National Report of JAPAN for the Sixth Review Meeting

JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

October 2017

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Abbreviations and Acronyms

Abbreviation or Acronym	Expanded or Original Term
ALARA	As Low As Reasonably Achievable
CAO	Cabinet Office
Cat-1 Waste Disposal	Category 1 radioactive waste disposal
Cat-2 Waste Disposal	Category 2 radioactive waste disposal
DCA	Deuterium Criticality Assembly
EAL	Emergency Action Level
EPR	Emergency Preparedness and Response
Final Disposal Act	Designated Radioactive Waste Final Disposal Act
GOJ	Government of Japan
HLW	High Level radioactive Waste
HRDC	NRA Human Resource Development Center
HTR	Hitachi Ltd.'s Hitachi Training Reactor
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
ICSA	Intensive Contamination Survey Area
IRRS	Integrated Regulatory Review Service
JAEA	Japan Atomic Energy Agency
JANSI	Japan Nuclear Safety Institute
JAPCO	Japan Atomic Power Company
JCO	JCO Co.,Ltd
JNES	Japan Nuclear Energy Safety Organization
JNFL	Japan Nuclear Fuel Ltd.
JRR	Japan Research Reactor
LLW	Low Level radioactive Waste
LWR	Light Water Reactor
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MHLW	Ministry of Health, Labour and Welfare
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MOE	Ministry of Environment
MOFA	Ministry of Foreign Affairs
MTU	Metric Ton of Uranium
NCA(A)	National Competent Authority for an Emergency Abroad
NCA(D)	National Competent Authority for a Domestic Emergency
NISA	Nuclear and Industrial Safety Agency
NPS	Nuclear Power Station

Abbreviation or Acronym	Expanded or Original Term
NRA	Nuclear Regulation Authority
Nuclear Emergency Act	Act on Special Measures Concerning Nuclear Emergency Preparedness
NUMO	Nuclear Waste Management Organization of Japan
Nuclear fuel processing	Process includes uranium enrichment and fabrication
NWP	National Warning Point
OIL	Operational Intervention Level
OJT	On the Job Training
PAZ	Precautionary Action Zone
PFSB	Pharmaceutical and Food Safety Bureau
Pharmaceuticals and Medical Devices Act	The Law on Securing Quality, Efficacy and Safety of Products including Pharmaceuticals and Medical Devices
Radiation Hazards Prevention Act	Act on Prevention of Radiation Hazards due to Radioisotopes, etc.
RANET	IAEA Response Assistance Network
Reactor Regulation Act	Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors
RFS	Recyclable-Fuel Storage Company
RUR	Rikkyo University Institute for Atomic Energy
RWMC	Radioactive Waste Management funding and research Center
TEPCO	Tokyo Electric Power Company Holdings, Inc.
TRACY	Transient Experiment Critical Facility
TRU waste	Trans-Uranic waste
TTR-	Toshiba Corporation's Training Reactor-(number) ; i.e. TTR-1
UPZ	Urgent Protective action planning Zone

Section A Introduction

A-1 Current status of Nuclear Facilities in Japan

Based on the definition of the nuclear facility in this convention, following types of facilities exist in Japan, as of end of March 2017. They are nuclear power reactor facilities, research reactor facilities, nuclear fuel processing facilities for uranium enrichment or fuel fabrication, spent fuel storage facilities, spent fuel reprocessing facilities, radioactive waste interim storage facilities, radioactive waste repositories, facilities which use more than a certain quantity of uranium or other nuclear fuel material, and facilities for handling radioisotopes. Among the above, spent fuel storage facilities and spent fuel reprocessing facilities correspond to spent fuel management facilities, and, radioactive waste interim storage facilities and radioactive waste repositories correspond to radioactive waste management facilities which defined in the article.

In Japan, 62 power reactors are currently granted the Reactor Installation Permit pursuant to the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (hereinafter referred to as the Reactor Regulation Act), and 10 units among them are under decommissioning with obtaining the approval of the decommissioning plans pursuant to the Act. As for research reactors, 10 of 22 licensed units are under decommissioning with obtaining the approval of the decommissioning plans pursuant to the Act.

6 nuclear fuel processing facilities including 2 uranium enrichment facilities and 1 spent fuel storage facility have been licensed. One of the 2 licensed spent fuel reprocessing facilities has ceased operation of its main process and has been permanent shutdown condition for decommissioning.

2 radioactive waste interim storage facilities, and 3 radioactive waste repositories, are licensed.

209 facilities which use more than a certain quantity of uranium or other nuclear fuel material are obtained permission for usage, and 8,049 business sites that handle radioisotope are under regulation pursuant to relevant Act as of March 2017.

A-2 Efforts concerning the safety of spent fuel management and radioactive waste management

The Nuclear Regulation Authority (NRA) developed the new regulatory requirements which reflected the lessons learned from the accident at Fukushima Daiichi NPS and enforced those for nuclear power stations in July 2013, and those for nuclear fuel cycle facilities including "spent fuel management facilities" and "radioactive waste management facilities" defined in this convention in December 2013. Nuclear fuel cycle facilities have variety of structures due to handle various types of nuclear material. Considering the above, regulatory requirements are determined by type of facility.

The licensee shall comply with the "new" regulatory requirements pursuant to the Reactor Regulation Act, for their facilities which had been already received the permission prior to the enforcement. Therefore, in order to resume operation of nuclear facilities, the licensee shall obtain:

- the permission for the amendment of existing permission
- the approval for the design and construction plan
- the approval for the Operational Safety Programs

through the Conformity Review for the regulatory requirements newly set by the NRA.

The NRA has been received the applications for conformity review of, 26 nuclear power reactors, 10 research reactors, 6 nuclear fuel processing facilities, 1 Spent fuel storage facility, 1 spent fuel reprocessing facility, 2 radioactive waste interim storage facilities, and 1 radioactive waste repository.

Among the above,

- Units 1 and 2 at the Kyushu Electric Power Company's Sendai Power Station,
- Units 3 and 4 at the Kansai Electric Power Company's Takahama Power Station,
- Unit 3 at the Shikoku Electric Power Company's Ikata Power Station

have completed the conformity review and completed the Pre-service inspections, and have been in commercial operation. Furthermore, 2 nuclear fuel processing facilities, 3 research reactors, have obtained the permission for the amendment of the existing permit.

In April 2017, the Reactor Regulation Act and the Act concerning Prevention from

Radiation Hazards due to Radioisotopes, etc. (hereinafter referred as the Radiation Hazards Prevention Act) were amended. The amendments strengthen and improve the regulation for such as decommissioning of nuclear facilities and disposal of radioactive waste.

In January 2016, the NRA invited IAEA/IRRS mission. Currently, the NRA is working on the improvement in regulatory activities based on recommendations and suggestions from this mission successively. As part of the said improvement, related Acts were revised including:

- Revision of inspection program for nuclear facilities
- Requirement for development and publication of implementing policy for decommissioning in earlier stage
- Restriction for activity such as excavation at intermediate depth disposal site and geological disposal site
- Enabling the storage of disposal RI waste regulated under Radiation hazards prevention Act in the waste facilities and repository regulated under Nuclear Regulation Act

As for the reactors in Fukushima Daiichi NPS has been designated as "Specified Nuclear Facility" since November 2012 by the NRA, pursuant to the Reactor Regulation Act which needs special measures to ensure nuclear safety based on the Implementation Plan.

A-3 Current status of the Fukushima Daiichi NPS

A-3-1 Efforts for decommissioning of Fukushima Daiichi NPS

The Fukushima Daiichi NPS Unit 1 to Unit 6 are designated as the specified nuclear facility based on the Reactor Regulation Act, and they are regulated in accordance with the Implementation Plan pursuant to the act which describes measures for the safety and protection of specified nuclear fuel materials.

Moreover, TEPCO is required to implement the measures for the decommissioning and treatment of contaminated water based on the “Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO’s Fukushima Daiichi Nuclear Power

Station" [1] decided by the "Inter-Ministerial Council for Contaminated Water and Decommissioning Issues".

The NRA set up "The Committee on Radioactive Waste Issues of the Specified Nuclear Facilities" in December, 2015 in order to achieve stable management of radioactive waste in the Fukushima Daiichi NPS considering the long period of decommissioning work in the future.

TEPCO reported the Waste Management Plan for the Fukushima Daiichi NPS which describes the storage policy of radioactive waste, the amount of radioactive solid waste for coming 10 years, and the installation policy of the radioactive waste facility at the Committee on Radioactive Waste Issues of the Specified Nuclear Facilities in March, 2016, and has been renewed periodically.

There are secondary waste generated from the water treatment, rubbles generated at the accident, and the solid waste that had been stored before the accident in the Fukushima Daiichi NPS according to the Waste Management Plan. Solid waste such as rubbles are classified by the dose rate, and are stored in the temporary storage area in the yard or in the solid waste storage facility, and the secondary liquid waste is stored in the temporary storage facility etc.

Temporary storage facilities for the radioactive waste are located widely in the Fukushima Daiichi NPS site. About 340,000m^3 of rubbles are stored in the outdoor temporary storage area, and about 8,000m^3 of rubbles are temporary stored in the solid waste storage facility at the end of December 2016. The secondary waste generated from the water treatment is temporarily stored in about 1,200 vessels and about 2,300 High Integrity Container (HIC) etc. as of February 2, 2017.

TEPCO plans to reduce volume of the rubbles as much as possible and consolidate to storage in the building for a further risk reduction, and move the secondary waste to the storage building, to gradually eliminate the outdoor storage area. At the same time, TEPCO studies method for treatment of wastes to stabilize them. As present status, the ninth building of solid waste storage facility is under construction, and the construction will be completed in fiscal year 2017.

[1]Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/index.html

Liquid radioactive waste which means contaminated water is purified by purification facilities such as multi-nuclide removal equipment. However, about 700,000m^3 of treated water which contains tritium is stored inside the site as of January, 2017.

Proper treatment and storage of wastes in the site and management of treated water containing tritium is the important challenge for decommissioning and contaminated water treatment of Fukushima Daiichi NPS in the future.

A-3-2 Progress and Current Situation of Off-site Decontamination and Interim Storage Facility

A-3-2-1 Decontamination

The whole area decontamination of Special Decontamination Area (SDA) was completed as planned at the end of March, 2017 where the national government, Ministry of the Environment (MOE), is responsible for. In the Intensive Contamination Survey Area (ICSA), where municipalities have been conducting the decontamination, it comes close to the end. In both areas, decontamination work has steadily been implemented and air dose rate in the environment has been decreasing.

a Special Decontamination Area (SDA)

The national government implemented decontamination in the SDA according to the Decontamination Implementation Plan. The SDA consists of the former "Restricted Areas" located within a 20 km radius from the TEPCO's Fukushima Daiichi NPS and the former "Deliberate Evacuation Areas," which are beyond 20 km radius from the NPS and where the additional annual dose for individuals was anticipated to exceed 20 mSv in the first year after the accident. The decontamination work was completed at the end of March 2017 in the SDA, excluding the "Areas where Returning is Difficult," in which the annual cumulative dose was expected to exceed 50 mSv.

b Intensive Contamination Survey Area (ICSA)

ICSA is the area where the air dose rate is over 0.23 μSv/h (equivalent to over 1 mSv/y of additional dose under a certain condition). Decontamination work for the area is implemented by each municipality with financial and technical supports by the national government. By the end of March 2017, 80 municipalities have completed the

decontamination works and the rest of 12 municipalities have almost completed the work based on their respective Decontamination Implementation Plans.

c Interim Storage Facility (ISF)

As for the Interim Storage Facility (ISF), in which contaminated soil generated from the decontamination work in Fukushima will be stored intensively and safely, MOE has been processing land acquisitions to secure necessary areas. In November 2016, MOE started the construction of reception / classification facilities and soil storage facilities in the ISF. The operation of these facilities will start in fiscal year 2017.

Approximately 230,000m^3 of contaminated soil has been delivered to the ISF by FY2016. In FY2017, MOE plans to transport approximately 500,000 m^3 of the soil, taking measures learned in the previous transportations. The following URL leads to the MOE's website, which posts updated information related to the environmental remediation activities.
http://josen.env.go.jp/en/

A-3-2-2 IAEA-MOE Experts' Meeting on Environmental Remediation

a Background:

Since the accident at the TEPCO's Fukushima Daiichi NPS occurred in March 2011, lessons learned from the accident have been shared and disseminated through the series of International Experts Meetings, International Peer Review Missions, and different types of technical documents. The IAEA Report on the Fukushima Daiichi Accident (IAEA Fukushima Report), which was presented at the 59th IAEA General Conference in September 2015, assessed the causes and consequences of the accident and exploited a lot of lessons learned from it. In particular, the Technical Volume 5 of the IAEA Fukushima Report extensively addressed the issues related to the post-accident recovery including off-site remediation, on-site stabilization, and radioactive waste management.

Although the report produced significant commentary on the strategy development and implementation of the environmental remediation in the off-site areas affected by the accident, the post-accident recovery including the environmental remediation works is continuing. Progress, challenges and solutions may all benefit from considerations by the IAEA, as well as sharing with the international communities.

For this, it was proposed that an ongoing dialogue, composed of bilateral meetings between the IAEA and the MOE (including other relevant authorities, as appropriate) could be established, so that development of the environmental remediation activities in Japan would be updated and discussed in a progressive way.

b Objective/scope:

(a) To discuss the current status (progress, challenges and solutions) of environmental remediation activities taking place in off-site areas affected by the accident
(b) To provide assistance to Japan, as appropriate, in considering the progress made with the environmental remediation works
(c) To share findings with the international agencies

The first IAEA-MOE Experts' Meeting was held in February 2016, followed by the second meeting on November 2016, and the third meeting on April 2017. The summary reports of these meetings are as follows;

1st IAEA-MOE Experts Meeting
http://www.env.go.jp/press/files/jp/102433.pdf (English)
http://www.env.go.jp/press/files/jp/102434.pdf (Japanese)

2nd IAEA-MOE Experts Meeting
http://www.env.go.jp/press/files/jp/105172.pdf (English)
http://www.env.go.jp/press/files/jp/105173.pdf (Japanese)

3rd IAEA-MOE Experts Meeting
http://www.env.go.jp/press/files/jp/106307.pdf (English)
http://www.env.go.jp/press/files/jp/106308.pdf (Japanese)

A-4 Preparation of the report

This report describes measures taken for implementing the obligations under this convention and is a compilation of information available at the end of March 2017, unless otherwise specified.

This report describes those measures contrasted with corresponding article of the

Convention, and its description is mainly focused on the system for the safety management. In addition, response to challenges identified at the 5th Review Meeting are reported in Section K

The Guidelines on the Structure of National Report, INFCIRC/604/Rev3, is taken into account to develop this National Report. In Japan, multiple government organizations are in charge of implementation for the obligations under this Convention. Following list is rough allocation of responsibility.

Chapters defined by INFCIRC/604	Responsible organization
A	NRA,MOE
B	METI, NRA, MEXT
C	MOFA
D	NRA, MHLW
E	NRA, MHLW, METI
F	NRA, MEXT, CAO
G	NRA, METI
H	NRA
I	METI, NRA, MLIT
J	NRA
K	NRA, METI
L	NRA

A-5 Overview Matrix

Type of liability	Long-term management policy	Funding of liabilities	Current practice Facilities	Planned facilities
Spent fuel	Reprocessing	Utilities shall pay contributions into fund management organization for reprocessing	Overseas Reprocessing	Interim Storage facilities, both on-site and off-site
Nuclear fuel cycle wastes	Geological disposal, intermediate depth disposal and near surface depth disposal	Utilities shall pay contributions into fund management organization for disposal	LLW disposal facilities. HLW storage facilities	Geological disposal, intermediate depth disposal and near surface depth disposal facilities
Application wastes	Near surface depth disposal	Waste generator pays for the storage and disposal	On site storage	Near surface depth disposal
Decommissioning Liabilities	Decommissioning of NPP	Utilities shall pay deposits into the Reserve Fund	Tokai Hamaoka(1,2) Fugen Genkai(1) Tsuruga(1) Mihama(1,2) Shimane(1) Ikata(1)	Tokai(reprocessing facility) Fukushima 1-6
Disused sealed sources	Return to manufacturers Long-term Source user storage	Source user	Return to manufactures Storage	-

Section B Policies and Practices

Article 32

1. In accordance with the provisions of Article 30, each Contracting Party shall submit a national report to each review meeting of Contracting Parties. This report shall address the measures taken to implement each of the obligations of the Convention. For each Contracting Party the report shall also address its:

(i) spent fuel management policy;

(ii) spent fuel management practices;

(iii) radioactive waste management policy;

(iv) radioactive waste management practices;

(v) criteria used to define and categorize radioactive waste.

Section B describes the national policy for promoting the spent fuel management and radioactive waste management in Japan and the operator's actions based on that policy. The policy and actions for the safety of spent fuel management and radioactive waste management are described in "Section G Safety of Spent Fuel Management" and "Section H Safety of Radioactive Waste Management", respectively.

B-1 Spent Fuel Management Policy

The management of spent fuel is a global challenge. Spent fuel is an unavoidable product of the use of nuclear energy, and it is essential to implement measures to resolve this challenge as a responsibility of the current generation so that the burden is not passed on to future generations. Therefore, Japan will drastically reinforce and comprehensively promote efforts to resolve the challenge of how to manage and dispose of spent fuel.

As the current generation that has produced radioactive waste, the government of Japan will reinforce measures toward final disposal of high-level radioactive waste and take the initiative in solving this problem. However, the process will take a long time. In the meantime, spent fuel produced by nuclear power generation must be safely managed. It is therefore necessary to expand the capacity for storing spent fuel and is urgently important to broaden the range of choices for managing spent fuel while ensuring safety.

It will enhance the flexibility of policy planning, and contribute to medium-term energy security.

In Japan's new Strategic Energy Plan (April, 2014 Cabinet decision), based on this concept, it is stated that the storage capacity of spent fuel will be expanded. Specifically, while studying a wide range of locations as possible sites, regardless of whether they are inside or outside the premises of a power plant, the government of Japan will strengthen its effort for facilitating construction and utilization of new intermediate storage facilities and dry storage facilities.

Furthermore, the government of Japan will promote development of technologies for reducing the volume and harmfulness of radioactive waste in order to secure a wide range of options in the future.

Regarding the nuclear fuel cycle policy, the government of Japan, taking into consideration past history, will steadily promote reprocessing and plutonium use in Light Water Reactors (LWRs) while seeking the understanding of the relevant municipalities and the international community, and will ensure flexibility in the mid- to long-term basis.

As a measure to organize the business environment and achieve steady reprocessing which forms the basis of the nuclear fuel cycle, Japan has implemented the Spent Nuclear Fuel Reprocessing Implementation Act (see Section E). The bill establishes a scheme for securing funds related to reprocessing spent fuel, as well as an implementation body to be responsible for reprocessing. Based on this, the Nuclear Reprocessing Organization of Japan was established as an authorized corporation on October 3rd, 2016.

B-2 Spent Fuel Management Practices

B-2-1 Reprocessing of spent fuel generated from nuclear power generation

Electric utilities had sent spent fuel to the United Kingdom and French reprocessing companies since 1969; the export of spent fuel to foreign reprocessing plants has stopped in July 2001. Approximately 7,100MTU of spent fuel had been exported.

A part of national demand for reprocessing had been covered by the reprocessing plant

of the incorporated administrative agency, JAEA, which was commissioned in December 1980, in Tokai village in Ibaraki Prefecture (reprocessing capacity: 0.7MTU per day). This plant was built for the purpose of establishing reprocessing technology and of training and fostering engineers and technicians in Japan. The plant completed the reprocessing service contracted by the electric utilities in the end of March 2006. Since then, it has been utilized as a facility for developing technologies for reprocessing spent MOX fuel in light water reactors (LWRs), spent fuel in an advanced thermal reactor and spent fuel in a fast breeder reactor. The plant has reprocessed a total of approximately 1,100MTU of spent fuel since the commissioning.

In response to the amendment of the Reactor Regulation Act in 1979, a private reprocessing company, the Japan Atomic Fuel Service Co., Ltd. (presently, the Japan Nuclear Fuel Ltd., JNFL) was established in 1980, funded by the electric utilities. This company commenced construction of a commercial reprocessing plant with the annual reprocessing capacity of 800MTU in Rokkasho village, Aomori Prefecture in 1993, based on the operating experience of the reprocessing plant of Japan Atomic Energy Agency (JAEA), considering the trends of domestic demand for reprocessing, and introducing technologies and experiences accumulated in the leading countries in the field of reprocessing. The reprocessing plant started pre-service inspection using actual spent fuel in 2006. The plant has reprocessed a total of approximately 430MTU for the pre-service inspection at the end of March 2008 for active testing to secure the safety function. Also, from November, 2007, vitrification testing began. It ended in 2013 after a temporary interruption due to the East Japan great earthquake. At the present time, the plant proceeds with management to meet the new requirements formulated by the Nuclear Regulation Authority, aiming at completion in the first half of 2018. Spent fuel storage has already begun at the plant, completed in 1999, with the storage capacity of 3,000MTU. This plant has accepted a total of approximately 3,400MTU by the end of March 2017. As of the end of March, 2017, the amount of spent fuel stored in nuclear power plants of LWR in Japan amounts to approximately 15,000 MTU.

B-2-2 Offsite interim spent fuel storage

The amendment of the Reactor Regulation Act was enforced in 2000 to incorporate provisions on interim spent fuel storage. In response to this amendment, TEPCO and JAPC jointly established “Recyclable-Fuel Storage Company (RFS)” in 2005. RFS applied to the Minister of Ministry of Economy, Trade and Industry (METI) for the

license for the construction and operation of Recyclable-Fuel Storage Center at Mutsu city, Aomori Prefecture, which is Japan's first off-site interim spent fuel storage facility, in March 2007, based on the Act. The application was accepted in May 2010. The application for the design and method of construction was submitted to the Minister of METI in June 2010, and was approved in August 2010. Upon receipt of the approval, the construction was started. The Recyclable-Fuel Storage Center is the facility to store spent fuel generated from BWRs and PWRs in metallic dry casks, and is capable of storing a maximum of approximately 3,000MTU of spent fuel.

In December 2013, the NRA developed new regulatory requirements for nuclear fuel cycle facilities including spent fuel storage facility based on the TEPCO's Fukushima Daiichi Nuclear Power Station Accident. In January 2014, RFS applied to NRA for the review of the spent fuel storage facility. Now NRA is implementing its review. RFS is scheduled to start operation in the latter half of 2018.

B-2-3 Management of spent fuel from research reactor facilities

The spent fuel from research reactor facilities is either returned to the USA etc., or is reprocessed or stored in Japan.

B-3 Radioactive Waste Management Policy

The government of Japan developed the policy for promoting radioactive waste disposal as described below.

B-3-1 Radioactive waste subject to geological disposal

B-3-1-1 High level radioactive waste

In Japan, a site for geological disposal of high level radioactive waste is determined through three steps of the selection of "preliminary investigation areas", "detailed investigation areas" and "construction site of final disposal facility", in accordance with the "Final Disposal Act" in May 2003. (See Section E). The Nuclear Waste Management Organization of Japan (NUMO) was established as an organization to implement final disposal. In addition, utilities have deposited the reserve funds for final disposal to NUMO. The appeal to the public for candidate areas for literature

survey on the possible installation of a final disposal facility was conducted by NUMO, but the literature survey has not yet been commenced.

Under these circumstances, the Japanese government revised fundamental policy based on the Final Disposal Act in May, 2015. In the new policy it was decided that Japan should take the initiative to solve the problem of high-level radioactive waste as the responsibility of the current generation that created the waste so as not to pass the burden on to future generations. Specifically, in order to ensure a deeper public concern and understanding of the issue, national government is supposed to indicate the area considered higher suitability from a scientific perspective. The Japanese government published the "Nationwide Map of Scientific features for Geological Disposal" in July, 2017. While making efforts on the assumption of geological disposal, it is ensured that the future generation will be able to select the best disposal method (reversibility and retrievability). The technical reliability of geological disposal will be evaluated while proceeding with parallel surveys and research of alternative disposal options. In addition, structure of regional consensus building for citizens of various positions to participate in and supportive measures toward the sustainable development of communities to accept final disposal site will be considered.

As for international cooperation, Japan has been studying, and using as reference, cases in foreign countries where disposal site selection is in progress, and will continue to exchange views with the countries that have final disposal programs and also to promote multinational cooperation using cooperative frameworks of the IAEA, OECD/NEA, etc.

B-3-1-2 Long-lived low-heat generating radioactive wastes (TRU wastes) to be geologically disposed of

Agency for Natural Resources and Energy (ANRE), which is the affiliated organization of METI, amended the Final Disposal Act in 2007. According to this amendment, TRU wastes from reprocessing that need to be geologically disposed of and high level radioactive wastes that are returned from overseas reprocessing plants in exchange for TRU wastes were added to the wastes to be finally disposed of by NUMO, and generators of such radioactive wastes were legally requested to provide the cost needed for final disposal.

B-3-2 Radioactive wastes subject to disposal with active control

In Japan, disposal with active control is categorized by the following three types; “near surface trench disposal”, “near surface pit disposal” and “intermediate depth disposal.” Low level radioactive wastes generated in nuclear power plants that are subject to near surface trench disposal and near surface pit disposal are already being disposed of with such methods.

B-3-3 Ban on sea dumping of radioactive waste

In compliance with the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972) and its amendment to Annex I in 1993, it was decided that “the government of Japan will eliminate the option of sea dumping as a principle of low level radioactive waste in the future.” Based on this decision, the Reactor Regulation Act was amended in May 2005, and sea dumping of radioactive waste was banned.

B-4 Radioactive Waste Management Practices

Operators, recognizing their responsibility concerning radioactive waste management, shall manage radioactive waste generated at their facilities in compliance with the Reactor Regulation Act, the Radiation Hazards Prevention Act and relevant regulations.

B-4-1 High Level Radioactive Waste Management Practices

Spent fuel generated in Japan, has been reprocessed by the Rokkasho Reprocessing Plant of JNFL, Tokai Reprocessing Plant of JAEA and reprocessing plants in the United Kingdom and France. (JNFL has reprocessed spent fuel in an active test and plans to complete the Rokkasho Reprocessing Plant in the first half of 2018.)

The electric power utilities in Japan have concluded reprocessing contracts with the United Kingdom and French companies for a total of 5,600 MTU of spent fuel from light water reactors and 1,500 MTU of spent fuel from a gas cooled reactor. In accordance with these contracts, vitrified waste canisters have been returned to the utilities and are stored at the Vitrified Waste Storage Center of JNFL. As of the end of March 2017, 1,830 vitrified canisters have been returned from the United Kingdom and

France. Return shipment of the 1,310 vitrified waste canisters from France started in 1995 and finished in 2007. Return shipment of the vitrified waste canisters from the United Kingdom started in 2010, and about 380 vitrified waste canisters will be returned in about 2 times. The Rokkasho Reprocessing Plant has been storing 346 vitrified waste canisters which were generated in an active test.

High level liquid waste generated at the Tokai Reprocessing Plant of JAEA was stored in tanks within the facility and has been vitrified at the vitrification facility which started operation in January 1995. As of March 2017, about 373 cubic meters of liquid waste and 272 vitrified waste canisters are in storage. Vitrified waste is decided to undergo geological disposal based on the Final Disposal Act.

B-4-2 Low Level Radioactive Waste Management Practices

For the business of waste based on the Reactor Regulation Law, please see Section H.

B-5 Criteria used to define and categorize radioactive waste

Classification of radioactive waste based on the Reactor Regulation Law is described in Section E.

Section C Scope of Application

Article 3

1. This Convention shall apply to the safety of spent fuel management when the spent fuel results from the operation of civilian nuclear reactors. Spent fuel held at reprocessing facilities as part of a reprocessing activity is not covered in the scope of this Convention unless the Contracting Party declares reprocessing to be part of spent fuel management.
2. This Convention shall also apply to the safety of radioactive waste management when the radioactive waste results from civilian applications. However, this Convention shall not apply to waste that contains only naturally occurring radioactive materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or it is declared as radioactive waste for the purposes of this Convention by the Contracting Party.
3. This Convention shall not apply to the safety of management of spent fuel or radioactive waste within military or defence programmes, unless declared as spent fuel or radioactive waste for the purposes of this Convention by the Contracting Party. However, this Convention shall apply to the safety of management of spent fuel and radioactive waste from military or defence programmes if and when such materials are transferred permanently to and managed within exclusively civilian programmes.
4. This Convention shall also apply to discharges as provided for in Articles 4, 7, 11, 14, 24 and 26.

The Government of Japan declared, pursuant to paragraph 1 of Article 3 of the Convention, that reprocessing is part of spent fuel management, when the government acceded to the Convention. Therefore the Government of Japan includes the spent fuel stored in reprocessing facilities in the scope of the Convention.

The Government of Japan did not make declarations provided for in paragraphs 2 and 3 of Article 3 of the Convention.

Section D Inventories and Lists

Article 32

2 This report shall also include:

(i) a list of the spent fuel management facilities subject to this Convention, their location, main purpose and essential features;

(ii) an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity;

(iii) a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features;

(iv) an inventory of radioactive waste that is subject to this Convention that:

(a) is being held in storage at radioactive waste management and nuclear fuel cycle facilities;

(b) has been disposed of; or

(c) has resulted from past practices.

This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides;

(v) a list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities.

D-1 List of spent fuel management facilities

As Japan declared that the reprocessing is a part of the spent fuel management, the spent fuel management facilities in Japan include nuclear reactor facilities, spent nuclear fuel storage facilities, and reprocessing facilities. Spent nuclear fuel assemblies generated in the nuclear power reactors are stored at spent fuel storage facilities within each nuclear power station for a certain period of time, and are transported to the spent fuel storage facilities or the reprocessing plant. Spent fuel generated in the research reactors are stored and managed inside the said research reactor facilities. Location, main purpose and features of these major spent fuel management facilities are described in the Annex L.

D-2 Spent fuel storage etc.

Inventory and types of spent fuel stored in Japan are shown in the Annex L.

D-3 List of radioactive waste management facilities

In Japan, there are radioactive waste repository and radioactive waste storage facilities where the radioactive waste are stored temporally before the final disposal.

As types of waste repository, there are a near surface disposal facility without artificial barrier, trench type repository, and a near surface disposal facility with artificial barrier (concrete vault), pit type repository. Very low level radioactive waste is disposed in the near surface trench type repository, and solidified wastes (homogeneous waste package, or cemented waste package) in drums are disposed in the near surface pit type repository.

In the waste storage facilities, the high-level radioactive vitrified waste packages generated by the reprocessing are temporarily stored.

The radioactive waste management facilities are also built in the nuclear facilities defined by this convention. Radioactive waste management facilities within nuclear power plants include the following: waste treatment facilities; solid waste depositories where treated waste (homogeneous waste packages, cemented waste packages, other miscellaneous solids) in drums are stored; depositories where the replaced steam generators and other large solid wastes are stored; spent fuel pools where disused control rods and channel boxes are stored; and vessels where the dumped ion-exchange resin is stored.

Radioactive waste management facilities within fuel processing plants include the following: equipment to treat radioactive waste generated at the plants; and solid waste depositories where treated radioactive waste is stored.

Radioactive waste management facilities within spent fuel reprocessing plants include: radioactive waste treatment equipment; waste depositories where vitrified waste and high level liquid waste are stored; and waste depositories where low level liquid waste and low level solid waste are stored.

Radioactive waste management facilities within research reactors and major nuclear fuel usage facilities include the following facilities: waste treatment equipment for low-level radioactive waste generated at the plants; and solid waste storage depositories for drums of treated waste etc.

