Convention on Nuclear Safety
National Report of Japan
for 6th Review Meeting
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NRA, Japan
Nuclear Regulation Authority

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Abbreviations in this report

ABWR	Advanced Boiling Water Reactor
APWR	Advanced Pressurized Water Reactor
ATR	Advanced Thermal Reactor
BWR	Boiling Water Reactor
ConvEx	Convention Exercise
EAL	Emergency Action Levels
FBR	Fast Breeder Reactor
GCR	Gas Cooled Reactor
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiation Protection
INES	International Nuclear and Radiological Event Scale
IRRS	Integrated Regulatory Review Service
IRS	Incident Reporting System
JAEA	Japan Atomic Energy Agency
JANSI	Japan Nuclear Safety Institute
JEAC 4111	Quality Assurance Standard for the Safety for Reactor Facilities, Nuclear Standards Committee of the Japan Electric Association
JNES	Japan Nuclear Energy Safety Organization, an incorporated administrative agency
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
NAC	National Assistance Capability
NCA	National Competent Authority
NIRS	National Institute of Radiological Science
NISA	Nuclear and Industrial Safety Agency (former nuclear regulator)
Notification on Doses	Notification to Establish Dose Limits in accordance with the Provisions of the NRA Ordinance Concerning the Installation, Operation of Commercial Power Reactors
NPS	Nuclear Power Station
NRA	Nuclear Regulation Authority
NRA Ordinance on Commercial Reactors	NRA Ordinance concerning the Installation and Operation, of Commercial Power Reactors
NRA Ordinance on Standards for the Location, etc.	NRA Ordinance prescribing Standards for the Location, Structure, and Equipment of Commercial Power Reactors and their Auxiliary Facilities
NRA Ordinances on Quality Control Methods	NRA Ordinances 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
Nuclear Emergency Act	Act on Special Measures Concerning Nuclear Emergency Preparedness
OIL	Operational Intervention Level
PAZ	Precautionary Action Zone
PPA	Plume Protection Planning Areas
PWR	Pressurized Water Reactor
RANET	Response Assistance Network
Reactor Regulation Act	Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors
SPEEDI	System for Prediction of Environmental Emergency Dose Information
TEPCO	Tokyo Electric Power Company
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 Current Nuclear Energy Use in Japan

The March 11, 2011 earthquake and subsequent tsunami off the Pacific coastline of Japan's Tohoku region caused severe damage at the Tokyo Electric Power Company's Fukushima Nuclear Power Stations and particularly at the Fukushima Daiichi Nuclear Power Station where the impact measured Level 7 on the International Nuclear and Radiological Event Scale (INES). Large amounts of radioactive materials were released causing extensive environmental and social consequences. There were fatalities connected to the evacuation procedures in disaster. Entire populations of residents around the nuclear power station were forced to evacuate their homes and more than two years later an estimated 150,000 people remain evacuees. Untold numbers face ongoing health concerns because of radiation exposure. Cleaning up operations and initial reconstruction began almost immediately but it is anticipated it will take many years to complete. Public trust in Japan's nuclear safety was lost and it has become difficult to establish a national consensus on the future role of nuclear power in Japan. Subsequently, power plants were shut down one by one, as each one underwent their scheduled periodic inspections and by May, 2012 all power stations had suspended operations. Following a government decision Units 3 and 4 at the Kansai Electric Power Company's Ohi Power Station resumed operations and they remained the only operational nuclear power stations in the country as of August 2013.

There were 50 reactor units in service at the end of March 2013 following a decision to decommission Units 1 to 4 at TEPCO's Fukushima Daiichi Nuclear Power Station.

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

2 Implementation Status of the Convention on Nuclear Safety in Japan and Related Initiatives

Through measures based on the Atomic Energy Basic Act, the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (Reactor Regulation Act), and related legislation, Japan has been steadily fulfilling its obligations under the Convention on Nuclear Safety (CNS). These include establishing and maintaining a legislative and regulatory framework to govern the safety of nuclear installations, and establishing a regulatory body to implement the regulations. However, following the TEPCO's Fukushima Daiichi NPS accident the Reactor Regulation Act was drastically revised and the Nuclear Regulation Authority (NRA) was established on September 19, 2012. Efforts are underway to implement a full revision of regulatory requirements.

The newly established NRA has been given centralized jurisdiction over regulations on nuclear security, safeguards, radiation monitoring, and regulations on the use of radioisotopes—all of

which were previously administered by multiple administrative organs, such as the Atomic Energy Commission and the Ministry of Education, Culture, Sports, Science and Technology - as well as over regulations on nuclear safety.

This report sets forth Japan's new nuclear regulation and confirms its compliance with its obligations under each article.

The new regulatory requirements for power reactors, based on lessons learned from the accident and in consideration of international requirements such as the IAEA Safety Standards, came into force on July 8, 2013. From now on, nuclear power stations seeking to resume operations will be assessed on whether they meet the new regulatory requirements.

One of the characteristics of these requirements is that nuclear operators must take backfitting measures based on experience and the latest available technical knowledge. Continuous efforts will be made to implement improvements based on these measures.

Because these regulatory requirements came into force only recently and as Japan works continuously to improve its overall nuclear regulation has drastically improved its framework we welcome reviews by the Contracting Parties during this Sixth Review process of the CNS.

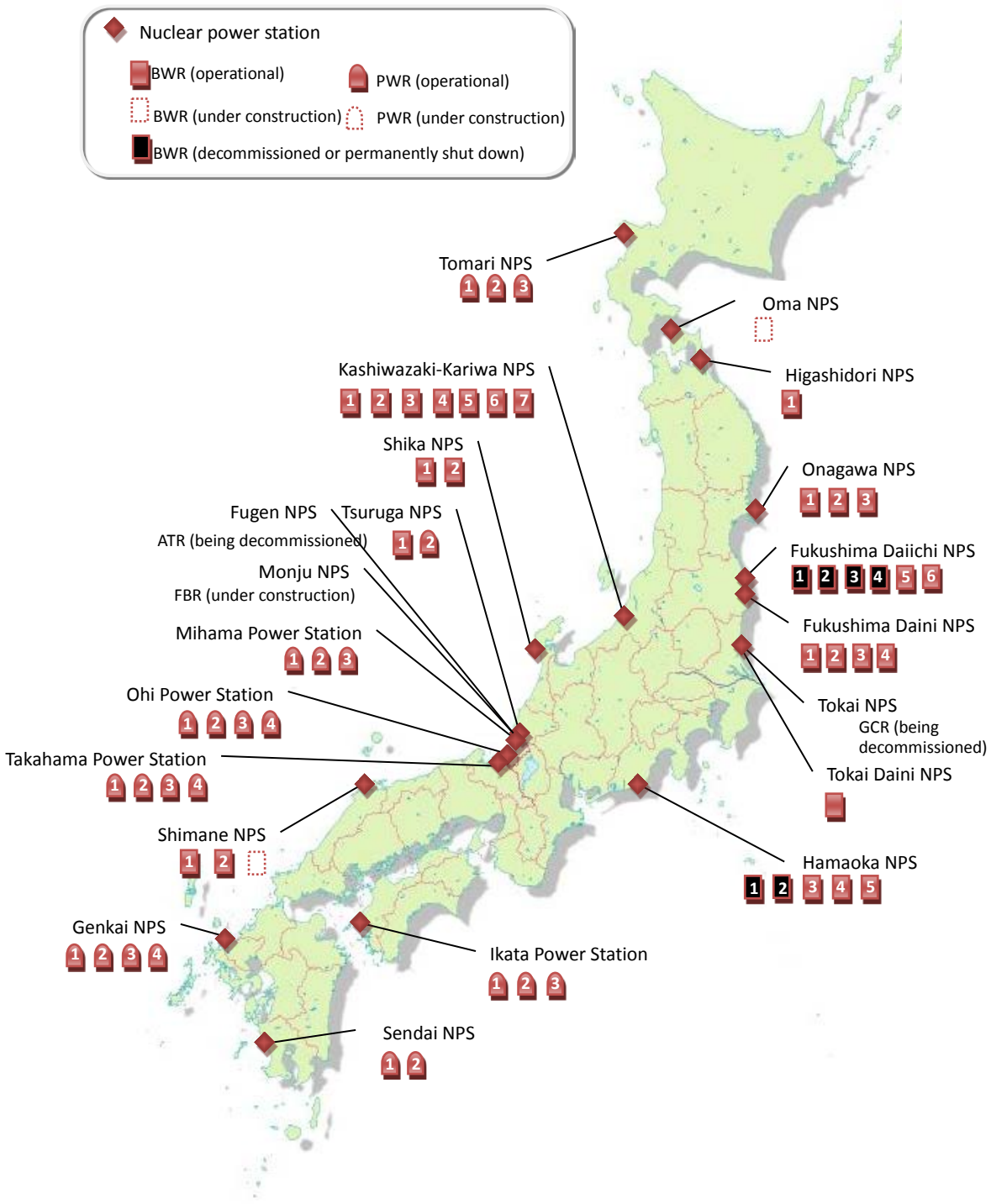


Figure A-1 Location and Status of Reactor Facilities

3 Development of the National Report

The Fukushima Daiichi accident led directly to the establishment of the NRA in September 2012, and the extensive revision of nuclear safety regulations taking into account lessons from the accident. This report on those developments is the first to be given to a Review Meeting.

The new regulatory requirements have inherited some of nuclear safety activities which were being carried out even before the 2011 crisis, while some others have been revised for incorporation and several new requirements have been freshly added.

New regulatory requirements introduced here will remain under review and future improvements will be made as necessary.

This Sixth National Report does not purport to discuss about changes from the nuclear regulations that were previously implemented by the Nuclear and Industrial Safety Agency (NISA). Rather, it presents the new nuclear regulations and related issues, focusing primarily on their compliance with the Convention on Nuclear Safety.

The content of this report is largely based on information available as of July 31, 2013.

B SUMMARY

1 Progress on Nuclear Safety since the previous National Report

1-1 Establishment of the NRA

The March 11, 2011 earthquake-tsunami damaged 14 reactor units at four nuclear power stations on Japan's Pacific Ocean coastline. In particular, the TEPCO's Fukushima Daiichi nuclear power plant was severely damaged and INES level 7 accident followed. Large amounts of radioactive materials were released causing extensive environmental and social consequences. There were fatalities connected to the evacuation procedures in disaster. Entire populations of residents around the nuclear power station were forced to evacuate their homes and more than two years later an estimated 150,000 people remain evacuees. Untold numbers face ongoing health concerns because of radiation exposure. Cleaning up operations and initial reconstruction began almost immediately but it is anticipated it will take many years to complete. In addition to the direct causes of the earthquake and tsunami, the lack of a true safety culture at TEPCO, and any genuine regulatory independence contributed to the overall devastating impact.

In the wake of the controversy and based on 'lessons learned' an Act for Establishment of the Nuclear Regulation Authority was enacted on June 20, 2012 and promulgated on June 27 to strengthen the regulatory structure and a new regulatory body, the Nuclear Regulation Authority (NRA), was established. As an external organ of the Ministry of the Environment the NRA is charged with separating the functions of promoting and regulating the nuclear energy industry, eliminating an earlier system whereby one single government organization was responsible for both. The Act of Establishment empowers the NRA Chairman and its Commissioners to follow an independent, neutral and fair role in enforcing regulations on nuclear energy, security, international safeguards, radiation monitoring, and regulations on the use of radioisotopes, which previously had been governed by other administrative units. On September 19, 2012, the Prime Minister appointed a Chairman and four Commissioners (the ex post facto consent of the Diet was obtained on February 15, 2013), and the NRA was officially inaugurated. A report on the organizational structure and independence of the NRA is provided in Article 8.

1-2 Revamp of the Regulatory System

Following the TEPCO's Fukushima Daiichi Nuclear Power Station's accident, the Reactor Regulation Act was revised and strengthened with the incorporation of the latest available technical knowledge and regulations and guidelines from such overseas organizations as the International Atomic Energy Agency (IAEA). The overall purpose of

the Act is to protect public health and preserve the environment. The main points of revision include (1) strengthening countermeasures against severe accidents; (2) adoption of the latest technical knowledge and introduction of a backfit system to which even already authorized nuclear facilities will be also required to conform; (3) the introduction of an approval system for the extension of operational periods, and (4) integration of regulations on power reactor into the Reactor Regulation Act.

The Act for the Establishment of the Nuclear Regulation Authority provides that the new power reactor regulations will come into force on a day specified by Cabinet Order within a period not exceeding ten months from the effective date of the said Act (by July 18, 2013) and that new regulations for other facilities (such as nuclear fuel facilities) shall come into force on a day specified by Cabinet Order within a period not exceeding one year and three months from the effective date of the said Act (by December 18, 2013). The NRA therefore established a Study Team on New Regulatory Requirements for Light Water Power Reactors, a Study Team on New Regulatory Requirements for Light Water Nuclear Power Plants (Earthquakes and Tsunamis), and a Study Team on Establishment of New Regulations for Light Water Nuclear Power Plants and held discussions on enforcing the new rules.

The Study Team on New Regulatory Requirements for Light Water Power Reactors discussed the tightening of conventional designs and proposed measures to counter severe accidents. The Study Team on New Regulatory Requirements for Light Water Nuclear Power Plants (Earthquakes and Tsunamis) discussed designs to counter earthquakes and tsunamis. When establishing these new regulatory requirements, particular emphasis was placed on utilizing the lessons learned from the Fukushima Daiichi accident, incorporating international knowledge and experience and ensuring consistency with the safety standards and guidelines established by the IAEA, and reflecting in these new regulatory requirements the fact that Japan is among the most vulnerable nations in the world to earthquakes, tsunamis and other natural disasters. Discussions were also held to establish the most rigorous regulations in the world.

Public comments were solicited February 7-28, 2013, on the proposed regulatory requirements and then compiled for review by the Study Teams after which additional amendments were adopted. They included the need for tsunami protection facilities against design basis earthquake ground motions.

The Study Team on Establishment of New Regulations for Light Water Nuclear Power Plants discussed issues such as the integration of the regulations on power reactor facilities into the Reactor Regulation Act, and conducted hearings with organizations subject to regulation.

Table B-1 Main Points of the New Regulatory Requirements for Light Water Power Reactors

Main Topic	Main Points of the New Regulatory Requirements
Tightening of design basis	- Add tornados, forest fires and others as natural disasters to be taken into consideration in designing facilities - Strengthen and thoroughly ensure fire protection measures - Strengthen the trustworthiness of essential safety equipment - Strengthen external power supplies - Physical protection of systems to allow heat dissipation
Countermeasures to prevent core damage during severe accidents	- Measures to be taken when nuclear reactors cannot be shut down by ordinary procedures - Measures to be taken in the event of losing the ability to cool down and reduce pressures of reactors - Measures to be taken with the failure of the ultimate heat sinks - Ensuring support functions (power supply, water, etc.)
Measures to prevent damage of containment vessels.	- Measures to cooling down and reduce atmospheric pressure and reducing the presence of radioactive materials in containment vessels (containment spray system) - Measures for preventing damage caused by pressure increase of containment vessels (filter vent) - Measures for cooling down reactor cores that have melted down at the base of containment vessels - Measures for preventing hydrogen explosions in containment vessels - Measures for preventing hydrogen explosions in reactor buildings - Measures for cooling down spent fuel storage pools
Countermeasures against intentional aircraft crash	- Develop specified safety facilities to be used in the event of core damage caused by terrorist attacks such as intentional aircraft crashes
Measures to curb the spread of radioactive materials outside the immediate vicinity	- Install outdoor water equipment and other measures to counter any damage to containment vessels
Strengthening of counter tsunami measures	- Use the largest-ever previously recorded tsunami as a new ‘standard’ level and install tsunami protection facilities such as seawalls, which meet these new standards.
Expansion of facilities to require a high quake resistance level	- In the design stage categorize facilities that help protect against tsunamis as Class S, the same category as reactor pressure vessels, for which the highest quake resistance is required.
Tightening standards for determining active faults	- When determining possible active faults to be considered in aseismic design, evaluate all active faults activity from the middle Pleistocene epoch (approx. 400 million years ago), as necessary
Setting an accurate design basis for earthquake ground motions	- Ascertain subsurface structures at NPS sites in three dimensions
Clarification of standards for ground shifts and deformation, in addition to those for quakes	- Construct buildings and structures categorized as Class S on grounds where there are no capable faults

On February 27, 2013, the NRA decided that new regulatory requirements for the Monju prototype Fast Breeder Reactor would be developed in line with the enforcement of the revised Act in July which included strengthened requirements for light water power reactors. Safety issues peculiar to Fast Breeder Reactors would be discussed separately, both medium and long term.

With regard to the new regulatory requirements for nuclear fuel facilities, it was decided on March 27, 2013 to establish a Study Team on the New Regulatory Requirements for Nuclear Fuel Facilities, with membership consisting of a NRA Commissioner, external experts, staff members of the NRA Secretariat and Japan Nuclear Energy Safety Organization (JNES) staff. This team began discussions on April 15, 2013.

Recognizing the importance of on-going safety efforts a March 19, 2013 NRA Commission Meeting decided basic policy for strengthening the backfitting system for continuous employment. It was also agreed that a transitional period would be allowed, in principle, whenever new regulatory requirements were introduced and that a final judgment on their efficacy would be made at the time operations were scheduled to restart.

Based on the main points of the new regulatory requirements and the Study Team's discussions, the NRA Ordinances, including regulations concerning the installation and operation of commercial power reactors, came into force on July 8, 2013.

A report on the legislative system as of July 2013 is provided in Article 7, and further details of the regulatory system are provided in Articles 17 - 19.

1-3 Strengthening the Nuclear Emergency Response System

(1) Framework for the Government's Nuclear Emergency Responses

To develop a new nuclear emergency response system based on the experience and 'lessons learned' from the accident at the TEPCO's Fukushima Daiichi Nuclear Power Station and the establishment of the NRA on September, 2012, the Atomic Energy Basic Act, the Act on Special Measures Concerning Nuclear Emergency Preparedness (Nuclear Emergency Act), and other related laws and regulations were amended and the government developed a new framework of nuclear emergency responses.

These response policies need to be implemented uniformly by all involved government agencies and to achieve that goal, a Nuclear Emergency Preparedness Commission was set up within the Cabinet with the Prime Minister as Chairperson, and the NRA Chairman as one of the Vice Chairpersons.

A Nuclear Emergency Response Headquarters will also be established in response to a nuclear emergency with the Prime Minister serving as Chief and the NRA Chairman

serving as one of the Vice Chiefs.

Reflecting the fact that there had been confusion in responding to Fukushima, on-site and off-site roles were clearly spelled out. The NRA will now oversee the technical and professional safety requirements of on-site nuclear facilities. Other relevant ministries and agencies will handle the procurement of needed equipment at nuclear facilities and other off-site activities under the supervision of the Chief of the Headquarters. The Secretary-General of the NRA Secretariat will serve as the Director-General of the Headquarters.

(2) Preparation of the Manual.

As part of the overall strengthening of the new response system, the chapter for nuclear emergency responses of Japan's Basic Disaster Prevention Plan was also revised. Jurisdictions were changed following the establishment of NRA and the crisis management system at the Official Residence of the Prime Minister, including the NRA, and allocation of roles in taking on-site and off-site measures, were clearly specified.

It was also decided that appropriate alternative facilities should be designated in advance to meet the challenge of possible malfunction of emergency response facilities (hereinafter referred to as "off-site centers") because of large scale natural disasters such as earthquakes and tsunamis.

At the first meeting of the Nuclear Emergency Preparedness Commission, a Nuclear Emergency Response Manual was approved. It specifies such issues as the deployment of staff and response procedures of the NRA and other ministries and agencies during an emergency. The manual specifies that the Chairman, Commissioners, and NRA will meet in the operations room of the Nuclear Emergency Response Headquarters to collect and transmit information, supervise relevant nuclear operators' restoration efforts and make any necessary professional judgments on the advisability of evacuating and providing other protective measures for affected local residents. NRA Commissioners and the Director General for Emergency Response of the NRA Secretariat will be dispatched to an emergency rapid response center to be set up in the head office of the relevant electric power company, and the Senior Vice Minister of the Environment (or the Parliamentary Secretary of the Environment) and the Director General for Regional Safety Management of the NRA Secretariat will be dispatched to headquarters at off-site centers to strengthen local response systems.

In conjunction with the September 19, 2012 revised Nuclear Emergency Act, the Cabinet Office revised related Ministerial Ordinances covering off-site centers and their technical standards guidelines. Prefectures hosting off-site centers will be responsible

for checking their preparedness based on revised Ministerial Ordinances and the guidelines.

If necessary, the prefectures will take measures such as relocating facilities or providing necessary equipment. In preparation for the possible relocation of off-site centers, the Cabinet Office has also undertaken to enhance the supply of emergency power supply equipment, increasing storage of protective clothing, masks, and emergency food, and preparing communication materials and equipment for such an eventuality.

Pursuant to the provisions of the Basic Act on Disaster Control Measures and the revised Nuclear Emergency Act, it was also decided that local governments should amend their regional disaster prevention plans by around March 18, 2013. These included evacuation guidelines, based on the Nuclear Emergency Response Guidelines.

To support any needed local government reorganization, the Cabinet Office held briefing sessions and prepared an amended manual on Regional Disaster Prevention Plans in December 2012. As areas included in the Urgent Protective Action Planning Zone (UPZ; see Table B-2) may extend over multiple prefectures, the Cabinet Office held a conference on multi-prefecture regional disaster prevention measures and made adjustments to ensure consistency.

To help determine a UPZ in preparing Regional Disaster Prevention Plans, the NRA conducted a simulation on the spread of radioactive materials resulting from a crisis equal to the Fukushima Daiichi accident, but under even more severe conditions. Results were released in October and partial corrections made on December 13.

As of July 18, 2013, all relevant local governments had completed their Regional Disaster Prevention Plans based on the Nuclear Emergency Response Guidelines. The NRA and the Cabinet Office will provide ongoing support to local governments to enhance regional systems.

(3) Preparation of Nuclear Emergency Response Guidelines

Under the Nuclear Emergency Act, the NRA will prepare Nuclear Emergency Response Guidelines to ensure that licensees and national and local governments will implement nuclear emergency responses. The NRA began relevant discussions immediately after its inauguration and completed them on October 31, 2012 (Table B-2).

Table B-2 Main Points of the Nuclear Emergency Response Guidelines (decided on October 31, 2012)

Basic issues concerning nuclear emergency responses	- Positioning of the guidelines - Characteristics of nuclear disasters - Basic concept of protective actions against radiation exposure
Issues concerning nuclear emergency preparedness measures	- Establishment of the EAL and OIL as standards for implementing protective actions, including evacuation, in an emergency - In anticipation of massive disasters unique measures need to be prepared in advance The PAZ (around 5km from nuclear facilities) should be established where immediate evacuation is necessary, and the UPZ (around 30km from nuclear facilities) where evacuation should be implemented depending on circumstances - Provision of information to residents on a regular basis concerning the potential discharge of radioactive materials, characteristics of nuclear disasters, protective actions against radiation exposure, etc. - Implementation of comprehensive emergency drills for ensuring cooperation with residents and related organizations and practical emergency drills in conditions similar to a real situation - Consideration for the socially vulnerable and others who have difficulties in taking refuge by themselves and need help during any evacuation. - As areas included in the UPZ may extend over multiple prefectures, there is a need for proactive involvement of the national government to make adjustments among prefectures and ensure consistency in regional zonal measures. - Other advance preparation for establishing monitoring and radiation emergency medicine systems in collaboration with disaster medical agencies
Emergency response measures	- Implementation of emergency monitoring to promptly ascertain the situation - Prompt and appropriate information distribution to residents - Implementation of effective protective measures based on the EAL and OIL (sheltering indoors, evacuation, intake of stable iodine, etc.)
Medium- to long-term measures against nuclear disasters	- Long-term evaluation of the effects of radiation on human health and the environment - Implementation of decontamination measures to minimize effects

The EAL and OIL (see Table B-2) are used as the criteria for the implementation of protective emergency actions. The NRA held discussions to enhance these measures, and radiation emergency medical procedures, such as screening and preventive ingestion of stable iodine. Discussions were also held on how to best utilize weather forecasts and the projected aerial spread of radioactive materials from the System for Prediction of Environmental Emergency Dose Information (SPEEDI). Based on these discussions and public input which was sought from January 30, 2013, further guideline revisions were decided on February 27 (Table B-3).

Table B-3 Main Points of the Revision to the Nuclear Emergency Response Guidelines (February 27, 2013)

Nuclear emergency preparedness measures	- Classification of the initial stage of emergencies into the Situation on Alert, Site Area Emergency, and General Emergency. - Specification of the EAL for making judgments on the above mentioned classification and the OIL as the standard for implementing protective actions in the case of a General Emergency
Radiation medicine	- Utilization of emergency disaster medical organizations, and broad-based collaboration among medical institutions - Preparation of a system for preventive intake of stable iodine, such as distributing tablets to residents in the PAZ in advance - Development of a screening system
Others	- Utilization of weather forecasts, etc. as reference materials for implementing protective actions - Need to consider TEPCO's Fukushima Daiichi NPS separately from other facilities

The NRA also discussed effective emergency radiation monitoring systems and procedures for changing the OIL, compiled their discussions on March 11, 2013 (Table B-4), and incorporated the results into the Nuclear Emergency Response Guidelines on June 5, 2013.

Table B-4: Main Points concerning Emergency Radiation Monitoring to be included in the Nuclear Emergency Response Guidelines

Basic policy	- Under the control of the national government, local governments, licensees, and related designated public organizations shall share objectives and collaborate, while fulfilling respective responsibilities.
Objective, definitions	- Collection of information on radiation levels resulting from accidents and provision of information for making decisions on the implementation of protective actions based on the OIL - Provision of information for evaluating effects of radiation on residents and the environment
Advance preparation	- The national government shall prepare a system for emergency radiation monitoring centers at relevant areas and make plans for deploying staff and equipment - Local governments shall each make an emergency radiation monitoring plan.
Implementation	- The national government shall make an implementation plan for emergency monitoring. - Related parties shall conduct emergency radiation monitoring based on the implementation plan. - The national government shall analyze and evaluate the results of emergency radiation monitoring and release the information in an integrated manner.

A report on nuclear emergency response systems is provided in Article 16.

2 Response to Challenges identified at the previous Review Meeting

2-1 Securing qualified personnel to serve as regulators and licensees

Nuclear regulation is an administrative field requiring highly professional and technical judgments. In order to prevent the regulatory authority from being unduly influenced by licensees, it is imperative to recruit a sufficient number of highly trained professional personnel and thereafter continuously enhance their expertise. To achieve these aims, the NRA began new training programs.

NRA officials attended Japanese graduate schools and preparations are continuing to send other personnel to overseas nuclear regulatory organizations such as the US Nuclear Regulatory Commission and the IAEA.

The NRA is continuing to recruit highly educated new graduates and mid-career workers for FY2013 and thereafter.

It was decided at a March 27, 2013 NRA Commission Meeting that the NRA Secretariat and JNES, which provides technical support to the NRA, should strengthen their collaboration. This will include not only issues directly related to nuclear regulation such as requirements, examinations, and inspections, but also human resource development including personnel exchanges and training sessions.

A report on the personnel strategy of the NRA is provided in Article 8.

2-2 Full-scale implementation of the aging management program and reviews of its effectiveness

Under the new regulatory requirements of July 8, 2013 based on the revised Reactor Regulation Act, the working life of power reactors is set at 40 years, in principle. This may be extended one time only for another 20 years if approval is obtained before the expiration of the initial 40 years. With the introduction of this system, a February 27, 2013 NRA Commission Meeting decided that before any extension could be agreed, the current status of the relevant plant would be assessed as further anticipated deterioration during the proposed extension period. A maintenance policy for this extension period must be included in an application, with particular attention paid to preventive measures against aging.

Regarding commercial power reactors in operation for thirty years or more, a degradation assessment and a long-term maintenance policy covering every ten years are already required, based on the Reactor Regulation Act and related legislation. This has been one of the requirements for approval of Operational Safety Programs (aging management system). The NRA decided on January 23, 2013 that as provisional step applications for approval of Operational Safety Programs covering the aging

management system would not be allowed until the Reactor Regulation Act came into force in July 2013.

A report on aging management measure is provided in Article 14.

2-3 Transition status of the Fukushima Daiichi Nuclear Power Station

In December 2012, the Nuclear Emergency Response Headquarters confirmed the followings with regard to Units 1 to 3 of the Fukushima Daiichi NPS: (1) temperatures at the bottom of the pressure vessels are mostly below 100°C; (2) discharge of radioactive materials from the containment vessels is controlled and public exposure due to additional discharge have been considerably reduced (the goal is to reduce the doses below 1 mSv/year at the boundary of the site); and (3) in order to maintain (1) and (2), the medium-term safety of the circulating water cooling system must be ensured.

TEPCO and the Nuclear Emergency Response Headquarters have continued to monitor the situation and confirmed that the nuclear reactors are gradually cooling down and that additional discharges of radioactive materials have been significantly reduced.

However, the Fukushima Daiichi Nuclear Power Station is still completely reliant on temporary safety facilities installed after the accident which frequently experience problems.

On March 18, 2013, power was lost in part of the power-supply facility. This halted the alternative cooling system for the spent fuel pool, the cooling system for the common spent fuel pool, part of the gas treatment system for the containment vessel of Unit 3, the cesium absorbers, and part of the nitrogen gas transfer unit. This underlined that problems continue to arise, and temporary facilities are being replaced with more reliable permanent facilities.

Another problem is the seepage of groundwater into the reactor buildings with TEPCO estimating the increase of 400m^3 of groundwater every day. TEPCO is increasing storage facility capacity, but further measures must be taken to halt the increase of contaminated water. Despite TEPCO's ongoing efforts to prevent continued inflow into the reactor buildings and to ensure the stable operation of the contaminated water treatment facility, the contaminated water situation is increasingly serious.

The NRA has designated the Fukushima Daiichi Nuclear Power Station as a Specified Nuclear Facility and provides necessary instructions to ensure the safety of decommissioning measures. The NRA established a Supervision and Evaluation Committee for Specified Nuclear Facilities to detail risk factors and evaluate various measures to meet specified situations.

2-4 Identification of the root causes, lessons from the accident and sharing that knowledge throughout the nuclear industry

The government, the Diet, and the private sector individually published accident investigation reports. All the reports noted that the accident occurred because of the loss of all power sources and the ultimate heat sink, and that measures to deal with such a severe accident were inadequate.

The NRA is required to conduct an accident investigation separate from those already held. The NRA therefore established the Investigation Committee on the Accident at TEPCO's Fukushima Daiichi Nuclear Power Station and has been carrying out on-site surveys and pursuing the causes of the accident. However, due to high radiation levels, access is still limited and only the area around the isolation condenser in Unit 1 and the hydrogen explosion in Unit 4 at the Fukushima Daiichi Nuclear Power Station have been studied so far. Ongoing long-term studies will continue to determine the causes of the accident, while taking into account the progress of the decommissioning measures.

Relevant industrial organizations also established the Japan Nuclear Safety Institute (JANSI) on November 15, 2012 with the ongoing goal of strengthening measures to ensure the safety of nuclear power stations, including countermeasures against severe accidents.

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

As of the current reporting period, there are 50 reactor units in Japan, following the decision by the licensee to decommission four reactors at the Tokyo Electric Power Company (TEPCO) Fukushima Daiichi Nuclear Power Station.

The NRA takes the measures to ensure the safety of existing NPS such as assessing fracture zones at facility sites.

The NRA has designated TEPCO's Fukushima Daiichi Nuclear Power Station as a Specified Nuclear Power Facility and continues to monitor this power station in order to ensure the proper management of the facility post-accident safety.

