GX Decarbonization Power Supply Bill, and was promulgated on 7 June 2023 following deliberations during the 211th Ordinary Session of the National Diet.

Prior to the enactment of the Revised Act, nuclear power reactors were reviewed for conformity with regulatory requirements only once, at the 40th year after the start of operation, under the System of Approval for Extension of Operational Period. In addition, long-term facility management policies were reviewed at the 30th year and every 10 years thereafter under the Technical Evaluation System for Aging Nuclear Facilities.

Under the Revised Act, these two systems have been integrated and strengthened into

the System of Approval for Long-Term Facility Management Plan. Specifically, licensees are required to formulate a Long-Term Facility Management Plan to address reactor facility degradation for each period not exceeding 10 years, starting from the 30th year after the start of operation, and obtain approval from the NRA. If approval is not granted, continued operation is not permitted. As a result of this revision, the frequency of compliance checks with regulatory requirements has increased to once every 10 years. The scope and depth of plan contents and reviews have also been enhanced, thereby strengthening the regulatory framework in a comprehensive manner.

In FY2023, the necessary laws and regulations for the transition to the System of Approval for Long-Term Facility Management Plan were developed, and preparatory procedures were initiated on 1 October to ensure a smooth transition to the new system. In FY2024, the development of the legal and regulatory framework required for the full-scale implementation was finalised, and all preparation for the system's full-scale operation were completed. Subsequently, the system came into full effect on 6 June 2025.

(2) Review of Approval of Long-Term Facility Management Plan

From 1 October 2023, when procedures were initiated to prepare for a smooth transition to the System of Approval for Long-Term Facility Management Plans, the NRA continued to review applications for the extension of operational periods under the existing framework. In parallel, it also conducted reviews of applications for approval of Long-Term Facility Management Plans submitted in accordance with the transition to the new system.

Under the new system, licensees operating power reactors that have reached 30 years since the commencement of operation and intend to continue operation beyond the date of full enforcement must establish a Long-Term Facility Management Plan and obtain approval from the NRA by the day prior to the enforcement date. The NRA completed the review of all 12 Long-Term Facility Management Plans submitted for the transition and granted approval for each.

3 Status of TEPCO Fukushima Daiichi NPS

3-1 Efforts Toward Risk Reduction

Review and Inspection

TEPCO formulated the "Medium-and-Long-Term Roadmap towards the Decommissioning of Fukushima Daiichi NPS Units 1-4" in December 2011 and has since

been working toward the decommissioning of the site, while continuously reviewing the site the conditions.

TEPCO Fukushima Daiichi NPS was designated as a Specified Nuclear Facility by the NRA on 7 November 2012, in accordance with the Reactor Regulation Act. Subsequently, on 14 August 2013, TEPCO obtained NRA approval for "Implementation Plan for the Specified Nuclear Facilities at TEPCO Fukushima Daiichi NPS" (Implementation Plan), under which special safety measures have been implemented.

Fourteen years have passed since the accident, and measures, such as the management of waste, including contaminated water, and risk reduction within R/Bs, have progressed in a planned manner.

From FY2022 to FY2024, the NRA approved 41 applications submitted by TEPCO for amendments to the Implementation Plan. These included the installation of equipment for the removal of spent fuel from Unit 2 and the construction of a second analysis building.

To ensure compliance with the Implementation Plan, inspectors from both the NRA regional office and headquarters oversee TEPCO's activities through various inspections, including operational safety inspections, security inspections, pre-service inspections, and welding inspections (as part of the Implementation Plan inspection), in addition to daily patrols. Between FY2022 and FY2024, 36 pre-service inspections and 29 welding inspections were conducted. During operational safety inspections, four violations of the Implementation Plan were identified, including body contamination incidents at the additional Advanced Liquid Processing System (ALPS). The NRA continues to monitor TEPCO's corrective actions through follow-up inspections.

Furthermore, regarding the implementation plan inspections, the NRA has reviewed its evaluation methods to incorporate performance-based and risk-informed approaches, concepts already applied in inspections of conventional nuclear facilities. The NRA continues to consider improvements to the inspection framework.

Overseeing Risk Reduction Activities Using the Risk Map

To establish a target for the decommissioning of TEPCO Fukushima Daiichi NPS, the NRA formulated the "Medium-Term Risk Reduction Target Map for TEPCO Fukushima Daiichi NPS " (Risk Map) in February 2015. The map has been revised periodically in accordance with the progress of decommissioning activities. The status of achievement of the Risk Map goals is reported by TEPCO at open meetings of Committee on Oversight and Evaluation of Specified Nuclear Facilities, which are attended by stakeholders including academics, representatives from Fukushima Prefecture, and the

NRA. The NRA monitors progress and provides guidance to TEPCO as necessary. Regarding progress from FY2022 to FY2024, the NRA confirmed that TEPCO had taken appropriate steps to safely initiate key activities, including the removal of spent fuel from the spent fuel pool of Unit 6, the operation of the first analysis building, and the operation of the tenth waste storage facility.

Regarding the Risk Map, when it was first formulated in 2015, there were many risks that needed urgent response, such as highly contaminated water in seawater pipeline trenches on the seaside. Therefore, the NRA set targets for the following three years and continued to update them in a similar format until FY2022. In the FY 2023 review of the Risk Map, while short-term risks requiring immediate action had decreased, medium-and-long term challenges, such as transitioning to stable storage of solid radioactive waste, including water treatment waste and debris, became more prominent. In response to these circumstances, the NRA considered it more appropriate for TEPCO to take flexible initiative in addressing medium-and-long term goals, rather than setting and managing short term targets. Accordingly, the NRA revised the format of the Risk Map to indicate what should be achieved over the next ten years in each relevant field.

Commencement of Discharge of ALPS Treated Water into the Sea

Regarding the ALPS treated water, purified accumulated water within the buildings at TEPCO Fukushima Daiichi NPS, processed using the ALPS and other equipment, two applications for amendments to the Implementation Plan related to its discharge into the sea were submitted: one concerning equipment and the other concerning operation and maintenance. Both applications were approved by May 2023. In addition, pre-service inspections were conducted at the facilities designated for discharging ALPS treated water into the sea, and a certificate of completion was issued on 7 July 2023.

Following these regulatory procedures, TEPCO commenced the discharge of ALPS treated water into the sea in August 2023. As of May 2025, a total of 12 discharges have been carried out as planned.

The NRA underwent IAEA regulatory reviews in March 2022 and January 2023 concerning the discharge of ALPS treated water into the sea. The IAEA published the details and findings of each review as progress reports, and in July 2023, compiled a comprehensive report prior to the commencement of the discharge. In its comprehensive report, the IAEA concluded that the NRA's activities related to the discharge of ALPS treated water were consistent with relevant international safety standards. Since the start of the discharge in August 2023, the IAEA has conducted four review missions, in October 2023, May 2024, December 2024, and May 2025, to assess the safety of the

discharge. The IAEA stated that the NRA's related activities continue to align with international safety standards.

3-2 Accident Analysis of TEPCO Fukushima Daiichi NPS

The investigation and analysis of the accident at TEPCO Fukushima Daiichi NPS is one of the important activities of the NRA. Accordingly, the NRA has conducted technical investigations and analyses. The NRA examined issues that remained unresolved in the "National Diet Accident Investigation Report" and required empirical investigation by regulatory authorities. An initial accident investigation report was compiled in 2014. In FY2019, due to improvements in site conditions and progress in decommissioning activities, access to the interior of the R/B improved, enabling direct observation of facility conditions and sample collection. As a result, additional research and analysis were conducted, and the implementation policy and framework were established. Furthermore, in March 2023, the objectives and methods of the investigation were reorganized in response to evolving circumstances, including the accumulation of knowledge from research conducted by various institutions, progress in decommissioning, and improved site accessibility. Based on these developments, the NRA has conducted on-site surveys, reviewed records from the time of the accident submitted by TEPCO, and held discussions at the Accident Analysis Review Committee, an open forum attended by external experts.

From FY2022 to FY2024, a total of 62 on-site surveys were conducted, and multiple meetings of Accident Analysis Review Committee were held. The results of these investigations and analyses were compiled in the "Interim Summary of Investigation and Analysis of TEPCO's Fukushima Daiichi NPS Accident " (Interim Report), which was published in March 2023 and June 2024. The Interim Report summarizes findings on several key topics, including shield plug contamination, the sequence and causes of hydrogen explosion events, concrete damage observed in the pedestal (support structure for the reactor pressure vessel) within Unit 1's containment vessel (CV), and insights into the leakage path of radioactive materials outside the CV.

In addition, the NRA actively disseminates, and shares information related to the accident investigation and analysis both domestically and internationally. From FY2022 to FY2024, the NRA presented research findings and engaged in discussions at various conferences and forums, including information exchange meetings with regulatory bodies from other countries, the IAEA-INSAG Forum, the International Conference of Regulators' Views and Priorities on Nuclear Safety and Radiation Protection 10 Years After TEPCO Fukushima Daiichi NPS Accident, the Workshop on Shielding Aspects of

Accelerators, Targets and Irradiation Facilities (SATIF-16), the opinion exchange meetings with U.S. agencies (Forensics Meeting), the Organization for Economic Co-operation and Development/Nuclear Energy Agency(OECD/NEA)-related projects (PreADES, ARC-F, FACE), and the Atomic Energy Society of Japan.

4 Enhancement of External Communication

Since its establishment, the NRA has actively worked to enhance external communication. For example, the NRA Chairman has visited local governments in areas where nuclear power plants are located to explain effective evacuation procedures in the event of a nuclear emergency and to provide information on radiation exposure for residents. These visits also serve as opportunities to exchange views with local stakeholders.

Beginning in February 2018, based on the "Policy on Commissioner's Visits to Nuclear Facilities and Exchange of Opinions with Local Stakeholders" adopted at the 49th NRA Commission Meeting in FY2017 (15 November 2017), NRA Commissioners have conducted site visits to nuclear facilities, primarily those that have received approval for compliance with current regulatory requirements. During these visits, they engage in dialogue with local stakeholders, including prefectural governors and municipal leaders, on various regulatory issues. Excluding the period when the program was temporarily suspended due to COVID-19 prevention measures, a total of 11 visits have been conducted to date. Feedback received during these exchanges has been appropriately reflected in the regulatory activities.

A representative example of a response based on local stakeholder feedback is the establishment of the Study Team on the Operation of Sheltering in Place in the Event of Nuclear Emergency. This initiative was launched in response to concerns raised by local governments regarding emergency response measures, particularly the timing of lifting shelter-in-place orders, based on their experience during the Noto Peninsula earthquake. These concerns were voiced during the Exchange of Opinions with Local Stakeholders on the Onagawa NPS held on 13 January 2024, shortly after the earthquake on 1 January 2024.

Additionally, as part of the Nuclear Regulatory Human Resource Development Project, the NRA Chairman visited the National Institute of Technology, Fukushima College to deliver lectures and engage in discussions with students.

5 Examination of Sheltering in Place During a Nuclear Emergency

Based on the Nuclear Emergency Act, the NRA has established the "NRA Guide for Emergency Preparedness and Response " to ensure the smooth implementation of nuclear emergency measures.

The Guide designates sheltering in place as a key protective action within the Urgent Protective Action Planning Zone (UPZ), as it can relatively easily reduce residents' radiation exposure during a nuclear emergency.

This approach aligns with the basic principles of radiation protection outlined in the Guide, which are based on IAEA standards and lessons learnt from the TEPCO Fukushima Daiichi NPS accident. The concept emphasizes that "radiation doses to residents should be kept as low as reasonably achievable, while also minimizing health impacts not directly caused by radiation exposure."

However, in practice, issues have arisen regarding the clarity of the when and how sheltering in place should be implemented, as well as the criteria for lifting the measure or transitioning to evacuation.

During a meeting with local governments in the Onagawa area in January 2024, a local government official raised concerns about the duration of sheltering in place and the lack of clear criteria for lifting the measure.

In response to concerns raised by local governments, the NRA established the Study Team on the Operation of Sheltering in Place in the Event of a Nuclear Emergency in March 2024 to examine operational improvements. The team consisted of NRA Commissioners, staff from the NRA Secretariat and the Cabinet Office (CAO, Nuclear Disaster Management Bureau), researchers specializing in reactor safety and radiation effects, and local government officials.

The review team held a total of nine meetings, and a report was compiled in March 2025. The report primarily states the following points:

- Two conditions must be met to lift sheltering in place: the reactor must be in a stable condition, and the radioactive plume must no longer be stagnant.
- Individuals sheltering in place may temporarily go outside when necessary to maintain daily life (e.g., to receive food and water or visiting healthcare institutions).
- The recommended duration for sheltering in place is three days. If daily like can be maintained through the provision of relief supplies and other support, the sheltering period maybe extended beyond that.
- To effectively implement sheltering in place during a complex disaster, adequate

preparations for natural disasters, including stockpiling food and daily necessities are essential.

In parallel, a collection of 45 Q&As related to sheltering in place operations has been published to inform residents and local governments. The NRA plans to revise the "NRA Guide for Emergency Preparedness and Response" in accordance with the findings of the report. Furthermore, as part of its response to complex disasters, the NRA intends to strengthen collaboration with relevant ministries and agencies responsible for natural disaster preparedness.

6 Establishment of the Medium Term Goals for the Third Term

The NRA has formulated the "NRA's Core Values and Principles," the "Statement on Nuclear Safety Culture," and the "Code of Conduct on Nuclear Security Culture" (Core Values and Principles) and established them as the foundation for organizational management. As a practical application of these principles, the NRA sets specific organizational management directions as medium term goals at regular intervals.

The second set of medium term goals, covering the period from FY2020 to FY2024, focused on embedding the fundamental concept of regulation into regulatory activities and further developing an organization capable of responding flexibly to emerging issues.

In FY2024, in preparation for the development of the third set of medium term goals, the NRA reviewed the activities implemented under the second term and discussed the challenges the NRA must address in anticipation of changes over the next decade. In this discussion, the NRA emphasized the importance of maintaining steady implementation and continuous improvement of regulatory practices. It also recognized the need to respond to evolving external conditions, such as new regulatory demands related to reactor replacement and geological disposal, the development of new technologies including AI and nuclear fusion, and the transition to a society with a declining population. Based on these discussions, the NRA established its third set of medium term goals for the five-year period beginning in FY2025, officially announced on 5 February 2025.

7 Vienna Declaration

The Vienna Declaration[2] was adopted at the Diplomatic Conference to consider a proposal to amend the CNS on 9th February 2015. Elements of the Vienna Declaration are as follows:

- New nuclear power plants are to be designed, sited, and constructed, consistent with the objective of preventing accidents in the commissioning and operation and, should an accident occur, mitigating possible releases of radionuclides causing long-term offsite contamination and avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions.
- Comprehensive and systematic safety assessments are to be carried out periodically and regularly for existing installations throughout their lifetime in order to identify safety improvements that are oriented to meet the above objective. Reasonably practicable or achievable safety improvements are to be implemented in a timely manner.
- National requirements and regulations for addressing this objective throughout the lifetime of nuclear power plants are to take into account the relevant IAEA Safety Standards and, as appropriate, other good practices as identified *inter alia* in the Review Meetings of the CNS.

In Japan, regulatory requirements previously focused on preventive measures for disaster caused by nuclear power reactors up to the Design Basis Accidents. However, following the amendment of the Reactor Regulation Act in 2012, measures against severe accidents were stipulated as regulatory requirements, resulting in enhancement of regulatory framework. The regulatory requirements mandate measures such as the prevention of core damage, prevention of CV failure, and minimization of the total amount of radioactive releases. Licensees are also required to evaluate effectiveness of these measures using a combination of Probabilistic Risk Assessments (PRAs) and deterministic analyses. The review guide specifies that the estimated release of Cs-137 should be less than 100 TBq in the postulated CV failure scenario (refer to Article 18, Section 2-5).

Additionally, this amendment made it newly mandatory to conduct evaluation for safety improvement, report the results, and make them publicly available. As a result, comprehensive and systematic safety evaluations are now conducted periodically, and

[2] INFCIRC/872

necessary improvement measures are implemented in a timely manner, alongside Licensee's Periodic Inspections and Nuclear Regulatory Inspections. Safety enhancement evaluations are reported under Article 14, while Periodic Inspections and Nuclear Regulatory Inspections are covered under Article 19.

Furthermore, the amendment of the Atomic Energy Basic Act in 2012 added a provision to incorporate established international standards into Japan's basic nuclear policy. A backfitting rule was also introduced in the Reactor Regulation Act, requiring licensees to upgrade existing nuclear facilities to meet revised regulatory requirements. The NRA has strengthened to its process for incorporating operating experience and state-of-the-art knowledge, based on lessons learnt from the TEPCO Fukushima Daiichi NPS accident, through discussions in the Technical Information Committee. The NRA Ordinances to which backfitting rule applies include the NRA Ordinance on Standards for Installation Permits and the NRA Ordinance on Technical Standards, as referenced in Articles 17, 18, and 19. The backfitting rule corresponds to measures aimed at preventing the operation of power reactors where safety cannot be ensured, as outlined in Article 6.

The NRA developed regulatory requirements incorporating measures against severe accidents and put them into force in July 2013. In developing regulatory requirements, the IAEA Safety Standards and other international standards were taken into account. In addition, the NRA participates in the IAEA's Commission on Safety Standards and its five associated committees, and actively contributing to the development of Safety Standards.

As stated above, Japan has already implemented measures that correspond to the elements of the Vienna Declaration.

8 Activities by Licensees

In response to the regulatory requirements in July 2013 entered into force, licensees have taken measures based on lessons learnt from the TEPCO Fukushima Daiichi NPS accident in order to conform to the requirements, such as measures to improve fragility of protection against tsunamis, including installation of seawalls, installing watertight doors to important areas, enhancing the pressure resistance and the waterproof property of outside walls of buildings. As for preparation of measures to be taken for water injection at the time of station black out, alternative power sources such as air-cooled gas turbine generator vehicles to be located at high ground level, increasing the number of

batteries stored, and constructing water reservoirs have been completed. In addition, as measures to mitigate influences of core damage, measures such as installation of top-vent facilities on R/Bs, top-head flange cooling lines to fill water into the top part of CV, filtered vent facilities have been taken. As for measures on the software side, emergency-response organizations have been reorganized so that they can respond to accidents when severe accidents occur simultaneously in two or more units. A necessary number of personnel for immediate response are ensured to enable initial response on emergency.
The regulatory requirements enforced in July 2013 require that preparation of necessary functions (of facilities or procedures) should be completed based on the lessons learnt from the accident, and in addition require that preparation of backup facilities (the Specialized Safety Facility and a permanent DC power supply facility as the third power system) to further enhance reliability should be completed within five years from the date of approval of Construction Plan related to measures to deal with severe accidents. For example, the Specialized Safety Facility is a facility for measures against acts of terrorism such as large-aircraft crash into a R/B. It is required that this facility is to be installed at a location about 100 meters or more apart from a R/B or to be housed in a robust building against aircraft crash with equipment necessary to prevent CV failure.
Licensees have been not only implementing various measures for meeting the above mentioned regulatory requirements but also making continuous efforts of deploying voluntary measures of safety improvement. Recent efforts are measures taken in consideration of the consequence of the Noto Peninsula Earthquake on 1 January 2024. The earthquake caused some equipment failures, such as transformers, at Shika NPSs of Hokuriku Electric Power Company (both unit 1 and unit 2 were shutdown at that time still under safety review for the new regulatory requirements), but safety functions of both units were maintained. Licensees made cooperative investigations of the failure events at Shika NPSs and voluntarily implemented safety improvement measures at all nuclear power plants in Japan. Licensees also learnt lessons from inappropriate announcements of plant situation by Hokuriku Electric Power Company due to insufficient communication within the company after the earthquake. Then industry wide efforts to improve in-house communication for proper information collection and management have been conducted by all licensees.
Licensees are also making substantial efforts of effectively improving safety by using risk information with developing and sophisticating probabilistic risk analysis (PRA) methods.
Among these activities, Shikoku Electric Power Company carried out the SSHAC (Senior Seismic Hazard Analysis Committee) project which provided the probabilistic seismic

hazard for Ikata Power Station of Shikoku Electric Power Company.

Safety Aspects of Long Term Operation (SALTO)

KEPCO accepted a Safety Aspects of Long Term Operation (SALTO) review mission by the IAEA from 16 to 25 April 2024, regarding Unit 3 of the Mihama Nuclear Power Plant. The review mission focused on the following six areas;

1. Organization and Structure
2. Overall Management Program for the Facility
3. Management of Aging for Mechanical Equipment
4. Management of Aging for Electrical and Instrumentation Equipment
5. Management of Aging for Concrete Structures
6. Management of Human Resources, Competence, and Knowledge

The mission team consisted of IAEA staff and experts from IAEA member countries, with a total of 11 participants from 8 countries: Argentina, the Czech Republic, Finland, France, South Korea, Sweden, the United Kingdom and the United States. The team leader of the mission was Mr. Martin Marchena, an IAEA nuclear safety officer.

In the comments following the investigation, KEPCO received the following evaluations:

- It was observed that KEPCO is implementing measures for safe long-term operation in a timely manner, and that the plant staff are professional and open-minded, accepting suggestions for improvement.
- Most of the aging management and long-term operation activities already meet the IAEA's safety standards.
- The plant is encouraged to address the review findings and to carry out all remaining activities as planned for safe long-term operation.

Additionally, the following were cited as good practices:

- A comprehensive methodology has been developed and implemented to identify and manage the aging of equipment and other systems.
- Benchmarking related to the aging management of the CV is being conducted to strengthen aging management.
- Retired staffs are effectively utilized as mentors to enhance the capabilities and skills of employees."

The team pointed out the following recommendations for further improvement:

- The plant should further develop and implement the long-term operation program.
- The plant should fully develop and complete the Ageing Management Review process for mechanical, electrical, and Instrumentation and Control (I&C) components and civil structures.
- The plant should improve the programmes designed to confirm the resistance of components to harsh conditions, a so-called equipment qualification programme.

In the future, a follow-up investigation will be conducted to confirm the status of efforts regarding the recommendations received during this review mission.

9 Update on Efforts to Address the Challenges Identified in Country Group Discussions of the Joint 8th and 9th Review Meeting

9-1 Safe and Steady Decommissioning of TEPCO Fukushima Daiichi Nuclear Power Station

Japan continues to make steady progress in the safe decommissioning of the Fukushima Daiichi NPS. Details are provided in Chapter B, Section 3-1 and Article 6, 3-5 of this report.

9-2 Regulatory Preparedness for the Authorization of Upcoming Reactor Long Term Operation Extensions to Ensure the Safety of Extended Operation of Nuclear Power Plants

The NRA prepared for the authorization of extended reactor operation beyond 40 years, potentially up to 60 years. Efforts to ensure the safety of long term operation are described in Chapter B, Section 2-3.

9-3 Hosting of IAEA OSART and EPREV Review Missions

OSART and EPREV missions were not invited during the reporting period.

10 Efforts to Address Challenges Highlighted in the Summary Report of the Joint 8th and 9th Review Meeting

Challenges outlined in paragraphs 45 to 52 of the Summary Reports from the 8th and 9th Joint Review Meetings are addressed throughout Chapters B and C of this national report.

10-1 Managing Extraordinary Circumstances Impacting the Safe Operation of Nuclear Installations

The NRA prepares for scenarios such as a major earthquake in the Tokyo metropolitan area, where its headquarters is located, or the outbreak of a new type of influenza. In such cases, the NRA prioritises essential tasks, secures the necessary personnel and supplies, and relocates operations to nearby alternative bases. Contingency plans have been developed to ensure that the NRA can continue to respond to emergencies at nuclear facilities with the highest priority. These plans include task prioritization, resource allocation, and relocation strategies, and their effectiveness is regularly verified through drills.

The NRA is committed to the continuous improvement of these plans and operations, and this process has been integrated into its management system to ensure ongoing effectiveness.

Additionally, in regions where nuclear facilities are located, NRA regional offices have been established to respond to accidents and incidents. These offices operate under the same procedures and standards as the headquarters.

10-2 Strengthening National Regulatory Capabilities Taking into Account New and Innovative Technologies

The NRA conducts surveys on trends in the nuclear field in Japan and abroad, focusing on emerging technologies such as artificial intelligence (AI) and advanced manufacturing technology (AMT). These efforts are aligned with the medium-term goals for the third period, as outlined in Section B6. In addition, the NRA engages in dialogue with relevant operators to implement these goals and to identify and address regulatory issues related to fusion facilities currently under development in Japan.

The NRA will continue these activities to ensure that its regulatory framework remains aligned with technological innovations.

10-3 Fostering International Collaboration

The NRA continues to share knowledge and lessons learnt from the TEPCO Fukushima Daiichi Nuclear Power Station accident with the international community. It also disseminates information and exchanges views to enhance global nuclear safety through participation in various meetings organized by the IAEA and OECD/NEA, the dispatch of expert staff, and bilateral cooperation (details provided in Chapter B, Section 3-2)

From 28 February to 1 March 2024, the NRA and the IAEA jointly held a technical meeting and organized a site visit to the TEPCO Fukushima Daiichi NPS for member countries of the Regulatory Cooperation Forum (RCF), a framework led by the IAEA that promotes collaboration among nuclear regulators and the sharing of international knowledge and experience to improve nuclear safety. The meeting was attended by ten senior regulators from seven countries, including NRA Commissioner Sugiyama. Through the meeting and site visit, the lessons learnt from the TEPCO Fukushima Daiichi NPS accident were conveyed to participating countries, and information was shared regarding the current status of the plant and ongoing regulatory activities.

To identify key issues and enhance understanding of the regulation of small modular reactor (SMR), including safety, security, safeguards, the NRA has participated in the SMR Regulators' Forum (SMR-RF) and the Nuclear Harmonization and Standardization Initiative (NHSI) on SMRs, actively engaging in discussions and exchanged views.

As part of inspector exchange programs, NRA inspectors have been continuously dispatched to the U.S. Nuclear Regulatory Commission (NRC).

Furthermore, the NRA contributes to the improvement of international nuclear safety by presenting the results of safety research at international scientific conferences and publishing in overseas academic journals.

10-4 Foster International Peer Review Missions and Timely Addressing of Findings

Steady progress has been made in addressing the findings of the IRRS mission. All recommendations and suggestions provided up to the IRRS Follow-up Mission conducted in January 2020 were fully addressed by FY2023. The next IRRS mission is scheduled for 2026.

10-5 Possible Impact of Global Climate Changes on the Safe Operation of Nuclear Installations

To date, no significant impact on the safe operation of nuclear power plants has been attributed to climate change.

In addition, the NRA collects and organizes the latest information from Japan and abroad, including regulatory trends, safety research, international standards, and academic society activities. Based on this information, the NRA conducts activities to identify information that may require consideration in relation to domestic regulations and the safety of nuclear facilities.

To assess whether such information should be incorporated into regulatory frameworks, the NRA has established, the Technical Information Committee, which holds regular meetings with the participation of relevant NRA Commissioners. As a result of these deliberations, matters deemed to require regulatory action are reported to the NRA, and measures such as standardization are implemented.

In the past, when new knowledge regarding natural hazards, such as volcanic ash and tsunamis, became available, regulatory actions such as backfitting were taken following NRA deliberations.

At present, no regulatory actions have been deemed necessary due to climate change. However, the NRA will continue to actively collect and evaluate new knowledge related to natural hazards and their potential impact on nuclear facilities.

10-6 Securing Reliable Supply Chains

Japan's nuclear industry and human resource base boasts a high rate of domestic production and technology, and contributes significantly to the domestic economy and employment. With the loss of new construction projects since the Great East Japan Earthquake, this foundation is being threatened. It is necessary to avoid future risks such as prolonged construction periods and rising costs, the disruption of industrial infrastructure and technologies including equipment, materials, fuel fabrication, and decommissioning, and a shortage of nuclear human resources, including those responsible for regulatory issues.

For this purpose, through the Nuclear Energy Supply Chain Platform, in which industry and government agencies collaborate, support for business succession, including the use of general industrial products, measures against supply disruptions of parts and materials, and support for human resource development and recruitment should be expanded. The public and private sectors will encourage participation in overseas projects where market expansion is anticipated, in the sense of maintaining and strengthening the industrial base for the development and installation of next-generation advanced reactors in Japan.

10-7 Strategies for Ageing Management in Support of the Operation of Nuclear Installations

Refer to Chapter B, Section 2.

10-8 Strengthening Emergency Preparedness and Response Arrangements and Fostering Cross Border Collaboration

To enable rapid and accurate evaluation of internal radiation doses from radioactive iodine for large numbers of the public and workers in the event of a nuclear accident, the NRA supported the development of a portable thyroid monitor that can be deployed at evacuation centres, command posts, and other relevant locations. Under these initiatives, a prototype was developed by the National Institutes for Quantum Science and Technology and the Japan Atomic Energy Agency, and was commercialised in 2024.
To implement new technologies in radiation monitoring and build a more resilient and agile radiation monitoring system, the NRA has deployed a concept for an advanced monitoring system. This initiative promotes:

- Agile monitoring, enabling rapid and detailed responses during nuclear emergencies;
- Resilient and diversified monitoring, ensuring functionality during complex disasters;
- Labor-saving, cost reducing, and digitally transformed monitoring systems.

Specific efforts include:

- Operational familiarization with aerial monitoring using unmanned aerial vehicles, conducted during nuclear emergency drills and local government training exercises.
- Development of drone-mounted monitoring posts to serve as alternatives in areas inaccessible due to road disruptions or other disaster related obstacles.
- Introduction of Low Power Wide Area (LPWA) network as a new communication method, supplementing existing mobile, wired, and satellite lines. Demonstration tests were conducted, and a compact monitoring device compatible with LPWA was developed.
- Integration of national and local government monitoring information system using cloud technology, aiming to build a high-quality, disaster resilient system. System development is currently underway.

Refer to Article 16(2) for details on cross border collaboration.

C Outline of the Report for Each Article

This Chapter reports Japan's implementation status of each Article of the Convention on Nuclear Safety.

ARTICLE 6 EXISTING NUCLEAR INSTALLATIONS

> Each Contracting Party shall take the appropriate steps to ensure that the safety of nuclear installations existing at the time the Convention enters into force for that Contracting Party is reviewed as soon as possible. When necessary in the context of this Convention, the Contracting Party shall ensure that all reasonably practicable improvements are made as a matter of urgency to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be implemented to shut down the nuclear installation as soon as practically possible. The timing of the shut-down may take into account the whole energy context and possible alternatives as well as the social, environmental and economic impact.

Outline of the Implementation of Article 6

Nuclear reactor facilities in Japan are required to comply with the regulatory requirements set forth in the NRA Ordinances in accordance with the provisions of Reactor Regulation Act. When the regulatory requirements have been revised, existing nuclear facilities are also obliged to comply with the revised regulatory requirements. In the event that they are deemed not to conform with the revised regulatory requirements, the NRA may order the suspension of the use of the facilities. For 50 power generation reactor facilities (including reactors currently being decommissioned) which already existed (in operation) as of 1996 when the CNS entered into force, appropriate measures have already been taken in the same manner in accordance with the provisions of the Reactor Regulation Act, and as of the end of March 2025, all 14 nuclear reactors for power generation in commercial operation in Japan have been confirmed to be comply with the regulatory requirements established by the NRA and have been granted the amendment to Reactor Installation Permits.

Therefore, there is no continuing operation of nuclear facilities in Japan that are in a state without safety secured, so that conformity to the provision of Article 6 of the Convention is fulfilled.

As for TEPCO Fukushima Daiichi NPS, it was designated as the Specified Nuclear Facilities by the NRA, and accordingly, it has been under special control.

1 Reactor Facilities in Japan

The Annex 2 provides a list of nuclear reactors in Japan as of the end of March 2025.