Major radioactive waste management facilities licensed under the Radiation Hazards Prevention Act include storage facilities for drums containing processed waste generated at radioisotope usage facilities.

Radioactive waste management facilities licensed under the Medical Care Act include storage facilities for drums etc. containing radioactive medical waste generated from medical facilities.

The location, purpose and characteristics of such radioactive waste management facilities are listed in the Annex L.

D-4 Inventories of radioactive waste

D-4-1 Radioactive Waste in Storage

The waste stored in the above-mentioned nuclear power plant include approximately 680,000 of 200-liter drums, 32 of used steam generators, disused control rods, channel boxes, dumped ion-exchange resin, as of the end of March 2017. In addition rubble, trimmed trees, dumped protective clothing generated after accident, etc. [345,300 m^3 in total], and waste from contaminated water treatment [3,586 of cesium absorber columns etc. and 597m^3 of sludge] have been temporarily stored in TEPCO's Fukushima Daiichi NPS.

At facilities other than nuclear power plants, ca. 2,448 of vitrified waste packages of HLW and ca. 373 m^3 of high level liquid waste are stored in spent fuel reprocessing facilities. Details of these inventories included the other radioactive waste are indicated in Annex L.

D-4-2 Radioactive Waste Disposed of

Since 1992, LLW which contains comparatively low concentration of radionuclides stored at radioactive waste management facilities in commercial power reactor facilities was transferred to a JNFL radioactive waste repository for disposal. The amount of waste currently at the repository is listed in the Annex L.

The JNFL repository is currently in operation and has disposed ca. 290,000 drums (200-liter-drum equivalent) of waste, as of the end of March 2017. At the JAEA Nuclear Science Research Institute's Tokai Research and Development Center, about 1,670 tons of very low level waste (concrete rubbles) resulting from the dismantling of the JPDR have been disposed of.

D-4-3 Radioactive Waste Resulting from Past Practices

None is produced from the past practices under the Reactor Regulation Act.

D-5 Nuclear facilities under decommission

D-5-1 Power reactors

As of the end of June 2017, 10 units in total are under decommissioning:

- JAPCO's Tokai NPS;
- the JAEA's Fugen Advanced Thermal Reactor;
- the Chubu Electric Power Company's Hamaoka units 1 and 2;
- JAPCO's Tsuruga unit 1;
- the Kansai Electric Power Company's Mihama units 1 and 2;
- the Kyushu Electric Power Company's Genkai unit1;
- the Shikoku Electric Power Company's Ikata unit 1;
- the Chugoku Electric Power Company's Shimane unit 1.

A reactor at JAPCO's Tokai NPS ceased operation in 1998. Decommissioning work has been conducted since December 2001. Equipment other than reactor such as the turbines, feed water pumps was dismantled first and heat exchangers have been dismantling since 2006. Dismantling of the reactor vessel will begin in FY 2020 and will

take around six years. Decommissioning is expected to be completed in FY2025.

The JAEA's Fugen Advanced Thermal Reactor ceased operation at the end of March 2003. The decommissioning plan was applied in November 2006, and approval was granted in February 2008. The Fugen Decommissioning Engineering Center was established for decommissioning work. Spent fuel is being transferred to the Tokai Reprocessing Plant, which is part of the Nuclear Fuel Cycle Engineering Laboratories at JAEA's Tokai Research and Development Center. Decommissioning will be completed by fiscal year 2033.

Chubu Electric Power Company's Hamaoka Units 1 and 2 ceased operation in January 2009. The decommissioning plan which set out both the basic decommissioning policy for units 1 and 2 and the activities in the first stage (dismantling preparation phase), was approved in November 2009. During the initial dismantling preparation phase, shipping of spent fuel, survey and investigation of contamination, decontamination of systems and dismantling of systems and equipment outside the reactor will be carried out. Decommissioning is expected to be completed in FY2036.

JAPCO's Tsuruga Unit 1 ceased operation in April 2015 and the decommissioning plan was approved in April 2017. Decommissioning is expected to be completed in FY2039.

Kansai Electric Power Company's Mihama Units 1 and 2 ceased operation in April 2015 and the decommissioning plan was approved in April 2017. Decommissioning is expected to be completed in FY2045.

Kyushu Electric Power Company's Genkai Units 1 ceased operation in April 2015 and the decommissioning plan was approved in April 2017. Decommissioning is expected to be completed in FY2043.

Chugoku Electric Power Company's Shimane Units 1 ceased operation in April 2015 and the decommissioning plan was approved in April 2017. Decommissioning is expected to be completed in FY2045.

TEPCO has decided to decommission Fukushima Daiichi units 5 and 6, as well as units 1 to 4, which severely damaged by the accident in March 2011. These six units are in a state of permanent shutdown prior to decommissioning stage.

Shikoku Electric Power Company decided to decommission Ikata unit 1, and ceased operation in April 2016. The decommissioning plan was applied in December 2016, and approved in June 2017.

D-5-2 Research reactors

A total of 10 research reactors are in the process of being decommissioned:

- the JAEA's JRR-2, JRR-4, TRACY;
- Reactor Facilities of the Nuclear Ship Mutsu;
- Deuterium Criticality Assembly (DCA);
- Hitachi Ltd.'s Hitachi Training Reactor (HTR);
- Toshiba Corporation's Training Reactor-1 (TTR-1);
- the Rikkyo University Institute for Atomic Energy (RUR);
- the Tokyo City University (formerly the Musashi Institute of Technology) Research Reactor (MITRR);
- the University of Tokyo Research Reactor (Yayoi).

In addition, in June 2017, the NRA has approved the application for decommissioning plan of JAEA's JRR-4 and Nuclear Science Research Institute's TRACY. Japanese government decided to decommission Monju FBR in December 2016 although the decommissioning plan has not been applied. JAEA also has applied Decommissioning Plan for Tokai reprocessing facilities to the NRA in June 2016.

Section E Legislative and Regulatory System

Article 18 Implementing Measures

Each Contracting Party shall take, within the framework of its national law, the legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under this Convention.

E-1 Implementing Measures

In Japan's legal system relating to nuclear 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 regulations, and the Act for Establishment of the Nuclear Regulation Authority, which prescribes the competence of the regulatory authority, were enacted under this Act.

As an act to enhance management of spent fuel and radioactive waste, by taking measures to achieve steady reprocessing and organizing the business environment for nuclear power generation, Japan has implemented the Spent Nuclear Fuel Reprocessing Implementation Act. Meanwhile, the Final Disposal Act is applicable to taking necessary steps to systematically and securely carry out the final disposal of radioactive waste to be geologically disposed, such as vitrified waste of HLW generated from reprocessing of spent fuel.

Other necessary legislation has been put in place such as the Act on Special Measures Concerning Nuclear Emergency Preparedness which stipulates responses to nuclear disasters.

The NRA subsequently compiled an NRA Ordinances, detailing regulatory requirements for implementing nuclear regulations. The Reactor Regulation Act prescribes such procedures as the permits, approvals, and inspections required for construction and operation of nuclear power reactor etc. The Reactor Regulation Act clearly stipulates the NRA's authority to revoke permits and suspend the operation of facilities, and impose penalties for violations of its provisions.

E-2 Legislation in Japan

Article 19 Legislative and Regulatory Framework

1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.
2. This legislative and regulatory framework shall provide for:

(i) the establishment of applicable national safety requirements and regulations for radiation safety;

(ii) a system of licensing for spent fuel and radioactive waste management activities;

(iii) a system of prohibition for the operation of a spent fuel or radioactive waste management facility without a license;

(iv) a system of appropriate institutional control, regulatory inspection and documentation and reporting;

(v) the enforcement of applicable regulations and of the terms of the licenses;

(vi) a clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and radioactive waste management.

3. When considering whether to regulate radioactive materials as radioactive waste, Contracting Parties shall take due account of the objectives of this Convention.

E-2-1 The Atomic Energy Basic Act

The Atomic Energy Basic Act promulgated in 1955 forms the basis of nuclear energy use in Japan. The objective of the Act is to secure future energy sources and promoting academic and industrial development, thereby contributing to the welfare of mankind and the enhancing quality of life.

The Act specifically limits the research, development and use of nuclear energy to peaceful purposes, prioritizes safety, ensures it is performed autonomously under democratic management, and fruit shall be made public and contribute to international cooperation. Moreover, the Act stipulates that the Atomic Energy Commission of Japan shall be established to ensure the democratic implementation of nuclear energy policy. Construction of reactors and the use of nuclear fuel materials will be governed by regulations stipulated in the Reactor Regulation Act.

After the Fukushima Daiichi NPS accident, Atomic Energy Basic Act was amended in September 2012. Regarding ensuring safety, contribute to protect lives, health, and

wealth of nationals, preservation of the environment and national security was added as an objective of this act by this amendment. Furthermore, new provisions concerning the establishment of the NRA and the Nuclear Emergency Preparedness Commission were added. And a provision concerning the establishment of the Nuclear Safety Commission of Japan, which was abolished upon the establishment of the NRA, was deleted.

E-2-2 The Reactor Regulation Act

The Reactor Regulation Act stipulated in 1957 provides regulation for all aspects of nuclear use in Japan.

By the revision of the Act in September 2012, the provision for prevention for the release of abnormal level of radioactive material by severe accident, regulation which considers the occurrence of large-scale natural disasters and the criminal acts including terrorist activities as well as safety objectives of Atomic Energy Basic Act were added.

The objective of the Act was as follows.
Under the spirit of the Atomic Energy Basic Act, this act aims to achieve protection of lives, health and wealth, preservation of the environment, and contribution to national security by; ensuring that nuclear use shall be limited to peaceful purpose; implementing regulation for nuclear energy use considering large scale natural disaster or criminal acts including terrorism to prevent nuclear disaster including abnormal release of radioactive material caused by severe accident, or to protect nuclear material; implementing regulation for nuclear material use to implement research use of nuclear material, and international commitments.

In this revision, severe accident measures have been added to the regulation on nuclear power reactors, fuel processing and reprocessing. Periodic Assessment of Safety Improvement, which is the comprehensive safety assessment periodically conducted by licensees, is introduced. Licensees are obliged to submit the result of Periodic Assessment of Safety Improvement to the NRA and make it public available.

In addition, "back-fitting" system has been also introduced, which requires a nuclear facility to meet the latest regulatory requirement retroactively even if it were already permitted or approved.

The Reactor Regulation Act stipulates procedures such as permission of business, approval of facility design and construction, regulatory inspections, approval of Operational Safety Program, decommissioning, and criteria for permission or approval, and obligations such as complying to the regulatory requirements, as regulations for spent fuel storage, reprocessing, and radioactive waste management.
Radioactive waste management has been categorized into three categories; Cat- 1 Waste Disposal, the Cat- 2 Waste Disposal and Waste Interim Storage. (Figure E2-1, Figure E2-2).

The Act also prescribes administrative penalties such as suspension of operations, revocation of permits, and criminal penalties such as imprisonment or a fine, in case that an operator fail to comply with the provisions of this Act.
Furthermore, this Act has provision on whistle-blowing which allows that an employee of licensee or any other person reports licensee's unlawful act to NRA without suffering any disadvantage.

The Reactor Regulation Act stipulates that it can be only partially applied when appropriate safety measures have been taken to ensure operational safety activities in regard to the facility which occurred the nuclear disaster.
Accordingly, the NRA Ordinance Concerning the Operational Safety of Reactor Facilities at the Tokyo Electric Power Company's Fukushima Daiichi NPS and the Protection of Specified Nuclear Fuel Material has been enacted. This prescribes the steps to be taken to ensure safety at the Fukushima Daiichi NPS, where the situation differs from that at other reactor facilities.

Figure E2-1 Radioactive Waste Management prescribed in the Reactor Regulation Act Article 51(2)

Category	Radioactive Waste Management					
	The Cat- 1 Waste Disposal	The Cat- 2 Waste Disposal			Waste Interim Storage / treatment	
Name	N/A*1	Intermediate Depth Disposal	Pit Disposal	Trench Disposal	Storage	Treatment
Contents	Final disposal by a method on the burial of radioactive waste in the excess of criteria defined by Order*2 as they have potential significant risks to human health.	Final disposal by a method on the burial of radioactive waste*4 at a depth of 50m and up from ground, and not exceeding criteria defined by Order*2.	Final disposal by a method on the burial of radioactive waste*5 above ground or less than 50m from ground, and not exceeding criteria defined by the rule*3 (limited to methods either to fix radioactive waste at waste disposal site with the engineered barrier structure or fix integrally radioactive waste at waste disposal site without the engineered barrier site)	Final disposal by a method on the burial of radioactive waste*5 above ground or less than 50m from ground, and not exceeding criteria defined by the rule*3 (excluding for methods either to fix radioactive waste at waste disposal site with the engineered barrier structure or fix integrally radioactive waste at waste disposal site without the engineered barrier site)	Storage of radioactive solid waste until final disposal is performed.	Processing radioactive liquid waste or radioactive solid waste to quality suitable for final disposal.

*1 The name of "geological disposal" is not based on the Reactor Regulation Act, but often used in order to distinguish other waste.

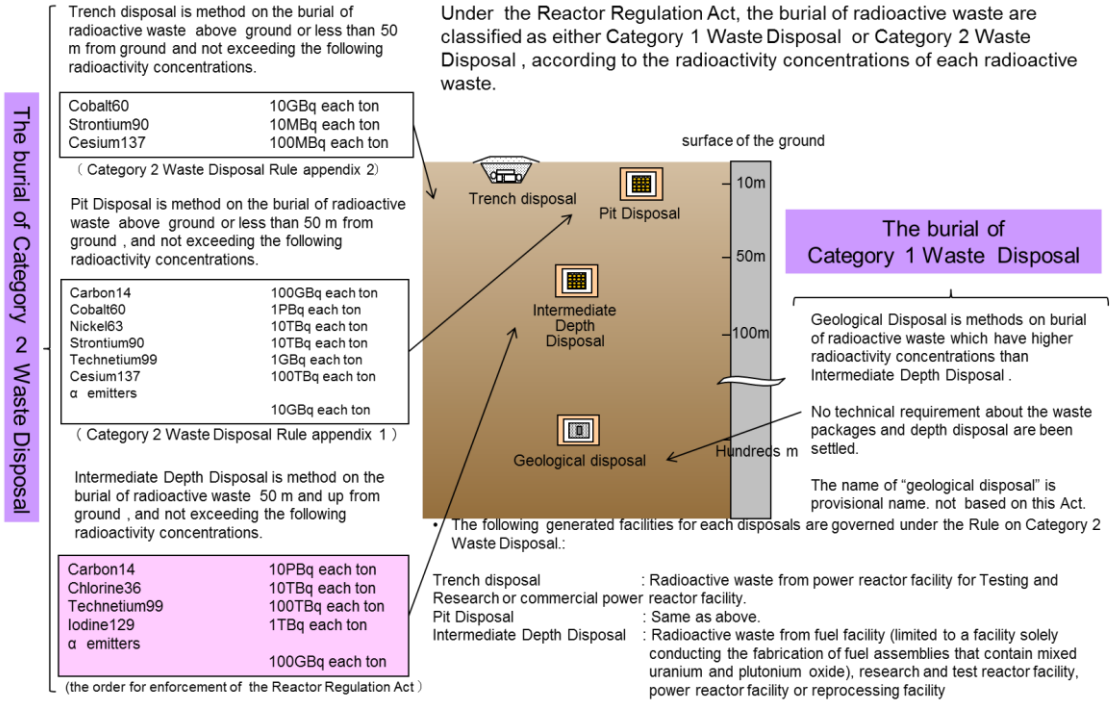
*2 The Order for Enforcement of the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors.

*3 The Rule on Category 2 Waste Disposal of Nuclear Fuel Material and Materials Contaminated with Nuclear Fuel Material.

*4 Radioactive waste from fuel facilities (limited to a facility solely conducting the fabrication of fuel that assemblies that contain mixed uranium and plutonium oxide), research and test reactor facility, power reactor facility or reprocessing facility.

*5 Radioactive waste from research and test reactor facility or power reactor facility.

Figure E2-2 Methods on the burial of radioactive waste for final disposal



E-2-3 Radiation Hazards Prevention Act

The aim of the Radiation Hazards Prevention Act is as follows: "Based on the objectives of the Atomic Energy Basic Act, this Act seeks to prevent radiation hazards and ensure public safety by regulating the use, deal, lease, storage, disposal, and other handling of radioisotopes, the use of radiation generators, or any material contaminated by radioisotopes." The Cabinet Order for Enforcement of the Radiation Hazards Prevention Act and the NRA Ordinance for enforcement thereof have been enacted under the Radiation Hazards Prevention Act. Permitted user involved in the use, storage or disposal of radioisotopes must undergo a facility inspection before use and further periodic inspections if they have larger than prescribed storage facilities or if they have a radiation generator. Before handling radioisotopes they must prepare Radiation Protection Program, appoint a Chief Engineer on Radiation Protection, and provide notification thereof. They shall comply with legal standards governing the use of facilities, measure doses within and at the boundary of their establishment as well as measuring the exposure dose of radiation workers, conduct education and training, and provide health examinations. When disposing of radioisotopes from an establishment handling radioisotopes or of items contaminated by such isotopes, users shall ensure that storage within the establishment in question or at the business

establishment of a storage and disposal contractor complies with legal standards.
If necessary, NRA radiation inspectors conduct on-the-spot inspections to check legal compliance standards. Users must notify the NRA when they cease to use radioisotopes or radiation generators and report any necessary subsequent measures.

E-2-4 Revision of the Reactor Regulation Act, Radiation Hazards Prevention Act and the Act on Technical Standards for Prevention of Radiation Hazards

After the Fukushima Daiichi nuclear accident, NRA newly established the regulatory requirements including severe accident measures. Those requirements are entering into force and conformity reviews to confirm compliance to those regulatory requirements are progressing. On the other hand, improvement of operation stage regulation such as inspection and improvement of regulation for radioisotopes are considered as future challenges.

These issues are identified as necessary or desirable improvements in the report of IRRS review mission[2]. It is necessary to perform effective regulatory improvements for ensuring higher level of safety in nuclear energy use as well as to establish effective organizational structure of NRA to perform those improvements.

Under such circumstances, the bill to amend the Reactor Regulation Act which realizes NRA's regulatory improvements was submitted to the National Diet. This bill was approved by the National Diet and promulgated in April 2017. Major points of this amendment are as follows.

E-2-4-1 Revision overview of the Reactor Regulation Act

a Revision of inspection system

Currently, inspections of nuclear facilities are subdivided and fragmented by various subjects, and remain at the level of pointing out the suitability of each result.

The improvement aims to establish effective inspection which is able to focus on concerned issue while it covers all of licensee's safety related activities, and thus achieving safety enhancement. Concrete idea is that licensees are obliged to maintain

[2] The report was disclosed by NRA in April 2016. https://www.nsr.go.jp/data/000148261.pdf

conformity to the regulatory requirements and to conduct assessment by themselves, the NRA is able to inspect the operational safety activities of licensees at any moment.

Furthermore, based on the result of the inspection, the NRA evaluates the level of safety activities comprehensively and reflects each result of evaluation on next inspection. Accordingly, it encourages the licensees to maintain and improve the safety level on their own initiative.

b Requirement for establishing and publishing implementing policy on decommissioning at earlier stage

Licensees shall establish and publish implementing policy on decommissioning which includes dismantle of facilities and dispose of radioactive waste, prior to the operation. The policy should include and establish the estimate of the amount of waste generated by dismantling facilities, the estimate for cost and sources and methods of raising funds, and any other necessary matter.

c Revision of regulatory system for intermediate depth disposal/geological disposal of Waste of reactor core structures etc.

New provisions are developed for regulation in conjunction with the backfilling of the tunnel of waste Disposal Site, and restrict activities such as excavation at intermediate depth disposal and geological disposal .

E-2-4-2 Revision overview of Radiation Hazards Prevention Act

a New requirements for security (counter-terror) measures for Radioisotope

The licensees that handle hazardous radioisotopes designated by international standards are obliged to establish protective measures. Concretely, requirements for counter-terror measures such as installation of surveillance cameras, stationing of security guards, assignment of full-time supervisors, have been strengthened.

b Special provisions on disposal of radioactive isotope

Radioactive waste which is regulated by Radiation Hazards Prevention Act can be treated as radioactive waste under regulation of Reactor Regulation Act when disposal of concerned radioactive waste is confided to the licensee permitted by Reactor Regulation Act.

E-2-4-3 Revision overview of The Act on Technical Standards for Prevention of Radiation Hazards

Reflecting international standards to domestic laws and regulations smoothly, this amendment adds functions to Radiation Council on conducting studies and submitting opinions on its own initiative, as enhanced affairs under the jurisdiction.

E-2-5 The Act on Special Measures Concerning Nuclear Emergency Preparedness (Nuclear Emergency Act)

This Act promulgated in 1999 to protect lives, health and wealth of general public against nuclear disaster by strengthen countermeasures for nuclear disaster considering provisions in Reactor Regulation Act, Basic Act on Disaster Management, or other Acts relevant to prevention of nuclear disaster. To this end, Nuclear Emergency Act stipulates responsibility of licensee, issuing Declaration of Emergency, establishment of Nuclear Emergency Response Headquarters, implementation of emergency response measures or other measures relevant to nuclear disaster, in light of the specific nature of nuclear disasters. It stipulates that the government take requisite emergency response measures, prevention and post-accident steps in such a disaster.

Following the TEPCO's Fukushima Daiichi NPS accident, the Nuclear Emergency Act was amended on September 19, 2012, including the enhancement of measures to prevent nuclear emergency, and the strengthening of the of the Nuclear Emergency Response Headquarters and other bodies.

E-2-6 Spent Nuclear Fuel Reprocessing Implementation Act.

To establish a scheme for the steady and efficient reprocessing of spent fuel, in accordance with the Government's policy, while the environment surrounding nuclear power business is undergoing change, Japan has amended the Spent Nuclear Fuel Reprocessing Fund Act. The bill establishes a scheme for securing funds related to reprocessing spent fuel, as well as an implementation body to be responsible for

reprocessing, and authorized by the Minister of Economy, Trade and Industry. The bill came into force on October 1st, 2016.

E-2-7 Final Disposal Act

The Final Disposal Act enacted in May 2000 provides for the following basic framework for systematically and securely carrying out the final disposal of high level radioactive wastes generated from spent fuel reprocessing (hereinafter referred to as “Designated Radioactive Wastes");

- development and public announcement of a basic policy and a plan (final disposal plan) for the final disposal of designated radioactive wastes by the Minister of METI
- process for site selection for final disposal of designated radioactive wastes
- securing of the expenses required for final disposal of designated radioactive wastes
- implementing organization for final disposal of designated radioactive wastes.

The amendment of the Act in June 2007 newly added TRU wastes to be the subjects of geological disposal. The Minister of METI establishes the basic policy and based on this, provides for the final disposal plan. NUMO, which was established as an implementing organization based on the final disposal plan, carries out final disposal activities. Utilities shall pay deposits to the fund reserved for disposal, which is managed by RWMC designated by the Minister of METI. NUMO promotes site selection by a three-step procedure, that is, selection of the preliminary investigation area, detailed investigation area and the construction site for final disposal facility; NUMO obtains approval of the Minister of METI at each step. The three-step procedure for site selection is clearly defined.

E-2-8 Medical Care Act

The Medical Care Act has aimed to contribute for maintaining the public health and to protect the person who receives the medical treatment of good quality by providing regulatory requirements to the establishment and the management of hospitals and medical offices. When the radioisotope for medical use is used in hospitals or medical offices, the notification to the prefectural governor, the usage in the room which complies to the regulation, the disposal in the waste disposal facilities which complies

to the standards are obliged. Moreover, the manager of the hospital or the medical offices is required to have the disposal facility that complies to the standards, and be able to consign the radioisotope to the contractor who is designated by the Minister of Health, Labour and welfare. In the designation, the Ministry of Health, Labour and welfare requires the periodic inspection, establishing the Radiation Hazards Prevention Program, notification of the terminating the waste management business, based on the Radiation Hazards Prevention Act.

E-2-9 Act on Clinical Laboratory Technicians.

In the Act on Clinical Laboratory Technicians, the registration standard of the Clinical Laboratory where the *in-vitro* examination is conducted is provided. For the usage of radioisotope for the *in-vitro* examination in the clinical laboratory, notification to the prefectural governor, the usage in the room which complies to the regulation, the disposal of radioisotope in the waste disposal facilities which complies to the standards are obliged. Moreover, the manager of Clinical Laboratory can consign the radioisotope to the contractor who is designated by the Minister of Health, Labour and welfare.

E-2-10 The Act on Securing Quality, Efficacy and Safety of Products including Pharmaceuticals and Medical Devices (Pharmaceuticals and Medical Devices Act)

As the safety requirements for manufacturing radioactive medicine, the rule for manufacturing and handling of radioactive medicine and the rule of pharmacy facilities, based on the Pharmaceuticals and Medical Devices Act are provided.

E-3 Regulatory body

Article 20 Regulatory Body

1. Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.
2. Each Contracting Party, in accordance with its legislative and regulatory framework, shall take the appropriate steps to ensure the effective independence of the regulatory functions from other functions where organizations are involved in both spent fuel or radioactive waste management and in their regulation.

E-3-1 Organization, authority, and responsibilities

The NRA is an organization for nuclear regulation in Japan. The mission of NRA is "To protect the general public and the environment through rigorous and reliable regulations of nuclear activities". The NRA Secretariat deals with related administrative matters.

The NRA was 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, in accordance with the provisions of the Act for Establishment of the Nuclear Regulation Authority, which aims for an independent, fair and neutral exercise of authority.

The term of office of the Chairman and Commissioners is five years, and reappointment is possible.

The NRA has to submit an annual report which contains status of execution of its duty to the National Diet via the Prime Minister, pursuant to the Act for Establishment of NRA. The appointment and dismissal of the NRA Secretariat personnel is at the discretion of the NRA Chairman.

The duty of the NRA is ensuring safety of nuclear energy use. The NRA can establish NRA Ordinances in order to implement laws and cabinet orders under its jurisdiction, and it has the legal authority to grant permission for the establishment of reactor facilities, for activities such as spent fuel storage or waste disposal, or other nuclear related activities.

The NRA can formulate NRA Ordinances governing nuclear regulations, including measures to ensure operational safety and the protection of specified nuclear fuel material, safety regulations, and emergency measures.

The NRA approves the design and construction of facilities, inspections, approval of Operational Safety Programs and decommissioning plans. In addition, it collects licensee reports of nuclear facilities and conducts on-the-spot inspections, if necessary.

NRA also has the authority to revoke permits of nuclear facilities or suspend their operations, to order additional safety measures, the dismissal of chief reactor engineers, decommissioning measures and other steps to prevent disasters

In March 2014, the NRA merged Japan Nuclear Energy Safety Organization (JNES) based on the thoughts that increasing its technical expertise is vital to strengthen NRA's function. Accordingly, at the end of March 2014, the NRA Secretariat had approximately 1,000 personnel, including the Operational Safety Inspectors and Nuclear Emergency Preparedness Officers stationed at nuclear sites.

There were some fluctuations in the number of staff because of the integration of function for Nuclear Disaster Preparedness into Cabinet Office.
The size of NRA staff is 1,005 as of 1 July 2017.

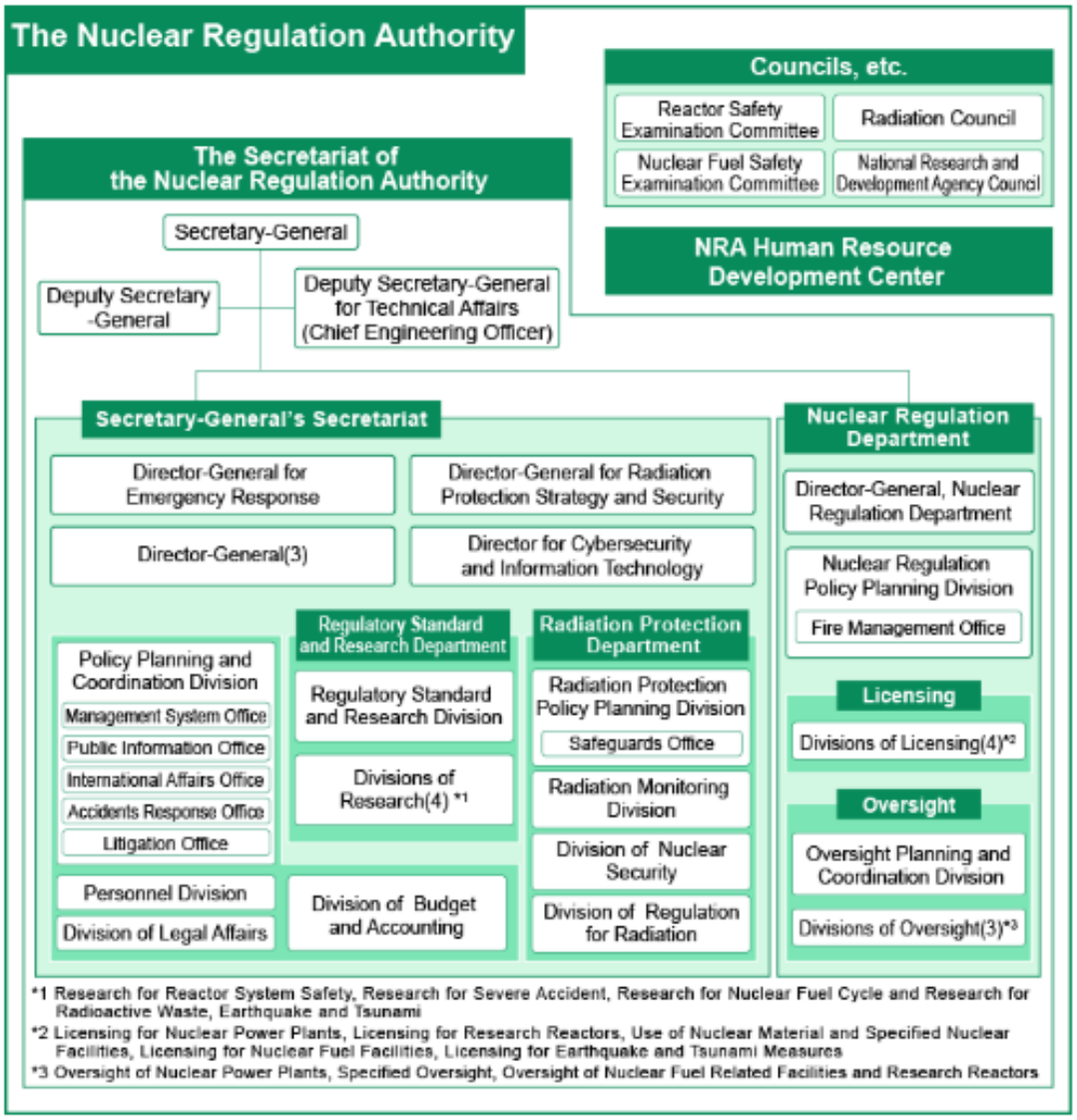
The NRA has the following committees and council under its auspices in accordance with the Act for Establishment of the Nuclear Regulation Authority.
They are the Reactor Safety Examination Committee, which investigates the safety of nuclear reactors, the Nuclear Fuel Safety Examination Committee, which investigates the safety of nuclear fuel material, and the Radiation Council, which examines the technical standards for the prevention of radiation damage.