Reactor facilities in Japan are required to conform to technical standards based on the provisions of the Reactor Regulation Act. If a facility is deemed not to comply with these standards, the NRA may order action including the suspension of the use of that facility.

1 Reactor Facilities in Japan

As of the end of March 2013, there were a total of 50 reactors (26 Boiling Water Reactors and 24 Pressurized Water Reactors) for power generation purposes in Japan. Four reactors were permanently shut down to take decommissioning measures, and the decommissioning of another four reactors is currently underway.

The Annex provides a list of reactors for power generation in Japan.

2 Events during the Reporting Period

During the three-year period FY2010-2012, 30 incidents were reported to the regulatory authorities by licensees, in accordance with the Reactor Regulation Act. The Annex provides a list of these incidents. The most serious accident during this period was at TEPCO's Fukushima Daiichi Nuclear Power Station.

For further details of this incident and the subsequent Urgent Safety Measures, please refer to a government report to the IAEA Ministerial Conference on Nuclear Safety in June 2011[1] and the report submitted to the IAEA in September of that year[2].

3 Initiatives to Ensure Nuclear Safety

3-1 Designation as a Specified Nuclear Power Facility in Accordance with the Reactor Regulation Act

A nuclear accident resulting in core damage took place at TEPCO's Fukushima Daiichi Nuclear Power Station, during the March 11, 2011 earthquake-tsunami in the Tohoku region of northern Japan. Temporary response measures were formulated in accordance with the Reactor Regulation Act to ensure safety in the aftermath of this accident.

Because it is envisaged that the special management of TEPCO's Fukushima Power Station will continue for some time to come, the NRA designated the plant as a "Specified Nuclear Power Facility" on November 7, 2012, in accordance with the Reactor Regulation Act, in order to ensure appropriate measures were adopted to suit the particular circumstances.

In doing so, and in accordance with the Reactor Regulation Act, the NRA gave the licensee a list entitled *Matters for which the Measures Should be Taken* (Table 6-1) and ordered it to submit a plan for implementing these measures including those focused on the operational safety of the facility.

On December 7, 2012, the NRA received the TEPCO implementation plan.

In response, the NRA established the Supervision and Evaluation Committee for Specified Nuclear Power Facilities, which is conducting a review to determine whether each of the facilities

[1] http://www.kantei.go.jp/foreign/kan/topics/201106/iaea_houkokusho_e.html
[2] http://www.meti.go.jp/english/earthquake/nuclear/iaea/iaea_110911.html

and measures detailed in the implementation plan conform to the safety requirements detailed in *Matters for which the Measures Should be Taken*. On-site inspections form part of this process. (See Figure 6-1)

Table 6-1 Main Points of *Matters for which the Measures Should be Taken*

- With the goal of completing fuel removal thereby reducing risks to the specified nuclear power facilities as a whole and ensuring safety both inside and outside the premises, measures should be taken promptly and efficiently. - Regarding Units 1 to 4, decommissioning measures, including removal and storage of melted fuel rods, should be completed as early as possible, while ensuring safety in the process. - Regarding Units 5 and 6, the cold shutdown status should be maintained.

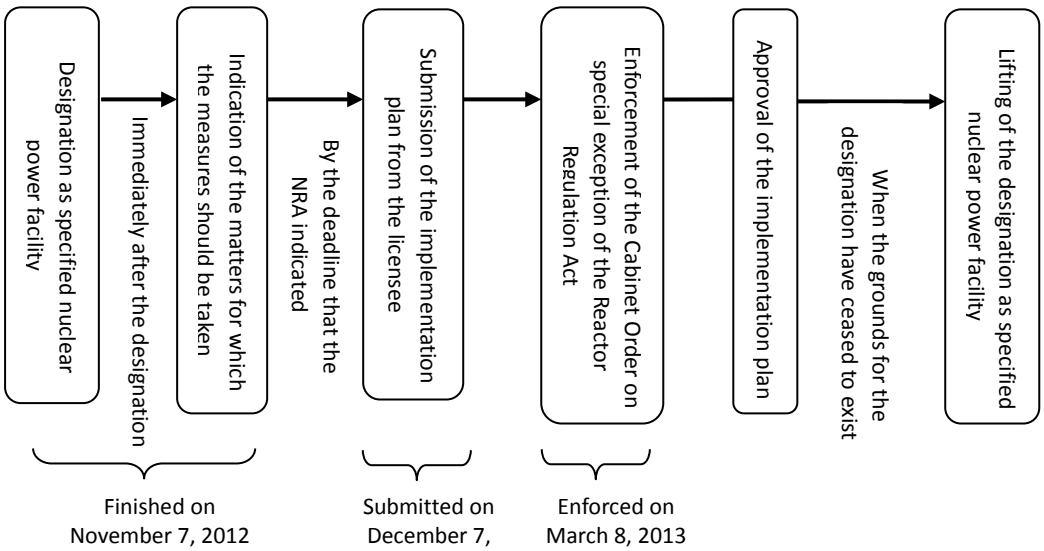


Figure 6-1 Action Scheme for Specified Nuclear Power Facility and Progress Thereof

The Reactor Regulation Act stipulates that only parts of the Reactor Regulation Act need be applied, pursuant to the provisions of the Cabinet Order, and only if measures are in force to ensure operational safety. Accordingly, on March 8, 2012, the Cabinet Order Concerning Special Provisions for the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors with Regard to Reactor Facilities at Tokyo Electric Power Company's Fukushima Daiichi NPS entered into force setting out the specific application of the Act.

The regulation in question is to be applied to TEPCO's Fukushima Daiichi Nuclear Power Station upon approval of the implementation plan.

From February to March 2013, a public consultation was conducted on the draft versions of the

NRA Ordinance and notification required to be put in place upon the entry into force of the aforementioned Cabinet Order.

3-2 Investigation of the Causes of the Accident

Continuous investigation of the causes of the accident at TEPCO's Fukushima Power Station is one of the NRA's most crucial roles, and it is examining technical factors based on the results of medium- to long-term studies of the situation inside the reactors.

TEPCO is progressively conducting surveys inside the containment vessels and the reactor buildings, including an October 2012 internal survey of the containment vessel at Unit 1 and a November survey of high-dose rate areas within the Unit 3 reactor building using a camera-equipped robot. The Secretariat of the NRA was informed of the results of these surveys.

At a March 27, 2013 NRA Commission Meeting it was decided to establish the Committee for Analysis of the Accident at TEPCO's Fukushima Daiichi Nuclear Power Station, to pursue both medium and long term studies. The membership of this body consists of NRA Commissioners, external experts, staff members from the Secretariat of the NRA, and staff members from the JNES.

3-3 Evaluation of On-site Fracture Zones

While verifying existing facilities (re-evaluation of seismic safety) during the review of the seismic design of nuclear power stations which began in September 2006, the possibility that active fracture zones within the site of the Tsuruga Nuclear Power Station of the Japan Atomic Power Company could affect important power station facilities was examined under NISA. Following the Great East Japan Earthquake of 2011, a decision was made to evaluate the status of fracture zones at the sites of nuclear power stations nationwide. In July 2012, deliberations began at the earthquake and tsunami experts hearing.

In September 2012, the experts hearings on all nuclear power stations and the Rokkasho Reprocessing Plant having been completed, points of note and response guidelines were established. Plants noted as needing an additional survey were instructed to carry this out, while the others were requested to continue to augment their data and overall knowledge.

After the NRA was established in September 2012, it was decided that the NRA would take over surveys of fracture zones from the former regulator, NISA. Accordingly, the NRA decided to conduct its own checks and evaluation of those fracture zones by appointing its own teams of experts, established for each of six sites originally identified by the NISA to identify and evaluate active faults and measures to be incorporated in seismic design.

Thus, additional surveys were to be conducted on sites involving 6 nuclear power stations (Ohi Power Station, Kansai Electric Power Company; Higashidori Nuclear Power Station, Tohoku

Electric Power Company; Shika Nuclear Power Station, Hokuriku Electric Power Company; Mihama Power Station, Kansai Electric Power Company; Tsuruga Nuclear Power Station, Japan Atomic Power Company; and Monju Nuclear Power Station, Japan Atomic Energy Agency). The NRA will progressively conduct active fault evaluations on-site, based on the surveys carried out by the licensees.

The following provides an outline of the studies conducted up to July 31, 2013.

(1) Ohi Power Station

Following a preliminary meeting to ascertain progress to date, the Expert Meeting on Investigation of Fracture Zones at the Ohi Power Station, conducted five days of on-site inspections followed by three evaluation meetings.

The results of the second on-site inspection formed the basis of the evaluation meeting held on January 16, 2011. Opinions were divided as to whether the fracture zone visible at the Daibahama Trench was due to a landslide or whether it resulted from faulting; accordingly, it was decided to hold another evaluation meeting after scrutinizing and analyzing the results of a future boring survey and conducting a trench excavation survey on the south side of the site. The third on-site inspection was conducted on July 27 and 28, 2013.

(2) Tsuruga Nuclear Power Station

Following a preliminary meeting to ascertain progress to date, the Expert Meeting on Investigation of Fracture Zones at the Tsuruga Nuclear Power Station, Japan Atomic Power Co., Inc. conducted a two-day on-site inspection (December 1 and 2, 2012) and then held two evaluation meetings.

On January 28, 2013, agreement was reached on an outline of a draft evaluation report, stating that there was a strong possibility that the fracture zone directly below the Unit 2 reactor is an active fault.

On March 8, a peer review meeting was held to seek the opinions of a wide range of experts concerning the initial draft evaluation report. It was decided to put together a draft evaluation report based on the comments at this meeting. The evaluation report was compiled at the fifth evaluation meeting and was approved at the NRA Commission Meeting on May 22.

(3) Higashidori Nuclear Power Station

Following a preliminary meeting to ascertain progress to date, the Expert Meeting on Investigation of Fracture Zones at the Higashidori Nuclear Power Station, Tohoku Electric Power Co., Inc. conducted a two-day on-site inspection (December 13 and 14, 2012) and then held three evaluation meetings.

During the on-site inspection and the first and second evaluation meetings, members of the panel were generally in agreement that there is a strong possibility that the on-site fracture zone is an active fault Agreement was reached on an outline of the draft evaluation report at the third meeting on February 18, 2013.

(4) Prototype Fast Breeder Reactor Monju Power Station

The members of the Expert Meeting on Investigation of Fracture Zones at the Prototype Fast Breeder Reactor Monju Power Station of the Japan Atomic Energy Agency conducted an on-site inspection for two days (July 17 and 18, 2013) after ascertaining the progress to date at a preliminary meeting.

3-4 Investigation of Seawater Inflow into Unit 5 of Hamaoka NPS

On May 14, 2011, an incident occurred at Unit 5 of the Chubu Electric Power Company's Hamaoka Nuclear Power Station during which approximately 400m^3 of seawater from a condenser flooded the reactor facilities after a reactor shutdown.

This was an unprecedented global event in which large amounts of seawater flowed into the nuclear facilities, possibly seriously affecting those facilities.

To implement precise nuclear regulations following this incident, it was considered necessary to accumulate further nuclear regulation knowledge in addition to monitoring and evaluating a seawater inflow impact survey to be conducted by the licensee, as well as its maintenance and management of equipment and instruments, and ascertaining the impact on the safety of the reactor facilities.

In order to precisely monitor and evaluate the seawater inflow impact survey and the maintenance and management of equipment and instruments, the NRA established the Supervision and Evaluation Committee for the Event of Seawater Inflow into Unit 5 of Hamaoka NPS with members including external experts in advanced specialist fields such as corrosion and hydrochemistry. Committee deliberations are now underway.

At hearings organized by the NISA, experts examined the status of inspections and investigations conducted by Chubu Electric Power Company and an interim summary of their deliberations was compiled in September 2012.

In the interim summary, the Committee in question is analyzing the impact of seawater inflow and evaluating the integrity of the reactor facilities, and will monitor and evaluate the response measures to be implemented by Chubu Electric Power Company.

3-5 Hosting of International Review Missions

During the current reporting period Japan hosted a number of IAEA teams of experts in relation

to the Fukushima Daiichi accident; specifically these were a Fact-Finding Mission, a Review Mission on Stress Tests, and a Seismic Safety Mission to the Onagawa Nuclear Power Station.

The IAEA provides reports[3] on those missions.

4 Facilities to be Decommissioned

4-1 Tokai Nuclear Power Station, Japan Atomic Power Company

Electric generating power: 166,000kW

Reactor type: Graphite-moderated carbon dioxide gas-cooled reactor (GCR)

Fuel: Natural uranium

Commissioned: July 25, 1966

Operations terminated: March 31, 1998

Operation period: 31 years, 8 months

Status: Decommissioning measures underway (being dismantled outside the reactor area)

Overview:

Tokai Nuclear Power Station is a natural uranium, graphite-moderated carbon dioxide gas-cooled reactor facility that began trial operations on May 4, 1965 and became the first commercial nuclear power station to begin operating in Japan on July 25, 1966; it ceased commercial operation on March 31, 1998.

Subsequently, the Japan Atomic Power Company submitted notification of its dismantling on October 4, 2001, and decommissioning commenced on December 4 of that year.

The decommissioning plan was approved on June 30, 2006, following the revision of the Reactor Regulation Act.

All of the spent fuel had been removed by June 21, 2001, before notification of the decommissioning.

The decommissioning began with the serial dismantlement of the auxiliary equipment. The dismantlement of the reactor area has been deferred until radioactivity levels are reduced and the immediate focus has been on safe storage until reactor dismantlement begins.

At present, non-operational facilities and equipment which have comparatively low levels of radioactivity or are uncontaminated are being dismantled in the area outside the reactor area are being dismantled.

[3] Fact-Finding Mission
http://www-pub.iaea.org/MTCD/Meetings/PDFplus/2011/documentation/cn200_Final-Fukushima-Mission_Report.pdf
Review Mission on the Stress Test
http://www.iaea.org/newscenter/focus/actionplan/reports/nisa-mission-report0312.pdf
Seismic Safety Mission to Onagawa Nuclear Power Station
http://www.iaea.org/newscenter/focus/actionplan/reports/onagawa0413.pdf

4-2 Fugen Nuclear Power Plant Advanced Thermal Reactor, Japan Atomic Energy Agency

Electric generating power: 165,000kW

Reactor type: Heavy-water-moderated light-water-cooled boiling water reactor (pressure tube reactor)

Fuel: Natural or enriched uranium, plutonium mixed oxide

Commissioned: July 29, 1978

Operations terminated: March 29, 2003

Operation period: 24 years, 8 months

Status: Decommissioning measures underway (spent fuel currently being removed)

Overview:

The Advanced Thermal Reactor facility (Fugen) reached its first critical state on March 20, 1978 and operated for about 25 years before ending operations on March 29, 2003. Removal of the whole fuel assemblies from the reactor was completed on August 13, 2003.

On February 20, 2004, the Minister of Economy, Trade and Industry approved measures to ensure that the fuel could not be reloaded and to shut down the reactor permanently.

Subsequently, the Japan Atomic Energy Agency received approval for its decommissioning plan on February 12, 2008.

It called for dismantling the facilities safely and efficiently, taking into account the need for ongoing management and equipment maintenance even after operations end.

Moreover, all of the spent fuel stored in a spent fuel storage pool will be disposed of in due course at the reprocessing plant of the Japan Atomic Energy Agency's Tokai Research and Development Center.

4-3 Hamaoka Nuclear Power Station, Chubu Electric Power Company (Units 1 & 2)

Electric generating power: 540,000kW (Unit 1); 840,000kW (Unit 2)

Reactor type: Light-water-moderated, light-water-cooled reactor, boiling water reactor (BWR)

Fuel: Enriched uranium

Commissioned: March 17, 1976 (Unit 1); November 29, 1978 (Unit 2)

Operations terminated: January 30, 2009

Operation period: 32 years, 10 months (Unit 1); 30 years, 2 months (Unit 2)

Status: Decommissioning measures underway (preparations for dismantling work underway)

Overview:

Both Units 1 and 2 at Hamaoka Nuclear Power Station are enriched uranium, light-water-cooled and moderated reactors (boiling water reactors); Unit 1 reached its first critical state on June 20, 1974 and operated for about 27 years until November 7, 2001, when the reactor was shut down due to the rupture of a pipe in the residual heat removal system.

Subsequently, the Chubu Electric Power Company decided halt reactor operations after January 30, 2009, and began decommissioning following approval of its decommissioning plan on November 18 that year.

Unit 2 reached its first critical state on March 28, 1978 and operated for about 26 years, until it was shut down on February 22, 2004 to conduct the 20th periodic inspection.

Subsequently, the Chubu Electric Power Company decided to end reactor operations after January 30, 2009 (the same date as Unit 1), and commenced decommissioning measures following approval of its decommissioning plan on November 18 that year.

At present, preparations are being made to dismantle both units; system decontamination is now underway in Unit 1, following completion of the removal of spent fuel on January 22, 2013.

In the case of Unit 2, dismantling preparations are underway with the removal of fuel from the spent fuel pool as the top priority. System decontamination is also underway.

4-4 Fukushima Daiichi Nuclear Power Station, Tokyo Electric Power Company (Units 1-4)

Electric generating power: 460,000kW (Unit 1); 784,000kW (Units 2-4)

Reactor type: Boiling Water Reactor (BWR)

Fuel: Enriched uranium

Commissioned: March 26, 1971 (Unit 1); July 18, 1974 (Unit 2); March 27, 1976 (Unit 3); October 12, 1978 (Unit 4)

Operations terminated: March 11, 2011

Operation period: 40 years (Unit 1); 37 years, 4 months (Unit 2); 35 years (Unit 3); 33 years, 7 months (Unit 4)

Status: Decommissioned as a commercial source of power under the Electricity Business Act (April 19, 2012)

Overview:

In the wake of the March 11, 2011 accident and having concluded that it was impossible to further use Units 1-4 of the Fukushima Daiichi Nuclear Power Station as electric facilities for business purposes, TEPCO submitted a plan, on March 30, 2012, for their decommissioning as a commercial source of power on April 19 that year, pursuant to the provisions of the Electricity Business Act.

After the accident, emergency measures pursuant to the provisions of the Reactor Regulation Act were taken at the Fukushima plant to deal with this dangerous situation.

The Nuclear and Industrial Safety Agency (as it was known at the time) published *The Concept of Securing Mid-Term Safety*, which set out basic targets to be achieved before starting work on specific decommissioning tasks. It instructed TEPCO to submit a facility operation plan and

then evaluated the validity of this emergency plan.

Because the safety of the Fukushima power station could not be guaranteed in the long-term by such emergency measures, the NRA On November 7, 2012, designated it as a Specified Nuclear Power Facility requiring special management. It further gave TEPCO a list entitled *Matters for which Measures Should be Taken* and told the company to submit an implementation plan to ensure operational safety and the protection of specified nuclear fuels.

The NRA established the Supervision and Evaluation Committee for Specified Nuclear Power Facilities, and reviewed TEPCO's implementation plan to ensure to ensure its compliance with the guidelines.

5 Operation of 'Safe' Reactor Facilities

The Reactor Regulation Act stipulates that "In the event that the location, structure, or equipment of a reactor facility for generating power does not comply with the standards set forth in the Ordinance of the NRA, the NRA can suspend the use of the reactor facility in question, or its modification, repair, or relocation, or may designate a specific method of operating the reactor in question, or may order any other measure required to ensure operational safety."

This means that reactor facilities that have not been confirmed to be safe will not be operated unless such necessary steps are taken, and that no reactor will be allowed to operate for power generation without its safety having first been ensured.

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 licence;

(iii) a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences;

(iv) the enforcement of applicable regulations and of the terms of licences, including suspension, modification or revocation.

Outline of the Implementation of Article 7

In the Japanese legal system governing nuclear energy regulation, the Atomic Energy Basic Act is the most important piece of legislation and defines the basic principles of nuclear energy use. The Reactor Regulation Act, which prescribes government safety regulations and the NRA Ordinances were enacted under this Act.

Moreover, other necessary legislation has been put in place, such as the Nuclear Emergency Act, which stipulates responses to nuclear disasters.

In response to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station, these Acts were revised on September 19, 2012.

The NRA formulating standards for implementing safety regulations are designated as the Ordinance of the NRA.

The Reactor Regulation Act prescribes the permits, approvals, and inspections required for reactor construction and operations. It clearly stipulates the authority of the NRA to revoke permits, suspend the operation of facilities and approve penalties for violations of its provisions.

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, development and utilization of nuclear energy shall be strictly limited to peaceful purposes, developed safely and contribute to international cooperation.

The Act further stipulates that the Atomic Energy Commission of Japan shall ensure the democratic operation of nuclear energy governance, and that government regulations must be followed in the construction of reactors and the use of nuclear fuel material.

Government regulations to be followed in reactor construction are prescribed in the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors.

In response to the Fukushima Daiichi accident, the Act was amended, establishing the NRA and Nuclear Emergency Preparedness Commission, and abolishing the NSC, in September 2012

1-2 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.

This Act, in accordance with the spirit of the Atomic Energy Basic Act, was enacted to provide necessary regulations on refining, fabricating and enrichment, interim storage, reprocessing and waste disposal activities, as well as on the installation and operation of reactors. The Act provides necessary regulations on the uses of internationally controlled materials. It executes treaties and other international agreements ensuring the use of nuclear energy – source materials, nuclear fuel and reactors are limited to peaceful ones. At the same time, it promotes public safety and the protection of nuclear fuel materials in the event of a serious nuclear accident resulting in abnormal radioactive levels.

The Reactor Regulation Act governing the construction and operation of reactors establishes safety regulations and standards for granting permits and approval, including Reactor Installation Permits, Approval of Construction Plan, Pre-service Inspections, Periodic Facility Inspections, Approvals for Operational Safety Programs and Operational Safety Inspections, and reactor

decommissioning. The regulations establish administrative procedures such as suspension of operations and the revocation of permits, as well as criminal penalties, such as imprisonment or a fine, which can be imposed if an operator does not comply with the provisions of this Act.

It stipulates a system for employee feedback system (whistle blowers) whereby they can report any violation of the Reactor Regulation Act to the NRA without any fear of penalty.

While Installation Permits for commercial power reactors are regulated on the basis of the Reactor Regulation Act, certain procedures from design and construction through to operation – namely Approval for Design and Construction Methods, Pre-service Inspections, welding methods and their inspection, and Periodic Facility Inspections – were also subject to equivalent regulation under the Electricity Business Act.

To avoid duplication of these two laws, commercial power reactors had been exempt from the provisions of the Reactor Regulation Act. But in response to the Fukushima Daiichi accident and subsequent revisions, this exemption was abolished and procedures relating to approval and inspection of commercial power reactors were added, making them subject to the application of the Reactor Regulation Act.

Consequently, the regulation of all reactors was consolidated into the Reactor Regulation Act.

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)

  Rules prescribing the specific regulatory system based on the Reactor Regulation Act. The regulatory scope of these rules encompasses boiling water reactors (BWR) and pressurized water reactors (PWR).

- NRA Ordinance Prescribing Standards for the Location, Structure, and Equipment of Commercial Power Reactors and their Auxiliary Facilities (NRA Ordinance on Standards for the Location, etc.)

  Standards relating to the location, structure, and equipment of reactor facilities, which form one of the criteria for obtaining a power reactor construction permit.

- NRA Ordinance Prescribing Technical Standards for Commercial Power Reactors and their Auxiliary Facilities (NRA Ordinance on Technical Standards)

  Technical standards relating to construction plan approvals 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 relating to design and construction for licensees, which are one of the criteria for approval of a construction plan, and systems for their inspection.

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

  These are technical standards relating to the inspection of fuel assemblies.

As well as BWR and PWR commercial power reactors, Japan has the Monju prototype fast breeder reactor. However, Monju is considered in law to be a reactor for power generation at the research and development stage, so the following NRA Ordinances have been established, separate from those governing commercial power reactors.

These ordinances take into account the attributes of power reactors at the research and development stage, but still establish the same regulations as those for commercial power reactors.

- NRA Ordinance on the Installation and Operation of Reactors for the Purpose of Power Generation at the Research and Development Stage
- NRA Ordinance Prescribing Standards for the Location, Structure, and Equipment of Reactors for the Purpose of Power Generation at the Research and Development Stage and their Auxiliary Facilities
- NRA Ordinance Prescribing Technical Standards for Reactors for the Purpose of Power Generation at the Research and Development Stage and their Auxiliary Facilities
- NRA Ordinance on Technical Standards for Quality Control Methods Concerning the Design and Construction of Power Reactors for Licensees of Power Reactor Operation at the Research and Development Stage and Systems for Their Inspection
- NRA Ordinance Prescribing Technical Standards for Nuclear Fuel Material Being Used as a Fuel for the Purpose of Power Generation at the Research and Development Stage

In addition to the aforementioned ordinances, the Reactor Regulation Act stipulates that it may be only partially applied if proper implementation of measures to ensure operational safety is ensured. Accordingly, the following ordinances have been enacted that stipulate the steps to be taken to ensure safety at the Fukushima Daiichi Nuclear Power Station, as the situation there differs from that at ordinary reactor facilities.

- NRA Ordinance on the Operational Safety of Reactor Facilities at the Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station and the Physical Protection of Specified Nuclear Fuel Material

Major amendments of the Reactor Regulation Act in the light of the accident at TEPCO's Fukushima Daiichi Nuclear Power Station are indicated in the Annex.

1-3 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, with the objective of strengthening measures against nuclear disasters. Combined with the Reactor Regulation Act, the Basic Act on Disaster Control Measures, and other related laws, they were designed to protect the lives, health, and property of the population by prescribing the disaster responsibilities of nuclear operators, the issue of a Declaration of a Nuclear Emergency Situation, the establishment of a 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 steps to prevent a nuclear disaster, preventing the spread of the effects of a crisis and repairing any damage caused by such an incident.

It stipulates that the government must implement emergency response measures, take steps to prevent any nuclear disaster, but in that event deal effectively with such an incident.

Following the TEPCO Fukushima Daiichi accident the Nuclear Emergency Act was revised on September 19, 2012, to enhance preventive measures and strengthen the Nuclear Emergency Response Headquarters.

Measures relating to nuclear disasters 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) Safety Requirements and Safety Regulations

1 Safety Requirements

The regulatory requirements relating to reactor facilities are prescribed in the Reactor Regulation

Act, and the NRA Ordinance has been put in place on the basis of this law.

The NRA Ordinance on Commercial Reactors clearly documents the provisions of the Reactor Regulation Act as more specific regulations.

2 Permit and Approval Systems

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

The Reactor Regulation Act sets forth the reasons for disqualification from obtaining a permit, stipulating that anyone who has had a Reactor Installation Permit revoked within the last two years may not obtain a new permit.

If a licensee wishes to change an already approved he must seek permission for any amendment or, if the change is a minor one prescribed in law, must submit notification of the change.

No expiry date is set for Reactor Installation Permit in Japan so there are no procedures for renewing a permit. A 40-year operation limit is stipulated though this may be extended one time only for a maximum of 20 additional years.

The safety reviews for obtaining a Reactor Installation Permit are carried out by the NRA, the regulatory authority. Article 17 provides an explanation concerning Reactor Installation Permit.

In granting Reactor Installation Permits, the NRA must seek the opinion of the Atomic Energy Commission 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 a Reactor Installation Permit will be subject to a penalty of imprisonment with work for not more than three years, or a fine of not more than three million yen, or both, pursuant to the provisions of the Reactor Regulation Act.

Holders of a Reactor Installation Permit must obtain NRA approval for their construction plan before commencing construction, or notify the NRA of the plan.

NRA approval must be sought for the design of the fuel assembly to be loaded into the reactor.

3 Inspection and Assessment Systems

In constructing a reactor facility, the licensee must undergo a Pre-service Inspection by the NRA and may not use the reactor facility in question if it does not pass this inspection.

The fuel assembly to be loaded into the reactor must undergo a Fuel Assembly Inspection by the NRA and may not be used if it does not pass this inspection.

As well as conducting inspections of welding contractors, particularly in areas which must withstand high pressures and the containment vessel itself, licensees must undergo a review by the JNES (Welding Safety Management Review). This will focus on the systems involved in conducting the inspection, the inspection method, process controls, and other matters stipulated

in the NRA Ordinance.

After commencing operations, licensees must undertake Periodic Licensee's Inspections, as well as undergoing Periodic Facility Inspections by the NRA, focusing on designated key safety components.

Systems involved in conducting inspections, inspection methods, process controls and other matters stipulated in NRA Ordinances must undergo a Periodic Safety Management Review by the JNES.

Operational Safety Inspectors from the NRA will also periodically conduct inspections to confirm compliance with Operational Safety Programs of operational facilities pursuant to the provisions of the Reactor Regulation Act.

Other inspections will examine compliance with regulations concerning the physical protection of nuclear material, pursuant to the provisions of the Reactor Regulation Act.

If reactor facilities or fuel assemblies that have not passed the Pre-service Inspection or Fuel Assembly Inspection are used, or if a licensee is obstructionist they may be subject to imprisonment with labor for not more than one year, a fine of not more than one million yen, or both, pursuant to the provisions of the Reactor Regulation Act. These include a refusal or obstruction or evasion of a Pre-service Safety Management Review, a Welding Safety Management Review, a Periodic Facility Inspection, or a Periodic Safety Management Review. Additionally, if a licensee has refused, obstructed, or evaded granting entry to the site, an inspection, or submitting samples for an Operational Safety Inspection or nuclear material physical protection inspection, or fails to respond to questions, or makes false statements in response to questions.

4 Law Enforcement Measures

In the event that a licensee is deemed to be violating legal provisions, the NRA may revoke their Reactor Installation Permit or order reactor operations to be suspended for not more than one year.

Moreover, if the capability of a reactor facility does not conform to technical standards, the NRA may order the suspension of the use of the reactor facility in question, or its modification, repair, or relocation, or may designate a specific method of operating the reactor in question, or may order any other measure required to ensure operational safety.

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 fulfill 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

In Japan, the Nuclear Regulation Authority (NRA) deals with regulations concerning nuclear installations. In the case of research reactors, which do not fall under the purview of this Convention, regulation of these has been centralized under the NRA.

The NRA is established as an external bureau of the Ministry of the Environment, in order to separate the regulation from the promotion of nuclear energy use, and to carry out its regulation mandate in a fair, neutral and independent manner. Its Chairman and Commissioners are appointed by the Prime Minister, with the consent of the Diet.

As a new organization the NRA urgently needs to acquire and train personnel.

The NRA will seek to ensure independent and transparent decision-making to help rebuild the public trust lost in the wake of the Fukushima Daiichi accident.

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 NRA Secretariat deals with related administrative matters.

The NRA is established as an external bureau of the Ministry of the Environment. 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 Act for Establishment of the Nuclear Regulation Authority. It will exercise independent authority from a fair and neutral standpoint.

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

The NRA has the authority to establish the Ordinance of the NRA to implement laws and Cabinet Orders relating to the affairs under its jurisdiction. The term of office of the Chairman and Commissioners is five year but they may be reappointed at the end of this initial term.

The duty of the NRA is to ensure safety in the use of nuclear energy, so it has the right to review planned nuclear installations to confirm their location, structure, and equipment do not pose a disaster threat, and that being the case to give the permission for their construction.

Moreover, as well as formulating the Ordinance of the NRA that includes regulations concerning nuclear-related activities such as emergency, operational safety measures and programs, and the physical protection of specified nuclear fuel material, the NRA handles other issues such as the approval of the design and construction of facilities, inspections, approval of Operational Safety Programs, and the approval of plans for nuclear reactor decommissioning measures. It also collects reports from licensees and conducts on-site inspections, if necessary.