2 Accidents or Failures that Occurred During the Reporting Period

During the three-year period from FY2022 to FY2024 among the incidents that occurred in the nuclear power facilities in Japan, 7 incidents were reported to the NRA by licensees in accordance with the Reactor Regulation Act. One of these incidents occurred in TEPCO Fukushima Daiichi NPS. The list of accidents or failures that occurred during the reporting period is shown in the Annex 3.
Regarding legal reporting based on the Reactor Regulation Act, it was decided to limit the events that require legal reporting at the decommissioning stage to those related to the safety of the facility at that point in time and amended the relevant regulations in April 2024. The NRA is still considering improving legal reporting.

3 Efforts to Secure Safety

3-1 Conformity Review

Based on the lessons learnt from the accident at TEPCO Fukushima Daiichi NPS, the revised Reactor Regulation Act, which came into effect in July 2013, along with NRA Ordinances and other relevant documents, stipulates that commercial power reactor facilities must comply with these regulations. The Conformity Review is a regulatory framework required for operation of existing power reactors in Japan. It consists of review procedures for the granting of amendments to Reactor Installation Permits, approval of Design and Construction Plans, and approval of amendments to Operational Safety Programs. The NRA verifies the compliance with the regulatory requirements through these procedures.
Measures against severe accidents were added as regulatory requirements, and those addressing earthquakes, tsunamis and other hazards were reinforced based on lessons learnt from the TEPCO Fukushima Daiichi NPS accident. Accordingly, existing reactors are required to undergo backfitting to meet these updated requirements. In November 2022, the NRA compiled concepts related to knowledge subject to backfitting and

established the Basic Concept on Backfitting along with approving the Back-fitting Consideration Process. This approach stipulates that, when determining whether specific knowledge should be subject to backfitting, decisions shall be made from a scientific and technical perspective. These decisions take into account the potential impact on facility safety, the likelihood and urgency of such impact, and the safety significance of the knowledge. Additionally, the response status of nuclear operators and other individual characteristics are considered. In principle, transitional measures are to be provided when implementing backfitting, and the content of such measures is determined by considering specific circumstances within the limits necessary to ensure operational safety. In the event of accidents or natural disasters that exceed postulated level in the regulatory requirements, measures must be taken to prevent core damage, CV failure, and dispersion of radioactive materials. The review of amendments to the Reactor Installation Permit focuses on whether the reactor's location, structure, equipment, as well as technical capability of the licensees, meet these regulatory requirements.

The review for approval of the Design and Construction Plan focuses on whether detailed design of nuclear facilities, quality control methods related to design and construction comply with the Reactor Installation Permit and conform to the regulatory requirements.

The review on amendment to Operational Safety Programs focuses on whether measures specified in the programs are consistent with the Reactor Installation Permit and sufficient to prevent disasters caused by nuclear fuel material, items contaminated by nuclear fuel material, or the power reactor itself.

By the end of March 2025, applications for amendments to Reactor Installation Permits, aimed at demonstrating conformity to current regulatory requirements, were submitted for 27 nuclear power reactors. Of these, 17 were granted amendments to their Reactor Installation Permits. All 17 subsequently obtained approval of their Design and Construction Plans, and 16 received approval for amendments to their Operational Safety Programs.

As for the SSF, the NRA requires licensees to complete its construction within five years from the date of approval of the Design and Construction Plan. By the end of March 2025, applications for amendments to the Reactor Installation Permit had been submitted for 19 power reactors. The review of the SSF focuses on whether adequate measures are in place to ensure that the functions necessary for responding to severe accidents will not be lost due to acts of terrorism, such as an intentional aircraft crash. So far, 18 reactors have been granted amendments to their Reactor Installation Permits. Applications for

approval of the Design and Construction Plan were submitted for 17 nuclear power reactors, of which 12 had obtained approval by the end of March 2025.

3-2 Review of Approval for Extension of Operational Period

Following the TEPCO Fukushima Daiichi NPS accident, the Reactor Regulation Act was amended in June 2012 to stipulate a standard operational period of 40 years. A one-time extension of up to 20 years is permitted, subject to approval by the NRA. During the reporting period, the NRA approved the extension of operations for Kyushu Electric Power Company's Sendai NPS Units 1 and 2 in November 2023, and Kansai Electric Power Company's Takahama Power Station Units 3 and 4 in May 2024. In total, the NRA has approved the extension of operations for eight units, including those mentioned above.

In accordance with the GX Decarbonized Power Supply Act, promulgated on 7 June 2023, the framework for aging nuclear power plants was revised. The previous systems, the "System of Approval for Extension of Operational Period" and the " System for Assessing Aging Technologies" were integrated into a new framework called the "System of Approval for Long-Term Facility Management Plans". While the maximum operational period of 60 years remains unchanged, the revised system excludes periods of shutdown for unforeseen circumstances from the 60-year operational period.

3-3 Improvement of Regulatory Requirements Reflecting the State-of-the-Art Technical and Scientific Knowledge

The NRA has been enhancing regulatory requirements and guidance to incorporate latest insights gained from domestic and international regulatory activities, operational experiences relating to incidents and troubles at nuclear facilities both in Japan and abroad, results from safety research conducted by the NRA, academic studies, and cutting edge technical and scientific knowledge obtained through the activities of international organizations such as IAEA and

As part of this process, the NRA collects information on incidents and troubles that occur at nuclear facilities worldwide, analyse them, and identifies key items of concern. Decision on whether to take regulatory actions regarding these items are made following discussions at the Technical Information Committee and based on advice from the Reactor Safety Examination Committee or the Nuclear Fuel Safety Examination Committee.

3-4 Assessment to Enhance Safety

The Reactor Regulation Act, amended in 2012, introduced a safety assessment system named “Periodic Safety Assessment of Continuous Improvement of Commercial Power Reactors”, which incorporates elements of former system “Periodical Safety Review (PSR)” system. Under this framework, licensees of power reactors are requested to conduct a self-assessment within six months following the completion of the Licensee's Periodic Inspections of the relevant facilities. After completing the assessment, licensees are requested to promptly submit a “Safety Assessment Reports” to the NRA and make publicly available.

Efforts by licensees under this system to evaluate safety improvements were reviewed and deliberated by the Reactor Safety Examination Committee and the Nuclear Fuel Safety Examination Committee. The findings were compiled into the "Review of the System for the Evaluation of Safety Improvement for Nuclear Power Reactor F (Review Report) published on 5 July 2024.

Subsequently, the NRA decided to revise the relevant ordinances and guidance documents in May 2025.

Specifically, as part of the short-term review of the system for evaluating safety improvements, the relevant ordinances and guidance documents have been revised. These revisions include streamlining materials that explain the current status of equipment in power reactors, reviewing how the latest scientific and technical knowledge from Japan and abroad is handled, revising the timing of evaluations and notifications, aligning the PSR with the IAEA Safety Guide, and addressing the issue of "design obsolescence”.

3-5 Specified Nuclear Facilities

The NRA designated TEPCO’s Fukushima Daiichi NPS as a Specified Nuclear Facility under the Reactor Regulation Act. The NRA issued a list titled “Matters for Which Measures Should Be Taken” and ordered the company to submit an Implementation Plan to ensure operational safety and the protection of specified nuclear fuel materials. Among the listed matters, the goals included reducing and optimising risks across the entire Specified Nuclear Facility, ensuring safety both on-site and off-site, and taking necessary measures promptly and efficiently to achieve these goals. It was also specified that the decommissioning process of Units 1 to4 must be conducted safely, and that the

removal and storage of melted fuel should be completed as soon as possible. For Units 5 and 6, it was indicated that the cold shutdown conditions should be maintained and continued in a stable manner. TEPCO submitted the Implementation Plan on 7 December 2012, and the NRA approved it on 14 August 2013. Since then, the plan has been amended in accordance with progress of work at the Fukushima Daiichi NPS.

The implementation plan is subject to ongoing revisions based on the progress of decommissioning activities. Following a revision of the regulatory framework in 2020, it became possible to include future decommissioning-related content in the plan. The NRA reviews and approves amendments to ensure that they are sufficient to prevent disasters involving nuclear fuel materials, contaminated items, or nuclear reactors, and that they adequately address the physical protection of specified nuclear fuel material.

In FY2022, the NRA approved a total of 13 modifications to the Implementation Plan. These include the installation of facilities related to the offshore discharge of ALPS treated water, as well as the installation of a removal platform and fuel handling equipment for the removal of spent fuel from Unit 2.I In FY2023, the NRA approved 14 modifications, including the addition of storage for transfer vessels within the site, in preparation for fuel removal from Unit 6.I In FY2024, the NRA approved 17 modifications in total. These included the planned removal of fuel debris from Unit 2 using a telescopic pilot retrieval device, and the construction of the second building of the Analysis and Research Laboratory.

Additionally, the licensee notified the METI of the abolition of power generation facilities by submitting a notification of changes to electrical facilities, in accordance with Article 9 of the Electricity Business Act.

Table 6-1 Decommissioning work in progress

NPS	Reactor Type	Commissioned	Submission on deciding the abolition according to the Electricity Business Act
Fukushima Daiichi NPS unit 1 (TEPCO)	BWR	26/3/1971	19/4/2012
Fukushima Daiichi NPS unit 2 (TEPCO)	BWR	18/7/1974	19/4/2012
Fukushima Daiichi NPS unit 3 (TEPCO)	BWR	27/3/1976	19/4/2012
Fukushima Daiichi NPS unit 4	BWR	12/10/1978	19/4/2012

(TEPCO)			
Fukushima Daiichi NPS unit 5 (TEPCO)	BWR	18/4/1978	31/1/2014
Fukushima Daiichi NPS unit 6 (TEPCO)	BWR	24/10/1979	31/1/2014

4 Nuclear Installations Under Decommissioning

In order to ensure a smoother transition from shutdown to decommissioning of aging nuclear facilities, nuclear licensees are obliged to formulate and publicize a policy on decommissioning from the start-up stage of projects as regulatory developments in response to the decommissioning of nuclear facilities. In response to the enforcement of relevant laws in October 2018, each nuclear licensee formulated and publicized a policy on decommissioning by the end of the same year.

As of the end of March 2025, 18 power reactors and two power reactors under research stage are under decommissioning as shown in Table 6-2.

Table 6-2 Nuclear Power Reactors under Decommissioning

NPS	**Reactor Type**	**Shutdown**	**Applied for Decommissioning**	**Approved**
Tokai Power Station (JAPC)	GCR	31/3/1998	10/3/2006	30/6/2006
Hamaoka NPS unit 1 and 2 (Chubu Electric Power)	BWR	30/1/2009	1/6/2009	18/11/2009
Mihama Power Station unit 1 and 2 (KEPCO)	PWR	27/4/2015	12/2/2016	19/4/2017
Shimane NPS unit 1 (Chugoku Electric Power)	BWR	30/4/2015	4/7/2016	19/4/2017
Genkai NPS unit 1 (Kyushu Electric Power)	PWR	27/4/2015	22/12/2015	19/4/2017

Tsuruga Power Station unit 1 (JAPC)	BWR	27/4/2015	12/2/2016	19/4/2017
Ikata Power Station unit 1 (Shikoku Electric Power)	PWR	10/5/2016	26/12/2016	28/6/2017
Ohi Power Station unit 1 and 2 (KEPCO)	PWR	1/3/2018	22/11/2018	11/12/2019
Onagawa NPS unit 1 (Tohoku Electric Power)	BWR	21/12/2018	29/7/2019	18/3/2020
Genkai NPS unit 2 (Kyushu Electric Power)	PWR	6/4/2019	3/9/2019	18/3/2020
Ikata Power Station unit 2 (Shikoku Electric Power)	PWR	23/5/2018	10/10/2018	7/10/2020
Fukushima Dai-ni NPS unit 1 thru 4 (TEPCO)	BWR	30/9/2019	29/5/2020	28/4/2021
Monju (JAEA)	FBR	8/5/2010	6/12/2017	28/3/2018
Fugen (JAEA)	ATR	29/3/2003	7/11/2006	12/2/2008

5 Ensuring Safety and Operation of Commercial Power Reactors

The Reactor Regulation Act stipulates that "In the location, structure, or equipment of a nuclear power reactor facility does not comply with the requirements set forth in the NRA ordinances, the NRA may suspend the use of the reactor facility, require its modification, repair, or relocation, designate specific operating methods, or order any other measures necessary to ensure operational safety." During the period covered by this report, no such actions were ordered.

When regulatory requirements are revised, the NRA may require licensees to comply with the updated requirements, even for existing nuclear installations. In principle, the enforcement date is set a certain period after the revision, or a moratorium period is set

to allow licensees time to meet the new requirements. This period is determined on a case-by-case basis, taking into account the safety significance of the revised requirements, and the time needed for licensees to implement necessary measures. However, if immediate action is deemed necessary to ensure safety, the revised regulatory requirements may be applied concurrently with their enactment.

ARTICLE 7 LEGISLATIVE AND REGULATORY FRAMEWORK

1	Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations.
2	The legislative and regulatory framework shall provide for: (i) the establishment of applicable national safety requirements and regulations; (ii) a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a license; (iii) a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licenses; (iv) the enforcement of applicable regulations and of the terms of licenses, including suspension, modification or revocation.

Outline of the Implementation of Article 7

The Reactor Regulation Act stipulates regulations on use of nuclear energy in Japan. The NRA Ordinance details regulations stipulated in the Reactor Regulation Act and defines regulatory requirements. To install a nuclear power plant, Reactor Installation Permit shall be obtained based on the Reactor Regulation Act. The approval of Design and Construction Plan, Pre-service Inspections, and the approval of Operational Safety Programs are procedures to check compliance to regulations and approval conditions.
The Reactor Regulation Act includes provisions to revoke permits and the order suspension of facility use in exercise of the NRA's authority; it also provides implementation methods for regulations and approval conditions within a legal framework.

Therefore, Japan has a legal framework to regulate conditions for safety which defines necessary regulatory requirements. It means that Japan conforms to the provisions of Article 7 of the Convention.

Article 7 (1) Establishment of a Legislative and Regulatory Framework

1 Outline of Major Legislation Relating to Nuclear Safety

1-1 The Atomic Energy Basic Act

Promulgated in 1955, the Atomic Energy Basic Act is the legal basis of nuclear energy use in Japan.
The objective of the Act is to secure current and future energy resources, promoting advanced learning and industrial development thus ensuring that nuclear energy will contribute to improved standards of living and the overall welfare of mankind.
The Act's basic principles ensure that the research, the development and the use of nuclear energy shall be strictly limited to peaceful purposes, be dedicated to securing safety democratically and voluntarily, and contribute to international cooperation.
The objects of securement for safety are protection of lives, health, and property of the people, conservation of the environment, and contribution to the security of Japan.
The Atomic Energy Basic Act stipulates the establishment of the NRA and the Nuclear Emergency Preparedness Commission, and it also provides the basis for the establishment of the NRA as a government supervisory body for enforcement and democratic control of nuclear energy policies for the use of nuclear energy.

1-2 The Act for Establishment of the Nuclear Regulation Authority

The Act for Establishment of the NRA which was enacted on 19 September 2012 stipulates the foundation of the NRA as the nuclear regulatory body of Japan, its authorities and responsibilities.
The object of the Act is to emphasize the importance for its powers to be exercised in a neutral, fair and independent manner.
The Act provides the organizational structure of the NRA, the appointment and dismissal of its Chairman and Commissioners, the duty of reporting to the national Diet and disclosure of information, and other authorities and responsibilities needed for the NRA to carry out its mission. A report on the authorities and responsibilities which this Act guarantees is to be provided in the reporting of Article 8.

1-3 The Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (Reactor Regulation Act) and Relevant Ordinances

Promulgated in 1957, the Reactor Regulation Act is a law dealing with all regulations concerning the use of nuclear energy.

In accordance with the spirit of the Atomic Energy Basic Act, this Act is enacted for the purpose of providing necessary regulations on refining activities, fabricating and enrichment activities, interim storage activities, reprocessing activities and waste disposal activities, as well as on the installation and operation of reactors while taking into consideration the possibility of large scale natural disasters, terrorist attacks, or other criminal acts, in order to ensure that the usage of nuclear source material, nuclear fuel material and reactors are limited to peaceful purposes, and to ensure public safety by preventing hazards in the event that a severe accident at a nuclear facility causes discharge of an abnormal level of radioactive materials outside the factory or place of activity where the nuclear facility is installed, and by protecting nuclear fuel material. And it is also enacted for the purpose of providing necessary regulations on the usage of international controlled material in accordance with treaties or other international agreements concerning the research, the development and the usage of nuclear energy.

In response to the TEPCO's Fukushima Daiichi NPS accident, the Reactor Regulation Act was amended in 2012. In order to strengthen safety measures in the use of nuclear power, part of the Reactor Regulation Act was amended in April 2017. Under this Act, from the perspective of reinforcing measures taken by both licensees and the NRA, with the aim of ensuring higher safety, licensees are obliged to confirm the nuclear facility's compliance to the regulatory requirements as well as to ensure the primary responsibility for securing safety. The Act also requires consistent quality assurance management from design and construction to use. This amendment to the Act came into force in April 2020

The Reactor Regulation Act establishes safety regulations and standards for granting permits and approval, including Reactor Installation Permit, the approval of Design and Construction Plan, Pre-service Inspections, Licensee's Periodic Inspections, the approval of Operational Safety Programs, and approval of Decommissioning Plan. The Acts also establish administrative procedures such as the suspension of operation (back-fitting) and the revocation of permits, as well as criminal penalties, such as custodial sentences or fines, which can be imposed if an operator does not comply with the provisions of this Act.

The Act also regulates the assessment to enhance safety, the type certification, and responsibilities of nuclear licensees (obligation of developing necessary measures such as the installation of facility or equipment contributing to safety improvement and fulfilment of safety education, based on the latest knowledge).

With regard to the operational period, based on the reflections and lessons learnt from TEPCO's Fukushima Daiichi NPS accident, the Reactor Regulation Act had stipulated that the operational period of a nuclear power reactor is 40 years, and that it is allowed to be extended only once for a period not exceeding 20 years with the approval of the NRA. However, in response to the Cabinet decision (February 2023) to promote "Green Transformation" initiatives which transform the fossil energy-centred industry and social structure to the clean energy-centred one, the Reactor Regulation Act was revised in June 2023 after determining the Overview of Safety Regulations for Aging Power Reactors so that strict regulations on safety confirmation of aging power reactors would not be impaired.

In addition, it stipulates a system for an employee feedback system (whistle blowers) of nuclear operators whereby they can report any violation of the Reactor Regulation Act to the NRA without fear of penalty. It also prohibits employers to fire employees or treat them disadvantageously because of reporting violations.

Cabinet Orders, the NRA Ordinances, and other related ordinances are stipulated based on the provision of the Reactor Regulation Act and to implement the provisions.

Of the NRA Ordinances established in response to the Reactor Regulation Act, those covering the regulation of reactor facilities are as follows.

- NRA Ordinance Concerning the Installation and Operation, of Commercial Power Reactors (NRA Ordinance on Commercial Reactors)
  - Applies to the installation and the operation of commercial power reactors
- NRA Ordinance Prescribing Standards for the Location, Structure, and Equipment of Commercial Power Reactors and their Auxiliary Facilities (NRA Ordinance on Standards for Installation Permit)
  - Standards relating to the location, the structure, and the equipment of reactor facilities, which form one of the criteria for obtaining an approval for Design and Construction Plan on power reactors.
- NRA Ordinance Prescribing Technical Standards for Commercial Power Reactors and their Auxiliary Facilities (NRA Ordinance on Technical Standards)
  - Technical standards relating to an approval of Design and Construction Plan and the maintenance of power reactor facilities.
- NRA Ordinance on Technical Standards for Quality Control Methods Concerning

the Design and Construction of Commercial Power Reactors for Licensees of Power Reactor Operation and Systems for Their Inspection (NRA Ordinance on Quality Control Methods)

- Technical standards prescribing quality control methods and systems for their inspection relating to the design and the construction for power reactors, which are one of the criteria for approval of Design and Construction Plan.

• NRA Ordinance Prescribing Technical Standards for Nuclear Fuel Material Being Used as a Fuel in Commercial Power Reactors

- Technical standards relating to the design of fuel assemblies.

Furthermore, the Act specifies that when the NRA determines it especially necessary for nuclear licensees to manage the facility in an appropriate manner according to the facility situation, the NRA can designate the facility as the Specified Nuclear Facility. In this case, it is stipulated that the licensees of the Specified Nuclear Facility have to submit an implementation plan to the NRA for approval and that they have to receive an additional approval every time a change is made.

For facilities designated as Specified Nuclear Facilities, the Reactor Regulation Act stipulates that those regulatory requirements may be only partially applied if proper implementation of measures to achieve operational safety is ensured based on an implementation plan. The following ordinances have been enacted for the TEPCO's Fukushima Daiichi NPS designated as Specified Nuclear Facilities to stipulate the measures to be taken to ensure safety, as the situation there differs from that of ordinary reactor facilities.

• NRA Ordinance on the Operational Safety of Reactor Facilities at the TEPCO's Fukushima Daiichi NPS and the Physical Protection of Specified Nuclear Fuel Material

1-4 The Act on Special Measures Concerning Nuclear Emergency Preparedness (Nuclear Emergency Act)

Because of the specific nature of nuclear disasters, the Nuclear Emergency Act was promulgated in 1999 to protect lives health and property of citizens. Combined with the Reactor Regulation Act, the Basic Act on Disaster Management, and other laws concerning nuclear disasters, this Act has been designed to strengthen measures against nuclear disasters by prescribing the responsibilities of licensees, the declaration of a nuclear emergency situation, the establishment of the Nuclear Emergency Response

Headquarters, and the implementation of emergency response measures, and other special measures relating to nuclear disasters.
Under this law, licensees must take all possible actions to prevent nuclear disasters, and take necessary actions faithfully for preventing the spread of the effects of a crisis and repairing any damage caused by such an incident.
This law also stipulates that the government must take all necessary actions to implement emergency response measures, precautionary protective measures and restorative measures for nuclear disasters.
Following the TEPCO Fukushima Daiichi NPS accident, the Nuclear Emergency Act was amended on 19 September 2012, to enhance precautionary protective measures and strengthen the Nuclear Emergency Response Headquarters during nuclear emergency.
Measures relating to nuclear emergency preparedness are detailed in Article 16.

2 International Conventions

Japan is a contracting party of the following conventions relating to nuclear safety.

- Convention on Nuclear Safety
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
- Convention on Early Notification of a Nuclear Accident
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency

Article 7 (2) Regulatory Requirements and Safety Regulations

1 Regulatory Requirements

Considering lessons learnt from the TEPCO's Fukushima Daiichi NPS accident, the NRA put into effect the new regulatory requirements in July 2013.
The current regulatory requirements are based on the concepts of defence-in-depth, which are to prepare multiple (or multi- layered) and effective countermeasures and do not rely on other levels of defence when preparing certain countermeasures. These requirements reinforce the estimations and the countermeasures against natural

phenomena and other events such as fire disasters that trigger common-caused failures. Moreover, they require measures to prevent core damages and CV failures in case of a severe accident, measures for suppression of dispersion of radioactive material, and protection measures against intentional aircraft crashes. The basic policies for measures against severe accidents and acts of terrorism are as follows:

- Protective measures through multiple stages such as "prevention of core damage ", "securing of the containment function", "controlled discharge through vents", and "suppression of dispersion of radioactive material."
- Further enhancement of reliability in combination with permanent facilities, while primarily based on the use of portable facilities.
- Reinforcement of preventive and protective measures in spent fuel storage pools.
- Enhancement of durability of Emergency Response Centre, reliability and durability of communication systems, and reliability and persistence of measurement systems including those in spent fuel storage pools (reinforcement of command communications and measurement systems).
- Development of procedures, securement of personnel, and implementation of trainings are required since it is important for hardware (facilities) and software (on-site work) to function integrally.
- As countermeasures against deliberate airplane crashes, distributed storage and connection of portable facilities are required. The Specialized Safety Facility is introduced as a backup measure for reliability enhancement.

2 Regulatory System

2-1 Licensing Systems

When constructing commercial power reactors, a permit must be obtained from the NRA, pursuant to the provisions of the Reactor Regulation Act.

The Act stipulates the reasons of disqualification from obtaining a permit, such as that anyone who has had Reactor Installation Permit revoked within the previous two years may not obtain a new permit.

If a licensee wishes to change an already obtained permit, they must obtain permit for any amendment or, if the change is prescribed as a minor change in the law, must submit notification of the change.

In addition, the operational period of nuclear power reactor is set at 40 years, and the

operational period is allowed to be extended only if it is approved by the METI (Electricity Business Act) from the viewpoint of securing a stable supply of electricity and contributing to decarbonization. In doing so, while maintaining the framework of "limiting the operational period to a maximum of 60 years," only the period of shutdown due to reasons that are unforeseeable by the licensee would be excluded from the 60-year operational period.

The previous “System of Approval for Extension of Operational Period” to review whether or not the operational period is allowed to be extended only once for a period not exceeding 20 years before the 40th year after the start of operation and the “The Technical Evaluation System for Aging Nuclear Facilities” that reviews long-term facility management policies based on the technical evaluation on aging degradation conducted at the 30th year since the start of operation and every 10 years after that, are integrated and strengthened into the “System of Approval for Long-Term Facility management Plan”.

Specifically, licensees are required to formulate the "Long-Term Facility Management Plan" to manage the degradation of their reactor facilities every period not exceeding 10 years after the 30th year from the start of operation and obtain approval from the NRA, and unless this approval is obtained, they will not be able to continue operation.

The Conformity Review for obtaining Reactor Installation Permit is carried out by the NRA. In granting Reactor Installation Permit, the NRA must seek the opinion of the Atomic Energy Commission (AEC) of Japan, in order to confirm that there is no risk that the facility will be used for anything other than peaceful purposes.

Anyone who constructs a reactor without obtaining Reactor Installation Permit will be subject to a penalty of a custodial sentence of up to three years, or a fine of no more than three million yen, or both, pursuant to the provisions of the Reactor Regulation Act.

Licensees shall submit the application for the approval of Design and Construction Plan to the NRA before commencing construction, and obtain NRA’s approval.

In the case of constructing new nuclear reactor facilities, the applicant shall describe all matters required by the NRA Ordinances concerning detailed equipment design and attach explanatory documents as required for reactor units, nuclear fuel material handling systems and storage systems, reactor cooling systems, instrumentations and control systems, radioactive waste disposal systems, radiation controlled systems, reactor containment systems, and so forth, on the application for the approval of Design and Construction Plan.

When an existing nuclear reactor facility is modified, a licensee shall obtain the approval of Design and Construction Plan or notify the NRA in accordance with the contents of

the modifying.

When the NRA acknowledges that the applied Design and Construction Plan complies with the approved Reactor Installation Permit and the NRA Ordinance on Technical Standards, and that the design and quality assurance method of the applicant complies with the regulatory requirements, it shall approve the Design and Construction Plan.

The type certification was newly introduced by the revision of the Reactor Regulation Act in 2012, and it is given by the NRA when the specified equipment regulated by the NRA Ordinance Concerning the Installation and Operation of Commercial Power Reactors, is applied and confirmed to be in compliance with the NRA Ordinance on Standards for Installation Permit. The equipment for which the certificate is given has no need to prove compliance for every application because it has already been regarded as compliant with the NRA Ordinance on Standards for Installation Permit. This certification is expected to contribute to a more efficient licensing process. For the certified equipment, which is given the type certification, the NRA reviews the application, and if it is based on and equal to the type certified design, and is compliant with the NRA Ordinance on Technical Standards, the type can be designated. The specified equipment for which the type-designation is given has no need to prove compliance for every application for the approval of Design and Construction Plan because it has already been regarded as compliant with the NRA Ordinance on Technical Standards. This also is expected to contribute to a more efficient licensing process of the approval of Design and Construction Plan.

In addition, the approval shall be obtained for the Operational Safety Programs of the fuel assembly before its operation.

In the amendment of the Reactor Regulation Act in April 2017, the approval of Construction Plan and the approval of Fuel Assembly Design for both the domestically produced fuel assembly and imported fuel assembly were integrated, and the licensee is required to apply for the approval of Construction Plan of design and construction, and to obtain NRA's approval.

In addition, the licensee is required to carry out the activities based on a Quality Management System (QMS) from the Reactor Installation Permit stage, and it is recognized as a subject for the review for the Reactor Installation Permit. The licensee is also required to set the Operational Safety Programs before the start of construction, and to conduct activities based on the Operational Safety Programs from the design and construction stages consistently.

2-2 Inspection Systems

A licensee of reactor shall conduct a Pre-service Inspection on reactor facilities for which a construction project for installation or modification is carried out in accordance with the Design and Construction Plan approved by the NRA, and shall confirm that the reactor facilities conform with the technical requirement established by the NRA. Also, unless the NRA confirms that the reactor facilities meet the regulatory requirement, the licensee may not use the reactor facilities.

After the commencement of a reactor facility operation, the licensee shall periodically conduct an operator inspection to confirm that the reactor facility conforms to the technical requirement established by the NRA. Upon completion of the Pre-service Inspection, the licensee shall report the result to the NRA.

While the licensee carries out the above-mentioned inspection on licensee's own responsibility, the NRA performs oversight on the licensee's activities through Nuclear Regulatory Inspection, the inspection program that enables the NRA to inspect the licensee's safety activities at any time (i.e., the NRA's inspections are carried out "at any time" and " on any matter"). When there are issues of concerns about a licensee's safety activities, the NRA points out them as an inspection finding, and conducts supplemental inspections depending on its safety significance and severity level.

It should be noted that Nuclear Regulatory Inspections shall not apply to Specified Nuclear Facilities, and that they shall be inspected by the NRA as to whether safety measures are being taken in accordance with the Implementation Plan.

When a nuclear reactor facility is used without confirmation of the NRA, or when a licensee refuses, obstructs or evades an entry through the Nuclear Regulatory Inspection, or refuses to make a statement or makes a false statement in response to a question in processes of the Nuclear Regulatory Inspection, the licensee shall be penalized by a custodial sentence of up to one year or a fine of not more than 1 million yen, or the both, pursuant to the provisions of the Reactor Regulation Act.

2-3 Law Enforcement Measures

The Reactor Regulation Act stipulates law-enforcement measures for the NRA execution.

The NRA can revoke Reactor Installation Permit if a licensee does not start operation of the power reactor without reasonable excuse within five years of the date of obtaining the Permit or if it discontinues operation for more than a year.

The NRA can also revoke Reactor Installation Permit or order a licensee to shut down

the power reactor at for a period of one year or less if it has come to fall into a disqualification state for the permit or if it violates a provision of the Reactor Regulation Act or an order issued based on the Act.

In addition, the NRA can order licensees to take measures necessary for safety such as a halt, remodelling, repair or transfer of power reactor facilities or designate a method of operation if it finds that the power reactor facilities do not conform to the installation permit standard rule or the technical standard rule, or that measures being taken related to safety, operation. The NRA can order licensees to dismiss Chief Reactor Engineers if they violate provisions of the Reactor Regulation Act.

As for measures against dangerous situations, the NRA can order licensee to take measure against disaster prevention in the case of occurrence on disaster caused by a reactor.

There are penalty provisions in the Reactor Regulation Act. For example, if anyone who installed a power reactor without Reactor Installation Permit or an order relating to shutdown of a power reactor which is issued by the NRA is not complied shall be sentenced to a custodial sentence of up to three years or a fine of not more than three million yen. However, these punishment provisions are not executed directly by the NRA, but the judiciary authorities shall enforce them after receiving an accusation from the NRA.

ARTICLE 8 REGULATORY BODY

1	Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.
2	Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy.

Outline of the Implementation of Article 8

The NRA is a regulatory body entrusted with enforcement of legal framework, and the Act for Establishment of the NRA guarantees its independence to execute of official power. The NRA has the authority to establish the NRA Ordinance to execute laws and it has the authority to grant permit and approval, implement of inspections, and issue necessary orders. The NRA is financed by the national budget and its staffs are government officials.

The Chairman and Commissioners of the NRA are appointed by the Prime Minister with the consent of the national Diet, and the NRA Chairman appoints the staff of the NRA.