The Secretariat of NRA consists of the Secretary-General's Secretariat and nuclear regulation departments:

- Secretary-General's Secretariat comprises:
  - the Policy Planning and Coordination Division, Personnel Division, Counsellor for Budget and Accounting, Division of Legal Affairs, Counsellor for Information and Cyber Security ;
  - the Regulatory Standard and Research Department which formulates standards ; conducts researches nuclear safety technology (for System Safety; Severe Accident; Nuclear Fuel Cycle and Radioactive Waste; and Earthquake and Tsunami);
  - the Radiation Protection Department: responsible for developing emergency preparedness systems; and physical protection of nuclear material; the Radiation Monitoring Division, which compiles summaries of nation-wide radiation monitoring; Division of Regulation for Radiation, which implements regulations on the use of radioisotopes and safeguards based on international commitments.
- And the Nuclear Regulation Department comprises:

Policy Planning Division; Licensing Group which provides licensing for power plants, research reactors, nuclear fuel facilities etc., earthquakes and tsunamis; and Oversight Group which provides oversight for power plants, specified oversight, and oversight for nuclear fuel related facilities and research reactors.

There are Nuclear Regulation Offices at 22 sites, with Operational Safety Inspectors and Nuclear Emergency Preparedness Officers permanently stationed at those offices.



E-3-2 Regulatory resources

E-3-2-1 Financial Resources

Financial resource for all NRA activities is defrayed out of the National Treasury. The NRA's draft budget is submitted to the Ministry of Finance and NRA is funded by the national budget after being reviewed by the appropriate financial authorities and are determined based on the overall national financial situation. The total budget of NRA in FY2017 is 56.2 billion yen.

E-3-2-2 Human Resources

a Human resource in the NRA

The NRA is composed of Chairman and 4 Commissioners who are appointed by the Prime Minister, with the NRA Secretariat which deals with related administrative matters.

The NRA accepted personnel mainly from the part of Nuclear and Industrial Safety Agency (NISA), Nuclear safety commission, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and Atomic Energy Commission, and was established in September 2012.

In April 2013, the NRA accepted the personnel from MEXT in association with the integration of Safeguard and Radiation Protection functions. In March 2014, the JNES, a technical support organization, was also merged into the NRA.

And the NRA has been securing personnel with new graduates and other various specialties, by recruiting personnel with experience in industries or research institutes. It is important that NRA maintains certain level of quality and quantity of human resources, and improves technical expertise continuously to achieve independent scientific and technical decision making without depending on licensees' knowledge and experience.

Based on the recognition above, the NRA has formulated a Basic Policy for Human resource development in July 2014 which clarifies the fundamental principles and outline of the policy for human resource development.

In this policy, the NRA is required to,

1) assign adequate resource for study and training
2) associate human resource management with challenges or strategic importance for future organization
3) encourage that the spontaneous desire of personnel to learn can be increased.

b Human resource development in the NRA

As the nuclear regulation is one of the governmental administration field which requires highly technical judgment such as reactor engineering, assessment of

countermeasure for earthquake and tsunami, radiation protection, probabilistic risk assessment, it is essential to secure the human resource with required expertise and scale, and it is also essential to enhance the expertise of personnel continuously.

Therefore, the NRA have been utilizing the NRA Human Resource Development Center (hereafter "HRDC"), which established in March 2014 in order to strengthen the human resource development function toward the enhancement of the expertise of personnel, and have been developing human resource in a planned manner by offering the various training program.
Specifically,

- Specialized training in regard to the nuclear regulation to the "Operational Safety Inspectors" and "nuclear emergency preparedness officers" who required to be legally qualified.
- Practical training using real-scale equipment/facility and simulator, and training using plant simulator for enhancing response capability against severe accident
- Short-term overseas training to improve not only expertise but also internationality as well as training to improve language skill such as oral communication in English

The NRA established "The basic policy on human development for the Nuclear Regulation Authority" in order to clarify the basic concept for human resource development of the personnel and to clarify the outline of measures for human resource development on 25th June 2014.

Based on this policy, the NRA have been promoting measures in human resource development with the HRDC as the driving force, by establishing the process for systematizing training which contribute to the improvement of expertise of NRA personnel and for promoting technology transfer and knowledge management.

And the NRA sent the personnel to the foreign postgraduate research institute and diplomatic establishments abroad (Embassy of Japan, in the United Kingdom) since FY2016, in addition to professional graduate school and international organization.

Furthermore, the NRA has employed 185 experienced and 93 new graduates since its establishment, and has been promoting the measures to secure the personnel by diversifying the recruit for new graduates and by recruiting personnel with experience

in industries or research institute.

E-3-3 Ensuring Transparency and Openness

E-3-3-1 Ensuring Transparency

The NRA established “the Policy for Ensuring Transparency for NRA’s business” in order to disclose the process of decision making and contents of discussion. It contains following principles; 1) establishing system to access regulatory information without official request of disclosure based on the provision of Act on Access to Information Held by Administrative Organs.; 2) open discussion; 3) documentation. According to this policy, NRA’s Commission Meetings, Conformity Review Meetings, and Study Team Meetings, as well as documents and record of these meetings are open to public.

If a meeting in conjunction with regulation is held by three or more Commissioners participation, or a meeting with commissioner or personnel of NRA and the licensees is held, the NRA develops and discloses document describing an outline of the discussion at the meeting, including the materials used in the meeting, and the name of Participants.

The NRA meetings such as the regular session of NRA Commission Meeting or Study Team meetings which deal with regulatory issue are open to the public in principle, based on the NRA decision such as "the Policy for Ensuring Transparency for NRA operation" and "the Operating procedure for the NRA meeting ".

The NRA has been releasing information of the regular sessions of NRA Commission Meeting or the Study Team meetings, by live broadcasting (web casting) as possible, and recorded videos are publicly available at the internet video site such as YouTube. The total time of movies released by NRA in YouTube is more than 775 hours in FY2016.

The materials for regular sessions of NRA Commission Meeting, Conformity Review meetings or Study Team meetings are uploaded to the official NRA Website at the moment of the start of the meeting, for the audience's convenience.
Minutes are strived for uploading on the website approximately one day after the regular sessions of NRA Commission Meeting, or one week after the Study Team meetings, etc. In principle, Chairman of the NRA holds regular press conference once

a week, and Spokesperson of NRA holds twice a week, and special press conference if required.

The press conferences are also broadcasted (live or recorded), and the minutes are strived for uploading the same day for Chairman's press conference, the next day for Spokesperson, on the website.

E-3-3-2 Ensuring Openness

One of the NRA's core value and principles refers to "We shall be open to all opinions and advice from Japan and the international community and avoid both self-isolation and self-righteousness".

Following this principle, the NRA, which is responsible for regulatory issues, has been inviting the external experts as the member of Study Team and utilizing their knowledge, and has been conducted hearing from the licensees in a positive manner. The NRA exchanged ideas with the members of "The government's and the Diet's Investigation Committee on the Accidents" and members who engage in NPO activities in September 2012, with international advisors invited by NRA in December 2012 on NRA's effort, which aimed to obtain feedback widely from domestic and foreign experts. The NRA has continuously exchanged opinion with external experts.

As for meetings with related specialists or licensees, the NRA conducted them in a positive manner under the condition of disseminating information and ensuring transparency, regarding that higher communication density contributes to acquire domestic and international knowledge, promotes understanding of regulation and building relationship for prompt emergency response.

Furthermore, the NRA solicited opinions from the Japanese National widely and positively not only by the public comment stipulated in the Administrative Procedure Act, when the NRA establish the document for New Regulatory Requirements, Nuclear Emergency Response Guideline, Conformity Review Guide or the document for Nuclear Disaster Preparedness.

For example, with regard to the new Regulatory Requirements, the NRA conducts public consultation on the draft prior to conducting the hearing on the provisions

pursuant to the Act on Administrative Proceedings, and provided the people more opportunities for offering opinions.

The NRA also has organized system via internet and telephone for accepting questions and opinions constantly from people by opening its website and call center.

E-3-4 Ensuring NRA independence

The Act for Establishment of the Nuclear Regulation Authority provides for the exercise of authority by NRA's Chairman and Commissioners should be independent, fair and neutral based on their expert knowledge.

As for organizational relationship with the authority for nuclear power utilization, the NRA has been established as an external organization of the Ministry of the Environment with a high degree of independence based on the National Government Organization Act. Therefore, the NRA is organizationally independent from promoting authority.

The Chairman and Commissioners of the NRA are appointed by the Prime Minister with the consent of the National Diet, and dismissal of member (s) also requires the Prime Minister to obtain the consent of the National Diet after consulting with the NRA.

And the Chairman appoints the NRA Secretariat staff, therefore, promoting authorities have no interaction in the appointment or dismissal of staff.

The NRA's budget for its activities is funded from the national budget. The Minister of the Environment as the competent minister of the NRA, submits the draft budget to the Minister of Finance, however, the actual estimates are performed by the Secretariat of the NRA, and are determined based on the overall national financial condition by the financial ministry which are ensured to be effectively independent. There is no financial involvement by other promoting authorities.

The NRA has a clear mandate. It engages in independent regulatory decision-making stipulated in the Reactor Regulation Act in such areas as permits, approvals, and inspections.

Supplementary Provisions of the Act for Establishment of the Nuclear Regulation Authority regulates reassignment of personnel who belong to the Secretariat of the NRA from the perspective of ensuring independence and neutrality of regulation. It is so called "No-Return-Rule" which rejects reassignment of the personnel to government organization tasked with promoting nuclear use, after 5-year transitional arrangement from the enforcement of the Act.

The NRA designated the concrete departments of ministries and agencies, to clarify operation of "No-Return-Rule" in 2015.

E-4 Ministry of Health, Labour and Welfare (MHLW)

The Ministry of Health, Labour and Welfare is responsible for the safety regulation of radioactive medical products, and the regulation related to the radioactive protection at the clinical laboratory.

The pharmaceutical safety and environmental health bureau is responsible for the safety regulatory requirements of manufacturing radioactive medicine, in accordance with the rule of manufacturing and handling, and rule of pharmacy based on the Pharmaceuticals and Medical Devices Act. And the Pharmaceuticals and Medical Devices Agency conducts periodical inspections of manufacturing facilities of radioactive medicines.

The pharmaceutical safety and environmental health bureau is also regulating safety concerning the consignment of the disposal of radioactive medicines.

The health policy bureau is responsible for the regulation for the radiation protection in the medical facilities equipped with radioisotopes for medical use based on the Medical Care Act and the relevant Ordinance for Enforcement, and also responsible for the regulation related to the radiation protection at the clinical laboratory equipped with the radioisotope for the *in-vitro* examination based on the Act on Clinical Laboratory Technicians and the relevant Ordinance for Enforcement.

Section F Other General Safety Provisions

Article 21

1. Each Contracting Party shall ensure that prime responsibility for the safety of spent fuel or radioactive waste management rests with the holder of the relevant license and shall take the appropriate steps to ensure that each such license holder meets its responsibility.
2. If there is no such license holder or other responsible party, the responsibility rests with the Contracting Party which has jurisdiction over the spent fuel or over the radioactive waste.

F-1 Responsibility of the license holder

F-1-1 Primal obligation for safety

The Atomic Energy Basic Act establishes the most basic policy concerning the nuclear energy use in Japan. This Act stipulates that “the research, development and use 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."

The Reactor Regulation Act explicitly states the legal responsibilities of licensees, stipulating that they shall be responsible for installing equipment 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 material or reactors, while taking into account the latest knowledge on safety at nuclear facilities."

Furthermore, supplementary provisions of the Act for Establishment of the Nuclear Regulation Authority stipulates that nuclear licensees shall be deeply aware that they have the primary responsibility for ensuring the safety of their nuclear facilities and settling any accident, and shall endeavor to further formulate voluntary measures with the aim of developing a system for thorough crisis management for each of their nuclear facilities in order to prevent the occurrence of an accident at said facilities and

the expansion of disasters in the event of an accident, in addition to the measures that are required under the Reactor Regulation Act and the provisions of other laws and regulations.

F-1-2 Measures to fulfill obligation of licensees

The regulations based on the Reactor Regulation Act prescribe the measures that licensees shall take to ensure operational safety, specifically measures concerning the operation and maintenance of facilities, and measures relating to transport, storage, and disposal. These measures are detailed in the NRA Ordinance pursuant to the Reactor Regulation Act.

In addition to establishing Operational Safety Programs and obtaining NRA approval, licensees shall also undergo Operational Safety Inspections. Licensees are requested to disclose any non-compliance events which do not satisfy requirements for individual activity, by the provision of plant specific Operational Safety Program. This prevents concealment of non-compliance event by licensees.

Licensees are subject to penalties in the event of failure to meet their statutory responsibilities; this can be cited as an institutional mechanism for ensuring that licensees fulfill their responsibilities. For example, in the event that a nuclear power reactor facility does not meet the technical standards prescribed by law or that its operation contravenes regulatory requirements, the NRA may require the licensee to adopt an operation method of the NRA's designation or order it to take any other measures deemed necessary, pursuant to the provisions of the Act.

If the licensee of reactor operations violates this order, the NRA may revoke its permission or order it to suspend operation of the facility for a specified period not exceeding one year.

In the event that an operator establishes a nuclear reactor without permission, it shall be sentenced to imprisonment and/or a fine, pursuant to the provisions of the Act. The same shall apply if the licensee fails to obtain approval for its Operational Safety Programs or amends them without approval, or if a licensee and/or its employee fails to comply with those Operational Safety Programs.

F-1-3 Steps in the event that there is no licensee or other responsible party

In the event of revocation of a license, if there is no successor to the operator through merger or inheritance stipulated by the Act, the current license holder shall continue to be regarded as the license holder and responsible for “record keeping," "protective measures," "Operational Safety Program," and “physical protection” as prescribed in the Reactor Regulation Act, and shall be subject to regulation.

In the event of the dissolution of the license holder, if there is no succession to the status of the operator through merger or inheritance stipulated by the Reactor Regulation Act, the liquidator or bankruptcy administrator shall be regarded as the license holder and responsible for “record keeping," "protective measures," "Operational Safety Program," and “physical protection” as prescribed in the Reactor Regulation Act, and shall be subject to regulation. In addition, the above-mentioned persons shall develop a decommissioning plan, have it approved by the NRA, carry out decommissioning, and obtain confirmation of the completion of decommissioning from the NRA.

The Radiation Hazards Prevention Act provides for situations in which the storage and disposal contractor licensed under said Act has been dissolved. In the event of succession of the business in this situation, the Act prescribes that once approval has been granted for the merger, the surviving corporation shall succeed to the status of the operator. If there is no succession of the business, the liquidator shall take appropriate measures for decommissioning, such as removal of contamination by radioisotopes.
As described above, provisions are in place to ensure that business succession does not create a situation in which no licensee exists and that the business in question is terminated if there is no business succession.

F-2 Human and Financial Resources

Article 22

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

(i) Qualified staff are available as needed for safety-related activities during the operating lifetime of a spent fuel and a radioactive waste management facility;

(ii) Adequate financial resources are available to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning;

(iii) Financial provision is made which will enable the appropriate institutional controls and monitoring arrangements to be continued for the period deemed necessary following the closure of a disposal facility.

F-2-1 Activities to secure human resource infrastructure

F-2-1-1 Human resource development for the regulatory organization

Recognizing the importance to develop not only the NRA employees but also the human resource who has necessary knowledge and capability for nuclear safety and nuclear regulation, the NRA has conducted the Human Resources Development Project for Nuclear Regulation with universities etc., since the fiscal year of 2016.

The NRA had reviewed proposed project and adopted 13 projects in 2016, and 5 projects in 2017.
In the case that a project of the last year continues to this year, the NRA evaluates its progress and the new plan for the next year to maintain effectiveness of the project.

F-2-1-2 Regulatory requirements for the human resource of licensees

In granting the permits for businesses prescribed in the Reactor Regulation Act, the NRA checks that an applicant possesses the technical capability necessary to conduct said business. In the case of licensees of power reactor operations, fuel processing, and spent fuel reprocessing, the NRA checks that they have the technical capability to prevent and mitigate severe accident.

The Reactor Regulation Act stipulates that licensees must take the necessary steps to ensure operational safety, that they must set forth Operational Safety Programs before commencing the operation of a facility, and that they must obtain the approval of the NRA for these.

In terms of the steps that should be taken to ensure operational safety, there are regulatory requirements concerning the deployment of appropriate staff and the certification of technicians. For example, the NRA Ordinance on Commercial Reactors stipulate that only those with the requisite knowledge shall operate a power reactor; that power reactors shall only be operated when the staff adequate to operate power reactor are present; and that those with responsibility for reactor operation shall have the necessary knowledge, skills, and experience, conform to the criteria set out by the NRA, and undergo checks by the NRA, focused on the method used to determine whether or not they conform to the criteria in question. Moreover, they stipulate the checks to be carried out before the reactor is started-up, the checks required for reactor operation and the checks to be conducted after reactor shut-down, and require the operator to comply with these.

The Operational Safety Programs for example, in the NRA Ordinance on Commercial Reactors prescribe matters relating to operational safety education for those who operate and manage reactor facilities. They stipulate what should be set out in the Operational Safety Programs, including the content of operational safety education and the policy on its implementation. Moreover, the quality assurance plans in the Operational Safety Programs are required to contain human resource provisions. These stipulate that the competence required for personnel involved in duties that affect nuclear safety shall be identified, with education, training, or other measures to be implemented in the event of any shortfall in competence, and that the effectiveness of education and training shall be evaluated.

As a prerequisite for carrying out activities, licensees must appoint staff with the relevant qualifications to chief engineer posts. Licensees of power reactor operation must appoint a Chief Reactor Engineer to supervise operational safety in reactor operation; licensees of fuel processing and reprocessing shall appoint a Chief Engineer for Nuclear Fuel Material Handling to supervise operational safety in the handling of nuclear fuel materials; licensees of spent fuel storage activity must appoint a Chief Engineer for Spent Fuel Handling to supervise operational safety in the handling of

spent fuel; and licensees of waste disposal activity shall appoint a Chief Engineer for Radioactive Waste Handling to supervise operational safety in the handling of nuclear fuel materials and other radioactive waste in disposal operations.

F-2-1-3 Other human resource development

The Integrated Support Center for Nuclear Nonproliferation and Nuclear Security of the JAEA is conducting the nuclear security course with aim of fostering of nuclear security culture and understanding requirements, design and evaluation process of physical protection systems on nuclear material and facilities, for nuclear researchers/licensees those who handle radioactive waste and government stakeholders in charge of nuclear security regulations and policy in Japan and abroad. Providing this training course based on demands of regulatory body and licensees has contributed to foster nuclear security culture and building capacity.

F-2-2 Financial Resources

In the process of licensing of a nuclear facility except for nuclear fuel material use facility, the NRA confirms that the applicant possesses the necessary financial basis based on the provision of Reactor Regulation Act.

As a prerequisite for application, the applicant has to submit a business plan that explains the financial base of the business and has to certify that it possesses said necessary financial basis.

F-3 Quality assurance

Article 23

Each Contracting Party shall take the necessary steps to ensure that appropriate quality assurance programmes concerning the safety of spent fuel and radioactive waste management are established and implemented.

F-3-1 Regulatory Requirements on Quality Assurance of Nuclear facilities:

Under the Reactor Regulation Act, one of the criteria for obtaining approval of construction plans for a nuclear facility is that the licensee's quality control methods and inspection systems comply with technical standards prescribed in the NRA Ordinance.

More specifically, this ordinance requires that a quality control supervision system incorporating mechanisms for activities to foster a safety culture be established for the design and construction of nuclear 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.

Moreover, in terms of operational safety activities at nuclear facilities, licensees are required to establish 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 in accordance with the plan.

For example, systems for implementing quality assurance must be operated by the top management of licensees; have clearly identified responsibilities, authority, and duties in relation to quality assurance; and mechanisms for the formulation, implementation, evaluation, and continuous improvement of quality assurance plans.

Plans for operational safety activities are required to establish appropriate management methods in the event of external procurement of goods or services, procedures for the appropriate management of documents and records concerning

operational safety activities, and systems for education and training for those involved in operational 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 an implementation plan. To check this, licensees of reactor operation shall conduct the requisite inspections and tests, and establish an effective system to deal with any cases of noncompliance.

To evaluate operational safety activities, licensees must systematically conduct required monitoring and measuring of the current state of safety activities. Systematic auditing should be carried out to secure the implementation of appropriate safety activities and such auditing should be carried out by persons not directly involved in the items under review.

Licensees should establish procedures for ensuring the continuous improvement of operational safety activities and instituting preventive measures to avoid noncompliance that could occur or, should one occur, for introducing corrective measures to prevent a recurrence. Knowledge gained both from operational safety activities at their own power reactor facilities and from other facilities should be evaluated and, where appropriate, incorporated by licensees into their own operations.

F-3-2 Licensee's practices

Based on the private-sector quality assurance standard for ensuring safety at nuclear power stations (JEAC 4111-2009) and Technical Standards of organization for quality management methods and inspection on design and construction as requirements for nuclear reactor facilities design stage, licensees formulate quality management oversight system and conduct quality assurance activities and remain its effectiveness 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 also meeting for standards on other nuclear facilities excluding test research reactor and facilities using nuclear fuel materials. It reflects review results of the IAEA's safety standard GS-R-3 "The Management System

for Facilities and Activities" which is published in August 2006 and also reflects IAEA Safety Guide No.GS-G-3.1.

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 management," "operational control 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 necessary competence and provide further education and training to ensure personnel reach the required competence, when necessary.

Licensees should conduct procurement procedures having clearly identified the requirements for product approval procedures, processes, and equipment; personnel competence checks, and quality management systems.

Regarding procurement products, at the time of products delivery, licensees directly ensure that the suppliers satisfy the specification sheet requirements and also manufacturing process. In addition, in the case of services, the specification sheet is given to the service provider 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.

Quality assurance programs regarding reactor operation are audited. To guarantee its independence, an audit should be conducted by the person who does not involved in the operation of concerned facility or belongs to the division be able to make fair decision. In many cases, auditing department is located directly under the president in the company's organizational structure so that president can be quickly informed of any situation necessary to take corrective action or improvement.

F-4 Operational radiation protection

Article 24

1. Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility:
   (i) the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account;
   (ii) no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection; and
   (iii) measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment.
2. Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited:
   (1) to keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account; and
   (2) so that no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.
3. Each Contracting Party shall take appropriate steps to ensure that during the operating lifetime of a regulated nuclear facility, in the event that an unplanned or uncontrolled release of radioactive materials into the environment occurs, appropriate corrective measures are implemented to control the release and mitigate its effects.

F-4-1 Regulatory Requirements

Regulation on radiation control in the facilities for spent fuel interim storage, reprocessing, waste disposal and radioactive waste storage are detailed by the NRA Ordinances which established by the NRA under the Reactor Regulation Act. Requirements such as dose limits etc. are specified in the NRA Notification on Doses.

It is required that reprocessing facility shall establish Radiation Controlled Area, Preserving Area, and Surrounding Monitored Area, and facilities for spent fuel storage, waste disposal, and waste storage shall establish Radiation Controlled Area and Surrounding Monitored Area. Radiation doses, concentrations and density in

Radiation Controlled Area and dose limits outside the Surrounding Monitored Areas are specified in the NRA Notification on Doses.

Radiation controlled area must be clearly separated by a fence or wall from other areas by placing an identification sign, and is subject to measures, such as access control and lock control, depending on the risk of radiation. A Preserving Area is out of radiation controlled area that requires special control to ensure the safety of a reprocessing facility.

The area must be clearly separated from other areas by placing a sign or offering other means of identification and are subject to measures, such as access control, lock control and a restriction on objects to be brought out in accordance with the requirements.

A Surrounding Monitored Area is an area around a Radiation Controlled area, outside of which the dose limits set by the NRA are not likely to be exceeded. People are prohibited from living in this area. A fence must be placed along the boundary to restrict the entry of people other than those who enter the area to work.

For the purpose of radiation control of radiation workers, the nuclear licensees are required to ensure that the dose of radiation workers should not exceed the dose limits set by the NRA and the concentration of airborne radioactive material inhaled by radiation workers does not exceed the concentration limits set by the NRA.

If it is unavoidable due to an emergency such as damage to a nuclear facility, the licensee is allowed to engage radiation workers in emergency work within the dose limits set by the NRA. The dose limits set by the NRA are shown in the Table F4-1 below.

Table F4-1 Dose limits

Item	Dose limits
A Radiation worker	
(1) Effective dose limit	100 mSv/5 years and 50 mSv/year
(2) Women	5 mSv/3 months in addition to the limit specified in (1)
(3) Pregnant women	1 mSv for internal exposure in addition to the limit specified in (1); for the period after the employee comes to know about the pregnancy until the baby is born
(4) Equivalent dose limit for the lens of the eye	150 mSv/year
(5) Equivalent dose limit for the skin	500 mSv/year
(6) Equivalent dose limit for the surface of the abdomen of pregnant women	2 mSv; for the period after the employee comes to know about the pregnancy until the baby is born
B Radiation workers to engage in emergency work	
(1) Effective dose limit	100 mSv (250 mSv)[3]
(2) Equivalent dose limit for the lens of the eye	300 mSv
(3) Equivalent dose limit for the skin	1 Sv

F-4-2 Licensee's radiation protection program

In addition to measures required by regulation, such as compliance with the designation of radiation controlled areas and other areas and the dose limits required by regulation, licensees have detailed radiation control measures in place, such as the use of a personal dosimeter with an alarm to measure a radiation dose at each entry into a Radiation Controlled Area.

In Japan, the ALARA concept is widely accepted by licensees. Essentially, in conducting radiation works, it is understood that unnecessary exposure should be avoided. In a nuclear power plant in operation, three elements (time, distance and shielding) in reducing exposure are implemented, such as controlling access to radiation controlled areas, reducing the duration of work by performing radiation

[3] The dose rate limit in case any event described in any number of section 2, article 7th of the "Notification to Establish Dose Limits in Accordance with the Provisions of NRA Ordinance on Activity of Refining Nuclear Source or Nuclear Fuel Materials "(NRA Ordinance No.8) occurred.

work in a planned manner, ensuring the distance from radiation sources, and installing a shield. In addition, the water quality of primary cooling systems is fully controlled to suppress the generation of radioactive material by radio-activation.

Based on the Reactor Regulation Act, any nuclear licensee is required to record the dose of the radiation workers and store the records during the period required by the NRA Ordinance.

The record is transferred to the organization designated by NRA after five years from recording or concerned person is not a radiation worker anymore. The designated organization is Radiation Effect Association.

F-4-3 Efforts for dose reduction in the Fukushima Daiichi NPS

In the early stages of the disaster in the Fukushima Daiichi NPS in March 2011, the system such as that for worker access control and dose data collection and processing was damaged and electronic dosimeters and charging equipment were not available, making it difficult to fully perform individual dose control. Currently, the system is back in operation, and individual dose control has been in place and dose reduction efforts have been made.

TEPCO has made efforts to reduce the doses by providing a radiation shield for equipment which emit high dose radiation due to contamination in the site of the Fukushima Daiichi NPS, cutting trees, and performing decontamination activities such as removing surface soil and plowing to replace surface soil with subsoil.

Due to these efforts, in most of the site area of the power plant, workers can work with simple respiratory protective equipment on, such as a half-face mask or dust respirator. In dose control, significant improvements have been made to the work environment. For example, the average dose in December 2016 has been reduced to 0.38 mSv/month.

F-4-4 Release Control of Gaseous/Liquid Waste

Licensees are required to reduce the concentration of radioactive material in gaseous waste as far as possible by such means as filtration in an exhaust air system, 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, evaporation, adsorbing with the ion exchange method, radioactive decay over time, or dilution in a drainage facility, and then, they measure and monitor its release.

Licensees are required to prescribe and manage 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 supervised area shall not be exceeded.

To ensure that release levels are below the legal limits outside the Surrounding Monitored Area, licensees decide the control targets based on the annual release quantity stipulated in their Installation Permit Application. 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.

F-4-5 Environmental Radiation Monitoring

To evaluate the impact of release of radioactive material to the environment from the nuclear facility, licensees monitor air radiation dose and environmental samples with the aim of improving release control and facility management.

To protect the health and safety of public, local governments (in prefectures where reactor facilities are located) also conduct radiation monitoring in a vicinity of nuclear facility.

After the Fukushima Daiichi nuclear accident, the government developed a “Comprehensive Radiation Monitoring Plan (decided in August 2011, revised in March, April 2012, April 2013, April 2014, April 2015, April 2016 and April 2017)" governing environmental radiation monitoring work related to Fukushima Daiichi nuclear accident.

Environmental radiation monitoring is conducted collaboratively by relevant ministries and local government of Fukushima Prefecture in accordance with the Comprehensive Radiation Monitoring Plan.

Environmental radiation monitoring data are uploaded on the website of the Monitoring Information of Environmental Radioactivity Level[4] which is run by the NRA, enabling the general public to see it in real time.

In addition, as the NRA is making effort for improving transparency and credibility of sea area monitoring data, the NRA has been cooperating with IAEA Environment Laboratories from the year of 2014 in order to compare and evaluate the radioactivity monitoring data from each laboratories, cooperative team has been determined radionuclides in seawater and sediment samples obtained from the coast of TEPCO's Fukushima Daiichi NPS. According to the project report released by IAEA on July 2017, IAEA appraised that their sample collection procedures follow the appropriate methodological standards required to obtain representative samples, and Japanese laboratories which participated in the analysis of radionuclides in marine samples based on sea area monitoring programs has high level of accuracy and competence on the part of the laboratories involved in the analysis of the radionuclides in marine samples for the sea area monitoring programme.

F-4-6 Measures Taken to Prevent Unplanned and Uncontrolled Releases of Radioactive Materials into the Environment:

The above-mentioned rules prescribe that the three-month-average of concentration of radioactive materials in air outside the Surrounding Monitored Area shall not exceed the concentration limits for discharge of gaseous radioactive waste, that the three-month-average of concentration of radioactive materials in water outside the boundary of the Surrounding Monitored Area shall not exceed the concentration limits for discharge of liquid radioactive waste by a discharge facility, and that doses due to liquid discharge of radioactive waste from reprocessing facilities monitored at the outlet to the ocean shall not exceed the dose limit for three months.
The rules also stipulate that licensees shall immediately report to the NRA when any of these limits are exceeded, and report within 10 days on details of the event and corrective measures taken.

F-4-7 Measures to Mitigate the Effects of an Unplanned or Uncontrolled Release

[4] http://radioactivity.nsr.go.jp/en/

of Radioactive Materials into the Environment:

Licensees stipulate in their Operational Safety Programs the measures to be taken in the event of an emergency; these include the steps to be taken in the event of an unplanned or uncontrolled release of radioactive materials into the environment, to control the release and mitigate its effects.

For example, the Safety Examination Guide for Reprocessing Facilities, which is used in safety examination of reprocessing facilities with a large inventory of radioactive materials, stipulates that fire and explosion due to fine metal particles from fuel cladding or organic solvent, criticality accidents, leakage or loss of function due to damage or failure of equipment or piping, or spent fuel handling failure must not subject the public to the risk of excessive radiation exposure.

If an unplanned or an uncontrolled release of radioactive materials from a nuclear facility triggers a specific event prescribed in the Nuclear Emergency Act, emergency activities will be initiated according to the procedure stipulated in accordance with the Nuclear Emergency Act. If the accident is serious enough, a Declaration of Nuclear Emergency is issued and emergency measures such as evacuation will be taken.