It has the authority to revoke Reactor Installation Permits or suspend the use of such facilities; to order safety measures, the dismissal of Chief Reactor Engineers and measures covering decommissioning and disaster prevention.

The NRA has under its auspices the Reactor Safety Examination Committee, which investigates and discusses the safety of nuclear reactors; the Nuclear Fuel Safety Examination Committee, which investigates and discusses the safety of nuclear fuel material; the Radiation Council, which examines the technical standards for the prevention of radiation hazards, and the Administrative Evaluation Bureau, which evaluates the incorporated administrative agencies under the NRA's jurisdiction.

As well as the General Affairs Division, which carries out general internal coordination, the Secretariat of the NRA consists of the Policy Review and Public Affairs Division which evaluates

policy and handles public and media relations; the International Affairs Division which liaises with international organizations and various other countries; the Regulatory Standard and Research Division which formulates standards and guidelines; the Nuclear Emergency Preparedness Division which is responsible for developing emergency preparedness and response systems, providing any initial emergency response and physically protecting nuclear material; the Radiation Monitoring Division which compiles summaries of the results of radiation monitoring; the Radiation Protection and Safeguards Division which implements safeguards based on regulations and international commitments concerning such matters as the use of radioactive isotopes; and five directors for nuclear regulation (BWR; PWR and advanced reactors; research and test reactors, reprocessing, fuel fabrication and utilization; waste, storage, and transportation; and earthquake and tsunami safety measures), who deal with the practical aspects of regulation, based on the Reactor Regulation Act (Figure 8-1).

Moreover, as shown in Table 8-1, there are Nuclear Regulation Offices at 22 nuclear sites, with safety inspectors and nuclear emergency preparedness officers permanently stationed there.

The full complement of staff at the NRA Secretariat is 527, including the nuclear safety inspectors and nuclear emergency preparedness officers stationed at nuclear sites.

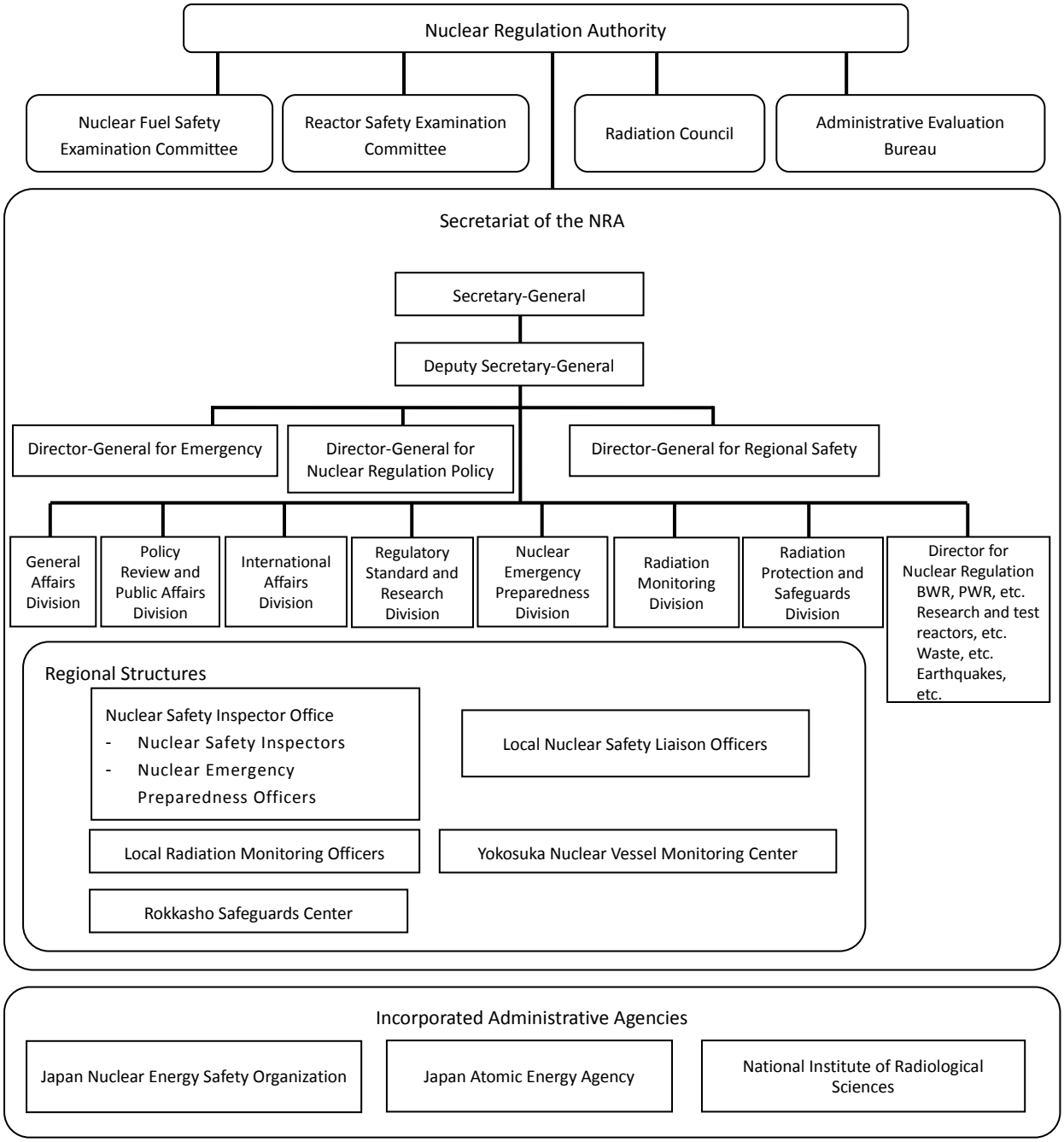


Figure 8-1 NRA Organizational Chart

Table 8-1 NRA Nuclear Regulation 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
Onagawa Nuclear Regulation Office	Power plant (BWR)
Fukushima Daiichi Nuclear Regulation Office	Power plant (BWR)
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	Uranium enrichment
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 Human Resource Development

Nuclear regulation is an administrative field requiring highly professional and technical judgments. In order to prevent the regulatory authority from being unduly influenced by licensees, it is indispensable to secure a sufficient number of highly professional personnel and thereafter continuously enhance their expertise.

To achieve these aims, the NRA initially introduced and carried out new training programs for its officials to improve their expertise. In practical, (1) specialized training on nuclear regulation and targeting Operational Safety Inspectors and Nuclear Emergency Preparedness Officers who need legal status, (2) practical inspection training to learn mechanism of abnormal event and method of measuring using real-sized machinery, equipment and simulation test equipment, and (3) practice for operation control, including responses to severe accidents, by using plant simulators. To maintain and enhance officials' expertise in nuclear engineering, the NRA began new

programs including lectures with graduate school level textbooks and other lectures covering national government-level crisis management and quality control.

Three NRA officials went to Japanese graduate schools related to nuclear engineering. Preparation of station to foreign nuclear regulatory organizations etc., including the US Nuclear Regulatory Commission and the IAEA, is progressing.

Following its launch, the NRA recruited 13 highly experienced personnel at the middle of the fiscal year and has begun recruiting activities for new graduates and mid-career workers for FY2013 and thereafter.

In order to have the NRA assume responsibility for the work of JNES pursuant to the Supplementary Provisions of the Act for Establishment of the Nuclear Regulation Authority, the government will abolish that organization as soon as possible and take any further legal steps necessary, such as for transferring former JNES officials to the relevant sections of the NRA Secretariat. Additionally, the government will review the structures and operations of incorporated administrative agencies and related organizations to ensure regulations for safety of nuclear energy use are implemented in a more efficient and effective manner.

At the March 27, 2013 NRA Commission Meeting, it was decided that the NRA Secretariat and JNES, which provides technical support to the NRA, should strengthen their collaboration not only on issues directly relating to nuclear regulation such as establishment of requirements, examinations, and inspections, but also in human resources development, such as personnel exchanges and training sessions.

1-3 Funding

As a regulatory body the government funds the NRA which compiles a proposed annual budget and submits it to the appropriate financial authorities.

This procedure is carried out in the same manner as all government departments.

The FY2013 NRA in FY2013 is 57.3 billion yen.

1-4 Ensuring Transparency and openness

(1) Ensuring Transparency

To restore confidence in nuclear regulation it is vital to ensure the transparency of the decision-making process.

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 published, 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 the names of those present and reference materials used. Overviews of particularly important information will be reported at the NRA Commission Meetings.

Based on such guidelines as the *Policy on Ensuring the Operational Transparency of the NRA* and *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, with the NRA Commission Meetings and study teams meetings being broadcast live whenever possible; in addition, recordings and edited highlights of these meetings will also be made available.

Reference materials used in the NRA Commission Meetings and its study teams are published on the NRA's website at the start of each meeting, increasing the ease and accessibility of interested parties.

As a rule, minutes of NRA Commission Meetings are posted on the website the following day while those of study team meetings are generally published within a week.

The NRA Chairman conducts weekly press conference. The Deputy Secretary-General of the NRA Secretariat, in his capacity as spokesman, also conducts press conference twice a week. If necessary, extraordinary press conferences are held.

These press conferences are made available as live broadcasts and recordings, in the same way as the NRA Commission Meetings and study team meetings, while the minutes of the press conferences are, as far as possible, made available on the NRA’s website on the same day in the case of the Chairman's press conferences, and the following day in the case of the spokesman's press conferences.

(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.

To seek the opinions of a wide range of both domestic and foreign experts concerning its activities, the NRA held a meeting in November 2012 with members of the accident investigation

committees established by the Diet and the government and NPO specialists; in December international advisors participated in an exchange of opinions.

In other activities, 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 canvassed widespread public views to help formulate new 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 centers enabling the public to express their opinions or questions via the internet or telephone whenever they wish.

1-5 Technical Support

(1) Technical support organizations

As well as holding jurisdiction over the JNES (which, as of January 1, 2013 had some 400 full-time officers and staff), the NRA has joint jurisdiction over the Japan Atomic Energy Agency (JAEA) and the National Institute of Radiological Sciences (NIRS) with the Ministry of Education, Culture, Sports, Science and Technology (MEXT).

Moreover, in order to enable the NRA to carry out the duties performed by the JNES, the JNES shall be abolished as quickly as possible, with the requisite legislative measures being formulated swiftly, including assigning the staff of the JNES to equivalent posts within the Secretariat of the NRA.

Following deliberations concerning the organization and duties of the incorporated agencies and other relevant bodies, requisite measures shall be formulated to facilitate more efficient, effective nuclear regulations.

JNES was established to ensure nuclear safety by conducting safety analysis and design appraisals of nuclear facilities and reactor facilities. This also included on-site inspections and activities to pre-empt a nuclear disaster, to prevent the effects of such a crisis spreading and to restore the situation to normalcy in the event of such an incident.

The JAEA is a body that, in accordance with the basic policy prescribed in the Atomic Energy Basic Act, conducts basic and applied research into nuclear energy; the development of fast breeder reactors 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 techniques 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 the 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.

The NIRS encouraged search and development focused on the radiation effects on the human body, thereby improving the scientific and technological level of medicine; the prevention of human radiation injuries, diagnosis and treatment, and the medical use of radiation.

Activities by the NIRS in the fields of radiation effects on the human body, the prevention of radiation injury in humans, and diagnosis and treatment also fall under the joint jurisdiction of the MEXT and the NRA.

(2) Input from external experts

The NRA holds regular meetings of the following study teams, consisting of experts who examine individual regulatory issues.

(NRA study teams)

- Study Team on New Safety Standards for Light Water Power Reactors
- Study Team on Establishment of New Safety Regulations for Light Water Nuclear Power Plants
- Study Team on the New Safety Design Basis for Light Water Nuclear Power Plants (Earthquakes and Tsunamis)
- Study Team on Nuclear Emergency Preparedness Measures
- Study Team on Radiation Emergency Medicine
- Study Team on Emergency Monitoring
- Study Team on Health-care of the Residents related to the Fukushima Daiichi NPS Accident

(Expert meetings on investigation of fracture zones in the sites of nuclear power stations)

- Expert Meeting on Investigation of Fracture Zones in the Site of Higashidori Nuclear Power Station, Tohoku Electric Power Co., Inc.
- Expert Meeting on Investigation of Fracture Zones in the Site of Tsuruga Nuclear Power Station
- Expert Meeting on Investigation of Fracture Zones in the Site of Ohi Power Station, Kansai Electric Power Co., Inc.

(Specific investigative committees and study teams)

- NRA Policy Review Panel
- Study Team on Nuclear Security
- Supervision and Evaluation Committee for the Specified Nuclear Power Facilities
- Supervision and Evaluation Committee for the Event of Seawater Inflow into Unit 5 of

Hamaoka NPS

(3) Safety Research

In administering regulations, the NRA uses research results into nuclear regulations, as required. The following examples enable the NRA to accurately resolve regulatory issues.

- Planning, and deployment of safety regulation systems
  - Research involving analysis of the progress of severe accidents, focusing on a wide variety of events, which is necessary in order to investigate the imposition of regulatory requirements in relation to severe accidents when developing regulatory standards
  - Research aimed at the development of guidelines for safety reviews conducted by regulatory authorities, in response to the deployment of a legal framework for nuclear regulations concerning the disposal of high-level radioactive waste
- Developing technical methods and techniques to be used when implementing regulatory measures
  - Acquiring technical knowledge when developing technical manuals and guidelines to be used in design and construction approvals, welding inspections, pre-service inspections, periodic inspections, and facility integrity evaluations
- Acquiring the technical knowledge required when making judgments concerning the implementation of regulatory measures
  - Research involving the acquisition of data required to evaluate the validity and effectiveness of measures against severe accidents put in place by licensees of reactor operation, and the examination of evaluation techniques
  - Investigating technical knowledge to evaluate the validity of measures to deal with the aging of each plant, and acquiring technical data concerning events associated with the degradation of plants over time
- Laying the technical foundations required for regulation
  - Research concerning the development of methods of probabilistic safety assessment essential to the identification of severity scenarios in measures against severe accidents at reactor facilities and nuclear fuel cycle facilities
  - Collecting and analyzing information concerning accidents and incidents within Japan and overseas, as well as the causes thereof and the countermeasures Investigating trends in the establishment and revision of overseas regulatory requirements, acquiring and developing evaluation data, and investigating the deployment of safety standards by international organizations such as the IAEA

1-6 Management of the Duties of the NRA

As employees of the Japanese government, NRA staff members are obliged to comply with the law, in accordance with the provisions of the National Public Service Act.

To ensure safety in the use of nuclear energy in protecting the lives and property of the populace, the NRA has stipulated NRA's Core Values and Principles for the execution of its duties.

With a new system, the General Affairs Division has put into place a system enabling it to identify any matters requiring clarification, evaluation, or rectification of duties by each division. Moreover, it sets operational targets for each fiscal year for the Secretariat, including the Nuclear Regulation Offices, to aid performance.

Because serious errors were repeatedly discovered in simulations of the dispersal of radioactive material published by the NRA in October 2012, it was decided that during large-scale simulations or when specifications were altered task objectives and systems for carrying them out would be checked to ensure that the work was carried out appropriately. In addition, the quality control process was strengthened through the establishment of the Quality Control Office to check compliance with these processes.

To increase quality control throughout the NRA Secretariat, staff members have been trained in quality assurance.

In the same way as other Japanese administrative bodies, the NRA conducts policy reviews.

These allow government agencies to fulfill their mission more efficiently by summarizing information that will assist in the accurate planning, formulation, and implementation of policy, reflecting this information appropriately in policies, and making continuous revisions and improvements to policies. Disclosure of this process and the outcomes also ensures thorough public accountability.

Policy reviews are used by the NRA Secretariat in budgetary requests, project decisions, requests concerning staffing numbers, and the establishment of new systems or abolishment of existing ones.

2 Integrated Regulatory Review Service

In June 2007, the NISA hosted the Integrated Regulatory Review Service (IRRS) of the IAEA, and planned to invite a follow-up mission in February 2010; this was postponed, because it was decided it would be more effective for a review to be conducted after having implemented proposals from the Basic Safety Policy Subcommittee which was examining regulatory issues at that time.

Since then, although the follow-up mission has not yet been invited to visit, Japan has established the NRA and overhauled its nuclear energy regulation, and the intention is to invite the IRRS mission to review the new regime as soon as possible.

Article 8 (2) Status of the Regulatory Body

1 Centralization of Nuclear Energy Regulation

The government institutions under the auspices of the Japanese government consist of the Cabinet Office and 11 ministries, with regulation of nuclear energy centralized in the hands of the NRA.

In Japan, the ministries that oversee nuclear energy differ according to the form of use of nuclear energy technology, with the Ministry of Economy, Trade and Industry (METI) holding jurisdiction over the use of nuclear energy as a source of energy, and the MEXT supervising the use of nuclear energy in relation to research and development.

Responsibility for the regulation of nuclear energy was also previously divided between the ministries with jurisdiction over it.

The accident at the TEPCO's Fukushima Daiichi Nuclear Power Station in March 2011 was the catalyst for the establishment of the NRA on September 19, 2012.

The NRA now has sole responsibility for the regulations on nuclear safety, nuclear security, safeguards based on international commitments, and regulations on the radiation monitoring and the use of radioactive isotopes that were formerly handled by a range of administrative bodies.

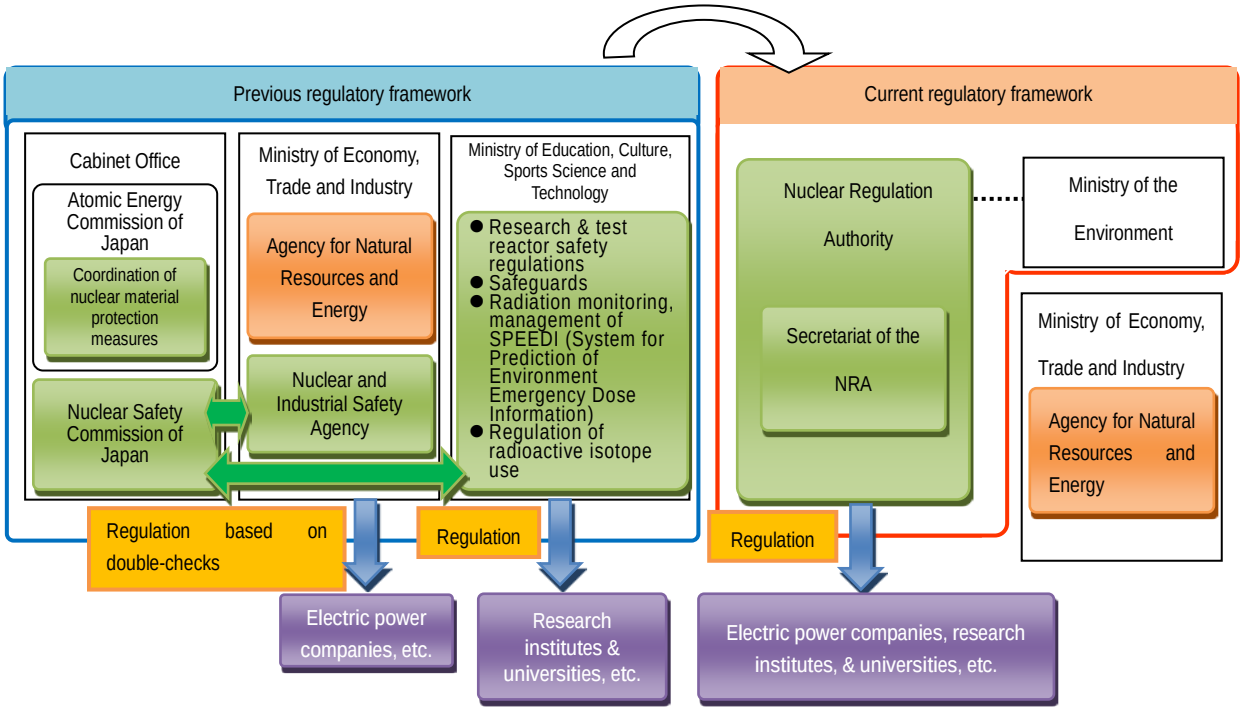


Figure 8-2 Previous and current regulatory framework

2 Ensuring Effective Separation

The use of nuclear energy has been separated into promotional aspects and regulatory aspects; the NRA is tasked with duties relating to the regulation of nuclear energy based on expert knowledge, from a fair and neutral standpoint as an independent body.

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 Secretariat of the NRA, so the authorities tasked with promoting 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.

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, approvals, and inspections, including nuclear reactor construction permits, without any involvement by the authorities tasked with promoting nuclear energy.

Moreover, with the objective of ensuring the independence and neutrality of regulation, Article 6, paragraph (2) of the Supplementary Provisions of the Act for Establishment of the Nuclear Regulation Authority stipulates that, following a five-year period of transitional measures after the entry into force of the Act, staff members of the Secretariat of the NRA shall not be permitted to be redeployed to administrative bodies with jurisdiction over administrative matters relating to the use of nuclear energy (the so-called “no-return rule”).

ARTICLE 9 RESPONSIBILITY OF THE LICENCE HOLDER

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

Outline of the Implementation of Article 9

The use of nuclear energy is based on the principle that licensees will bear primary responsibility for ensuring safety, with the Atomic Energy Basic Act clearly stipulating that the use of such energy shall be aimed at ensuring safety and be performed independently under democratic management.
To implement 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.

1 The Primary 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 primary 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.

In addition to establishing Operation Safety Programs and obtaining NRA approval, licensees must also undergo NRA compliance inspections.

Licensees must stipulate in their Operational Safety Programs that they will disclose noncompliance information in the event that such noncompliance results in the non fulfillment 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 fulfill the legal responsibility for operational safety.

In case a reactor facility 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 permission or order it to suspend

operations for a specified period not exceeding one year.

If an operator establishes a nuclear reactor without permission, it shall be sentenced to imprisonment with work and/or a fine, 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 a quality management system to prioritize overall safety.

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.

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 reactor facilities, 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 approval for Operational Safety Programs before commencing reactor operations, in accordance with the Reactor Regulation Act.

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

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 Installment 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 a 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.

3 Efforts by the Regulatory Authority to Prioritize Safety

At its 22nd Commission Meeting in FY2012 on January 9, 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 the Fukushima Daiichi nuclear accident of March 11, 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 a 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.

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 basic financial reviews in the examination stage of Reactor Installation Permits, a mechanism is always included for financial reserves to cover the cost of possible decommissioning as well as the cost of processing and disposal of all spent fuel and radioactive waste.

The recruitment of competent personnel is a regulatory requirement.

Article 11 (1) Financial Resources

1 Regulatory Requirements

The Reactor Regulation Act requires that any seeking permission to construct a reactor have adequate financial resources to undertake such a project.

In addition to a request for a Reactor Installation Permit, applicants must provide appropriate financial evidence outlining funding needed for construction and the source of such finances, details to acquire the necessary fuel materials an and recent inventories of assets and balance sheets. The NRA will check and confirm that any applicant has the appropriate financial resources.

2 Steps to be taken by Licensees

Licensees are also obligated to guarantee financial reserves to cover any decommissioning of generating facilities in accordance with the Ministerial Ordinance on Reserve Fund for Dismantling Nuclear Power Facilities enacted by the Minister of Economy, Trade and Industry, pursuant to the Electricity Business Act.

On the final day of each business year, licensees must provide a cost estimate of dismantling their reactor facilities which must be approved by the Minister of Economy, Trade and Industry by the end of the business year in question.

While the plant is in operation and to fund the cost of any reprocessing of spent fuel, licensees must build up a financial reserve with a Deposit Management Entity designated by the Minister of Economy, Trade and Industry while the plant is in operation, pursuant to the Spent Nuclear Fuel Reprocessing Fund Act.

The fund amount shall be determined by such factors as the amount of spent fuel generated, the capacity and operational status of reprocessing facilities, and the cost of reprocessing. The Act states that the Minister of Economy, Trade and Industry shall notify each licensee of the amount of needed reserves according to set criteria and any necessary changes in accordance with the criteria set forth in an ordinance of the METI and licensees will be further informed should changes needed to be made in the reserves depending on status of spent fuel generation.

With regard to the final disposal of high-level radioactive waste and radioactive waste with low heat production and a long half-life (TRU waste) generated by reprocessing, the Specific Radioactive Waste Final Disposal Act stipulates that needed financial reserves shall be calculated by multiplying the final disposal cost per unit of high-level radioactive waste by the quantity of generated waste; and that the final cost of disposal per unit shall be prescribed in an ordinance of the METI, based on these factors.

Funds designated for the final disposal of high-level radioactive waste generated through spent

fuel reprocessing shall be deposited with a Deposit Management Entity designated by the Minister of Economy, Trade and Industry.

The legislation limits the ability to utilize these reserves which may not be used for anything other than their designated purpose. Furthermore, the Minister of Economy, Trade and Industry may conduct on-site inspections of electric utilities and Deposit Management Entities.

Article 11 (2) Human Resources

In granting Reactor Installation Permits the NRA must ensure that the applicant possesses the technical and personnel ability to build such a facility, operate it safety and efficiently and prevent severe accidents.

Before commencing reactor operations, licensees must both outline Operational Safety Programs and obtain NRA approval.

There are regulatory requirements to ensure operational safety that only fully qualified staff and technicians meeting NRA criteria and having undergone NRA checks are engaged in the reactor operation. Checks must be carried out before the reactor is started, while it is operational, and after it is shutdown.

The NRA Ordinance on Commercial Reactors outlines Operational Safety Programs, including the content of operational safety education and its implementation for personnel operating and managing reactor facilities.

A quality assurance plan in the Operational Safety Programs outlines requirements on staff competence for operational safety and any supplemental education or training to be implemented should staff be deficient in such competency.

The NRA conducts inspections four times a year, focused compliance with Operational Safety Programs, as well as checking that competence management and education and training are carried out appropriately.

From among qualified applications, including the provisions of the NRA Ordinance, licensees must appoint a Chief Reactor Engineers to supervise the operational safety of reactor operations.

When implementing decommissioning measures, licensees must establish appropriate Operational Safety Programs and obtain NRA approval.

Human resource provisions covering Operational Safety Programs follow the same system as those for reactor operations, including operational safety education in such fields as decommissioning and providing for competence management and similar matters in the quality assurance plan as well.

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

Licensees must deal with both human and organizational factors in anticipating problems and managing any noncompliance with rules and regulations.

In the Operational Safety Program and its quality assurance plan, licensee set force guidelines dealing with noncompliance. These include programs for the analysis, prevention, detection, and correction of human error, and for self-appraisal of management and organizational problems.

Incidents of noncompliance due to human or organizational error are shared within the licensee organization, as well as with other licensees to ensure a strong and effective system.

All designs must incorporate appropriate measures to prevent mis-operations by operators.

1 Design Considerations

Regulatory requirements governing the prevention and rectification of human error at reactor facilities are stipulated in the NRA Ordinance on Standards for the Location, etc. Such facilities must incorporate safety measures which are easy to operate and where there is no possibility of mis-operation.

The NRA Ordinance on Technical Standards requires that the main reactor safety systems must be concentrated in a facility such as the control room. At the construction plan approval stage, systems must be installed in such a way as to ensure their safe operation and prevent any mis-operation.

2 Consideration in the Management of Reactor Operation

In their Operational Safety Programs, licensees must establish a quality assurance plan, outlining their plans to deal with noncompliance situations, including steps to be taken to prevent the further deterioration of noncompliance situations and those involving human error.

Licensees are required to undertake close analysis and evaluation of human error, and take steps to prevent future human error situations.

The NRA evaluates these licensee measures during Operational Safety Inspections.

Guidelines are described in the *Guidelines for Evaluation by Regulatory Authorities of Autonomous Initiatives by Business Operators for Rectifying Noncompliance Concerning Direct Factors in Human Error* (February 2008). The Guidelines state that clarity is essential in analyzing the direct cause of any problem and whether human error was responsible. The mechanism for sharing information with other licensees' about noncompliance due to human error must also be clear, as well as the system for enabling all licensees to effectively utilize such information.

Noncompliance events are classified according to their impact on overall safety with categories including accident/failure, deviation from operational conditions, violation of Operational Safety Programs, and autonomous analysis of direct causes. Key points to be checked in specific examples include:

- that the condition of systems, equipment, and components and any changes therein; and the behavior of individuals, relationships between individuals, and communications, are described logically, together with any associated problems.
- that factors surrounding any human error are summarized objectively in a way easily understood by third parties; that safety factors are identified and described in specific detail; and that proposed corrective safety measures are described in specific terms and then applied if necessary.

Accumulating, analyzing and utilizing data from human error noncompliance are checked during Operational Safety Inspections taking into account the frequency and timing of data analysis

carried out by each licensee:

- that data concerning direct causes of noncompliance resulting from human error are collected and accumulated;
- that this accumulated data is analyzed;
- that, should the collected data indicate such actions are necessary, preventive measures are formulated, evaluated, and implemented and the outcomes checked; and
- that information about noncompliance resulting from human error is shared with other licensees and utilized as appropriate.

The overall objective is not to assign individual responsibility but to construct a more efficient operational management structure to try to eliminate human error or, if it occurs, to reduce the severity of the impact. Based on this objective, the NRA conducts the aforementioned checks, while encouraging licensees to implement the PDCA cycle (Plan ⇒ Do ⇒ Check ⇒ Act ---make improvements and formulate another plan), share the information with their workers and other licensees and implement continuous improvement initiatives.

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 concept of quality assurance as part of the safety of reactor facilities was introduced in Japan in October 2003, and quality management systems are now required to be incorporated into operational safety activities.

Licensees formulate their management systems based on the JEAC 4111 quality assurance standard (Nuclear Standards Committee of the Japan Electric Association: a quality assurance standard for the safety for reactor facilities), which was revised while taking into account ISO 9001 (International Organization for Standardization: Quality Management Systems) and GS-R-3 (IAEA Safety Standard: The Management System for Facilities and Activities).

1 Regulatory Requirements and Measures

Under the Reactor Regulation Act, one of the criteria for obtaining construction approval of a nuclear facility is that the quality control methods and inspection systems comply with technical standards of the NRA Ordinance (the *NRA Ordinance on Quality Control Methods*).

In practice, this ordinance requires that a quality control supervision system be established for the design and construction of reactor facilities; that the responsibility of management executives be clearly stated; and that management of human and other resources, planning and implementation of specific duties, measurement, analysis, and continuous improvement be carried out.

Concerning operational safety activities, licensees must outline a quality assurance plan in their Operational Safety Programs, and must make continuous improvements to this plan, as well as planning, implementing, evaluating, and improving operational safety activities.

Quality assurance plans must be operated by licensee senior management; have clearly identified responsibilities, authority, and duties; and to feature mechanisms for the formulation, implementation, evaluation, and continuous improvement of such plans.

Operational safety plans must establish appropriate management methods covering external goods or services procurement; procedures for the appropriate management of operational safety documents and records; and education and training courses in safety activities.

It is necessary to clarify individual goals and requirements during operational safety activities, and to check at appropriate times that these are being carried out in accordance with the implementation plan.

To check this, licensees must conduct requisite inspections and tests, and establish an effective system to deal with incidents of noncompliance.

To evaluate operational safety activities, licensees must conduct systematic monitoring and implementation procedures; auditing should be carried out on a regular basis by persons not directly involved in the items under review.

Licensees should establish procedures to ensure the continuous improvement of operational safety activities and to institute preventive measures to avoid noncompliance situations or, should one occur, to introduce remedial measures to prevent a reoccurrence. Preventive knowledge acquired at both their own plant and other nuclear facilities should be evaluated and, where appropriate, incorporated by licensees in their operations.

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 above.

The technical adequacy of the JEAC 4111-2009 standard was evaluated by the former regulatory authority, 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 a quality management system, as well as making continuous improvements. These regulations establish specific requirements for a quality management system including "responsibility of top executives," "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 in areas such as education, training, skills and experience.