Therefore, the NRA has authority, financial resources, and human resources needed to pursue its mission and secure effective separation from implementation organizations as defined by the law, which means that it conforms to provisions of Article 8 of the Convention.

Article 8 (1) Establishment of a Regulatory Body

1 Nuclear Regulation Authority

1-1 Organization, Authority, and Duties

The NRA regulates nuclear-related activities in Japan, while the Secretariat of the NRA deals with related administrative matters for the NRA.

The NRA is established as an external bureau of the MOE. The Chairman and Commissioners of the NRA are appointed by the Prime Minister, with the consent of the Diet, based on the provisions of the National Government Organization Act and the Act for Establishment of the NRA. It exercises independent authority from a fair and neutral standpoint. The term of office of the Chairman and Commissioners is five years, but they may be reappointed at the end of this initial term.

The NRA will provide the Diet with a detailed report, via the Prime Minister, concerning its activities. The appointment or dismissal of staff of the NRA rests with the NRA Chairman.

The NRA is tasked with ensuring safety in the use of nuclear energy and holds the authority to grant permits for the installation of nuclear reactor facilities.

Furthermore, the NRA formulates its rules, which stipulate detailed regulatory provisions pertaining to nuclear safety, including measures for the physical protection of nuclear materials, operational safety programs, and emergency response procedures. In addition, the Authority is responsible for granting approvals related to facility design and construction, conducting inspections, granting approvals for operational safety programs and decommissioning plans for nuclear reactor facilities, collecting reports from reactor operators, and performing on-site inspections when deemed necessary. Furthermore, it has the authority to issue orders for the revocation of Reactor Installation Permits or suspension of the use of such facilities, safety measures, dismissal of Chief Reactor Engineers and measures covering decommissioning and disaster prevention.

The Act for the Establishment of the Nuclear Regulation Authority stipulates the establishment of the Reactor Safety Examination Committee (which investigates and deliberates on reactor safety), the Nuclear Fuel Safety Examination Committee (which investigates and deliberates on the safety of nuclear fuel materials), and the Radiation Council (which deliberates on technical standards for the prevention of radiation hazards) under the NRA.

In March 2014, following a notion that more enhancement of expertise is indispensable

for reinforcement of the NRA's functions, Japan Nuclear Energy Safety Organization (JNES) was integrated into the Secretariat of the NRA.

In July 2017, the NRA has strengthened its organization in order to improve the inspection system, the strengthening of regulation for radiation source and radiation protection, and the development and securing of human resources, those were identified as Recommendation items in the IRRS mission by the IAEA. Specifically, the number of NRA staff increased as well as Radiation Protection Department to strengthen regulation of radiation source and the Oversight Planning and Coordination Division to operate a new oversight program for nuclear facilities, were newly established.
In April 2024, the NRA created a new post of Director of Division of Long Term Operation of Nuclear Power Plants to strictly and steadily conduct review of aging power reactor facilities, and in July 2025, created a new post of Director of Division of Safeguards to steadily implement safeguards at Japan Nuclear Fuel's Rokkasho Reprocessing Plant, etc.
As of April 2025, the number of staff members of the NRA is 1,145, including Nuclear Safety Inspectors and the Nuclear Emergency Preparedness Officers stationed at nuclear facilities.
The Secretariat of the NRA consists of the Departments of the Regulatory Standard and Research Department in charge of preparation of standards and guides and research on nuclear systems, severe accidents, radiation and nuclear waste, safety research related to earthquakes and tsunamis, the Radiation Protection Department in charge of setup of the systems of nuclear emergency preparedness and response, physical protection of nuclear material, radiation monitoring, regulation for radiation sources, and safeguards based on international commitments, and the Nuclear Regulation Department consisting of the Nuclear Regulation Policy Planning Division, the Group of Licensing for the nuclear facilities, and the Group of Oversight for the nuclear facilities including Oversight Planning and Coordination Division, in addition to the Policy Planning and coordination Division, the Personnel Division, the Division of Budget and Accounting, the Division of Legal Affairs.
Moreover, as shown in Table 8-1, there are NRA Regional Offices at 22 nuclear sites, with safety inspectors and nuclear emergency preparedness officers permanently stationed there.

Table 8-1 NRA Regional Offices

Office Name	Target Facilities
Tomari Nuclear Regulation Office	Power plant (PWR)
Higashidori Nuclear Regulation Office	Power plant (BWR); research reactor; SF interim storage
Rokkasho Nuclear Regulation Office	Uranium enrichment; reprocessing; disposal facility; usage facilities
Onagawa Nuclear Regulation Office	Power plant (BWR)
Fukushima Daiichi Nuclear Regulation Office	Power plant (BWR); Specified Nuclear Facilities
Fukushima Daini Nuclear Regulation Office	Power plant (BWR)
Kashiwazaki-Kariwa Nuclear Regulation Office	Power plant (BWR)
Tokai and Oarai Nuclear Regulation Office	Power plant (BWR, GCR); research reactor, fuel fabrication, reprocessing, and usage facilities; disposal facility
Kawasaki Nuclear Regulation Office	Research reactor; usage facilities
Yokosuka Nuclear Regulation Office	fuel fabrication; research reactor
Shika Nuclear Regulation Office	Power plant (BWR)
Hamaoka Nuclear Regulation Office	Power plant (BWR)
Tsuruga Nuclear Regulation Office	Power plant (PWR, BWR, FBR, ATR)
Mihama Nuclear Regulation Office	Power plant (PWR)
Ohi Nuclear Regulation Office	Power plant (PWR)
Takahama Nuclear Regulation Office	Power plant (PWR)
Kumatori Nuclear Regulation Office	fuel fabrication; research reactor; usage facilities
Kamisaibara Nuclear Regulation Office	fuel fabrication, usage facilities
Shimane Nuclear Regulation Office	Power plant (BWR)
Ikata Nuclear Regulation Office	Power plant (PWR)
Genkai Nuclear Regulation Office	Power plant (PWR)
Sendai Nuclear Regulation Office	Power plant (PWR)

1-2 Resource for Regulation

(1) Funding

As a regulatory body, the national government funds the NRA which compiles a proposed annual budget and submits it to the appropriate financial authorities via the MOE. This procedure is carried out in the same manner as all government departments.

(2) Human resources

The NRA is composed of the Chairman and four Commissioners who are appointed by the Prime Minister, and the Secretariat of the NRA was established with staff accepted mainly from the Nuclear and Industrial Safety Agency (NISA), the Nuclear Safety Commission (NSC), and the AEC of Japan in September 2012. In order to integrate functions of safeguards and radiation protection in April 2013, the NRA accepted staff from the Ministry of Education, Culture, Sports, Science and Technology (MEXT). The NRA integrated JNES, a technical and scientific support organization, in March 2014, and accepted staff from the organization. Furthermore, it has employed new graduates and mid-career with experiences in the industry and other R&D institutes, so that the NRA has come to command human resources with various expertise.

In order to make scientific and technical judgments without relying on knowledge and experiences of electricity utilities, the NRA needs to maintain a certain level of the amount and quality of human resources and continually enhance their technical ability. With this in mind, the NRA formulated Basic Policy for Human Resource Development of the NRA Personnel in June 2014 so as to make clear the fundamental principles and the outline policy of human resource development. In this basic policy, the following points are identified as duties of the NRA: (1) to properly distribute resources needed for learning, training, (2) to connect future challenges and strategies of the organization with human resource development, and (3) to encourage staff to promote their voluntary learning. Furthermore, in order to show the direction of human resource development, career paths were set as a career improvement models.

In addition, based on the recognition that it is important for the NRA to develop and secure not only NRA staff members but also human resources who have the knowledge necessary for nuclear safety and nuclear regulation widely in order to conduct nuclear regulatory steadily, the NRA has been implementing a nuclear regulatory human resource development project in collaboration with universities etc. since FY2016.

The NRA reviews the contents of the project proposed by the applicants by documents and interviews and adopts projects. For projects selected in the previous fiscal year that are being continued, the NRA evaluates their progress and plans for the following year, striving to ensure effective execution.

1-3 Ensuring Transparency and Openness

(1) Ensuring transparency

The "Policy on Ensuring the Operational Transparency of the NRA" stipulates that the basic policy of the organization is (1) to be able to release information not subject to disclosure under the Act on Access to Information Held by Administrative Organs; (2) to adhere to the process of disclosure and discussion; and (3) to adhere to the principle of administration based on written documents. Accordingly, to ensure full transparency it has been decided that details of the agenda, minutes and distributed materials at NRA Commission and committee meetings and information from its study teams, shall be publicized, as a general rule.

Following meetings concerning regulations attended by at least three Commissioners or interviews between NRA Commissioners or Secretariat staff and those subject to regulation, it was decided that outlines of these proceedings will be published, together with reference materials used.

In addition, the NRA has been working to improve the transparency of the review. Based on discussions on the basic concept of disclosure of nuclear operator interviews, the minutes made by the automatic speech-to-text software have been posted on the NRA's website since April 2019. Based on such guidelines as the "Policy on Ensuring the Operational Transparency of the NRA" and the "Operational Guidelines for NRA Commission Meetings", the proceedings of NRA Commission Meetings and its study teams will generally be made available to the public.

For this purpose, an official page has been set up on online video-sharing websites such as YouTube.

Meeting materials are posted on the NRA's website so that they can be obtained at the same time as the meeting begins, in order to facilitate the convenience of viewers.

As a rule, minutes of NRA Commission Meetings are posted on the NRA website the following day while those of study team meetings are generally published within a week. In addition, Technical Information Committee, in which examines whether the latest findings require regulatory response, frequently used materials obtained from overseas regulatory agencies on the premise of non-disclosure, so these meetings itself conducted as closed. The transparency of such meetings has been ensured by publishing materials as far as possible and summary of the meeting minutes. However, based on the importance of this meeting and further transparency, the NRA decided to make this

meeting disclosed to the public in principle, and the meetings may be treated as closed meeting only if it handles non-disclosure information or if the meeting is deemed appropriate not to be disclosed. The NRA started the policy from June 2018.
Regular press conferences are, in principle, held once a week by the Chairperson of the NRA and twice a week by the spokesperson. In addition, ad hoc press briefings are conducted as necessary.
Press conferences are also made available as live broadcasts, and their recordings are disclosed to the public. The minutes are posted on the NRA's website within the next day as the target.
When the chairman and commissioners of the NRA conduct site visits, photographs of site visits and interviews with the chairman or commissioners after achieving the purpose of the visit are provided (15 cases in FY2024).
In order to make it easier for users of the NRA website to view materials, since September 2024, we have started operating N-ADRES, a system that archives and publishes important information published on the NRA website.

(2) Ensuring openness

One of the guiding principles in NRA's Core Values and Principles is "We shall be open to all opinions and advice from Japan and the international community and avoid both self-isolation and self-righteousness."
Based on these principles, the NRA has utilized the expertise of external experts, including those serving on study teams, and has actively held discussions with other experts and relevant licensees.
The NRA has published information and conducted interviews with relevant experts and licensees to ensure transparency, closer communications and stronger relationships to facilitate a swift response to any emergency, encouraging a wider understanding of regulations and gathering a wider knowledge from both domestic and overseas sources.
The NRA started visits of nuclear facilities by NRA Commissioners and Exchange of opinions with local parties based on the discussion in the NRA Commission Meeting in November 2017.
The NRA canvassed widespread public views to help formulate the current regulatory requirements and countermeasures in the event of nuclear disasters and published those findings.
Even before inviting public comment on the draft text of provisions, the NRA sought public comment on the draft framework stage, further encouraging widespread public participation.

The NRA established a website and call centres enabling the public to express their opinions or questions via the internet or telephone whenever they wish.

1-4 Technical and Scientific Support

(1) Technical and scientific support organizations

As Technical and Scientific Support Organizations, the NRA has joint jurisdiction over JAEA and National Institute for Quantum and Radiological Science and Technology (QST) with the MEXT.

JAEA is a body that, in accordance with the basic policy prescribed in the Article 2 of the Atomic Energy Basic Act, conducts basic and applied research into nuclear energy; the development of FBRs and the nuclear fuel material required for this, in order to establish the nuclear fuel cycle. It also seeks the comprehensive, systematic, efficient development of reprocessing of nuclear fuel material and the disposal of high-level radioactive waste. This information is disseminated to help promote nuclear energy research which in turn should help improve the standard of living and welfare of mankind.

Activities carried out by JAEA in the fields of ensuring the safety in nuclear energy research, its development, and use fall under the joint jurisdiction of the MEXT and the NRA.

QST's mission is to raise the level of quantum and radiological sciences and technologies through its commitment to research and development into quantum science and technology, the effect of radiation on humans, the prevention of human radiation hazards, diagnosis and treatment, and the medical use of radiation.

Activities by QST in the fields of radiation effects on the humans, the prevention of radiation hazards for humans, and diagnosis and treatment fall under the joint jurisdiction of the MEXT and the NRA.

(2) Input from external experts

The NRA has opportunities to hear opinions from external experts working in Japan and abroad. There are various study teams where experts discuss individual regulatory challenges, including formulation of the current regulatory requirements, measures against nuclear disasters, etc. For the Conformity Review, the Conformity Review Meeting is held to hear opinions from external experts. In addition, the NRA has an opportunity to get advice from international advisers consisting of experts overseas, in order to capture a wide range of international knowledge on general issues including the NRA's organizational approach and safety regulatory activities, etc.

(3) Safety research

For the NRA to adequately implement its activities, it is necessary to pursue safety research to continue improving nuclear safety and to accumulate scientific/technical knowledge. The NRA decided to review research fields to tackle in light of past progress of safety research. In July 2016, the NRA formulated the "Basic Policy of the Safety Research in the NRA" and decided to formulate the "Safety Research Areas to Be Promoted and the Implementing Policy" every year after FY2017.

As for evaluation of the safety research, the NRA performs evaluation at each phase from prior evaluation in the research planning phase to follow-up evaluation after the research based on the "Basic policy of the Safety Research in the NRA."

In addition, from a viewpoint of practical use for nuclear regulation, it is important to make results of the safety research scientifically and technologically reliable while securing traceability. It is also important to reflect results of safety research in efforts to address imminent challenges immediately. For this reason, the NRA promptly discloses results of the safety research as NRA technical report.

Collaborative research is pursued in international agencies, because nuclear safety is a global issue. Participation in such international collaborative research plays an important role in grasping needs for future nuclear regulation and obtaining the latest knowledge. Therefore, the NRA is actively joining international collaborative research operated by international agencies such as the OECD/NEA and the IAEA or under the frameworks of bilateral/multilateral cooperation.

1-5 Management System

In order to carry out duties stipulated in the Act for Establishment of the NRA, the "NRA Management Rules" was established in September 2014 for the purpose of maintaining and improving work quality of the NRA and building, implementing, evaluating, and enhancing an integrated management system that enables development of robust and sound safety culture supported by effective leadership with reference to ISO 9001 (JIS Q 9001), a standard specified by the IAEA. Based on the rules, the NRA established the "Medium Term Goal for the First Term of the NRA" in February 2015, and full operation of this management system started in April 2015.

The NRA Management Rules stipulates that the PDCA cycle (Plan-Do-Check-Act make improvements and formulate another Plan) should be implemented as a management system in a unified manner where the cycle consists of periodical formulation of a fiscal-year plan with items on special emphasis, implementation of activities, management

review, and improvement. It also stipulates organizational structure, leadership, and documentation and recording needed as a basis for implementation of the management system as well as management of resources needed for securement, development, and effective use of high-quality human resources. In addition, the rule also includes provisions about processes to handle items where improvement is needed, preventive measure, internal audits, aiming at promotion of efforts by the whole organization toward improvement of activities for effective implementation of them.

The Medium Term Goal indicates the direction of medium-to-long-term organizational management for approximately five years, and the Medium Term Goal for the Third Term has been implemented since April 2025.

Article 8 (2) Status of the Regulatory Body

The NRA carry out its regulatory activities in a far, neutral and independent manner base on the approach to separate the "regulation" from the "promotion" of nuclear energy use. The Chairman and Commissioners of the NRA are appointed by the Prime Minister with the consent of the Diet, and the NRA Chairman appoints the staff of the NRA, so other authorities on the promotion side of nuclear energy have no involvement in the appointment and dismissal of staff.

From a fiscal perspective, the activities of the NRA are funded by the national budget, with budget proposals being submitted to the Ministry of Finance by the NRA via the MOE.

The budget proposals undergo appraisal by the financial authorities, according to the fiscal situation of the government as a whole, but the authorities tasked with promoting nuclear energy are not involved from a financial perspective either.

The NRA has clear authority and competence over safety regulation, in accordance with the provisions of the Reactor Regulation Act, and it engages in independent decision-making concerning regulatory activities focused on reactor facilities, such as permits, approval, and inspections, including approval of nuclear reactor construction plan, without any involvement by the authorities tasked with promoting nuclear energy.

In accordance with the provisions of the Supplementary Provisions of the Act for the Establishment of the Nuclear Regulation Authority, conflicts of interest that may arise between the NRA and other government ministries are duly taken into consideration (the so-called "no-return rule").

ARTICLE 9 RESPONSIBILITY OF THE LICENSE HOLDER

Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant license and shall take the appropriate steps to ensure that each such license holder meets its responsibility.

Outline of the Implementation of Article 9

In Japan, nuclear energy use should be aimed to ensuring safety and be performed independently under democratic management in accordance with the Atomic Energy Basic Act, and it is basic policy that licensees have primary responsibility for ensuring safety. For implementing this principle, the Reactor Regulation Act aims to enforce nuclear-related activities and regulations and stipulates primary responsibility of licensees to ensure safety.

The Reactor Regulation Act includes a system of penalties to be imposed on licensees if they violate the law or any orders based thereon.

Therefore, the provisions of the Act clearly state that those who have been granted permits shall have total responsibility about safety and be requested to perform it, which conforms to Article 9 of the Convention.

1 The Prime Responsibility to Ensure Safety

The Atomic Energy Basic Act establishes the most basic issues concerning the use of nuclear energy in Japan. This Act stipulates that "The research, development and utilization of nuclear energy shall be limited to peaceful purposes, aimed at ensuring safety and performed independently under democratic management. The results therefrom shall be made public to contribute to international cooperation."
Based on this provision, licensees bear the prime responsibility to ensure the safe and peaceful use of nuclear energy.
Furthermore, the Atomic Energy Basic Act establishes that "Those wishing to build a nuclear reactor must comply with the regulations imposed by the government, as prescribed separately by law."
In other words, those seeking or holding a license bear responsibility to comply with regulations imposed by the government as set forth in the Reactor Regulation Act.
The Reactor Regulation Act explicitly states the legal responsibilities of licensees that they "shall be responsible for installing equipment or apparatus contributing to the improvement of the safety of nuclear facilities, enhancing education on operational safety, or taking any other necessary measures for preventing disasters resulting from nuclear source material, nuclear fuel material, and reactors, while taking into account the latest knowledge on safety at nuclear facilities."

2 Measures to Ensure That Licensees Meet Their Responsibilities

In the Reactor Regulation Act, measures for operation and maintenance of reactor facility, shipment, storage and disposal are stipulated as the measures licensees should take to ensure operational safety.
These measures are detailed in the NRA Ordinance pursuant to the Reactor Regulation Act.
To establish Operation Safety Programs and obtain NRA's approval, licensees must also undergo NRA's inspections.
In addition, licensees must stipulate in their Operational Safety Programs that they will disclose noncompliance information in the event that such noncompliance results in the non- fulfilment of basic operational targets. Measures have thus been put in place to ensure that licensees do not conceal noncompliance.
Licensees are liable to penalty if they fail to fulfil the legal responsibility for operational

safety.

In case nuclear installations fails to meet legal technical standards or its operations contravene regulatory requirements, the NRA may require the licensee to adopt alternative operating methods or order it to take any other necessary measures pursuant to the provisions of the Act. If the licensee violates this order, the NRA may revoke its permit or order it to suspend operations for a specified period not exceeding one year.

Anyone who constructs a reactor without obtaining Reactor Installation Permit will be subject to a penalty of a custodial sentence, or a fine, or both, pursuant to the provisions of the Act.

The same shall apply if licensee fails to obtain approval of Operational Safety Programs or amends it without obtaining approval, or if a licensee and/or its employee(s) fails to comply with those Operational Safety Programs.

ARTICLE 10 PRIORITY TO SAFETY

Each Contracting Party shall take the appropriate steps to ensure that all organizations engaged in activities directly related to nuclear installations shall establish policies that give due priority to nuclear safety.

Outline of the Implementation of Article 10

The NRA Ordinance on Commercial Reactors prescribes that Operational Safety Programs established by licensees shall stipulate provisions fostering safety culture and disclosing noncompliance, thereby focusing on the operational safety of reactor facilities. Quality assurance plans have been established in Operational Safety Programs and incorporated into the QMS, quality management system, to prioritize overall safety.

The NRA has been engaged in its activities along with NRA's Core Values and Principles. Furthermore, it has formulated the Statement on Nuclear Safety Culture, and setting priority to safety, it has been engaged in its activities.

Therefore, in Japan, the regulatory body and licensees and their related organizations are taking measures to set reasonable priority to safety, which means conformity to Article 10 of the Convention.

1 Regulatory Requirements Prioritizing Safety

The Reactor Regulation Act clearly states that licensees are responsible for installing appropriate safety equipment and apparatus, enhancing operational safety education, and other appropriate measures, while incorporating the latest nuclear safety knowledge.

It further stipulates that licensees must ensure safety in the maintenance and operation of nuclear installation, in the storage of waste and in other related activities.

In the event that a licensee contravenes these rules, the NRA may order to take other necessary safety measures and, if the licensee violates this order, may revoke its Reactor Installation Permit or order the licensee to suspend operation of the facility for a specific period not exceeding one year.

Moreover, licensees must establish and obtain NRA's approval of Operational Safety Programs before commencing reactor operations, in accordance with the Reactor Regulation Act.

Operational Safety Programs are required to establish a system fostering safety culture and a plan for quality assurance incorporating safety-first activities into the QMS.

Licensees and their employees must comply with Operational Safety Programs, as stipulated by the Reactor Regulation Act. If the programs are violated, the NRA may revoke its Reactor Instalment Permit or order the licensee to suspend operations for a period not exceeding one year.

2 Measures to Prioritize Safety Taken by Licensees

In Operational Safety Programs, licensees must establish provisions to foster safety culture wherein safety is the first priority of the nuclear energy business.

Further, licensees must establish the policy for fostering safety culture, develop annual plan, and implement the activities for fostering safety culture, in order to realize prioritize safety in their business operations.

They must evaluate the implementation of the plan, report the results to the company president, and seek improvements in subsequent fiscal years.

Operational Safety Programs must comply with relevant legislation and the Operational Safety Programs themselves at the same time as activities to improve compliance awareness are followed.

The quality assurance plan must assign the highest priority to nuclear safety under the

direct responsibility of senior management. Duties must be clearly specified, and structured in such a way to ensure that these requirements are met.
In addition, as part of such activities, the licensees are making voluntary efforts to improve safety, and reports to the NRA in a timely manner. For example, as the lessons learnt from the TEPCO's Fukushima Daiichi NPS accident, TEPCO has established the nuclear safety advisory board of nuclear experts from abroad for seeking their advises on the relationship with partner companies and strengthening risk management. Moreover, the senior management directly visits the sites, receives voices from the field workers who are responsible for safety, and correctly grasps the actual situation at the site, resulting in effective support for nuclear safety reform and improvement.
From the perspective of defence in depth, TEPCO holds the contest aims to enhance the competence of proposing a cost-effective safety measure through multilateral studies, and to acquire the competence of substantialize such ideas quickly. Since the accident, TEPCO has selected 147 good proposals out of 1973 proposals applied. And among good proposals, 111 safety measures are already substantialized such as introduction of automatic alert system which informs on-site workers of the occurrence of such as a unit scram incident, instalment of vehicles which are loaded with various tools and parts necessary to maintain various safety measures such as mobile equipment.

3 Efforts by the Regulatory Authority to Prioritize Safety

At its Commission Meeting in January, 2013, the NRA discussed its Core Values and Principles, and decided that the organization's mission was to "protect the general public and the environment through rigorous and reliable regulation of nuclear activities." It established five guiding principles focusing on independence, effectiveness, transparency, expertise, and readiness, in order to achieve this mission (Table 10-1).

Table 10-1 The NRA's Core Values and Principles

The Nuclear Regulation Authority was established to absorb and learn the lessons of TEPCO's Fukushima Daiichi nuclear accident on 11 March 2011. Such nuclear accidents should never be allowed to happen again. Restoring public trust, both within Japan and overseas, in the nation's nuclear regulatory organization is of utmost importance, and the nuclear safety system and management must be rebuilt on a solid basis, placing the highest priority on public safety and genuine safety culture. Everyone involved in nuclear activities must have a high degree of responsibility and ethical values, and seek to achieve the highest levels of global safety.

We hereby solemnly pledge our full commitment and unwavering efforts in regard to the foregoing.

Mission

Our fundamental mission is to protect the general public and the environment through rigorous and reliable regulation of nuclear activities.

Guiding Principles for Activities

We in the NRA and its supporting Secretariat shall perform our duties diligently, acting in accordance with the following principles.

(1) Independent Decision Making

We shall make decisions independently, based on the scientific and technological information, free from any outside pressure or bias.

(2) Effective Actions

We shall discard the previous formalistic handling of regulatory work and stress the importance of a field-oriented approach in achieving genuinely effective regulations.

(3) Open and Transparent Organization

We shall ensure transparency and appropriate information disclosure on regulations, including the decision-making process.

We shall be open to all opinions and advice from Japan and the international community and avoid both self-isolation and self-righteousness.

(4) Improvement and Commitment

We shall be assiduous in learning and absorbing the latest regulatory know-how and best practices, enhancing individual capacity, and performing our duties, mindful of high ethical standards, a sense of mission, and rightful pride.

(5) Emergency Response

We shall be ready to swiftly respond to all emergency situations while ensuring that in 'normal' times a fully effective response system is always in place.

In May 2015, the NRA formulated "Statement on Nuclear Safety Culture," as a subordinate document related to NRA's Core Values and Principles, which concretely and clearly explains activity principles from a viewpoint of nuclear safety culture (see Table 10-2). The NRA has pronounced that it will enhance awareness of importance for nuclear safety and contribute to development of safety culture in Japan by taking initiative in accordance with "Statement on Nuclear Safety Culture."

Table 10-2 Statement on Nuclear Safety Culture

Safety shall be given the overriding priority in the utilization of nuclear energy. Safety culture is recognized as continued practices with an awareness of this principle. It is the duty of everyone involved in nuclear energy to foster safety culture.

Recognizing its importance, the NRA has developed the code of conduct on safety culture taking due account of the lessons learnt from the accident at the Fukushima Daiichi Nuclear

Power Station of Tokyo Electric Power Company. The NRA will take the initiative in acting based on it.
Thereby, the NRA will strive for raising awareness of the importance of safety culture among everyone involved in nuclear energy and hence contributing to fostering safety culture in Japan.

Code of conduct

1. Priority to safety
   In lucid recognition that absolute safety is not achievable and the possibility of a serious accident remains, the overriding priority shall be placed on safety for "protecting people and the environment".
2. Decision making taking into account the risks
   Decision shall be made in an independent and objective manner taking due account of the risks. Anyone who makes a decision is responsible for explaining logically the rationale of the decision while clarifying its own roles, responsibilities, and authority.
3. Fostering, sustaining and strengthening safety culture
   Managers shall take the initiative in fostering the attitudes and actions that place the overriding priority to safety in their respective organizations. For sustaining and further strengthening safety culture, they shall also be vigilant to any early warning signs of decline in safety culture and shape and enhance the working environment so that the staff can maintain high morale.
4. Maintaining high level of expertise and organizational learning
   Recognizing the importance of scientific and technical expertise for safety, each organization shall collect and analyse the latest information in Japan and overseas on regulatory activities, operating experience, and failures to feedback the findings in its activities. Managers shall shape and enhance the working environment to promote such organizational learning.
5. Effective communication
   Open and frank discussion in the workplace shall be the basis in the pursuit of safety. Managers shall create such working environment and promote active discussion in their respective organizations.
   Adequate communication shall be pursued both inside/outside the organization and with stakeholders for enhancing transparency and building trust by taking the initiative in information disclosure and exchange of a wide range of opinions.
6. Questioning attitude
   All the personnel shall always have one's own "questioning attitude" without complacency whether there are any weaknesses that may affect safety, as well as whether there is any room for further improvement, and thereby identify safety issues.
7. Rigorous and prudent decisions and agile actions
   In response to any challenges to ensuring safety, all the staff shall make conservative decisions for safety taking into account even the worst-case scenario, and take necessary actions with agility.
8. Harmonization with nuclear security
   It is necessary to recognize that nuclear safety and security activities do not exist independently, namely complement each other and interfere with each other. All the personnel involved in nuclear safety and security activities shall respect each other's way of thinking and make efforts for harmonizing both activities. Senior managers shall take

responsibility to select the most appropriate solution.

ARTICLE 11 FINANCIAL AND HUMAN RESOURCES

1	Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of each nuclear installation throughout its life.
2	Each Contracting Party shall take the appropriate steps to ensure that sufficient numbers of qualified staff with appropriate education, training and retraining are available for all safety-related activities in or for each nuclear installation, throughout its life.

Outline of the Implementation of Article 11

In addition to reviewing the financial basis during the examination stage for Reactor Installation Permits, a mechanism is in place to ensure that financial reserves are secured to cover the potential costs of decommissioning, as well as the processing and disposal of all spent fuel and radioactive waste, even while the reactors are still in operation.

The deployment of competent personnel is also a regulatory requirement. Licensees are required to secure a sufficient number of personnel with appropriate qualification and competencies.

Therefore, the regulatory framework ensures that both financial and human resources are secured to maintain the safety of nuclear installations, demonstrating conformity with Article 11 of the Convention.

Article 11 (1) Financial Resources

1 Regulatory Requirements

Under the Reactor Regulation Act, individuals or entities seeking to install nuclear facilities are required to have adequate financial resources as one of the criteria for obtaining a permit.

In addition to submitting an application for a Reactor Installation Permit, applicants must provide appropriate financial documentation demonstrating the availability of funds necessary for the installation. This includes details on the procurement of nuclear fuel materials, as well as up-to-date financial statements such as balance sheets and asset reports. The NRA reviews and verifies that each applicant possesses sufficient financial resources to meet these requirements.

2 Measures that Operators Should Take Regarding the Decommissioning of Reactors and the Disposal of High-Level Radioactive Waste

With the enactment of the GX Decarbonized Power Supply Act in May 2023, the government added the operations of the management of decommissioning across the country, collaborative implementation of research and development related to decommissioning and procurement of equipment, and management of funds necessary for decommissioning activities to the previous “Spent Fuel Reprocessing Organization”. Additionally, the name of the Organization was changed to the “Nuclear Reprocessing and Decommissioning facilitation Organization (NuRO)". Furthermore, the Government has mandated that operators of commercial nuclear power reactors and others pay decommissioning contributions to the organization to cover the costs necessary for the decommissioning facilitation activities conducted by the organization. Based on this new system, which came into effect in April 2024, the Government will provide the necessary guidance and supervision to the NuRO and nuclear operators to ensure that decommissioning in Japan proceeds smoothly and steadily.

Regarding the final disposal of high-level radioactive waste and long-lived low-heat radioactive waste (TRU waste[3]) generated from reprocessing, the amount of contributions

[3] “Low level radioactive waste generated during reprocessing and MOX fabrication. TRU

is stipulated in the "Act on the Final Disposal of Specified Radioactive Waste". The amount of contribution is calculated by multiplying the necessary amount for final disposal per unit quantity of high-level radioactive waste, etc., by the total quantity of high-level radioactive waste, etc. Additionally, the necessary amount for final disposal per unit quantity is to be determined based on the total cost required for final disposal and the total amount of high-level radioactive waste, etc., as specified by a METI ordinance.
Under the Act, the accumulation of funds for the final disposal of high-level radioactive waste, etc., generated from the reprocessing of spent fuel, is to be deposited with a fund management corporation designated by the METI. The use of these funds is restricted by the regulation, and they cannot be used for purposes other than those for which they were accumulated. Furthermore, the METI has the authority to conduct inspections of electricity providers and fund management corporations.