F-5 Emergency preparedness

Article 25

1. Each Contracting Party shall ensure that before and during operation of a spent fuel or radioactive waste management facility there are appropriate on-site and, if necessary, off-site emergency plans. Such emergency plans should be tested with appropriate frequency.
2. Each Contracting Party shall take the appropriate steps for the preparation and testing of emergency plans for its territory insofar as it is likely to be affected in the event of a radiological emergency at a spent fuel or radioactive waste management facility in the vicinity of its territory.

F-5-1 Outline of the laws and regulations on nuclear emergencies

F-5-1-1 Nuclear emergency response under Nuclear Emergency Act.

a Precautionary protective measures

A nuclear licensee has the responsibility of preventing occurrence and development of a nuclear emergency and taking action for recovery from a nuclear emergency. Licensee must develop a licensee's EPR plans for each nuclear site and, prior to its development, must consult with the governor and head of the city, town or village where the nuclear facility is located, as well as to the governors of the neighboring prefectures.

After developing the plan, licensee must submit it to the Prime Minster and the NRA and disclose the summary. The Prime Minister and the NRA may order licensee to make changes to the plan if it is considered to be inadequate for prevention of occurrence or mitigation of a nuclear emergency.

Licensee must establish a nuclear emergency preparedness organization for each nuclear site, place nuclear emergency preparedness personnel, and provide an update of the status of nuclear emergency preparedness personnel to the NRA and the governor and head of the city, town or village where the nuclear facility is located, as well as to the governors of the neighboring prefectures. The NRA may order licensee to establish a nuclear emergency preparedness organization or place nuclear emergency preparedness personnel if it is considered that licensee is in violation of

this requirement.

Licensee must appoint a nuclear emergency preparedness manager for each nuclear site to manage the nuclear emergency preparedness organization and a deputy nuclear emergency preparedness manager to assist the nuclear emergency preparedness manager. After appointing the nuclear emergency preparedness manager and the deputy nuclear emergency preparedness manager, licensee must report the appointment to the NRA and the governor and head of the city, town or village where nuclear facility is located, as well as the governors of the neighboring prefectures. The NRA may order licensee to appoint or dismiss a nuclear emergency preparedness manager or a deputy nuclear emergency preparedness manager if licensee is in violation of this requirement or the nuclear emergency preparedness manager or the deputy nuclear emergency preparedness manager is in violation of this law.

Upon occurrence of an event specified in the government ordinance, the nuclear emergency preparedness manager must report it to the Prime Minister, the NRA and the governor and head of the city, town or village where the nuclear facility is located, as well as to the governors of the neighboring prefectures. This notification is commonly called Article 10 Notification because it is required by Article 10 of Nuclear Emergency Act. Events subject to Article 10 Notification is called specified events.

Licensees are required to install and maintain the necessary radiation measurement instruments to make Article 10 Notification and to have in place the necessary nuclear emergency prevention equipment for the nuclear emergency preparedness organization to perform its duties, such as radiation hazard prevention equipment and emergency communication equipment, and to inspect and maintain the equipment. Radiation measurement instruments installed by licensee are subject to inspection by the NRA. The Prime Minister or the NRA can order licensee to take necessary action if it is considered that licensee is in violation of these requirements. Licensee must keep a record of the doses detected by the installed radiation measurement instruments and disclose the record.

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

necessary documents to take emergency response actions and post-nuclear emergency actions. The documents will be available at the off-site center.

The Government's emergency exercises are conducted in accordance with the plan developed by the Prime Minister.

Licensees must conduct emergency exercises, report the results of the exercises to the NRA and disclose the summary. The NRA may order, through consultation with the Prime Minister, licensee to take action, such as improving the exercise procedures, if the exercises are considered to be inadequate for prevention or mitigation of a nuclear emergency.

Nuclear Emergency Act provides for the obligation of other licensees to strive to cooperate. Licensees must strive to cooperate in the event of a nuclear emergency in a nuclear site of other licensees by sending nuclear emergency preparedness personnel and lending nuclear emergency response equipment.

b Emergency response actions

In Japan, the Prime Minister declares a nuclear emergency situation.
If an event occurs that falls under the category of an emergency, the NRA will immediately provide the Prime Minister with an information on the status of the event, the areas where emergency response actions should be taken, a brief description of the event, a proposed announcement on what needs to be communicated to residents in the areas, and proposed instructions on emergency response actions such as evacuation and sheltering. Following this, the Prime Minister will immediately declare a nuclear emergency situation

If a nuclear emergency situation is declared, Nuclear Emergency Response Headquarters will be set up.
The Prime Minister will serve as the chief of the Nuclear Emergency Response Headquarters. The Nuclear Emergency Response Headquarters will develop a policy for the implementation of emergency response actions and provide overall coordination of the emergency response actions and the post-nuclear emergency actions. In the area where the nuclear facility is located, local nuclear emergency response headquarters to perform some of the administrative work of the Nuclear Emergency Response Headquarters will be set up within the Nuclear Emergency

Response Headquarters.
Following the declaration of a state of nuclear emergency, the emergency response headquarters of the local government (prefecture, city, town or village) will be set up in the area where the nuclear facility is located. The local nuclear emergency response headquarters and the emergency response headquarters of the local government will set up a Nuclear Emergency Joint Response Meeting to exchange information on the nuclear emergency and develop cooperation in the implementation of emergency response actions.

If a specified event occurs, the nuclear emergency preparedness manager must immediately order the nuclear emergency preparedness organization to take emergency actions to prevention or mitigation of a nuclear emergency. Licensee must report the summary of the action to the Prime Minister, the NRA, the governor and head of the city, town or village where the nuclear facility is located, as well as to the governors of the neighboring prefectures.

c Measures following the nuclear emergency

Measures following the nuclear emergency include a survey of the concentration, density and dose of radioactive material, medical procedures including a medical examination of residents and a mental and physical health consultation, public relations activities to prevent economic damage caused by rumors, and measures to prevent development of the nuclear emergency or recover from the emergency. For measures following the nuclear emergency taken by administrative agencies and local governments, licensees must take actions such as sending nuclear emergency preparedness personnel and lending nuclear emergency response equipment.

F-5-2 Basic Disaster Management Plan

The Central Disaster Management Council formulated a Basic Disaster Management Plan based on the Disaster Countermeasures Basic Act and the Nuclear Emergency Act.

The Basic Disaster Management Plan is a fundamental plan for the Government's disaster prevention measures to respond to various disasters in a comprehensive manner. In the Basic Disaster Management Plan, the section of nuclear emergency countermeasures defines basic issues on the nuclear emergency preparedness of the Government, licensees and local governments and their responsibility (sharing of

responsibility). The Guide for EPR developed by the NRA (NRA EPR Guide) applies to specialized and technical issues specific to nuclear emergencies.

Broadly speaking, the following measures are set forth in the Basic Disaster Management Plan:

- Precautionary protective measures: ensuring the safety of facilities; disseminating knowledge of disaster prevention; promoting researches on nuclear emergency prevention etc. ; implementing measures to prevent recurrence; preparing for emergency response actions and recovery from a disaster; preparing for emergency response to an accident during the transport of nuclear fuel material etc. outside a nuclear site
- Emergency response measures: collecting and communicating information immediately after the occurrence of an emergency; setting up an emergency contact system and an activity system; activities to provide protection, such as evacuation and sheltering-in-place, and information; activities to assist the life of nuclear accident sufferers; maintaining social order, including crime prevention; securing traffic for emergency transportation and conducting emergency transportation activities; rescue, first-aid, medical and fire extinguish activities; activities to procure and supply materials; activities related to health and hygiene; accepting voluntary support; emergency response to an accident during the transport of nuclear fuel material etc. outside a nuclear site; response to the complex of natural disaster and nuclear accident
- Measures to recover from a disaster: canceling the declaration of a Nuclear Emergency Situation; measures following the nuclear emergency; assisting accident sufferers in reconstructing their life etc.; abolition of the Nuclear Emergency Response Headquarters.

F-5-3 Guideline for Emergency Preparedness and Response

Under the provisions of the Nuclear Emergency Act, the NRA must develop guidelines for nuclear emergency response to ensure the smooth implementation of precautionary protective actions, emergency response actions and measures following the nuclear emergency and make the guidelines available to the public without delay.

The purpose of NRA EPR Guide is to allow licensees, the head of designated administrative agencies and designated local administrative agencies, local

governments, designated public organizations, designated local public organizations, and others to take nuclear emergency actions in a smooth manner. The Guide went into effect on October 31, 2013 and, since then, they have been revised repeatedly. The ultimate goal of the guidelines is to ensure that in the event of an emergency, protective actions will be taken to minimize the radiation effects on residents etc. in the surrounding area of a nuclear facility.

Described below are the main provisions of the Guide for Emergency Preparedness and Response

F-5-3-1 Preliminary Measures for Nuclear Emergency Preparedness and Response

a Establishment of the Nuclear Emergency Response Zone

In the event of a nuclear emergency, the magnitude of the effect that an unusually large amount of radioactive material or radiation released has on the surrounding environment and the time for the effect to come into play depend on the form of the abnormal event, the characteristics of the facility, the weather conditions, the environmental conditions in the surrounding area, the living conditions of residents, and other factors.

Therefore, it is necessary to take the appropriate action for the event in a flexible manner. To take action to protect residents etc. against radiation exposure efficiently in a short time, it is necessary to in advance, assume the occurrence of an unusual event, to define areas that may be affected by the event, taking into account factors, such as the characteristics of the facility, and to put in place measures, particularly for nuclear emergencies.

Nuclear emergency planning zones for nuclear emergency response actions are designated for the type of nuclear facility based on the distance from the facility. For commercial power reactors, a precautionary action zone (PAZ) is defined as an area where precautionary protective actions, such as immediate evacuation depending on the EAL, should be prepared in the stage before radioactive material is released into the environment in order to avoid the stochastic effect of radiation exposure in a rapidly developing accident.

The rough target of the PAZ is approximately within a radius of 5 km from the power reactor facility.

An urgent protective action planning zone is defined as an area where emergency protective actions should be prepared based on the EAL and OIL to minimize the risk of the stochastic effect of radiation exposure.
The rough target of the UPZ is approximately within 30 km of the power reactor facility.

Exceptionally, When the nuclear power plant which is designated by the NRA that: the decommissioning plan is approved and the irradiated fuel assemblies are cooled for a sufficient period, the Nuclear emergency planning zone for nuclear emergency response action for relevant facility is designated as UPZ with rough target of approximately 5 km of the relevant facility.

Nuclear emergency planning zone for nuclear emergency response actions in regard to reprocessing facility is designated as UPZ with rough target of approximately within 5 km of the relevant facility.
The designation of these nuclear emergency planning zones is based on the international standards and the lessons learned from the accident at the Fukushima Daiichi NPS.

b Nuclear emergency category and Emergency Action Level (EAL)

In Japan, emergencies situations are divided into three categories: an alert, a site area emergency and a general emergency condition.

An alert is a phase in which, in a nuclear facility, an unusual event occurs or may occur that has or may have no immediate radiation effects on the public and preparations need to be made to collect information, conduct emergency monitoring and implement protective actions such as the evacuation of those who need to evacuate in a site area emergency. In this phase, licensee must immediately report the occurrence of an event in the alert category and the state of the facility to the national government. The national government must confirm the occurrence of the alert event based on the information from licensee and provide it to the local governments and the public and other stakeholders without delay. The national government and the local governments must start to prepare for the implementation of relatively time-consuming protective actions in the PAZ near the nuclear facility.

A site area emergency is a phase in which, in a nuclear facility, an event that may have radiation effects on the public occurs and preparations need to be made to take main protective actions, such as evacuation in an emergency, in the surrounding area of the facility. In this phase, licensee must immediately report the occurrence of an event in the site area emergency category and the state of the facility to the national government and the local governments. The national government must confirm the occurrence of the site area emergency and provide information to the local governments, the public and other stakeholders without delay.

The national government, the local governments and licensee must enhance the information collection activities to grasp the development of the event by emergency monitoring and other means and, mainly in the PAZ, must prepare for the implementation of precautionary protective actions, such as the evacuation of basically all residents etc., and evacuate those who need to evacuate in a site area emergency.

A general emergency is a phase in which, in a nuclear facility, an event occurs that is very likely to have radiation effects on the public and protective actions need to be taken promptly to avoid the stochastic effect of radiation exposure and reduce the risk of the stochastic effect. In this phase, licensee must immediately report the occurrence of an event in the general emergency category and the state of the facility to the national government and the local governments. The national government must confirm the occurrence of the general emergency and provide information to the local governments, the public and other stakeholders without delay.

The national government and the local governments must take precautionary protective actions in the PAZ, such as the evacuation of basically all residents and the administration of stable iodine. As in the PAZ, precautionary preventive actions, such as evacuation, need to be taken in the UPZ, depending on the scale of the event as well as on how much time has passed.

In the Guide for Emergency Preparedness and Response, the EAL used to determine the category of an emergency is defined for each of the three emergency categories and for each of the three reactor types (BWR, PWR and FBR), as well as for different conditions in the reactor, such as the condition that no nuclear fuel material exists in the reactor vessel in Fukushima Daiichi NPS Units 1 to 4.

Following Emergency Action Level (EAL) concerning spent fuel storage facilities of which this Joint Convention is applied in Japan is provided.

Alert	1	In case of evaporation to dryness when the function described in article 35 of the NRA Ordinance On Standards for the Location, Structure, and Equipment of Reprocessing Facilities (NRA Ordinance No.27, 2013) is lost.
	2	In case the power supply from all the AC bus is lost, and the situation continues for 30 minutes or more.
	3	The water level of the spent fuel storage pool cannot be maintained, and the water level of the storage pool cannot be measured for a period longer than the limited value.
	4	The control room environment deteriorates, and the possibility to make the obstacle for the operation and the control of the reprocessing facility is caused.
	5	The function of the equipment for the communication inside the facility or function of a part of communication equipment between inside and outside of the facilities are lost.
	6	There is possibility of loss of a part of the function of safety equipment due to fire, explosion or flooding in the vital area.
	7	There is possibility of explosion by the hydrogen in the cell, or fire or explosion by the organic solvent etc. is caused or has a risk to be caused, when the safety function described in the article 1-3 of the NRA Ordinance on Standards for the Location, Structure, and Equipment of Reprocessing Facilities is lost.
	8	There is high possibility of the status that the management of nuclear fuel material by the shape control, by the mass control and other methods is damaged or lost and other high possibility of criticality in the reprocessing facility.
	9	In case the earthquake of Japanese seismic scale is sixth or bigger occurs in the city, town or village where the nuclear installation site is located.
	10	In case the high tsunami warning is announced in the sea district for alarm including the nuclear installations.
	11	In case a significant failure etc. of the reprocessing facility concerned causes which the responsible person on site decides the need for precaution.
	12	In case an external event which exceeds the design basis decided in the new safety regulatory requirements occurs. (tornado, flooding, typhoon, and eruption of volcano, etc.).
	13	In case the Chairman or the deputy judges to the necessity to install the nuclear emergency alert headquarters when a risk which the event caused by other than reprocessing facility might influence on the reprocessing facility.
the Site Area emergency	1	The water level of spent fuel pool lowers two meters from the top of the irradiated spent fuel assemblies.
	2	It becomes impossible to use the Main Control Room

	3	All the function of equipment for the communication in the nuclear installation or all functions of the equipment for the communication between inside and outside of the nuclear installation are lost.
	4	A part of function of safety equipment etc. is lost due to fire, explosion or flooding.
	5	The radioactive material leaks out the building from the cell.
	6	The nuclear fuel material reaches critical in the reprocessing facility.
	7	In case the radiation dose rate described in the article 10 of the act on special measures concerning nuclear emergency preparedness exceeds the limitation or the radioactive material described in the act is detected at the site boundary of the nuclear installation. (The case of transport to the outside of the nuclear installation is excluded).
	8	The event which the protection measures need to be prepared or a part of protection measures need to be started causes around the nuclear installation, which there is a possibility radioactive materials or radiation is released to the outside of the nuclear installation, for example, the event resulted by other than a reprocessing facility.
the General emergency	1	In case of evaporation continues when the function described in article 35 of the NRA Ordinance On Standards for the Location, Structure, and Equipment of Reprocessing Facilities (NRA Ordinance No.27, 2013) lost and volatilized radioactive materials is generated or may be generated.
	2	In case of the water level of spent fuel pool decrease to the top of the irradiated spent fuel assemblies.
	3	In case of large volume of radioactive material is released to the building from the cell.
	4	The nuclear fuel material reach criticality (status the chain reaction of nuclear fission is maintained) inside the facility for the reactor operation (excluding the reactor core).
	5	In case the radiation dose rate described in the article 15 of the Act on Special Measures concerning Nuclear Emergency Preparedness exceeds the limitation or the radioactive material described in the act is detected at the site boundary of the nuclear installation. (The case of transport to the outside of the nuclear installation is excluded).
	6	The event which the sheltering of the resident around the nuclear installation need to be started causes, which there is a possibility abnormal level of radioactive materials or radiation is released to the outside of the nuclear installation, for example, the event resulted by other than a reprocessing facility make impact to the reprocessing facility.

c Operational Intervention Level (OIL)

In a general emergency, after release of radioactive material, due to the spread of the radioactive material, there are likely to be points with a high air dose rate in a relatively wide area. To prepare for such an event, the national government, the local governments and licensee need to conduct emergency monitoring promptly, determine the necessary

protective actions to be taken by evaluating the results of the monitoring against the criteria for the implementation of protective actions and take the actions.

After release of radioactive material, in areas where the air dose rate is high, the zones will be determined in a few hours and emergency protective actions, such as the evacuation of residents, will be taken to minimize the effect of exposure. In areas where the air dose rate is relatively low, the zones will be determined in a day and early protective actions, such as temporary relocation, will be taken in a week or so to avoid unnecessary exposure.

Operational Intervention Levels (OILs), which are indicated measurable values, such as the air dose rate and the concentration of radioactive material in environmental samples, are specified as the criteria for determining whether these protective actions should be taken. Table 5-3 shows the relationship between the OIL and the protective actions.

Figure F5-2 OILs and Protective Actions

	Classification	Description	Initial Values	Outline of Protective actions
Urgent protective actions	OIL1	Criteria for advising local residents to evacuate within a few hours or sheltering, in order to prevent radiation effects from surface soil, inhalation of re-suspended radioactive material, or inadvertent ingestion	500μSv/h (air radiation dose rate when measured 1m above the ground)	Identification of zones and evacuation within a few hours (including ordering those who cannot easily move to shelter indoors temporarily)
	OIL4	Criteria for conducting decontamination to prevent inadvertent ingestion and external exposure via skin contamination	βrays:40,000 cpm (Counting rate measured by detector at several centimeters off the skin) βrays:13,000 cpm(Value 1 month later) (Counting rate measured by detector at several cm off the skin)	Contamination screening of those who are ordered evacuation or relocation and prompt primary decontamination when the results exceed the criteria
Early protective actions	OIL2	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 ingestion	20μSv/h (Air radiation dose rate measured at 1m from ground)	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
Restriction on intake	Food and drink screening standards	Criteria for identifying areas where measurement of radionuclide concentrations in food and drink should be	0.5μSv/h (Air radiation dose rate measured at 1m from ground)	Identification of zones where radionuclide concentrations in food and drink should be

<table>
<tr><th></th><th>Classification</th><th>Description</th><th colspan="3">Initial Values</th><th>Outline of Protective actions</th></tr>
<tr><td rowspan="6">of food and drink</td><td>(corresponding to OIL3)</td><td>carried out in preparation for possible food and drink restrictions at OIL6</td><td colspan="3"></td><td>measured</td></tr>
<tr><td rowspan="5">OIL6</td><td rowspan="5">Criteria when restricting food and drink intake in order to prevent radiation exposure via ingestion</td><td>Nuclide</td><td>Drinking water, milk, dairy products</td><td>Vegetables, cereals, meat, eggs, fish, other</td><td rowspan="5">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>Radioactive iodine</td><td>300Bq/kg</td><td>2,000Bq/kg</td></tr>
<tr><td>Radioactive cesium</td><td>200Bq/kg</td><td>500Bq/kg</td></tr>
<tr><td>a nuclide of plutonium and transuranic elementS</td><td>1Bq/kg</td><td>10Bq/kg</td></tr>
<tr><td>Uranium</td><td>20Bq/kg</td><td>100Bq/kg</td></tr>
</table>

d Development of an emergency monitoring system

In an emergency, information on the air dose rate from radioactive material in the environment, the concentration of airborne radioactive material and the concentration of radioactive material in environmental samples provides the basis for appropriately implementing protective actions for residents and those engaged in disaster prevention work. Measures will be taken to prevent loss of the emergency monitoring function.

In the implementation of emergency monitoring, the national government will supervise emergency monitoring; develop an implementation policy; develop a plan for conducting emergency monitoring and a mobilization plan; provide instructions on the implementation of the monitoring and overall coordination; collect and disclose data; evaluate the results of the monitoring and change the implementation plan as the event develops; and conduct wide-area monitoring such as marine monitoring and aerial monitoring.

The local governments will develop the emergency monitoring plan and conduct emergency monitoring in nuclear emergency planning zones

Licensee will provide information on the source of the radioactive material released and cooperate in emergency monitoring in the surrounding area of the facility and other areas.

If the situation develops into a site area emergency, the national governments will set up an Emergency Monitoring Center in the Off-site Center with the necessary functions to

conduct emergency monitoring in the area where the nuclear facility is located, so that the national government, the local governments and licensee can work together to conduct emergency monitoring.

The Emergency Monitoring Center consists of the national government, the prefecture where the nuclear facility is located, the neighboring prefectures, the designated public organizations, licensee, and supporting organizations, and is responsible for collecting information on environmental radiation levels due to the nuclear emergency and providing information to be used to determine whether OIL-based protective actions should be taken and information to be used to evaluate radiation effects from the nuclear emergency on the residents etc. and the environment.

e Development of a medical care in a nuclear emergency

A medical care to allow specified first-aid emergency health care institutions to provide health care in a nuclear emergency and a chain of command are in place even at ordinary times to allow for appropriate health care activities in a nuclear emergency. The Government designates Advanced Radiation Exposure Treatment Support Centers and Nuclear Emergency Health Care and General Support Centers, and reviews them for compliance with the facility requirements every three years or so. The prefecture and the city, town or village where the nuclear facility is located designates and registers primary nuclear emergency care hospitals and nuclear emergency health care support institutions, and review them for compliance with the facility requirements every three years or so.

f Preemptive intake of the iodine tablets

For the purpose of preemptive intake of stable iodine tablets in a nuclear emergency, at ordinary times, the local governments will provide stable iodine tablets to residents in the PAZ in preparation for an emergency.

Iodine tablets are stored in a public facility. When the tablets are provided in preparation, a medical doctor (physician, etc.) will explain the preventive effect of the tablet, the time to take it and its side effects. In the event of a general emergency, protective actions, such as evacuation, will be taken in the UPZ, depending on the state of the plant and the air dose rate. In addition, a system for the supply and intake of stable iodine tablets will be put in place.

g Setting-up of an Off-site Center

The Local Nuclear Emergency Response Headquarters of the national government and the emergency response headquarters of the local governments set up a Nuclear Emergency Joint Response Meeting to exchange information in the event of a nuclear emergency and an Off-site Center as a center for implementing nuclear emergency response actions in a coordinated manner in the area where the nuclear facility is located.

The Off-site Center is located in an area, considering the guidelines for PAZ and UPZ and has the necessary systems in place to maintain its function as the primary emergency facility to take the necessary actions for radiation protection and emergency actions such as alternative facility and multiple lines of communication channels.

F-5-3-2 Emergency response actions

a Comprehending an unusual state and taking emergency response actions

Upon being informed of an alert or a site area emergency by a nuclear licensee, the national government and the local governments will start to prepare for the implementation of protective actions and provide information to residents in preparation for a general emergency. Upon being informed of a general emergency by a nuclear operator, residents in the PAZ will be required to evacuate and UPZ will be required to take precautionary preventive actions, such as sheltering. If an unusually large amount of radioactive material is or may be released from the nuclear facility, residents will shelter in place as needed in consideration of the condition of the facility and the release of radioactive material in areas other than those where precautionary preventive actions are taken. In consideration on the results of emergency monitoring, additional protective actions are implemented, such as evacuation from areas other than those where precautionary preventive actions and restrictions on eating and drinking.

b Emergency monitoring

In the event of an alert, the national government, the local governments, licensee, and the relevant designated public organizations will prepare for emergency monitoring. In the event of a site area emergency, the national government will set up an Emergency Monitoring Center, make a request for the necessary personnel under the mobilization plan and start emergency monitoring.

c Evacuation, temporary relocation and sheltering-in-place

If an unusually large amount of radioactive material is or may be released into the surrounding area of the nuclear facility, depending on the nuclear emergency planning zone, all residents in the PAZ will be required to evacuate immediately, and residents in the UPZ will be required to shelter in place when the situation develops into a general emergency. Subsequently, a phased-evacuation will be considered depending on the state of the nuclear facility. In addition, after radioactive material are released, areas exceeding OIL 1 will be determined based on emergency monitoring and residents will be evacuated within a few hours, and areas exceeding OIL 2 will be determined and residents will be temporarily relocated within a day or so.

In the event of a general emergency, evacuation will be implemented in the PAZ depending on the priority zones for nuclear emergency response actions. However, sheltering will be implemented if it has a higher priority than evacuation. In the UPZ, sheltering-in-place will be implemented until a phased-evacuation or other OIL-based protective actions are taken.

d Development and support of local disaster management plans and evacuation plans

Relevant local governments are required to develop local disaster management plan based on the Disaster Countermeasures Basic Act, and the local government such as prefectures, and municipalities should plan the basic measures for nuclear disasters.
A local disaster management plan (the section for nuclear disaster) (hereafter, it's called “local disaster management plan") is developed by the relevant local governments within the radius 30 km range for the most part from a nuclear power plant, based on the Basic Disaster Management Plan and the NRA EPR Guide at present.

For local disaster management plan, materialization of the contents and the system performance are important, and an aggressive support by the national government is expected in the case that local governments have hardship to progress the local evacuation plan or measures for persons requiring with supports etc.
In order to support the improvement and reinforcement of local disaster management plans and evacuation plans developed by local government such as prefectures, cities, towns and villages, based on the decision of the Nuclear Emergency Preparedness Commission in September, 2013, CAO (Nuclear Disaster Management Bureau) established a "Local Nuclear Disaster Management Council" (Hereinafter it's called

"Council".) as a task team in each area where a nuclear power plant is located, and put a working group to solve the problems under the Council in March, 2015.

In the working group of each area, national government and local governments are working to materialize and improve the local disaster management plans and evacuation plans together such as the measures for the support of developing emergency preparedness and response, coordinating measures among wide areas, supports by the bodies in charge of field response etc.

In the area where the local disaster management plans and the evacuation plans were admitted to be materialized and improved, the Council are required to confirm that their Emergency Response in the region are concrete and reasonable, considering the NRA EPR Guide, and CAO (Nuclear Disaster Management Bureau) reports results of examination and consultation for the Emergency Response in the region by the Council to Nuclear Emergency Preparedness Commission for approval.

In the area where the Emergency Response in the region has been confirmed, in addition to the support of materialization and improvement of the emergency response, and confirmation of the emergency measures (Plan), the exercise based on the Emergency Response in the region confirmed by the Council is conducted (Do), items to be improved from the exercise results are extracted (Check), and the Emergency Response in the region are improved considering the items(Action), so this PDCA cycle was introduced and the regional disaster prevention system is improved continuously.

As for the Emergency Response in the region, "Emergency Response in Sendai Region" was reviewed at the Sendai area working team special meeting in fiscal year of 2014, and the confirmation results were approved by Nuclear Emergency Preparedness Commission.

And the "Emergency Response in Ikata Region" was reviewed at the Ikata Council and "Emergency Response in Takahama Region" was reviewed at the Fukui Council in fiscal year of 2015, and those results were approved by the Nuclear Emergency Preparedness Commission , "Emergency Response in Tomari Region" was reviewed at the Tomari Council and "Emergency Response in Genkai Region" was reviewed at the Genkai Council in fiscal year of 2016, and those results were approved by the Nuclear

Emergency Preparedness Commission.

F-5-4 Nuclear Emergency Exercises

Previously, nuclear emergency exercises were carried out by the national and local governments and nuclear operators, to check the effectiveness of emergency response systems in accordance with the Nuclear Emergency Act. However, lessons learned from the Fukushima Daiichi NPS accident, these exercises are under review.

Future exercises must now incorporate lessons learned from the Fukushima Daiichi NPS accident, including the possibility of an unprecedented complex earthquake-tsunami-nuclear accident disaster, as well as incorporating more realistic evacuation exercises. Such exercises range from large-scale national government exercises to those carried out by nuclear operators within a single facility. The following provides an explanation of these.

F-5-4-1 Exercises Drawn up by the National Government

Hitherto, local governments have drawn up nuclear emergency exercises. 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 comprehensive exercises.

The Fukushima Daiichi NPS accident which was occurred in March 2011, marked the first time that such a nuclear emergency had been declared in Japan, and the nuclear emergency response system, including the nuclear emergency exercises, was put to the test. Based on this experience, the national government is now reviewing the disaster response system, as well as reviewing nuclear emergency exercises.

Nuclear Energy Disaster Prevention Drill is an exercise conducted by national governmental organizations, local government organizations and nuclear operators in order to verify the system and organizations against the nuclear disaster, based on the Nuclear Energy Act, and the most recent in 2016 Nuclear Energy Disaster Prevention Drill was conducted for Hokkaido Electric Power Company's Tomari Nuclear Power

Station for the following purposes:

- Confirmation of performance of emergency response system of national government, local governments and nuclear operator, and confirmation of cooperation system by relevant organizations.
- Confirmation of systems and procedures set as manuals in the national and local organizations in a nuclear emergency situation that is caused by the large-scale earthquake.
- Verification of further improvement of system performance of the emergency preparedness and response based on the "Emergency Response in Tomari Region"
- Extraction of lesson-learned from the exercise results and improvement of Emergency Response in the region etc.
- Acquirement of personnel's skill for nuclear emergency preparedness and response and promotion of resident understanding for the nuclear disaster prevention.

Items to be improved were collected from the specialist's advice and questionnaire results from the resident who participated in the 2016 Comprehensive nuclear emergency response exercise, and the "The result report of the 2016 Nuclear Energy Disaster Prevention Drill was issued in May, 2017.

Improvement of the "Emergency Response in Tomari Region" and/or various procedures and manuals will be proceeded through the study in the Council from now on, based on the items pointed out in the result report. And for Nuclear Energy Disaster Prevention Drill, executing methods and menu of exercise should be improved continuously, so that the exercise will become more effective and practical.

F-5-4-2 Exercises planned by a licensee

In accordance with Nuclear Emergency Act, licensees must conduct nuclear emergency exercises, report the results of the exercises to the NRA and disclose the summary.

Activities in the exercises of a licensee include non-scenario-based training and sharing of good practice through mutual visits of licensees.

For example, in a power plant, component training programs on individual

procedures to improve the skills to perform work procedures and a comprehensive training program that combines several component training programs are conducted. The component training programs include, for example, reporting training to ensure that the related organization inside and outside company could contact promptly; emergency response training to ensure that in the event of a nuclear emergency, a power supply will be provided and emergency action to provide the sources of cooling water will be taken in a prompt and appropriate manner; nuclear emergency medical treatment training to ensure that those who suffered from radiation injuries will be taken out of a controlled area and decontaminated and will receive emergency treatment; and evacuation instruction training to ensure that visitors in a nuclear power plant will be instructed to evacuate in the event of an emergency and those other than the emergency response personnel will be instructed to evacuate when a state of emergency is declared.