Licensees must identify needed competences and if necessary provide further education and training to ensure personnel reach the necessary standards.

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

Reactor quality assurance programs are audited.

To guarantee its impartiality an audit should be conducted by the appropriate authority at the licensee's head office and it should have no direct involvement with the department running the nuclear facility. The auditing department should be directly under the president in the company's organizational structure so that he 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 the specification sheet requirements.

Such specification sheets are given to the supplier at the time of ordering and products are then checked upon delivery.

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

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

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

On the issue of outsourcing, the provider must submit to the licensee a quality assurance plan to guarantee all requirements are met.

This prevents sub-standard outsourcing to providers with inappropriate quality assurance

systems.

This provides licensees in Japan with the confidence 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;

(i) 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

In obtaining a reactor installation permit, licensees must conduct an evaluation to confirm that the basic reactor facility design would not impede disaster prevention measures. During construction licensees must evaluate safety measures of all processes approved in the construction plan.

After beginning operations, licensees are obliged to conduct regular evaluations during periods of not more than ten years.

The Reactor Regulation Act stipulates that pre-service Inspections are conducted at the construction stage, and that Periodic Facility Inspections and Operational Safety Inspections are carried out during the operational stage, with checks focusing on both the hard and soft aspects of the safety of reactor facilities.

In response to the Fukushima Daiichi accident the Reactor Regulation Act was revised and an evaluation system to enhance the safety of reactor facilities was introduced.

Article 14 (1) Safety Assessments

Anyone seeking to construct reactor facilities, in addition to an installation permit application, they must provide evidence that the basic design and design principles will not impede disaster prevention. Such documentation will be submitted to the NRA, pursuant to the provisions of the Reactor Regulation Act.

The Installation Permit procedure is detailed in Article 18.

After obtaining a Reactor Installation Permit, licensees must obtain approval for their construction plans, as well as for the design of the fuel assembly to be loaded in the reactor.

When seeking construction plan approval, applicants must append a safety evaluation conducted by the licensee, based on the detailed design for the reactor facility. This document will cover earthquake-resistance and strength, as well as an attachment document concerning the safety-related design features specific to the equipment for which the application is being submitted.

When seeking approval for the design of the fuel assembly, applicants must attach a document covering such features of the fuel assembly as its heat, radiation and corrosion resistance, as well as a document featuring calculations of the strength of the fuel assembly (or the fuel elements, if the assembly consists of a bundle of fuel elements), a structural drawing of the fuel assembly, a flow chart for processing, and an attachment document concerning quality assurance.

Licensees must conduct welding inspections focusing specifically on areas which must withstand extra pressures and the containment vessel. Licensees welding inspections must be reviewed by the JNES.

Before beginning reactor operations, licensees must obtain approval for their Operational Safety Programs, with which they must comply to assure such operational safety.

Matters concerning construction plans, Pre-service Inspections, Fuel Assembly Design Approval, Fuel Assembly Inspections, and Welding Safety Management Reviews are detailed in Article 18.

Licensees are required to conduct regular safety evaluations during the course of their lifetime, for a period not exceeding ten years.

A report on these evaluations is provided in Article 19.

In response to the Fukushima Daiichi accident the Reactor Regulation Act was revised in June 2012 and an evaluation system to enhance the safety of commercial power reactor facilities was introduced. The system requires licensees to evaluate the safety of their reactor facilities whenever they undertake voluntary measures to prevent nuclear accidents other than those under regulatory requirements and to report these results to the NRA, and the public.

Safety evaluations have been incorporated into the legislative regulation structure to ensure that such evaluations are conducted throughout the lifetime of the reactor as part of the responsibilities

of the licensees, taking IAEA safety standards (GSR Part 4) into account.

Article 14 (2) Verification of Safety

1 Measures Relating to Safety Verification

After receiving approval for the construction plan, the licensee may not use the facility until it has passed a Pre-service Inspection.

The licensee may not use the fuel assembly unless it has passed a Fuel Assembly Inspection.

Licensees are obliged to undergo Periodic Facility Inspections and inspections of the status of their compliance with the Operational Safety Programs.

A report on inspections pursuant to the Reactor Regulation Act is provided in Article 19.

In their Operational Safety Programs, licensees establish internal safety mechanisms and conduct internal deliberations on such matters as changes to structures, systems, and components that have already received a Reactor Installation Permit, amendments to the Operational Safety Programs, and the results of regular evaluation of reactor facilities.

2 Aging management

The oldest reactor facilities in Japan have been operating since the 1970s, or 40 plus years. Dealing with age-related deterioration is therefore a crucial issue. Figure 14-1 shows the number of reactor units and the number of years they have been operating in Japan.

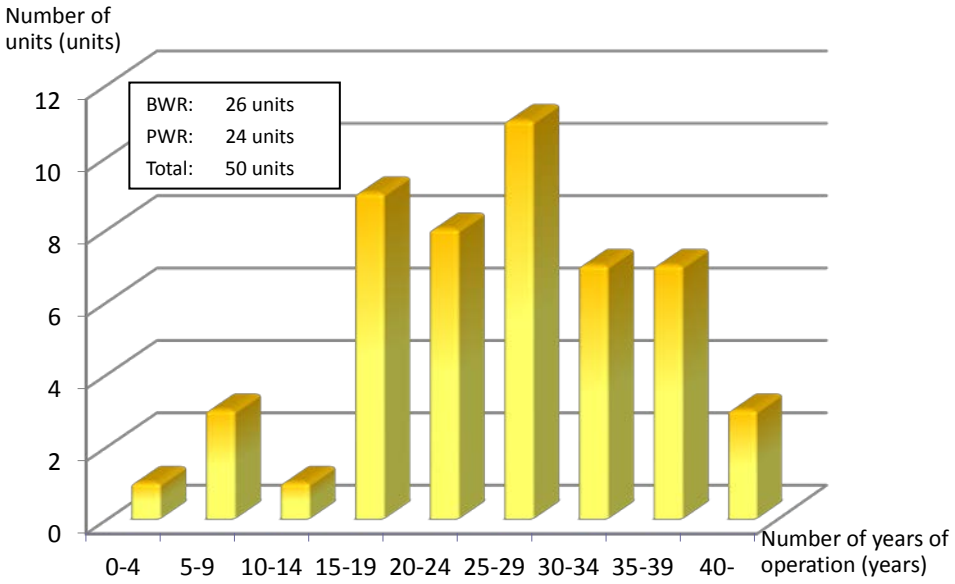


Figure 14-1 Number of Years of Operation and Number of Units

The Reactor Regulation Act prescribes an operating life of 40 years, but it is possible to extend this once, for a period of no more than 20 years, if approval is obtained from the NRA.

In determining whether or not to extend the operation period of a facility, it is necessary to ascertain the current status of the plant in detail so extension applicants must conduct a special inspection to assess such factors as deterioration.

Licensees must carry out a technical evaluation of any deterioration, set out their maintenance and management policy during the extension period, and append these details to their extension application.

The special inspection must include all equipment, components, and structures with functions required to ensure plant safety that have not hitherto been subject to a deterioration inspection or which have only undergone partial inspection, excluding those items that should be dealt with as part of the usual maintenance process. More specifically, it involves inspections of such components as the base metal of the reactor pressure vessel, and strength checks of concrete structures by means of core sampling.

The main equipment subject to special inspections in PWR and BWR is shown in Tables 14-1 and 14-2, respectively.

Table 14-1 Equipment and Areas Subject to Special Inspection at PWR Plants and the Inspection Methods Used

Equipment Targeted	Areas Targeted	Inspection Method
Reactor vessel	- Base metal and welded parts (100% of the reactor core area)	- Check for defects using ultrasonic inspection
	- Primary coolant nozzle side (the part with the highest fatigue usage factor)	- Check for cracks by means of surface inspection or eddy-current testing
	- Bottom mounted instrumentation nozzles (all)	- Check for cracks in the welded parts in question, using MVT-1[4], and check for defects on the inner surface of the bottom mounted instrumentation nozzles by means of surface inspection or eddy-current testing
Containment vessel	- Steel plates for the containment vessel (all areas to which it is possible to get close enough to inspect) - Pre-stressed concrete containment vessel	- Visual check of the condition of the coating - Checks of strength, concrete carbonation, and salt penetration by means of core sampling
Concrete structures	- Concrete structures designed to ensure the safety of reactor equipment[5] (primary shield wall)	- Checks of strength, concrete carbonation, and salt penetration by means of core sampling

[4] Visual inspection using a camera that can distinguish between wires with a width of 0.025mm

[5] Support functions, shielding functions, leak-prevention functions, etc.

Table 14-2 Equipment and Area Subject to Special Inspection at BWR Plants and the Inspection Methods Used

Equipment Targeted	Areas Targeted	Inspection Method
Reactor pressure vessel	- Base metal and welded parts (reactor core area and all areas to which it is possible to get close enough to inspect)	- Check for defects using ultrasonic inspection
	- Primary coolant nozzle side (the part with the highest fatigue usage factor)	- Check for cracks by means of surface inspection or eddy-current testing
	- Control rod drive mechanism stub tubes and drive housing (all).	- Check for cracks in the welded parts in question, using MVT-1[1], and check for defects on the inner surface of the housing by means of surface inspection or eddy-current testing
	- Foundation bolts (all)	- Check via ultrasonic inspection, to ensure there are no anomalies within the bolts
Containment vessel	- Suppression chamber vent pipes and vent pipe bellows (Mark I, modified Mark I)	- Check for hazardous defects or cracks, by means of surface inspection of all relevant surfaces, using MVT-1[6]
	- Steel plates for the containment vessel (all areas to which it is possible to get close enough to inspect) - Reinforced concrete containment vessel	- Visual check of the condition of the coating - Checks of strength, concrete carbonation, and salt penetration by means of core sampling
Concrete structures	- Concrete structures with functions required to ensure the safety of reactor equipment[2] (reactor pressure vessel pedestal or equivalent part, etc.)	- Checks of strength, concrete carbonation, and salt penetration by means of core sampling

Deterioration situations subject to evaluation and the evaluation techniques to be used are outlined in technical evaluations of deterioration. The evaluation focuses on situations such as stress corrosion cracking, corrosion, embrittlement, abrasion, fatigue cracks, and other possibilities.

During an extension period licensees must submit a maintenance and management policy covering all relevant maintenance measures identified as a result of technical evaluation of deterioration.

During an extended operational period, a system for aging management is used. Under this system, licensees operating reactors 30 years or older are required to include in their Operational Safety Programs a deterioration evaluation for equipment covering a period of ten years and a maintenance and management policy, thereby ensuring compliance. Efforts are made to ensure appropriate implementation including a maintenance and management policy focused on the

[6] Visual inspection using a camera that can distinguish between wires with a width of 0.025mm

period up to the last day of the extended operation period of the facility run for ten years.

The content implemented in each operational cycle, fleshing out the maintenance and management policy, is reflected in the inspections of individual items of equipment and the maintenance plan, taking into account past inspection performances and the status of deterioration. These details are checked by the NRA.

Under this system, an NRA Operational Safety Inspector checks the implementation status of the maintenance plan by such means as an Operational Safety Inspection. Figure 14-2 provides an outline.

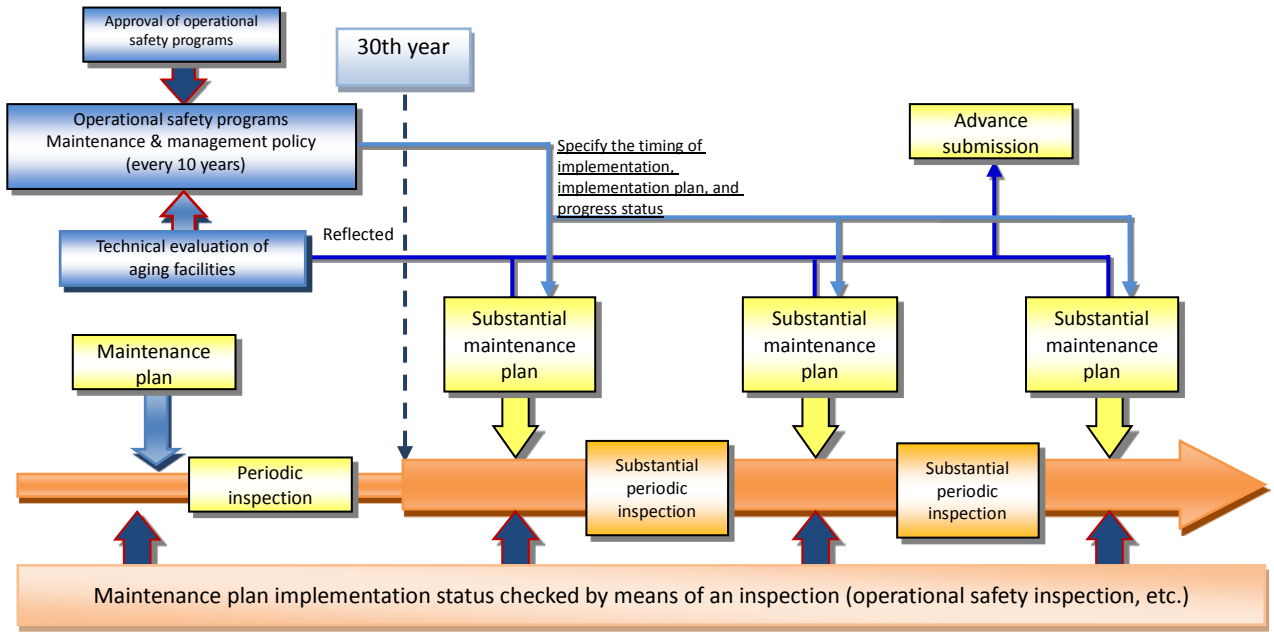


Figure 14-2 Maintenance Activities at Reactor Facilities

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 of radiation workers at nuclear facilities ensure they are not exposed to levels in excess of those prescribed in law.

Established release control targets for gaseous and liquid wastes are set lower than legal concentration limits. Such waste is treated by filtration or allowing radioactive decay over time to reduce the concentration of radioactive material that it contains, and is managed to ensure that radioactivity concentrations outside the surrounding monitored area do not exceed the prescribed limits.

Initiatives to reduce the exposure dose include management of prior records of radiation exposure and task management.

1 Legislative and Regulatory Measures for Radiation Protection

Measures for radiation protection in a reactor facility are outlined in in laws such as the Reactor Regulation Act and other legislation.

Radiation protection standards comply with those of the International Commission on Radiological Protection (ICRP) and have been incorporated into legislation.

The Radiation Council ensures consistency between relevant pieces of radiation hazard legislation.

The NRA Ordinance on Commercial Reactors prescribes the legislative requirements of radiation protection. These include measures controlling the exposure of radiation workers, and the monitoring of concentrations of radioactive material released as part of the management of gaseous or liquid waste.

The NRA Ordinance on Commercial Reactors stipulates that in the event of certain problems licensees must immediately report to the NRA and submit a situation report and measures taken within 10 days. These include incidents when concentration limits in the air outside the Surrounding Monitored Area are breached, a disposal facility is emitting gaseous radioactive waste or when a drainage facility releases liquid radioactive waste and concentration limits are also breached in water outside, the boundary of the Surrounding Monitored Area.

The “Notification to Establish Dose Limits in Accordance with the Provisions of the NRA Ordinance Concerning the Installation, Operation of Commercial Power Reactors (Notification on Doses)” prescribes in quantitative terms the dose limits and radioactive material concentration limits within Radiation Controlled Areas, dose limits and radioactive material concentration limits outside the Surrounding Monitored Area, dose limits for radiation workers, and dose limits relating to emergency work.

To comply with these guidelines licensees must include the following provisions in their Operational Safety Programs: matters relating to operational safety education and radiation protection; the establishment of Radiation Controlled Areas, Conservation Areas, and Surrounding Monitored Areas and entry restriction; exhaust gas and effluent monitoring equipment; the monitoring of doses, dose equivalent, radioactive material concentrations, and the surface density of radioactive material of contaminated items and decontamination; and the management of radiation detectors.

Compliance with such matters is included in the Operational Safety Programs and checked by Operational Safety Inspectors during periodic NRA inspections.

In addition, the NRA Ordinance on Commercial Reactors also requires licensees to submit reports for each business establishment, detail in doses received by radiation workers over the course of the year.

Japan’s radiation protection standard complies with the ICRP’s 1990 Recommendations

(Publication 60).

This standard incorporates basic ICRP Recommendations and additional provisions:

- The standard for the boundary of Radiation Controlled Areas has been set at 1.3 mSv per three months, based on the special limit for the public (5 mSv per year).
- The limit for female radiation workers has been set at 5 mSv per three months, this shorter period reflecting the need for stronger protection of a fetus before any pregnancy has been recognized.
- The dose limit relating to emergency work remains at 100 mSv, taking into account the IAEA's Basic Safety Standards (BSS).

Since 2008, the Radiation Council has conducted deliberations aimed at incorporating the ICRP's 2007 Recommendations into domestic legislation.

Table 15-1 shows the dose limits for radiation workers and the general public prescribed in the Notification on Doses.

Table 15-1 Dose Limits

Item	Dose Limit
A Radiation workers	
(1) Effective dose limit	100 mSv/5 years and 50 mSv/year
(2) Women	As prescribed in (1), plus 5 mSv/3 months
(3) Pregnant women	As prescribed in (1), plus 1 mSv/user for internal exposure from the time the pregnancy is recognized 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 abdominal surface in pregnant women	2 mSv/user from the time the pregnancy is recognized until childbirth
B Radiation workers involved in emergency work	
(1) Effective dose limit	100 mSv
(2) Equivalent dose limit for the lens of the eye	300 mSv
(3) Equivalent dose limit for the skin	1 Sv
C General public	
(1) Effective dose	1 mSv/year
(2) Equivalent dose limit for the lens of the eye	15 mSv/year
(3) Equivalent dose limit for the skin	50 mSv/year

2 Radiation Protection Programs Implemented by Licensees

2-1 Annual Exposure for Individuals

The average dose per person for radiation workers from FY2010 to FY2012 was 0.2-0.9 mSv per year at reactor facilities, according to reports made by nuclear operators under the Reactor Regulation Act. (The effects of the Fukushima Daiichi accident are excluded.)

The effective dose for radiation workers at reactor facilities in FY2012 was lower than the legally prescribed limits.

2-2 Total Dose of radiation workers in reactor facilities

The total dose remained basically unchanged in recent years. Figure 15-1 shows the trend of total dose and average dose for past 10 years; based on reports made by licensees under the Reactor Regulation Act (data does not include the effects of the Fukushima Daiichi accident).

At present, the individual dose, excluding the effects of the accident, is lower than the legal dose limit. So, in effect, current dose levels are not in themselves a problem, but it is important to continue activities to reduce radiation exposure based on the ALARA Principle.

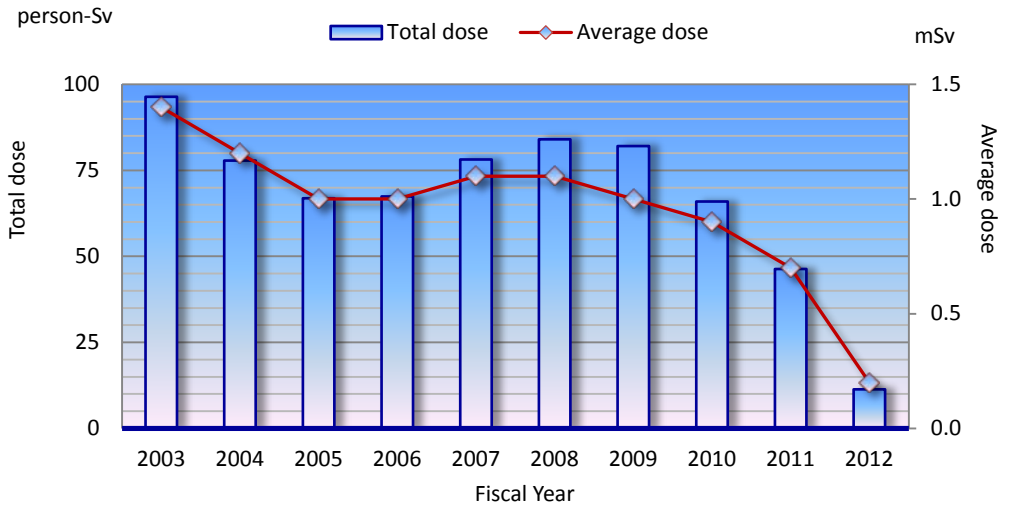


Figure 15-1 Total Dose and Average Dose

2-3 Release Control of Gaseous/Liquid Waste

In accordance with the provisions of the NRA Ordinance on Commercial Reactors, licensees reduce the concentration of radioactive material in gaseous waste as far as possible by such means as filtration in an exhaust gas facility, radioactive decay over time, or dilution, and then, measure and monitor its release.

In the case of liquid waste, they reduce the concentration of radioactive material as far as possible by filtration in a drainage facility, evaporation, adsorbing with the ion exchange resin

method, radioactive decay over time, or dilution, and then, they measure and monitor its release.

Licensees in turn outline measures in their own Operational Safety Programs to control the release of gaseous and liquid waste ensuring that the legally-prescribed radioactive material concentration limits outside the Surrounding Monitored Area are not exceeded.

To ensure that release levels are below the legal limits outside the Surrounding Monitored Area, licensees release control targets equal to the annual release quantity stipulated at the time they received their Installation Permit. They guarantee in their Operational Safety Programs that they will not exceed those levels and the NRA checks the status of compliance when conducting Operational Safety Inspections.

Figures 15-2 and 15-3 show that release of gaseous and liquid waste from reactor facilities (BWR and PWR) over the last ten years, based on reports made by nuclear operators under the Reactor Regulation Act (data does not include the Fukushima Daiichi incident. Based on reports from nuclear operators gaseous waste increased in FY2010 but did not exceed the release control targets. Iodine-131 was not detected in FY2012.

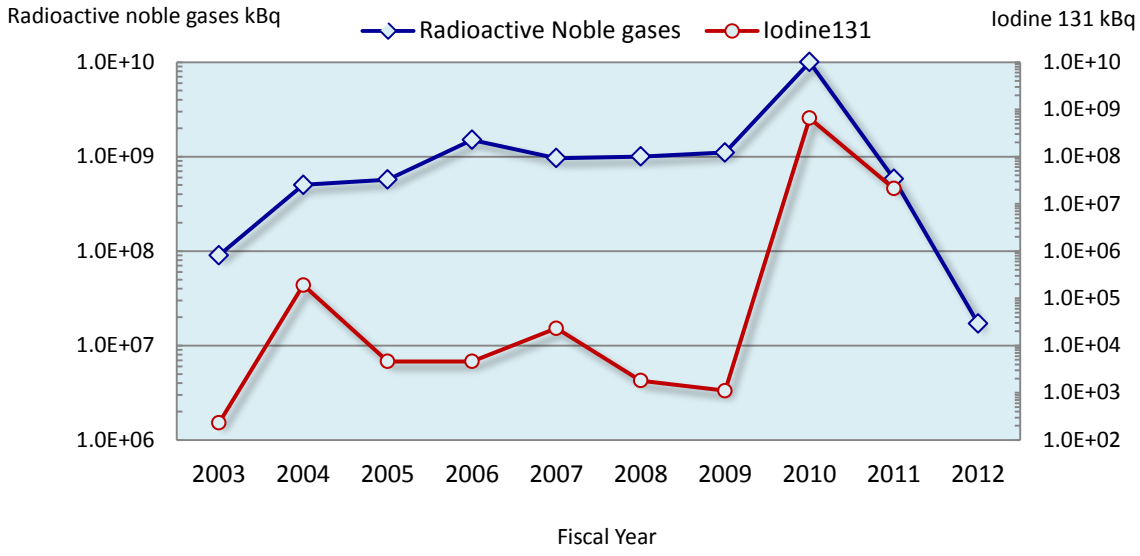


Figure 15-2 The Quantity of Gaseous Waste Released
(Radioactive Noble Gases and Iodine-131)

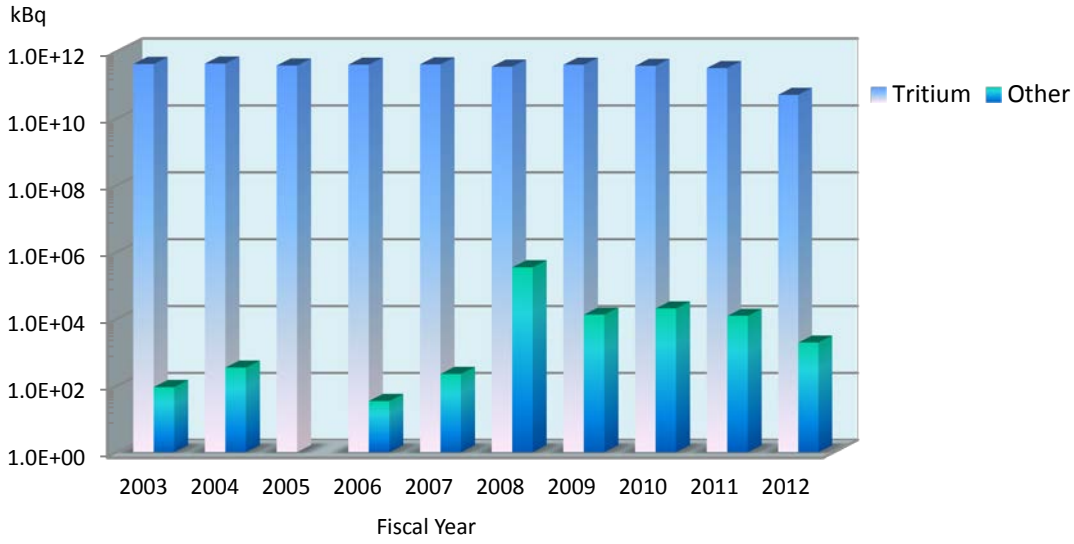


Figure 15-3 The Quantity of Liquid Waste Released

2-4 Measures to Reduce Radiation Exposure

Radiation exposure at reactor facilities in Japan is below the legal dose limits.

To further reduce exposure, licensees conduct autonomous initiatives such as reducing the dose in work environments and managing the time of radiation work.

It is usual for Japanese radiation workers to carry out maintenance work at several reactor facilities.

To reduce the exposure of such radiation workers, it is vital to implement centralized management system of their individual exposure histories.

Under the Reactor Regulation Act, licensees must maintain records of radiation workers' doses, but they may forward records older than five years to NRA designated organizations. These organizations can provide centralized data management covering individual workers.

This enables licensees to ascertain the prior exposure records and better management of radiation workers who have been engaged at multiple reactor facilities

2-5 Environmental Radiation Monitoring

To evaluate radioactive release on the surrounding environment licensees monitor air radiation does rates and environmental samples with the aim of improving release control and facility management.

To help protect the health and safety of nearby public communities local governments (in prefectures where reactor facilities are located) have also conducted local radiation monitoring.

After the TEPCO Fukushima Daiichi accident, the government developed a "Comprehensive Radiation Monitoring Plan (decided in August 2011, revised in March, April 2012 and April 2013)"

governing environmental radiation monitoring work related to Fukushima Daiichi accident.
Environmental radiation monitoring was increased after the accident, and relevant ministries and bodies including the government of Fukushima Prefecture are now working in partnership in accordance with the Comprehensive Radiation Monitoring Plan.
Environmental radiation monitoring data are uploaded on the website of the Disaster Prevention and Nuclear Safety Network for the Nuclear Environment (http://www.bousai.ne.jp/eng/), which is run by the NRA, enabling the general public to see it in real time.

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

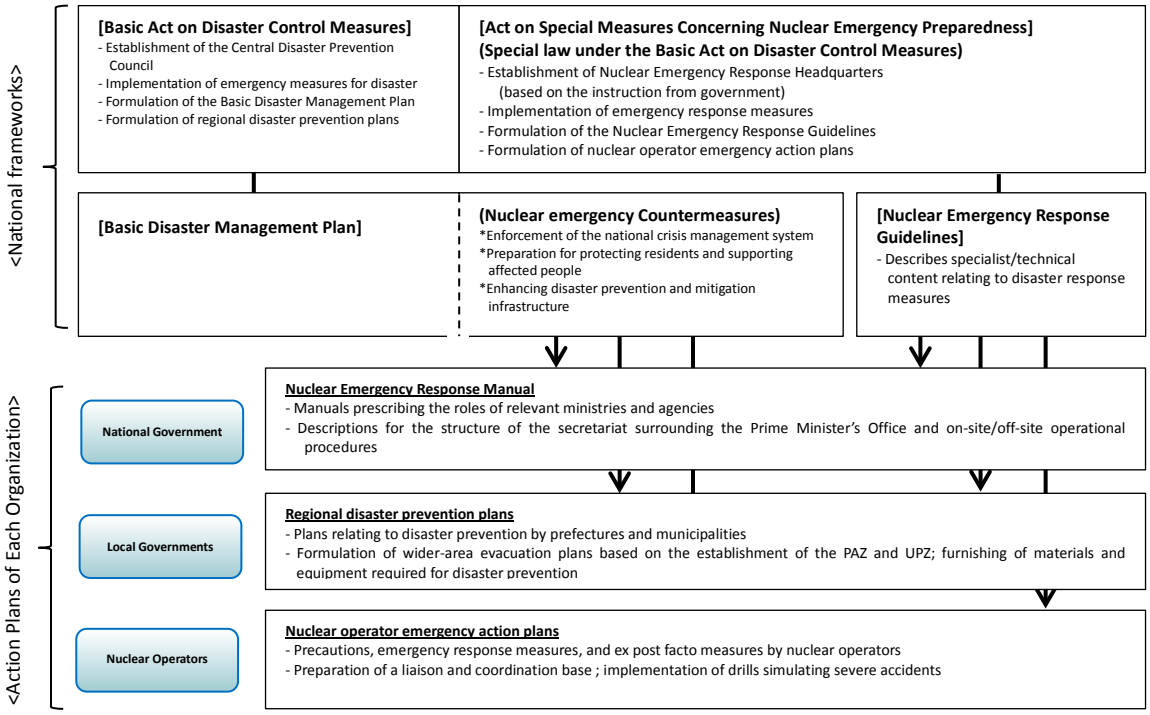
Nuclear emergency responses in Japan are conducted on the basis of the Nuclear Emergency Act. The accident at TEPCO's Fukushima Daiichi Nuclear Power Station has been the catalyst tostrengthen the nuclear emergency response system, such as establishing a new Nuclear Emergency Preparedness Commission within the Cabinet. This is chaired by the Prime Minister, and will enable the government to promote measures to prevent future nuclear emergencies as part of its routine work, and failing that, to be prepared to deal with any crisis.

Article 16 (1) Planning for an Emergency

1 Outline of the Laws and Regulations Concerning a Nuclear Emergency

Based on the experiences and lessons learned from the accident at the Fukushima Daiichi accident, the government revised the Atomic Energy Basic Act, the Nuclear Emergency Act, and related legislations in September 2012 to develop new nuclear emergency responses. As a result of the revision of the Atomic Energy Basic Act, a Nuclear Emergency Preparedness Commission was established within the Cabinet, with the Prime Minister serving as the Chairperson and the Chief Cabinet Secretary, the Minister of the Environment, and the NRA Chairman serving as Vice Chairpersons. The goal of the Commission is to ensure unified nuclear emergency response policies are part of the routine work of the entire government. The Revision of the Nuclear Emergency Act enhanced measures to prevent nuclear disasters and strengthened the functions of the Nuclear Emergency Response Headquarters in any emergency.