Article 11 (2) Human Resources

1 Regulatory Requirements

When applying for a Reactor Installation Permit, licensees are required to submit documentation certifying their technical capability to properly install and operate a nuclear reactor, as well as to prevent and mitigate severe accidents.
Licensees must take appropriate measures to ensure operational safety. For example:
- Operations must be assigned to properly qualified personnel with sufficient knowledge.
- Operations must be carried out with an adequate number of personnel.
- Responsible personnel must possess appropriate knowledge and experience, and be certificated in accordance with standards approved by the NRA.

The proper deployment and accreditation of technical staff are regulatory requirements.
Licensees must establish procedures for conducting checks before reactor operation begins, during operation, and after shutdown, and must ensure that operators carry out these checks.
Licensees are also required to develop Operational Safety Programs and obtain approval by the NRA. These programs must include content related to operational safety education and its implementation for personnel involved in the operation and

comes from transuranium elements, i.e. elements with atomic numbers higher than that of uranium." (https://www.numo.or.jp/en/publications/pdf/TRU_200809.pdf)

management of reactor facilities.
A quality assurance plan must be included in the Operational Safety Programs, and matters related to human resources must be addressed within it. The quality assurance plan outlines requirements for staff competence in ensuring operational safety, as well as any supplemental education or training to be provided to personnel who need additional development.
Licensees must appoint a Chief Reactor Engineer from among qualified candidates, in accordance with the provisions of the NRA Ordinance, to supervise the operational safety of the reactor.
When implementing decommissioning, licensees are required to establish appropriate Operational Safety Programs and obtain approval from the NRA.
Human resource provisions related to Operational Safety Programs follow the same framework as those for reactor operations. This includes operational safety education in areas such as decommissioning, as well as competence management and related matters, which must be addressed in the quality assurance plan.

2 Acquisition and Check by Licensees on Knowledge and Technical Competence

To secure safety of nuclear power plant, securing high awareness of nuclear safety and excellent knowledge and technical competence held by on-site personnel involved in operation and maintenance are important. Licensees are making effort on the education and training of personnel involved in operation and maintenance in specialized facilities inside and outside their companies on a long-term basis following their plans. For operation training, the licensees have their own operation training facilities (simulators) to implement emergency response training and training on failure and troubles. There are specialized facilities for different reactor types outside their companies: the BWR Operator Training Centre (BTC)[4] for BWR and the Nuclear Power Training Centre (NTC)[5] targeting PWR, both of which are used for basic education and simulator training for operators of nuclear facilities of the licensees. In training in these Training Centres, curriculums designed according to the level of competence of operators. The licensees periodically dispatch operators to the facilities for re-training.
Shift supervisors are required to have not only knowledge and technical competence directly needed for operation of reactor facilities but also leadership and capability of

[4] http://www.btc.co.jp/e_training.html
[5] https://www.mhi.com/group/ntc/

crisis management. Accordingly, training for this purpose is provided for them. Shift supervisors are also required to have a certain level of performance that conforms to the following standards set up by the NRA,

- Have five year or more work experiences related to reactor operation.
- Have six month or more work experiences in operation of the same type of reactors within the last one year.
- Have position state at a management or supervisory level in the nuclear power station, and
- Have knowledge and technical competence concerning reactors.

In response to designation by licensees in April 2009, JANSI has come to be engaged in competence confirmation of shift supervisors that is subject to the requirements provided by licensees and the code related to assessment of shift supervisors for nuclear power station (Japan Electric Association Code (JEAC) 4804). The confirmation is made based on operation skill tests using a simulator, training sessions, and an oral examination. When conformance to standards is confirmed with a person, a certificate is granted. This certificate is valid for three years.

For maintenance staff, trainings through daily practical business or on-the-job training (OJT) applies and each licensee sets up a maintenance training centre, thus providing its employees and employees of maintenance-related companies with education on Operational Safety Programs and radiation protection as well as training on practical maintenance work using actual models of equipment and facilities unique to the nuclear industry. There are also various types of training courses on equipment produced by manufacturers, and engineers are dispatched to these manufacturers for training.

In addition, with regard to human resource development, licensees are participating "Nuclear Human Resource Development Network (Human Resources Network)" aiming to promote efficient and effective encouragement of nuclear human resources securing and development by industry-government-academia collaborating.

Human Resources Network has five working groups (elementary to high school education, universities and colleges education, human resource development for working engineers, overseas human resource development, and internationalization of national human resources). Moreover, since its establishment in April 2019, the Strategy Working Group has strengthened the functions and structure of the Human Resources Network by overseeing both domestic and international activities, coordinating efforts, and formulating strategies for securing and developing nuclear human resources.

ARTICLE 12 HUMAN FACTORS

Each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account throughout the life of a nuclear installation.

Outline of the Implementation of Article 12

In Japan, licensees address both human and organizational factors when anticipating potential issues and managing noncompliance with rules and regulations.

Within the quality assurance plan established in the Operational Safety Programs, licensees set forth guidelines for handling noncompliance. These include programs for analysing, preventing, detecting, and correcting human errors, as well as conducting self-assessments of management and organizational issues.

Incidents of noncompliance caused by human or organizational errors are shared internally within licensee organizations and externally with other licensees to strengthen and maintain an effective safety system.

Facility designs incorporate appropriate measures to prevent operator mis-operations.

Therefore, it is confirmed that human factors are considered in regulatory requirements, and that facility design and safety activities subject to these requirements are implemented in practice. This demonstrates conformity with the provision of Article 12 of the Convention.

1 Regulatory Requirements

Under the NRA Ordinance on Standards for Installation Permits, nuclear reactor designs are required to incorporate necessary measures to prevent operational errors. Similarly, the NRA Ordinance on Technical Standards mandates that control rooms be designed to ensure safe operation and prevent operator error.

During the operational phase, licensees are required to establish a quality assurance plan within their Operational Safety Programs. This plan must address nonconformance caused by human error as part of the quality assurance activities. Licensees must conduct thorough analysis and evaluation of human errors and implement measures to prevent recurrence.

In the operation phase of a nuclear reactor, licensees must establish a QMS within their Operational Safety Programs. Nonconformance caused by human error must be managed through the QMS. Licensees are required to analyse and assess the causes of human errors and implement corrective actions to prevent recurrence.

The NRA oversees these QMS activities through Nuclear Regulatory Inspection. The NRA Ordinance for Licensee's QMS (hereinafter "the QMS Ordinance") serves as a criterion for installation permits, and the NRA has established inspection guidelines for evaluating QMS implementation. These guidelines outline inspection viewpoints for daily, semi-annual, and annual reviews. NRA inspectors conduct oversight of licensee's Plan-Do-Check-Act activities related to safety, based on their QMS.

(1) Effectiveness of licensee's Corrective Action Program (CAP), including the identification of issues through observation, data analysis, and categorization of nonconformance; prioritization; root cause analysis; implementation of corrective actions; and measures to prevent recurrence, as part of the licensee's Problem Identification and Resolution (PI&R) activities
(2) Achievement of expected outcomes by the licensee through the implementation of safety related activities in accordance with internal rules established under the QMS Ordinance.
(3) Status of implementing appropriate measures to prevent recurrence, based on information gathered from NRA directives and recommendations, operational experiences from domestic and international nuclear facilities, and databases such as the Nuclear Information Archives (NUCIA).
(4) Effectiveness of self-assessment activities, including internal audits conducted by the licensee (external audits are also acceptable), and management reviews.
(5) Status of the licensee's efforts to foster and maintain a healthy safety culture,

including identification of weaknesses or areas for improvement through CAP activities, in accordance with the QMS Ordinance and the licensee's internal rules

(6) Status of corrective actions taken in response to past violations of regulatory requirements or the licensee's self-imposed rules (e.g., green inspection finding and Severity Level Ⅳ violations).

(7) Status of proper procurement management, particularly the investigation of nonconformance at supplier facilities and assessment of potential impacts on the licensee's operations

2 Prevention of Human Error

In NPSs in Japan, measures to prevent human error are taken not only with hardware but also in operation management. As measures to prevent human error based on hardware, man-machine interfaces on the control board have been improved for prevention of mis-operations, and interlock systems have been introduced to prevent equipment or components from wrong operation. In addition, a fail-safe system has been introduced which is designed to ensure operation of equipment or components on the safe side in case that failure occurs in a part of the system.

For example, the Japan Electric Association formulated the "Rule on Equipment Design for Preventing Mis-Operation in Reactor Control Rooms of Nuclear Power Stations" (Japan Electric Association Guide (JEAG)-4624) that specifies required items for systems to be installed in such a way as to ensure their safe operation and prevent any mis-operation in the reactor control rooms of nuclear power stations, which has become a guideline for licensees in their designing of control rooms.

As for measures licensees take to meet regulatory requirements related to prevent mis-operation, such methods of preventing mis-operation are adopted as use of display devices on the control board; arrangement of alarm system and operating devices; identification by colour for each type of liquid flowing inside the piping in local; locking control of control panels of equipment and manual valves.

In terms of operation and control, licensees are required to set up the provisions related to a system to foster safety culture and QMS, and also provide provisions related to safety education targeting staff in charge of operation and control of reactors in their Operational Safety Programs. In addition, as part of quality assurance activities, they are providing accident prediction training, including case study based on past failure examples, for staff in charge of operation and control by having them form small groups

as a target of the training, in order to have safety actions established in their work.

ARTICLE 13 QUALITY ASSURANCE

Each Contracting Party shall take the appropriate steps to ensure that quality assurance programmes are established and implemented with a view to providing confidence that specified requirements for all activities important to nuclear safety are satisfied throughout the life of a nuclear installation.

Outline of the Implementation of Article 13

The NRA has established requirements for quality assurance during the design phase of nuclear power plants. Licensees are required to develop a quality assurance plan as part of their Operational Safety Programs. This ensures that quality assurance measures are implemented throughout all phases, design, operation, and decommissioning, that are critical to nuclear safety. Through these measures, the provision of Article 13 of the Convention is fulfilled.

1 Regulatory Requirements and Measures

The Reactor Regulation Act requires that quality control methods and inspection systems comply with the regulatory requirement of the NRA Ordinance[6]. In practice, the ordinance mandates the establishment of a quality control supervision system for the design and construction of reactor facilities. It also requires that the responsibilities of management executives be clearly defined; and that the management of human and other resources, planning and execution of specific tasks, measurement and analysis, and continuous improvement be carried out effectively.

Under the previous system, quality control methods and inspection systems were reviewed for technical adequacy during the licensing process for the approval of the Construction Plan. Following the amendment of the Reactor Regulation Act in April 2017, the licensing process for quality assurance is being revised to be included at an earlier stage, specifically, during the Reactor Installation Permit process, with enforcement targeted for April 2020.

Regarding operational safety activities, licensees are required to outline a quality assurance plan within their Operational Safety Programs, they must continuously improve this plan and carry out planning, implementation, evaluation, and enforcement of operational safety activities.

Quality assurance plans must be managed by an organizational unit under the supervision of senior management. These plans must clearly define responsibilities, authority, and duties; and establish mechanisms for their formulation, implementation, evaluation, and continuous improvement.

Operational Safety Programs must also include appropriate management procedures for the procurement of goods and services, the handling of operational safety documents and records, and the provision of education and training related to safety activities.

It is necessary to clarify and define individual goals and requirements during operational safety activities and to verify at appropriate intervals that these are being implemented in accordance with the Implementation Plan.

To insure this, licensees must conduct the necessary inspections and tests, and establish an effective system to address instances of noncompliance.

To evaluate operational safety activities, licensees are required to implement systematic monitoring and execution procedures. Audits should be conducted regularly by personnel who are not directly involved in the activities being reviewed.

[6] the NRA Ordinance on Quality Control Methods

Licensees should also establish procedures to ensure the continuous improvement of operational safety activities and to implement preventive measures to avoid noncompliance. In case where noncompliance does occur, corrective actions must be taken to prevent recurrence. Preventive measures identified at their own facilities or at other nuclear facilities should be evaluated and, where appropriate, incorporated into their operations.

Matters related to quality assurance in the licensing process are addressed in Article 7 and 19.

2 Implementation Status of Quality Assurance by Licensees

Based on the private-sector quality assurance standard for ensuring safety at nuclear power stations (JEAC 4111-2009), licensees formulate quality assurance plans and conduct quality assurance activities in order to meet the regulatory requirements mentioned in the section above.

The technical adequacy of the JEAC 4111-2009 standard was endorsed by the former regulatory authority, the NISA, when it was published as a set of specifications and criteria for meeting statutory performance standards; it complies with the quality assurance requirements of the IAEA's safety standard GS-R-3.

In terms of the general requirements in JEAC 4111-2009, licensees are required to establish, document, implement, and maintain the QMS, as well as making continuous improvements. These regulations establish specific requirements for the QMS including "responsibility of senior management," "operational management of resources," "planning and implementation of duties," and "evaluation and improvement."

Human resources requirements stipulate that key personnel involved in nuclear safety must be competent based on judgment in areas of education, training, skills and experience.

Licensees shall identify necessary competences and, if necessary, provide further education and training to ensure the designated personnel to reach the required level.

Licensees shall conduct procurement procedures having clearly identified the requirements for product approval procedures, processes, and equipment; personnel competence checks, and the QMS. Moreover, the standard stipulates that the procured items must be inspected on the premises of the supplier, if possible, to ensure that they meet set standards.

As for the operation of reactor facilities, reactor quality assurance programs are audited.

To guarantee its impartiality the audit should be conducted by an appropriate department at the licensee's head office which has no direct involvement with the department running the nuclear facility. In general, the auditing department is directly under control of the president in the company's organizational structure so that the president can be quickly informed of any situation needing remedial action or improvement.

In procurement management, it is common for licensees to conduct audits of suppliers directly, to ensure that the suppliers satisfy requirements written in the specification.

The specification is provided to the supplier at the time of ordering and the products are then checked upon delivery.

If checks are required during the product manufacturing process, the licensees can directly check that process.

In the case of services, the specification is given to the service provider in advance in order to ensure that a person with the requisite skills is dealt with.

These include checking to confirm that the provider has technicians with the required specific skills i.e. welding.

The provider shall submit to the licensee a quality assurance plan to guarantee all requirements are met.

Thus, this prevents sub-standard outsourcing to providers with inappropriate quality assurance systems.

As described above, licensees in Japan recognize steadily that quality assurance systems constitute one of the major elements for maintaining their own quality assurance systems; accordingly, mechanisms to enable licensees themselves to conduct audits of providers and suppliers are being developed, as required.

ARTICLE 14 ASSESSMENT AND VERIFICATION OF SAFETY

Each Contracting Party shall take the appropriate steps to ensure that:

(i) comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation and throughout its life. Such assessments shall be well documented, subsequently updated in the light of operating experience and significant new safety information, and reviewed under the authority of the regulatory body;

(ii) verification by analysis, surveillance, testing and inspection is carried out to ensure that the physical state and the operation of a nuclear installation continue to be in accordance with its design, applicable national safety requirements, and operational limits and conditions.

Outline of the Implementation of Article 14

During the process of obtaining a Reactor Installation Permit, licensees are required to evaluate whether the basic design of the reactor facility interferes with prevention measures during the construction. Additionally, licensees must assess safety measures for the facility through the approval process of the Construction Plan. Before commencing operation, licensees must obtain approval for their Operational Safety Programs, which specify the operational limits and conditions of the reactor facility. The NRA is responsible for verifying that operations are continuously conducted in accordance with these limits and conditions. If changes are made to the safety programs, licensees must evaluate the modifications and, if necessary, obtain approval for equipment changes.

Once the reactor facility begins operation, licensees are required to conduct evaluations aimed at improving safety and must report the results to the NRA and disclose them publicly. Licensees are also required to conduct aging evaluations every ten years after t the facility has been in operation for 30 years. If they intended to extend the operational period, they had to submit an evaluation for license renewal before reaching 40 years of operation, up until June 2025. Starting in June 2025, the NRA implemented a new system requiring licensees to predict future degradation and formulate a management plan for each period not exceeding ten years from the 30th year of operation. Continued operation is not permitted without NRA approval under the system.

The Reactor Regulation Act mandates the NRA to validate evaluations conducted by licensees during the safety review process. It also requires the NRA to conduct Pre-service Inspections during the construction phase, as well as Licensee's Periodic

Inspections and Operational Safety Inspections during the operational phase, to assess the safety of reactor facilities from both hardware and procedural perspectives.

Therefore, safety evaluations are conducted throughout both the installation and operational phases of nuclear power facilities under the supervision of the regulatory authority, ensuring compliance with the provision of Article 14 of the Convention.

Article 14 (1) Safety Assessments

1 Overview of regulatory requirements

1-1 Safety Assessments on Reactor Installation

Applicants seeking to construct reactor facilities must submit documentation, along with their application for a Reactor Installation Permit, demonstrating that the basic design and design principles of the reactor do not interfere with disaster prevention measures. This documentation must be submitted to the NRA in accordance with the provisions of the Reactor Regulation Act.

To obtain the Reactor Installation Permit, applicants are required to present the equipment necessary for responding to abnormal operational transients, design-basis accidents, and severe accidents. They must also specify the conditions used to evaluate the scales and the impacts of accidents. Based on the results of these evaluations, applicants must demonstrate that the safety of the nuclear facility is ensured.

After obtaining the Reactor Installation Permit, licensees must receive the NRA approval for Design and Construction Plan before beginning construction., In addition, they must obtain approval for the design of the fuel assemblies to be loaded into the reactor, except in case where the fuel assemblies are imported.

When applying for approval of the Design and Construction Plan, licensees must evaluate whether the detailed design complies with the conditions specified in the Reactor Installation Permit. As part of this safety evaluation, licensees are required to include descriptions regarding durability, earthquake resistance, and safety-related design features specific to the equipment in question, based on the detailed design of the reactor facilities.

In addition, licensees must conduct welding inspections with a particular focus on components such as pressure boundaries and the CV. The organizational structure of the licensee responsible for these inspections must be reviewed by the NRA.

Prior to commencing reactor operation, licensees must also obtain approval for the Operational Safety Programs, which are required to ensure operational safety.

Details regarding the Reactor Installation Permit, approval of the Design and Construction Plan, Pre-service Inspections, approval of Fuel Assembly Design, and approval of the Operational Safety Programs are specified in Article 7(2), 17 and 19(1).

1-2 Safety Evaluation on Reactor Operation

The safety evaluation during the operational phase of power reactors consists of the following three systems:

1. Periodic Safety Assessment of Continuous Improvement
2. Technical Aging Evaluation
3. Approval for Extension of the Operational Period

After the operational period is extended, the safety evaluation continues with two systems:

- Periodic Safety Assessment for Continuous Improvement
- Long-Term Facility Management Plan

The relationship among these technical evaluations and the corresponding application documents are as follows.

(1) Periodic Safety Assessment of Continuous Improvement

Periodic Safety Assessment for Continuous Improvement was newly introduced through the amendment of the Reactor Regulation Act in 2012, following the TEPCO Fukushima Daiichi NPS accident. Incorporating the elements of the former system of Periodical Safety Review (PSR), this new framework requires licensees to conduct a self-evaluation of the safety of their nuclear power reactor facilities. This evaluation must be completed no later than six months after the conclusion of the Licensee's Periodic Inspection of the facility. Starting in 2025, the deadline will be extended to one year. The licensee is required to report the results of the evaluation to the NRA and disclose them to the public.

For further details, refer to Article 17 (3) of the Operational Guide for Periodic Safety Assessment for Continuous Improvement.

(2) The Technical Evaluation System for Aging Nuclear Facilities and Approval of Extending Operational Period

The Technical Aging Evaluation and Approval for Extending Operational Period were integrated into the Long-Term Facility Management Plan as of June 2025. Figure 14-1 illustrates the changes in the systems designated to ensure the safety of aging reactors. Prior to integration into Long-Term Facility Management Plan, the Technical Aging Evaluation was conducted every 10 years after a reactor had been in operation for 30 years. Its purpose was to assess the integrity of components and structures with safety

functions. Licensees were required to identify aging related events of concern, perform technical evaluations regarding structural integrity, and formulate a long-term maintenance policy for the next 10 years. This policy was to be included in the Operational Safety Programs and required approval by the NRA.

The system for Extending Operational Period, before its integration into the Long-Term Facility Management Plan, was introduced in the 2012 revision of the Reactor Regulation Act. Under this system, nuclear power reactors were permitted to operate for 40 years from the start of operation. If approved by the NRA before the expiration date, the operational period could be extended once for up to 20 additional years. To obtain approval for the extension, licensees were required to conduct special inspections to assess the deterioration of reactors and related equipment due to long-term operation. They also had to perform technical evaluations based on regulatory requirements, establish maintenance and management policies for the extended periods, and receive approval from the NRA. Additionally, if the degradation assessment was conducted in conjunction with the Technical Aging Evaluation, its results could be utilized in the approval process.

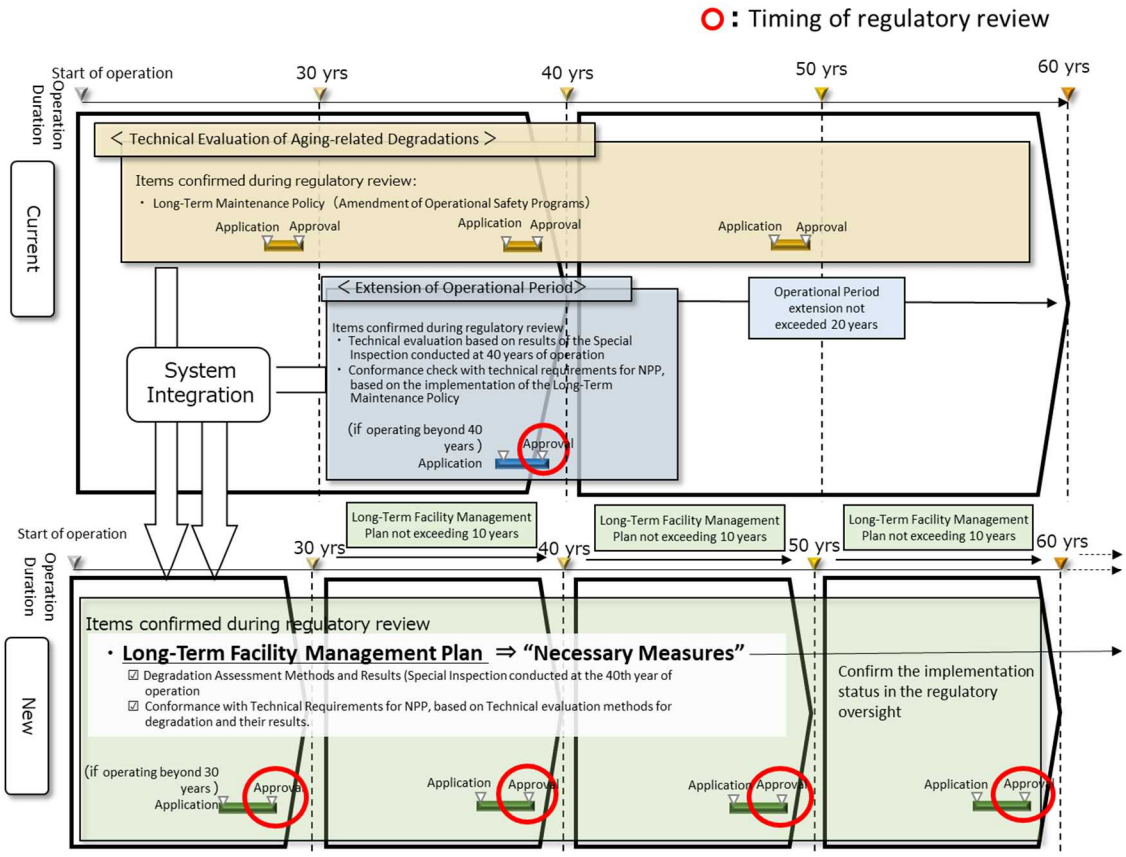


Figure 14-1 The Changes in the Systems Designated to Ensure the Safety of Aging Reactors

(3) Long-Term Facility Management Plan

The Long-Term Facility Management plan, which integrated the Technical Aging Evaluation and the Approval of Extending Operational Period, requires licensees to develop a "Long-Term Facility Management Plan" to predict future deterioration and manage aging related degradation. This plan must be updated and submitted for approval by the NRA every ten years, starting from the 30th year of operation. Continued operation is not permitted without obtaining this approval.

The Long-Term Facility Management Plan must specify:

- Methods for inspecting and assessing the current condition of deterioration, along with the results;
- Methods for predicting and evaluating future deterioration, and the corresponding results;
- Specific measures to manage deterioration, such as additional monitoring, replacement, or repair.

The criteria for approval of the Long-Term Facility Management Plan are as follows:

·The methods used to predict and evaluate future deterioration must be reliable and scientifically sound.

· the proposed measures to manage deterioration must not interfere with disaster prevention systems.

·The facility must be able to comply with regulatory requirements for a period not exceeding the next 10 years, even when accounting for deterioration.

(4) Special Inspections and Additional Inspections

To assess the condition of degradation, a detailed “special inspection” shall be conducted from the time of operation commencement. For long-term facility management plans beyond 60 years, “additional inspections” shall be carried out. Although the items covered in the additional inspections are the same as those in the special inspections, different inspection methods may be permitted. Furthermore, based on operational history and other factors, inspections of additional items tailored to the specific characteristics of each nuclear power reactor facility shall also be required.

Article 14 (2) Verification of Safety

Even after receiving approval for the Design and Construction Plan, licensees must

conduct a Pre-service Inspection to confirm that the facility meets the technical requirements set by the NRA. The facility must not be operated unless the NRA verifies that it conforms to these requirements.

Addition, throughout the operational period of a nuclear facility, licensees are required to undergo Nuclear Regulatory Inspections conducted by the NRA. Details of this inspection program are provided in Article 19(3).

ARTICLE 15 RADIATION PROTECTION

Each Contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low as reasonably achievable and that no individual shall be exposed to radiation doses which exceed prescribed national dose limits.

Outline of the Implementation of Article 15

Working conditions for radiation workers at nuclear facilities are designed to ensure their exposure levels do not exceed the limits prescribed by law.

Release control targets for gaseous and liquid wastes are set below the legal concentration limits. Such waste is treated through filtration or by allowing radioactive decay over time to reduce the concentration of radioactive materials. Waste management practices ensure that radioactivity levels outside supervised areas remain within the prescribed limits.

Measures to reduce radiation exposure include maintaining records of prior exposure and implementing task-specific management strategies.

As a result, radiation dose for workers and others engaged in radiation related tasks are kept as low as reasonably achievable (ALARA) and do not exceed the legal dose limits. These practices ensure compliance with the provision of Article 15 of the Convention.

1 Regulatory Requirements

Radiation control at commercial power reactor facilities is governed by the NRA Ordinance on Commercial Reactors under the Reactor Regulation Act. Baseline standards for dose limits and related matters are specified in the Notification to Establish Dose Limits in Accordance with the Provisions of the NRA Ordinance Concerning the Installation, and Operation of Commercial Power Reactors (hereinafter referred to as the Notification on Doses).

Within a commercial power reactor facility, radiation controlled areas, protection areas, and supervised areas must be designated, The Notification on Dose specifies radiation dose limits, as well as concentration and density limits for radioactive materials within controlled areas and outside supervised areas.

Radiation controlled areas must be clearly separated from other areas by fences or walls and marked with identification signs. These areas are subject to measures such as access control and lock control, depending on the level of radiation risks. Protection areas, which are located outside radiation controlled areas, require special controls to ensure the safety of the nuclear reactor facility. These areas must also be clearly distinguished from other zones using signs or other means of identification and are subject to measures such as access control, lock control, and restrictions on items that may be removed from the area, in accordance with regulatory requirements.

A supervised area is defined as the zone surrounding a radiation controlled area, where the annual dose limit of 1mSv/y[7], as set by the NRA, is not expected to be exceeded. Residential occupation within this area is prohibited. A fence must be installed along the boundary to restrict access to individuals other than those entering for work related purposes.

To ensure radiation protection for radiation workers, the licensee of a commercial power reactor is required to manage radiation exposure so that individual doses do not exceed the limits set by the NRA. Additionally, the concentration of airborne radioactive materials inhaled by radiation workers must remain below the concentration limits established by the NRA. In the event of an emergency, such as damage to a commercial power reactor, if unavoidable, the licensee may engage radiation workers in emergency response activities, provided that their exposure remains within the emergency dose limits specified by the NRA. The dose limits established by the NRA are presented in the Table 15-1 below.

[7] In the "Guideline of Dose Target Around Light Water Power Reactor Facilities" (decided by the Atomic Energy Commission on 13 May 1975), the target dose is set at 50μSv/y.

Table 15-1 Dose limits

Item	Dose limits
A Radiation workers	
(1) Effective dose limit	100 mSv/5 years and 50 mSv/year
(2) Women	5 mSv/3 months in addition to the limit specified in (1)
(3) Pregnant women	1 mSv for internal exposure, in addition to the limit specified in (1); applicable from the time the pregnancy is known until childbirth
(4) Equivalent dose limit for the lens of the eye	150 mSv/year
(5) Equivalent dose limit for the skin	500 mSv/year
(6) Equivalent dose limit for the surface of the abdomen of pregnant women	2 mSv; applicable from the time the pregnancy is known until childbirth
B Radiation workers to engage in emergency work	
(1) Effective dose limit	100 mSv (250 mSv[8])
(2) Equivalent dose limit for the lens of the eye	300 mSv
(3) Equivalent dose limit for the skin	1 Sv

For the purpose of controlling the discharge of radioactive waste, the concentration of radioactive materials in gaseous waste must be reduced as much as possible within an exhaust air system. This is achieved through methods such as gas filtration, allowing radioactive decay over time, and dilution with a large volume of air. The concentration of radioactive materials in the discharged gas must be monitored either at the discharge outlet or via the discharge gas monitoring system. Similarly, when discharging liquid waste, the concentration of radioactive materials in the wastewater must be minimized within the drainage system. This is accomplished through techniques such as liquid filtration, evaporation, adsorption using ion exchange resin columns, radioactive decay over time, and dilution with a large volume of water. The concentration of radioactive materials in the discharged water must be monitored either at the discharge outlet or through the discharge water monitoring system.

[8] The dose rate limit in case any event described in any number of Section 2, Article 7th of the Notification on Doses occurred.

2 Licensee's Radiation Protection Program

In addition to regulatory requirements, such as compliance with the designation of radiation controlled areas and other areas, and the adherence to dose limits, licensees implement detailed radiation protection measures. These include the use of personal dosimeters equipped with alarms to measure radiation doses upon each entry into a radiation controlled area. In Japan, the ALARA concept is widely adopted by licensees. It is generally understood that unnecessary exposure should be avoided during radiation related work. At operating nuclear power plants, three key elements, time, distance, and shielding, are applied to minimize exposure. Measures include controlling access to radiation controlled areas, reducing the duration of work through careful planning, maintaining distance from radiation sources, and installing appropriate shielding. Additionally, the water quality of core cooling systems is strictly managed to minimize the generation of radioactive materials caused by activation within these systems.

Under the Reactor Regulation Act, nuclear reactor licensees in Japan are required to record the radiation doses of radiation workers and retain these records for the period specified by the NRA Ordinance.

These records must be stored; however; exceptions apply in case where a person ceases to be a radiation worker or when the records are transferred to an organization designated by the NRA after being retained for five years or more. In such cases, the Radiation Effect Association is designated as the specified organization.

Figure 15-1 shows the total and average radiation doses over a ten-year period for radiation workers at nuclear power plants, excluding the Fukushima Daiichi NPS.