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

In the head office, training is provided on reporting, emergency support organization activities, power plant support activities, and media relations.

Nuclear Emergency Act requires that a nuclear operator report the results of emergency exercises to the NRA. The NRA may order, through consultation with the Prime Minister, licensee to improve the drill procedures and take other necessary actions if the results of the exercises are determined not to be adequate for preventing occurrence or development of a nuclear disaster. The Basic Plan on Disaster Preparedness states that the NRA will evaluate the results of exercises for severe accidents. The NRA developed indices for the evaluation of nuclear operator emergency exercises and evaluates the exercises by taking opportunities such as general exercises.

F-5-4-3 The exercise drawn up by the local governments

Local governments should put the drills into effect periodically based on Disaster Countermeasures Basic Act.

In the drills conducted by the relevant prefectures, the local governments (including the governor), the bodies in charge of field response, such as police, fire services, the Japan Coast Guard and Japan Self-Defense Forces, and nuclear operator should participate usually. And, some exercises on evacuation of residents or screening tests for evacuation from emergency zones are carried out with the bodies in charge of field response.

Besides, national government conducts several training (for the beginners, for drivers of transport services (e.g. bus drivers), for nuclear emergency preparedness headquarter staff) and table top exercises at headquarter are carried out for local government organs personnel who are in charge of nuclear emergency preparedness.

F-5-4-4 Participation in International Exercises

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, pursuant to the provisions of these conventions, notification is provided without fail in an emergency, Japan consistently participates in the ConvEx exercises organized by the IAEA.

In addition, national government has practical discussion on information dissemination to overseas and acceptance of international emergency assistance based on the framework of INEX5 conducted by OECD/NEA.

F-5-5 Information to the Public and Neighboring Countries

F-5-5-1 Measures for Providing Public Information

To enhance information dissemination of disaster management plans for the public, local residents participate in national and local government emergency exercises. Local authorities explain a disaster response plan to residents, who then simulate evacuations to actual shelter facilities, and radiation surveys are carried out.

The former nuclear regulatory organization, NISA, launched its emergency information mailing service in July 2008 enabling people to register their mobile phone e-mail address in advance and promptly receive emergency information.
This system was inherited by the NRA in September 2012 (and is now called N-alert). During a nuclear emergency, the media will provide information to local residents. Press briefings, covered in 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 Websites will also provide emergency information to the public.

F-5-5-2 Providing Information to Neighboring Countries

Japan is an island nation and shares no land borders with its immediate neighbors. However, since its geographical neighbors -China and South Korea- also have reactor facilities, it is important for the three countries to share information in case of a nuclear accident.

In order to make an information sharing framework among the three regulatory bodies, senior Japanese, Chinese and South Korean regulators' meeting was established in August 2009. Although the three nuclear regulatory bodies had shared information as required, the Fukushima accident underlined the importance of closer cooperation, and talks are currently underway.

At the meeting among senior Japanese, Chinese and South Korean nuclear regulators in November 2011, the three authorities reached an agreement on a Nuclear Safety Cooperation Initiative, which included improving the exchange of information, cooperating in response to severe accidents, and cooperating on disaster prevention and emergency responses.

The three nuclear regulatory bodies agreed to set emergency response working group at Top Regulators Meeting in October 2015. For purpose of establishing immediate reporting system on emergency, first joint exercise is planned on November 2017.

In addition to the Nuclear Safety Cooperation Initiative among the three nuclear regulatory bodies above, Japan is making effort to utilize the website (USIE) of IAEA, and announce necessary information.

F-5-5-3 Response in the Event of a Nuclear Accident or Radiological Emergency in a Neighboring Country

To implement 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 (MOFA) as the National Warning Point (NWP) and National Competent Authority for an Emergency Abroad (NCA (A)) for the event of a nuclear accident or radiological emergency occurring outside the territory of Japan. As for the National Competent Authority for a Domestic Emergency (NCA (D)), Japan has designated the NRA, the MLIT and the MOFA.

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 in RANET (the IAEA Response Assistance Network), and Japan satisfies the Article 2 Section 4 of the Convention on Assistance.

F-6 Decommissioning

Article 26

Each Contracting Party shall take the appropriate steps to ensure the safety of decommissioning of a nuclear facility. Such steps shall ensure that:

(i) qualified staff and adequate financial resources are available;

(ii) the provisions of Article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied;

(iii) the provisions of Article 25 with respect to emergency preparedness are applied; and

(iv) records of information important to decommissioning are kept

F-6-1 Human and financial resources

F-6-1-1 Human Resources

Licensees indicate, in the Operational Safety Program, safety organizations, responsibility and roles in decommissioning processes, and planning and implementation of relevant safety education programs necessary for managers and workers including subcontractors.

The regulatory body confirms the observance of the above-mentioned Operational Safety Program by the inspection (Operational Safety Inspection).

F-6-1-2 Financial Resources

Electric utilities have deposited funds for decommissioning of commercial power reactors using the Dismantling Reserve Funds. (See Section B)

F-6-2 Operational radiation protection

The regulations on radiation protection applied to operating nuclear facilities which are described in Article 24 (F4), are also applicable to nuclear facilities in the process of being decommissioned.

F-6-3 Emergency preparedness

The regulations on emergency preparedness applied to operating nuclear facilities which are described in Article 25 (F5), are also applicable to nuclear facilities in the process of being decommissioned.

F-6-4 Records of information important to decommissioning are kept.

The Reactor Regulation Act requires the retention of important records such as inspection and radiation control records even at decommissioning stage.
Other records specific to decommissioning such as equipment or systems being dismantled, the schedule and method of dismantling will be registered at the end of each dismantling process.

Thus the regulatory body will be able to officially confirm the completion of the decommissioning process.

Section G Safety of Spent Fuel Management

G-1 General Safety Requirements

Article 4

Each Contracting Party shall take the appropriate steps to ensure that at all stages of spent fuel management, individuals, society and the environment are adequately protected against radiological hazards.

In so doing, each Contracting Party shall take the appropriate steps to:

(i) ensure that criticality and removal of residual heat generated during spent fuel management are adequately addressed;

(ii) ensure that the generation of radioactive waste associated with spent fuel management is kept to the minimum practicable, consistent with the type of fuel cycle policy adopted;

(iii) take into account interdependencies among the different steps in spent fuel management;

(iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;

(v) take into account the biological, chemical and other hazards that may be associated with spent fuel management;

(vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;

(vii) aim to avoid imposing undue burdens on future generations.

Japan declares that the reprocessing is a part of the spent fuel management. (Refer to section C.)

According to this declaration and Article 2 of the Joint Convention, operation of nuclear reactors, spent fuel interim storage activity and reprocessing activity in Japan correspond to the spent fuel management.

In this report, safety of the spent fuel management facility, spent fuel storage facilities and the reprocessing facility where the main purpose is the spent fuel management, is described.

G-1-1 The prevention of criticality and the removal of the residual heat

The licensee of the spent fuel interim storage activity is required that the spent fuel storage facility shall have adequate measure applied such as designed in the safe geometry/dimension in order to ensure that the spent fuel is not at risk of reaching a state of criticality in compliance with the NRA Ordinance on Technical Standards for the Design and Construction Methods of Spent Fuel Interim Storage Facilities.

Licensee is also required that the spent fuel interim storage facility must be installed so as to adequately remove decay heat of the spent fuel or the material contaminated by the spent fuel in compliance with the Ordinance.

For equipment with safety functions in reprocessing facilities, measures to prevent nuclear fuel material from reaching criticality must be taken by way of managing geometries of components that contain nuclear fuel material, managing concentration, mass or isotopic composition of nuclear fuel material, or managing geometries, concentration or material of neutron-absorber, or by way of combining these, or by any other appropriate means so that there is no risk that nuclear fuel material may reach criticality in the event of any single failure or malfunction of component or single operational error thereof by an operator occurring in any single unit for handling nuclear fuel material, which are anticipated during operation in compliance with the NRA Ordinance on Technical Standards for Design and Construction Method of Reprocessing Facilities.

And for facilities have safety functions, in case of two or more single units are located, measures to prevent nuclear fuel material from reaching criticality must be taken by way of maintaining proper layout of respective single units, using neutron shielding between respective single units or by way of combining these so that eliminate possibility of nuclear fuel material may reach criticality in the event of any single failure or malfunction of component or single operational error thereof by an operator, which are anticipated during operation.

Spent fuel receiving and storage facilities in a reprocessing plant are required to remove decay heat of spent fuel safely, and product storage facilities are required to be constructed in such a way that decay heat can be removed safely in compliance with the NRA Ordinance.

Furthermore, following equipment are required as severe accident management facility to prevent criticality accidents.

Facilities that have a function to prevent criticality in a cell must have

- Equipment necessary to achieve and maintain subcritical state;
- Equipment necessary to isolate the flow path of ventilation ducts connected to the equipment at which a criticality accident occurred
- Equipment necessary to discharge radioactive material outside of the ducts installed within the cell in the case where the inside of the ducts are pressurized
- Equipment necessary to mitigate the impact due to discharge of radioactive material in the event of a criticality accident.

G-1-2 Minimization of radioactive waste

In Japan, spent nuclear fuel is managed in the fuel storage facility, the spent fuel storage facilities in the nuclear reactor facilities, and the reprocessing facility. In the nuclear reactor facilities, the spent fuel is stored in the storage pool or the spent fuel cask, and in the spent fuel storage facilities, the spent fuel is stored in the spent fuel cask.

In any case, the spent nuclear fuel is stored in a form as it is in water or the sealed container.

In the reprocessing plant, spent nuclear fuels received from nuclear reactors are stored in the receiving and storage facilities in a certain period. As for this period, it is similar to the case to be managed in the nuclear reactor facilities.

The Reactor Regulation Act describes that licensees are required to reduce the concentration of radioactive material as far as possible. Measures such as filtration and/or radioactive decay over time gaseous waste, filtration, evaporation, adsorbing with the ion exchange resin method, or radiation decay over time for liquid waste, and incineration for solid radioactive waste, are stipulated in relevant NRA Ordinances. Licensees can select the appropriate method in order to reduce the radioactive waste.

G-1-3 Interdependence in different stage in spent fuel management

The spent fuel is stored in the spent fuel storage facilities in the nuclear installation for

a certain period after it is taken out of the reactor core. Through the period for spent fuels are managed in the nuclear facilities, it is regulated by the Reactor Regulation Act and the secondary legislations.

The period for spent fuels to be stored in the spent fuel storage facility is regulated as the spent fuel storage activity, and the period for spent fuels to be stored and reprocessed in the reprocessing facility is regulated as the reprocessing activity.

All the regulations for the nuclear reactors, for the spent fuel storage activity, for the reprocessing activity are based on the Reactor Regulation Act, and the consistent regulation is conducted without becoming interrupted, considering that various steps of spent fuel management are dependent mutually.

G-1-4 Effective protection of individuals, society and environment

One of the objectives of the Reactor Regulation Act is to ensure public safety by preventing hazards resulting from nuclear source material, nuclear fuel material and nuclear reactors, thereby contributing to protecting people's lives, health, and property, preserving the environment in accordance with the spirit of the Atomic Energy Basic Act.

The Atomic Energy Basic Act aims to contribute to protecting people's lives, health, and property, preserving the environment based on the established international standards.

G-1-5 Consideration for biologically, chemical and other risk relating to the spent fuel management

For the spent fuel management facilities, regulatory requirements set by the NRA requires prevention of damage due to external impact such as natural phenomenon.
Moreover, for the reprocessing facility, regulatory requirements set by the NRA requires that safety function of the facilities may not be impaired due to a leak of chemicals, and requires the prevention of damage by fire and/or explosion by organic solvent or other flammable liquid or hydrogen, and damage by the impact from the outside such as natural phenomenon and airplane crash etc.

G-1-6 Evasion of influence on future generation

As described in G2, there is a mechanism for ensuring the appropriate management of the operation of spent fuel interim storage facilities and consideration is being given to measures to ensure that there is no increased risk in the future.

G-1-7 Evasion of unjustified load to the future generation

As described in the previous section, consideration is being given to ensuring that any undue burden is not imposed on future generations. Separate legislation prescribes the securing of funds to cover the cost of spent fuel reprocessing. (See Section B)

G-2 Existing Facilities

Article 5

Each Contracting Party shall take the appropriate steps to review the safety of any spent fuel management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility.

Joint Convention entered into force in Japan on November 24, 2003. At that time, the spent fuel management facilities where licensed were the reprocessing facilities. Japan has confirmed that the obligations described in the Joint Convention are fulfilled by the national law and regulations when it joins this convention. In addition, measures have been taken to enhance safety improvement, and examples are as follows.

G-2-1 The back-fit system and the conformity review

The back-fit system was introduced in the amendment of Reactor Regulation Act in 2012, and licensed nuclear facilities are required to comply with the latest regulatory requirements (for installation permission and for construction approval).

When the NRA finds that the nuclear facilities do not conform to the regulatory requirements, NRA may order the licensee of the nuclear facility to suspend use/operation, modification, repair, or change the location of the nuclear facilities, designate a method for operating the nuclear facility or order the necessary operational safety measures to be taken.

Based on the NRA Ordinances enacted in July 2013, regulatory requirements for the nuclear power reactors was established, and in the NRA Ordinances enacted in December 2013, regulatory requirements for the spent fuel storage facilities, reprocessing facilities, radioactive waste storage facilities and radioactive waste disposal facilities were established respectively.

It is not possible to resume operations without passing the Conformity Review which is the regulatory procedure to confirm that the existing nuclear facilities in Japan comply with the latest regulatory requirements.

G-2-1-1 Spent fuel storage facility

The conformity review of the spent fuel storage facilities is composed of the review of the amendment of existing operating license, the review of the design and construction method, and the review of Operational Safety Program.

The regulatory requirements request the fundamental safety functions such as confinement, shielding, prevention of criticality, and heat removal for the design of spent fuel storage facilities, and requires radiation monitoring for radiation control, measures for aging, and measures for natural phenomenon as other safety measures. Existing nuclear facilities are required to comply with them.

In the review of the application on amendment of operating license, the NRA reviews that the location, structure and component of the spent fuel storage facilities and technical competence of licensee are conforming to the NRA regulatory requirements (for installation permit).

The NRA reviews that the design and construction method of the spent fuel storage facilities are complying with the permitted operation license, and those are complying with regulatory requirements (on technical standards), and that method of quality control related design and construction is compliant with regulatory requirements (on quality control).

In the review of Operational Safety Program, the NRA reviews that measures taken for safety of spent fuel storage facilities are sufficient and appropriate for the prevention of the disaster caused by the spent fuel or the material which contaminated by the spent fuel.

For the spent fuel storage facilities that activity license are permitted, and design and construction method, Operational Safety Programs are approved through conformity review, the NRA conducts the Pre-service Inspection for the spent fuel storage facilities, and confirms that the facility is conformed to the approved design, method of construction and regulatory requirements.

The licensee of spent fuel storage activity is required to conduct a periodical evaluation in compliance with regulations of the Reactor Regulation Act. In a periodical evaluation, licensee is required to evaluate the status of incorporation of the latest technical knowledge into the operational safety activity, and to evaluate the status of the execution of the operational safety activity for every spent fuel storage facility for period that doesn't exceed ten years.

G-2-1-2 Reprocessing facility

The Conformity Review for the reprocessing facility is composed of the review of the activity license, the review of the design and construction method, and the review of the Operational Safety Program even though those were once approved.

In the regulatory requirement for the reprocessing facilities, licensee is required to enforce design criteria, take measures for severe accidents and existing facilities need to back-fit to latest regulatory requirements.

In the review of the activity license, the NRA reviews location, structure and component of the reprocessing facility, and the technical competence of the licensee of reprocessing facilities are compliant with these regulatory requirements.

In the review of design and construction methods, the NRA reviews that the detailed design and the method of the quality control are compliant to the license condition, and to the regulatory requirement.

In the review of the Operational Safety Program, the NRA reviews that licensee takes sufficient measures to prevent disasters that might be caused by spent fuel, material separated from spent fuel or material contaminated with any of the foregoing, for the safety operation of reprocessing facility.

For the reprocessing facilities, those activity license, design and construction method, Operational Safety Programs were authorized through Conformity Review, the NRA conducts the Pre-service inspection for the reprocessing facilities, and confirms that the facility is conformed to the approved design, method of construction and regulatory requirements.

G-2-2 Operation of nuclear installation which conformity to the new regulatory requirements is confirmed

When the NRA revises regulatory requirements, by reflecting domestic and/or international state of the art knowledge, study results, etc., licensee is obligated to comply with the revised regulatory requirements, even after the Conformity Review and the Pre-service inspection, etc. are completed and it resumes operations. (Back-fit system)

In the 2012 amendment of Reactor Regulation Act, new requirements of the Periodic Assessment of Safety Improvement were newly introduced. In this system, licensee is required to evaluate safety of its facility by themselves every time within six months after the completion of its Periodic Facility Inspection, and required to submit the report to the NRA and make the result open to the public.

This system is obligated to the nuclear power reactor, the nuclear fuel fabrication facility, and the reprocessing facility. For the other nuclear fuel facilities, licensee is required to evaluate safety of its facility periodically in accordance with the regulation for each activity.

For instance, the licensee of spent fuel storage activity is required to evaluate status of operational safety activity, evaluate the status of reflecting state of the art technology for the operational safety activity, conduct technical evaluation related to aging in every ten years in accordance with the NRA Ordinance on Activity of Spent Fuel Storage.

For the Periodic Assessment of Safety Improvement, and the periodical evaluation, the NRA has developed various guidelines for licensees to be able to conduct necessary evaluation.

G-3 Siting of Proposed Facilities

Article 6

1. Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed spent fuel management facility:
   (i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime;
   (ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment;
   (iii) to make information on the safety of such a facility available to members of the public;
   (iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.
2. In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 4.

G-3-1 Spent fuel storage facilities

Any person who intends to carry out an activity for interim storage of spent fuel shall obtain the permission of the Nuclear Regulation Authority pursuant to the provisions of the Reactor Regulation Act. Any person who intends to obtain the permission shall submit an application documents containing the type of spent fuel to be stored, the storage capacity, location, structure and component of the spent fuel interim storage facilities and the storage method, to the NRA. Documents concerning the conditions of weather, ground, hydrologic, seismic and the social conditions at the site of the spent fuel storage facility is requested to submit as a part of the attachment of the application.

The NRA shall not grant the permission unless it finds that the application conforms to all of the following items:

- That the facilities will not be used for non-peaceful purposes,
- That the applicant has sufficient technical capability and financial basis for

executing the activity competently,

- That the location, structure and equipment of the facilities conform with the regulatory requirements set by the Ordinance of the NRA.

The regulatory requirement is the NRA Ordinance on Standards for the Location, Structure and Equipment of Spent Fuel Interim Storage Facilities. The applicable scope of this Ordinance is the spent fuel storage facilities made by the metallic cask. A metallic cask here is the metallic dry cask in order to transport and store the spent nuclear fuel.

In the NRA Ordinance on Activity of Interim Storage of Spent Fuel, regulatory requirements such as prevention of criticality, shielding, confinement, heat removal and a prevention of damage due to fire, natural phenomenon, the ground shift, earthquake, tsunami, mam-made external impact are described. Moreover, the Ordinance requires that the spent fuel interim storage facility must not cause public exposure to radiation in the vicinity of the place of activity in the Maximum Credible Accident (an accident which is expected maximum public exposure within the accidents taken into account in plant design).

The NRA discloses the meeting on reviewing an application for permission of a spent fuel storage activity to the public, and the documents related to the licensing are accessible for the public.

G-3-2 Reprocessing facilities

Any person who intends to carry out an activity for reprocessing shall obtain the permission of the NRA pursuant to the provisions of the Reactor Regulation Act. Any person who intends to obtain the permission shall submit an application documents containing the type of spent fuel to be reprocessed, the reprocessing capacity, location, structure and equipment of the reprocessing facilities and the reprocessing method, to the NRA. Documents concerning the conditions of weather, ground, hydrologic, seismic and the social conditions at the site of the reprocessing facility is requested to submit as a part of the attachment of the application.

The NRA shall not grant the permission unless it finds that the application conforms to all of the following items:

- That the facilities will not be used for non-peaceful purposes,
- That the applicant has sufficient technical capability for executing measures to prevent occurrence and enlarge of severe accident,
- That the applicant has sufficient technical capability and financial basis for executing the activity competently,
- That the location, structure and equipment of the facilities conform with the regulatory requirements specified by the Ordinance of the NRA.

The standard provided by the NRA is "The NRA Ordinance on Standards for the Location, Structure, and Equipment of Reprocessing Facilities", and it requires prevention of criticality of nuclear materials, shielding, confinement, prevention of damage due to fire, prevention of damage of equipment with safety function due to ground shift, earthquake, tsunami, natural phenomenon and man-made external impact, flooding, leak of chemicals etc. A reprocessing facility is required: to be able to control the parameters within acceptable design safety level on abnormal transient in operation; and to be able to prevent radiation hazards to the public on the design basis accident.

The Ordinance requires installing the facility for measures to manage severe accidents. The NRA discloses the meeting for reviewing an application for permission of a reprocessing activity to the public, and the documents related to the activity licensing are accessible for the public.

G-3-3 Consideration of influence on other contracting states

Japan is an islands nation surrounded by ocean and with no land links with neighboring countries. Moreover, the spent fuel management facilities in Japan are located in a place with sufficient distance from the land of neighboring country.

Therefore, the possibility of significant radiological impact on other Contracting Parties is extremely low. Thus, no framework for international discussion on siting of a spent fuel management facility is established.

G-4 Design and Construction of Facilities

Article 7

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

(i) the design and construction of a spent fuel management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;

(ii) at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a spent fuel management facility are taken into account;

(iii) the technologies incorporated in the design and construction of a spent fuel management facility are supported by experience, testing or analysis.

G-4-1 Spent fuel storage facilities

The licensee who obtains the permission of the spent fuel storage activity is required to obtain the authorization of the NRA for design, method of construction for the facilities before the start of construction in accordance with the Reactor Regulation Act.

The NRA reviews and confirm that the design, method of construction of the facilities are consistent with permitted activity license, regulatory requirements stipulated in NRA Ordinance[5], their quality control method and organization for inspection complies to the technical standards of the NRA Ordinance[6], and give permission.

In relation to the limitation of the radiation impact that might have influence to the individuals, society and the environment, the NRA Ordinance[7] requires that metal cask shall be designed in a structure that is not possible to leak the spent fuel material, and that spent fuel interim storage facility must be installed to sufficiently suppress radiation dose defined by the NRA in the vicinity of the place of activity due to direct ray and sky-shine ray from the spent fuel interim storage facility concerned. And disposal facility of radioactive waste which is generated in the spent fuel interim storage facility is required

[5] NRA Ordinance on Technical Standards for the Design and Construction Methods of Spent Fuel Interim Storage Facilities

[6] NRA Ordinance on Quality Control

[7] NRA Ordinance on Technical Standards for the Design and Construction Methods of Spent Fuel Interim Storage Facilities

that concentration of radioactive material in the air outside of the Surrounding Monitored Area and in the water at the boundary of the Surrounding Monitored Area have to be lower than value set by the NRA.
Licensee of the spent fuel storage activity is required to develop a Decommissioning Plan and obtain approval by the NRA before the start of decommissioning in accordance with Reactor Regulation Act. After the revision of the Reactor Regulation Act in 2017, licensees who intend to start the service of interim fuel storage is required to establish and publicly announce a policy for decommissioning which describes plans on dismantling, transfer of the nuclear fuel material, disposal of radioactive waste.

The Implementation Policy on Decommissioning shall describe the estimation of amount of material which is contaminated by spent fuel material, of necessary cost and financing for complete decommissioning, and any other necessary matter for the decommissioning.

The technology used for design and construction of spent fuel storage facilities is evaluated in the process of the review of design and construction methods. It is an obligation of licensee of spent fuel storage activity to prove that the design of the facility comply with the regulatory requirements of the NRA Ordinance, and this ensures the appropriate technology is used for the design and construction. In addition, licensee is required to develop a design and development plan for the design and development in accordance with the NRA Ordinance[8], and is required to implement investigation, verification and validation and adequacy check. These quality control activity ensures that the spent fuel interim storage facility comply with the required performance, purpose of usage, intended usage method.

G-4-2 Reprocessing facilities

The licensee who obtains the permission of the Reprocessing activity is required to obtain the authorization of the NRA for design, method of construction for the facilities before the start of construction in accordance with the Reactor Regulation Act.

The NRA reviews and confirms that the design, construction method of the facilities are consistent with approved activity license, technical requirements of the NRA Ordinance, their quality control method and organization for inspection complies to the regulatory

[8] NRA Ordinance on Quality Control Methods for Spent Fuel Interim Storage Facility

requirements of the NRA Ordinance, and gives permission.

In relation to the limitation of the radiation impact that might have influence to the individuals, society and the environment, the NRA Ordinance on Technical Standards for the Design and Construction Methods of Reprocessing Facilities requires that equipment with safety function shall be designed in a structure that is not possible to leak the spent fuels, and that reprocessing facility must be installed so as to sufficiently suppress radiation dose defined by the NRA in the vicinity of the place of activity due to direct ray and sky-shine ray from the reprocessing facility concerned during operation and outage, and that the equipment shall be capable to dispose the radioactive waste so as to keep the concentration of radioactive substance in the air outside of the surrounding monitored area and the dose rate of liquid radioactive substance to be discharged to the ocean shall be equal or below the value defined by the NRA.

In addition, installation of equipment necessary to control the release of radioactive substance and radiation to the outside of reprocessing facilities in case of a severe accident.

Licensee of the reprocessing activity is required to develop a Decommissioning Plan and obtain approval by the NRA before the start of decommissioning in accordance with the requirements of the Reactor Regulation Act.

After the revision of the Reactor Regulation Act in 2017, licensees who intend to start the service of reprocessing is required to establish and publicly announce a policy for decommissioning such as dismantling facilities, transfer of the nuclear fuel material, disposal of radioactive waste.

The decommissioning policy shall establish and include the amount of material which is contaminated by spent fuel, the estimate for cost and sources and methods of raising funds, and any other necessary matter for the decommissioning.

The technology used for design and construction of reprocessing facilities is evaluated in the process of the licensing review of design and construction methods. It is an obligation of licensee of reprocessing activity to prove that the design of the facility comply with the regulatory requirements of the NRA Ordinance, and this ensures the appropriate technology is used for the design and construction.

In addition, licensee is required to develop a design and development plan for the design and development in accordance with the NRA Ordinance[9], and is required to implement investigation, verification and validation and adequacy check. These quality control activity ensures that the reprocessing facility comply with the required performance, purpose of usage, intended usage method.

[9] NRA Ordinance on Quality Control Methods for Reprocessing Facility

G-5 Assessment of Safety of Facilities

Article 8

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

(i) before construction of a spent fuel management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;

(ii) before the operation of a spent fuel management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).

G-5-1 Spent fuel storage facilities

The licensing procedure for the spent fuel storage facilities activities are described in G3 and G4.

Concretely, the person who tries to obtain the permission of the activity in the process of the licensing of the spent fuel storage activity should append "description concerning safety design of spent fuel storage facilities", "description concerning the disposal of exposure control of radiation dose from the spent fuel etc. and the disposal of radioactive wastes" and " description concerning kind, level, and influence, etc. of the accident at spent fuel storage facilities, those assumed to be caused in case of mis-operation, failure of machine or equipment, flooding, earthquake, fire, explosion etc." etc. , and explain the result of the safety evaluation to the NRA.

When the NRA permits the application, these manuals are also reviewed.

In The NRA Ordinance on Activity of Interim Storage of Spent Fuel, the performance that the facility should have, such as prevention of criticalities, shielding, heat removal, prevention of damage by the outer impact such as fire, earthquake, tsunami, and the performances for each equipment.

And a systematic evaluation concerning safety is performed in accordance with the Ordinance.

After obtained the permit for the activity, the licensee is required to obtain the authorization of the design and construction method for the facility before construction starts. The licensee of spent fuel interim storage activity is required to submit the document that explains by calculation that the design and the method of construction are compliant with the requirements of the NRA Ordinance for spent fuel storage facilities design.

When the NRA permits the application, these manuals are also reviewed. In the NRA Ordinance on Technical Standards for the Design and Construction Methods of Spent Fuel Interim Storage Facilities, the performance that the facility should have, such as prevention of criticalities, shielding, heat removal, prevention of damage by the external impact such as fire, earthquake, tsunami, and the performances for each equipment are described. And a systematic evaluation concerning safety is performed in accordance with the Ordinance. The evaluation at this stage is more detailed than that of the activity permit, because they are based on the design of concrete facilities design.

G-5-2 Reprocessing Facility

The licensing procedures before the construction of the reprocessing facilities are described in G3 and G4.

Concretely, the person who tries to obtain the designation of the activity in the process of the licensing of the reprocessing activity should describe the following in the application documentation:

- Necessary facilities as the countermeasure for abnormal transients during operation and design basis accidents, impact of the assumed accidents, condition to evaluate the impacts and a result of the evaluation.
- Necessary facilities as the countermeasure and organization for severe accident and for accident supposed to become a severe accident, impact of the assumed accidents, condition to evaluate the impacts and a result of the evaluation.

In addition, a licensee is required to append "description document concerning the safety design of the reprocessing facility" and "description document concerning the maintenance of a necessary facilities and system for an accident concerned when the accident occurs in the reprocessing facility to deal", etc., and to explain the result of the

safety evaluation.
Description documents are also reviewed in licensing process. NRA Ordinance [10] stipulates requirements on performance that reprocessing plant should have, such as prevention of criticality, shielding, confinement, prevention of damage by fire, earthquake, tsunami, external impact, leakage of chemicals, as well as transient, prevention of expansion of design basis accident, or performance necessary for other components. In addition, as the requirement for severe accident management facility, prevention of expansion of severe accident, prevention of damage by fire, earthquake, tsunami, and performance of severe accident management facility. To grant permission, systematic evaluation of application is performed in line with these requirements.

After obtaining permit for the activity, the licensee of the reprocessing facility is required to obtain the approval for the design and the construction method of the facility before the start of construction.

The licensee of the reprocessing facility is required to submit the application documents which explaining by calculation that the design and the method of construction are consistent with requirements of the NRA Ordinance in the process of the licensing.
When the NRA approves the application, these documents are also reviewed.

In the NRA Ordinance[10] , the performance that the reprocessing facility should have, such as prevention of criticalities, shielding, heat removal, prevention of damage by the external impact such as fire, earthquake, flooding, leakage of chemicals, and the performances for each equipment are described. A systematic evaluation concerning safety is performed in accordance with the Ordinance. At this phase, evaluation is performed based on the specific design for the concrete equipment, so is more detail than that of licensing phase.

[10] the NRA Ordinance on Technical Standards for the Design and Construction Methods of Reprocessing Facilities

G-6 Operation of Facilities

Article 9

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

(i) the licence to operate a spent fuel management facility is based upon appropriate assessments as specified in Article 8 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements;

(ii) operational limits and conditions derived from tests, operational experience and the assessments, as specified in Article 8, are defined and revised as necessary;

(iii) operation, maintenance, monitoring, inspection and testing of a spent fuel management facility are conducted in accordance with established procedures;

(iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a spent fuel management facility;

(v) incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body;

(vi) programmes to collect and analyze relevant operating experience are established and that the results are acted upon, where appropriate;

(vii) decommissioning plans for a spent fuel management facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body.