In Japan, emergency measures follow those contained in the Basic Plan on Disaster Prevention, which is drawn up in accordance with the Basic Act on Disaster Control Measures, the Nuclear Emergency Act, and the Nuclear Emergency Response Guidelines, which in turn are formulated in accordance with the Nuclear Emergency Act. The former prescribes the division of roles and responsibilities between nuclear operators, the national government and local governments, while the latter stipulates the specialized and technical measures required to deal with an emergency (such as references for the extent of zoning and criteria). The diagram below provides an outline of the relevant legal system.



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

In the event of an emergency such as the release of large amount of radioactive material, a Nuclear Emergency Response Headquarters will be temporarily established within the government. Following the Fukushima Daiichi accident, the Nuclear Emergency Act was revised and the Nuclear Emergency Response Headquarters was strengthened. The Prime Minister serves as Headquarters director, the Chief Cabinet Secretary, Minister of the Environment, and the NRA as deputy director generals, with all Ministers of State and the Deputy Chief Cabinet Secretary for Crisis Management serving as regular members. The NRA holds primary responsibility technical and specialized on-site safety issues. Matters Procurement of equipment and supplies required to deal with the nuclear facilities and all matters associated with off-site response are handled by the relevant ministries and agencies, according to the directions of the director (the Prime Minister).

The NRA formulates specialized and technical guidelines to implement emergency preparedness measures, emergency response and the restoration of facilities (hereinafter referred to as “Nuclear Emergency Response Guidelines”).

The responsibility of nuclear operators outlined in the Nuclear Emergency Act is to take all possible steps to prevent a nuclear disaster, to prevent the spread of any subsequent accident and to restore any resultant damage. Operators must make a Nuclear Operator Emergency Preparedness Program and formally notify the Prime Minister and the NRA and prepare a synopsis. An on-site organization for nuclear emergency preparedness must be established at each nuclear site and actions to either prevent a disaster or limit the spread of such a crisis must be carried out in accordance with the Nuclear Operator Emergency Preparedness Program. Accordingly, nuclear operators must appoint Nuclear Emergency Preparedness Personnel to the on-site emergency organization and notify the NRA, the governors of the local and neighboring prefectures and the municipal mayor. These officials and organizations must also be formally notified about the appointment or dismissal of a nuclear emergency preparedness manager chosen by the operator. If a specified event prescribed in the Nuclear Emergency Act occurs, the Nuclear Emergency Preparedness Manager must alert the above actors and the Prime Minister.

In addition, nuclear operators must maintain radiation measurement equipment to provide notification of specified developments[7] Instruments for radiation protection and emergency communications equipment required to enable the on-site emergency team to undertake its activities must be permanently available and regularly inspected and maintained. If radiation measurement instruments to provide alerts are installed, they must undergo NRA performance

[7] Events of which notification is required under Article 10, paragraph (1) of the Nuclear Emergency Act

checks.

As part of their routine work local governments formulate regional disaster prevention plans based on the Basic Plan on Disaster Response and the Nuclear Emergency Response Guidelines and, and are able to respond to any emergency.

The Prime Minister designates an off-site disaster response center for each nuclear site at which a local nuclear emergency response headquarters is established to coordinate emergency response measures.

Government emergency drills are carried out on the basis of a plan drawn up by the Prime Minister. Drills conducted by nuclear operators are carried out on the basis of legislation, disaster response plans, or nuclear operator emergency response programs, and nuclear operators must report the results to the NRA, as well as a synopsis.

1-2 Basic Plan on Disaster Response

The Central Disaster Response Council formulated a Basic Plan on Disaster Response based on the Basic Act on Disaster Control Measures and the Nuclear Emergency Act. The section on nuclear emergency response measures prescribes basic matters and the respective division of roles of nuclear operators, the government and local authorities.

The Basic Plan on Disaster Response was revised in September 2012 following the Fukushima Daiichi accident. The major revisions are as follows.

- The revisions prescribe the immediate assembly of the NRA Chairman at the Official Residence of Prime Minister and strengthen the Official Residence's decision-making and information dissemination functions.
- A rapid response center for emergencies shall be established at the head office or any other office of the relevant power company as the base for accident response measures, and a local headquarters shall be established at an off-site center to take responsibility for ensuring residents' safety. Measures to be taken on-site and off-site are thus clarified.
- The revisions prescribe the implementation of practical drills simulating complex disasters and severe accidents.
- The revisions prescribe close cooperation when multiple headquarters are established in the event of a complex disaster.

1-3 Nuclear Emergency Response Guidelines

In response to the accident at Fukushima Daiichi Nuclear Power Station, nuclear emergency preparedness measures, were strengthened in the Nuclear Emergency Response Guidelines.

These guidelines stipulate disaster response measures and their implementing frameworks and

the establishment of specific zones where such measures will be treated as a priority. The national government, relevant local governments and the nuclear operators plan the measures to deal with a nuclear disaster based on the Basic Plan on Disaster Prevention and the Nuclear Emergency Response Guidelines (the Nuclear Emergency Response Guidelines are detailed in "3 Measures for Dealing with an Emergency" below).

The main items indicated in the Nuclear Emergency Response Guidelines are as follows.

- Basic matters concerning nuclear emergency responses
  - Guideline Objectives
  - Characteristics of nuclear disasters
  - Basic concept of protective actions against radiation exposure
- Nuclear emergency preparedness measures
  - Establishment of EAL and OIL, which form the standards for decision-making in an emergency
  - Introduction of a PAZ (around 5km from the facility) and UPZ (around 30km from the facility), the zones for which prior measures, such as preparations for evacuation, should be formulated
  - Advance preparations, such as the development of information systems, emergency radiation monitoring, and a framework for radiation emergency medicine, as well as education and training
- Emergency response measures
  - Prompt emergency radiation monitoring
  - Providing prompt public information
  - Implementation of proper protective actions (sheltering, evacuation, medication of stable iodine tablets, etc.), based on EAL and OIL
- Medium- to long-term measures in response to nuclear disasters
  - Long-term evaluation of radiation effects on human health and the environment
  - Implementation of decontamination measures to minimize effects

The Guidelines stipulate the following as matters for further consideration.

- Introduction of Plume Protection Planning Areas (PPA) and establishment of priority zones and emergency response measures for facilities other than commercial reactors
- Responses to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station
  - Determination of approaches to the transition from an emergency exposure situation to an existing exposure situation and a planned exposure situation
  - Determination of approaches to priority zones for nuclear emergency response measures peculiar to TEPCO's Fukushima Daiichi Nuclear Power Station based on

risk assessment

- Establishment of a regular forum for information sharing with local residents

2 Responsibilities of Relevant Organizations Involved in Nuclear Emergency Response

The national government, local governments, and nuclear operators prepare the following systems to prevent a nuclear disaster or respond when a nuclear emergency occurs.

2-1 The National Government

- In the Nuclear Emergency Response Headquarters, the NRA holds primary responsibility for technical and specialized matters associated with the safety of nuclear facilities (on-site), while matters relating to the procurement of equipment and supplies required to deal with the nuclear facilities and all matters associated with the response outside the facilities (off-site) are handled by the relevant ministries and agencies, based on the directions of the director (the Prime Minister).
- Nuclear Emergency Preparedness Officers stationed in regions where nuclear facilities are located provide guidance and advice to help prevent nuclear emergency, such as preparing Nuclear Operator Emergency Response Programs and help carrying out measures to prevent a disaster spreading.
- Off-site centers have been located in areas near each nuclear installation site with essential equipment and communications to reach the Prime Minister's Official Residence, the NRA Emergency Response Center, nuclear operators, and relevant local governments. They can monitor in real time the plant status and environmental radiation levels since they are linked with monitoring posts located around the facilities. The national government supervises emergency environmental radiation monitoring and implements Comprehensive Nuclear Emergency Response Drills with local governments, nuclear operators, and local residents.

2-2 Nuclear Operators

- Nuclear operators must prepare a Nuclear Operator Emergency Response Program after conducting discussions with local governments before operations begin and then formally notify the NRA. The following must be included in the Nuclear Operator Emergency Response Program:
  - The duties of the Nuclear Emergency Preparedness Manager.
  - The composition of the organizations for nuclear emergency preparedness at each emergency base location.
  - The implementation policy of nuclear emergency response education for

appropriate personnel

- Needed equipment for nuclear any emergency response including maintenance and inspections.
- Planning, implementation, evaluation and improvement of nuclear emergency response drills.
- Measures to be taken during specified events following the declaration or cancellation of a nuclear emergency.

- Nuclear operators must establish an on-site nuclear emergency preparedness organization and appoint a Nuclear Emergency Preparedness Manager.
- This Manager must notify the government and surrounding prefectures immediately following specified developments.
- Nuclear operators must install and maintain radiation measurement equipment, radiation protection equipment and emergency communications to undertake on-site emergency responsible activities.

2-3 Local Governments

- Local governments formulate and implement Regional Disaster Prevention Plans based on the Basic Plan on Disaster Prevention and the Nuclear Emergency Response Guidelines. The main points in the Regional Disaster Prevention Plans are included:
  - Maintain communication networks among disaster prevention centers to ensure reliable communication with the national government, other local governments, and nuclear operators.
  - Preparation of facilities, materials and equipment, and systems to enable local headquarters to continue activities even in the event of a severe accident; establishment of collaboration with the NRA, designated administrative organs, public agencies, and nuclear operators; and development of a system to carry out extensive and flexible emergency radiation monitoring.
  - Preparation of precautionary protection measures (initial emergency evacuation) within the PAZ; formulation of extensive evacuation plans and with the national government ensuring effective instruction for evacuation and transportation of people who need support.
  - Development of systems regulating the shipment of water, and food.
  - Ensuring a comprehensive traffic control system to transport people from prioritized areas such as PAZ
  - Preparation of a system governing iodine tablets including their timely and proper distribution and administration; establishment of a radiation emergency medicine

system; and development and maintenance of systems to dispatch and accept radiation emergency medical teams.

- Preparation of information systems in the event of a complex disaster.

- Prefectures support and coordinate administrative duties by municipalities.

3 Measures for Dealing with an Emergency[8]

3-1 Nuclear Emergency Preparedness Measures

(1) Basic Approach to Nuclear Emergency Preparedness

In case of a nuclear emergency, appropriate measures to protect local residents and others against radiation exposure to avoid further contamination and random knock-on effects. .

Because of the rapid escalation of the Fukushima catastrophe, in future it will be necessary to anticipate a developing emergency even before the release of radioactive materials and take precautionary measures such as evacuation. If radioactive material is released it may be necessary to take other requisite protection measures.

(2) The Establishment of EAL and OIL

To establish such protection measures, it is necessary to set forth nuclear facility emergency categories and resulting exposure risks so that all stakeholders can share a common understanding of the emergency. The NRA has deliberated on agreed radiation exposure doses at which protection measures should be taken need to be specified in advance.

To enable appropriate protection measures to be implemented in various emergency categories, it is necessary to establish operational judgment criteria based on observations and figures. Specifically, it is necessary to stipulate Emergency Action Levels (EALs) which determine emergency categories. They are primarily used to implement preventive protection measures in the event of an emergency at nuclear facilities. Also, it is necessary to stipulate OILs, which are used to formulate protection measures particularly after the radioactive release. They are prescribed in the form of measurements, such as the radiation dose rate envisaged in case of an emergency. Following detailed deliberations the following conclusion was reached.

The emergency categories are divided into three:

- Alert

  In this phase, there is no radiation effects on the public or any imminent risk, but caution is required because of the possibility of an 'abnormal' event occurring. The PAZ, the body implementing protection measures such as a local government, begins preparations which may require a comparatively long time to implement.

- Site Area Emergency

[8] Nuclear Emergency Response Guidelines (revised June 5, 2013)

In this phase, it is necessary for local governments and the PAZ to put into place the main protection measures around a nuclear facility where a radioactive material release already threatens public safety. They include the evacuation of all local residents.

- General Emergency

  It is now necessary for controlling organizations such as local governments to implement full emergency protection measures, to mitigate inevitable damage impact and prevent its spread following the radioactive material release. The PAZ will organize preventive activities such as the evacuation of local residents and the distribution of stable iodine tablets. It may also become necessary to take preventive protection measures such as evacuation of workers within the UPZ, in the same way as within the PAZ.

Emergency Action Levels are guidelines to establish whether a specific situation corresponds to one of these emergency categories, such as the status of the facility's defense-in-depth equipment, the status of radioactive material confinement functions, and whether or not any external events have also occurred. Table 16-1 shows emergency categories relating to commercial reactor facilities and the details of current EALs.

Nuclear operators are required to consider establishing more detailed EALs specifically reflecting conditions at each power reactor and submit them to the NRA, which will examine them and amend recommendations if warranted.

Table 16-1 Emergency Categories and EALs

Emergency Category	EAL
Alert	- If an earthquake with a magnitude of at least 6-lower on the Japanese seismic intensity scale has occurred in the prefecture in which the nuclear facilities are sited - If a major tsunami warning has been issued in the prefecture in which nuclear facilities are sited - If a Tokai Earthquake Advisory has been issued - In the event of a crucial failure of the reactor facilities that a Director-General of the NRA Secretariat or the Director of the Accident Countermeasures Office of the Nuclear Emergency Preparedness Division deems to necessitate an alert - In any other case in which the Chairman of the NRA deems the establishment of an NRA Nuclear Accident Vigilance Headquarters to be necessary
Site Area Emergency	- Leakage of reactor coolant - Failure of emergency core cooling system in the high pressure coolant injection system in the event of the loss of feedwater functions - Loss of all feedwater functions to steam generators - Loss of residual heat removal functions in the event of the loss of residual heat removal functions from the reactor by means of the main condenser - Station blackout (continuing for at least five minutes) - If a situation in which only one power source is supplying electricity to the DC bus continues for at least five minutes, in the event that there is only one emergency DC bus - Decline of the water level within the reactor vessel while the reactor is shut down to the level at which the emergency core cooling system begins to actuate - Loss of all functions for cooling the reactor during outage - Unavailability of the reactor control room
General Emergency	- Inability to shut down the reactor, if required, by means of a conventional neutron absorber. - Loss of all functions to shut down the reactor, in such an emergency is required. - Inability to inject water into the reactor in question using any of the emergency core cooling systems - If the pressure within the containment vessel reaches the design-basis maximum allowable working pressure - Loss of pressure control functions in the containment vessel, in the event that functions for removing residual heat from the reactor have been lost - Loss of all functions for cooling the reactor - Loss of all emergency DC power supply continues for at least five minutes - Detection of radiation or temperature indicative of core meltdown - Detection of a change in the liquid level within the reactor vessel or other phenomenon indicative of exposure of the irradiated fuel assemblies within the reactor vessel - If a situation continues for at least one hour in which the water level declines to a point where residual heat removal functions are lost - Unavailability of the reactor control room - The liquid level in the irradiated fuel assembly storage tank declines to the level at which the fuel assemblies in question are exposed - If a situation in which the air radiation dose rate at the site boundary reaches 5 mSv/hour continues for at least ten minutes

If the initial phase of an emergency reaches the General Emergency level, based on the judgement of the local EAL facility, it may be necessary to begin protection measures such as precautionary evacuations to reduce exposure of the general public. There is a possibility that

high air radiation dose rates could occur over a comparatively extensive area after radioactive release because of air dispersal.

Accordingly, it is necessary to conduct emergency monitoring and to measure results against set criteria before taking any requisite protection measures. The criteria take the form of setting Operational Intervention Levels using figures such as the air radiation dose rate and the concentration of radioactive material in environmental samples. Table 16-2 shows the content of OILs corresponding to each type of protection measure.

Table 16-2 OILs and Protection Measures

<table>
<tr><th></th><th>Classification</th><th>Outline of Classification</th><th colspan="3">Initial Figure</th><th>Outline of Protection Measures</th></tr>
<tr><td rowspan="2">Emergency protection measures</td><td>OIL1</td><td>Criteria for advising local residents to evacuate within a few hours or sheltering, in order to prevent radiation effects from surface soil, inhalation of re-suspended radioactive material, or inadvertent oral ingestion</td><td colspan="3">500μSv/h
(air radiation dose rate when measured 1m above the ground)</td><td>Identification of zones and evacuation within a few hours (including ordering those who cannot easily move to shelter indoors temporarily)</td></tr>
<tr><td>OIL4</td><td>Criteria for conducting decontamination to prevent inadvertent oral ingestion and external exposure via skin contamination</td><td colspan="3">βrays:40,000 cpm
(detector counting rate a few cm from the skin)
βrays:13,000 cpm
(detector counting rate a few cm from the skin)</td><td>Screening of evacuees based on the evacuation standards and prompt decontamination of those exceeding the criteria</td></tr>
<tr><td>Initial protection measures</td><td>OIL2</td><td>Criteria for restricting ingestion of local produce and advising local residents, to temporarily relocate within a week or so, in order to prevent radiation effects from surface soil, inhalation of radioactive material, or inadvertent oral ingestion</td><td colspan="3">20μSv/h
(air radiation dose rate when measured 1m above the ground)</td><td>Identification of zones within a day or so and restriction of ingestion of local produce, as well as temporary relocation within a week or so</td></tr>
<tr><td rowspan="2">Restrictions on ingestion of food and drink</td><td>Screening criteria for food and drink (Response to OIL3)</td><td>Criteria for identifying areas where measurement of radionuclide concentrations in food and drink should be carried out in preparation for possible food and drink restrictions at OIL6</td><td colspan="3">0.5μSv/h
(air radiation dose rate when measured 1m above the ground)</td><td>Identification of zones where radionuclide concentrations in food and drink should be measured within a few days</td></tr>
<tr><td>OIL6</td><td>Criteria when restricting food and drink intake in order to prevent radiation exposure via oral ingestion</td><td>Nuclide</td><td>Drinking water, milk, dairy products</td><td>Vegetables, cereals, meat, eggs, fish, other</td><td>Analysis of radionuclide concentrations in food and drink within a week, and prompt restrictions on food and drink intake if results are in excess of the criteria</td></tr>
<tr><td></td><td></td><td></td><td>Radioactive iodine</td><td>300Bq/kg</td><td>2,000Bq/kg</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Radioactive cesium</td><td>200Bq/kg</td><td>500Bq/kg</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Alpha-emitting nuclides of plutonium and transuranic elements</td><td>1Bq/kg</td><td>10Bq/kg</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Uranium</td><td>20Bq/kg</td><td>100Bq/kg</td><td></td></tr>
</table>

(3) Radiation Medicine

In addition to conventional medicines, radiation emergency medicine may be required in a nuclear emergency. Medical controls must be implemented for affected populations including recording exposure doses, the extent of the affected area, and the potential for contamination.

Appropriate medical procedures should then be provided with various medical institutions fulfilling their respective roles (emergency treatment, contamination checks, etc.), Effective systems and chains of command should be established as a routine measure in institutions dealing with emergencies and disasters. An issue particular to radiation medicine is the long-term and late-onset effects of radiation, so it is vital to develop a knowledge of these and ensure proficiency in relevant techniques.

From the foregoing perspective, the NRA incorporates radiation medicine systems into the Nuclear Emergency Response Guidelines, together with education, training and practice drills for appropriate institutions, including the national and local governments.

If radioactive iodine enters the body, it can accumulate in the thyroid gland and cause thyroid cancer from a few years after exposure up to a dozen or more years thereafter. This risk can be reduced through the prior administration of stable iodine tablets and preparations should be made in any possible crisis situation. The effectiveness of stable iodine tablets does vary considerably according to the timing of their administration, and there is a possibility of side-effects and so the NRA has instructed their use in compliance with medical advice.

In the PAZ, because of the possibility of immediate evacuations, a system is being developed to enable local governments to distribute iodine tablets to local residents in advance as a routine measure, ensuring maximum effectiveness.

3-2 Emergency Response Measures

(1) Basic Approach to Emergency Response Measures

In an emergency and in order to institute the most effective preventive measures to protect local residents, it is necessary to collect the most credible information on the situation as speedily as possible.

(2) Identifying Abnormal Situations and taking Emergency Response Measures

Following the release, or threat of, abnormal levels of radioactive materials or radiation, the operator of a nuclear facility must immediately determine the applicable emergency category based on available information and notify the national and local governments and propose appropriate protection measures. The national government and local governments shall take the following emergency response measures:

- If the situation has reached Alert or Site Area Emergency status, they shall begin protection measures in case it develops into a General Emergency and provide information to local residents.

- If situation has reached General Emergency status, they will begin measures such as the evacuation of local residents from the PAZ, as a general rule, and from part of the UPZ, depending on the situation at the plant.
- Depending on the results of emergency environmental radiation monitoring, measures such as evacuation, temporary relocation, and/or restrictions on food and drink intake shall be implemented outside the areas where precautionary protection measures have already been taken.

(3) Implementation of Emergency Environmental Radiation Monitoring

a Preparation and initial response to emergency environmental radiation monitoring

The national and local governments, nuclear operators, and designated public organizations prepare emergency environmental radiation monitoring in an Alert status. In a Site Area Emergency, the national government establishes and begins operating an emergency environmental radiation monitoring center with the cooperation of local governments, and requests necessary personnel based on a staff deployment plan providing them with disaster information with which to begin emergency environmental radiation monitoring.

b Establishment of an emergency environmental radiation monitoring implementation plan

The national government swiftly formulates an emergency environmental radiation monitoring implementation plan, taking into consideration such practical factors as the seriousness of the accident, location of homes and population centers, topography, weather forecasts and the results of atmospheric dispersion predictions, and integrates supervision of emergency environmental radiation monitoring among various fields.

c Implementation of emergency environmental radiation monitoring

The national and local governments, nuclear operators, and designated public organizations conduct emergency environmental radiation monitoring based on the emergency environmental radiation monitoring implementation plan under the supervision of the emergency environmental radiation monitoring center. Initial monitoring should focus on the measurement of air dose rates, to determine future protection measures based on OILs. The aerial concentration of radioactive materials, mainly radioactive iodine, should also be measured. Measurement targets are to be expanded sequentially.

The reactor operator is responsible for monitoring the radiation source, such as the concentration of radioactive material discharged from the facility, and air dose rates at the edge of the site. The operator must report the results to the emergency environmental radiation monitoring center.

Depending on the severity of the problem, the emergency environmental radiation monitoring center shall effectively utilize available staff, materials and equipment, focusing on measurement targets to be prioritized.

d Results of emergency environmental radiation monitoring

The emergency environmental radiation monitoring center first judges the validity of the monitoring results, and the national government collects, analyzes and evaluates the verified results. These are utilized as a reference in determining future protection measures based on OILs. The national government takes weather data and atmospheric dispersion predictions into account when analyzing and evaluating the monitoring results. The government publicizes analysis and evaluation results promptly in an easy-to-understand manner.

(4) Providing Information to Local Residents in an Emergency

The national and local governments must make full use of all feasible means of communication, including diverse forms of media, in order to swiftly provide accurate, easily-understandable information to local residents. In doing so, they should convey the following matters repeatedly to local residents.

- The name of the affected facility, the time when it occurred, and details of the situation.
- The state of the surrounding environment such as measurements of air radiation dose rates, as well as future projections.
- Action that local residents should take, broken down by zone or settlement

When the national or local governments disseminate information, they must seek the help of the media. In providing information, consideration must be given to those requiring assistance and those who are only staying in the area temporarily. Information should also be shared with relevant organizations and there are no discrepancies in such information.

(5) Protection Measures

When abnormal levels of radioactive material or radiation are released, or there is a risk of such an occurrence the following protection measures shall be taken.

a Evacuation and temporary relocation

Urgent evacuation and temporary relocation should be taken if local residents are exposed to unacceptable levels of radiation. Moving them reduces such risk. Temporary relocation will take place in areas where the air radiation dose rates are lower than more seriously affected areas. Temporary relocation is carried out over a longer period of time compared with high-risk

areas to reduce any unnecessary radiation exposure should residents continue to live there. Contamination status of evacuation shelters must be checked. Following screening, decontamination of evacuees may be necessary to help fight internal exposure and reduce skin surface exposure.

Evacuation and temporary relocation measures should be tailored to the Priority Zones for Nuclear Emergency Response.

- In the PAZ, evacuation of all local residents must generally be carried out immediately when the situation reaches General Emergency status.
- In the UPZ, it is necessary to carry out a phased evacuation, depending on the situation at the nuclear facility. Emergency environmental radiation monitoring shall be conducted, with zones higher than OIL1 being identified and evacuated within a few hours. Emergency environmental radiation monitoring shall be ongoing thereafter, and identification of and temporary relocation from zones higher than OIL2 must be carried out within a day.
- Outside the UPZ, areas higher than OIL1 and OIL2 must be identified following radioactive releases, in the same way as in the UPZ, and evacuation or temporary relocation must be carried out.

In implementing evacuation or temporary relocation as described above, the government's Nuclear Emergency Response Headquarters judges the necessity of evacuation and must clearly and without confusion convey its decisions to residents through appropriate local governments.. Nuclear Emergency Response Headquarters will considers transport methods, and routes, ensuring evacuation shelter, utilize emergency environmental radiation monitoring results obtained by the NRA and weather predictions and atmospheric dispersion predictions as a reference

Special assistance must be given to residents, particularly those who need special help because of physical or psychological reasons. Attention should be paid to coordinating evacuation centers in advance of an emergency and the possibility that these shelters may need to be relocated. Radiation protection measures must be included at evacuation centers like hospitals, nursing homes and community centers which serve as temporary refuge centers for locals whose evacuation has been delayed or patients in hospitals and nursing homes.

b Sheltering

Receiving shelter is relatively easy to arrange by local residents and helps to reduce radiation exposure and shielding the body from neutron and gamma radiation. Residents should follow government advice to shelter indoors while awaiting orders. At hospitals and nursing homes it is

sometimes necessary to prioritize shelter over evacuation. In such situations, providing shelter in a concrete building providing a solid 'shielding' effect and air tightness is generally effective.

Practical sheltering measures are tailored to the Priority Zones for Nuclear Emergency Response.

- In the PAZ, evacuation is generally carried out in the event of a General Emergency, but sheltering is prioritized over evacuation.
- In the UPZ, sheltering must be implemented as a general rule, until phased evacuation or protection measures based on the OIL are carried out.
- Outside the UPZ, sheltering is generally implemented in the same way as within the UPZ. Accordingly, local residents must be warned that there is a possibility that temporary sheltering might be necessary if the situation reaches General Emergency status.

Once a shelter regime is established the focus will eventually shift to evacuation if it appears possible that such shelter will likely become prolonged because of prevailing conditions. Thus radiation exposure reduction would be lost due to the influx of contaminated air and it would become increasingly difficult to maintain a normal lifestyle. Life would become more complicated in indoor shelters in such areas as providing information, medical supplies and other relief items becomes difficult.

In formulating Regional Disaster Prevention Plans (Nuclear Emergency Response Section), buildings must fulfill stringent air-tightness conditions, and evacuation shelters and routes must be secured because of the possibility of a switch in evacuation plans. Local residents must be provided with such relevant information.

c Preventive prescriptions of stable iodine tablets

To prevent internal radioactive iodine exposure, stable iodine tablets should be taken according to government directives. In addition to warnings about possible side-effects the following points should be considered:

- Stable iodine has no protective effect against radionuclides other than radioactive iodine.
- It is necessary to take stable iodine tablets in addition to other protective measures such as evacuation, shelter, and restrictions on food and drink intake. An excessive reliance on the effects of stable iodine alone must be avoided and it is necessary to prevent inadvertent oral ingestion.
- When taking stable iodine tablets, psychological anxiety could give rise to unusual reactions.
- Doses must be appropriate to the age of the patient. Particular care is required to avoid an overdose to infants and young children.

The following methods of taking stable iodine tablets should be used, tailored to the Priority Zones for Nuclear Emergency Response.

- In the PAZ, the Nuclear Emergency Response Headquarters or local governments immediately issue instructions concerning evacuation and taking stable iodine tablets when the situation reaches the General Emergency phase. However, persons unable to take stable iodine tablets, as well as infants and young children (for whom the impact of thyroid gland exposure to radiation from radioactive iodine is greater) and their guardians should evacuate earlier upon the declaration of a Site Area Emergency, when taking stable iodine tablets is unnecessary.
- When a situation enters the General Emergency phase outside the PAZ, the NRA determines the necessity of taking stable iodine tablets, in addition to possible evacuation and shelter, after which the Nuclear Emergency Response Headquarters or local governments issue instructions. Residents are advised to take stable iodine tablets in line with such instructions.

d Radiation emergency medicine

Medical procedures shall be carried out in accordance with the medical care system developed in advance, with a focus on contaminated patients or those exposed to radiation.

The NRA which consolidates information from emergency environmental radiation monitoring and conveys information about radiation doses, to key medical personnel coordinating care in affected areas via the Nuclear Emergency Response Headquarters.

These medical personnel direct patients to the appropriate hospital and rescue services and instruct these institutions to accept the incoming patient. People who are severely stricken can be taken to an advanced medical facility. If radioactive iodine has been released or may be released shortly, responsible officials can direct that stable iodine tablets are taken promptly by the general public in according with government instructions. Decontamination, protection guidance and screening shall be carried out. If there is a strong possibility of internal exposure, it is necessary to carry out thyroid screening and measurements.

e Contamination screening and decontamination

Screening to ascertain the degree of contamination is essential to curb internal exposure via inhalation and oral ingestion, reduce skin exposure, and prevent the spread of contamination, as well as ensuring that medical interventions can take place smoothly.

The place for contamination screening should be selected to ensure all procedures (the human body, objects, etc.) can be screened; it is desirable for such screening to take place in a location where the radiation background is as low as possible.

It is necessary to conduct contamination screening of evacuees and people suffering temporary location at convenient centers and to carry out decontamination if the level is higher than the reference value.

(i) Body surface contamination screening

Body surface contamination screening shall be carried out primarily among evacuees. The OIL4 criteria shall determine decontamination. It is also desirable to carry out decontamination below OIL4 guidance being provided on required radiation protection measures.

If OIL4 is exceeded in body surface contamination screening at evacuation shelters, simple decontamination (change of clothes, wiping of the skin, use of a simple decontamination agent or shower) shall be implemented, taking into account the effectiveness of such measures. Nasal smears should be taken to check contamination of the nasal cavity, if there is concern about inhalation exposure. If the individual cannot be decontaminated there, they should undergo the procedure without delay when the return home or another suitable venue

Medical personnel should were two layers of gloves to prevent secondary contamination when examining persons suffering body surface contamination.

It is desirable to explain the results of body surface contamination screening measures when carrying out protection measures such as decontamination.

(ii) Thyroid screening

Thyroid screening shall be carried out if concerns arise about radioactive iodine exposure following screening and emergency environmental radiation monitoring. However, it must be accepted that thyroid screening do not provide an accurate estimate of thyroid gland exposure dose.

Screening should initially be carried out using a simple measurement technique. If more detailed measurement is required, a thyroid monitor or whole body counter should be used, depending on the nuclide(s) involved. When making detailed estimates of internal exposure, it is necessary to utilize instruments capable of carrying out such detailed measurements.

(iii) Screening of goods

The screening of goods shall be carried out to curb external and/or internal exposure among those handling said goods, and preventing the spread of contamination. Moreover, OIL4 shall also be used in the screening of goods, with simple decontamination procedures being carried out ion contaminated goods

f Restrictions on ingestion of food and drink

Restrictions on food and drink consumption are enforced when radionuclide concentrations rise above a certain level. These restrictions are designed to reduce internal exposure due to oral ingestion, but it is vital to provide alternative food and drink from outside the affected zone if necessary.