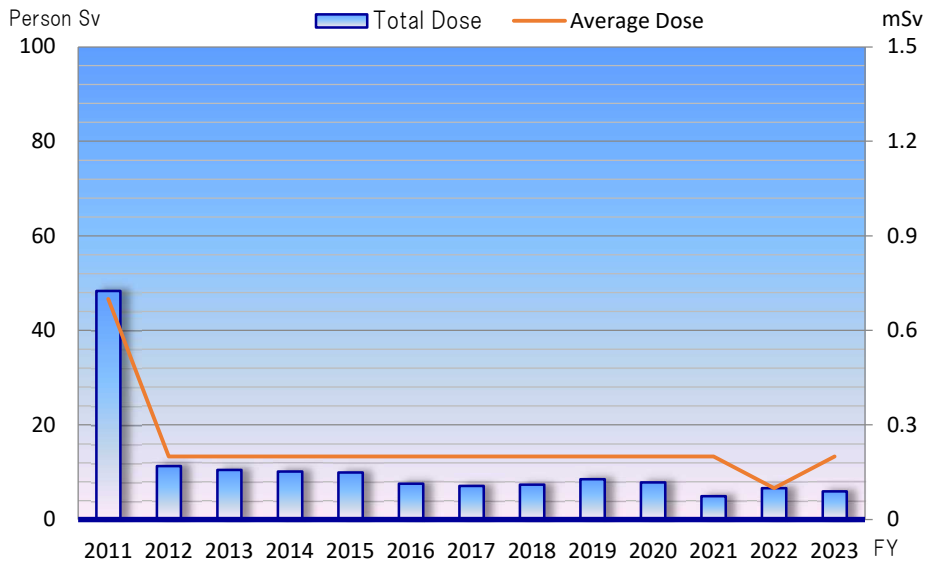


Figure 15-1 Total and Average Dose

3 Dose Reduction Efforts in the Fukushima Daiichi NPS

In the early stages of the earthquake disaster at the Fukushima Daiichi NPS, systems for worker access control, dose data collection, and processing were damaged. Electronic dosimeters and charging equipment were unavailable, making it difficult to fully implement individual dose management. Currently, these systems have been restored, and individual dose control has been reestablished, along with ongoing efforts to reduce radiation exposure.

TEPCO has undertaken various dose reduction measures, including installing radiation shielding around highly radioactive equipment, cutting down trees, and conducting decontamination activities such as removing surface soil and replacing it with subsoil through ploughing.

As a results of these efforts, in most of the site, workers can now operate using basic respiratory protective equipment, such as half-face masks or dust respirators. Significant improvements have been made to the working environment in terms of dose control. For example, the average radiation dose has been reduced to approximately 1 mSv/month.

4 Release Control of Gaseous and Liquid Waste

In accordance with the provisions of the NRA Ordinance on Commercial Reactors, licensees are required to reduce the concentration of radioactive materials in gaseous waste as much as possible. This is achieved through methods such as filtration in exhaust air systems, allowing radioactive decay over time, and dilution. The concentration of radioactive materials is then measured and monitored at the point of release.

For liquid waste, licensees similarly reduce the concentration of radioactive materials as much as possible using techniques such as filtration, evaporation, adsorption via ion exchange resin, radioactive decay over time, and dilution within drainage facilities. The concentration is subsequently measured and monitored at the discharge outlet.

Licensees define and manage these procedures within their Operational Safety Programs to ensure that the legally-prescribed concentration limits of radioactive materials outside supervised areas are not exceeded.

To maintain discharge levels below legal limits outside supervised areas, licensees establish control targets based on the estimated annual release quantities evaluated during the Reactor Installation Permit application process. These targets are guaranteed within their Operational Safety Programs, and the NRA verifies compliance during Operational Safety Inspections.

Figures 15-2 and 15-3 show the amount of gaseous and liquid waste discharged from reactor facilities (BWRs and PWRs) over the past ten years, as reported by licensees in accordance with the Reactor Regulation Act.

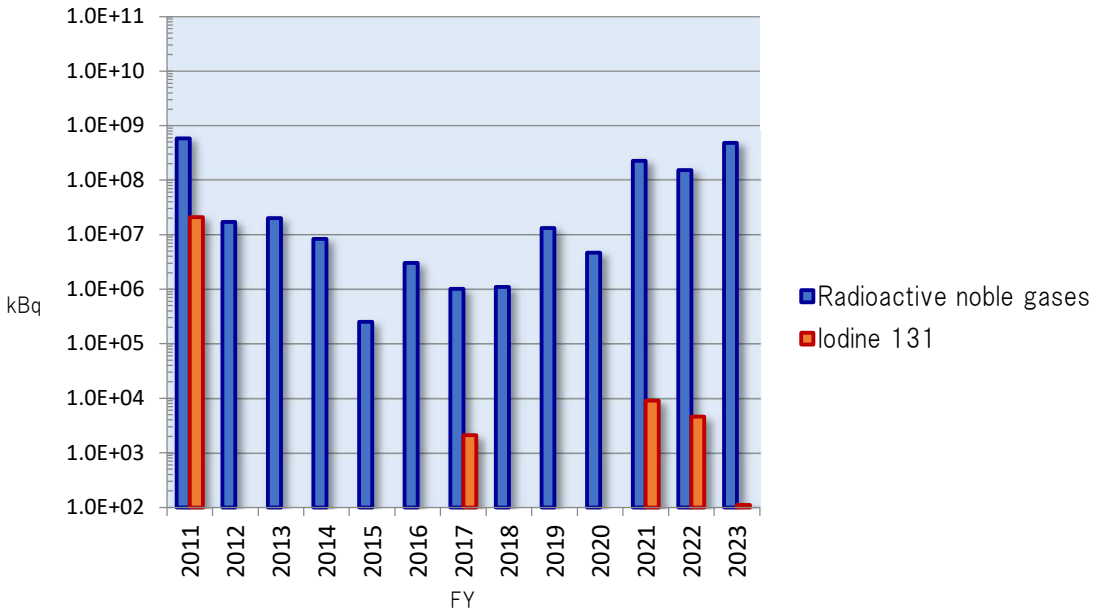


Figure15-2 The Quantity of Gaseous Waste Released

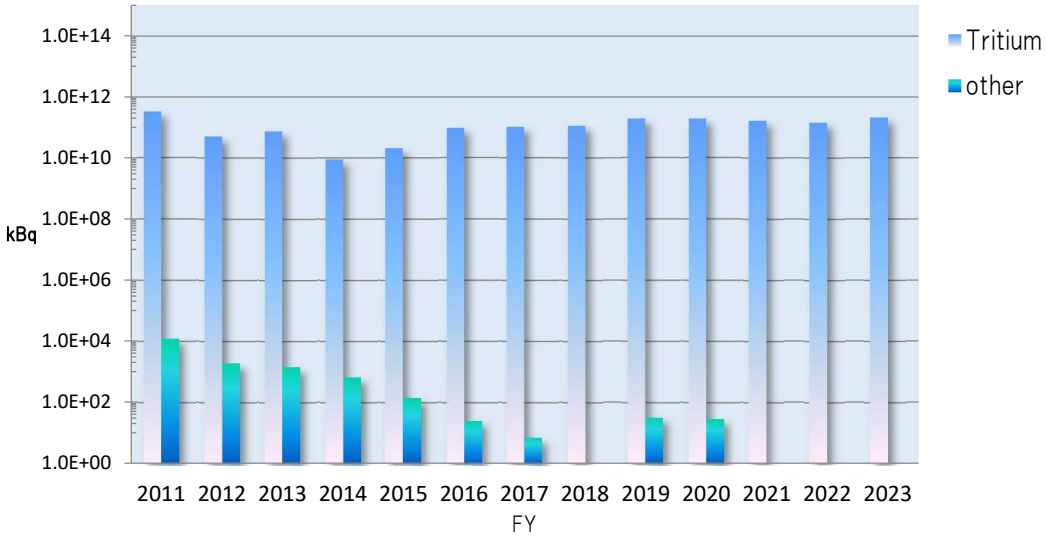


Figure15-3 The Quantity of Liquid Waste Released

5 Environmental Radiation Monitoring

To evaluate the environmental impact of radioactive releases from the nuclear facilities, licensees monitor air does rates and collect environmental samples. These efforts aim

to improve release control and facility management.

To help protect the health and safety of nearby communities, local governments in prefectures where reactor facilities are located also conduct independent radiation monitoring.

Regarding radiation monitoring related to the TEPCO Fukushima Daiichi NPS accident, the national government conducts monitoring in corporation with relevant ministries and local governments, based on the "Comprehensive Radiation Monitoring Plan (established at the Monitoring Coordination Meeting on 2 August 2011 and revised on 30 March 2022)".

The results of environmental radiation monitoring are published on the website of the "Disaster Prevention and Nuclear Safety Network for the Nuclear Environment "(https://www.bousai.ne.jp/eng/), operated by the NRA, allowing the general public to view the data in real time. Air dose rate measurements are also available in real time on the Japanese-language version of the same website.

ARTICLE 16 EMERGENCY PREPAREDNESS

1 Each Contracting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency. For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.

2 Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response.

3 Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.

Outline of the Implementation of Article 16

In accordance with the Basic Act on Disaster Management and the Nuclear Emergency Act, the section of the Basic Disaster Management Plan concerning nuclear emergency measures has been formulated to include measures related to nuclear emergencies. This section defines the fundamental matters related to emergency responses and the allocation of roles among the national government, local governments, and nuclear operators (licensees) in the event of a nuclear emergency. Under the Nuclear Emergency Act, licensees are required to develop a Nuclear Operator's Emergency Preparedness and Response (EPR) Plan. Relevant local governments have also developed their own regional emergency management plans and evacuation plans. Drills and exercises based on these plans are conducted at the levels of licensees, local governments, and the national government.

To enhance and strengthen governmental organizations' preparedness and response capabilities for nuclear emergencies, Nuclear Disaster Management Bureau was established in the CAO on 14 October 2014. The Bureau is responsible for improving and reinforcing off-site preparedness and response measures in the event of a nuclear emergency. Its role includes supporting relevant local government organizations in developing their regional emergency management plans and evacuation plans, assisting their emergency response efforts during emergencies, and conducting national-level drills and exercises.

Due to Japan's geographical location, being surrounded by ocean and separated from neighbouring countries, domestic radiological emergencies are not expected to have direct impacts on other countries. However, recognising the importance of information sharing, Japan, China and Korea have agreed to exchange emergency-related information within the framework of the Japan-China-Korea Top Regulators Meeting.

Accordingly, emergency response plans are in place, drills and exercises are regularly conducted, and an information sharing mechanism has been established among neighbouring countries. These measures ensure compliance with the provision of Article 16 of the Convention.

Article 16 (1) Emergency Plans

1 Outline of the Laws and Regulations on Nuclear Emergencies

1-1 Nuclear Emergency Response Under Nuclear Emergency Act

(1) Precautionary protective measures

Licensees are responsible for taking actions to prevent, mitigate, and recover from nuclear emergencies. They must develop EPR plans for each of their nuclear power facilities. Prior to the development or amendment of these plans, licensees must consult with the governors of the prefectures and the mayors of the municipalities where the nuclear facilities are located and those adjacent to them. After the plan is developed or amended, the licensee must submit it to the Prime Minster and the NRA and disclose a summary of the plan to the public. If the Prime Minister or the NRA determines that the plan is inadequate for preventing the occurrence or escalation of a nuclear emergency, they may order the licensee to revise the plan.

Licensees must establish a nuclear emergency preparedness organization for each nuclear site, assign nuclear emergency preparedness personnel, and report the status of these personnel to the NRA, the governor of the prefecture, and the mayor of the municipalities where the nuclear facility is located, as well as to the governors of neighbouring prefectures. If the NRA may determine that a licensee is in violation of this requirement, it may order the licensee to establish a nuclear emergency preparedness organization or assign nuclear emergency preparedness personnel.

Each licensee must appoint a nuclear emergency preparedness manager for each nuclear site to oversee the nuclear emergency preparedness organization, and a deputy nuclear emergency preparedness manager to assist the manager. After making these appointments, the licensee must report them to the NRA, and the governor of the prefecture and the mayor of the municipalities where nuclear facility is located, as well as to the governors of neighbouring prefectures. If the NRA determines that the licensee is in violation of this requirement, or that the appointed manager or deputy manager is in violation of the law or any order issued under the law, it may order the licensee to appoint or dismiss the nuclear emergency preparedness manager or deputy manager.

Upon occurrence of an event specified in the government ordinance, the nuclear emergency preparedness manager must report it to the Prime Minister, the NRA and the governor of the prefecture and the mayor of the municipalities where the nuclear facility

is located, as well as to the governors of the neighbouring prefectures involved. This notification is commonly referred to as an "Article 10 Notification", as it is required under Article 10 of the Nuclear Emergency Act, which stipulates the duty of the nuclear emergency preparedness manager to promptly notify relevant organizations of the occurrence of a significant event that may indicate the onset of a nuclear emergency. Events subject to Article 10 Notification are referred to as " Specified Events".

Licensees are required to install and maintain the necessary radiation measurement instruments to enable Article 10 Notification, and to have in place the necessary nuclear emergency prevention equipment for the nuclear emergency preparedness organization to perform its duties. This includes radiation hazard prevention equipment and emergency communication equipment, which must be regularly inspected and maintained. Radiation measurement instruments installed by licensees are subject to inspection by the NRA. If the Prime Minister or the NRA determines that the licensee is in violation of these requirements, they may order the licensee to take necessary actions. Licensees must keep records of radiation doses detected by the installed instruments and disclose these records to the public.

The Prime Minister designates a facility for each nuclear site that will be used as the centre for emergency response actions and post-nuclear emergency actions. This facility is called an off-site centre. Licensees must provide the Prime Minister with the necessary documents to take emergency response actions and post-nuclear emergency actions. The documents will be available at the off-site centre.

Government emergency exercises are conducted in accordance with a plan developed by the Prime Minister based on a CAO Order. Before formulating the plan, the Prime Minister must consult with the NRA.

Licensees are required to conduct emergency exercises, report the results to the NRA, and disclose a summary of the exercises. If the exercises are deemed inadequate for preventing occurrence or escalation of a nuclear emergency, the NRA, in consultation with the Prime Minister, may order the licensees to take actions, such as improving the exercise procedures.

The Nuclear Emergency Act also stipulates that other licensees have an obligation to make efforts to cooperate. If emergency response actions are required at another licensee's nuclear site, licensees must endeavour to cooperate by dispatching nuclear emergency preparedness personnel and lending nuclear emergency response equipment.

(2) Emergency response actions

The Prime Minister declares a nuclear emergency situation.

If an event occurs that falls under the category of a nuclear emergency, based on Article 15 of the Nuclear Emergency Act, the NRA will immediately provide the Prime Minister with necessary information, including the status of the event, the areas where emergency response actions should be taken, a brief description of the event, a proposed announcement for residents in the affected areas, and proposed instructions for emergency response actions such as evacuation or sheltering-in-place. Based on this information, the Prime Minister will promptly declare a nuclear emergency situation.

Once a nuclear emergency situation is declared, the Nuclear Emergency Response Headquarters will be established, with the Prime Minister serving as its chief. The headquarters will formulate policies for implementing emergency response actions and coordinate both the emergency response actions and post- nuclear emergency recovery efforts. At a designated facility serving as the centre for emergency response operations, a Local Nuclear Emergency Response Headquarters will be established within the off-site centre to perform part of the administrative functions of the Nuclear Emergency Response Headquarters.

Following the declaration of a state of nuclear emergency, emergency response headquarters of the local government (prefectures and municipalities) will be set up by the governors and mayors responsible for the areas where emergency response actions are to be implemented. The Local Nuclear Emergency Response Headquarters and the emergency response headquarters of the local governments will jointly establish a nuclear emergency joint response conference to facilitate information exchange and mutual cooperation in the implementation of emergency response actions.

If a Specified Event occurs, the nuclear emergency preparedness manager must immediately instruct the nuclear emergency preparedness organization to take emergency actions to prevent the occurrence or escalation of a nuclear emergency. The licensee must report a summary of the actions taken to the Prime Minister, the NRA, the governor of the prefecture, and the mayor of the municipalities where the nuclear facility is located, and the governors of neighbouring prefectures.

(3) Measures following the nuclear emergency

Measures following a nuclear emergency include surveys of the concentration, density, and dose of radioactive materials, medical procedures such as medical examinations for residents and consultations on mental and physical well-being; public relations activities to mitigate economic damage caused by rumours; and actions to prevent further escalation of the emergency or to support recovery efforts. To ensure that these post-emergency measures are carried out accurately and smoothly by administrative agencies

and local government leaders, licensees are required to take supportive actions, such as dispatching nuclear emergency preparedness personnel and lending nuclear emergency response equipment.

1-2 Basic Disaster Management Plan

The Central Disaster Management Council formulated the Basic Disaster Management Plan based on the Basic Act on Disaster Management and the Nuclear Emergency Act.
The Basic Disaster Management Plan serves as a fundamental framework for the national government's disaster prevention measures, enabling a comprehensive response to various types of disasters. The section of the plan addressing nuclear emergency preparedness outlines the basic principles and responsibilities of the national government, licensees, and local governments, including the allocation of roles among them. The Emergency Preparedness and Response (EPR) Guide, developed by the NRA, applies to specialized and technical matters specific to nuclear emergencies.
Broadly, the following measures are set forth in the Basic Disaster Management Plan:

- Precautionary protective measures: ensuring the safety of facilities; disseminating knowledge on disaster prevention; promoting research on nuclear emergency prevention; implementing measures to prevent recurrence; preparing for emergency response actions and recovery from disasters; and preparing for emergency response to accidents involving the transport of nuclear fuel materials outside nuclear sites
- Emergency response measures: collecting and communicating information immediately after the occurrence of an emergency; setting up an emergency contact and operational systems; implementing protective actions such evacuation, shelter-in-place, and public information dissemination; supporting the lives of those affected by nuclear accidents; maintaining public order, including crime prevention; securing transportation routes and conducting emergency transport operations activities; conducting rescue, first-aid, medical, and firefighting activities; procuring and supplying necessary materials; implementing health and hygiene measures; accepting voluntary support; responding to accidents involving the transport of nuclear fuel materials outside nuclear sites; and responding to the combination of natural disasters and nuclear emergencies.
- Recovery measures: lifting the declaration of a nuclear emergency situation; implementing post-emergency measures; supporting affected individuals in rebuilding their lives; and dissolving the Nuclear Emergency Response

Headquarters

A regional emergency management plan is developed by the related local governments within the radius approximately 30 km range from a nuclear power plant, based on the Basic Disaster Management Plan and the NRA EPR Guide. For a regional emergency management plan, materialization of the contents and the system performance are important, and it is determined that the national government provides an aggressive support in the case that local public bodies have hardship to progress local evacuation plan or measures for persons needed for special treatments, etc.

In order to support the improvement and reinforcement of regional emergency management plans and evacuation plans developed by local governments such as prefectures, municipalities, the Nuclear Emergency Preparedness Council decided in September 2013 to establish a support framework. Based on this decision, the Nuclear Disaster Management Bureau of the CAO established Regional Nuclear Emergency Preparedness Committees (Hereinafter referred to as "Regional Committees") in March 2015 as task forces in each area where a nuclear power plant is located. A working group was also established under each regional committee to address specific issues. Each working group studies measures to support the development of emergency preparedness and response, coordinates efforts across wide areas, and considers support from the national government. Through these efforts, the national and local governments work together to materialize and improve the regional emergency management plans and evacuation plans. In the areas where the regional emergency management plans are deemed to have been sufficiently materialized and improved, the Regional Committees are required to confirm that the emergency response measures, including evacuation plans, are concrete and reasonable, in accordance with the NRA EPR Guide. Furthermore, the Nuclear Disaster Management Bureau reports the results of the Regional Committees' reviews and consultations to the nuclear emergency preparedness council and seeks the Council's approval.

In areas where the "emergency response" has been confirmed, the PDCA cycle has been introduced to continuously improve and enhance the regional emergency management system. In addition to supporting the materialization and improvement of emergency measures and confirming the emergency response plans (Plan), emergency exercises (Do) are conducted based on the confirmed emergency response. Items requiring improvement are identified from the results of these exercises (Check), and the emergency response measures in the area are revised accordingly (Act).

1-3 NRA Guide for Emergency Preparedness and Response

Under the provisions of the Nuclear Emergency Act, the NRA is required to develop the NRA EPR Guide to ensure smooth implementation of precautionary protective actions, emergency response actions, and post-emergency measures. The guide must be made publicly available without delay.

The purpose of the NRA EPR Guide is to facilitate the smooth implementation of nuclear emergency response actions by licensees, heads of designated administrative agencies and designated local administrative agencies, local governments, designated public organizations, designated local public organizations, and other relevant entities. The NRA EPR Guide came into effect on 31 October 2012 and, and has been revised as necessary since then. The ultimate goal of the NRA EPR Guide is to ensure that, in the event of a nuclear emergency, protective actions are taken to avoid or minimize serious deterministic effects and to reduce stochastic effects of radiation exposure on residents and others in the vicinity of the nuclear facility.

Outlined below are the main provisions of the NRA EPR Guide.

(1) Measures in Advance for Nuclear Emergency Preparedness and Response

- Establishment of the Nuclear Emergency Planning Zone

In the event of a nuclear emergency, the magnitude and the timing of the impact caused by release of a large amount of radioactive material or radiation depend on various factors, including the nature of the abnormal event, the characteristics of the facility, weather conditions, environmental conditions in the surrounding area, and the living conditions of residents. Therefore, it is essential to respond flexibly and appropriately to each situation. To ensure efficient and timely protective actions for residents and others against radiation exposure, it is necessary to assume the occurrence of abnormal events in advance identify areas that may be affected, taking into account factors such as facility characteristics, and establish specific measures for nuclear emergencies.

Nuclear emergency planning zones for emergency response actions are designated based on the type of nuclear facility and the distance from the facility. For power reactor facilities, a precautionary action zone (PAZ) is defined as the area where precautionary protective actions, such as immediate evacuation depending on the emergency action level (EAL), should be prepared prior to the release of radioactive materials into the environment. These actions aim to avoid or minimize serious deterministic effects of radiation exposure in the event of a rapidly developing accident. The approximate radius of the PAZ is within 5 km of the power reactor facility.

An UPZ is defined as an area where emergency protective actions should be prepared based on the EAL and operational intervention level (OIL), in order to reduce the risk of deterministic effects of radiation exposure. The approximate radius of the UPZ is within 30 km of the power reactor facility.

The designation of nuclear emergency planning zones is based on international standards and lessons learnt from the TEPCO Fukushima Daiichi NPS accident.

Additionally, the scope of emergency planning zones for nuclear fuel facilities was defined through the revision of the NRA EPR Guide in March 2017. As noted in section B5, the NRA EPR Guide is scheduled to be revised in accordance with the findings the compiled report.

- Nuclear emergency categories and Emergency Action Levels (EALs)

In Japan, nuclear emergencies phases are classified into three categories: alert (AL), site area emergency (SE) and general emergency (GE).

An AL is declared when an unusual event occurs or is likely to occur at a nuclear facility, which does not have immediate radiological consequences for the public. However, preparations must be made to gather information, conduct emergency monitoring, and implement protective actions such as the evacuation of individuals who may need to evacuate in the event of a site area emergency. Site Area Emergency Evacuation Persons refers to residents within PAZ who require protective measures such as early evacuation or sheltering-in-place during an SE. This includes vulnerable populations such as the elderly, infants, pregnant women, and individuals who cannot take stable iodine tablets. During the AL phase, the licensee must immediately report the event and the facility's status to the national government. The national government must verify the occurrence of the AL event based on the licensee's information and promptly share it with the local governments, the public, and other stakeholders. Both the national and local governments must begin preparations for implementing protective actions that require more time, particularly within the PAZ surrounding the nuclear facility.

An SE is declared when an event occurs at a nuclear facility that may result in radiological consequences for the public. In this phase, preparations must be made to implement primary protective actions such as emergency evacuation, in the vicinity of the facility. Upon the declaration of an SE, the licensee is required to immediately notify both the national and local governments of the event and the operational status of the facility. The national government must verify the occurrence of the SE and promptly disseminate relevant information to local governments, the public, and other stakeholders. The national government, local governments, and the licensee must

intensify efforts to monitor the progression of the event through emergency monitoring and other means. In particular, within the PAZ, they must prepare for the implementation of precautionary protective measures, including the evacuation of nearly all residents. Evacuation must be carried out for individuals identified as requiring protective actions during a site area emergency.

A GE is declared when an event occurs at a nuclear facility that is highly likely to result in radiological consequences for the public. In this phase, protective actions must be taken promptly to prevent or mitigate serious deterministic effects of radiation exposure and to reduce the risk of stochastic effects. Upon the declaration of a GE, the licensee is required to immediately report the event and the operational status of the facility to both the national and local governments. In addition, the licensee must implement emergency measures necessary to prevent the occurrence or escalation of the nuclear emergency and report a summary of these actions. The national government must confirm the occurrence of the GE and promptly disseminate relevant information to local governments, the public, and other stakeholders. Together with the local authorities, the national government must implement precautionary protective actions within the PAZ, including the evacuation of virtually all residents and the administration of stable iodine tablets. Similar precautionary measures, such as evacuation, sheltering-in-place, may also be required within the UPZ, depending on the scale of the event the time elapsed since its onset.

In the NRA EPR Guide, EALs used to determine the category of an emergency are defined for each of the three emergency categories, AL, SE, and GE, for each reactor type (BWR and PWR), as well as for nuclear fuel facilities, Fukushima Daiichi NPS units 1 through 4, and specific reactor conditions, such as when no nuclear fuel material exists in the reactor vessel.

For SE and GE declaration at power plants that comply with current regulatory requirements, the judgement criteria are based on the condition of damage to the facility. These criteria are considered reasonable, as they reflect the actual status of the plant by taking into account the Design Basis Event Countermeasure System (DB System), and the Extended Design Basis Event or Severe Accident Countermeasure System (SA System), including the Specified Safety Facility. For facilities not subject to current regulatory requirements, applicable criteria may include indicators such as radiation levels, concentrations of radioactive materials, and the water level of spent fuel pool, among others.

- Operational Intervention Level (OIL)

In a general emergency involving the release of radioactive material, high air dose rates may occur at multiple locations across a relatively wide area due to the dispersion of the material. To prepare for such an event, the national government, local governments, and the licensee must promptly to conduct emergency monitoring., Based on the monitoring results, they should evaluate the situation against the established criteria and implement appropriate protective actions. In areas where the air dose rate is high, protective zones will be identified within a few hours, and emergency protective actions, such as the evacuation of residents, will be taken to minimize radiation exposure. In areas with the relatively lower air dose rates, zones will be determined within a day, and early protective actions, such as temporary relocation, will be implemented within a week to prevent unnecessary exposure.

OILs are defined as measurable indicators, such as air dose rate and the concentration of radioactive materials in environmental samples. These values serve as criteria for deciding whether protective actions should be taken. Table 16-1 illustrates the relationship between OILs and the corresponding protective actions.

Table 16-1 OILs and Protective Actions

	Classification	Description	Initial Values	Outline of Protective actions
Urgent protective actions	OIL1	Criteria for advising local residents to evacuate within a few hours or to shelter indoors, to prevent radiation exposure from surface soil, inhalation of re-suspended radioactive material, or inadvertent ingestion	500μSv/h (Air dose rate measured 1m above ground)	Identification of zones and evacuation within a few hours, including temporary indoor sheltering for those unable to evacuate immediately.
	OIL4	Criteria for conducting decontamination to prevent inadvertent ingestion and external exposure due to skin contamination	βrays:40,000 cpm (Measured a few cm from skin) βrays:13,000 cpm (Measured a few cm from skin)	Screening of evacuees or relocated individuals for contamination; prompt primary decontamination if levels exceed criteria
Early protective actions	OIL2	Criteria for restricting consumption of local products and advising temporary relocation within a week or so, to prevent radiation exposure from surface soil, inhalation, or ingestion.	20μSv/h (Air dose rate measured 1m above ground)	Zone identification within a day; restriction of local produce consumption; temporary relocation within a week.
Food and	OIL3(screening standards)	Criteria for identifying areas where radionuclide concentrations in food and	0.5μSv/h (Air dose rate measured 1m above	Identification of zones for radionuclide measurement in food

<table>
<tr><th></th><th>Classification</th><th>Description</th><th colspan="3">Initial Values</th><th>Outline of Protective actions</th></tr>
<tr><td rowspan="6">drink intake restrictions</td><td></td><td>drink should be measured in preparation for possible food and drink restrictions under OIL6</td><td colspan="3">ground)</td><td>and drink.</td></tr>
<tr><td rowspan="5">OIL6</td><td rowspan="5">Criteria for restricting food and drink intake to prevent radiation exposure via ingestion.</td><td>Rdionuclide</td><td>Drinking water, milk, dairy products</td><td>Vegetables, cereals, meat, eggs, fish, other</td><td rowspan="5">Measurement and analysis of radionuclide concentrations in food and drink within a week; prompt restrictions if levels exceed criteria</td></tr>
<tr><td>Radioactive iodine</td><td>300Bq/kg</td><td>2,000Bq/kg</td></tr>
<tr><td>Radioactive caesium</td><td>200Bq/kg</td><td>500Bq/kg</td></tr>
<tr><td>Plutonium and transuranic elementS</td><td>1Bq/kg</td><td>10Bq/kg</td></tr>
<tr><td>Uranium</td><td>20Bq/kg</td><td>100Bq/kg</td></tr>
</table>

- Development of an emergency monitoring system

In the event of a nuclear emergency, information such as air dose rates from radioactive materials in the surrounding environment, concentrations of airborne radioactive substances, and the levels of radioactive materials in environmental samples forms the basis for implementing appropriate protective actions for residents and emergency responders. Measures will be taken to ensure the continuity and reliability of the emergency monitoring function.

The national government will oversee emergency monitoring activities by:

- establish implementation policies and plans,
- organizing monitoring personnel,
- providing instructions and coordinating overall operations,
- collecting and disclosing monitoring data,
- evaluating monitoring results and updating the Implementation Plan as the situation evolves, and
- conducting wide-area monitoring including.in marine and aerial zones.

The local governments are responsible for:

- preparing emergency monitoring plans in advance,
- Specifying the required quantity of materials, equipment, and trained personnel in supporting documents,
- receive instructions o from the national government during an emergency,
- conducting emergency monitoring within designated nuclear emergency planning zones.

The licensee provides information regarding the source of the released radioactive material and cooperates in emergency monitoring activities in the vicinity of the facility and other relevant areas.

If the situation escalates into a severe emergency, the national governments will establish an emergency monitoring centre within the off-site centre, equipped with the necessary functions to conduct emergency monitoring in the area surrounding the nuclear facility. This arrangement enables the national government, local governments, and the licensee to work collaboratively in carrying out emergency monitoring.

The emergency monitoring centre composed of representatives from the national government, local governments, the licensee, and the designated public organizations[9], is responsible for:

- collecting information on environmental radiation levels resulting from the nuclear emergency,
- providing data to support decisions on whether protective actions based on OILs should be implemented, and
- supplying information to assess the impact of radiation on residents and the environment.

Efforts to introduce new technologies in the field of radiation monitoring are described in B10-8.

- Development of medical care system in a nuclear emergency

Medical care system is maintained during normal times to ensure that first-aid and emergency medical institutions can provide appropriate health care service in a case of nuclear emergency. This includes an established chain of command to support effective medical response. The national government designates the following organizations:

- Nuclear Disaster Medical Cooperation Organizations, which develops a nationwide framework.
- Advanced Radiation Emergency Medical Support Centres (among which one is designated as the core centre to take a leading role),
- Nuclear Emergency Medical Support Centres.