G-6-1 Spent fuel storage facilities

In accordance with Reactor Regulation Act, licensee of the spent fuel interim storage activity could not start without passing Pre-service Inspection by the NRA. Pre-service inspection checks whether approved design, method of construction and functions are complied with methods approved by the NRA and the NRA's technical standards.

In addition, in order to welding container utilize for interim storage, operator has to pass welding inspection by the NRA. Welding inspection checks whether methods of welding comply with methods approved by the NRA and the NRA's technical standards.

The licensee of spent fuel interim storage activity should obtain the approval for the Operational Safety Programs from the NRA before starting operation. For

implementation of the Operational Safety Programs, the licensee of interim storage activity also shall undergo the Operational Safety Inspection by the NRA. The implementation of the Operational Safety Programs is required by the law, in the case of violation, the NRA could impose penalties such as revoke permits and suspend the operation of facilities within one year.

The main items indicated in Operational Safety Programs are as follows:

- The system for implementing relative laws and Operational Safety Programs
- The organizational system for fostering safety culture
- Quality assurance for spent fuel interim storage facilities
- Duties and organization of personal who manage and operate spent fuel interim storage facilities
- The job description and range of Chief Engineer for Spent Fuel Handling and the positioning in organization and necessary authority for Chief Engineer for Spent Fuel Handling's supervising
- education on operational safety for radiation workers in spent fuel interim storage facilities
- Operating equipment which need management especially for operational safety
- Establish Radiation Controlled Area, Surrounding Monitored Area and access control for those area
- exhaust gas and effluent monitoring equipment
- Dose, equivalent dose, concentration of radioactive material, monitoring density of surface contaminated by radioactive material and removal of contamination.
- Management of dose meter and methods of dose monitoring
- Walk-down, inspection and measures for spent fuel interim storage facilities
- Periodic facilities self-inspection for spent fuel interim storage facilities
- Receipts, transportation and other handling for spent fuel
- Disposal of radioactive waste
- Measures for emergency
- Appropriate report and record of operational safety for spent fuel interim storage facilities
- Periodic assessment for spent fuel interim storage facilities
- Distributing and sharing technical information obtained from maintenance to other spent fuel interim storage operator.
- Open information on non-compliance to public in case of occurrence on non-

compliance
- Other necessary items of safety operation for spent fuel interim storage facilities

Based on the Reactor Regulation Act, the licensee of interim storage activity shall undergo Periodic Facilities Inspection whether functions of facilities comply with the NRA's regulatory requirements.

Licensees have to report to NRA based on the provision of Reactor Regulation Act when an event designated by NRA occurs, such as: spent fuel is stolen or missing; loss of confinement function, shielding, decay heat removal function or function for prevention of fire or explosion, or possibility of losing these functions due to failure of spent fuel storage facility.

In the case of decommissioning spent fuel interim storage facilities, the licensee of interim storage activity shall obtain the approval of decommissioning plan in accordance with Reactor Regulation Act.

The following instruction should be attached to the application of Decommissioning Plan,

- management of radiation exposure during decommissioning,
- possible kind of incident, damage, effect in spent fuel interim storage facilities in case of error, fault of machine and equipment, flooding, earthquake, fire
- contamination of distribution by spent fuel and assessment method
- maintaining functions of spent fuel interim storage facilities during decommissioning
- period of maintaining above functions

Acceptance criteria on Approval of Decommissioning Plan are spent fuel is removed from spent fuel storage facility, management of material contaminated by spent fuel material is appropriate, implementation of decommissioning is appropriate in terms of prevention of disaster caused by material contaminated by spent fuel material.

G-6-2 Reprocessing facilities

In accordance with Reactor Regulation Act, licensee of reprocessing facilities could not

start without passing pre-service inspection by the NRA. Pre-service inspection checks whether approved design, method of construction and functions are complied with methods approved by the NRA and the regulatory requirements.

In addition, regarding welding, dissolving vessel or other component designated by the NRA Ordinance have to pass welding inspection conducted by the NRA. Welding inspection checks whether methods of welding comply with methods approved by the NRA and the NRA's regulatory requirements.

The licensee of reprocessing facilities should obtain the approval for the Operational Safety Programs from the NRA before starting operation. For implementation of the Operational Safety Programs, the licensee of reprocessing facilities also shall undergo the Operational Safety Inspection by the NRA. The implementation of the Operational Safety Programs is required by the law, in the case of violation, the NRA could impose penalties such as revoke permits and suspend the operation of facilities within one year. The main items indicated in operational safety programs are as follows:

- The system for implementing relative laws and Operational Safety Programs
- The system and organization for fostering safety culture
- Quality assurance for reprocessing facilities
- Duties and organization of personal who manage and operate reprocessing facilities
- The job description and range of Chief Engineer for Nuclear Fuel Handling and the positioning in organization and necessary authority for Chief Engineer for Nuclear Fuel Handling's supervising
- Education on operational safety for radiation workers in reprocessing facilities
- Operating equipment which need management especially for operational safety
- Safety review for operating reprocessing facilities
- Establish Radiation Controlled Area, Preservation Area and Surrounding Monitored Area and access control for those area
- Exhaust gas and effluent monitoring equipment
- Dose, equivalent dose, concentration of radioactive material, monitoring density of surface contaminated by radioactive material and removal of contamination
- Management of dose meter and methods of dose monitoring
- Walk-down, inspection and measures for reprocessing facilities

- Periodic facilities self-inspection for reprocessing facilities
- Receipts, transportation and other handling for spent fuel
- Disposal of radioactive waste
- Radiation control around liquid waste discharge equipment
- Measures for emergency
- Develop system for initial fire fighting
- Develop system for safety activities at severe accident
- Develop system for safety activities at occurrence of large scale damage
- Appropriate report and record of operational safety for reprocessing facilities
- Periodic assessment for reprocessing facilities
- Distributing and sharing technical information obtained from maintenance to other reprocessing facilities operator
- Open information on non-compliance to public in case of occurrence on non-compliance
- Other necessary items of safety operation for reprocessing facilities

Based on the Reactor Regulation Act, the licensee of reprocessing facilities shall undergo Periodic Facility Inspection whether functions of facilities comply with the NRA's regulatory requirements.

Licensees have to report to NRA based on the provision of Reactor Regulation Act when an event designated by NRA occurs, such as: spent fuel is stolen or missing; loss of confinement function, shielding, or function for prevention of fire or explosion of reprocessing facility, or possibility of losing these functions due to failure of reprocessing facility.

In the case of decommissioning reprocessing facilities, the licensee of reprocessing facilities shall obtain the approval of Decommissioning Plan in accordance with Reactor Regulation Act.

The following documents should be attached to the application of Decommissioning Plan,

- management of radiation exposure during decommissioning,
- estimation of incident, damage, effect in reprocessing facilities in case of error, fault of machine and equipment, flooding, earthquake, fire
- mapping and assessment method on contamination of distribution by spent fuel
- maintaining vital functions of facilities during decommissioning

- period of maintaining above functions

Acceptance criteria on Approval of Decommissioning Plan are recoverable nuclear fuel material is removed from main process of reprocessing plant, management and transfer of spent fuel, material separated from nuclear fuel material or spent fuel are appropriate, management of spent fuel, nuclear fuel material or material separated from nuclear fuel is appropriate, implementation of decommissioning is appropriate in terms of prevention of disaster caused by material contaminated by spent fuel, nuclear fuel material or material separated from nuclear fuel material or spent fuel.

G-6-3 Making Effective Use of Operational Experiences

In accordance with Reactor Regulation Act, spent fuel interim storage facilities are required to implement periodic assessment and reprocessing facilities are required to implement safety uplift review. Those are prescribed in G2.

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. After investigating the root cause and the measures of the event, licensees shall report to the NRA and publish those contents. Once in receipt of the report concerning the event, the secretariat of the NRA immediately publishes the details and checks the response of the licensee to the event. Moreover, after report of the root and the measures on the event from licensees, licensees confirm the validity of the contents and report again to the NRA.

Licensee implements quality management system stipulated in Operational Safety Program. Corrective actions and preventive actions are taken in the quality management system. Operational experiences obtained not only from own facility but also from domestic/foreign facility are used. The NRA ensures licensee’s those activities through operational safety inspection a quarter of the year.

NRA reviews information of these events/failures and try to extract lessons for enhancing safety with taking advice of experts of operation, inspection and radiation protection into account. NRA uses the information related to these events/failures to regulatory activities including requesting to incorporate these lessons into operators' activities, as necessary.

In the information collection and analysis process in the Secretariat of the NRA, through the first step of screening process, information with possibility related to regulation of our country is chosen from collected information, and through the second step of screening process, "technical information which needs measure to be taken" is selected.

The Secretariat of the NRA study about the "technical information which needs measure to be taken" and develop the measure, report to the Reactor Safety Examination Committee and the Nuclear Fuel Safety Examination Committee periodically, get the advice and report to NRA periodically. In such manner, decision by NRA is conducted and reflected to the regulation in our country.

The licensee manages the "Nuclear Information Archives (NUCIA)", database for nuclear facilities' information which is disclosed to the public, cooperating with JANSI. Database of NUCIA contains operating information from the first nuclear reactor in 1966 to the current reactors or reprocessing plant, and is shared not only by licensees but also the public for the transparency.

In addition to that, as for the collection, analysis, assessment and utilization of operating information among licensees, Japan Nuclear Safety Institute (JANSI), as a third party which is independent from atomic energy activity operators, collect domestic and abroad information such as event at nuclear facility, analyze, assess and provide the result to the domestic operators.

G-7 Disposal of spent fuel

Article 10
If, pursuant to its own legislative and regulatory framework, a Contracting Party has designated spent fuel for disposal, the disposal of such spent fuel shall be in accordance with the obligations of Section 3 relating to the disposal of radioactive waste.

According to Final Disposal Act, radioactive waste have to be disposed after reprocessing spent fuel, it means spent fuel is not stipulated as disposal in Japan.

Section H Safety of Radioactive Waste Management

Article 11

Each Contracting Party shall take the appropriate steps to ensure that at all stages of radioactive waste management individuals, society and the environment are adequately protected against radiological and other hazards.

In so doing, each Contracting Party shall take the appropriate steps to:

(i) ensure that criticality and removal of residual heat generated during radioactive waste management are adequately addressed;

(ii) ensure that the generation of radioactive waste is kept to the minimum practicable;

(iii) take into account interdependencies among the different steps in radioactive waste management;

(iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;

(v) take into account the biological, chemical and other hazards that may be associated with radioactive waste management;

(vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;

(vii) aim to avoid imposing undue burdens on future generations.

For purpose of trench disposal with very low radioactive level of radioactive waste which are generating during dismantling nuclear power plant, JAPC applied for Tokai burial disposal facilities of low- level radioactive waste [the Cat- 2 Waste Disposal] to the NRA in July 2015.

H-1 General safety requirements

This session forces on safety of radioactive waste management. In Japan, radioactive waste management has classified into “Waste Interim Storage/treatment", "the Cat-1 Waste Disposal” and “the Cat-2 Waste Disposal”

H-1-1 The criticality and the removal of the residual heat

As for Waste Interim Storage/treatment facility, the regulatory standards which stipulated by the NRA require the operators to take necessary measures for cooling when the radioactive waste is likely to be overheated by decay heat.
As for interim storage facility which store the waste which contain more than certain amount of radioactivity, the regulatory requirements which the NRA establish, require that, the necessary measures shall be taken to prevent criticality if there is possibility of nuclear fuel material reaching criticality.

H-1-2 Minimizing the generation of Radioactive Waste

Each nuclear facility in Japan has the equipment to treat waste generated at the facility. The regulatory standards require minimizing the concentration of radioactive material when discharged from the facility,

- by filtration and time attenuation: for gaseous radioactive materials,
- by filtration, evaporation, adsorption method such as ion exchange, and time attenuation: for liquid radioactive materials.

The NRA established the standards for discharging gaseous and liquid radioactive waste safely that are effective in reducing the volume and amount of radioactive waste required to be stored or disposed.

H-1-3 Interdependence of different stages in Radioactive Waste Management

For example, ordinances such as NRA Ordinance on Commercial Power Reactors and other ordinances require the radioactive waste in the liquid state to be stored in a liquid waste tank, to be enclosed in a containment, or solidified integrally with a containment and stored in the storage facility, as the standard.

On the other hand, the ordinances require the radioactive waste to be enclosed in a containment or solidified integrally with a containment, as the standard for waste disposal activity.

Therefore, the requirements for the generating stage of radioactive waste, include the requirements which disposal stage are taken into account.

Regarding the natural barrier surrounding a repository, the regulatory requirements for permission of intermediate depth disposal[11] request that estimation on creating path that radioactive material can easily transit through back-filling access tunnels between ground-level and repository.

The regulatory requirements also request appropriateness of monitoring method in the stage after the back-filling and of repair method taken when abnormal leakage of radioactive material occurred, as the requirements for approval of plan for back-filling of access tunnel. Therefore, regulatory requirements applied for certain stage contain the requirements which consider safety of next stage.

As stated above, the regulatory system is taken the interdependence of different stages into account.

H-1-4 Providing for effective protection of individuals, society and the environment

One of the purposes of the Reactor Regulation Act, is to prevent disaster caused by nuclear source material, nuclear fuel material or nuclear reactors in accordance with the spirit of the Atomic Energy Basic Act.

Namely, to contribute for ensuring the safety and health of the citizens, protecting their property, and maintaining the lives of the citizenry, and conserving the environments, through the regulation stipulated in the Reactor Regulation Act.

The Atomic Energy Basic Act provide that ensuring safety shall be conducted for the

[11] Waste disposal in the depth which is considered it is effective isolation between public and radioactive waste.

purpose of contributing to protecting the lives, bodies, health and property of nationals, and to conserving the environments, taking the established international standards into account.

H-1-5 Taking into account the biological, chemical and other hazards associated with radioactive waste management

In the standards for radioactive waste interim storage facility and radioactive waste repository, each facility is required not to impair its safety against the occurrence of possible natural phenomena. In this context, natural phenomena include biological event.

Furthermore, chemical hazards are taken into account, such as the prevention of fire/explosion caused by the storage of extremely easily-oxidizable solid-form waste such as zirconium metal powder, in the standards for radioactive waste management on spent fuel reprocessing facility.

H-1-6 Avoidance of impacts on future generations

As for the standards for the prevention of radioactive hazard after the closure of waste disposal site (repository), the standards require the prospect that a site shifts into the state which does not need institutional controls after the permanent closure of the repository.

Concretely, the standards require that, the exposed dose of the general public in the future shall not exceed the dose constraint in any scenario, which include the strictest case in the possible scenarios which reasonably estimated.

The Final Disposal Act aims, to contribute to the appropriate usage of nuclear power generation by taking necessary steps to systematically and securely carry out the final disposal of specific radioactive waste produced from the reprocessing of the spent fuel which generated by the operation of power plant, and thereby to contribute to the sound development of the national economy and stabilization of lives of the citizenry by preparing environment for the nuclear use in regard to the power generation.

It is enacted with the consideration to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation.

H-1-7 Avoidance of imposing undue burdens on future generations.

As stated above.

H-2 Existing Facilities and Past Practices

Article 12

Each Contracting Party shall in due course take the appropriate steps to review:

(i) the safety of any radioactive waste management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility;

(ii) the results of past practices in order to determine whether any intervention is needed for reasons of radiation protection bearing in mind that the reduction in detriment resulting from the reduction in dose should be sufficient to justify the harm and the costs, including the social costs, of the intervention.

This Convention took effect in Japan on 24th November 2003.

At this moment, the existing operators were the Near-surface Pit Disposal, Near-surface Trench Disposal which have "Cat-2 Waste Disposal" licenses and Waste Interim Storage/Treatment operators.

On acceding to this Convention, the Government of Japan (GOJ) ensured that the regulation by the internal law fulfilled the obligation which provided in the Convention. Furthermore, the GOJ have been taking actions for improving safety, examples are reported as below.

H-2-1 Periodic Evaluation for safety

H-2-1-1 Safety Evaluation for Specific radioactive waste management facility and Specific radioactive waste disposal facility (repository)

The back-fit system was introduced by the amendment of the Reactor Regulation Act in 2012, a nuclear facility shall conform to the latest regulatory requirements (Standards for Reactor Installation Permit and Technical standards for reactor installation) retroactively even if it were already issued permission or approval.

When the NRA finds that the nuclear facilities do not conform to these regulations, it may order the relevant licensee of the nuclear facility to suspend use, remodel, repair or change the location of the nuclear facilities, designate a method for operating the power reactors or order the necessary operational safety measures to be taken.

Based on the NRA Ordinance enacted in July 2013, regulatory criteria for the nuclear reactors was established, and in the NRA Ordinance enacted in December 2013, regulatory criteria for the spent fuel storage facilities, reprocessing facilities, radioactive waste management facilities and radioactive waste disposal facilities were established respectively.

It is not allowed to resume operations without passing the conformity review which is the regulatory procedure to confirm that the current nuclear facilities in Japan comply with the latest safety regulatory criteria.

Cat-1 Waste Disposal (Geological Disposal) is targeted to dispose the waste which has especially high level of radioactivity such as High-Level radioactive waste or cladding of spent fuel.

This kinds of waste contain very high concentration of the radioactive materials, including the materials that emit alpha-ray which have greater influence to the human body by internal exposure (hereinafter "alpha radioactive nuclide").

These are the radioactive materials which have a possibility of immediate serious impact on the health of humans, in case of the failure in maintaining proper functionality of the relevant facility - existing above the ground where these kinds of waste are handled.

Therefore, as for repository for radioactive waste (hereinafter "the specified waste disposal facility") among the relevant facilities for Cat-1 Waste Disposal service, following regulations are applied to them, such as:

- requiring the proper functionality of the facility in design or construction retroactively
- requiring the approval for the design prior to the construction and the construction method, requiring periodic inspections, in order to maintain functionality of relevant facility through its operating lifetime.

The NRA may order the necessary measures to be taken in regard to the specified waste disposal facility, when the location, structure or equipment of the facility does not meet the criteria which stipulated by the NRA Ordinance, or the performance of the facility does not meet the technical standards which established by the NRA Ordinance.

The interim storage facility which handles certain amount of alpha radioactive nuclide, is also regulated by similar stipulation.

Regardless of the date which the Convention took into force in Japan, these stipulations are applied to existing facilities to "back-fit" to the latest requirement, therefore, the stipulations include the provision of article 12 (i) of the Convention.

H-2-1-2 Periodic Evaluation

As for Intermediate depth/Near-surface disposal facilities (repositories), the NRA Ordinance requires the licensees to:

- Conduct evaluation which latest technical knowledge taken into account until the commencement of the closure,
  - with the regular period of not longer than 10 years
  - prior to the transition of stages (such as preservation stage to closure stage)
  - prior to the backfill of tunnel (applicable for Intermediate depth disposal only)
- Take necessary measures for preserving waste disposal facilities based on the result of the periodic evaluation stated above

As for geological repositories, the NRA Ordinance requires the licensees to:

- Conduct evaluation which latest technical knowledge taken into account until the commencement of the closure with the regular period of not longer than 20 years and prior to the backfill of the tunnel
- Take necessary measures for preserving repositories based on the result of the periodic evaluation stated above

As for the waste interim storage facilities, the NRA Ordinance requires the licensees to:

- Conduct evaluation which latest technical knowledge taken into account until the commencement of the decommission with the regular period of not longer

than 10 years

- Take necessary measures for preserving facilities based on the result of the periodic evaluation stated above

H-2-2 Past Activities

In Japan, there is no radioactive waste or facilities which need intervention for reasons of radiation protection as the results of past practices.

H-3 Siting of Proposed Facilities

Article 13

1. Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed radioactive waste management facility:

(i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime as well as that of a disposal facility after closure;

(ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment, taking into account possible evolution of the site conditions of disposal facilities after closure;

(iii) to make information on the safety of such a facility available to the general public;

(iv) consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.

2. In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 11.

H-3-1 Permission for Waste Disposal activity

Any person who intends to carry out the activity of radioactive waste disposal or storage shall, for each category of waste listed in each of the items (Cat-1 Waste Disposal, Cat-2 Waste Disposal, Interim storage of Radioactive Waste), obtain the permission of the NRA.

To obtain permission, the applicant shall submit an application which describes required items such as

- the property and quantity of the nuclear fuel material or material contaminated with nuclear fuel material that are to be disposed of,
- the location, structure and equipment of the waste disposal facilities or radioactive waste storage facility, and the methods of disposal or storage,
- the timing for amendment of the measures taken for the operational safety of Cat-2 waste disposal in accordance with the attenuation of radioactivity.

When giving a permit for the relevant activity, the NRA reviews

- the applicant has sufficient technical capability and financial basis for executing the activity competently, and
- the location, structure and equipment of the waste disposal facilities or radioactive waste storage facility are such that they will not hinder the prevention of disasters resulting from nuclear fuel material or material contaminated with nuclear fuel material in accordance with the standards stipulated by the NRA Ordinance.

The NRA Ordinance for the location, structure and equipment of the Cat-2 waste disposal facilities requires that the location of the facility should not be set the areas that may have a significant impact on facilities by the natural phenomena such as volcanic activity or dislocation activity.

Furthermore, it also requires that the exposed dose of people will not exceed the dose limit through the evaluation of scenario in consideration of natural phenomena which reasonably assumed the occurrence after the period of active institutional control.

These steps comply with the article 13 1. (i) and (ii) of the Convention.

The review meetings of the NRA in regard to the procedure for the permission or approval for Disposal activity, are open to the public, therefore, the information on the review process and result are available to members of the public, which comply with the article 13 1 (iii) of the Convention.

H-3-2 Permission for disposal activity based on the Radiation Hazard Prevention Act

Any person who intends to carry out the activity of disposal of radioisotopes shall obtain the permission of the NRA, based on the Radiation Hazard Prevention Act.

On the application for permission, the applicant shall attach the document which explain

- the method of waste management,
- location, structure and equipment of: waste repacking facilities, waste storage facility, or waste management facilities, to the application document.

The NRA Ordinance stipulates the requirements for the shielding, waste storage equipment, drainage system.

H-3-3 Conformity review for the newly established regulatory standards

The NRA enforced the newly established regulatory standards in December 2013.
The conformity reviews have been conducted for

- the radioactive waste interim storage facility, of JFNL
- the radioactive waste interim storage facility of Oarai R&D Center, of JAEA
- the Cat-2 waste disposal facility (repository) of Tokai Low Level Radioactive Waste Repository, of JAPC.

H-3-4 Consideration of the effects on other Contracting Parties

Japan is an island nation surrounded by ocean, and has no land links with neighboring countries. Furthermore, the locations of radioactive waste interim storage facilities or repositories are sited at sufficient distance from land of neighboring country. As the result, these facilities have extremely low possibility to give unacceptable effects on other Contracting Parties. Therefore, Japan has no legal system in place for consultations concerning the siting of radioactive waste interim storage facility or repository.

H-4 Design and construction of facilities

Article 14

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

(i) the design and construction of a radioactive waste management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;

(ii) at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a radioactive waste management facility other than a disposal facility are taken into account;

(iii) at the design stage, technical provisions for the closure of a disposal facility are prepared;

(iv) the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis.

H-4-1 Radioactive waste storage facilities

A licensee who obtains the permission of the activity of the radioactive waste storage should obtain the authorization of the NRA about the design and method of construction of the facilities concerned based on the reactor regulation act before starting the construction. The NRA reviews and confirms that the design and the method of construction are consistent with the contents of obtained permission for the activity of radioactive waste storage, and with requirements of the NRA Ordinance for Technical Standards, and that the licensee's method of quality assurance related design and construction method and its organization for inspection comply to the requirements of the NRA Ordinance for Technical Standards.

In the Regulatory Guide of the NRA Ordinance on Standards for the Location, Structure, and Equipment of Waste Interim Storage and Treatment Facilities, regulatory requirement concerning the performance of facilities such as the prevention of criticality, the confinement, and prevention of the impact from fire, earthquake, and the other impacts from outside are described. For instance, it is described that in response to the level of influence to the public by the radiation, originated by the loss of safety function, which might be caused by an earthquake, It is necessary to design the facility so as not

to be damaged by the calculated seismic forces and does not cause the public radiation damage, and the waste storage facilities shall install shielding and take other appropriate measures so as not that doses in the vicinity of the facility caused by direct radiation and sky shine radiation shall fall below enough the dose limit that the NRA Ordinance provides.

The licensee is required to append the document that explains the design and method of construction of the equipment in the radioactive waste storage facilities which is installed for disposal or storage of radioactive wastes generated in the facilities, and those design and construction methods complies with the requirements of the NRA Ordinance. The NRA reviews the application documents, and permits if the application is approved that it complies with the technical requirements described in the Reactor Regulation Act.

The technology used for the design and construct a specified waste storage facility is evaluated in the procedure of the review of the design and method of construction. It is an obligation of the licensee to prove that the applied facility is designed to have a performance which satisfies the requirements of the NRA Ordinance for Technical Standards for design and construction of waste storage facilities, and this ensures that the appropriate technology is applied to the design and construction. In addition, the licensee is required to develop a design and development plan, and to check, verify and validate it, and ensures that the facility complies to the required performance, purpose of usage, or the requirements concerning to the method of usage in accordance with the NRA Ordinance for Technical Standards for quality assurance of waste storage facilities.

The procedure of the decommissioning of the radioactive waste storage facilities is provided for by the reactor regulation act. Licensee is required to develop the decommissioning plan and obtain the authorization of the NRA in the stage where facilities terminate their operation.

H-4-2 Waste disposal facility

The activity applicant is requested to explain measures to ensure isolation, including the selection of an appropriate location (in case of disposal inside mid-depth and geological disposal) and measure for confinement and shielding at the review stage of the activity application, about the design of the waste disposal facility to reduce the risk according

to the event assumed not only during under the regulation but also after the period of regulation.

The NRA confirms the validity, and if it complies with the design standard including dose limit for the public, the NRA permits the activity.

In the construction phase of facilities after the license, the licensee applies to the NRA for the confirmation that the waste disposal facility is constructed in accordance with the permitted design. The NRA confirms that the waste disposal facility and the measures for operational safety comply with the requirements of the technical standard in the NRA Ordinance.

The licensee develops the operational safety program before beginning to accept radioactive waste, and the NRA confirms the validity, and approves the operational safety program.

Appropriate measures are taken to comply with the regulations of Article (i) 14 by the above-mentioned regulatory regime.

Moreover, it is thought to provide the guideline for the licensing standard, that the natural barrier where the access tunnel is set up, should have provisions that tunnels can be closed so as not to make a path to which the radioactive substance is moved easily, based on the drilling technology and the backfill technology that can be used reasonably at the design stage.

This standard complies with the regulations of Article 14 (iii) of the Joint Convention related to the close measures of the tunnel.

It is thought that the guideline of the licensing standard for the waste disposal facility requires the licensee to explain that the waste disposal site can be technically constructed in the site environment, and after comparison and consideration of construction, installation technology, and the design utilizing those technologies, selecting structure and specification by the excellent technology etc. which can be utilized reasonably, and to explain the basis of the design and technology.

Moreover, it is thought in the NRA Ordinance that licensee is requested to submit the documents to explain that the facility to be constructed complies with the permitted design in addition to the installation method of the facility and the timing of confirmation of the structure of main parts, when licensee makes a confirmation application to the NRA.

By the requirement above, the appropriateness of the technologies supported by experience, testing or analysis that is regulated in the Article 14 (iii) of the Joint Convention are explained by licensee.

H-4-3 Facilities of waste disposal activity etc. based on Radiation Hazards Prevention Act.

The person who tries to obtain the permission of the waste disposal activity based on the Radiation Hazards Prevention Act is required to submit for the application to the NRA. Licensee is requested to attach documents explains about method of disposal, position, structure and facilities for refill, storage and disposal with the application to the NRA.

Licensee is requested that the shield wall or other shielding object, ventilation equipment, water discharge equipment complies with the technical standards required by law in order to reduce impact by radiation.

In addition, the person who obtains the permission of the activity of waste disposal shall obtain the confirmation that complies to the technical standards before the usage of the facility.

The NRA confirms appropriately that the radioactive waste disposal facility complies to the technical standards in the stage of the permission for the activity, based on the Radiation Hazards Prevention Act.

H-4-4 New measures according to law revision

In the process of decommissioning, licensee is required to submit the Decommissioning (closure) Plan describing about the dismantling of auxiliary facilities left on the ground, and the NRA reviews the compliance with the standards decided by the NRA. If it complies with the standards, the NRA approves the Decommissioning (closure) Plan.

In the revision of the reactor regulation act in 2017, licensee who intend to start the service of radioactive waste disposal is required to establish and publicly announce a policy for decommissioning such as dismantling facilities, transfer of the nuclear fuel material, disposal of radioactive waste. The decommissioning policy shall establish and include the amount of material which is contaminated by spent fuel, the estimate for cost and sources and methods of raising funds, and any other necessary matter for the decommissioning.

By this mechanism, appropriate measures are taken to comply with the regulations of Article 14 (iii) of the Joint Convention.

Special Provisions stipulated so that radioactive waste which is regulated by Radiation Hazards Prevention Act can be treated rationally as radioactive waste under regulation of Reactor Regulation Act when disposal of concerned radioactive waste is confided to the licensee permitted by Reactor Regulation Act.

H-5 Safety assessment of facilities

Article 15

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

(i) before construction of a radioactive waste management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;

(ii) in addition, before construction of a disposal facility, a systematic safety assessment and an environmental assessment for the period following closure shall be carried out and the results evaluated against the criteria established by the regulatory body;

(iii) before the operation of a radioactive waste management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).

H-5-1 Radioactive waste storage facilities

The procedure before the construction of radioactive waste storage facilities are as reported in H3 and H4.

Concretely, the person who tries to obtain the permission of the activity in the procedure of the permission of the waste disposal activity is required to append "Document concerning safety design of radioactive waste storage facilities", "Document concerning the disposal of exposure management of the radiation with the nuclear fuel material etc. and radioactive wastes" and "Document concerning the kind, level and impact of the accident of the radioactive waste storage facilities assumed to be caused when a mis-operation, failure of the machine or the device, flooding, earthquake, fire, and explosion of the equipment in the radioactive waste storage facilities, etc." and to explain the result of the safety evaluation. In the course of the NRA's permission, approvals of these documents are also included.

In the NRA Ordinance for waste disposal technical standard, required performance which waste disposal facility should have, such as prevention of criticality, shielding, confinement, heat removal and the prevention of the damage from fire, earthquake,

tsunami, and impact from outside, and prevention of radiation damage at the design maximum evaluation accident and the performance of each equipment are provided for. A systematic evaluation concerning safety is performed in accordance with this standard.

Licensee is required to obtain the NRA's approval for the design and method of construction of facilities concerned before construction starts after obtaining the permission of the waste disposal activity. In this process of licensing, licensee is required to submit document explaining that the design and method of construction complies with requirements of the NRA Ordinance for technical standards by calculation.

The review of these documents by the NRA is included in the process of licensing. In the NRA Ordinance for technical standards for waste disposal facility, performance needed for the facility, such as prevention of criticality, shielding, confinement, heat removal, protection of damage from fire, earthquake, tsunami and the outside impact, performance of each equipment are described. And a systematic evaluation concerning safety is performed in accordance with this standard. In this phase, the evaluation is based on the concrete facility design, so is more detailed than that of the licensing phase.

H-5-2 Waste disposal facility

The procedure for the evaluation concerning safety of the waste disposal facility is reported in H3 and H4.

Appropriate measures are taken in the provision of Article 15 (i) and (ii) of the Joint Convention.