Practical restrictions on the consumption of food and drink should be implemented as follows:

- As well as identifying areas where the air radiation dose rate is higher than OIL2 and considering the temporary relocation, consuming local produce must be restricted. Once the radionuclide concentrations in food and drink have been obtained, possible restriction shall be determined on the basis of OIL6.
- Areas where air radiation dose rates are higher than the screening criteria for food and drink must be identified and measurement of radionuclide concentrations started. If these measurements confirm radionuclide concentrations in excess of OIL6, consumption of food or drink must be restricted.

In implementing the aforementioned restrictions the NRA must disseminate all relevant information to local governments via the Nuclear Emergency Response Headquarters. Local governments in turn must inform all local residents.

3-3 Medium- Long-term Measures in response to Nuclear Disasters

(1) Basic Approach to Medium- Long-term Measures in response to Nuclear Disasters

In response to a nuclear disaster proper measures need to be taken with regard to radioactive materials discharged into the environment once the immediate crisis ends. It is therefore important to take the following medium- to long-term measures as discussions continue:

(2) Environmental Radiation Monitoring to Promote Disaster Recovery

The national and local governments must conduct continuous environmental radiation monitoring to ascertain changes in radiation doses and concentrations of radioactive materials to enable the following disaster recovery decisions to be made.

- Revision of evacuation zones
- Determination of measures to manage and reduce exposure doses
- Estimates of current and future exposure doses (estimation of individual radiation doses)

A system to integrating the collection, preservation, and utilization of data must be created to enable relevant organizations to efficiently use the information and ensure the validity of environmental radioactivity monitoring to be conducted on a medium- to long-term basis.

(3) Estimation of Individual Radiation Doses to Promote Disaster Recovery

In addition to environmental radiation monitoring, national and local governments must estimate individual radiation doses assuming medium- and long-term exposure to contamination and take appropriate measures.

Individual radiation doses vary according to a person's daily activities so the results of behavioral surveys must be checked againstthose of environmental radiation monitoring. Actual measured values obtained through individual dose monitoring are also necessary. By combining these values, individual radiation doses may be estimated with higher accuracy.

(4) Health Assessment to Promote Disaster Recovery

Residents suffer not only radiation exposure but also mental and physical stresses of living in an abnormal environment when they must evacuate, take shelter, and live communally over a long period of time. National and local governments must therefore conduct long-term health assessments including the mental health of residents in addition to monitoring diseases associated with radiation exposure. Through such health assessments, officials must eliminate pubic fear about present and future health problems.

(5) Decontamination Measures

Government officials must institute decontamination measures to enable residents to return to their normal lives as quickly as possible. Such decontamination measures must take relevant social factors into consideration

Government organizations must encourage public participation by providing all decontamination information, guidance, materials, equipment and training, and by deploying specialized advisors.

The exposure of workers engaged in decontamination situations should be managed by relevant laws and regulations.

(6) The transition from an emergency exposure situation to an existing exposure situation and a planned exposure situation

Nuclear facilities experience an emergency situation when the release of radioactive materials exceeds planned targets. The situation is considered 'stable' when such release falls below a controllable level. But even in the aftermath of an emergency some areas may continue to experience both an emergency-and-existing exposure concurrently. The transition between the two is a major factor in judging such issues as lifting evacuation directives and other protective measures and should be carefully considered. Once a 'situation exposure' measures should immediately be taken to transition to a 'planned exposure.

4 Nuclear Emergency Drills

Previously, nuclear emergency drills have been carried out by the national and local governments and nuclear operators, in order to check the effectiveness of emergency response systems in accordance with the Nuclear Emergency Act. However, following the Fukushima Daiichi accident these drills are under review. Future drills must now incorporate 'lessons learned' from Fukushima Daiichi accident including the possibility of a complex earthquake-tsunami-nuclear accident disaster which had never before been experienced as well as incorporating more realistic evacuation drills. Such exercises range from large-scale national government drills to those carried out by nuclear operators within a single facility. The following provides an explanation of these.

4-1 Drills Drawn up by the National Government

Hitherto, local governments have drawn up nuclear emergency drills. The national government provided support and coordination. Following the enactment of the Nuclear Emergency Act, for which the 1999 JCO criticality accident was the catalyst, the national government drew up plans and implemented independent drills.

The Fukushima Daiichi accident marked the first time that such a nuclear emergency had been declared in Japan, and the nuclear emergency response system, including nuclear emergency drills, was put to the test. Based on this experience, the NRA is now reviewing the disaster response system, as well as nuclear emergency drills.

The key feature of the drills is that they envisage severe accidents or complex disasters and are intended to test close collaboration with related ministries and agencies, through such aspects as evacuation of local residents within the UPZ (around 30km from the facility). These drills will form the basis for subsequent revisions of various plans and manuals.

4-2 Drills Based on Plans Drawn up by Nuclear Operators

Nuclear operators conduct drills approximately once a year, focusing on such aspects as establishment and operation of a response headquarters, notification and liaison, and emergency environmental radiation monitoring, in accordance with the Nuclear Operator Emergency Response Program prescribed for each site. Drills check the effectiveness of organizations implementing accident management. In addition, if a local government carries out a site drill, that site management will also conduct a drill at the same time.

4-3 Drills Drawn up by Local Governments

Even since the Fukushima Daiichi accident, prefectures and municipalities have conducted drills

stipulated in their Regional Disaster Prevention Plans.

These drills simulate severe accidents and complex disasters, train participants without providing them of the scenarios in advance and conduct map exercises.

4-4 Participation in International Drills

Japan is a contracting party to the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. In order to ensure that notification is provided pursuant to the provisions of these conventions without fail in an emergency, Japan consistently participates in the ConvEx organized by the IAEA.

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

1 Measures for Providing Public Information

To enhance widespread public dissemination of disaster response plans, local residents participate in national and local government emergency drills. Local authorities explain a disaster response plan to local residents who then simulate evacuations to actual refugee facilities and radiation surveys are carried out.

NISA launched its emergency information mailing service in July 2008, which is to enable people to register their mobile phone e-mail addresses in advance and promptly receive emergency information. This system was inherited by the NRA in September 2012 as N-alert.

During a nuclear emergency, the media will provide information to local residents. Press briefings, highlighted by television and radio broadcasts, will be held as required at the local off-site disaster prevention centers and at the Emergency Response Center in Tokyo, and these will provide local residents with relevant information.

Information posted on websites provide emergency information.

2 Providing Information to Neighbor Countries

Japan is an island nation and shares no land borders with its immediate neighbors. However, its geographical neighbors – China and South Korea – also have reactor facilities. Following the Fukushima Daiichi accident sharing information during a nuclear emergency is an important issue for all of the neighboring countries. In August 2009, senior Japanese, Chinese and South Korean regulators met and agreed to share emergency information. The three countries had earlier exchanged information as required, but Fukushima underlined the importance of closer cooperation's and talks are currently underway to achieve such an outcome.

At a Japan - China - South Korea Top Regulators' Meeting in November 2011, the three countries

reached agreement on a Nuclear Safety Cooperation Initiative, which includes improving the exchange of information, cooperating in response to severe accidents, and cooperating on disaster prevention and emergency responses.

In terms of existing mechanisms for the providing information other than the aforementioned tripartite mechanism, Japan will disseminate information via the Unified System for Information Exchange in Incidents and Emergencies (USIE) web portal run by the IAEA's Incident and Emergency Centre (IEC).

3 Response in the Event of a Nuclear Accident and a Radiological Emergency in a Neighboring Country

To carry out 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, Japan has designated the Ministry of Foreign Affairs as 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 the territory of Japan. In the event of a radiological emergency outside the territory of Japan, including in a neighboring country, the Ministry of Foreign Affairs will receive a notification and pass on the details without delay to the National Competent Authority for a Domestic Emergency (NCA(D)) and other relevant authorities, as well as taking any the necessary action. Moreover, in relation to the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, the National Assistance Capabilities (NAC) of relevant organizations within Japan have been registered with RANET (the IAEA Response Assistance Network).

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 deciding on the siting of reactor facilities, licensees are required to conduct adequate studies of external events that could occur at the proposed location and to take these into account in its design.

The impact on society and the environment of a proposed reactor facility is evaluated as part of the procedure for granting a Reactor Installation Permit.

Moreover, in the same way as other large-scale industrial facilities, there is an obligation to conduct an environmental impact assessment of the siting location.

Article 17 (1) Evaluation of Factors Related to Siting Location

Factors relating to the siting location that may affect the safety of reactor facilities are evaluated during the Reactor Installation Permit review process. Licensees are required to conduct adequate studies of external events that could occur at the siting location and to take these into account in the design of such facilities.

The NRA Ordinance on Standards for the Location, etc. establishes the review criteria relating to Reactor Installation Permits; it also presents design requirements in regard to external events, which include the followings:

- Reactor facilities shall be constructed on ground that can adequately support the facilities, and can even withstand a major seismic occurrence.
- Reactor facilities shall be able to adequately withstand seismic force.
- There will be no major risk of the safety functions of reactor facilities from any tsunamis which may impact on the facilities.
- Safety facilities shall be such that there is no risk to their safety from other natural phenomena.
- There will be no major risk of the safety from accidental human action within the surrounding monitored area.

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

The risk of radiological consequences in the surrounding area arises from the siting of reactor facilities.

In reviewing Reactor Installation Permits, the siting conditions and design of facilities are evaluated to confirm that the risk of radiological consequences for the public or the environment as a result of radioactive releases is ‘acceptably’ low.

In applying for a Reactor Installation Permit, the applicant must evaluate the effective dose outside the surrounding monitored area, as well as evaluating the risk of a major accident.

The NRA Ordinance on Standards for the Location, etc. requires that such facilities are able to dispose of radioactive waste during normal operations to ensure that concentrations of radioactive material in the air and in the water outside the surrounding monitored area can be reduced sufficiently to ensure safety. Also that step can be taken to ensure that air dose rates around the site due to direct gamma radiation from the reactor facilities and gamma-ray skyshine can also be reduced adequately.

In the event of a severe accident, licensees are required to take necessary measures to prevent the containment vessel failure and abnormally high radioactive release outside the plant or site.
An environmental impact assessment, which is required when siting a large-scale plant or other facility, is carried out before applying for a Reactor Installation Permit.

Article 17 (3) Re-evaluation of Factors Related to Siting Location

The Reactor Regulation Act does not provide for the re-evaluation of factors related to siting location, but re-evaluation is carried out as required, such as re-evaluation based on new knowledge.
In terms of related legislative measures, licensees must submit an application for amendment of the Reactor Installation Permit, in the event that the safety analysis changes due to a change in the conditions or envisaged events that formed the assumptions of the safety analysis in the original Reactor Installation Permit application.
In the event that the factors altering the safety analysis are related to factors associated with the siting location, the factors relating to the siting location are re-evaluated when submitting the application for amendment.

Article 17 (4) Discussion with Other Countries That Could be Affected by Reactor Facilities

Japan is an island chain located in East Asia and shares no land borders with its neighbors.
As reactor facilities in Japan use seawater as a coolant, they are sited along the coast. But all such facilities are sufficiently separated from neighboring countries by the sea, and none are sited close to any borders, so reactor sitings and operations do not affect other countries.
Consequently, it is not deemed necessary to obtain the consent of these states for the siting of facilities, and no such procedures have been prescribed in law.

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 (defense 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

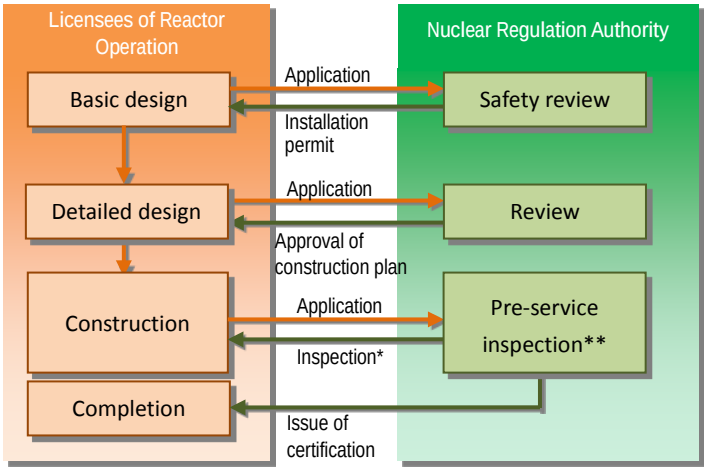
In Japan, the mechanism for the design review by the regulatory authority consists of three procedures: a Reactor Construction Permit which includes a review of the basic design and safety evaluation in relation to the siting of a reactor facility; Approval of a Construction Plan which entails a review of the detailed design of specific facilities; and Approval for the Fuel Assembly Design which entails a review of the design of the fuel assembly to be used in the reactor facility.

The NRA conducts Pre-service Inspections and Fuel Assembly Inspections to check that reactor facilities have been constructed and fabricated in accordance with the approved plans.

Article 18 (1) Implementing a Defense in Depth Strategy

1 Regulatory Procedures Relating to Design and Construction of Reactor Facilities

Figure 18-1 shows the permits and approvals process in the design and construction of reactor facilities.



* Part of the inspection is carried out by the JNES, at the instruction of the NRA, which is notified of the results.

**The fuel assembly inspection and welding safety management review are carried out in conjunction with the pre-service inspection.

Figure 18-1 Main Procedures Involved in the Design and Construction of Reactor Facilities

1-1 Reactor Installation Permits

As explained under Article 17, an evaluation of siting is carried out as part of the process of granting a Reactor Installation Permit. The safety of the facility is evaluated at the same time.

The NRA Ordinance on Standards for the Location, etc. broadly classifies the requirements for the safe design of reactor facilities into those relating to equipment dealing with a design basis accident and those relating to equipment to deal with a severe accident.

The requirements relating to equipment dealing with a design basis accident focused on earthquakes and other external events, and design requirements for ensuring the safety of reactor facilities.

The requirements relating to equipment for severe accidents stipulate the necessity for avoiding such crises as well as preventing the spread of such accidents and resolving them.

1-2 Approvals of Construction Plans

Having obtained a Reactor Installation Permit, licensees must then develop a detailed design of

the reactor facility, and before commencing construction work must seek NRA design approval pursuant to the provisions of the Reactor Regulation Act.

When constructing a new reactor facility, the detailed equipment design stipulated in the NRA Ordinance must be described on the application form for Approval of the Construction Plan; these include the reactor unit and facilities for the handling and storage of nuclear fuel material, the reactor cooling system, the instrument and control system, facilities for the disposal of radioactive waste, radiation management and reactor containment facilities. In addition, an explanatory documentation prescribed in the Ordinance must be appended.

If modifications to an existing reactor facility are required, the licensee must either obtain an Approval of Construction Plan or carry out formal notification procedures, depending on the nature of the construction work.

The standards for the Approval of Construction Plans are stipulated in the NRA Ordinance on Technical Standards; in the same way as the Ordinance on Standards for the Location, etc. These are broadly categorized into requirements concerning equipment to deal with a design basis accident and requirements concerning equipment to deal with a severe accident.

In addition to the foregoing, the procedure for the Approval of Construction Plans involves checking the quality control methods used by the licensee from the reactor facility design and construction stage onward, so one of the standards for Approval of Construction Plan is having a technically-appropriate quality assurance method and system for its inspection.

The requirements for quality assurance relating to construction plans are prescribed in the NRA Ordinance on Quality Control Methods. (See Article 13)

Licensees carry out construction work on reactor facilities after receiving an Approval of Construction Plan. A mechanism has been put in place whereby the NRA conducts Pre-service Inspections to check that the construction work is being carried out in accordance with the plan approved in advance.

1-3 Pre-service Inspections

Pre-service Inspections are carried out for each construction process, in accordance with the NRA Ordinance.

Before manufacturing the fuel assemblies used in reactor facilities, fuel manufacturers must obtain prior NRA approval for their design. If they do not pass the Fuel Assembly Inspection ensuring their manufacture in accordance with the approved specifications, they cannot be used as fuel in a reactor facility.

Furthermore, under the Reactor Regulation Act, licensees are obliged to conduct a welding inspection, focusing on the welded areas of key components, such as the containment vessel.

The system (organization, methods of testing, etc.) for conducting these welding inspections

must be reviewed by the JNES.

1-4 Model Certification and Model Designation for Components

Following an application for Model Certification in relation to specified components prescribed in the NRA Ordinance on Commercial Reactors, the NRA certifies the model if it complies with the NRA Ordinance on Standards for the Location, etc. In the construction permit process, certified components are deemed to comply with the technical standards, so it is anticipated that this will contribute to greater efficiency in the construction permit process.

In the event of an application, the NRA approves a Model Certification if all of the following are applicable: it is based on a design that has already received Model Certification; it complies with the NRA Ordinance on Technical Standards; and it demonstrates homogeneity. In the approval process of construction plan, specified components that have received this designation are deemed to comply with the technical standards and it is anticipated that this will contribute to greater efficiency in the approval process of the construction plan.

2 Regulatory Requirements Relating to Reactor Facility Design

The NRA Ordinance on Technical Standards sets forth the standards for approving construction plans in accordance with the provisions of the Reactor Regulation Act.

The main requirements for safety functions in the standards concerning equipment to deal with a design basis accident are as follows.

- Prevention of damage due to an earthquake, tsunamis, or other external force
- Prevention of fire damage
- Prevention of flood damage within the reactor facility
- Reactor facility functions such as inherent characteristics for reactivity control, etc.
- Measures to prevent a station blackout
- Prevention of damage due to fluid oscillation, etc.

The NRA Ordinance on Technical Standards prescribes requirements relating to the vessels, pipes and pumps used in reactor facilities, as well as support structures and the materials and structures of reactor core support structures, stipulating these by component class and by operational status (in the case of concrete containment vessels and liner plates, these are prescribed by load status).

Table 18-1 shows the classification of equipment to deal with a design basis accident, Table 18-3 shows the operational status classes, and Table 18-4 shows the load status classes.

In addition, requirements for individual components of reactor facilities are also prescribed.

As well as prescribing the requisite features of equipment to prevent, deal with, or mitigate a severe accident, the standards also require the installation of specified safety facilities to deal

with a severe accident caused by an aircraft collision or other acts of terrorism.

Moreover, requirements relating to vessels, pipes and pumps which are part of systems dealing with a severe accident, and materials and structures of their support structures and reactor core support structures, are prescribed by component class and by operational status.

Table 18-2 shows the classes of equipment to deal with a severe accident.

The following equipment must be installed to deal with a severe accident, separately from equipment to deal with a design basis accident.

- Equipment for bringing the reactor to a subcritical state in the event of failure of the reactor emergency shutdown system
- Equipment for cooling the reactor in the event of a high pressure load on the coolant boundary
- Equipment for reducing the pressure on the coolant boundary
- Equipment for cooling the reactor in the event of a low pressure load on the coolant boundary
- Equipment for transporting heat to the ultimate heat sink
- Equipment for cooling the containment atmosphere
- Equipment for preventing containment failure due to overpressure
- Equipment for cooling a molten reactor core in the bottom of the containment vessel
- Equipment for preventing damage to the containment vessel due to a hydrogen explosion
- Equipment for preventing damage to the reactor building due to a hydrogen explosion
- Equipment for cooling the spent fuel storage tank
- Equipment for curbing the radioactive dispersion outside the plant or industrial establishment
- The requisite water source for tackling a severe accident and equipment for supplying such water
- Power supply facilities
- Instrumentation
- Reactor control room
- Monitoring and measurement equipment
- Office for Emergency response
- Communications and liaison equipment

The concept behind power station design requirements focuses on using equipment to deal with a design basis accident in order to prevent an anticipated operational event from progressing to an accident. It seeks to create a mechanism to prevent damage to the reactor core and

radioactive releases outside the facility, and to return the power station to a safe condition even if the original problem had already become a more serious 'accident.'

Even if a severe accident occurred, equipment to deal with a severe accident should enable radioactive releases to be kept as low as reasonably achievable.

Thus, design requirements have been implemented in order to introduce the concept of defense in depth.

Table 18-1 Classification of Equipment for Design Basis Accidents

Class 1	Vessels, pipes, pumps, and valves	Components of the reactor coolant pressure boundary
	Support structures	Structures supporting Class 1 components
Class 2	Vessels, pipes, pumps, and valves	Equipment required to safely shut down a power reactor or ensure its safety in an emergency, which could indirectly cause radiation hazards to the public
		Equipment associated with circuits through which fluid circulates for the primary purpose of driving the turbines, which form part of the steam line located downstream of the Class 1 components and are located between the Class 1 components and the valve closest to those components; also those which form part of the feedwater system located upstream of the Class 1 components and are located between the Class 1 components and the valve closest to those components
		Components other than the foregoing, from the containment vessel penetration to the inner or outer isolation valve
	Support structures	Structures supporting Class 2 components
Class 3	Vessels and pipes	This refers to vessels or pipes (only pipes in which the concentration of radioactive material in the fluid contained therein is at least 37mBq per cubic centimeter (37kBq per cubic centimeter, if the fluid is in liquid form) or pipes in which the maximum allowable working pressure is greater than 0 MPa) other than ducts that belong to Class 1 components, Class 2 components, the containment vessel, and the radiation control facility or reactor containment facility (standby gas treatment equipment)
Class 4	Pipes	This refers to ducts belonging to the radiation control facility or reactor containment facility (restricted to the standby gas treatment equipment), in which the concentration of radioactive material in the fluid contained therein is at least 37mBq per cubic centimeter (excluding those parts that belong to Class 2 pipes)

Table 18-2 Classification of Equipment for a severe Accident

Major Accident Class 1	Vessels, pipes, pumps, and valves	Components of specified safety facilities
	Support structures	Structures supporting Major Accident Class 1 components
Major Accident Class 2	Vessels, pipes, pumps, and valves	Components of static equipment to deal with a severe accident that are not part of specified safety facilities
	Support structures	Structures supporting Major Accident Class 2 components
Major Accident Class 3	Vessels, pipes, pumps, and valves	Components of portable equipment for a severe accident

Table 18-3 Classification of Operational Status

Operational Status I	Status of power reactor facilities during normal operation
Operational Status II	Status other than Operational Status I, Operational Status III, Operational Status IV, or Testing Status
Operational Status III	Status in which power reactor operation needs to be halted as a matter of urgency, due to a failure or mis-operation of the power reactor facilities
Operational Status IV	Status in which an abnormal situation envisaged in the safety-related design standards of the power reactor facility has arisen
Testing Status	Status in which pressure in excess of the maximum allowable working pressure is being applied to the power reactor facilities during a pressure test

Table 18-4 Classification of Load Status

Load Status I	Status in which a concrete containment vessel is subjected to a load envisaged in Operational Status I (apart from when snow has accumulated or there is a storm)
Load Status II	Status in which a concrete containment vessel is subjected to a load envisaged in one of the following situations: (a) A situation when the safety relief valve is operating (apart from when snow has accumulated or there is a storm) (b) A situation when pressure testing of the containment vessel is taking place (apart from when snow has accumulated or there is a storm) (c) A situation when snow has accumulated and the containment vessel is in Operational Status I (apart from when there is a storm)
Load Status III	Status in which a concrete containment vessel is in Operational Status I and there is a storm, or status other than Load Status IV when the containment vessel is in Operational Status IV
Load Status IV	Status in which a concrete containment vessel is in Operational Status IV (including times when snow has accumulated or there is a storm) and is in an abnormal state envisaged in the safety-related design standards for the containment vessel

3 Main Modifications Carried Out in Response to the Results of Safety Evaluations

When constructing reactor facilities, licensees are required to give prior consideration to preventing an accident beyond the design basis and mitigating any effects if such an accident were to occur, and to ensure that there is sufficient leeway in the design for this. However, the Reactor Regulation Act stipulates that the NRA can order licensees to suspend reactor operations or implement improvements, if its location, structure, or equipment does not meet NRA standards. Even when a Reactor Installation Permit has been granted, if the standards for granting a Reactor Installation Permit have changed, the NRA can order licensees to take steps to become compliant with these new levels.

Since the revised Act entered into force only recently, no improvements to reactor facilities have yet been made in accordance with the new provisions.

Article 18 (2) Application of Proven Technologies

1 Regulatory Requirements Concerning the Technologies Applied

There are no provisions in laws that clearly prescribe the use of proven technologies in facility design. But if new technology is introduced when seeking Approval of Construction Plan, it will be necessary to conduct testing and analysis to prove that the technology in question complies with the technical standards set forth by the NRA.

2 Measures that Licensees should take in the Application of Proven Technologies

The NRA Ordinance Prescribing Standards for the Location, Structure, and Equipment of Commercial Power Reactors and their Auxiliary Facilities requires the highest standards of reliability for safety structures, systems, and components with safety functions, and that their design is such that this can be maintained.

This should not impede the application of new technologies, but licensees are required to ensure the reliability of these technologies when designing reactor facilities.

Safety facilities should function in all envisaged environmental conditions up to the occurrence of a design basis accident; moreover, in order to check their soundness and capabilities, they must be tested or inspected while the reactor facility is operating or shut down.

More specifically, in obtaining Reactor Installation Permits and Approval of Construction Plans, it is necessary for licensees to verify the technologies used in the design of reactor facilities.

3 Reflection of Knowledge through Testing and Analysis

In formulating its safety standards, the NRA has sought to strengthen design standards, tighten measures against severe accidents, and improve earthquake and tsunami resistance, so it is proactively promoting safety research into nuclear regulations that can resolve regulatory issues.

The main research themes are:

- Research into the development of design standards
  - Developing evaluation techniques focused on earthquakes and tsunamis
  - Research into fuel behavior in the event of an accident
  - Developing measures to deal with the aging of facilities and evaluation techniques for approving life extensions
- Research into measures against severe accidents
  - Developing regulatory standards focused on severe accidents
  - Experiments focused on severe accidents; developing a domestic severe accident analysis code
  - Research into the progress of severe accidents

- Research into the safety management of Specified Nuclear Power Facilities
  - Studies of the cause of the accident at TEPCO's Fukushima Daiichi Nuclear Power Station; evaluation of the situation within the reactors
  - Developing appropriate techniques for evaluating implementation plans relating to specified nuclear power facilities
- Research into nuclear emergency response measures
  - Research into fire protection measures
  - Research into risk communication and the prevention of nuclear disasters due to earthquakes, tsunamis, or other external events
- Fostering a safety culture
  - Developing safety regulatory requirements relating to people and organizations in nuclear facilities

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

In terms of regulatory reliability requirements, important safety systems are designed to handle the single failure of a component to guarantee continued system functioning even in the event of an off-site power failure.

It is necessary for redundancy or diversity and independence to be incorporated into the design of such systems, taking into account their physical make-up, working principles, and assigned safety functions.

For easily managed operation, the design incorporates appropriate measures to prevent mis-operation and allows the operator to safely operate said equipment in appropriate environmental conditions.

Vital safety functions will continue even during an unanticipated absence by an operator including during a design basis accident. This involves taking such steps as giving consideration to operability in the design of panel layouts, handling devices, and valves, taking ergonomic factors into account; bearing in mind the need to be able to grasp the status of reactor facilities quickly and accurately from measuring instrument and alarm displays; and taking into account the need to ensure that errors cannot easily occur when carrying out maintenance or inspections.

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 licence 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

Licensees may not use a reactor facility unless the facility in question passes Pre-service Inspections confirming that the construction work carried out corresponds to the approved design.

In commencing operation, licensees must set forth Operational Safety Programs and obtain NRA approval. Operational Safety Programs prescribe such matters as limiting conditions for operation, operational matters, maintenance, inspection, and testing of the reactor facilities, steps to deal with accidents and anticipated operational events, requirement to report major safety problems to the regulatory body, and requirement to gain operational experience and share it with other licensees as necessary. Licensees are required to comply with the Operational Safety Programs, with the status of compliance being checked periodically by the NRA.

Radioactive waste resulting from the operation of reactor facilities is treated and managed appropriately and its volume reduced using suitable methods.

Article 19 (1) Initial Authorization

In Japan, after obtaining a Reactor Installation Permit, in accordance with the provisions of the Reactor Regulation Act, approval must be obtained for the detailed design of the facility in question.

Figure 19-1 provides an outline of the procedures from the construction of a reactor facility to its operation.

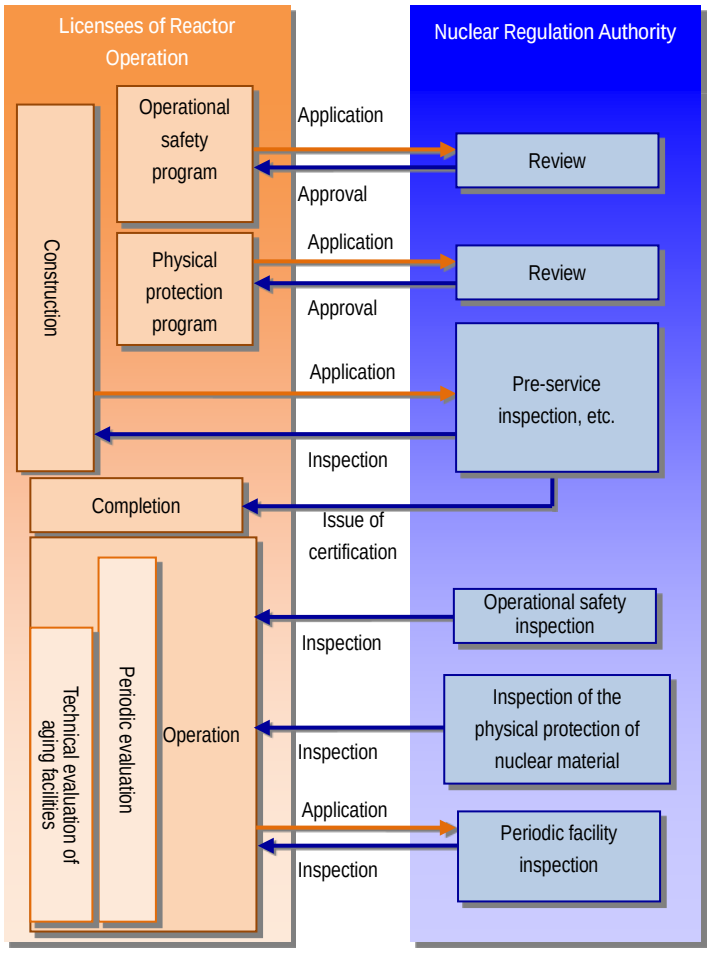


Figure 19-1 Main Procedures at the Operation Stage

A reactor facility is in construction stage, the NRA carries out Pre-service Inspections to check that the construction work has been carried out in accordance with the approved construction plan.

The licensee must undergo Pre-service Inspections, in accordance with the provisions of the Reactor Regulation Act, and may not use the reactor facility until it passes these inspections.

The licensee applies to the NRA for a Pre-service Inspection conducted after Approval of Construction Plan.

These inspections are conducted at an appropriate time during the construction process; before each inspection takes place, the regulatory authority compiles documentation, such as procedural manuals for the Pre-service Inspection, and this documentation forms the basis for the inspection.

Once it receives an application for a Pre-service Inspection from a licensee, the NRA provides JNES with inspection instructions so that it can carry out part of the inspection in accordance with the provisions of the Reactor Regulation Act.

Table 19-1 shows the items to be inspected in each construction process during the Pre-service Inspection in accordance with the provisions of the Reactor Regulation Act.

The items to be inspected during the Pre-service Inspection are prescribed in advance and are determined on the basis of the design of the reactor facility and the safety functions required. The criteria for judging success or failure are determined on the basis of the construction plan that has already been approved.

Consequently, the safety analysis employed in the Pre-service Inspection has already been carried out at the design stage and been approved by the NRA, so a new safety analysis is not carried out at this stage, as a general rule.

The practical work involved in Pre-service Inspections is carried out by NRA's Nuclear Facility Inspectors.

Inspectors from JNES are required to conduct the Pre-service Inspection in accordance with NRA instructions and the NRA is notified of the results.