These organizations are reviewed approximately every three years to ensure compliance with established requirements. The prefectures within nuclear emergency planning zones are responsible for designating and registering:

- Nuclear Emergency Core Hospitals, and

[9] Japan Atomic Energy Agency and the National Institutes for Quantum and Radiological Science and Technology

- Nuclear Emergency Cooperative Institutions. These institutions are also reviewed approximately every three years to confirm they meet the necessary standards.

Additionally, the government is responsible for verifying that each designated organization continues to meet the requirements and should consider revising those requirements as needed. In the FY2024 review, a new framework was introduced to allow the government to designate Nuclear Disaster Medical Cooperation Organizations as part of a system to secure medical personnel on a nationwide scale.

• Distribution and intake of the Stable Iodine

To prepare for the intake of stable iodine during a nuclear emergency, the local governments distribute stable iodine in advance to residents living within the PAZ. When distributing the iodine, a physician provides explanations regarding its effectiveness, appropriate timing for intake, and potential side effects. In the event of the GE, protective actions such as evacuation may be implemented in the UPZ, depending on the condition of the facility and the air dose rate. Additionally, a system for distribution and administration of stable iodine will be established to ensure timely and effective implementation.

• Establishment of an Off-site centre

In the event of a nuclear emergency, the Local Nuclear Emergency Response Headquarters of the national government and the emergency response headquarters of the local governments will convene a nuclear emergency joint response conference to facilitate information exchange. The off-site centre serves as a central facility for coordinating and implementing nuclear emergency response actions. The off-site centre must be located in an area that takes into account the guidelines for PAZ and UPZ. It must also be equipped with the necessary systems to maintain its function as the primary emergency facility. This includes provisions for an alternative facility and multiple communication channels to ensure continuity of operations and effective radiation protective measures.

(2) Emergency response actions

• Identifying unusual conditions and taking emergency response measures

Upon receiving notification of an alert or a site area emergency from a licensee, the national government and local governments start preparing for implementing protective actions and provide information to residents in anticipation of a GE. Once a GE is declared by the licensee:

- residents in PAZ will be required to evacuate
- residents in UPZ will be instructed to take preventive measures, such as sheltering-indoors. Depending on the condition of the facility and the progression of the accident, evacuation may also be required for residents in the UPZ and event for those outside UPZ. Additionally, further protective actions such as evacuation, temporary relocation, and restrictions on food and water consumption, will be implemented based on the results of emergency monitoring following the release of radioactive materials.

• Emergency monitoring

In the event of an AL, the national government, local governments, the licensee, and the relevant designated public organizations will begin preparation for emergency monitoring. In the event of a SE, the national government will establish an emergency monitoring centre, request the mobilization of necessary personnel in accordance with the monitoring personnel deployment plan, and initiate emergency monitoring activities.

• Evacuation, temporary relocation and sheltering-in-place

If an unusually large amount of radioactive material or radiation is, or may be, released into the area surrounding a nuclear facility, all residents within the PAZ will be required to evacuate immediately, while residents in the UPZ will be instructed to shelter in place. As the situation evolves, phased- evacuation may be considered based on the condition of the nuclear facility. After the release of radioactive materials, areas exceeding OIL 1 will be identified through emergency monitoring, and residents in those areas will be evacuated within a few hours. Similarly, areas exceeding OIL 2 will be identified and residents will be temporarily relocated within approximately one day.

In the event of the GE, evacuation will be carried out in the PAZ according to the priority zones for nuclear emergency response. However, sheltering-in-place will be implemented if it is deemed a higher priority than evacuation. In the UPZ, sheltering-in- place will continue until phased- evacuation or other protective actions based on OILs are initiated.

• Thyroid Dose Monitoring

When evacuation or temporary relocation is implemented as a protective measure based on OILs, thyroid dose monitoring will be conducted for residents under 19 years of age, pregnant women, and lactating women in the affected areas. This monitoring aims to quantitatively assess the accumulation of radioactive iodine in the thyroid gland through inhalation and to estimate the resulting radiation dose. The

implementation of thyroid dose monitoring was clarified by the government through the revision of the NRA EPR Guide in April 2022, and the development of the Thyroid Dose Monitoring Implementation Manual in May 2024.

2 Nuclear Emergency Exercises

In the past nuclear emergency exercises were conducted by the national and local governments, as well as licensees, to assess the effectiveness of emergency response systems in accordance with the Nuclear Emergency Act. However, following the TEPCO Fukushima Daiichi NPS accident, these exercises have been under review. Future exercises must incorporate the lessons learnt from the TEPCO Fukushima Daiichi NPS accident, including the possibility of a complex disaster involving both an earthquake and nuclear accident, an unprecedented scenario. Additionally, more realistic evacuation drills must be included. These exercises range from large-scale national government-led drills to site-specific exercises conducted by licensees. The following sections provide explanations for each type of exercise.

2-1 Exercises Planned by the National Government

Until recently, nuclear emergency exercises were primarily planned by local governments, with the national government providing support and coordination. However, following the enactment of the Nuclear Emergency Act, prompted by the 1999 JCO criticality accident, the national government began taking the lead in planning and implementing these exercises.

The TEPCO Fukushima Daiichi NPS accident was the first instance in Japan where a nuclear emergency was officially declared. Based on this experience, both the emergency management system, and nuclear emergency exercises have been significantly improved.

The Nuclear Disaster Comprehensive Prevention Drill is a large scale exercise conducted by national governmental agencies, local governments and nuclear operators. It is designated to verify the effectiveness of systems and organizational coordination in response to a nuclear disaster, in accordance with the Nuclear Emergency Act. The 2024 drill was conducted for Kyusyu Electric Power Co., Inc.'s Sendai NPS in Kagoshima Prefecture, with the following objectives:

- To confirm the performance of emergency response systems of the national government, local governments, and the nuclear operator, as well as the

coordination among relevant organizations.
- To verify the systems and procedures outlined in manuals for both central and site level organizations during a nuclear emergency.
- To validate the evacuation plan specified in the Emergency Measures in Sendai Area
- To identify lesson-learnt from the exercise results
- To enhance the skills of personnel involved in nuclear emergency preparedness and response, and to promote public understanding of nuclear disaster prevention.

Based on the Nuclear Disaster Comprehensive Prevention Drill and other related exercises, the methods and components of these drills should be continuously reviewed and further improved to enhance their effectiveness and practicality.

In collaboration with the CAO (responsible for nuclear disaster prevention), the NRA partially revised the Nuclear Disaster Countermeasures Manual on 2 July, 2024, incorporating lessons learnt from the FY2023 Nuclear Disaster Comprehensive Prevention Drill conducted in October 2023. Furthermore, based on both this revision and insights gained from the response to the Noto Peninsula earthquake in January 2024, the Nuclear Disaster Initial Response Manual and the Standard Manual for Local Response to Nuclear Emergencies were also partially revised (e.g., on 23 December, 2024). Additionally, in response to the issuance of temporary information regarding a potential Nankai Trough earthquake, the NRA reorganized its procedures for handling warning information related to large scale earthquakes and undertook revisions of the NRA Initial Response Manual.

2-2 Exercises Planned by a Licensee

In accordance with Nuclear Emergency Act, licensees must conduct nuclear emergency exercises, report the results of the exercises to the NRA and disclose the summary.
Activities in the exercises of a licensee include non-scenario-based training and sharing of good practice through mutual visits of licensees.
For example, in a power plant, component training programs on individual procedures to improve the skills to perform work procedures and a comprehensive training program that combines several component training programs are conducted. The component training programs include; for example, accident management training to ensure that a prediction of the development of an event and a judgment and selection of means of bringing the event under control will be made in an appropriate manner; emergency response training to

ensure that in the event of a nuclear emergency, a power supply will be provided and emergency action to provide the sources of cooling water will be taken in a prompt and appropriate manner; nuclear emergency medical treatment training to ensure that those who suffered from radiation injuries will be taken out of a controlled area and decontaminated and will receive emergency treatment; evacuation instruction training to ensure that visitors in a nuclear power plant will be instructed to evacuate in the event of an emergency and those other than the emergency response personnel will be instructed to evacuate when a state of emergency is declared; and connection training to confirm the communication channels in the event of emergency.

In the comprehensive training program, more extensive training is conducted with the participation of the power plant as well as the head office. For example, in a power plant, training is provided on accident management, emergency response, organization of nuclear emergency preparedness personnel, reporting, emergency exposure medical treatment, monitoring, evacuation instructions, and emergency operations. In the head office, training is provided on reporting, emergency support organization activities, power plant support activities, and media relations.

Nuclear Emergency Act requires that a nuclear operator reports the results of emergency exercises to the NRA. The NRA may order, through consultation with the Prime Minister, licensee to improve the drill procedures and take other necessary actions if the results of the exercises are determined not to be adequate for preventing occurrence or development of a nuclear disaster. The Basic Disaster Management Plan states that the NRA will evaluate the results of exercises for severe accidents. The NRA developed performance indicator of nuclear operator emergency exercises (including nuclear fuel facilities etc.) and have evaluated the exercises by taking opportunities such as general exercises and by holding a debriefing session of emergency exercises by nuclear operators since 2013.

In the working group for development of training scenarios set under the debriefing session of emergency exercises by nuclear operators since 2018, trainings have been conducted to enhance the judgment ability of commanders in an Emergency Response Centre or the main control room in a power station and also to improve the ability of staff on site to respond to emergency. The name of this working group was changed into "the working group for sharing training experience" in 2024 and taken over by nuclear operators as their own activity.

2-3 The Exercise Planned by the Local Governments

Local governments that have jurisdiction over the area where a nuclear facility is located, as well as neighbouring local governments, are responsible for conducting drills and exercises in accordance with the Basic Act on Disaster Management. In exercises organised by the relevant prefectures, participants include local government officials (including the governors), operational units such as the police, fire departments, the Japan Coast Guard, and Japan Self-Defence Forces, and the nuclear operator. These exercises typically involve evacuation drills for residents and contamination screening for evacuating from emergency zones, carried out with cooperation of local residents and the participation of operational units.

More specifically, exercises include evacuation from the PAZ and UPZ, emergency communication drills, and in some areas, public communication exercise using emergency broadcast system and public information vehicles. In addition, some regions conduct drills for sending emergency alert e-mails.

To implement local disaster management and evacuation plans and to assess their effectiveness, Regional Committees support areas where improvements have been confirmed. This support includes planning and conducting exercises, promoting evaluation methods, and practicing the PDCA cycle for continuous improvement.

Furthermore, with support from the national government, the aforementioned local governments are actively planning and conducting training programs for personnel involved in nuclear emergency preparedness. These programs include various types of training aimed at strengthening local response capabilities.

2-4 Participation in International Exercises

Japan is a contracting party to both the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. To ensure readiness for providing notifications in accordance with these conventions during emergencies, Japan continuously participates in the Convention Exercises (ConvEx) organized by the IAEA.

Article 16 (2) Information to the Public and Neighbouring Countries

1 Measures for Providing Public Information

To promote widespread public understanding of disaster response plans, local residents participate in emergency exercises organised by central and local governments. During these exercises, local authorities explain the disaster response plans to residents, who then simulate evacuations to designated shelters, and radiation monitoring is conducted.

The NISA, the former nuclear regulator, launched an emergency information email service in July 2008. Individuals who registered their mobile phone e-mail addresses in advance could promptly receive emergency notifications. This system was inherited by the NRA in September 2012 and renamed N-alert.

Emergency information is also disseminated through the NRA website, temporary NRA briefings, and social networking services (SNS).

During a nuclear emergency, mass media will play a key role in informing local residents. Press briefings, broadcast via television and radio, will be held as needed at local off-site centres for disaster response and at the Emergency Response Centre of the national government within the NRA), providing residents with timely and relevant information.

2 Providing Information to Neighbour Countries

Japan is an island nation located in the East Asia and does not share land borders with neighbouring countries. However, its geographical neighbours across the sea – China and the Republic of Korea – also operate nuclear facilities. In light of the TEPCO Fukushima Daiichi NPS accident, sharing information during nuclear emergencies has become a matter of mutual importance. In August 2008, Japan, China and the Republic of Korea established Top Regulators Meeting (TRM) to facilitate information exchange in the field of nuclear safety regulation. At the 4th TRM held in November 2011, the three countries agreed on the Cooperative Nuclear Safety Initiative, which includes the establishment of an information exchange framework, cooperation in responding to severe accidents, and strengthening nuclear emergency preparedness and response capabilities. Furthermore, at the 6th TRM in November 2013, the three countries agreed to establish an information exchange framework for both normal and emergency

situations. In 2015, a working group for emergency response was formed to develop a system for prompt sharing of emergency information within this framework, and discussions have continued to ensure smooth information exchange during emergency. The three countries also conduct Joint Emergency Drill, taking advantage of emergency exercises held in each country. These drills verify communication methods available during emergencies, such as the effectiveness of dispatching liaison officers, with Japan serving as the host country in both 2018 and 2024.

In addition to the aforementioned trilateral cooperation mechanism, Japan actively uses the Unified System for Information Exchange in Incidents and Emergencies (USIE) web portal operated by the IAEA's Incident and Emergency Centre (IEC). Following the Noto Peninsula earthquake in January 2024, Japan promptly disseminated information about the earthquake through USIE and immediately provided updates on the status of nuclear facilities near the epicentre as soon as the situation became clear. Japan is also preparing to provide monitoring data to the International Radiation Monitoring Information System (IRMIS), which is managed by the IAEA's IEC.

3 Response in the Event of a Nuclear Accident and a Radiological Emergency in Neighbouring Countries

To fulfil the provisions of the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, the Government has designated the Ministry of Foreign Affairs as both the National Warning Point (NWP) and National Competent Authority for an Emergency Abroad (NCA(A)), in the event of a nuclear accident or radiological emergency occurring outside Japanese territory. In such cases, including emergencies in neighbouring countries, the Ministry of Foreign Affairs receives notification through various channels, promptly shares the information with the National Competent Authority for a Domestic Emergency (NCA(D)) and other relevant agencies, and takes appropriate action. If international emergency assistance is requested, Japan will provide support following bilateral discussions and agreement on the terms of assistance. Additionally, Japan has registered its National Assistance Capability(NAC) with the IAEA's Response and Assistance Network (RANET), thereby fulfilling the requirements of Article 2, Paragraph 4 of the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.

ARTICLE 17 SITING

Each Contracting Party shall take the appropriate steps to ensure that appropriate procedures are established and implemented:

(i) for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;

(ii) for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;

(iii) for re-evaluating as necessary all relevant factors referred to in sub-paragraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation;

(iv) for consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they are likely to be affected by that installation and, upon request providing the necessary information to such Contracting Parties, in order to enable them to evaluate and make their own assessment of the likely safety impact on their own territory of the nuclear installation.

Outline of the Implementation of Article 17

In the process of installing a nuclear facility, the majority of the requirements under the Article 17, including the Evaluation of Site-Related Factors and Evaluation of Safety Impacts on Individuals, Society, and the Environment Resulting from Reactor Facilities, are addressed through the regulatory review for the Reactor Installation Permit application. Under the NRA Ordinance on Standards for Installation Permits, regulatory requirements concerning external events, such as natural phenomena and human induced incidents, have been significantly strengthened to ensure robust safety measures. Following the 2012 amendment to the Reactor Regulation Act, measures for severe accident management were incorporated into the legal framework. Licensees are now required to implement both preventive and mitigative measures to address the consequences of severe accidents, and to evaluate the effectiveness of these measures. As part of this evaluation, it must be demonstrated that the implementation of such measures will result in significant radiation risks to the public in surrounding areas.

In accordance with the amendment of the Reactor Regulation Act, a backfitting system was introduced to ensure continuous improvement in safety. Under this system, re-evaluation of site-related factors is required when the NRA Ordinance is revised based on new scientific or technical knowledge. Additionally, the Periodic Safety Assessment of Continuous Improvement was established, requiring licensees to conduct comprehensive evaluations every five years, in principle, in alignment with the IAEA

Safety Guide SSG-25, Periodic Safety Review for Nuclear Power Plants. These evaluations include assessments related to external events.

With regard to resident evacuation and other protective actions, as prescribed in Article 16(1), a framework has been established for the development of local emergency management plans by prefectures, cities, towns and villages, based on the Basic Act on Disaster Management. This ensures coordinated and effective emergency preparedness at the local level.

As for international considerations, Japan's geological position, surrounded by ocean, means that neighbouring member states are not directly affected by the installation of nuclear facilities within Japan. Therefore, formal consultation mechanism regarding facility siting is not in place. However, as outlined in Article 16 (2), a framework for information sharing with neighbouring countries has been established to ensure transparency and regional cooperation in the event of a nuclear emergency.

In conclusion, the measures implemented by the Government are in full compliance with the provisions of Article 17 of the Convention.

Article 17 (1) Evaluation of Site-Related Factors

Site-related factors that may affect the safety of reactor facilities are evaluated as part of the regulatory review process for the reactor installation permits. Applicants are required to conduct comprehensive assessments of external events, both natural and human-induced, that could occur in the vicinity of the proposed site, and to incorporate these considerations into the design of the facility. Applicants must demonstrate the adequacy of the basic design in relation to normal operation, anticipated operational occurrences, design-basis accidents, and severe accidents (design extension conditions, including both scenarios without significant fuel degradation and those involving core melting). As part of this process, applicants are also required to evaluate the safety impacts on individuals, society, and the environment resulting from the reactor facilities, as outlined in Article 17(2).

To apply for a reactor installation permit, the applicants must submit documentation to the NRA that includes the following:

- Name and address of the applicant; for legal entities, the name of the representative
- Purpose of reactor use
- Types, thermal output, and number of nuclear reactors
- Name and location of the reactor site
- Layout, structures, systems, and components of the nuclear power reactor and associated facilities
- Construction plans for the reactor facilities
- Types and annual planned consumption of nuclear fuel materials
- Method for disposal of spent fuel
- Radiation protection and control measures
- Facilities and organizational arrangements for accident response
- Quality assurance systems

In addition, the following supporting documents must be attached:

- Purpose of reactor use
- Thermal output of reactors
- Estimated construction costs and procurement plans
- Procurement plan for nuclear fuel materials
- Technical capabilities for installation and operation of the nuclear facilities
- Site-specific data on weather, geology, hydrology, seismic activity, and social environment (including population distribution, transportation infrastructure,

industry activity, and public facilities such as hospitals)
- Map of the area surrounding the reactor site
- Safety design documentation
- Radiation protection measures
- Accident response facilities and organizational structures
- Corporate documents including articles of incorporation, certificate of registered matters, inventory of assets, balance sheet, and profit and loss statement

Based on the considerations outlined above, the NRA determines the following when reviewing applications for reactor installation permits: reactor will not be used for non-peaceful purposes; the applicant possesses the necessary technical competence and financial resources; the applicant has the technical capability to implement measures for the prevention and mitigation of severe accident consequences; and the locations, structures, and equipment of the reactor facilities comply with the regulatory requirements set forth in the NRA Ordinance on Standards for Installation Permits. If the proposed reactor facilities conform to these regulatory requirements, the NRA grants the reactor installation permit.

In response to lessons learnt from the TEPCO Fukushima Daiichi NPS accident, the NRA significantly strengthened regulatory requirements for external events, both natural and human-induced, under the aforementioned Ordinance. Key enhancements include:

- To address risks associated with ground displacement and deformation, in addition to seismic tremors, buildings and structures important to seismic safety must be constructed on ground surfaces free from outcrops of capable faults. This is due to the potential for damage to building and internal equipment caused by fault movements. The criteria for identifying capable faults, those with the potential to become active in the future, have been clarified. Faults are considered capable if fault activity cannot be ruled out since the Late Pleistocene epoch (approximately 120,000 to 130,000 years ago). Where necessary, evaluation may extent back to the Middle Pleistocene epoch (approximately 400,000 years ago).
- To prevent damage caused by earthquakes, reactor facilities must be designed such that the safety functions of buildings, structures, and other components important to seismic safety are maintained under seismic forces and potential slope failures associated with the design basis ground motion. The design basis ground motion must be determined based on the latest scientific and technical knowledge in seismology and earthquake engineering. This includes consideration of geological

conditions, geological structures, soil characteristics, and seismic activity in and around the proposed site. Two types of seismic ground motions must be formulated:

1 Sources specific seismic ground motion: this is developed by identifying seismic sources specific to the site. Several representative earthquakes, selected from continental-crust earthquakes, inter-plate earthquakes, and oceanic intraplate earthquakes, must be considered based on their potential impact on the site. The formulation must account for uncertainties and reflecting the propagation characteristics of seismic waves.

2 Source independent seismic ground motion: This is developed without identifying specific seismic sources. It is based on historical earthquake records from continental crust events where seismic sources cannot be clearly linked to capable faults. The formulation must also consider the ground characteristics of the site.

In evaluating the propagation characteristics of seismic waves, a three dimensional assessment of subsurface structure beneath the site is required. This is to account for the potential amplification of seismic ground motion due to subsurface geological conditions. Additionally, the design basis ground motion must be assessed in terms of its exceedance probability, to ensure that the seismic design reflects an appropriate level of conservatism and safety.

- To prevent damage caused by tsunamis, reactor facilities must be designed to withstand a design-basis tsunami that exceeds the maximum historically observed tsunami levels. As measures, tsunami protection structure, such as seawalls to prevent site inundation tide gates to prevent water intrusion into buildings must be installed. These protective structures are required to meet Class S standards, the highest classification in seismic design, to ensure that their flood prevention functions are not compromised by concurrent seismic events. The design-basis tsunami must be formulated based on the latest scientific and technical knowledge, incorporating seismological perspectives such as ocean floor topography, geological structures, and seismic activity from the wave sources area to the vicinity of the site. In assessing tsunami generation mechanisms, not only earthquakes, including inter-plate earthquakes, oceanic intraplate, and continental-crustal earthquakes associated with capable faults, but also other phenomena such as landslides, slope collapses, and combinations thereof must be considered. Numerical simulations must be conducted to formulate the design-basis tsunami, taking into account associated uncertainties. Furthermore, the

exceedance probability of the formulated design basis tsunami must be evaluated to ensure that the design reflects an appropriate level of conservatism and safety.

- To ensure the integrity of safety functions, reactor facilities must be designed to withstand a wide range natural phenomena beyond earthquakes and tsunamis. These include floods, strong winds (e.g., typhoons), tornadoes, freezing conditions, heavy precipitation, snow accumulation, lightning strikes, landslides, volcanic activity, biological hazards, forest fires, and combinations thereof. The design must ensure that safety functions are not compromised under any of these conditions. For human induced events (excluding intentional acts), reactor facilities must also maintain safety functions in the event of incidents such as airplane crashes, dam failures, explosions, fires at nearby industrial facilities, toxic gas releases, ship collisions, and electromagnetic interference. These requirements are based on the environmental and operational conditions in and around the site.
- In addition, facilities must include a Specialized Safety Facility designed to support abnormal releases of radioactive materials in the event of intentional acts such as a large aircraft crash or other forms of terrorism. This facility must be capable of operating independently until external support becomes available and must include equipment necessary to prevent damage to the CV. It must also be designed to maintain functionality even in the event of a direct aircraft impact on the R/B. Furthermore, the facility must demonstrate enhanced robustness against seismic motions that exceed the design basis ground motion to a certain extent.

The NRA has developed a series of technical review guides to support the evaluation of site related safety factors for nuclear facilities. These include:

- Guide for Review on Geological and Geological Structural Investigations on and around the Site
- Guide for Review on Design-Basis Earthquake and Seismic-resistance Design
- Guide for Review on Design-Basis Tsunami and Tsunami-resistance Design
- Guide for Review on Foundation Grounds and Slope Stability Assessment
- Guide for Assessment of Volcanic Hazards
- Guide for Assessment of Tornado Hazards
- Guide for Assessment of External Fires, among others

For example, in the Guide for Assessment of Volcanic Hazards specifies that volcanoes located within a 160 km radius of a nuclear power station and active during the

Quaternary period[10] , particularly those with activity during the Holocene epoch[11], are to be classified as capable volcanoes, meaning their future activity cannot be ruled out. applicants are required to assess the potential impacts of capable volcanoes on the site over the operational lifetime of the facility. Special attention must be given to five volcanic phenomena for which design based protective measures are generally not feasible:

1. pyroclastic density currents
2. lava flows
3. debris avalanches, landslides, and slope collapses
4. Formation of new volcanic vents
5. Ground deformation

If the likelihood of such impacts is assessed to be sufficiently low, applicants must establish monitoring system for volcanic activity and formulate a response policy in the event of signs of volcanic unrest. Conversely, if the likelihood is not sufficiently low, the site is to be deemed unsuitable for nuclear facility installation.

Article 17 (2) Evaluation of Safety Impacts on Individuals, Society, and the Environment Resulting from Reactor Facilities

The evaluation of safety impacts on residents and the surrounding environment is conducted separately for normal operation and accident conditions. Under accident conditions, measures for severe accident management became legally mandated following the 2012 amendment to the Reactor Regulation Act. In accordance with the NRA Ordinance on Standards for Installation Permits, licensees are required to implement measures for the prevention and mitigation of severe accident consequences. The effectiveness of these measures must be evaluated using a combination of probabilistic risk assessment (PRA) and deterministic safety assessment methodologies, in order to confirm their adequacy. These requirements are further detailed in sections 2-4 and 2-5 of Article 18. During normal operation, the NRA Ordinance also specifies the fundamental regulatory requirements to ensure that reactor facilities do not pose undue risks to individuals, society, or the environment.

A summary of the safety impact evaluation is provided below, categorised by accident conditions and normal operational conditions.

[10] A period from about 2.58 million years ago to the present

[11] A period from about 11,700 years ago to the present

2-1 Evaluation of Safety Impacts of Nuclear Facilities

2-1-1 At the accident

In accordance with the NRA Ordinance on Standards for Installation Permits, licensees are required to implement necessary measures to prevent significant core damage in the event of an accident that could escalate into a severe accident. Furthermore, in the event of a severe accident, additional measures must be taken to prevent failure of the CV and abnormal releases of radioactive materials to the external environment. To ensure the adequacy of these measures, an effectiveness evaluation is required. This evaluation must confirm that the implemented measures are effective in mitigating the consequences of such events. The NRA has issued regulatory guides that provide acceptable examples and methodologies for conducting these evaluations. For example, the following evaluation items must be addressed to confirm that the measures against CV failure and abnormal radioactive releases are fundamentally sufficient.

(a) The pressure on the CV boundary remains below the maximum design pressure or the specified limiting pressure.
(b) The temperature of the CV boundary remains below the maximum design temperature or the specified limiting temperature.
(c) The total amount of radioactive material released is minimised to the extent practicable, ensuring that the environmental impact, particularly in terms of radioactive contamination, is kept ALARA.

The NRA has issued a regulatory guide for reviewing the results of effectiveness evaluations related to severe accident measures. This guide specifies that, for postulated CV failure scenarios (see section 2-5 of Article 18), it must be confirmed that the amount of released cesium-137(Cs-137) does not exceed 100 TBq, in order to satisfy the requirement outlined in item(c) regarding environmental impact. The guide also stipulates that, for accident sequences involving the use of the CV pressure relief system (i.e., filtered venting system), the effectiveness evaluation must include an assessment of the effective dose at the site boundary. This assessment must confirm that the risk of significant radiation exposure to the nearby public is acceptably low, specifically, approximately five (5) mSv or less per accident.
In addition, to evaluating measures to prevent core damage and CV failure, the NRA Ordinance on Standards for Installation Permits also requires effectiveness evaluations

of:

- measures to prevent fuel damage in the spent fuel storage pool/pit, and
- measures to prevent fuel damage during reactor shutdown conditions.

While the aforementioned requirements primarily concern facility design, the organizational structure and operational capabilities of applicants for reactor installation permits are also critical for ensuring the prevention and mitigation of severe accident consequences. Following the 2012 amendment to the Reactor Regulation Act, it was established as regulatory criteria that applicants must possess the technical capability necessary to implement measures for the prevention and mitigation of severe accidents. The NRA review standards include the following elements:

- securing access routes for emergency response
- provision and management of spare parts and equipment
- establishment of storage areas with consideration for spatial distribution
- procedures for receiving external support, including confirmation of policies to ensure support is available within six days of an event
- development of operational procedures
- implementation of training programs
- establishment of appropriate organizational structures., and with regard to procedure, training, and organizational development, the NRA conducts inspections to verify the effectiveness of training programs and the adequacy of conditions and operator actions adopted by applicants in their effectiveness evaluations.

2-1-2 During normal operation

Under The NRA Ordinance on Standards for Installation Permits, nuclear facilities are required to have the capability to appropriately manage radioactive waste generated during normal operation. Specifically, facilities must be designed to:

- effectively reduce the concentration of radioactive materials in air outside the controlled area and in water at the boundary of the controlled area, and
- prevent the leakage of liquid radioactive waste from systems designed for radioactive waste management.

According to the relevant regulatory guide, the term “effectively reduce” is interpreted to mean that the dose objective of 50 μSv/year, as stipulated in the guide developed by the former Nuclear Safety Commission, can be achieved. This is to be ensured under the ALARA principle, which governs radiation protection practices.

2-2 Development and Continuous Improvement of Local Disaster Management Plans

As stated in Article 16 (1), each prefecture and municipality has developed its respective local emergency management plan based on the Basic Disaster Management Plan and the NRA EPR Guide.
Training is conducted periodically at various levels, including the national government, licensees, and local governments. These efforts are accompanied by continuous improvements to the NRA EPR Guide, the development of emergency monitoring systems, medical systems for use during nuclear disasters, systems for the distribution and administration of stable iodine tablets, and the establishment of the off-site centres. Through these training activities and related initiatives, local governments, such as prefectures, cities, towns, and villages, are continually encouraged to improve their local emergency management plans.

Article 17 (3) Re-Evaluation of Site-Related Factors

Following the amendment of the Reactor Regulation Act in 2012, a backfitting system was introduced. For example, when new knowledge regarding the evaluation of active faults becomes available and regulatory requirements are revised accordingly, licensees are required to re-evaluate their facilities and demonstrate compliance with the updated regulations.
In addition, the amendment introduced the Periodic Safety Assessment for Continuous Improvement. Under this system, licensees are required to periodically assess the safety of their facilities, report the results to the NRA, and make the findings publicly available. The Operational Guide for Periodic Safety Assessment of Continuous Improvement stipulates that the evaluation should be conducted at the time of completion of a Licensee's Periodic Inspection and must be completed within six months thereafter. The evaluation consists of two main components, one of which involves the preparation of documentation describing the current (as is) status of the plant. The guide requires explanations on the following items:

- Summary of power reactor facilities
- Site characteristics: A description of the facility’s location and characteristics, including meteorological conditions, geology, hydrology, seismic activity, tsunamis, volcanic activity, external fires, and the surrounding social environment.

- Structures, systems, and components: A description of their current states, based on approved or submitted construction plans and permitted content.
- Management systems and safety related items: a description of their current status, based on operation management as outlined in the Operational Safety Program.
- Results of safety assessments to confirm compliance with laws and regulations: a description of the current status, based on safety assessments for normal operation, anticipated operational occurrences, design basis accidents, and severe accidents, including radiation exposure assessments during normal operation.

In preparing these documents, reference should be made to the Updated Final Safety Analysis Report (UFSAR) of the U.S. Nuclear Regulatory Commission, the IAEA Safety Guide GS-G-4.1, Format and Content of the Safety Analysis Report for Nuclear Power Plants, and other relevant sources.

The other component of the evaluation corresponds to a periodic safety review (PSR). The guide was revised based on findings from the IRRS mission conducted in February 2017. As part of this revision, re-evaluation of site characteristics was expanded to include factors such as volcanic activity and external fires. At the same time, alignment with the IAEA Safety Guide SSG-25, Periodic Safety Review for nuclear power plants, was clarified. According to the Operational Guide, licensees are required to implement safety improvement measures and, in principle, conduct evaluations every five years to assess the effectiveness of these improvements. However, if significant changes are expected, such as those resulting from large-scale construction, re-evaluation must also be conducted.