Moreover, licensee is required to develop the operational safety program related to an operational safety activity before the start of operation, and the NRA confirms the validity, and approves the operational safety program in accordance with the Reactor Regulation Act. As a result, the appropriate measures are taken in the provision of Article 15 (iii) of the Joint Convention.

H-5-3 Facilities of waste disposal activity based on the Radiation Hazards Prevention Act.

For the review of waste disposal facility based on the Radiation Hazards Prevention Act., the NRA reviews that the site condition and facility comply with the technical standard of the act and related regulation, and permits the activity if the application is appropriate.

For the site condition, it is required that the facility should be installed in the location where there is a small risk of ground slide and flooding, and it is required that the main structure of the facility is fire resisting structure, and the material should be noninflammable, shield wall or the shielding structure is required to be installed.

H-6 Operation of facilities

Article 16

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

(i) the licence to operate a radioactive waste management facility is based upon appropriate assessments as specified in Article 15 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements;

(ii) operational limits and conditions derived from tests, operational experience and the assessments as specified in Article 15 are defined and revised as necessary;

(iii) operation, maintenance, monitoring, inspection and testing of a radioactive waste management facility are conducted in accordance with established procedures. For a disposal facility the results thus obtained shall be used to verify and to review the validity of assumptions made and to update the assessments as specified in Article 15 for the period after closure;

(iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a radioactive waste management facility;

(v) procedures for characterization and segregation of radioactive waste are applied;

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

(vii) programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate;

(viii) decommissioning plans for a radioactive waste management facility other than a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body.

(ix) plans for the closure of a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility and are reviewed by the regulatory body.

H-6-1 Radioactive waste storage facilities

Licensee of the waste storage facilities which obtained the approval of the NRA about the design and method of construction of the radioactive waste storage facilities cannot

use facilities concerned is required to receive and pass the inspection about the construction and the performance by the NRA. And the licensee cannot use the waste storage facilities unless it passes the inspections.

By the inspection, the NRA confirms that the facility is constructed in accordance with the approved design and method of construction, and that the performance of the facility complies with the regulatory requirements of the NRA Ordinance.

In the NRA Ordinance on Technical Standards for the Capabilities for Specific Waste Disposal Facility or Specific Waste Interim Storage and Treatment Facility, the function of confinement, shielding, heat removal, the prevention of damage from fire, earthquake, tsunami, and external impacts are described, and those are confirmed by the inspections.

The licensee of waste disposal activity should obtain the approval for the Operational Safety Programs from the NRA before starting operation. The implementation of the Operational Safety Programs is required by the law, in the case of violation, the NRA could impose penalties such as revoke permits and suspend the operation of facilities within one year. The main items indicated in Operational Safety Programs are as follows:

- The system for implementing relative laws and Operational Safety Programs
- The system and organization for fostering safety culture
- Quality assurance for waste storage facilities
- Duties and organization of personal who manage and operate waste storage facilities
- The job description and range of Chief Engineer for Radioactive Waste Handling and the positioning in organization and necessary authority for Chief Engineer for Radioactive Waste Handling's supervising
- Education on operational safety for radiation workers in waste storage facilities
- Operating equipment which need management especially for operational safety
- Establish Radiation Controlled Area, Surrounding Monitored Area and access control for those area
- Exhaust gas and effluent monitoring equipment
- Dose, equivalent dose, concentration of radioactive substance, monitoring density of surface contaminated by radioactive material and removal of contamination
- Management of dose meter and methods of dose monitoring
- Walk-down, inspection and measures for waste storage facilities
- Periodic facilities self-inspection for waste storage facilities

- Receipts, transportation and other handling for radioactive waste
- Measures for emergency
- Appropriate report and record of operational safety for waste storage facilities
- Periodic assessment for waste storage facilities
- Distributing and sharing technical information obtained from maintenance inspection operators to other waste storage facilities operator
- Disclose information of non-conformance in case of occurrence on non-conformance
- Other necessary items of safety operation for waste storage facilities

The licensee of waste disposal activity should take an inspection that the NRA periodically conducts for which the licensee complies with the Operational Safety Program. The Operational Safety Inspection is conducted four times in a year.
The licensee of waste disposal activity should take Periodic Facility Inspection by the NRA for which it confirms periodically that the performance of the facility complies to the regulatory requirements of the NRA Ordinance based on the the Reactor Regulation Act.

If events occurred such that nuclear fuel material is stolen or missing, or functions of confinement, shielding, heat removal due to the failure of waste disposal facility or function to prevent damage from fire, explosion at the facility were lost, or possibilities of losing those functions, the licensee of waste disposal facilities shall report to the NRA in accordance with then Reactor Regulation Act.

When the licensee terminates the radioactive waste storage activity, the licensee is required to obtain the authorization of the Decommissioning Plan based on the Reactor Regulations Act.

As decommissioning measures for waste storage activity, the licensee is required dismantling the waste storage facility, decontamination by the nuclear fuel materials, disposal of the nuclear fuel material etc., transmittal of radiation control records to the organization designated by the NRA.

For the application, licensee of waste storage facility is requested to append document describing the management of radiation exposure during decommissioning, document describing kind, level and impact of accident which is assumed due to failure of machine or equipment, flooding, earthquake or fire, etc., document concerning the distribution of

contamination by nuclear fuel material and evaluation method, document concerning the waste storage facilities of those function should be maintained during decommissioning and its performance and period.

The acceptance criteria for the decommissioning plan is that all the nuclear fuel material related to disposal and storage is transported from the radioactive waste storage facilities, and the management, disposal and storage of nuclear fuel materials are appropriate, and that decommissioning is performed appropriately in the point of disaster preparedness by the nuclear fuel material etc.

H-6-2 Cat-1 waste disposal facilities

Licensee who obtained the permission of the activity of the waste disposal facilities is required to get the confirmation of the NRA that the waste disposal facility other than a specific waste disposal facility and its Operational Safety Program complies to regulatory requirements of the NRA Ordinance.

For the specific waste disposal facility, after obtaining the NRA's approval for design and construction method, licensee is not allowed to use the facility unless the licensee have the NRA inspection concerning the construction and performance and pass the inspection.

In this inspection, the NRA confirms that construction is conducted properly according to the approved design and method of construction, and that the performance of facilities complies with the technical standards of the NRA Ordinance.
In the NRA Ordinance on Technical Standards for the Capabilities for Specific Waste Disposal Facility or Specific Waste Interim Storage and Treatment Facility, the function of confinement, shielding, heat removal, the prevention of damage from fire, earthquake, tsunami, and impacts from outside are described, and those are confirmed by the inspections.

The licensee of waste disposal activity should obtain the approval for the Operational Safety Programs from the NRA before starting operation. The implementation of the operational safety programs is required by the law, in the case of violation, the NRA could impose penalties such as revoke permits and suspend the operation of facilities within one year. The main items indicated in Operational Safety Programs are as follows:

- The system for implementing relative laws and Operational Safety Programs
- The system and organization for fostering safety culture
- Quality assurance for waste disposal facilities
- Duties and organization of personal who manage and operate waste disposal facilities
- The job description and range of Chief Engineer for Radioactive Waste Handling and the positioning in organization and necessary authority for Chief Engineer for Radioactive Waste Handling's supervising
- Education on operational safety for radiation workers in waste disposal facilities
- Operating equipment which need management especially for operational safety
- Establish Radiation Controlled Area, Surrounding Monitored Area and Preservation Area, and access control for those area
- Exhaust gas and effluent monitoring equipment
- Dose, equivalent dose, concentration of radioactive substance, monitoring density of surface contaminated by radiation substance and removal of contaminated.
- Management of dose meter and methods of dose monitoring
- Walk-down, inspection and measures for waste disposal facilities
- Periodic facilities self-inspection for waste disposal facilities
- Receipts, transportation and other handling for spent radioactive waste
- Measures for emergency
- Appropriate report and record of operational safety for waste disposal facilities
- Periodic assessment for waste disposal facilities
- Distributing and sharing technical information obtained from maintenance inspection operators to other waste disposal facilities operator
- Disclose information of non-conformance in case of occurrence on non-conformance
- Other necessary items of safety operation for waste disposal facilities

The licensee of waste disposal activity should take an inspection that the NRA periodically conducts for which the licensee complies with the Operational Safety Program. The Operational Safety Inspection is conducted four times in a year.
The licensee of waste storage activity should take Periodic Facility Inspection by the NRA for which it confirms periodically that the performance of the facility complies to the regulatory requirements of the NRA Ordinance based on the requirement of the Reactor Regulation Act.

If events occurred such that nuclear fuel material is stolen or missing, or functions of

confinement, shielding are lost due to the failure of waste disposal facility or loss of function to prevent damage from fire, explosion at the facility, or possibilities of losing those functions, the licensee of waste disposal facilities shall report to the NRA in accordance with then Reactor Regulation Act.

Licensee of the Cat-1 waste disposal activity is required to develop the closure plan and obtain the NRA's approval when the tunnel of the facility is closed. Licensee is required to describe the plan concerning backfilling the tunnel, blockage of the pithead, and other measures in the closure plan, and to attach document concerning management of radiation exposure during closure, document concerning kind, level and impact of accident of waste disposal facility assumed to be caused due to the human error, failure of machine or equipment, flooding, earthquake, or fire, etc., document concerning waste disposal facility which should keep its function during closure, and its performance, and period needed to maintain the performance.

The acceptance criteria for the closure plan is that closing measures are consistent with contents described in the approved application documents, and that the closing measures are appropriate for prevention of disaster by the nuclear fuel materials.

Licensee of the Cat-1 waste disposal activity is required to get the confirmation of the NRA for each step of the tunnel closure which the NRA decides that the closing measures are conducted in accordance with closure plan.

Licensee of waste disposal activity is requested to obtain the approval of Decommissioning Plan of the NRA based on regulations of the Reactor Regulation Act when the disposal activity is terminated. What to do as a decommissioning for a Cat-1 waste disposal facility is dismantling auxiliary facility at the site of waste disposal facility, decontamination by the nuclear fuel materials, disposal of nuclear fuel material, and transfer of radiation control report to the organization designated by the NRA.

Licensee is required to append the document concerning radiation control during decommissioning, kind level and impact of accident of waste disposal facility assumed to be caused due to human error, failure of machine or equipment, flooding, earthquake and fire, document concerning distribution of contamination due to the nuclear fuel materials and evaluation method, document concerning waste disposal facility needed to maintain function during decommissioning and the performance and the period.

The acceptance criteria of decommissioning plan is that backfilling of all the tunnels are completed, and that management, storage and disposal of nuclear fuel material are appropriate, implementation of decommissioning is appropriate according to the prevention of disaster of nuclear fuel materials.

H-6-3 Cat-2 waste disposal facilities

Licensee who obtained the permission of the activity of the category 2 waste disposal facilities is required to get the confirmation of the NRA that the facility and its Operational Safety Program complies to regulatory requirements of the NRA Ordinance.

The licensee of waste disposal activity should obtain the approval for the Operational Safety Programs from the NRA before starting operation. The implementation of the operational safety programs is required by the law, in case of violation, the NRA could impose penalties such as revoke permits and suspend the operation of facilities within one year. The main items indicated in Operational Safety Programs are as follows:

- The system for implementing relative laws and Operational Safety Programs
- The system and organization for fostering safety culture
- Quality assurance for waste disposal facilities
- Duties and organization of personal who manage and operate waste disposal facilities
- The job description and range of Chief Engineer for Radioactive Waste Handling and the positioning in organization and necessary authority for Chief Engineer for Radioactive Waste Handling's supervising
- Education on operational safety for radiation workers in waste disposal facilities
- Operating equipment which need management especially for operational safety
- Establish Radiation Controlled Area, Surrounding Monitored Area and Preserved Area and access control for those area
- Exhaust gas and effluent monitoring equipment
- Dose, equivalent dose, concentration of radioactive substance, monitoring density of surface contaminated by radiation substance and removal of contaminated.
- Items concerning the observation of the site and the circumference to obtain the necessary information for the periodical evaluation of the waste disposal facility.
- Management of dose meter and methods of dose monitoring
- Walk-down, inspection and measures for waste disposal facilities

- Receipts, transportation and other handling for waste disposal facilities
- Measures for emergency
- Appropriate report and record of operational safety for waste disposal facilities
- Periodic assessment for waste disposal facilities
- Distributing and sharing technical information obtained from maintenance inspection operators to other Cat-1 and Cat-2 waste disposal facilities operator
- Disclose information of non-conformance in case of occurrence on non-conformance
- Other necessary items of safety operation for waste disposal facilities

The licensee of waste disposal activity should take an inspection that the NRA periodically conducts for which the licensee complies with the operational safety program. The operational safety inspection is conducted four times in a year.

If events occurred such that nuclear fuel material is stolen or missing, or functions of confinement, shielding are lost due to the failure of waste disposal facility or loss of function to prevent damage from fire, explosion at the facility, or possibilities of losing those functions, the licensee of waste disposal facilities shall report to the NRA in accordance with then the Reactor Regulation Act.

Licensee of the waste disposal activity is required to develop the decommissioning plan and obtain the NRA's approval based on the Reactor Regulation Act. What to do as a decommissioning for a Cat-2 waste disposal facility is dismantling auxiliary facility at the site of waste disposal facility, decontamination by the nuclear fuel materials, disposal of nuclear fuel material, and transfer of radiation control report to the organization designated by the NRA.

Licensee is required to append the document concerning radiation control during decommissioning, kind level and impact of accident of waste disposal facility assumed to be caused due to human error, failure of machine or equipment, flooding, earthquake and fire, document concerning distribution of contamination due to the nuclear fuel materials and evaluation method, document concerning waste disposal facility needed to maintain function during decommissioning and the performance and the period.

The acceptance criteria of decommissioning plan are;

- going beyond the timing for amendment of the measures taken for the operational

safety of Category 2 waste disposal in accordance with the attenuation of radioactivity

- there is no need to take measures for preservation of the waste disposal site,
- the management, including storage and disposal of nuclear fuel material are appropriate,
- implementation of decommissioning is appropriate according to the prevention of disaster caused by nuclear fuel materials.

H-6-4 Waste disposal activity based on Radiation Hazards Prevention Act.

For the waste disposal facilities based on the Radiation Hazards Prevention Act., licensee is required to evaluate mainly by the above articles, obtain the permit and have the facility inspection by the NRA before operation. Waste disposal facility cannot be used unless licensee passes the inspection, and it is mandatory to comply with the requirements.

H-6-5 Technological, technical support

A licensee of waste storage facility and a licensee of waste disposal facility can voluntarily take flexible measure for the necessary technological and technical support for ensuring safety of relevant facility.
When the licensee consigns technical support for the operation management of facilities to a special contractor, the licensee is requested appropriately to manage and audit the contractor in accordance with its own Quality Management Program in the Operational Safety Program, and the NRA confirms this by operational safety inspection etc.

H-6-6 Identification of source materials and classification of waste

Radioactive waste is disposed of appropriately after the identification of source material and characteristic of waste is understood to prevent significant impact on human's health.

As for the classification considering the disposal methods of radioactive waste, classification standard based on the kind and quantity of the radioactive substance included in the radioactive waste is described in the Cabinet Order for Enforcement of the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and

Reactors.

Concretely, criteria of the waste disposal subjected to the Cat-1 waste disposal, are as follows;

nuclide	Concentration (per ton)
Carbon 14	10 PBq
Chlorine 36	10 TBq
Technetium 99	100 TBq
Iodine 29	1 TBq
Radioactive substance emits alpha ray	100 GBq

Other waste including radioactive substances are in the scope of Cat-2 waste disposal. As for the Cat-2 waste disposal, the concentration limit of each kind of the radioactive substance included in radioactive waste is provided in the NRA Ordinance on Activity of Cat-2 Waste Disposal of Nuclear Fuel Material or Materials Contaminated by Nuclear Fuel Material, and radioactive waste is classified based on these limitation to either of the trench disposal, the pit disposal or the intermediate depth disposal.

The person who does the waste disposal activity should obtain the permission of the activity according to the above-mentioned classification.

H-6-7 Use of operating experience

The licensee is requested to evaluate the status of licensee's operational safety activity, and evaluate the status of introducing the latest technical findings to the operational safety activity, and a technical evaluation concerning the aging, as a periodical evaluation based on "the NRA Ordinance on the Activity of Waste Interim Storage and Treatment of Nuclear Fuel Material or Material Contaminated by Nuclear Fuel Material" every ten years. Licensee is required to evaluate the implementation status of reflecting the lesson learned from operational experiences from domestic and overseas facilities, as a part of evaluation status of operational safety activity.

Reflection of the operating experience into the regulation and treatment by licensee is reported in "G6"

H-7 Institutional measures after closure

Article 17

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility:

(i) records of the location, design and inventory of that facility required by the regulatory body are preserved;

(ii) active or passive institutional controls such as monitoring or access restrictions are carried out, if required; and

(iii) if, during any period of active institutional control, an unplanned release of radioactive materials into the environment is detected, intervention measures are implemented, if necessary.

Regarding Cat-1 Waste Disposal (geological disposal) and Intermediate Depth Disposal for Cat-2 Waste Disposal , the NRA shall designate site for waste disposal facilities, surrounding area and underground of those area as certain range of dimensional area (as follows the designated waste disposal area) before starting operation. Within the designated waste disposal area, no person shall dig out site without permission from the NRA. This provisions were stipulated in the amendment of Reactor Regulation Act promulgated in April 2017.

In addition, according to this act, the NRA shall give public notice of record for the designated waste disposal area and keep those permanently. Since those institutional systems are remained after the end of regulation periods, those measures are compiled to article 17 (i) and (ii) of this convention.

Also the NRA Ordinance based on the Act requires that the licensee for disposal activity shall monitor the leakage of radioactive material and shall take necessary measures to prevent abnormal leakage of radioactive material such as repair of the repository in case of detecting abnormal leakage.

That means measures for article 17 (i) and (ii) of JC are to be taken.

Section I Transboundary Movement

Article 27

1. Each Contracting Party involved in transboundary movement shall take the appropriate steps to ensure that such movement is undertaken in a manner consistent with the provisions of this Convention and relevant binding international instruments.

In so doing:

(i) a Contracting Party which is a State of origin shall take the appropriate steps to ensure that transboundary movement is authorized and takes place only with the prior notification and consent of the State of destination;

(ii) transboundary movement through States of transit shall be subject to those international obligations which are relevant to the particular modes of transport utilized;

(iii) a Contracting Party which is a State of destination shall consent to a transboundary movement only if it has the administrative and technical capacity, as well as the regulatory structure, needed to manage the spent fuel or the radioactive waste in a manner consistent with this Convention;

(iv) a Contracting Party which is a State of origin shall authorize a transboundary movement only if it can satisfy itself in accordance with the consent of the State of destination that the requirements of subparagraph (iii) are met prior to transboundary movement;

(v) a Contracting Party which is a State of origin shall take the appropriate steps to permit re-entry into its territory, if a transboundary movement is not or cannot be completed in conformity with this Article, unless an alternative safe arrangement can be made.

2. A Contracting Party shall not licence the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees south for storage or disposal.

3. Nothing in this Convention prejudices or affects:

(i) the exercise, by ships and aircraft of all States, of maritime, river and air navigation rights and freedoms, as provided for in international law;

(ii) rights of a Contracting Party to which radioactive waste is exported for processing to return, or provide for the return of, the radioactive waste and other products after treatment to the State of origin;

(iii) the right of a Contracting Party to export its spent fuel for reprocessing;

(iv) rights of a Contracting Party to which spent fuel is exported for reprocessing to return, or provide for the return of, radioactive waste and other products resulting from reprocessing operations to the State of origin.

The electric power utilities in Japan have concluded reprocessing contracts with the United Kingdom and French companies and exported 7,100MTU of spent fuel between 1969 and 2001. They, in return, receive nuclear fuel material recovered from the spent fuel and vitrified waste generated in the reprocessing. 1,830 vitrified waste canisters were sent back to Japan between 1995 and March 2017 and the remaining packages will be returned in the next approximately five years. As they are constructing a reprocessing plant at Rokkasho Village in Aomori Prefecture since 1993, there has not been any contract of spent fuel with the United Kingdom and French companies after 2002.

I-1 Transboundary movement

I-1-1 Steps to Ensure Prior Notification and Consent of the State of Destination

For the export of the spent fuel or the radioactive waste, the Foreign Exchange and Foreign Trade Control Law provides that an applicant should apply for and obtain the Export Permit from the Minister of METI. This Export Permit should be applied once it is confirmed that the authorities of the State of destination recognized the administrative and technical capacity of the importer.

I-1-2 Steps to Ensure Transboundary Movement Subject to International Obligations

Japanese domestic laws, such as the Ship Safety Law, etc., have incorporated obligations under the IAEA Regulations for the Safe Transport of Radioactive Materials and relevant international conventions on each mode of transport, such as International Convention for the Safety of Life at Sea (SOLAS), etc.

I-1-3 Consent as a State of Destination

As stated in Section B, G, H and I, Japan has the administrative and technical capacity, as well as the regulatory structure, needed to manage the spent fuel or the radioactive waste. That means measures for article 27 (iii) of JC convention are to be taken.

I-1-4 Confirmation of the Capacity of a State of Destination

The Foreign Exchange and Foreign Trade Control Law provides that an exporter should apply for and obtain the Export Permit from the Minister of METI for the export of the spent fuel or the radioactive waste. The Minister of METI judges the grant of the Export Permit after confirming the general conditions of safety of the country of destination such as its regulatory structure, the membership in relevant international agreements, and the administrative and technical capacity of the importing body.

I-1-5 Steps to Permit Re-entry in case of Uncompleted Transboundary Movement

The Import Trade Control Order allows, as special exemption, re-entry of exported goods, in case of uncompleted transboundary movement so long as original characteristics and configuration of exported goods are preserved, and the other case of the exemption is a transport accident. Re-entry of exported spent fuel and radioactive waste is allowed by that provision.

I-2 Prohibition of shipment to a destination south of latitude 60 degrees South

The Foreign Exchange and Foreign Trade Control Law provides that an applicant should apply for and obtain the Export Permit from the Minister of Ministry of Economy, Trade and Industry for the export of the spent fuel or the radioactive waste. The Export Permit is judged by considering implementation of international convention for the export of spent fuel or radioactive waste to a destination south of latitude 60 degrees south for storage or disposal.

Section J Disused Sealed Sources

Article 28

1. Each Contracting Party shall, in the framework of its national law, take the appropriate steps to ensure that the possession, remanufacturing or disposal of disused sealed sources takes place in a safe manner.

2. A Contracting Party shall allow for reentry into its territory of disused sealed sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer qualified to receive and possess the disused sealed sources.

The use and disposal of radioisotopes and the use of radiation generation apparatuses is regulated by Radiation Hazards Prevention Act, as mentioned in paragraph E2.1. Sealed sources are also regulated by this Act. Licensees are responsible for safety and ensuring it means radioisotopes are properly controlled.

J-1 Regulatory framework for sealed sources

The NRA, as the competent regulatory authority, conducts safety reviews and on-site inspections in accordance with this Act. The safety of radioactive sources is effectively ensured through regulation under this Act, as described below. A person who intends to use a larger quantity of radioactive sources than specified shall apply for a license or notify to the regulatory authority.

The Radiation Hazards Prevention Act prescribes technical criteria and requirements for the use of facilities and other criteria such as dose limits for radiation workers. For example, to ensure radiation safety, the licensee must:

- limit access to storage facilities through the use of locks;
- install walls or fences to restrict easy access to the boundary of controlled areas; and
- prohibit entry into controlled areas without permission of the facility supervisor.

The licensee is responsible for annually submitting to the NRA a facility management report, including the inventory of radioactive sources at the end of the fiscal year. The NRA carries out on-site facility inspections, if needed, and checks that the inventory of radioactive sources corresponds to the amount permitted to the license.

In accordance with the IAEA's "Code of Conduct on the Safety and Security of Radioactive Sources", operators must report to the NRA details of the specification, receipt and issue of any sealed radioactive isotopes above a set amount which have potential significant risks to human health. In addition, they must provide the NRA with a report on any such radioactive sources in their possession at the end of each fiscal year.

As a result of this strict regulatory system, there have been no occurrences that pose significant risks to the public, such as exposure to "orphan sources"

J-2 Management of radioactive sources

Legal restrictions are imposed to ensure that the possession of high activity sealed radioactive sources is not allowed other than authorized license holders. There is a well-established mechanism for the handover of disused radioactive sources to licensees with the requisite expertise. Licensees are obliged to submit notification of a decommissioning plan to the regulatory body when they terminate the use of sources, and to report the outcome of the handover.

All licensees shall conduct an annual inventory check of both sealed and unsealed radioactive sources in their possession and report the results to the regulatory body, to prevent the occurrence of orphan sources. The Radiation Hazards Prevention Act prescribes penalties and underlines that responsibility for managing the safety of radioactive sources lies with the licensee.

Most sources in Japan are imported from overseas; sources with a long half-life and high activity are returned to the original foreign manufacturers. Regarding the distribution of radioisotopes and sealed sources in Japan, a single supplier (the Japan Radioisotope Association) organizes the entire process, from distribution and delivery of almost all radioactive sources to the recovery of disused radioactive sources.

As a result, there have been no serious radiation hazard incidents involving radioactive sources or orphan sources to date.

J-2-1 Criteria for the storage of disused sealed radioactive sources

The Radiation Hazards Prevention Act prescribes the following technical criteria relating to the storage of sealed sources.

- Sealed sources shall be put in containers and stored in storage pits or bins.
- Sealed sources shall not be stored in quantities exceeding storage capacity.
- Appropriate measures, such as
  - installing shields,
  - distancing personnel from sealed sources, and
  - shortening the time during which personnel may be exposed to radiation,

  shall be taken to prevent radiation workers being exposed to levels exceeding the effective dose limit.
- Appropriate measures, such as immobilizing storage bins, shall be taken to prevent containers storing sealed sources from being transferred from one place to another without permission.
- Appropriate measures shall be taken to prevent surface contamination from exceeding the surface contamination density limit.
- Radioactive contaminated substances whose surface concentration exceeds one-tenth of the surface contamination density limit shall not be taken out of the controlled area without permission.
- A notice showing the precautions necessary to prevent radiation hazards shall be posted at an appropriate location within storage facilities.
- Appropriate measures shall be taken to prevent unauthorized persons entering a controlled area.

J-2-2 Response to missing radioactive sources

In accordance with the regulation, in case of loss of any radioactive sources, the licensee shall immediately report the matter to the police and the regulatory body. The regulatory body will order the licensee to conduct an immediate search for the lost source, while the police will carry out a criminal investigation if the loss is associated with a criminal act. The NRA will also conduct an INES rating of the loss, in accordance with the additional guidance for rating events related to radiation sources, and will report the resultant rating to the IAEA.

J-2-3 Response to orphan sources

If an orphan source is found, the NRA request and instruct the manager of the site or facility to take sources in safe condition. The NRA or cooperation organization might dispatch personnel to the site or facility. Basically an orphan source has to be managed by the owner with permission. After the NRA take measures, in most cases, the NRA intermediate to responsible party to order the Japan Radioisotope Association for recovery and proper management of the orphan source.

J-2-4 Response to accidents involving radioactive sources

In the event of an accident involving a radioactive source, the police and fire service will carry out immediate initial measures depending on the notification. The regulatory body will dispatch radiation inspectors to instruct the licensee on the proper measures to be implemented.

J-2-5 Long-term management of sealed radioactive sources unreturnable to the manufacturers

As previously described, most sealed radioactive sources used in Japan are manufactured abroad, imported and then returned to foreign manufacturers after use. Therefore, Japan has few sealed radioactive sources that are unreturnable to the manufacturers. The storage and management of some unreturnable sealed radioactive sources are carried out pursuant to the Radiation Hazards Prevention Act. Accordingly, there are no specific issues at present concerning unreturnable sealed sources.

J-3 Reentry of returning sealed sources

The reentry of approved sealed sources which have been returned from abroad by a manufacturer licensed under the Radiation Hazards Prevention Act is allowed within the scope of the storage capacity stipulated in the license. In this situation, licensees, when importing and exporting such sources, shall comply with legislation or procedures concerning import-export management consistent with the IAEA's Guidance on the Import and Export of Radioactive Sources. A manufacturer intending to possess or renew the returned sealed sources is required to store them in accordance with the

storage criteria prescribed in the Radiation Hazards Prevention Act.

Section K Planned Activities to Improve Safety

K-1 General Efforts to Improve Safety during reporting period

K-1-1 Conformity Review for the spent fuel/radioactive waste management facilities

A Nuclear Fuel Cycle Facilities shall obtain permission and approvals in the Conformity Review on the regulatory requirements, which enacted in Dec 2012 and embodied the back-fit systems pursuant to the Reactor Regulation Act with exemption for operating waste repository and moratorium for existing waste management facilities.

The NRA is reviewing conformity for following facilities which correspond to the relevant definition of this convention, as of March 2017.

Spent fuel management facilities:

- Reprocessing plants of Japan Nuclear Fuel Ltd (JNFL) (under construction)
- Spent fuel storage facility of Recyclable-Fuel Storage Co. (RFSC) (under construction)

Radioactive waste management facilities:

- Waste storage facility of JNFL
- Waste storage facility of JAEA
- Cat-2 Waste Disposal Facility of Japan Atomic Power Co. (JAPC) (new build)

As for reprocessing facility, in accordance with the provisions of the Reactor Regulation Act, the NRA may order suspension of operation, modification, repair or transfer of the facility, specification of operating method or other actions required to ensure safety, - if the location, structure, or equipment of the facility is not comply with the standards based on the provisions of the "NRA Ordinance on Standards for the Location, Structure, and Equipment of Reprocessing Facilities".

If the licensee does not comply with the order, the NRA may rescind the designation of reprocessing activity, or may specify a period not exceeding one year and order suspension of the activity for that period.

The Act requires the compliance with the regulatory requirements that have been newly enacted, as legal obligations for spent fuel interim storage and waste management facilities. JNFL (for reprocessing facility and RW interim storage facility) and RFSC (for spent fuel interim storage facility) submitted the applications for the Conformity Review, to the NRA in January 2014. JNFL have revised the application in regard to the reprocessing facility 10 times with the progress of examination. In regard to the waste storage facility of JAEA, JAEA submitted the application in February 2014 and revised once. JAPC submitted the application for new Cat-2 Waste Disposal Facility in July 2015.

To ensure transparency and openness of decision-making process with regard to the regulation, the NRA has a policy that meetings such as examination of applications are generally open to the public. Therefore, people are able to listen to the meeting as audiences, and are able to access the movies of the meeting in live webcast on YouTube and as recorded video.

In addition, minutes and distributed materials at the meeting are made available afterwards at the NRA Website.

K-1-2 Dialogue with the nuclear industry

The NRA has been making opportunities to exchange views with top management of licensees of major nuclear facilities since October 2014, in order to:

- Promote efforts for improvement in safety based on the dissemination of safety culture in Japan
- Hear opinions on basic policy for voluntary safety improvement of licensees, and perspectives and idea on improving current regulatory system for continuous improvement in safety.

Considering the status of implementation so far, the NRA decided to continue to have a dialog with such top managements about once a month.
As agenda, the meeting supposed to deal with

- Their voluntary efforts or improvement to enhance safety by the licensees after the previous meeting
- Any other issues proposed by the NRA or licensees prior to the meeting and so forth.

In regard to the dialogues between the NRA and such top managements, the NRA had dialogues with all major licensees at least once.

The NRA decided to continue the dialogue considering the following significance.