The NRA compiles the inspection results by its Nuclear Facility and JNES Inspectors and then conducts a comprehensive examination of the results of the Pre-service Inspection. If the facility passes the inspection, the NRA issues a Pre-service Inspection Certificate to the licensee.

Table 19-1 Items Inspected in Each Construction Process during the Pre-service Inspection

Construction Process	Matters Inspected
1. The reactor unit, nuclear fuel material handling and storage facilities, reactor cooling system facilities (excluding steam turbines), instrumentation and control system facilities (excluding power reactor operation control devices), radioactive waste disposal facilities (excluding exhaust stacks), radiation control facilities or reactor containment facilities, when it is possible to carry out tests relating to their structure, strength, or leakage	The following inspections (excluding those focused on portable machinery or appliances) relating to the structure, functions, or performance of the reactor unit, nuclear fuel material handling and storage facilities, reactor cooling system facilities (excluding steam turbines), instrumentation and control system facilities (excluding power reactor operation control devices), radioactive waste disposal facilities (excluding exhaust stacks), radiation control facilities or reactor containment facilities: (1) Inspection of material (2) Inspection of dimensions (3) Inspection of external appearance (4) Inspection to check assembly and mounting (5) Inspection of pressure resistance

Construction Process	Matters Inspected
	(6) Inspection for leakages (7) Inspection to check the status of foundations on which the reactor containment facility has been directly installed
2. When the mounting of the lower half of the steam turbine casing has been completed and the assembly of the auxiliary boiler unit has been completed	(1) The following inspections to check the structure, functions, or performance of the steam turbine: (a) Inspection of materials (b) Inspection of dimensions (c) Inspection of external appearance (d) Inspection to check assembly and mounting (2) The following inspections to check the structure, functions, or performance of the auxiliary boiler: (a) Inspection of material (b) Inspection of dimensions (c) Inspection of external appearance (d) Inspection to check assembly and mounting (e) Inspection of pressure resistance (f) Inspection for leakages
3. When the state of the power reactor allows the fuel to be inserted	Inspection to check the necessary functions or performance of the nuclear fuel material handling and storage facilities, reactor cooling system facilities, instrumentation and control system facilities, radioactive waste disposal facilities, radiation control facilities, reactor containment facilities, emergency power supply system, normal power supply system, fire protection equipment, flood protection facilities, fuel equipment for driving auxiliaries (excluding that relating to the emergency power supply system and the auxiliary boiler), emergency water intake equipment, on-site civil engineering structures, and the Office for Emergency Response, when the state of the power reactor is such that the fuel can be inserted
4. When critical reaction operations can commence in the power reactor	Inspection to check the necessary functions or performance of the reactor unit, reactor cooling system facilities, instrumentation and control system facilities (excluding power reactor operation control devices), and generators, when the reactor reaches criticality
5. When all construction work in the construction plan has been completed	Inspection to check the overall performance of the power reactor facilities when the reactor is generating output and any other inspections required in order to check the completion of construction work

Nuclear fuel material used in reactors must undergo the Fuel Assembly Inspections prescribed in the NRA Ordinance during each engineering process, and may not be used unless it passes these inspections.

When a licensee of fabricating or enrichment activity wishes to undergo a Fuel Assembly Inspection it must obtain prior NRA approval for the design of the fuel assembly in question.

The licensee of fabricating or enrichment activity applies to the NRA to have the Fuel Assembly Inspection conducted after it has received approval for the fuel assembly design.

These inspections are conducted at an appropriate time during the fuel assembly engineering process, based on Inspection Manuals which are developed before such an inspection.

Once it receives an application for a Fuel Assembly Inspection from a licensee of fabricating or enrichment activity, the NRA provides JNES with inspection instructions so that it can carry out part of the inspection in accordance with the provisions of the Reactor Regulation Act.

Table 19-2 shows the items inspected in each engineering process during the Fuel Assembly Inspection conducted in accordance with the provisions of the Reactor Regulation Act.

The practical work involved in Fuel Assembly Inspections is carried out by NRA's Nuclear Facility Inspectors.

Moreover, the inspectors from JNES who carry out part of the inspection work are required to conduct the Fuel Assembly Inspection in accordance with instructions provided by the NRA and notify the NRA of the results.

The NRA compiles the results of the inspections carried out by the NRA Nuclear Facility Inspectors and the results of the inspections by JNES inspectors, and conducts a comprehensive examination of the Fuel Assembly Inspection. If it passes the inspection the NRA issues a Fuel Assembly Inspection Certificate to the licensee of fabricating or enrichment activity, etc.

Table 19-2 Items Inspected in Each Engineering Process during the Fuel Assembly Inspection

Engineering Process	Matters Inspected
1. The fuel material, cladding material, and other components, when they are in a state in which tests relating to their composition, structure, or strength can be carried out	Inspection to check the results of analysis of the chemical composition of the fuel material, cladding material, and other components, and other inspections relating to the composition, structure, or strength of these components
2. The fuel assembly, which is an assembly of fuel elements, when processing of the fuel elements has been completed	The following inspections relating to the fuel assembly, which is an assembly of fuel elements: (1) Inspection of dimensions (2) Inspection to check the degree of bend (3) Inspection of external appearance (4) Inspection of surface contamination density (5) Non-destructive inspection of welded areas (6) Helium leak inspection (excluding cases in which an inspection will be carried out in relation to (3) in item 3. below)
3. When engineering has been completed	The following inspections of the assembled fuel assembly: (1) Inspection of dimensions (2) Inspection of external appearance (3) Helium leak inspection (excluding cases in which an inspection will be carried out in relation to (6) in item 2. above)

Licensees must obtain approval for their Operational Safety Programs before commencing operation. After receiving an application from a licensee, the NRA reviews the content of its programs.

Operational Safety Programs also prescribe the measures that should be taken under conditions that could have a direct impact on safety, such as the establishment of limiting conditions for operation to ensure the safe operation of reactor facilities, and measures in the event of deviation from limiting condition for operation.

Licensees must comply with their Operational Safety Programs when operating and maintaining reactor facilities.

The matters that should be regulated in the Operational Safety Programs are prescribed in the NRA Ordinance on Commercial Reactors, as shown below.

- Matters relating to systems for compliance with relevant legislation and Operational Safety Programs (including the involvement of senior management)
- Matters relating to systems for fostering a safety culture (including the involvement of senior management)
- Matters relating to quality assurance at reactor facilities (including matters relating to root cause analysis methods and systems for implementing this, the positioning of procedure manuals in Operational Safety Programs, and the periodic evaluation of reactor facilities)
- Matters relating to the duties and organization of those who operate and manage reactor facilities (excluding those listed in the next item)
- Matters relating to the scope and content of the duties of Chief Reactor Engineers, the authority required by them in supervising operational safety, and their organizational positioning
- Matters relating to the scope and content of the duties of Chief Electrical Engineers, the authority required by them in supervising operational safety, and their organizational positioning
- Matters relating to the scope and content of the duties of Chief Engineers of Boilers and Turbines, the authority required by them in supervising operational safety, and their organizational positioning
- The following matters relating to operational safety education among those who operate and manage reactor facilities:
- Matters relating to the policy on implementing operational safety education (including the formulation of implementation plans)
- The following matters relating to the content of operational safety education:

(1) Matters relating to compliance with relevant legislation and Operational Safety

Programs

(2) Matters relating to the structure, performance, and operation of reactor facilities

(3) Matters relating to radiation control

(4) Matters relating to the handling of nuclear fuel material and items contaminated with such material

(5) Matters relating to measures that should be taken in an emergency

- Other matters required in relation to operational safety education concerning reactor facilities
- Matters relating to the operation of reactor facilities (excluding those listed in the next two items)
- Matters relating to the operation period of reactors
- Matters relating to safety reviews of the operation of reactor facilities
- Matters relating to the establishment of controlled areas, conservation areas, and surrounding monitored areas and restrictions on entry to these
- Matters relating to exhaust gas and effluent monitoring equipment
- Matters relating to the monitoring of dose, dose equivalent, radioactive material concentrations, and the surface contamination density, as well as matters concerning the removal of such contamination
- Matters relating to the management of radiation detectors
- Matters relating to visits to and inspections of reactor facilities and procedures arising from these
- Matters relating to receipt and send out of nuclear fuel material, as well as its transport and storage, and other matters relating to its handling
- Matters relating to the disposal of radioactive waste
- Matters relating to measures that should be taken in an emergency
- Matters relating to the development of systems for conducting activities to maintain the integrity of reactor facilities in the event of a severe accident, large-scale damage, fire, or internal flooding
- Matters relating to appropriate recording and reporting of operational safety at reactor facilities (including the status of compliance with Operational Safety Programs)
- Matters relating to the maintenance management of reactor facilities (including matters relating to systems for the implementation of licensee's welding inspections and Periodic Licensee's Inspections, matters relating to the technical evaluation of age-related deterioration, and the long-term maintenance management policy)
- Matters relating to the sharing of information with other licensees, focused on technical information concerning operational safety obtained from contractors who

have carried out maintenance checks

- Matters relating to the disclosure of information concerning noncompliance, in the event that such noncompliance has occurred
- Other matters required in relation to the operational safety of reactor facilities

Operational Safety Programs can be revised after being approved, due to such factors as those relating to the organization of the licensee or modification of the reactor facilities.

If intending to change their Operational Safety Programs, licensees must obtain the approval of the NRA for the amended programs.

Moreover, the NRA may order the amendment of Operational Safety Programs in accordance with the provisions of the Reactor Regulation Act, if it deems this to be necessary in order to prevent a disaster resulting from nuclear fuel material, material contaminated by nuclear fuel material, or reactors.

The Operational Safety Programs are the most important documents in the operation of a reactor facility, so licensees put together various operating procedure manuals and testing guidelines that set forth the procedures for the actual operation and maintenance of reactor facilities.

These provisions subordinate to Operational Safety Programs are managed appropriately under the quality management systems of licensees, including matters relating to consistency with their Operational Safety Programs.

Article 19 (2) Limiting Condition for Operation

1 Regulatory Requirements Concerning Limiting Conditions for Operation

In Japan, in accordance with the provisions of the Reactor Regulation Act, licensee must set forth their Operational Safety Programs and obtain NRA approval therefor before commencing operation of a reactor facility.

The figures for the limiting conditions for operation of reactor facilities correspond to such values as the shutdown margin and thermal limit value of the reactor, and are all prescribed in the Operational Safety Programs.

If a licensee fails to comply with the limiting conditions for operation, the NRA may order the licensee concerned to take such action as shutting down the reactor facility, in accordance with the provisions of the Reactor Regulation Act.

In the event that a reactor facility deviates from its limiting conditions for operation, the licensee is required to immediately declare a deviation from the limiting conditions for operation and report this to the NRA.

Licensees must take measures to revert from a state of deviation from the limiting conditions for

operation within the allowed time of operation permitted in the event of a deviation from limiting conditions for operation. However, if it cannot resolve the deviation within the time allowed, it must modify the reactor's status in such a way as to ensure that the limiting conditions for operation do not apply.

This includes shutting down the reactor.

If the NRA receives a report of a deviation from the limiting conditions for operation from a licensee, it examines the root cause and provides other licensees with feedback, if necessary.

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

Operators at reactor facilities take turns to operate and monitor the reactor, and are responsible for such practical duties as ensuring compliance with the limiting conditions for operation and taking the necessary steps in the event of deviation from these.

The limiting conditions for operation and steps to be taken in the event of deviation from them are specifically documented in Operational Safety Programs and operators are required to implement those procedures correctly.

The limiting conditions for operation are conditions relating to the safe operation of reactor facilities, and there are cases in which it is necessary to alter them, such as when related equipment is modified.

As described above, the limiting conditions for operation are detailed in operational safety programs and if they are revised, it is necessary to obtain approval from the NRA for that revision.

More specifically, when revising the limiting conditions for operation, licensees must not only conduct their own review, including a safety evaluation, but also undergo a review by the NRA.

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

1 Operation, Maintenance, Inspection, and Testing of Reactor Facilities

1-1 Periodic Facility Inspections

Carried out periodically in order to prevent the occurrence or escalation of accidents or failure involving reactors, their auxiliary equipment, and steam turbine equipment, Periodic Facility Inspections of reactor facilities (excluding those being decommissioned) are inspections of facilities that are of particular importance in ensuring the safety of reactor facilities.

The JNES carries out part of the work involved in periodic facility inspections, based on instructions from the NRA, in accordance with the provisions of the Reactor Regulation Act, and notifies the NRA of the results.

After compiling the results of inspections conducted by Nuclear Facility Inspectors and the inspection results provided by the JNES, the NRA evaluates the Periodic Facility Inspection.

Moreover, licensees must undergo a Periodic Safety Management Review, which focuses on the organization involved in the Periodic Licensee Inspection, inspection methods, process controls, and other matters stipulated in the NRA Ordinance.

The Periodic Safety Management Review is conducted by the JNES and the NRA is notified of the results. Based on the notification from the JNES, the NRA evaluates the Periodic Safety Management Review.

In accordance with the Reactor Regulation Act, the timing of the Periodic Facility Inspection is stipulated in the NRA Ordinance, which prescribes that reactors and their auxiliary equipment are to undergo inspection at intervals of 13, 18, or 24 months, as specified by the NRA in a public notification.

The Periodic Facility Inspection checks that the facilities and equipment are being maintained and operated in compliance with the technical standards prescribed in the NRA Ordinance.

An NRA's Nuclear Facility Inspector or an inspector from the JNES attends or checks the records of Periodic Licensee's Inspections of equipment that is of particular importance in terms of safety; quality assurance standards are utilized in the checking of processes for conducting Periodic Licensee's Inspections (such as the Inspection Manuals, inspecting personnel, and the appropriateness of judgments concerning the results).

Moreover, the maintenance plans are checked before the Periodic Facility Inspection is carried out. This is a procedure in which the plans for the inspection and maintenance of individual components (maintenance plans), which take into account past inspections and the deterioration of components, are submitted to the NRA so that their content can be checked.

In addition, Operational Safety Inspectors check the implementation status of maintenance activities carried out by licensees during Operational Safety Inspections, etc.

The Periodic Facility Inspection checks that facilities are compliant with the technical standards for commercial power reactors and their auxiliary facilities.

1-2 Periodic Licensee's Inspections and Periodic Safety Management Reviews

Licensees are obliged to carry out Periodic Licensee's Inspections, in which they independently check compliance with technical standards for reactor facility; the JNES checks the implementation status of these Periodic Licensee's Inspections.

More specifically, the JNES conducts a document review and on-site inspection to examine the system for implementing Periodic Licensee's Inspections from the perspective of the appropriateness of the implementing organization, inspection methods, process controls, record management, management of contractors, and education and training (Periodic Safety

Management Review).

The NRA conducts a comprehensive evaluation based on the results of the Periodic Safety Management Review provided by this body.

The evaluation is carried out in the following two stages and the licensee subject to review is informed of the outcome.

1 Evaluation of whether the Periodic Licensee's Inspection implementation system at the organization under review is adequate, enabling such inspections to be carried out autonomously and appropriately.

2 Evaluation of whether the Periodic Licensee's Inspection implementation system at the organization under review is such that checks are required to see whether corrective action has become firmly established, or whether improvements are necessary.

Moreover, if the system for conducting Periodic Licensee's Inspections is judged to be adequate, incentive regulations are implemented, such as excluding checks of record management and education and training from the legally-prescribed checks at the time of the next review, with a view to encouraging licensees to implement safety initiatives.

1-3 Operational Safety Inspections

Operational Safety Inspections are designed to check that licensees comply with the Operational Safety Programs previously approved by the NRA in the operation and maintenance of reactor facilities. They are carried out four times a year, with each inspection taking about two weeks.

During the Operational Safety Inspections, Operational Safety Inspectors may, in accordance with the provisions of the Reactor Regulation Act, enter business establishments, inspect documents and equipment, ask questions of relevant personnel, and request the submission of the requisite samples.

Furthermore, as well as the quarterly inspections in accordance with the provisions of the NRA Ordinance on Commercial Reactors, the status of compliance with the Operational Safety Programs may be inspected when conducting the Periodic Facility Inspections prescribed in the Reactor Regulation Act, in the event that the following operations will be carried out.

- Operations relating to the startup or shutdown of a reactor
- Operations relating to refueling
- Operations relating to the switchover of the residual heat removal seawater system in BWR
- Operations relating to the reduction of the water level within the reactor vessel in PWR and operations relating to the removal of residual heat carried out while the water level within the reactor vessel is reduced
- When drills which are recognized by the NRA as necessary to inspect are carried out

for key response personnel who would be involved in dealing with a severe accident or large-scale damage

The new inspection system introduced in January 2009 obliges licensees to gather and store data concerning age-related deterioration, in order to make continuous improvements, and to use this as the basis for evaluating deterioration leading to the aging of facilities as part of daily maintenance. Accordingly, licensees are enhancing the status monitoring of components in operation.

The NRA checks the implementation status of such maintenance activities as part of its Operational Safety Inspections.

1-4 Maintenance management of reactor facilities

Licensees must take the following steps in relation to checks, tests, inspections, repairs, replacement, modification, and any other measures deemed necessary to the maintenance of reactor facilities (maintenance management), both while the reactor is operating and while shut down, in accordance with the provisions of the NRA Ordinance on Commercial Reactors.

- Set forth a policy concerning the maintenance management of reactor facilities (hereinafter referred to as the “maintenance management policy”) to ensure that the reactor facility performance detailed in the Reactor Installation Permit is being maintained.
- Set out targets for maintenance management that should be achieved in accordance with the maintenance management policy (including quantitative maintenance management targets relating to systems of high importance in regard to the reactor and maintenance management).
- Formulate a plan for the implementation of maintenance management that sets out the following matters, in order to achieve the maintenance management targets, and implement maintenance management in accordance with this plan.
  - Matters relating to the timing of the commencement and the duration of the plan concerning the implementation of maintenance management
  - Matters relating to methods used for conducting checks, tests, inspections, repairs, replacement, and modifications (inspections, etc.) of reactor facilities, and the frequency and timing thereof
  - Matters relating to measures to ensure operational safety taken when conducting inspections, etc. of reactor facilities
  - Matters relating to checks of the results of inspections, etc. of reactor facilities and methods of evaluating these
  - Matters relating to corrective and preventive measures concerning methods of

conducting the inspections, etc. that should be carried out at reactor facilities, in light of checks of the results of such reactor facility inspections, etc. and the results of the evaluation thereof, as well as the frequency and timing thereof

- Matters relating to records of maintenance management at reactor facilities

- Periodically evaluate the reactor facility maintenance management policy, the maintenance management targets, and plans for the implementation of maintenance management.
- Reflect the results of the evaluation referred to in the item above in the reactor facility maintenance management policy, the maintenance management targets, or plans for the implementation of maintenance management.
- Take special measures in relation to the steps referred to in the foregoing items, tailored to the particular condition of the reactor facility in question, in the event that operation of the reactor is suspended for a considerable period of time or in other situations that differ from the norm from the perspective of the maintenance management of a reactor facility.

In addition, if a licensee has formulated or amended a long-term maintenance management policy of the kind described below, this must be reflected in the maintenance and management policy. A report on measures to deal with the aging of facilities is provided in Article 14.

1-5 Periodic Assessment

In accordance with the provisions of the NRA Ordinance on Commercial Reactors, licensees must conduct evaluations of the implementation status of operational safety activities at their reactor facilities, focusing on a period of not more than ten years, as well as evaluating the situation in terms of reflecting the latest technical knowledge in operational safety activities at their reactor facilities.

Periodic safety reviews were implemented as administrative guidance from 1992, but they were enshrined in law as operational safety measures in the Ordinance on Commercial Reactors in 2003; in 2005, deterioration in the organizational climate within licensees was added to the focus of the evaluation.

In August 2008, the NISA established guidelines for implementing periodic safety reviews and requested that licensees conduct their periodic safety reviews in accordance with these.

Among the evaluations to be carried out in periodic safety reviews cited in the guidelines are an evaluation of the implementation status of operational safety activities at reactor facilities, an evaluation of the situation in terms of reflecting the latest technical knowledge in operational safety activities at reactor facilities, and a probabilistic safety assessment. The guidelines state that it is preferable for licensees to conduct probabilistic safety assessments at their own

discretion.

Under this mechanism, licensees are required to consider the necessity of effective additional measures to further improve the safety and reliability of plants, in light of the results of periodic safety reviews.

1-6 On-site inspections

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

During these on-site inspections, NRA staff may enter the offices or business establishments of licensees and inspect documents, records, and other articles, as well as questioning the personnel there.

These inspections include inspections of manufacturers, etc. The NRA may directly inspect those involved in the design or construction of nuclear facilities, as well as those involved in the manufacture of equipment for such facilities.

1-7 Chief Reactor Engineers and Operation Supervisor

Chief Reactor Engineers, who are deployed at each reactor by the relevant licensee, are selected from among those who have qualifications certified by means of a national examination, and have the practical experience[9] stipulated in the NRA Ordinance; it is necessary to formally notify the NRA of their appointment and dismissal.

If deemed necessary in terms of operational safety, Chief Reactor Engineers may give their opinions to the station chief, provide staff at all levels with advice and recommendations, and participate in the formulation of plans for operational safety.

Operation Supervisor are appointed by licensees and deployed at each reactor.

The duties of Operation Supervisor is to monitor operation in general and provide leadership and supervision for operators, touring the plant site periodically to gain an understanding of the current status of operation and operational safety.

The Reactor Regulation Act requires that records concerning fuel assemblies, reactor inspections, operation, radiation control, maintenance, anomalies or accidents, and weather be included in the operational records compiled and retained by licensees.

Moreover, the Reactor Regulation Act stipulates that the results of Periodic Licensee's Inspections

[9] 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
(iv) Period of involvement in duties relating to the design or management of power reactor fuel assemblies

be recorded and saved, covering such matters as the focus of inspections, as well as the methods used to conduct them and the results thereof.

2 Establishment, Implementation, and Revision of Operation Manuals

The NRA Ordinance on Commercial Reactors stipulate that licensees must set forth manuals, procedural manuals, and other documentation relating to operational safety, based on their Operational Safety Programs, and must comply with these.

Procedural manuals are required to be documented, following an approval procedure within the nuclear power station, and applied to the operation and maintenance of the reactor facility in question.

Moreover, in the event that the procedure is altered, due to such reasons as the modification of equipment, licensees are required to ensure that those carrying out tasks do not follow the incorrect procedure.

Procedural manuals are required to be made available in such a way as to ensure that all staff involved in the operation and maintenance of a reactor facility can make appropriate use of them, such as placing them in the control room.

Procedural manuals are documents put in place on the basis of Operational Safety Programs, so they are included in the scope of application of quality management systems.

Procedural manuals are reviewed regularly and revised if necessary.

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

1 Regulatory Requirements Concerning Responses to Abnormal Events

In the NRA Ordinance on Commercial Reactors, licensees are obliged to take the necessary steps, in the form of emergency measures, to prevent radiation hazards.

This is prescribed in Operational Safety Programs as a measure that should be taken in an emergency.

Furthermore, licensees are obliged to detail “matters relating to the operation of reactor facilities” in their Operational Safety Programs.

As well as procedural manuals focused on the handling of normal operation, these include procedures relating to handling operation in the event of an accident or other abnormal situation, thereby ensuring a smooth response to accidents and abnormal events.

Matters prescribed in relation to “steps in the event of an abnormal situation” include status checks, the removal of root causes, the necessary measures in order to prevent escalation, and measures following reactor scram.

The operating procedures in an emergency are one of the operating procedures based on the Operational Safety Programs. During the operational safety inspection, the NRA checks the procedures and system for their implementation.

2 Operating Procedures in an Emergency

The emergency operating procedures are put in place as provisions subordinate to and based on the Operational Safety Programs; they include procedures formulated as standards based on events such as the occurrence of an earthquake or a fire, as well as those formulated as standards based on changes in the operational parameters of the reactor.

3 Responses to Severe Accidents

As well as stipulating the following with regard to responses to severe accidents, the NRA Ordinance on Commercial Reactors prescribe that these measures shall be evaluated periodically, with the requisite measures being taken on the basis of the results.

- Formulating the plans required in order to carry out activities to maintain the integrity of reactor facilities in the event of a severe accident, etc.
- Deploying the personnel required in order to carry out activities to maintain the integrity of reactor facilities in the event of a severe accident, etc. (key response personnel)
- Implementing regular education and drills at least once a year among key response personnel
- Furnishing vehicle-mounted generators, fire trucks, fire hoses, and other materials and equipment required in order to carry out activities to maintain the integrity of reactor facilities in the event of a severe accident, etc.
- Setting forth the following matters required in order to carry out activities to maintain the integrity of reactor facilities in the event of a severe accident, etc. and ensuring that key response personnel comply with these
  - Matters relating to measures to prevent substantial core damage
  - Matters relating to measures to prevent the containment failure
  - Matters relating to measures to prevent damage to fuel assemblies stored in spent fuel storage facilities
  - Matters relating to measures to prevent damage to fuel assemblies during outage
- Putting in place the systems required in order to carry out activities to maintain the integrity of reactor facilities in the event of a severe accident, etc., other than those listed above

Moreover, the NRA Ordinance on Commercial Reactors stipulate that matters relating to putting

in place systems for carrying out activities to maintain the integrity of reactor facilities in the event of a severe accident, large-scale damage, fire, or internal flooding should be detailed in Operational Safety Programs; accordingly, licensees take measures to prepare for a severe accident.

Article 19 (5) Engineering and Technical Support

There is no regulation of engineering or technical support for licensees.

This enables licensees to respond flexibly, at their own discretion, if they require engineering or technical support to ensure the safety of reactor facilities.

If licensees outsource technical support for duties relating to the operation and management of reactor facilities to a specialist contractor, it is vital that the contractor to which the work is outsourced is equipped with the necessary capabilities and conditions to ensure the safety of reactor facilities; accordingly, Operational Safety Programs require licensees to monitor and manage contractors appropriately, on the basis of their own quality management systems, and their performance in this regard is checked by the NRA in inspections such as Operational Safety Inspections.

Article 19 (6) Reporting of Events, Failures, etc.

1 Regulatory Requirements

In the event of an accident or failure at a reactor facility, licensees are obliged to report this fact immediately, in accordance with the Reactor Regulation Act, and also have an obligation to provide the NRA with a report on the situation and the measures taken to deal with it within ten days of its occurrence.

Moreover, in the event of a specified event or emergency prescribed in the Nuclear Emergency Act, licensees are required to notify the Prime Minister and NRA of this fact immediately.

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

The criteria for reporting an event in accordance with the provisions of the Reactor Regulation Act are prescribed in the NRA Ordinance on Commercial Reactors.

Licensees are required to report such cases to the NRA, based on these criteria.

The NRA has constructed a system that enables reports of event to be accepted 24 hours a day, 365 days of the year. In the event that should be reported, the licensee immediately provides an

initial report to the duty NRA officer and continues to provide reports thereafter in accordance with legislation.

Upon receiving such reports from licensees, the NRA releases such information as the details of the event, the NRA's response, and the provisional INES rating without delay.

3 Reporting of Events and Failures during the Past Three Years

The annex provides list of events reported by licensees to the NRA and its predecessor, NISA, during the period FY2010-2012, in accordance with the provisions of the Reactor Regulation Act.

There were 16 events in FY2010, eight in FY2011, and six in FY2012. Based on criteria relating to the discharge amount, the accident at TEPCO's Fukushima Daiichi Nuclear Power Station on March 2011 was assigned a rating of 7 on the International Nuclear Event Scale (INES).

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

Licensees have a primary responsibility to deal with events that occur at their reactor facilities and must take responsibility for everything from investigating the root cause of the event to implementing measures to prevent recurrence.

The NRA checks that this process is being carried out appropriately, or provides guidance to ensure that this is the case.

As well as investigating the event, compiling a report outlining the root cause and measures to deal with it, and submitting the report to the NRA, licensees also publish their reports.

The NRA examines the details reported by the licensee concerning the root cause and measures to prevent recurrence, in order to check the validity of the investigation and the measures formulated by the licensee as a result.

Moreover, with regard to measures to prevent recurrence of the event in question, licensees are required to take preventive measures not only in regard to knowledge gained from events occurring at their own reactor facilities, but also knowledge gained from events that have occurred at other facilities, in accordance with the provisions of the Reactor Regulation Act.

5 Use of INES

In July 1989, Japan began to use its own nuclear event evaluation scale to assign ratings to events that occurred within Japan, but since August 1992, it has used the INES to evaluate an event.

Article 19 (7) Making Effective Use of Operational Experiences

1 Measures for Effective Use of Operational Experiences

If a safety significant event occurs, licensees are required to report this to the NRA without delay, in accordance with the provisions of the Reactor Regulation Act. Once in receipt of the report concerning the event, the NRA immediately publishes the details and checks the response of the licensee to the event. Moreover, once the root cause has been identified and a decision has been taken on measures to prevent recurrence, these are also published.

Having received advice from experts in operation management, inspection, and radiation control, the NRA scrutinizes information concerning the event and strives to identify safety lessons from it, if necessary, it requests that licensees reflect these lessons in their operation and maintenance activities, or reflects them in its own regulatory activities.

The JNES has put in place a system for gathering and evaluating safety information from both within Japan and overseas. In order to promptly share the outcomes of this information gathering and evaluation with the NRA, provide a regulatory response, and implement precise follow-up, the JNES has established a joint committee with the NRA, called the Safety Information Committee, which conducts regular deliberations.

The NRA Ordinance on Commercial Reactors prescribe that Operational Safety Programs should stipulate matters relating to sharing with other licensees any technical information about operational safety obtained from licensees who have conducted maintenance checks.

This provision is a measure aimed at encouraging licensees to contribute to improvements in safety by sharing with each other details of incidents, even if they have a comparatively small impact on safety.

In addition, during its review process, the NRA instructs licensees to ensure the necessary lateral spread of information about evens that should be reported to the NRA, in accordance with legislation.

2 International Sharing of Operational Experiences

As a country that has experiences of operating many reactor facilities, Japan believes that it is vital to share these experiences with a wide range of countries on the international stage, and that it has a responsibility to do so in order to improve international nuclear safety.

The NRA and the JNES share information internationally via mechanisms for sharing information about events with international organizations such as the IAEA and OECD/NEA, as well as through bilateral cooperation.

Mechanisms relating to the sharing of operational experiences with international organizations include the proactive provision of information via the Incident Reporting System (IRS). In Japan,

the mechanism involves the JNES gathering information about operational experiences within Japan, compiling it as a database, and providing these data to the IRS.

In terms of bilateral activities, information is shared through a long-established system of regular meetings etc., to exchange information.

Article 19 (8) On-site Management of Spent Fuel and Radioactive Waste

1 On-site Management of Spent Fuel

In addition to the spent fuel pools used at many reactor facilities, dry storage casks are used to store spent fuel at some power stations.

In storing spent fuel, licensees are required to take the necessary measures to cool the fuel, and to ensure that the design of the storage system is such that the fuel is kept subcritical. The Pre-service Inspections check that construction work has been carried out according to this design, while the Periodic Licensee's Inspections carried out by licensees check that the soundness of the storage facility is being maintained during the lifetime of the reactor facility.

The on-site management of spent fuel is positioned in safety regulations as part of measures to ensure the operational safety of reactor facilities, so its implementation status is checked in Operational Safety Inspections.

2 On-site Management of Radioactive Waste

Licensees are required to take appropriate steps in relation to the transport, storage, and/or disposal on-site of radioactive waste as part of the measures required for operational safety, in accordance with the provisions of the Reactor Regulation Act.

If disposing of radioactive waste at a site, licensees are required to ensure that this takes place under the supervision of someone who has the requisite knowledge concerning disposal and radiation protection associated with disposal.