- Evaluation related to internal and external events (re-evaluation of internal and external hazards): Internal and external events should be re-evaluated as the basis for safety assessment, using the latest scientific and technical knowledge available at the time of evaluation. If the adequacy of protective measures is confirmed and a review is deemed necessary based on previous evaluation results (including the latest notifications or installation/amendment permits, whichever is more recent), and if changes to installation permits are required, the procedures for applying for amendments to Reactor Installation Permit and related approvals should be promptly initiated.
- Deterministic safety assessment: assessment methods, including analysis codes, should be applied in accordance with the latest available knowledge.
- Probabilistic risk assessment (PRA) related to internal and external events: Both Level 1 and level 2 PRAs should be conducted for internal and external events. The scope of PRA shall be gradually expanded in line with the maturity of each method.

Examples of internal events to be addressed in future development include internal flooding and internal fires. Examples of external events include combined earthquake and tsunami scenarios, external events other than earthquakes and tsunamis, incidents in spent-fuel storage pool/pit, and simultaneous events affecting multi units.

- Safety margin assessment: It is stated that reference should be made to the specifications of the EU "stress tests" and similar frameworks.

In addition, an evaluation of effectiveness from a medium- to long-term perspective shall be conducted every ten years, in principle, focusing on the following 11 safety factors out of the 14 listed in the IAEA Safety Guide SSG-25. This excludes the three safety factors that are already addressed in the assessments mentioned above:

- Plant design
- Actual condition of structures, systems, and components
- Equipment qualification
- Aging degradation
- Safety performance
- Use of experience from other plants and research findings
- Organizations, management systems, and safety culture
- Procedures
- Human factors
- Emergency planning
- Radiological impact on the environment

Article 17 (4) Discussion with Other Countries Likely to be Affected by Reactor Facilities

Japan is an island country surrounded by the ocean, with no land borders shared with other countries. All nuclear facilities in Japan are located along the coastline, as they utilise seawater as the ultimate heat sink. The nearest nuclear power plant is located more than 100 kilometres away from the land territory of the closest country. Therefore, it is understood that the location of Japan's nuclear facilities does not pose a direct impact on other countries. For this reason, Japan does not have a formal system for consultation with nearby countries regarding the siting of nuclear facilities, nor is there a recognised need to establish such arrangements.

However, from the perspective of information sharing, Japan maintains a framework for exchanging information with its two nearby countries, China and the Republic of Korea.

ARTICLE 18 DESIGN AND CONSTRUCTION

Each Contracting Party shall take the appropriate steps to ensure that:

(i) the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defence in depth) against the release of radioactive materials, with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur;

(ii) the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;

(iii) the design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.

Outline of the Implementation of Article 18

Japanese regulations require the incorporation of defence-in-depth approach in the design of nuclear reactor facilities. In addition to measures corresponding to the first through the third levels of defence, additional provisions are required under Design Extension Condition (DEC), including the prevention of core damage, CV failure, and the prevention of the loss of a large area of the facility, and the suppression of radioactive material dispersion. To obtain approval for the design of a nuclear reactor facility, the licensee must demonstrate compliance with regulatory standards by utilising proven technologies or conducting demonstration tests. Furthermore, consideration must be given to human factors and the man-machine interface, such as the design of the reactor control room and emergency power supply systems. These elements must be designed to ensure high reliability, stability, and ease of operation.

Through these measures, the provision of Article 18 of the Convention is fulfilled.

Article 18 (1) Implementing a Defence in Depth Strategy

1 Basic policy on Defence in Depth in Japan

Prior to the establishment of the current regulatory requirements, the concept of defence-in-depth was incorporated into the Reactor Regulation Act and the Regulatory Guides issued by the Nuclear Safety Commission (NSC). The following measures were required:
- For the first level: ensuring high reliability of structures, systems, and components (SSCs) in accordance with their importance, to prevent the occurrence of abnormalities.
- For the second level: implementing necessary measures for early detection of abnormalities and prompt reactor shut-down to prevent escalation.
- For the third level: ensuring that the reactor core is not severely damaged and remains adequately cooled in the event of a Design Basis Accident (DBA), in order to mitigate its consequences.

Under the current regulatory requirements issued by the NRA, measures to eliminate common cause failures have been significantly reinforced, based on lessons learnt from the TEPCO Fukushima Daiichi NPS accident. In addition to the previously mentioned requirements, the following measures are now mandated:
- preventing severe core damage in the event of failure of equipment designed to address DBAs.
- preventing CV failure in the event of severe core damage.
- Addressing CV failure risks specifically, in light of Japan's experience with the TEPCO Fukushima Daiichi NPS accident.
- implementing measures to prevent the loss of a large area of nuclear facilities due to extreme natural disasters, intentional airplane crashes, or other acts of terrorism.

The regulatory framework requires that each level of defence-in-depth must independently and effectively perform its intended function.

2 Requirements in the Each Layer of Defence in Depth

2-1 Prevention of Abnormality

To prevent abnormalities, it is required to ensure high reliability of structures, systems, and components in accordance with their importance, to incorporate sufficient safety

margins in the design, to maintain core stability characteristics, and to prevent operational errors. Fail-safe design features and interlock functions are implemented to address potential mis-operations or equipment failures.
Under the current regulatory requirements, measures for seismic safety, tsunami protection, power supply reliability, and fire protection have been significantly strengthened. In addition, new requirements have been introduced to address internal flooding, volcanic activity, tornadoes, forest fires, and other external hazards. Requirements related to the external events are described in Article17 (1).

2-2 Prevention of Escalation of Abnormalities

To detect deviations from normal operational conditions and bring them under control, measures are required to prevent anticipated transients, events expected to occur during normal operation, from escalating into accidents. These measures include incorporating specific systems and mechanisms into the design, and establishing operational procedures to restore the nuclear power plant to a safe state.

2-3 Mitigation of Design Basis Accident

In case where an anticipated transient or postulated initiating event cannot be controlled at the previous level and progresses to the DBA, it is required that the reactor core is not severely damaged and that sufficient cooling is maintained. This is achieved through the use of Engineered Safety Features and the inherent stability characteristics of the core.

2-4 Prevention of Core Damage under Design Extension Condition Without Severe Core Damage

Licensees are required to verify the effectiveness of measures designed to prevent severe core damage under Design Extension Conditions(DEC) that do not involve such damage. These DECs are categorised as “Postulated Accident Sequence Groups”. The Guide for the NRA Ordinance on Standards for Installation Permits, which incorporates relevant research findings, specifies accident sequence groups that encompass most scenarios involving significant core damage. These are referred to as “Designated Accident Sequence Groups”, as shown in Table 18-1.

Table 18-1 Designated Accident Sequence Groups

BWR	PWR
Loss of high-pressure and low pressure water injection functions	Loss of heat removal function of the secondary cooling system
Loss of high-pressure water injection and depressurization function	Loss of all AC power
Loss of all AC power	Loss of component cooling function
Loss of decay heat removal function	Loss of CV heat removal function
Loss of reactor shutdown function	Loss of Reactor shutdown function
Loss of water injection during a Loss of Coolant Accident (LOCA)	Loss of Emergency Core Cooling System (ECCS) water injection function
CV bypass (Interface system LOCA)	Loss of ECCS recirculation function
-	CV bypass (Interface system LOCA, steam generator tube rapture)

Considering the differences among individual plants, internal events are evaluated using probabilistic risk assessment (PRA), while external events are assessed using PRA or other applicable methods. In an accident sequence group is identified that has a significant frequency or impact but is not included in the "Designated Accident Sequence Groups", it must be added to the "Postulated Accident Sequence Groups".

In the next step, important accident sequences with each Postulated Accident Sequence Group are identified based on several factors: the number of equipment failures occurring simultaneously, the available time margin, the level of equipment capacity required to prevent core damage, and whether the sequence represents the characteristics of the group in question. Effectiveness evaluations are conducted to confirm that equipment intended for severe accident mitigation meets the required performance criteria, such as ensuring the maximum fuel cladding temperature remains below 1,200 degree Celsius, based on simulation code analyses. These evaluations also assess the adequacy of plans regarding necessary resources, such as manpower and fuel, to determine whether the equipment designated for severe accident response can effectively prevent severe core damage in the identified accident sequences.

Equipment required to address the DEC must meet the following regulatory requirements:

- it must not fail simultaneously with safety systems designed to address the DBA due to common cause failures.
- it must be equipped with seismic resistance and other necessary protective features.

In addition to these requirements, permanently installed equipment must demonstrate high reliability. For mobile equipment, compliance with general industrial standards

and the deployment of multiple units (e.g., for water injection or power supply) are required.

2-5 Prevention of CV Failure under Design Extension Condition with Core Melt

Licensees are required to verify the effectiveness of measures to prevent CV failure under the DEC involving core melt.

DECs with core melt are categorised as "CV failure modes". The Regulatory Guide for the NRA Ordinance on Standards for Installation Permits, incorporating relevant research findings, defines "Designated CV failure mode" as typical failure scenarios. These include:

- Static loads due to internal pressure and temperature (e.g., CV over-pressurization/overheating)
- High-pressure melt ejection and direct heating of the CV atmosphere
- Ex-vessel fuel-coolant interaction
- Hydrogen explosion
- Direct contact with the CV shell (shell attack)
- Molten core-concrete interaction (MCCI)

Considering the differences among individual plants, internal events are evaluated using PRA, and external events are assessed using PRA or other applicable methods to identify CV failure modes based on plant-specific characteristics. If a CV failure mode with significant frequency or impact is identified but not included in the "Designated CV failure modes", it must be added to the "Postulated CV failure modes".

In the first step, for each Postulated CV failure mode, a representative severe accident sequence, based on loading conditions affecting the CV, is identified using PRA results. Subsequently, effectiveness evaluations are conducted to confirm that equipment for severe accident mitigation meets performance criteria, such as maximum operating pressure or limiting pressure, as determined by simulation code analysis. These evaluations also assess the adequacy of plans regarding necessary resources (e.g., manpower, fuel) to determine whether the equipment can prevent CV failure in the identified accident sequences. The NRA Guide for Evaluating Effectiveness requires confirmation that the release of Cs-137 remains below 100 TBq.

Equipment required to address DECs involving core melt must meet the following regulatory requirements:

- The equipment must function under accident conditions

- Redundancy, diversity, independence, and spatial separation must be ensured, especially when DBA-related equipment does not have similar functions (e.g., water injection to the CV bottom, hydrogen explosion mitigation).
- The equipment must be seismically qualified and possess other necessary protective features.

In addition to these requirements, permanently installed equipment must demonstrate high reliability. For mobile equipment, compliance with general industrial standards and deployment of multiple units (e.g., for water injection, power supply) are required.

2-6 Measures to Suppress Dispersion of Radioactive Material

As described in 2-4 and 2-5, the NRA Ordinance on Standards for Installation Permits requires measures to prevent severe core damage and CV failure as part of the response to DEC. Additionally, the Ordinance mandates that equipment be installed to suppress the dispersion of radioactive material beyond the site boundary, based on appropriate analysis of dispersion mechanisms. These measures aim to prevent abnormal levels of radioactive release into the environment, even in scenarios where severe core damage and CV failure occur beyond the scope of DEC. For example, water cannons are required to suppress the dispersion of radioactive aerosols leaking from the R/B.

2-7 Measures to Address Loss of Large area of Nuclear Facilities

The loss of a large area of nuclear facilities refers to the large-scale destruction of a nuclear installation caused by extreme natural disasters, intentional airplane crashes, or other acts of terrorism. Extreme natural disasters are defined in the NRA Ordinance on Standards for Installation Permits as events that exceed the design basis.

Under the NRA Ordinance, measures are required to address such scenarios, including the deployment of mobile equipment and the installation of Specialized Safety Facility (SSF).

(1) Measures Using Mobile Equipment

An airplane crash or similar event can cause severe destruction to a specific area of a nuclear installation, resulting in the loss of a large area of nuclear facilities. In such cases, it is important to implement measures not based on specific accident sequences, but rather to ensure that all systems for mitigating the release of radioactive material remain functional, even after the destruction has occurred.

In the event of an extreme natural disaster beyond the design basis, or a large airplane crash, mobile equipment must remain available. This is achieved through measures such as dispersed deployment to prevent simultaneous loss of equipment.
In practice:
- access routes must be restored using heavy machinery stored in dispersed locations, in case roads or other pathways are destroyed by a beyond-design-basis natural disaster.
- Connection points must be prepared on the side opposite to the damaged area, so that mobile equipment, such as feedwater pumps or power sources, can be connected if the original connection points are lost due to an airplane crash into one side of the R/B.

(2) Measures Using the Specialized Safety Facility

The Specialised Safety Facility (SSF) shall be equipped with adequate measures to prevent the loss of necessary functions due to the intentional crash of a large airplane into the R/B. Practical requirements include:
- Ensuring sufficient distance, e.g., more than 100 metres, between the SSF and the R/B to prevent simultaneous failure of both facilities
- Constructing the SSF with a robust structure capable of withstanding an intentional airplane crash, or using facilities with equivalent or greater effectiveness.
Licensees must demonstrate that the designated equipment can maintain its required functions in the event of an airplane crash. This is done by performing structural evaluations of the building and functional evaluations of the equipment, based on the specified characteristics of the airplane and the identified crash point.
Equipment to prevent CV failure shall be installed in the SSF. Practical requirements include:
- A depressurization function for the reactor coolant pressure boundary (e.g., equipment for reactor depressurization operable from the emergency control room).
-A cooling function for the molten core inside the reactor (e.g., equipment for low-pressure water injection into the reactor).
- A cooling function for molten core material that has relocated outside the bottom of the reactor (e.g., equipment for water injection into the CV bottom).
- CV cooling, depressurization, and radioactive material suppression functions (e.g., equipment for water injection into CV sprays).
- CV heat removal and depressurization functions (e.g., filtered vent systems).
- A function to prevent CV failure due to hydrogen explosion (e.g., hydrogen concentration control systems).

- Support functions (e.g., equipment for power supply, instrumentation, and communication).

In addition, an emergency control room must be provided to operate the above-mentioned functions.

3 Regulatory Procedures Relating to the Design and Construction of Reactor Facilities

3-1 Regulation During the Design and Construction Phase

The licensing process includes the Reactor Installation Permit, approval of the Design and Construction Plan, Pre-service Inspections, Fuel Assembly Inspections, and other related procedures.

These processes are explained in Article 7 (2) 2-1.

3-2 Regulatory Requirements

The NRA Ordinance on Standards for Installation Permits and the NRA Ordinance on Technical Standards stipulate the requirements outlined in Article17 (2) 1 and 18.

Table 18-2 lists the facilities subject to design standards that are intended to prevent the occurrence or escalation of a design basis accident. These facilities are classified into categories, and their structural and strength requirements for each operating condition are specified in Table 18-3, in accordance with the NRA Ordinance on Technical Standards.

Table 18-2 Classification of facilities subject to design standards

Class 1	Vessels, pipes, pumps, valves	Components forming the reactor coolant pressure boundary
	Support structures	Structures supporting Class 1 components
Class 2	Vessels, pipes, pumps, valves	Components required to safely shut down a power reactor or ensure the safety of the reactor facility under environmental conditions such as a design basis accident (DBA), or during periods leading up to a DBA, which may indirectly pose radiation hazards to the public due to damage, failure, or other abnormalities.
		Components in circuits where fluids (e.g., steam, feedwater)

		circulate primarily to drive a steam turbine, located between a Class 1 component in the steam line downstream of the Class 1 component and the nearest stop valve, and between a Class 1 component in the feedwater line upstream of the Class 1 component and the nearest stop valve
		Components located between a penetration in the CV and the isolation valve, either inside or outside the CV
	Support structures	Structures supporting Class 2 components
Class 3	Vessels, pipes	Vessels (subject to design standards) or pipes (excluding ducts) that: - contain fluids with radioactive material concentrations exceeding 37 mBq/cm^3 (or 37 kBq/cm^3 for fluids) - Have a maximum operating pressure greater than 0 MPa are associated with Class 1 or Class 2 components, the CV, radiation control facilities, or reactor containment facilities (limited to emergency gas treatment systems)
Class 4	Pipes	Ducts associated with radiation control facilities or reactor containment facilities (limited to emergency gas treatment systems) that contain fluids with radioactive material concentrations exceeding 37 mBq/cm^3 (excluding Class 2 pipes)
CV support structures		Structures supporting the CV

Table 18-3 Classification of operating conditions

Operating Condition I	Normal operating condition of a power reactor facility
Operating Condition II	A condition, other than Operating Condition I, III, IV, or the Testing Condition, that occurs under environmental conditions anticipated during a DBA or during a situation that may develop into a DBA.
Operating Condition III	A condition requiring emergency shutdown of the power reactor due to an unusual event, such as a failure or malfunction, occurring under environmental conditions anticipated during a DBA or during a situation that may develop into one.
Operating Condition IV	A condition in which an emergency, anticipated in the safety design of the power reactor facility, occurs under environmental conditions anticipated during a DBA or during a situation that may develop into one.
Testing Condition	A condition in which the power reactor facility is subjected to its maximum operating pressure during a hydrostatic test

As shown in Table 18-4, severe accident measure systems are classified into categories, and regulatory requirements are specified for each category.

Table 18-4 Classification of severe accident management facilities

Severe Accident Class 1	Vessels, pipes, pumps, valves	The severe accident measure system, limited to those used in Specified Safety Facilities.
	Support structures	Structures that support Severe Accident Class 1 components.
Severe	Vessels, pipes,	The permanently installed severe accident measure

Accident Class 2	pumps, valves	system, excluding those used in specified safety facilities.
	Support structures	Structures that support Severe Accident Class 2 components.
Severe Accident Class 3	Vessels, pipes, pumps, valves	Components such as vessels, pipes, pumps, or valves that are part of portable severe accident measure system.

In addition to the above classifications, the quality assurance methods and inspection organizations of the licensee operating the power reactor are reviewed for technically adequacy during the licensing process for approval of the Design and Construction Plan. This review ensures that the licensee's quality control methods are appropriate from the design and construction stage of nuclear facility.

3-3 Compliance with Regulatory Requirements

The licensee is implementing modifications, such as the addition of necessary facilities, to comply with the regulatory requirements established by the NRA. For example, protective walls are being installed around seawater pumps to account for higher tsunami levels, along with protective embankments surrounding the area.

A weir for water storage has been installed at the intake port to secure cooling water for a certain period in the event of a tsunami undertow. Additionally, an emergency fuel storage tank for the diesel generator has been added to ensure more than seven days of continuous operation, thereby enhancing the reliability of emergency power supply in the event of a loss of off-site power.

As a measure for emergency shutdown failure, an automatic actuation panel has been newly installed to enable closure of the Main Steam Isolation Valve and injection of emergency boric acid water, allowing the reactor to be brought to a subcritical state even if control rods cannot be inserted.

To improve cooling reliability, the number of permanently installed cooling water injection pumps has been increased, diversifying the water injection function into the reactor pressure vessel and the CV.

To prevent hydrogen explosions, measures have been taken to avoid CV failure, such as the additional installation of equipment capable of igniting hydrogen or recombining it into water.

Article 18 (2) Application of Proven Technologies

Although the Reactor Regulation Act and other regulatory requirements do not mandate the use of only technologies proven through experience or testing/analysis, it is standard practice to apply proven technologies when applying for a Reactor Installation Permit or approval of a Design and Construction Plan. If a licensee adopts a new technology, they must demonstrate that it complies with the technical standards endorsed by the NRA by conducting verification tests. Alternatively, they must explain how safety can be ensured when using the technology, even if it is not explicitly referenced in the technical standards.

Regarding the application of proven technologies, the NRA Ordinance on Standards for Installation Permits requires the highest level of reliability for safety related structurers, systems, and components (SSCs) with safety functions, and that their design ensures this reliability is maintained.

The use of new technologies is not prohibited; however, licensees are required to ensure the reliability of such technologies when designing reactor facilities.

During the licensing process for approval of the Design and Construction Plan, licensees must demonstrate quality assurance and apply proven technologies.

Safety related facilities must function under all anticipated environmental conditions up to the occurrence of a design basis accident. To verify their integrity and performance, these facilities may be tested or inspected while the reactor facility is either in its operation or shut down.

Specifically, when applying for a Reactor Installation Permit and approval of the Design and Construction Plan, licensees are required to verify the technologies used in the design of reactor facilities.

For example, when using a digital reactor protection system(RPS), licensees implement the following measures:

- Hardware isolation: The RPS hardware is physically and functionally isolated. Signals are transmitted only from the RPS, and no external signals are received. No external hardware is allowed to connect directly to the RPS. External access is restricted to one-way signal transmission only.
- Access control: Physical access is restricted through access control at the nuclear facility entrance. Software access is limited via the RPS panel maintenance tools, and connector access is controlled by keys to prevent unauthorized modifications.
- Software integrity: The RPS software is specifically designed and verified through validation at every stage, design, fabrication, testing, and design change control, in

accordance with industrial standards[12][13], ensuring immunity to general computer viruses.

- Protection from external disturbances: Isolation circuits and other protective components are installed at power and signal connection points to protect the RPS from disturbances such as lightning, induced surges, and electromagnetic interference.
- Vendor requirements: Licensees require vendors to implement cybersecurity and anti-sabotage measures for the RPS design. These include prohibiting direct internet connections and using only limited, controlled tools for maintenance access.

Article 18 (3) Design for Highly Reliable, Stable, and Easily Manageable Operations

Safety related facilities must be designed to function under anticipated environmental conditions up to the occurrence of a design basis accident, as required by regulatory standards. Therefore, high reliability is essential.

In addition, these facilities must be designed for ease of operation.

Facilities intended to respond to severe accidents must function effectively and be operable with certainty under the environmental conditions expected during such events.

The licensee adopts a design for the main control room that integrates key instrumentation and control equipment for safety related systems, allowing centralised monitoring and control of the plant.

To enhance monitoring capabilities and prevent operational errors or mis-judgements, the control panel is designed with proper arrangement of displays, alarms, and centralised equipment based on human factors engineering principles.

For local operations, identification measures such as colour coding and key-locking mechanisms are implemented to prevent mis-operation.

To improve operability, appropriate tools for manually operated local valves and platforms for local operation are provided near the main control room or within the radiation-controlled area.

[12] Standard for the Application of Digital Computers to Safety Protection Systems（JEAC4620）

[13] Guide for Verification and Validation of Digital Safety Protection Systems（JEAG4609）

ARTICLE 19 OPERATION

Each Contracting Party shall take the appropriate steps to ensure that:

(i) the initial authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;

(ii) operational limits and conditions derived from the safety analysis, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;

(iii) operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;

(iv) procedures are established for responding to anticipated operational occurrences and to accidents;

(v) necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;

(vi) incidents significant to safety are reported in a timely manner by the holder of the relevant license to the regulatory body;

(vii) programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies;

(viii) the generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and any necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal.

Outline of the implementation of Article 19

To operate nuclear facilities, the licensee must confirm that construction work has been carried out in accordance with the approved Design and Construction Plan, and that the facilities comply with the technical standards set forth in the NRA Ordinance on Technical Standards.

Additionally, the licensee must obtain approval for the Operational Safety Program, which outlines rules for in–service safety preservation activities. This program specifies limiting conditions for operation, accident response measures, and procedures for operation and maintenance.

Throughout the operational period, the licensee receives technical support from plant vendors and their subcontractors for inspections and construction related activities.

The licensee is obligated to report accidents to the NRA in accordance with the Reactor

Regulation Act.

The licensee manages the NUCIA database, which contains publicly disclosed information on nuclear facilities, for the purpose of sharing operational experience.

The NRA utilizes an international nuclear information notification system to share operational data globally.

Spent nuclear fuels and radioactive waste are temporarily stored on-site. These wastes undergo necessary treatment and volume reduction before being transferred to a final disposal site. Under Japan's clearance system, waste with radiation levels below regulatory criteria can be treated as general industrial waste, contributing to the reduction of radioactive waste volume.

Therefore, Japan complies with the provisions of Article19 of the Convention.

Article 19 (1) Initial Authorization

In Japan, a Reactor Installation Permit must be obtained, followed by approval from the NRA for the Design and Construction Plan, in order to construct a reactor facility. Subsequently, the licensee must conduct Pre-service Inspections to confirm that the reactor facility has been installed in accordance with the approved Design and Construction Plan and complies with regulatory requirements. The licensee must also obtain confirmation from the NRA that the Pre-service Inspections have been appropriately conducted.
Upon receiving an application for confirmation of Pre-service Inspections, the NRA conducts a review. If it is confirmed that the nuclear facility conforms to the Design and Construction Plan and technical standards, the NRA issues a certificate of verification of Pre-service Inspections to the licensees. The reactor facility may not be operated until this confirmation has been granted by the NRA.

When applying for confirmation of pre-service inspections, licensees must submit a written application to the NRA, including necessary information such as the construction schedule, date, and location of the construction work subject to inspection. Licensees must conduct Pre-service Inspections using appropriate methods to confirm that installation or modification work related to structure, strength, leakage, function, performance, and other relevant aspects has been carried out in accordance with the approved Design and Construction Plan. Records of Pre-service Inspection results must be preserved for the entire operational period of the power reactors.
Licensees are also required to specify Operational Safety Programs and obtain approval from the NRA. Following the amendment of the Reactor Regulation Act in 2017, licensees must define their Operational Safety Programs prior to the construction of power reactors and implement safety related activities consistently from the design and construction stage. Operational Safety Programs prescribe measures to be taken under conditions that may directly affect safety, including the establishment of limiting conditions for operation to ensure safe reactor operation, and actions to be taken in the event of deviations from those conditions.
Licensees must comply with their Operational Safety Programs during the operation and maintenance of nuclear facilities.
The matters to be regulated under the Operational Safety Programs are stipulated in the NRA Ordinance on Commercial Reactors, as outlined below:

- Systems to ensure compliance with relevant laws and the Operational Safety Programs,
- Quality management systems,
- Roles and organizational structures of personnel responsible for operating and managing reactor facilities,
- Scope and responsibilities of Chief Reactor Engineers, including their authorised supervisory role in operational safety and their position within the organization,
- Scope and responsibilities of Chief Electrical Engineers, including their authorised supervisory role in operational safety and their position within the organization,
- Scope and responsibilities of Chief Engineers of Boilers and Turbines, including their authorised supervisory role in operational safety and their position within the organization,
- Operational safety education for personnel involving in the operation and management of reactor facilities,
- Operation of reactor facilities,
- Establishment of controlled, restricted, and supervised areas, and regulations regarding access these areas,
- Venting systems and effluent monitoring equipment,
- Monitoring of radiation dose, dose equivalent, concentrations of radioactive materials, and surface contamination density, as well as decontamination procedures,
- Management of radiation detectors and methods of radiation measurement,
- Receipt, shipment, transportation, and storage of nuclear fuel materials, and other related matters,
- Disposal of radioactive waste,
- Emergency response measures,
- Measures to maintain the integrity of reactor facilities in the event of design basis accidents, severe accidents, or large-scale damage,
- Proper recording and reporting of operational safety activities at reactor facilities,
- Facility Management of reactor sites,
- Sharing of technical information related to operational safety with other licensees, particularly information obtained from contractors who have carried out maintenance checks,
- Disclosure of information regarding noncompliance, in the event such noncompliance occurs, and
- Other necessary matters related to the operational safety of reactor facilities.

Operational Safety Programs maybe revised after receiving approval, due to factors such as organizational changes within the licensee or modifications of reactor facilities.
If licensees intend to revise their Operational Safety Programs, they must obtain approval from the NRA for the amended programs.
Additionally, the NRA may order amendments to the Operational Safety Programs in accordance with the provisions of the Reactor Regulation Act, if it determines that such changes are necessary to prevent disasters involving nuclear fuel materials, materials contaminated by nuclear fuel, or reactors.
Operational Safety Programs are the most critical documents governing the operation of reactor facilities. Licensees are required to define their Operational Safety Programs prior to the commencement of power reactor construction and must consistently implement them from the design and construction stage onward. Licensees also prepare various operating procedure manuals and test manuals that detail the procedures for the actual operation and maintenance of reactor facilities.
These subordinate provisions are appropriately managed under the licensee's quality management system, ensuring consistency with the Operational Safety Programs.

Approval of the Design and Construction Plan includes approval of the fuel assembly design, which licensees must submit to the NRA for authorization.

Article 19 (2) Limiting Conditions for Operation

1 Regulatory Requirements Regarding Limiting Conditions for Operation

In Japan, under the provisions of the Reactor Regulation Act, licensees are required to establish their Operational Safety Programs and obtain approval from the NRA before commencing operation of a reactor facility.
Limiting values for reactor operation, such as the shutdown margin and thermal-hydraulic limits, are specified in the Operational Safety Programs.
If a licensee fails to comply with the limiting conditions for operation, the NRA may order corrective actions, including reactor shutdown, in accordance with the Reactor Regulation Act.
In the event that a reactor facility deviates from its limiting conditions for operation, the licensee must immediately declare the deviation and report it to the NRA.

The licensee is required to take corrective measures to return the facility to compliant state within the permitted time for operation during the deviation. If the deviation cannot be resolved within the allowed time, the licensee must place the reactor in a state where the limiting conditions for operation no longer apply. This includes shutting down the reactor.
Upon receiving a deviation report, the NRA investigates the root cause and, if necessary, shares feedback with other licensees.

2 Establishment, Implementation, and Revision of Limiting Conditions for Operation

Operators at reactor facilities take turns operating and monitoring the reactor, and are responsible for practical tasks such as ensuring compliance with the limiting conditions for operation and taking appropriate actions in the event of any deviation.
The limiting conditions for operation, along with the measures to be taken in case of a deviation, are clearly documented in the Operational Safety Programs. Operators are required to implement these procedures accurately.
Limiting conditions for operation refer to parameters essential for the safe operation of reactor facilities. In certain cases, such as modifications to related equipment, it may be necessary to revise these conditions.
As noted above, the limiting conditions for operation are specified in the Operational Safety Programs, and any revisions require approval from the NRA.
More specifically, when revising the limiting conditions for operation, licensees must conduct an internal review, including a safety evaluation, and undergo a review by the NRA.

Article 19 (3) Procedures for Operation, Maintenance, Inspection, and Testing

1 Establishment, Implementation, and Revision of Operation Manuals

Licensees must regulate matters related to the operation, maintenance, and testing of reactor facilities in their Operational Safety Programs, as stipulated in Article 19(1). Based on these programs, licensees are required to establish general procedures,

procedural manuals, and other documentation related to operational safety, and comply with them.

Regarding maintenance, licensees must conduct Licensee's Periodic Inspections in accordance with the Reactor Regulation Act, as specified in their Operational Safety Programs.

Procedural manuals must be formally documented following an internal approval process within the nuclear power plant, and applied to the operation and maintenance of each reactor facility.

Furthermore, if procedures are modified, such as due to equipment changes, licensees must ensure that personnel do not follow outdated procedures.

To ensure accessibility, procedural manuals are made available to all staff involved in the operation and maintenance of reactor facilities, for example by placing them in the control room.

Since procedural manuals are established based on the Operational Safety Programs, they fall within the scope of the quality management system.

These manuals are reviewed regularly and revised as necessary.

The Reactor Regulation Act requires licensees to create and maintain operational records. These records must include information related to fuel assemblies, reactor inspections, operations, radiation control, maintenance, and any anomalies or accidents.

Additionally, the Reactor Regulation Act mandates that the results of Licensee's Periodic Inspections be recorded and preserved, including details such as the inspection subjects, methods, and outcomes.

Among the items prescribed in Operational Safety Programs, Chief Reactor Engineers, Operation Supervisors, maintenance management of reactor facilities, and Licensee's Periodic Inspections, as stipulated in the NRA Ordinances, are described in detail below.

(1) Chief Reactor Engineers and Shift Supervisors

Chief Reactor Engineers, assigned to each reactor by the licensee, are selected from individuals who hold qualifications certified through a national examination, and possess the practical experience[14] required by the NRA Ordinances. Their appointment

[14] The Rules on Commercial Reactors stipulate that at least three years of practical experience are required, adding together the periods listed below.