The measures that should be taken to dispose of radioactive waste are prescribed according to the nature of such waste.

Gaseous radioactive waste is required to be discharged using an exhaust facility, or to be retained as waste in disposal tanks.

Liquid radioactive waste is required to be discharged using a drainage facility, retained as waste in disposal tanks, or placed in containers or solidified along with the container and stored at a retained waste facility, or incinerated at an incineration facility.

Solid radioactive waste is required to be incinerated at an incineration facility, placed in containers, or solidified along 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 items of machinery, and radioactive waste that requires the decay of radioactivity over time is required to be stored at a retained waste facility.

The NRA Ordinance on Commercial Reactors prescribe requirements and criteria for each disposal method in relation to the type of radiation monitoring necessary to prevent radiation hazards and the containers required for disposal, 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 taken to a disposal facility.

Radioactive waste is classified into gaseous, liquid, and solid waste. Gaseous radioactive waste is exhaust gas generated by ventilating components and rooms in the radiation controlled area, and it is discharged via exhaust stacks while using exhaust radiation monitors to monitor it.

Liquid radioactive waste is effluent generated within the controlled area, which is filtered, desalinated, and concentrated; apart from some that has an extremely low level of radioactivity, the treated liquid is re-used in the facility, as a general rule, rather than being discharged into the environment.

Solid waste such as scrap material generated in the course of maintenance and repair work during the period of Periodic Facility Inspections is either placed as it is into drums, or incinerated, melted, or compressed in order to reduce the volume before being placed into drums, and is then stored at the on-site radioactive waste storage facility.

In Japan, there are no legal provisions imposing an obligation to minimize the volume of radioactive waste generated, but as there is a limit to the quantity of radioactive waste that can be stored on-site, and it costs money to treat and dispose of waste, licensees voluntarily strive to minimize the amount of radioactive waste by such means as evaporative concentration of liquid waste and the compression or melting of solid waste.

The on-site management of radioactive waste is positioned in safety regulations as part of measures to ensure the operational safety of reactor facilities, so its implementation status is checked in Operational Safety Inspections.

3 Clearance Procedures

In Japan, of the scrap material generated due to the operation and maintenance of reactor facilities or decommissioning measures, radioactive waste with an extremely low radioactivity concentration is safely classified as “material not required to be handled as radioactive waste” after the approval and confirmation by the NRA, following which it is appropriately and rationally recycled or disposed of. (Clearance system)

The methods of measuring and evaluating the radioactivity concentration of items for which

licensees are seeking clearance are formulated in accordance with the provisions of the Reactor Regulation Act, and the regulatory authority approves radioactivity concentration measurement and evaluation methods and checks the result of such measurements.

The NRA is involved at the following two stages.

Stage 1: The NRA judges and approves the validity of the radioactivity concentration measurement and evaluation methods formulated by licensees

Stage 2: Using records and sampling, the NRA checks that licensees are carrying out radioactivity concentration measurement and evaluation using the methods for this for which approval was granted, as well as confirming that the licensee concerned is below the clearance level

In addition, this system targets not only reactor facilities, but also other nuclear fuel cycle facilities.

D ANNEXES

1 List of nuclear installations (Article 6)

Licensee	Power Station	Unit	Reactor Type	Output (MWe)	Commissioned	Status
Hokkaido Electric Power Co., Inc.	Tomari	1	PWR	579	June 22, 1989	In Operation
		2	PWR	579	April 12, 1991	In Operation
		3	PWR	912	Dec. 22, 2009	In Operation
Tohoku Electric Power Co., Inc.	Onagawa	1	BWR4	524	Jun. 01, 1984	In Operation
		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
Tokyo Electric Power Co. Inc.	Fukushima Daiichi	1	BWR3	460	Mar. 26, 1971	Under permanent suspension
		2	BWR4	784	Jul. 18, 1974	Under permanent suspension
		3	BWR4	784	Mar. 27, 1976	Under permanent suspension
		4	BWR4	784	Oct. 12, 1978	Under permanent suspension
		5	BWR4	784	Apr. 18, 1978	In Operation
		6	BWR5	1,100	Oct. 24, 1979	In Operation
	Fukushima Daini	1	BWR5	1,100	Apr. 20, 1982	In Operation
		2	BWR5	1,100	Feb. 3, 1984	In Operation
		3	BWR5	1,100	Jun. 21, 1985	In Operation
		4	BWR5	1,100	Aug. 25, 1987	In Operation
	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. 3, 1993	In Operation
		5	ABWR	1,267	Jan. 18, 2005	In Operation
Kansai Electric Power Co., Inc.	Mihama	1	PWR	340	Nov. 28, 1970	In Operation
		2	PWR	500	Jul. 25, 1972	In Operation
		3	PWR	826	Dec. 1, 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. 5, 1985	In Operation
	Ohi	1	PWR	1,175	Mar. 27, 1979	In Operation
		2	PWR	1,175	Dec. 5, 1979	In Operation
		3	PWR	1,180	Dec. 18, 1991	In Operation
		4	PWR	1,180	Feb. 2, 1993	In Operation

Licensee	Power Station	Unit	Reactor Type	Output (MWe)	Commissioned	Status
Hokuriku Electric Power Company	Shika	1	BWR5	540	Jul. 30, 1993	In Operation
		2	ABWR	1,206	Mar. 15, 2006	In Operation
Chugoku Electric Power Co., Inc.	Shimane	1	BWR3	460	Mar. 29, 1974	In Operation
		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	In Operation
		2	PWR	566	Mar. 19, 1982	In Operation
		3	PWR	890	Dec. 15, 1994	In Operation
Kyushu Electric Power Co., Inc.	Genkai	1	PWR	559	Oct. 15, 1975	In Operation
		2	PWR	559	Mar. 30, 1981	In Operation
		3	PWR	1,180	Mar. 18, 1994	In Operation
		4	PWR	1,180	Jul. 25, 1997	In Operation
	Sendai	1	PWR	890	Jul. 4, 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 Daini	-	BWR5	1,100	Nov. 28, 1978	In Operation
	Tsuruga	1	BWR2	357	Mar. 14, 1970	In Operation
		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)	Oma	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		Under construction

Notes:

In Planning: NPS for which the operator submitted a license application, but not yet approved

Under construction: NPS has been licensed, but has not yet passed a pre-service inspection

In Operation: NPS that has passed a pre-service inspection

Under permanent suspension: NPS that where operations have been suspended pending decommissioning

Under decommissioning: NPS whose decommissioning plan has already been approved

2 List of accidents and failures reported under the Reactor Regulation Act during the reporting period (Article 6 and Article 19)

(1) Accidents and failures reported in FY2010

Power Station	Accidents and Failures	Date	INES[10]
Ikata PS Unit 1	Flaws on the seawater piping for cooling the emergency diesel generator (Shikoku Electric Power Co., Inc.)	Apr. 27, 2010	0 -
Fukushima Daini NPS Unit 1	Manual reactor shutdown (Tokyo Electric Power Co. Inc.)	Jun. 2, 2010	0+
Ikata PS Unit 1	Flaws on the seawater piping for the component cooling system (Shikoku Electric Power Co., Inc.)	Jun. 11, 2010	0 -
Tokai Daini PS	Manual reactor shutdown (Japan Atomic Power Company)	Jun. 25, 2010	0 -
Fukushima Daiichi NPS Unit 5	Automatic reactor shutdown (Tokyo Electric Power Co. Inc.)	Nov. 2, 2010	0+
Prototype Fast Breeder Reactor “Monju”	Deformation of in-vessel transfer machine (Japan Atomic Energy Agency)	Nov. 9, 2010	0 -
Kashiwazaki-Kariwa NPS Unit 3	Erroneous insertion of a control rod (Tokyo Electric Power Co. Inc.)	Dec. 1, 2010	0 -
Prototype Fast Breeder Reactor “Monju”	Flaws on a cylinder liner confirmed in the emergency diesel generator (Japan Atomic Energy Agency)	Dec. 28, 2010	0 -
Shika NPS Unit 2	Manual reactor shutdown(Hokuriku Electric Power Company)	Jan. 21, 2011	0 -
Fukushima Daiichi NPS Units 1-4[11]	Leak of radioactive substances from the nuclear reactor buildings to the non radiation controlled areas (Tokyo Electric Power Co. Inc.)	Mar. 11, 2011	7 (interim)
Fukushima Daini NPS[11]	Impact of the 2011 Great East Japan Earthquake off the Pacific Coast of Tohoku (Tokyo Electric Power Co. Inc.)	Mar. 11, 2011	Unit 1：3 Unit 2：3 Unit 3：1 Unit 4：3 (interim)
Tokai Daini PS	A trip of a seawater pump for the emergency diesel generator (Japan Atomic Power Company)	Mar. 18, 2011	1 (interim)
Tokai Daini PS	Releasing traces of radioactive substance outside the radiation controlled area (Japan Atomic Power Company)	Mar. 28, 2011	0 - (interim)
Onagawa NPS Unit 2	Current status of Onagawa NPS (failures of a pump of a reactor building closed cooling system) (Tohoku Electric Power Co., Inc.)	Mar. 29, 2011	2 (interim)

[10] Japan uses the values of 0- and 0+ for the events evaluated and classified by the INES Scale.
[11] For Fukushima Daiichi NPS, an event is counted per station, but for Fukushima Daini NPS, an event is counted per unit.

(2) Accidents and failures reported in FY2011

Power Station	Accidents and failures	Date	INES[12]
Onagawa NPS Unit 1	Current status of Onagawa NPS (damage to the emergency diesel generator (A)) (Tohoku Electric Power Co., Inc.)	Apr. 8, 2011	0+ (interim)
Takahama PS Unit 4	Flaws on the SG tubes, which were indicated and confirmed during the periodic inspection (Kansai Electric Power Co., Inc.)	Aug. 18, 2011	0 -
Fukushima Daini NPS Unit 2	Failures of a seawater pump for cooling the diesel generator facility of the high pressure core spray system (Tokyo Electric Power Co. Inc.)	Aug. 30, 2011	0 - (interim)
Genkai NPS Unit 4	Automatic reactor shutdown (Kyushu Electric Power Co., Inc.)	Oct. 4, 2011	0+
Genkai NPS Unit 3	Breaking of a main shaft of the charging pump (Kyushu Electric Power Co., Inc.)	Dec. 16, 2011	0 -
Fukushima Daini NPS Units 3 and 4	Radioactive contamination confirmed outside the radiation controlled areas (Tokyo Electric Power Co. Inc.)	Mar. 27, 2012	1
Takahama PS Unit 3	Flaws on the SG tubes, which were indicated and confirmed during the periodic inspection (Kansai Electric Power Co., Inc.)	Mar. 29, 2012	0 -
Hamaoka NPS Unit 5	Through holes confirmed in the liner of the condensate storage tank (Chubu Electric Power Co., Inc.)	Mar. 30, 2012	0 -

(3) Accidents and failures reported in FY2012

Power Station	Accidents and failures	Date	INES[12]
Onagawa NPS Unit 1	Failures of a pump for the emergency service water system (Tohoku Electric Power Co., Inc.)	Apr. 4, 2012	0 -
Onagawa NPS Unit 1	Damage to the travelling section of the ceiling crane in the reactor building (Tohoku Electric Power Co., Inc.)	Jun. 7, 2012	below scale
Tokai Daini PS	Leak of radioactive substances outside the radiation controlled areas (Japan Atomic Power Company)	Nov. 30, 2012	0 - (interim)
Kashiwazaki-Kariwa NPS Unit 5	Some fuel rods touching in the fuel assemblies (Tokyo Electric Power Co. Inc.)	Dec. 12, 2012	1 (interim)
Mihama PS Unit 1	Failures of an emergency diesel generator (Kansai Electric Power Co., Inc.)	Feb. 6, 2013	0 - (interim)
Kashiwazaki-Kariwa NPS Unit 1	Some fuel rods touching in the fuel assemblies (Tokyo Electric Power Co. Inc.)	Mar. 19, 2013	1 (interim)

[12] Japan uses the values of 0- and 0+ for the events evaluated by the INES Scale.

3 Implementation Status of the IAEA Action Plan

Progress in Japan with regard to the 12-point IAEA Action Plan for Nuclear Safety adopted at the 2011 IAEA General Conference, includes:

(1) Safety assessments following the Fukushima Daiichi Nuclear Power Station Accident

Following a January 2012 visit by IAEA experts to Japan an assessment of the durability of power plants against extreme natural hazards was carried out in a Comprehensive Assessment on the Safety of Reactor Facility.

(2) IAEA peer reviews

In terms of reviews focused on the safety of nuclear power stations, which is within the scope of this Convention, Japan has hosted a Fact-Finding Mission on the TPCO Fukushima Daiichi accident and a Seismic Safety Mission to Onagawa Nuclear Power Station, as well as the aforementioned Review Mission stated in (1).

(3) Emergency preparedness and response

Japan proposed strengthening the RANET in January 2012 and designated the IAEA RANET Capacity Building Centre in Fukushima Prefecture for a May 2013 IAEA RANET Workshop.

(4) National regulatory bodies

A Nuclear Regulation Authority (NRA) was established in September 2012 and is preparing to host an IRRS mission as soon as possible.

(5) Operating organizations

No IAEA Operational Safety Review Team (OSART) missions have been hosted during the current reporting period.

(6) IAEA Safety Standards

In formulating its new regulations, the NRA has referred when necessary to the IAEA Safety Standards, guided by Japanese regulatory requirements.

(7) International legal framework

Japan actively participates in deliberations to enhance the implementation of international conventions relating to nuclear safety.

(8) Capacity building

Following lessons learned at Fukushima, the NRA is pursuing an urgent human resource development program to attract the highest quality personnel

(9) Protecting the public and the environment from ionizing radiation

The NRA regularly compiles, analyzes, and publishes radiation domestic monitoring results Japan invited an IAEA international decontamination mission in October 2011 to exchange views and to explain post-accident decontamination work and treatment of the contaminated waste.

(10) Communication and information provision

The establishment of the NRA triggered the restructuring of cooperative relationships, such as bilateral information exchanges with regulatory authorities in other countries. In December 2012, Japan hosted the Fukushima Ministerial Conference on Nuclear Safety jointly with the IAEA to share with international partners the findings and lessons learned from that incident.

(11) Research and development

As stated in Article 8, the NRA conducts safety research for nuclear regulation.

4 Consideration of IAEA Safety Standards

The NRA takes IAEA Safety Standards into consideration when formulating its own regulations because there is a good level of consistency between Japan's nuclear regulations and the IAEA Safety Standard Fundamental Safety Principles (SF-1). The following describes Japan's regulations in response to SF-1.

Principle 1: Safety Responsibility

The Reactor Regulation Act stipulates that nuclear operators are responsible for installing equipment or apparatus to improve nuclear safety, enhancing operational safety education and taking any other necessary measures to prevent disasters resulting from nuclear source material, nuclear fuel material, and reactors, while taking into account the latest safety knowledge. (Article 59-9 of the Reactor Regulation Act)

Principle 2: Role of the government

As described in Article 7, Japan's Atomic Energy Basic Act was amended to establish the NRA to ensure safety in the use of nuclear energy. The Reactor Regulation Act was enacted as legislation subordinate to the Atomic Energy Basic Act, stipulating the regulation to be carried out by the government.

Article 8 of this report states that the NRA is a regulatory body that exercises its authority independently, that it has the legal competence and human and financial resources required of a regulatory body, and that it establishes and maintains regulatory frameworks such as the criteria for nuclear regulation.

Principle 3: Leadership and safety management

The NRA Ordinance on Commercial Reactors oblige licensees to establish a quality assurance plan and make continuous improvements to it, as well as planning, implementing, evaluating, and improving operational safety activities. Article 13 stipulates that licensees use a quality assurance standard (JEAC-4111), which complies with such international standards as IAEA Safety Standards (GS-R-3) for establishing the management system.

Principle 4: Justification of facilities and activities

Once a reactor has been constructed the level of risk is judged during the NRA's Reactor Installation Permit reviews which are carried out under the Reactor Regulation Act.

Principle 5: Optimization of physical protection

One of the objectives of the Reactor Regulation Act is to prevent nuclear disaster and its criteria are clearly stated in the Act. Licensees can select practical measures to meet needed criteria according to the specific nature of each facility to avoid excess restrictions.

Principle 6: Limitation of risks to individuals

Established under the NRA Ordinance on Commercial Reactors, the Public Notification on Doses prescribes limits on individual exposure (see Article 15). Radiation protection measures are implemented to ensure that individual exposure doses are kept at levels that significantly lower than dose limits, ensuring that no individual is subjected to unpermissable levels.

Principle 7: Protection of current and future generations

Radioactive waste and spent reactor fuel are stored at reactor facilities or other on-site locations to ensure that they do not pose a radiation risk to people or the environment (see Article 19). As reported in our 4th National Report on the Joint Convention, radioactive waste should be disposed at an underground depth that offers an adequate protective effect according to the level of radioactivity.

Principle 8: Prevention of accidents

The concept of defense in depth has been introduced at reactor facilities and measures have been taken to prevent accidents or their escalation. In the event of accidents operators are required to equip facilities to quickly restore control functions and mitigate the impact of such accidents.

Principle 9: Emergency preparedness and response

As well as explaining the responsibilities of the national and local governments and nuclear operators, the Nuclear Emergency Act outlines steps that should be taken at each stage of a disaster. Nuclear Emergency Response Guidelines must be set forth; based on these, local authorities prepare for and respond to emergencies (Regional Disaster Prevention Plans).

Japan uses international mechanisms (for example, USIE) to share disaster information in accordance with the Convention on Early Notification of a Nuclear Accident promptly with other contracting parties.

Principle 10: Protective actions to reduce existing or unregulated radiation risks

With regard to “remedial measures, taken following an uncontrolled release of radionuclides into the environment”, one of the solutions in SF-1 and one in which Japan believes is that it is

beneficial to take protection measures to ensure the legally-prescribed individual exposure limits are not exceeded and that decontamination procedures are carried out accordingly.

5 Revision of the Reactor Regulation Act

The law prescribing nuclear regulations in Japan is the Reactor Regulation Act, and the new regulations formulated by the NRA are also based on this Act.

This section provides an overview of the main revisions to the Reactor Regulation Act.

(1) Clarification concerning responses to severe accidents

The March 2011 Fukushima Daiichi accident (hereinafter referred to as “the Fukushima Daiichi nuclear accident”) escalated into a severe accident (an accident beyond the design basis).

Large amount of radioactive material was released into the surrounding area and the effects were widespread, with local residents being forced to evacuate.

Accordingly, it has been emphasized that preventing disasters (resulting from nuclear fuel material, etc.), which is one of the objectives of the Reactor Regulation Act, includes not only the prevention of design-basis events, but also the prevention of the release of large amount of radioactive material outside the reactor facility because of ‘severe accidents.’

A Japanese Government report to the IAEA Ministerial Conference on Nuclear Safety (approved by the Nuclear Emergency Response Headquarters in June 2011 and hereinafter referred to as “the IAEA Report”) stated one of the lessons of the Fukushima Daiichi nuclear accident was the fact that severe accident countermeasures were inadequate. To strengthen severe accident countermeasures in future--the safety and integrity of ‘hard’ areas such as the water-tightness of buildings and the redundancy or diversity of power sources must be guaranteed. But also, during reviews for power reactor construction permits it will be just as important to review ‘soft aspects’, to ensure the effectiveness of materials and equipment for emergencies to mitigate the impact of a severe accident (what is termed accident management capability).

It has been explicitly stated that “having sufficient technical capability for competently operating a nuclear reactor”, which is one of the criteria for granting a installation permit in the first place, includes “sufficient technical capability for competently dealing with a serious accident, should one occur”. It has also been decided that accident management capability shall be reviewed when a Reactor Installation Permit is sought.

During the Fukushima Daiichi nuclear accident, it became clear that the usual preparations of licensees for a severe accident were inadequate; in regard to this point, the IAEA Report cites the need to implement severe accident countermeasures in future as one of the major lessons of this accident.

In particular, it said drills focused on dealing with severe accidents, response measures and managing radiation exposure must be strengthened. This so-called ‘accident management’ is no longer a voluntary safety measure by the licensee but is now a legislative requirement.

Although licensees previously were obliged to take the necessary operational safety measures under the Reactor Regulation Act, the revision has made explicit the fact that the necessary operational safety measures include “measures in the event of a severe accident”.

Since this has been made explicit, Chief Reactor Engineers, who are responsible for operational safety must be able to respond competently in such circumstances.

Therefore Chief Engineers must have practical experience in addition to certification as a Chief Reactor Engineers.

(2) Revision of procedures for Reactor Installation Permit

Because equipment failure during the tsunami was a major factor in the Fukushima Daiichi nuclear accident, it is vital to check whether safety analysis and evaluation of the facilities actually ensure the safety of the reactor. Such procedures should take into account unlikely phenomena and conditions such as accidents or failure and their impact on overall safety.

Under the existing system, licensees were required to conduct a safety analysis as part of the review process to obtain a Reactor Installation Permit. But this safety analysis was only one of several documents accompanying the application and there was no requirement to obtain official permission to alter said documents. Consequently, some safety alterations were not even submitted to the authorities unless they involved a major change in the location, structure, or equipment of reactor facilities.

Thus, even if the safety analysis was revised and a scenario not previously envisaged was now added and the safety evaluation of the reactor was altered as a result, this information was not necessarily submitted to the authorities. They were now not in a position to confirm the actual safety situation of the reactor facilities.

To allow authorities a true picture of the safety situation and allow them to envisage possible additional scenarios which could alter that situation, issues related to safety analysis have been added to the required items accompanying an application.

(3) Quality assurance at the design and construction stages

Under the former Reactor Regulation Act, systems for quality assurance of licensees after commissioning a reactor could be checked via their operational safety programs. But to prevent a potential disaster it is necessary not only to check quality assurance after commissioning, but also quality assurance in earlier stages of the reactor’s life such as design and construction to ensure they also achieved the required standards.

IAEA Safety Standards should ensure that design, technology, and materials are of the highest quality to guarantee overall safety.

To check the licensee quality control methods from the design and construction stage onward, having a quality assurance system was added as a criterion for approval of the construction plan.

(4) Backfit system

Under the former Reactor Regulation Act, there was no legal requirement for licensees to apply new regulatory standards on existing reactors, even if new safety measures incorporating new and improved technology were now available.

Accordingly, even if the Reactor Installation Permit standards relating to earthquakes or tsunamis were revised, licensees were given only 'administrative guidance' to comply with the revised standards and so any changes were purely voluntary

To incorporate the latest scientific and technical knowledge to safety procedures and in light of the lessons learned during the accident at Fukushima Daiichi NPS, the NRA can now order licensees to comply with any new Reactor Installation Permit standards even if the reactor facilities in question have already been granted a Reactor Installation Permit.

(5) Evaluations to improve the safety of power reactors (enforceable by December 18, 2013)

The Reactor Regulation Act ensures the safety and integrity of power reactors through reviews for Reactor Installation Permits and subsequent reviews and inspections, such as construction plan approval reviews, Pre-service Inspections, and Periodic Facility Inspections. It forms the basis for checks of the operational safety activities of licensees, by such means as approvals for Operational Safety Programs and Operational Safety Inspections.

In addition to the content of such regulatory requirements relating to safety that are imposed uniformly in law, licensees should be encouraged to voluntarily strengthen existing safety requirements.

To encourage autonomous initiatives, if licensees draw up their own measures to prevent the occurrence or escalation of accidents which exceed current regulatory requirements, they should then carry out an evaluation of such plans and then formally notify the NRA and publish the results.

(6) Model certification system for equipment

There had been expectations that modern equipment able to withstand even severe accidents would be introduced in following the accident at the Fukushima Daiichi NPS. However, under the system in place hitherto, each reactor facility was required to undergo a Reactor Installation Permit (amendment) review and obtain approval for a construction plan when introducing such equipment, even if it was the same type of equipment as that which had already received

approval. This led to concerns that such a burden of reviews would slow down the introduction of new safety equipment.

To speed up the introduction of better safety equipment, it was decided to introduce type certification to reduce the review burden on licensees and shorten the review period.

(7) Limits on the operation period

After the commissioning of a reactor, its safety is checked by Periodic Licensees' Inspections and Periodic Facility Inspections. However, it is clear that risks increase with the age of the reactor with the obvious conclusion that the life of such facilities should be restricted. In fact there have been ongoing public discussions over the age-related deterioration of plants which have been operational for many years.

In this vein, the government report submitted to an IAEA ministerial conference contained a reference that, learning lessons from the Fukushima Daiichi accident, "the Japanese government will review and improve the legal structure governing nuclear safety and nuclear emergency preparedness and response, along with related criteria and guidelines, and during this process it will reevaluate measures taken against age-related degradation of existing facilities from the viewpoint of structural reliability as well as the necessity of responding to new knowledge and expertise including progress in system concepts."

As a result of such review, the operation period of 40 years has been introduced as a mandatory stipulation. This rule took into account several factors: that the safety evaluations of critical equipment and components during the Reactor Installation Permit Review generally envisaged a life-span of 40 years after commencing operations; that almost all facilities are assessed on a 40-year period in evaluation of deterioration due to neutron irradiation and material stress.

However, it is not clearly the case that nuclear reactors can remain 'problem free' for 40-year periods and then suddenly become dangerous after that time span. The status of individual plants also varies greatly depending on such factors as the effectiveness of maintenance and the decade in which the reactor was built.

Accordingly, some flexibility was thought necessary in the system of operation period, with the possibility of granting an extension "for a period not exceeding 20 years in cases that certain requirements are met as stipulated in a Cabinet Order".

On the other hand, even if a rector is less than 40 years old since commencing operation, the new system of backfit could result in suspension of its operation or revoking its Reactor Installation Permit if it fails to meet technical standards.

It should be added that one of the points of reference in adopting the 40-year period, was the US system where the allowable operational period is up to 40 years after the granting of the operational license. Under the US system, the licenses can be renewed for an additional 20

years, beyond the life of the original operating license, although this period is chosen taking into account other factors such as asset depreciation.

(8) Clarification of the responsibilities of nuclear operators

The Fundamental Safety Principles in the IAEA Safety Standards stipulate that the prime responsibility for safety at nuclear facilities rests with the licensee.

Furthermore, the report submitted to an IAEA Ministerial Conference notes that one of the lessons learned from the accident at Fukushima Daiichi NPS was that nuclear operators must take all appropriate steps to enhance safety. In the interim report compiled by the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of the Tokyo Electric Power Company in December 2011, it was pointed out that operators' countermeasures for natural disasters, such as tsunamis, which was one of the main causes of the accident at Fukushima Daiichi NPS, were inadequate.

Taking into consideration international standards and efforts to avoid 'future' Fukushimas or the escalation of crises, it was decided to legally clarify the responsibility of licensees. They should work on an ongoing basis to verify the soundness of nuclear design, modify equipment to enhance safety whenever possible, develop accident procedures, enhance operational safety education, and undertake regular safety drills.

(9) Steps to prevent a disaster in an emergency

Until now it has not been possible to order licensees, to take emergency measures such as shutting down a facility, even if the threat of a disaster was considered extremely high, until such a crisis actually occurred

Following a major earthquake, for instance, and the possibility of aftershocks, it was still not possible to take legal steps to prevent an impending disaster.

Therefore, should the NRA consider a disaster imminent, it will now be able to order licensees to take preventive measures, including suspending nuclear operators, even if such threats as an earthquake do not materialize.

(10) Special regulations concerning facilities at which nuclear disasters have occurred

As became clear from the accident at Fukushima Daiichi NPS, once a nuclear disaster occurs, it can take a considerable amount of time before repairs or decommissioning can be carried out. In such situations, the nuclear facility in question could remain in a state of noncompliance with the Reactor Regulation Act. Special measures that differ from those for ordinary nuclear facilities are required during this period, and it is necessary to clarify matters relating to the application of the Reactor Regulation Act.

After emergency measures in the Reactor Regulation Act have been implemented following a nuclear disaster, facilities deemed to require special management shall be designated as Specified Nuclear Power Facilities.

In this situation, the NRA shall issue a public notice to this effect and shall immediately inform the specified nuclear operator of the "Matters for which Measures should be Undertaken" and submission deadline for their implementation.

The nuclear operator that has been designated in this way shall obtain NRA approval for the implementation plan and take steps to ensure operational safety or physical protection of specified nuclear materials.

They must undergo an NRA inspection to confirm compliance with the implementation plan.

During implementation other not normally part of the Reactor Regulation Act may be applied as specified by Cabinet Order.

Once these special measures have been implemented and the plant can once more comply with normal regulations in the Reactor Regulation Act - or if decommissioning measures can be carried out - the designation of Specified Nuclear Power Facility shall be revoked and a public notice to this effect issued.

(11) Inspections of manufacturers

Until now safety inspections of nuclear power reactors and other facilities focused on components that have actually been completed, namely Pre-service Inspections and Periodic Facility Inspections. These, however, may be insufficient on their own and checks are necessary from the facility manufacture and construction stages, focusing on such areas as management.

Authorities, however, were unable to conduct direct inspections of parties other than nuclear operators, pursuant to laws and regulations; in other words, they could not inspect manufacturers, so authorities were unable to adequately check the safety and integrity of nuclear facilities.

In light of the accident at Fukushima Daiichi NPS, there are expectations that a more diverse range of equipment will be introduced to improve nuclear safety, and an increase in procurement from manufacturers not previously engaged in such nuclear production is also anticipated, so there is a growing need for procurement management regulations.

Moreover, the necessity of inspections of manufacturers by the authorities is stipulated in the IAEA Safety Standards.

Accordingly, authorities themselves will now be able to inspect those involved in the design or construction of nuclear facilities, or the manufacture of equipment for such facilities.

(12) Consolidation of nuclear safety regulation systems for power reactor facilities

In the relevant Cabinet approval dated August 12, 2011, the duties relating to the regulation of nuclear safety were separated from the ministries and agencies responsible for the use of nuclear energy and centralized in the hands of the NRA, thereby seeking to further improve its functions as a regulatory body.

With regard to administrative matters concerning electrical facilities generating nuclear energy (hereinafter referred to as “nuclear power generation facilities”) under the Electricity Business Act, those relating to the regulation of nuclear safety are now overseen by the NRA, while some administrative matters relating to nuclear power generation facilities under the Electricity Business Act have been placed under the joint jurisdiction of the Minister of Economy, Trade and Industry and the NRA.

Hitherto, safety regulation of nuclear power station equipment was carried out on the basis of two legal codes: by the Reactor Regulation Act as power reactor facilities and by the Electricity Business Act as electrical facilities. However, the operation of systems based on multiple legal codes was complex and unclear, so in light of the accident at TEPCO’s Fukushima Daiichi NPS, the need to clarify the regulatory system for nuclear safety was noted, along with the necessity of putting in place an environment that would encourage licensees of power reactor operation to implement initiatives aimed at ensuring safety.

It was decided to centralize safety regulation of nuclear reactor facilities under the Reactor Regulation Act, by setting out in this Act provisions for regulating safety measures focused on nuclear power generation facilities previously under the Electricity Business Act; and further setting out relevant provisions in the Electricity Business Act, such as a directive stating that some provisions therein do not apply to nuclear power generation, as power reactor facilities are regulated by the Reactor Regulation Act.

3 References

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- Act for Establishment of the Nuclear Regulation Authority
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  http://www.nsr.go.jp/english/data/ar_0701.pdf
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  http://www-pub.iaea.org/MTCD/Meetings/PDFplus/2011/cn200/documentation/cn200_Final-Fukushima-Mission_Report.pdf
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- IAEA Mission to Onagawa Nuclear Power Station to Examine the Performance of Systems, Structures and Components Following the Great East Japanese Earthquake and Tsunami
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