(i) Period of involvement in duties relating to construction work on or maintenance management of power reactor facilities
(ii) Period of involvement in duties relating to the operation of power reactors
(iii) Period of involvement in duties relating to the analysis and evaluation of the safety of power reactor facility design

and dismissal must be formally reported to the NRA.
When deemed necessary for operational safety, Chief Reactor Engineers may provide their opinions to the plant general manager, offer advice and recommendations to staff at all levels, and participate in the development of operational safety plans.
Shift Supervisors are appointed by the licensee and assigned to each shift.

(2) Maintenance management of reactor facilities

Licensees must take the following measures related to checks, tests, inspections, repairs, replacements, modifications, and other necessary actions for the maintenance of reactor facilities (hereinafter referred to as "maintenance management"), both during reactor operation and shutdown, in accordance with the provisions of the NRA Ordinance on Commercial Reactors:

- Establish a policy for maintenance management of reactor facilities (hereinafter referred to as the "maintenance management policy") to ensure that the performance of the reactor facility, as specified in the Reactor Installation Permit, is maintained.
- Define maintenance management targets to be achieved in accordance with the maintenance management policy.
- Develop a maintenance management implementation plan that includes the following elements to achieve the defined targets, and carry out maintenance management in accordance with this plan:
  - Timing and duration of the maintenance management implementation plan
  - Methods, frequency, and timing for conducting checks, tests, inspections, repairs, replacements, modifications, and other maintenance activities
  - Safety measures to be taken during inspections and other maintenance activities
  - Procedures for reviewing inspection results and evaluating their effectiveness
  - Corrective and preventive actions based on inspection results and evaluations, including their frequency and timing thereof
  - Recordkeeping related to maintenance management activities
- Periodically evaluate the maintenance management policy, targets, and implementation plans.
- Reflect the results of these evaluations in the maintenance management policy,

(iv) Period of involvement in duties relating to the design or management of power reactor fuel assemblies

targets, and implementation plans.

- Take special measures tailored to the specific condition of the reactor facility, particularly in case where reactor operation is suspended for an extended period or under other exceptional circumstances from the perspective of maintenance management.

Additionally, if a licensee formulates or revises a Long-Term Maintenance Policy based on a technical aging evaluation, these revisions must be incorporated into the maintenance management policy.

(3) Licensee's Periodic Inspections

Licensees are required to conduct Licensee's Periodic Inspections to verify compliance with the provisions of the NRA Ordinance on Technical Standards. These inspections must be conducted at intervals not exceeding 13 months from the date of the previous inspection. Prior to conducting these inspections, licensees must report the timing, scope, inspection methods, and other relevant details to the NRA.

Licensee's Periodic Inspections must be performed on the following reactor facilities: reactors, systems for handling and storing nuclear fuel materials; reactor cooling systems; instrumentation and control systems; systems for handling and storing radioactive waste; radiation control systems; reactor containment systems; emergency power supply systems; normal power supply systems; auxiliary boiler systems; fire protection systems; inundation protective systems; fuel supply for auxiliary components; emergency water intake systems; civil engineering structures on site, emergency response centres; and the main bodies and accessory equipment of steam turbines.

Licensee's Periodic Inspections shall be conducted using methods that sufficiently confirm the presence of any damage, deformation, wear, or abnormalities. These methods may include opening up equipment, overhauls, non-destructive inspections, and test operations to verify functionality and operational status.

If, during a Licensee's Periodic Inspection, a licensee identifies parts that may fail to meet technical standards[15] over time, the licensee must evaluate when these parts are expected to become non-compliant. The results of this evaluation must be recorded, preserved, and reported to the NRA.

[15] Article 18 of the Technical Standard Rules specifically stipulates that Class 1 Components and Class 1 Support Structures in use must not have any cracks or other defects that could lead to damage. Furthermore, the pressure-bearing parts of Class 1 Components in use must not have any cracks or other defects that penetrate the pressure boundary.

The evaluation shall focus on the core shroud and shroud support within the vessel, piping, and core support structures classified as Class 1 Components under the NRA Ordinance on Technical Standards.
Licensees must estimate the time at which these components may fail to meet technical standards by identifying the cause of crack formation, determining the crack's shape and size, and predicting its progression over time. This evaluation should be based on the assumption that the crack will develop as expected.
If the evaluation indicates that repairs are necessary, the licensee must assess whether the timing, scope, and method of the proposed repairs are appropriate.

2 Confirmation of Licensee Activities by the NRA

(1) Nuclear Regulatory Inspections

Licensees are responsible for conducting Pre-service Inspections and Licensee's Periodic Inspections independently. The NRA oversees these activities through its Nuclear Regulatory Inspection Program, which enables continuous monitoring of licensee safety activities, allowing the NRA to conduct inspections "at any time" and "on any matter". If concerns arise regarding the safety activities of a licensee, the NRA should identify them as inspection findings. Depending on the safety significance and severity of the findings, supplemental inspections may be conducted.
The NRA inspectors are stationed at Regional Offices located near nuclear facilities. As outlined in the Article 8 (1), a senior inspector is appointed as the office chief, and a nuclear emergency preparedness officer serves as the deputy office chief. An appropriate number of inspectors is assigned to each facility based on its size.
Nuclear Regulatory Inspections are conducted based on the approximate number of inspection samples outlined in the NRA's annual inspection plan.
If suspected performance degradation is identified during a Nuclear Regulatory Inspection, the NRA inspectors and relevant departments shall assess its safety significance and severity in accordance with the applicable guidelines. The safety significance is evaluated based on the degree of impact on the function or performance of safety assurance systems, while severity is assessed from the perspective of whether the case involves violations of regulatory requirements or intentional misconduct. The results of these assessments are typically categorised into four levels, as shown in Table 19-1. In certain cases, licensees may be required to submit a corrective action plan and

report the results of its implementation. Additionally, the NRA may conduct supplemental inspections to verify the licensee's implementation of corrective actions.

Table19-1 Four Levels of Significance Evaluation in Regulatory Inspections

Green	Very low and limited impact on safety functions and performance. The licensee's performance can be improved through corrective actions taken by the licensee.
White	Low impact on safety functions and performance, with minimal reduction in safety margins. The licensee's performance should be improved under the NRA monitoring of corrective actions.
Yellow	Substantial impact on safety functions and performance, with significant reduction in safety margins.
Red	High impact on safety functions and performance.

Based on the results of Nuclear Regulatory Inspections, if deemed necessary, the NRA may order regulatory actions for licensees. These actions may include suspension of reactor facility operations, modification, repair, or relocation of facilities, designation of reactor operating methods, or other necessary measures.

The results of Nuclear Regulatory Inspections are compiled and reported to the NRA quarterly. Additionally, the NRA conducts a comprehensive annual evaluation of safety activities for each reactor facility, based on inspection results and safety performance indicators from the previous fiscal year. These evaluation results are made publicly available on the NRA's website.

(2) On-Site Inspections

In accordance with the provisions of the Reactor Regulation Act, the NRA may conduct on-site inspections as necessary to enforce the Act.

During these inspections, the NRA staff may enter the offices or buildings of licensees to examine documents, records, and other materials, as well as to interview personnel.

These inspections also include vendor inspections. The NRA may directly inspect entities involved in the design or construction of nuclear facilities, as well as those engaged in the manufacture of equipment for the relevant facilities.

Article 19 (4) Procedures for Dealing with Events Occurring During Operation

1 Regulatory Requirements Concerning Responses to Abnormal Events

Under the NRA Ordinance on Commercial Reactors, licensees are required to take necessary emergency measures to prevent radiation hazards.
These requirements are specified in the Operational Safety Programs as actions to be taken in emergency situations.
Additionally, licensees must include details regarding "matters related to the operation of reactor facilities" in their Operational Safety Programs.
These include procedures for responding to accidents or other abnormal situations, as well as manuals for normal operations, thereby ensuring an effective and timely response to emergencies.
Provisions related to "steps in the event of an abnormal situation" include status checks, elimination of causes, measures to prevent escalation, and actions following a reactor scram.
Emergency operating procedures are part of the overall operating procedures defined in the Operational Safety Programs. During the Nuclear Regulatory Inspections, the NRA reviews these procedures and the systems in place for their implementation.

2 Operating Procedures in an Emergency

Emergency operating procedures are established as subordinate provisions under the Operational Safety Programs. These procedures include standardised responses to specific events, such as earthquakes or fires, as well as procedures based on changes in the reactor's operational parameters.

3 Responses to Severe Accidents

The NRA Ordinance on Commercial Reactors stipulates the following requirements regarding responses to severe accidents. These measures must be periodically evaluated, and appropriate actions must be taken based on the evaluation results:

- Formulating plans necessary to carry out activities aimed at maintaining the

integrity of reactor facilities in the event of a severe accident.

- Deploying personnel required to perform such activities (referred to as "key response personnel")
- Conducting regular training and exercises for key response personnel at least once per year.
- Providing mobile generators, fire engines, fire hoses, and other equipment and materials necessary to maintain the integrity of reactor facilities during a severe accident.
- Establishing procedures to be followed by key response personnel, including:
  - Measures to prevent significant core damage,
  - Measures to prevent CV failure,
  - Measures to prevent damage to fuel assemblies stored in spent fuel storage facilities, and
  - Measures to prevent damage to fuel assemblies when the reactor is shut down.
- Implementing systems necessary to support activities for maintaining the integrity of reactor facilities during a severe accident, beyond those listed above.

Moreover, the NRA Ordinance on Commercial Reactors stipulates that systems for carrying out activities to maintain the integrity of reactor facilities in the event of fire, internal flooding, volcanic eruptions, severe accidents, or the loss of a large area of a nuclear facility must be detailed in the Operational Safety Programs. Accordingly, licensees are required to take appropriate measures to prepare for these events.

Article 19 (5) Engineering and Technical Support

Licensees may act flexibly, at their own discretion, when engineering or technical support is needed to ensure the safety of reactor facilities.

If a licensee outsources technical support related to the operation and management of reactor facilities to a specialized contractor, it is essential that the contractor processes the necessary capabilities and conditions to ensure safety. Accordingly, the Rule on Standards for Systems Necessary for Quality Management Relating to Operations for Ensuring the Safety of Nuclear Facilities and the Operational Safety Programs require licensees to appropriately monitor and manage the contractor based on their own QMS. The NRA verifies the licensee's performance in this regard through inspections, such as Nuclear Regulatory Inspections.

Article 19 (6) Reporting of Accidents and Failures, etc.

1 Regulatory Requirements

In the event of an accident or failure at a nuclear facility, a licensee is required to immediately report the incident to the NRA in accordance with the Reactor Regulation Act. The licensee is also obligated to promptly provide the NRA with a report detailing the situation and the measures taken in response to the event.
Furthermore, in the event of a specified incident or emergency as defined in the Nuclear Emergency Act, the licensee must immediately notify both the Prime Minister and the NRA.

2 Outline of Reporting Criteria and Procedures for Accidents, Failures, etc.

The criteria for reporting events in accordance with the Reactor Regulation Act are defined in the NRA Ordinance on Commercial Reactors.
Licensees are required to report such events to the NRA based on these criteria.
The NRA has established a system that allows event reports to be received within 24 hours a day, 365 days a year. For reportable events, the licensee must immediately submit an initial report to the NRA's duty officer and continue to provide follow-up reports in accordance with applicable regulations.
Upon receiving reports from licensees, the NRA promptly discloses information such as event details, the NRA's response, and the provisional International Nuclear and Radiological Event Scale (INES) rating.

3 Reporting of Accidents and Failures, etc. During the Past Three Years

Annex 3 provides a list of events reported by licensees to the NRA during fiscal years 2022 to 2024, in accordance with the provisions of the Reactor Regulation Act.

4 Investigation of the Causes of Accidents or Failures and Measures to Prevent Recurrence

Licensees bear primary responsibility for responding to events that occur at their reactor facilities. They are required to investigate the root causes of such events and implement measures to prevent recurrence.

The NRA verifies whether this process is being carried out appropriately and may prompt licensees to take necessary actions.

In addition to investigating the event, compiling a report detailing the root cause and measures, and submitting it to the NRA, licensees also publish these reports.

The NRA reviews the licensee's findings regarding the root cause and preventive measures, and to assess the validity of the investigation and the adequacy of the proposed actions.

Furthermore, with respect to recurrence prevention, licensees are required to take measures not only based on lessons learnt from events at their own facilities, but also from events that have occurred at other facilities, in accordance with the Reactor Regulation Act.

To enhance transparency in the process of addressing accidents and failures, the NRA holds the Meetings for Dealing with Accidents and Failures at Nuclear Facilities, which serve as a forum for sharing information and discussion among licensees.

5 Use of INES

In July 1989, Japan began using its own nuclear event evaluation scale to assign ratings to domestic events. However, since August 1992, Japan has adopted the International Nuclear and Radiological Event Scale (INES) for event evaluation.

When a licensee reports an accident or failure in accordance with laws such as the Reactor Regulation Act, the NRA reviews the report and, upon determining that the identified causes and corrective measures are appropriate, assigns an INES rating based on the report. For TEPCO Fukushima Daiichi NPS, INES ratings are not applied to events occurring after the approval of its Implementation Plan, as these events are assumed to be below INES Level 6. This is because the criteria related to defence in depth and radiation barrier management standards are considered not applicable to the facility's current status.

INES serves as a communication tool to convey the safety significance of events at

nuclear facilities. INES ratings are published on the NRA website. Events rated at INES Level 2 or higher are registered on the IAEA's NEWS website. If necessary, events rated below Level 2 may also registered.

Article 19 (7) Making Effective Use of Operational Experiences

1 Measures for Effective Use of Operational Experiences

When a safety significant event occurs, a licensee is required to report it to the NRA without delay, in accordance with the provisions of the Reactor Regulation Act. Upon receiving the report, the NRA promptly discloses the event details and verifies the licensee's response. Once the root cause is identified and recurrence prevention measures are determined, this information is also made public.

With input from experts in operation management, inspection, and radiation control, the NRA thoroughly examines the event information, identifies safety lessons, and, if necessary, requests licensees to incorporate these lessons into their operation and maintenance activities. The NRA may also reflect these lessons in its own regulatory practices.

The NRA continuously improves ordinances and guidance documents by incorporating the latest knowledge gained from domestic and international regulatory activities, operational data from incidents and failures at nuclear facilities in Japan and abroad, results of safety research conducted by the NRA, academic studies, and cutting edge technical and scientific insights from international organizations such as the IAEA and OECD/NEA.

As part of this process, the NRA collects and analyses information on incidents and failures at nuclear facilities worldwide. Decisions on whether to take regulatory action are made following discussions in the Technical Information Committee and based on advice from the Reactor Safety Examination Committee or the Nuclear Fuel Safety Examination Committee.

As prescribed in the NRA Ordinance, licensees are required to define Operational Safety Programs that include provisions for sharing technical information related to operational safety among licensees, when such knowledge is obtained through maintenance or inspection activities.

This regulation serves as a mechanism for licensees to share event related information

and utilize it to enhance nuclear safety, even when the impact of the event is minor.
Licensees, in cooperation with JANSI, manage the NUCIA database, which contains publicly accessible information on nuclear facilities.
The NUCIA database includes operational data from Japan's first nuclear reactor in 1966 to current reactors and reprocessing plants, and is shared not only among licensees but also with the public to promote transparency.
In addition, JANSI, an independent third party organization separated from electricity utilities, collects, analyses, assesses, and distributes operational information from domestic and international nuclear facilities. This includes data on events, which are then provided to domestic electric utilities for safety improvement.
During its review process, the NRA also instructs licensees to share relevant information and take necessary actions for evens that must be reported, in accordance with applicable legislation.

2 International Sharing of Operational Experiences

As a country with extensive experience in operating nuclear reactor facilities, Japan recognises the importance of sharing these experiences internationally with a wide range of countries, and acknowledge its responsibility to contribute to global nuclear safety.
The NRA shares information internationally through mechanisms provided by international organizations such as IAEA and OECD/NEA, as well as through bilateral cooperation.
Mechanisms for sharing operational experiences with international organizations include the proactive provision of information via the IAEA Incident Reporting System (IRS), the Fuel Incident Notification and Analysis System (FINAS), and the Incident Reporting System for Research Reactors (IRSRR). In Japan, the NRA collects operational experience data, compiles it into a database, and submits relevant information to IRS, FINAS, and IRSRR.
In terms of bilateral activities, information is exchanged through regular meetings and other collaborative efforts.

Article 19 (8) On-Site Management of Spent Fuels and Radioactive Wastes

1 On-Site Management of Spent Fuels

In addition to spent fuel pools used at many reactor facilities, dry storage casks are utilised at some power stations to store spent fuel. Spent fuel owned by TEPCO and Japan Atomic Power Company may be transported to an off-site storage facility and stored until reprocessed.

When storing the spent fuel, licensees are required to implement necessary cooling measures and ensure that the design of the storage system maintains subcriticality, in accordance with the provisions of the NRA Ordinance on Commercial Reactors. A Pre-service Operator Check is conducted to confirm that construction work has been carried out in accordance with the approved design. Licensee's Periodic Inspections are also conducted to verify the continued integrity of the storage facility throughout the reactor's operational lifetime.

On-site management of spent fuel is considered part of the safety measures required to ensure the operational safety of reactor facilities, and its implementation status is reviewed during Nuclear Regulatory Inspections.

Regarding on-site dry storage using Dual Purpose Casks (DPCs), which are designed for both transportation and storage, the NRA has established appropriate regulations and procedures based on stringent transportation specifications. DPCs must be designed to meet seismic conditions applicable to any candidate site, with sufficient safety margins. The NRA has included DPCs in the Type Certification for Design of Specified Equipment and Designation of Type of Specified Equipment. When certified and designated DPCs are used, reviews for Reactor Installation Permits and approval of Design and Construction Plans are limited to site specific conditions, such as radiation dose at the site boundary or separation distance from fire sources. To support this framework, the NRA revised and established the NRA Ordinance on Standards for Installation Permits, the NRA Ordinance on Technical Standards, and relevant guidance documents, which were promulgated and enforced in April 2019.

2 On-Site Management of Radioactive Waste

Licensees are required to take appropriate measures for the transport, storage, and on-

site disposal of radioactive waste as part of the operational safety requirements, in accordance with the provisions of the Reactor Regulation Act.

When disposing of radioactive waste on-site, licensees must ensure that the process is supervised by personnel with the necessary expertise in disposal and radiation protection.

Disposal measures must be implemented according to the nature of the waste:

- Gaseous radioactive waste must be discharged through an exhaust system or retained in disposal tanks.
- Liquid radioactive waste must be discharged through a drainage system, retained in disposal tanks, placed in containers and solidified along with the container for storage at a storage facility, or incinerated at an incineration facility.
- Solid radioactive waste is required to be incinerated at an incineration facility, and the resulting residue must be placed in containers or solidified together with the container and stored at a retained waste facility. Alternatively, radioactive waste that is extremely difficult to dispose of using these methods, such as large machinery, or waste that requires decay over time to reduce radioactivity must be stored at a retained waste facility.

The NRA Ordinance on Commercial Reactors prescribes requirements and criteria for each disposal method, including the type of radiation monitoring necessary to prevent radiation hazards and the specifications for disposal containers, thereby ensuring the appropriate handling of radioactive waste. Licensees store radioactive waste generated by their own reactor facilities at on-site storage facilities until it can be transported to an off-site disposal facility.

Radioactive waste is classified into gaseous, liquid, and solid waste:

- Gaseous radioactive waste consists of exhaust gases generated from ventilating components and rooms within radiation controlled areas. It is discharged through vent stacks while being monitored by exhaust radiation monitors.
- Liquid radioactive waste is effluent generated within controlled areas. It is filtered, demineralized, and concentrated. Except for waste with extremely low radioactivity, the treated liquid is generally reused within the facility rather than discharged into the environment.
- Solid radioactive waste, such as scrap materials generated during maintenance and repair work conducted during Licensee's Periodic Inspections, is either placed directly into drums or processed, by incineration,

melting, or compression, to reduce volume before being placed into drums. It is then stored at the on-site radioactive waste storage facility.

In Japan, there are no legal provisions mandating the minimization of radioactive waste volume. However, due to limitations on on-site storage capacity and the costs associated with waste treatment and disposal, licensees voluntarily strive to minimize waste volume. Methods include evaporative concentration of liquid waste and compression or melting of solid waste.

On-site management of radioactive waste is considered part of the safety measures required to ensure the operational safety of reactor facilities under safety regulations. Its implementation status is reviewed during Nuclear Regulatory Inspections.

Although the above-mentioned procedures have been in place for many years, it is essential to continuously improve these measures to ensure safety. Therefore, reviews of these procedures will continue.

3 Clearance System

In Japan, scrap material generated from the operation, maintenance, or decommissioning of reactor facilities that has extremely low radioactivity concentration may be classified as "material not required to be handled as radioactive waste" following approval and confirmation by the NRA. This allows such material to be appropriately and rationally recycled or disposed of. This framework is referred to as the Clearance system. The system applies not only to reactor facilities but also to other nuclear facilities, including those involved in the nuclear fuel cycle.

The NRA is involved at two key stages:

Stage 1: The NRA reviews and approves the validity of the radioactivity concentration measurement and evaluation methods developed by the licensee.

Stage 2: The NRA confirms that the licensee is conducting radioactivity concentration measurements and evaluations using the approved methods from Stage 1. It also verifies, through Nuclear Regulatory Inspections, that the materials classified by the licensee as "not required to be handled as radioactive waste" are indeed below the clearance level defined in the Clearance system.

Fukui Prefecture is conducting a study on the industrialization of centralised processing for dismantling waste from nuclear power plants intended for reuse under the Clearance

System. In response, the NRA has revised the regulatory criteria to include provisions aimed at preventing intentional mixing and dilution.

D Annexes

1 Results of the IAEA Regulatory Review Mission on the ALPS Treated After Discharge into the Sea at TEPCO Fukushima Daiichi NPS

2 List of Nuclear Installations (as of 31 March 2025)

3 List of Accidents and Failures Reported under the Reactor Regulation Act during the Reporting Period

4 References

1 Results of the IAEA Regulatory Review Mission on the ALPS Treated Water Discharge into the Sea at TEPCO Fukushima Daiichi NPS

IAEA's website：IAEA Task Force Releases Report on Regulatory Aspects of Water Discharge at Fukushima Daiichi, https://www.iaea.org/newscenter/pressreleases/iaea-task-force-releases-report-on-regulatory-aspects-of-water-discharge-at-fukushima-daiichi

2 List of Nuclear Installations (as of 31 March 2025)

Licensee	Power Station	unit	Reactor Type	Output (MWe)	Commissioned	Status
Hokkaido Electric Power Co., Inc.	Tomari	1	PWR	579	Jun 22, 1989	In Operation
		2	PWR	579	Apr 12, 1991	In Operation
		3	PWR	912	Dec 22, 2009	In Operation
Tohoku Electric Power Co., Inc.	Onagawa	1	BWR4	524	Jun 01, 1984	Decommissioning
		2	BWR5	825	Jul 28, 1995	In Operation
		3	BWR5	825	Jan 30, 2002	In Operation
	Higashidori	1	BWR5	1,100	Dec 08, 2005	In Operation
		2	ABWR	1,385		In Planning
Tokyo Electric Power Co. Inc.	Fukushima Daiichi	1	BWR3	460	Mar 26, 1971	decommissioning work in progress
		2	BWR4	784	Jul 18, 1974	decommissioning work in progress
		3	BWR4	784	Mar 27, 1976	decommissioning work in progress
		4	BWR4	784	Oct 12, 1978	decommissioning work in progress
		5	BWR4	784	Apr 18, 1978	decommissioning work in progress
		6	BWR5	1,100	Oct 24, 1979	decommissioning work in progress
	Fukushima Daini	1	BWR5	1,100	Apr 20, 1982	Decommissioning
		2	BWR5	1,100	Feb 03, 1984	Decommissioning
		3	BWR5	1,100	Jun 21, 1985	Decommissioning
		4	BWR5	1,100	Aug 25, 1987	Decommissioning
	Kashiwazaki-Kariwa	1	BWR5	1,100	Sep 18, 1985	In Operation
		2	BWR5	1,100	Sep 28, 1990	In Operation
		3	BWR5	1,100	Aug 11, 1993	In Operation
		4	BWR5	1,100	Aug 11, 1994	In Operation
		5	BWR5	1,100	Apr 10, 1990	In Operation
		6	ABWR	1,356	Nov 07, 1996	In Operation
		7	ABWR	1,356	Jul 02, 1997	In Operation
	Higashidori	1	ABWR	1,385		Under Construction
Chubu Electric Power Co., Inc.	Hamaoka	1	BWR4	540	Mar 17, 1976	Decommissioning
		2	BWR4	840	Nov 29, 1978	Decommissioning
		3	BWR5	1,100	Aug 28, 1987	In Operation
		4	BWR5	1,137	Sep 03, 1993	In Operation
		5	ABWR	1,380	Jan 18, 2005	In Operation
Hokuriku Electric Power Company	Shika	1	BWR5	540	Jul 30, 1993	In Operation
		2	ABWR	1,206	Mar 15, 2006	In Operation
Kansai Electric Power Co., Inc.	Mihama	1	PWR	340	Nov 28, 1970	Decommissioning
		2	PWR	500	Jul 25, 1972	Decommissioning
		3	PWR	826	Dec 01, 1976	In Operation
	Takahama	1	PWR	826	Nov 14, 1974	In Operation
		2	PWR	826	Nov 14, 1975	In Operation
		3	PWR	870	Jan 17, 1985	In Operation
		4	PWR	870	Jun 05, 1985	In Operation
	Ohi	1	PWR	1,175	Mar 27, 1979	Decommissioning
		2	PWR	1,175	Dec 05, 1979	Decommissioning
		3	PWR	1,180	Dec 18, 1991	In Operation
		4	PWR	1,180	Feb 02, 1993	In Operation
Chugoku	Shimane	1	BWR3	460	Mar 29, 1974	Decommissioning

Licensee	Power Station	unit	Reactor Type	Output (MWe)	Commissioned	Status
Electric Power Co., Inc.		2	BWR5	820	Feb 10, 1989	In Operation
		3	ABWR	1,373		Under Construction
	Kaminoseki	1	ABWR	1,373		In Planning
Shikoku Electric Power Co., Inc.	Ikata	1	PWR	566	Sep 30, 1977	Decommissioning
		2	PWR	566	Mar 19, 1982	Decommissioning
		3	PWR	890	Dec 15, 1994	In Operation
Kyushu Electric Power Co., Inc.	Genkai	1	PWR	559	Oct 15, 1975	Decommissioning
		2	PWR	559	Mar 30, 1981	Decommissioning
		3	PWR	1,180	Mar 18, 1994	In Operation
		4	PWR	1,180	Jul 25, 1997	In Operation
	Sendai	1	PWR	890	Jul 04, 1984	In Operation
		2	PWR	890	Nov 28, 1985	In Operation
		3	APWR	1,590		In Planning
Japan Atomic Power Company	Tokai		GCR	166	Jul 25, 1966	Decommissioning
	Tokai No2		BWR5	1,100	Nov 28, 1978	In Operation
	Tsuruga	1	BWR2	357	Mar 14, 1970	Decommissioning
		2	PWR	1,160	Feb 17, 1987	In Operation
		3	APWR	1,538		In Planning
		4	APWR	1,538		In Planning
Electric Power Development Co., Ltd. (J-POWER)	Ohma	1	ABWR	1,383		Under Construction
Japan Atomic Energy Agency	Advanced Thermal Reactor "Fugen"		ATR	165	Mar 20, 1979	Decommissioning
	Prototype Fast Breeder Reactor "Monju"		FBR	280		Decommissioning

Notes:

In Planning:	NPS for which the operator submitted a license application, but not yet approved
Under Construction:	NPS has been authorized, but has not yet passed a pre-service inspection[16]
In Operation:	NPS that has passed a pre-service inspection
Decommissioning work in progress;	Decommissioning work is underway in accordance with the Act on the Regulation of Nuclear Reactors
Decommissioning:	NPS whose decommissioning plan has already been approved

[16] "Pre-Service Inspection" refers to the inspection performed prior to the amendment of Reactor Regulation Act in 2020.

3 List of Accidents and Failures Reported under the Reactor Regulation Act during the Reporting Period

Accidents and failures reported in FY 2022

Power Station	Accidents and Failures	Date	INES
Takahama Power Station	Indication of flaw of heat transfer tubes of the Steam Generator at unit 4	8 Jul 2022	0
Takahama Power Station	Reactor trip at unit 4	30 Jan 2023	0

Accidents and failures reported in FY 2023

Power Station	Accidents and Failures	Date	INES
Takahama Power Station	Indication of flaw of heat transfer tubes of the Steam Generator at unit 3	17 Oct 2023	0
Takahama Power Station	Indication of flaw of heat transfer tubes of the Steam Generator at unit 4	22 Jan 2024	0
Takahama Power Station	Leakage of steam at the inlet piping of B feed water booster pump at unit 1	24 Jan 2024	0
Fukushima Daiichi NPS	Leakage of water containing radioactive material from the high temperature incineration building	7 Feb 2024	Below scale

Accidents and failures reported in FY 2024

Power Station	Accidents and Failures	Date	INES
Mihama Power Station	Tiny hole and thickness reduction of the sea water piping for the primary component cooling water system at unit 3	10 Oct 2024	0

4 References

The following documents are references for writing national report.

In General

- The Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors, Act No.166, 1957
- NRA Ordinance Concerning the Installation and Operation, of Commercial Power Reactors, Ordinance of the Ministry of International Trade and Industry No. 77, 1978
- NRA Ordinance Prescribing Standards for the Location, Structure, and Equipment of Commercial Power Reactors and their Auxiliary Facilities, NRA Ordinance No. 5, 2013
- NRA Ordinance Prescribing Technical Standards for Commercial Power Reactors and their Auxiliary Facilities, NRA Ordinance No. 6, 2013

A

- The 7th Strategic Energy Plan, February 2025

B

- The Medium Term Goal for the Third Term of the Nuclear Regulation Authority, 5 February 2025, the Nuclear Regulation Authority

Article 8

- The Basic Policy on Human Development for the Nuclear Regulation Authority Personal, the Nuclear Regulation Authority
- The Nuclear Regulation Authority Management Rules, 10 October 2014, the Nuclear Regulation Authority
- The Medium Term Goal for the First Term of the Nuclear Regulation Authority, March 2017 amended, the Nuclear Regulation Authority
- The Medium Term Goal for the Second Term of the Nuclear Regulation Authority, 5 February 2020, the Nuclear Regulation Authority

Article 14

- The Guideline for Periodic Safety Assessment of Continuous Improvement of Commercial Power Reactor, March 2020 amended, the Nuclear Regulation Authority

Article 15

- Report on radiation control in nuclear installations, the Secretariat of the Nuclear Regulation Authority

Article 16

- The Basic Act on Disaster Management, 1961, Act No.223
- The Nuclear Emergency Act, 1999, Act No.156
- Basic Plan for Disaster Preparedness, part 12 Nuclear Emergency Preparedness, 17 June 2022 amended, the Central Disaster Management Council
- The NRA EPR Guide, 7 July 2022 amended, the Nuclear Regulation Authority
- The Installation Guideline for Emergency Monitoring Center, 25 June 2019, the Nuclear Regulation Authority

Article 19

- Accidents and failures reported in FY2022, the Secretariat of the Nuclear Regulation Authority
- Accidents and failures reported in FY2023, the Secretariat of the Nuclear Regulation Authority
- Accidents and failures reported in FY2024, the Secretariat of the Nuclear Regulation Authority
- Challenges and actions regarding the improvement of regulatory requirements, 22 November 2016, the Secretariat of the Nuclear Regulation Authority
- Operation of the International Nuclear and Radiological Event Scale for Events occurred in nuclear facilities, 18th March 2015, the Nuclear Regulation Authority