- From the top managements perspective, it is worthwhile to directly express their opinion to the NRA in a public place, which increase awareness of the licensees in regard to the responsibility.

- From the NRA perspective, it is important to continuously have the dialogue for embodying NRA's Core Values and Principles that "We shall be open to all opinions and advice and avoid both self-isolation and self-righteousness".

Apart from the above, the NRA have started to have opportunities to exchange views between the Commissioners/Executives of the NRA and Executive Officers of nuclear division of major licensee for major electric utilities, since January 2017.

K-2 Response to the challenges identified in the 5th review meeting

K-2-1 Establishing regulations in regard to disposal of radioactive waste generated by decommissioning

K-2-1-1 Conformity Review for Spent Fuel/Radioactive Waste Management Facility

Radioactive waste generated from decommissioning of NPPs have to be disposed in intermediate depth where RW is able to be isolated from public, in order to protect people and environment from radiation. Regulations for Intermediate Depth Disposal such as regulation on backfilling of access tunnel, restriction of boring in waste disposal site, are introduced by the amendment on the Reactor Regulation Act in April 2017.

The NRA has issued the policy in August 2016 for requirements on design and management mainly for ensuring long-term safety towards preparation on specific regulatory requirements in future. Requirements on natural barrier (disposal site) selection, design of engineered barrier, and radiological characteristics of radioactive

waste generated by decommissioning will be introduced, according to this policy.

Major points of site selection and radiological characteristics on radioactive waste generated by decommissioning;

- It requires disposing at a host rock (70 meter deep from surface) where depth is secured about the next 100,000 years with consideration on period of sea level change and condition of geological environment such as volcanic and fault activities in Japan.
- It requires concentration limit of long half-life nuclides so that most of radioactive materials in the disposed waste will be substantially decayed in 100,000 years

Regulation will be lasting about 300~400 years considering the existing requirements for near surface pit disposal as a reference. Even though licensees are required to have stable technical capabilities and financial basis until regulation terminates, it is assumed that securing funds and measures in case of difficulty on continuing operation will be implemented by the government.

Major points of design requirements for engineered barrier;

- It requires design of repository, tunnel, surface facilities for securing safety in view of radiation protection for the workers in disposal facility and public.
- Especially it is required that radiation dose generated by disposed waste shall not exceed dose constraint of public for long period after regulation is terminated.

The NRA showed the idea of requirements for operation to be added;;

- It requires that there are no sign of abnormal leakage on radiative nuclide by inappropriate construction methods, design problems of engineering barrier, by monitoring radiation until starting decommissioning. Also, it requires obtaining data of confirmation on function of natural barrier and engineering barrier in terms of preventing leakage and transfer of leaked nuclides by monitoring ground water conditions.
- Regarding backfilling tunnel, it requires to not allow people to get in easily, and also backfilling area not be transfer path for radioactive nuclide. In addition, it requires licensees to review methods of repairing anomalies and methods of radiation monitoring at the time of starting backfilling tunnel
- For final confirmation by the NRA, licensees have to submit data and it requires to confirm that there are no sign of abnormal leakage on radioactive nuclide from waste burial facilities until decommissioning starting and prepare to keep record for preventing boring c activities after termination of decommissioning stage.

The NRA is preparing detailed regulations as necessary.

K-2-1-2 Process to select the location of the final disposal facility of high-level radioactive waste

As for the geological disposal of high-level radioactive waste, a final disposal facility will be constructed through the selection process of three stages, based on "The Final Disposal Act" enacted in March, 2000.

On the other hand, as we could not even start the literature research by now, we will change the approach.

Specifically, reversibility and retrievability of the radioactive waste are required to solve the high-level radioactive waste issue so that future generations may select the best disposal method at any time in the future, and the national government indicates the region suitable for site of the final disposal facility from a technological viewpoint.
(Refer to Section B)

As this situation, where an investigation has not been launched to select a repository site after a decade since the creation of the disposal system in 2000 was taken with sincerity, a review was conducted to fundamentally reassess the efforts to achieve final disposal. Specifically, that reversibility and retrievability be assured and that a system be put in place which, considers future generations, allows for the reconsideration of decisions concerning final disposal, also, that the government explains from a scientific viewpoint the properties of the area's geological environment by indicating regions believed to be more scientifically suitable, and request the reasoning for siting of such a facility. (See Section B)

The GOJ published the "Nationwide Map of Scientific features for Geological Disposal" in July, 2017. With this as momentum, the Japanese government will continue the conversation nationwide for the public acceptance of the final disposal facilities.

K-2-2 Process to select the location of the final disposal facility of high-level radioactive waste

As for the geological disposal of high-level radioactive waste, a final disposal facility will be constructed through the selection process of three stages, based on "The Final Disposal Act" enacted in March, 2000.

On the other hand, as we could not even start the literature research by now, we will change the approach.

Specifically, problem on final disposal of high-level radioactive waste is tackled as the responsibility of current generation which created radioactive waste not to pass the burden on to future generations and reversibility and retrievability of the radioactive waste are required to solve the high-level radioactive waste issue so that future generations may select the best disposal method at any time in the future, and the national government indicates the region suitable for site of the final disposal facility from a scientific viewpoint to ensure a deeper public concern and understanding of the geological disposal and understanding of site location from the public.(Refer to Section B)

The GOJ published the “Nationwide Map of Scientific features for Geological Disposal” in July, 2017. With this as momentum, the Japanese government will continue the conversation nationwide for the public acceptance of the final disposal facilities.

K-2-3 Enhancement of Human Resource Development.

The NRA is promoting measures in human resource development on following items, based on "The basic policy on human development for the Nuclear Regulation Authority personnel".

K-2-3-1 Systemizing human resource development processes

Referring the IAEA's Safety Guides and others, the NRA formulated a human resource image for each task such as safety examination, inspection, safety research, emergency response, etc. and clarified the competence necessary for carrying out the task in charge based on the formulated image.

The NRA introduced Competence Management system of the personnel including IT system, and have been trying the system for inspectors since 2016, and for all personnel since 2017.

Based on the results of trials, the NRA will perceive the competence of staff and consider the optimum allocation of resources and the formulation of capacity building plan for each staff.

K-2-3-2 Acquiring Common knowledge

Based on the result of the training program since the establishment of the NRA Human Resource Development Center (hereafter "HRDC"), the knowledge common to all staff (including international knowledge) and technical staff have been organized and reflected in the training for staff.

K-2-3-3 Systemizing the training program

As for advanced training facility, The NRA have developed and introduced a plant simulator for training which can simulate the behavior which is very close to the actual nuclear power reactor since 2015.

The NRA started the practical training which contributes to the promotion of understanding for safety mechanism and countermeasures for accident of power reactors, and to the improving ability to grasp the situation of plant in case of accident or to respond severe accident.

K-2-3-4 Conducting On the Job Training (OJT)

The NRA are promoting OJT program side by side with the trial of Competence Management system of the personnel, creating a guidebook for conducting OJT as well as management system.

Furthermore, for newly recruited staff, training is being conducted at NRA regional offices located around such as nuclear power plants, which cultivate "sense at the site" by accompanying the inspection of the local inspectors since 2014.

K-2-3-5 Improvements in the environment

The NRA developed an implementation system (including a staff portal for efficient knowledge management) to promote technology transfer and knowledge management efforts, systematically share advanced knowledge, in order to pass down to younger generation, and also started to identify, collect and organize the knowledge to be managed.

And Seminars have been held for the personnel in order to pass down the administrative experience or highly advanced technical knowledge.

Furthermore, commendation system for brilliant achievement or effort of self-improvement, has been established and started commendation since 2015.

As for training for personnel, based on the basic policy stated above, the NRA have been set various training programs and conducted them at HRDC in order to contribute to the improvement of professionalism.

In FY 2016, a total of 140 courses totaling 82 courses were held, and 1058 people attended the course.

K-2-4 Implementation of recommendations and suggestions from the IRRS Mission.

IAEA provides the Integrated Regulatory Review Service (IRRS), as one of the IAEA's international peer review services, upon request of Member States. IRRS covers broad issues related to nuclear regulation e.g., legal framework, organization, etc., and it provides comprehensive review. The Japanese Government declared to invite an IAEA's IRRS review mission in December 2013, and invited a review mission between January 11 and 22, 2016. The report of this review was provided by IAEA for the Japanese Government on April 22, 2016. The IRRS report and related material used in the IRRS review mission are made public in Web sites of the NRA.

The report introduces the following two items as good practices.

- The legal framework for setting up the regulatory agency where independence and

transparency are embodied and whose authority is strengthened was built and positioned in governmental organizations.

- In the fields of natural hazard response, severe accident measures, response to emergency as well as intensification of safety of existing facilities, the NRA reflected swiftly and effectively lessons learned from the Fukushima Daiichi NPS accident to the new regulatory framework.

The report also stresses a need for the Japanese Government and the NRA to continue efforts to implement a new regulatory framework where nuclear power and radiation safety are intensified, and it presents 13 recommendations and 13 suggestions to the Japanese Government and/or the NRA where it is indicated that it is necessary or desirable for the Japanese framework to be improved so as to continually harmonize with IAEA's safety standards.

The NRA is addressing the issues which extracted through self-assessment process including the action plan, in addition to the responses for recommendations and suggestions stated in the report.

Among these issues, the GOJ revised related acts in 2017 in regard to the regulatory improvement for Inspection System, Regulation and Protection for Radiational Source Material, burial of radioactive waste and decommission.

The details of the revision are described in section- E

In regard to the occupational dose limit to the lens of the eye among the action plans extracted through self-assessment, we plan to conduct fact-finding on the exposure of crystalline lens of eye followed by the review for specialized matters concerning radiation protection such as method for measurement and evaluation to conform to "The IRCP Statement on Tissue Reaction (April, 2011)".

The NRA plans to invite IRRS follow up mission after the summer of 2019.
And the summary of 2016 IRRS such as recommendations is listed in the Annex L5.

Section L ANNEXES

L1 Inventory of spent fuel

L2 Inventory of radioactive waste

L3 List of spent fuel storage facilities and radioactive waste storage facilities

L4 Main nuclear reactor facilities under decommissioning

L5 The results of IAEA IRRS review mission

L-1 Inventory of spent fuel*

Facility		Inventory (tons)	Type of spent fuel assemblies
Japan Atomic Power	Tokai No. 2 Power Station	370	Uranium oxide fuel
	Tsuruga Power Station	630	
Hokkaido Electric Power	Tomari Power Station	400	
Tohoku Electric Power	Higashidori NPS	100	
	Onagawa NPS	420	
Tokyo Electric Power	Fukushima Daiichi NPS	2,130	
	Fukushima Daini NPS	1,120	
	Kashiwazaki-Kariwa NPS	2,370	
Chubu Electric Power	Hamaoka NPS	1,130	
Hokuriku Electric Power	Shika NPS	150	
The Kansai Electric Power	Mihama Power Station	470	Uranium oxide fuel, MOX fuel
	Ohi Power Station	1,420	Uranium oxide fuel
	Takahama Power Station	1,220	
The Chugoku Electric Power	Shimane NPS	460	
Shikoku Electric Power	Ikata Power Station	640	
Kyushu Electric Power	Genkai NPS	900	
	Sendai NPS	930	
Japan Atomic Energy Agency	Reactor Decommissioning R&D Center	70	Uranium oxide fuel, MOX fuel
	FBR Research and Development Center	0	
	Reprocessing Facility of the Nuclear Fuel Cycle Engineering Laboratories, Tokai Research and Development Center	41	Uranium oxide fuel, MOX fuel
	Nuclear Science Research Institute, Tokai Research and Development Center	18	Uranium oxide fuel
	Oarai Research and Development Center	16	Uranium oxide fuel, MOX fuel
Japan Nuclear Fuel Limited	Rokkasho Reprocessing Facility	3,393	Uranium oxide fuel
Total		18,398	

*Data is provided by licensees.

L-2 Inventory of radioactive waste

L2-1 High-level radioactive waste

Facility		Vitrified waste (number of containers*1)	High-level liquid radioactive waste
JAEA	Reprocessing facility	272	373m3*2
JNFL	Reprocessing facility	346	0*2
	Waste storage facility	1,830	0
Total		2,448	373 m3*2

＊1: Unit: JAEA: 120-liter container, JNFL (reprocessing facilities): 160-liter container; JNFL (waste storage facilities): 170-liter container

*2: JAEA recognizes high-level radioactive effluents for radioactive wastes. Those wastes will be vitrified in future. On the other hand, JNFL does not recognize high-level radioactive effluents in the manufacturing process of vitrified waste for radioactive wastes. It should be noted that there are about 213m3 (as of 31st March, 2017) of high-level radioactive effluents stored.

L2-2 Power station waste

1. Homogeneous solid, packed solid and miscellaneous solid

Power station		Homogeneous (drums)	Packed (drums)	Miscellaneous (drums)	Total (drums)
JAPCO	Tokai Power Station	0	0	1,311	1,311
	Tokai No. 2 Power Station	574	1,854	60,151	62,579
	Tsuruga Power Station	2,592	1,808	61,086	65,486
Hokkaido Electric Power Co., Inc.	Tomari Power Station	972	0	10,845	11,817
Tohoku Electric Power Co., Inc.	Onagawa Nuclear Power Station	1,804	140	29,820	31,764
	Higashidori Nuclear Power Station	0	0	12,104	12,104
TEPCO	Fukushima Daiichi NPS	14,947	2,925	168,224	186,096*
	Fukushima Daini Nuclear Power Station	670	1,717	18,814	21,201
	Kashiwazaki-Kariwa Nuclear Power Station	662	1,380	27,523	29,565
Hokuriku Electric Power Co., Inc.	Shika Nuclear Power Station	8	1,662	4,556	6,226
The Kansai	Mihama Power Station	2,388	1,363	21,924	25,675

Electric Power Co., Inc.	Takahama Power Station	5,024	0	34,371	39,395
	Ohi Power Station	3,957	3,174	21,434	28,565
The Chugoku Electric Power Co., Inc.	Shimane Nuclear Power Station	293	2,594	30,258	33,145
Shikoku Electric Power Co., Inc.	Ikata Power Station	1,274	908	24,642	26,824
Kyushu Electric Power Co., Inc.	Genkai Nuclear Power Station	4,227	5,317	31,138	40,682
	Sendai Nuclear Power Station	2,264	0	22,558	24,822
JAEA	Reactor Decommissioning R&D Center	2,002	0	17,075	19,077
	Fast Breeder Reactor Monju, Research and Development Center	20	0	6,532	6,552
Total		47,021	28,150	633,712	708,883

*In addition, rubble, trimmed trees, disused-protective clothing generated after accident, etc.[total 345,300m^3], and secondary waste from contaminated water treatment[3586 cesium absorption apparatus and absorption vessel etc. and Sludge 597m^3] have been temporarily stored.

2. Steam generator (SG)

Power station		Number of stored SGs
The Kansai Electric Power Co., Inc.	Mihama Power Station	7
	Takahama Power Station	6
	Ohi Power Station	8
Shikoku Electric Power Co., Inc.	Ikata Power Station	4
Kyushu Electric Power Co., Inc.	Genkai Nuclear Power Station	4
	Sendai Nuclear Power Station	3
Total		32

3. Control rods, channel boxes, others

Power station		Control rod (number)*	Channel box (number)	Others (m^3)	Resin, (m^3)
JAPCO	Tokai Power Station	91 m^3	0	1,289	60
	Tokai No. 2 Power Station	306	3,621	17	887

Power station		Control rod (number)*	Channel box (number)	Others (m^3)	Resin, (m^3)
	Tsuruga Power Station (Unit 1)	173	2,158	49	846
	Tsuruga Power Station (Unit 2)	353	0	0	95
Hokkaido Electric Power Co., Inc.	Tomari Power Station	312	0	0	103
Tohoku Electric Power Co., Inc.	Onagawa Nuclear Power Station	231	3,112	1	480
	Higashidori Nuclear Power Station	67	644	0	137
TEPCO	Fukushima Daiichi NPS	1,448	22,720	193	3,529
	Fukushima Daini Nuclear Power Station	699	9,233	43	5,277
	Kashiwazaki-Kariwa Nuclear Power Station	800	13,549	0	2,638
Chubu Electric Power Co., Inc.	Hamaoka Nuclear Power Station	553	10,990	34	2,696
Hokuriku Electric Power Co., Inc.	Shika Nuclear Power Station	69	1,094	0	156
The Kansai Electric Power Co., Inc.	Mihama Power Station	968	0	0	101
	Takahama Power Station	1,344	0	0	122
	Ohi Power Station	1,134	0	0	104
The Chugoku Electric Power Co., Inc.	Shimane Nuclear Power Station	285	4,878	56	821
Shikoku Electric Power Co., Inc.	Ikata Power Station	828	0	0	174
Kyushu Electric Power Co., Inc.	Genkai Nuclear Power Station	905	0	0	181
	Sendai Nuclear Power Station	476	0	0	163
Subtotal		10,951 +(91 m^3)	71,999	(1,682m^3)	(18,570 m^3)
		Control rod (number)	Neutron detector (number)	Others (number)	Resin, etc. (m^3)

Power station		Control rod (number)*	Channel box (number)	Others (m^3)	Resin, (m^3)
JAEA	Reactor Decommissioning R&D Center	54	128	0	219.9
		Tubes for guiding the drive mechanisms of control rods (number)			
JAEA	Fast Breeder Reactor Research and Development Center (Monju)	7			

＊Figures of the Tokai Power Station are not included.

L2-3 Long half-life low heat generating radioactive waste

Facility		Drum (number)	Bituminized solid (drums)	Plastic solid (drums)	Other waste (drums)	Total (drums)
JAEA	Reprocessing facility	31,976	29,967	1,812	12,765	76,520
JNFL	Reprocessing facility	16,888	0	0	25,951	42,839
JNFL	waste storage facility	0	0	0	896	896
Subtotal		48,864	29,967	1,812	39,612	120,255

		Sheared cladding (drums)	Spent filter (drums)	Sample bottle (drums)	Total (drums)
JAEA	Reprocessing facility	5,059	315	1,380	6,754
JNFL	Reprocessing facility	219*	0	0	219

		Low-level concentrated liquid waste (m^3)	Sludge (m^3)	Waste solvent (m^3)
JAEA	Reprocessing facility	2,980	1,160	100

Unit: 200-liter drum, including values equivalent to 200 liters per drum

* Unit for a piece of sheared cladding: 1,000-liter drum

L2-4 Uranium waste

		Drum (number)	Other waste (drums)	Total (drums)	Low-level liquid waste (m^3)
Global Nuclear Fuel-Japan Co., Ltd.		16,627	2,580	19,207	0.15
Mitsubishi Nuclear Fuel Co., Ltd.		9,539	606	10,145	1.78
Nuclear Fuel Industries, Ltd.	Tokai Works	5,448	821	6,269	5.45
	Kumatori Works	7,939	425	8,364	13.4
JAEA	Prototype Uranium Enrichment Plant	544	56	600	-
JNFL	Enrichment and Disposal Office	6,033	2,192	8,225	3.51
Total		46,130	6,681	52,810	24.29

Unit: 200-liter drum, including values equivalent to 200 liters per drum

L2-5 Waste stored in research facilities

Waste stored by licensees of research reactor operations and those of nuclear reactor facilities used for research, excluding power reactors used for power generation, and those stored by users of nuclear fuel materials related to usage facilities of such materials pursuant to Article 41 of the Ordinance for Enforcement of the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors

Name of facility		Solid waste (drum*1)	Liquid waste (m^3)	Remarks
JAEA	Nuclear Science Research Institute	128,559	—	Sum of values for reactor facilities and those for facilities using nuclear fuel materials
	Nuclear Fuel Cycle Engineering Laboratories	64,003	26.6	Facility using nuclear fuel materials
	Oarai Research and Development Center (North Area)	1,478	—	Sum of values for reactor facilities and those for facilities using nuclear fuel materials
		30,578	—	Waste storage facility

	Oarai Research and Development Center (South Area)	0	0.03	For solid wastes, values refer to those for reactor facilities (for temporary storage). For liquid wastes, values refer to facilities using nuclear fuel materials.
	Ningyo-toge Environmental Engineering Center	15,183	11.80	Facility using nuclear fuel materials
	Mutsu Office, Aomori Research and Development Center	1,080	21.47	Reactor facility
Nuclear Professional School, School of Engineering, the University of Tokyo		4	4.40	For solid wastes, values refer to the sum of those for reactor facilities and those for facilities using nuclear for temporary storage. For liquid wastes, values refer to those for reactor facilities.
Research Reactor Institute, Kyoto University		114	0.00	The values refer to the sum of reactor facilities and for facilities using nuclear fuel materials.
Nuclear Material Control Center	Tokai Safeguards Center	530	—	Facility using nuclear fuel materials
	Rokkasho Safeguards Analytical Laboratory	383	—	Facility using nuclear fuel materials
Institute for Atomic Energy, Rikkyo University		15	0	Reactor facility
Atomic Energy Research Institute, Tokyo City University (former Musashi Institute of Technology)		12	—	Reactor facility
Atomic Energy Research Institute, Kinki University		3	—	Reactor facility
Nippon Nuclear Fuel Development Co., Ltd.		321	17.10	Facility using nuclear fuel materials
Nuclear Development Corporation		2,191	—	Facility using nuclear fuel materials
Toshiba Corporation	Research Reactor Center	74	—	Reactor facility
	Nuclear Engineering Lab.	1,605	0.74	For solid wastes, the values refer to the sum of reactor facilities and facilities using nuclear fuel materials. For liquid

				wastes, the values refer to facilities using nuclear fuel materials.
Ozenji Hitachi Training Reactor Center, Power & Industrial Systems Nuclear System Division, Hitachi, Ltd.		556	—	Reactor facility
Total		246,689	82.0	

Note: The data in this table includes those of long half-life low heat generating radioactive waste and uranium waste generated in the facilities.

Wastes stored by a licensee of waste management pursuant to Article 4 (1) of Radiation Hazards Prevention Act			
Name of facility		Amount of waste (drum*)	Remarks
Japan Radioisotope Association	Kanto Waste Relay Station II	8,521	
	Ichihara Office	68,618	
	Kansai Waste Relay Station	0	
Vesta Co., Ltd.		52,477	
JAEA	Nuclear Science Research Institute	100,289	
	Oarai Research and Development Center	34,418	
Total		264,323	

＊1: The data is provided by licensees.

＊2：Unit: 200-liter drum, including values equivalent to 200 liters per drum; this data includes values for liquid waste.

L-3 List of spent fuel storage facilities and radioactive waste storage facilities

L3-1 List of spent fuel management facilities

（1）Facilities related to power reactors

Facilities in which spent fuel management facilities are located	Location	Major purpose	Major feature
Tokai No. 2 Power Station, JAPCO	Ibaraki	Storing spent fuel	Wet storage (partially stored in dry cask storage)
Tsuruga Power Station, JAPCO	Fukui	Storing spent fuel	Wet storage
Tomari Power Station, Hokkaido Electric Power Co., Inc.	Hokkaido	Storing spent fuel	Wet storage
Onagawa NPS, Tohoku Electric Power Co., Inc.	Miyagi	Storing spent fuel	Wet storage
Higashidori NPS, Tohoku Electric Power Co., Inc.	Aomori	Storing spent fuel	Wet storage
Fukushima Daiichi NPS, TEPCO	Fukushima	Storing spent fuel	Wet storage (partially stored in dry cask storage)
Fukushima Daini NPS, TEPCO	Fukushima	Storing spent fuel	Wet storage
Kashiwazaki-Kariwa NPS, TEPCO	Niigata	Storing spent fuel	Wet storage
Hamaoka NPS, Chubu Electric Power Co., Inc.	Shizuoka	Storing spent fuel	Wet storage
Shika NPS, Hokuriku Electric Power Co., Inc.	Ishikawa	Storing spent fuel	Wet storage
Mihama Power Station, the Kansai Electric Power Co., Inc.	Fukui	Storing spent fuel	Wet storage
Takahama Power Station, the Kansai Electric Power Co., Inc.	Fukui	Storing spent fuel	Wet storage
Ohi Power Station, the Kansai Electric Power Co., Inc.	Fukui	Storing spent fuel	Wet storage
Shimane NPS, the Chugoku Electric Power Co., Inc.	Shimane	Storing spent fuel	Wet storage
Ikata Power Station, Shikoku Electric Power Co., Inc.	Ehime	Storing spent fuel	Wet storage
Genkai NPS, Kyushu Electric Power Co., Inc.	Saga	Storing spent fuel	Wet storage
Sendai NPS, Kyushu Electric Power Co., Inc.	Kagoshima	Storing spent fuel	Wet storage

Advanced Thermal Reactor *Fugen*, Fugen Reactor Decommissioning R&D Center, JAEA	Fukui	Storing spent fuel	Wet storage
Reprocessing Facility of the Nuclear Fuel Cycle Engineering Laboratories, Tokai Research and Development Center, JAEA	Ibaraki	Storing spent fuel	Wet storage
Rokkasho Reprocessing Plant, JNFL	Aomori	Storing spent fuel	Wet storage
Fast Breeder Reactor *Monju*, FBR Research and Development Center, JAEA	Fukui	Storing spent fuel	Wet storage

(2) List of spent fuel management facilities (related to research and test reactors)

Facilities in which spent fuel management facilities are located	Location	Major purpose	Major feature
Nuclear Science Research Institute of the Tokai Research and Development Center, JAEA	Ibaraki	Storing spent fuel	Wet storage (partially stored in dry cask storage)
Oarai Research and Development Center, JAEA	Ibaraki	Storing spent fuel	Wet storage
Research Reactor Institute, Kyoto University	Osaka	Storing spent fuel	Wet storage

L3-2 List of radioactive waste management facilities

（1）Facilities related to power reactors

Facilities in which radioactive waste management facilities are located	Location	Major purpose	Major feature
Tokai Power Station, JAPCO	Ibaraki	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Tokai No. 2 Power Station, JAPCO	Ibaraki	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Tsuruga Power Station, JAPCO	Fukui	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration

Facilities in which radioactive waste management facilities are located	Location	Major purpose	Major feature
Tomari Power Station, Hokkaido Electric Power Co., Inc.	Hokkaido	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Higashidori NPS, Tohoku Electric Power Co., Inc.	Aomori	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Onagawa NPS, Tohoku Electric Power Co., Inc.	Miyagi	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Fukushima Daiichi NPS, TEPCO	Fukushima	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Fukushima Daini Nuclear Power Station, TEPCO	Fukushima	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Kashiwazaki-Kariwa NPS, TEPCO	Niigata	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Hamaoka NPS, Chubu Electric Power Co., Inc.	Shizuoka	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Shika Nuclear Power Station, Hokuriku Electric Power Co., Inc.	Ishikawa	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Mihama Power Station, the Kansai Electric Power Co., Inc.	Fukui	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Takahama Power Station, the Kansai Electric Power Co., Inc.	Fukui	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Ohi Power Station, the Kansai Electric Power Co., Inc.	Fukui	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or

Facilities in which radioactive waste management facilities are located	Location	Major purpose	Major feature
			incineration
Shimane NPS, the Chugoku Electric Power Co., Inc.	Shimane	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Ikata Power Station, Shikoku Electric Power Co., Inc.	Ehime	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Genkai NPS, Kyushu Electric Power Co., Inc.,	Saga	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Sendai NPS, Kyushu Electric Power Co., Inc.,	Kagoshima	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing or incineration
Advanced Thermal Reactor *Fugen*, Fugen Reactor Decommissioning R&D Center, JAEA	Fukui	Disposing and storing waste from power reactors	Storing waste in storage after reducing the volume by compressing or incineration
Prototype fast-breeder reactor *Monju*, FBR Research and Development Center, JAEA	Fukui	Disposing and storing waste from power reactors	Storing waste after reducing the volume by compressing

(2) List of radioactive waste management facilities (excluding those related to power reactors)

Facilities in which radioactive waste management facilities are located*1		Location	Major purpose	Major feature
Global Nuclear Fuel-Japan Co., Ltd.	Facility for fabricating nuclear fuel materials	Kanagawa	Disposing and storing uranium waste	Storing waste after reducing the volume by compressing
Mitsubishi Nuclear Fuel Co., Ltd.	Facility for fabricating nuclear fuel materials	Ibaraki	Disposing and storing uranium waste	Storing waste after reducing the volume by compressing or incineration

Nuclear Fuel Industries, Ltd. Tokai Works	Facility for fabricating nuclear fuel materials	Ibaraki	Disposing and storing uranium waste	Storing waste after reducing the volume by incineration
	Facility for fabricating nuclear fuel materials		Disposing and storing waste from facilities using nuclear fuel materials	Storing waste after reducing the volume by incineration
Nuclear Fuel Industries, Ltd. Kumatori Works	Facility for fabricating nuclear fuel materials	Osaka	Disposing and storing uranium waste	Storing waste after reducing the volume by compressing
	Facility using nuclear fuel materials		Storing waste from facilities using nuclear fuel materials	Storing waste after reducing the volume by compressing
Ningyo-toge Environmental Engineering Center, JAEA	Facility for fabricating nuclear fuel materials	Okayama	Disposing and storing uranium waste	Storing waste after reducing the volume by incineration
	Facility using nuclear fuel materials		Disposing and storing waste from facilities using nuclear fuel materials	Storing waste after reducing the volume by incineration
Nuclear Science Research Institute of the Tokai Research and Development Center, JAEA	Waste disposal facility	Ibaraki	Disposing low-level radioactive waste materials	Trench disposal of concrete waste
	Research and test reactor facility (under operation: 7; under decommissioning: 1), facility using nuclear fuel materials, and facility managed by disposal service businesses*2		Disposing and storing waste from research and test reactor facilities using nuclear fuel materials, and facilities using radioisotope	Storing waste after reducing the volume by compressing or incineration
Nuclear Fuel Cycle Engineering Laboratories, Tokai Research and Development Center, JAEA	Reprocessing facility	Ibaraki	Disposing and storing high-level radioactive waste and waste containing trans uranium	Storing high-level radioactive waste and waste containing trans-uranium after reducing volume by

				solidifying high-level radioactive waste with glass or incinerating the waste containing trans uranium
	Facility using nuclear fuel materials		Disposing and storing waste from facilities using nuclear fuel materials	Storing waste after reducing the volume by compressing or incineration
Oarai Research and Development Center, JAEA	Research and reactor facilities (under operation: 3; under decommissioning: 1), waste storage facility, facility using nuclear fuel materials, and facility managed by disposal service businesses *2	Ibaraki	Disposing and storing waste from research and test reactor facilities, facilities using nuclear fuel materials, and facilities using radioisotope	Storing waste after reducing the volume by compressing or incineration
Mutsu Office, Aomori Research and Development Center, JAEA	Research and test reactor facility (under decommissioning: 1)	Aomori	Disposing and storing waste from research and test reactor facilities	Storing waste after reducing the volume by compressing
Reprocessing facility, JNFL	Reprocessing facility	Aomori	Disposing and storing high-level radioactive waste and waste containing trans uranium	Storing waste from storage facilities that accept spent fuel materials (a reprocessing facility is now under construction)
	Waste storage facility		Storing vitrified waste	Facilities for storing returned vitrified waste
Enrichment and Disposal Office, JNFL	Waste disposal facility	Aomori	Disposing low-level radioactive waste materials	Waste disposal facilities Units 1 and 2
	Facility for uranium enrichment		Disposing and storing uranium waste	Storing waste
Nuclear Professional	Research and test reactor facility,	Ibaraki	Temporarily storing waste	Commissioned to the Nuclear Science

School, School of Engineering, the University of Tokyo	facility using nuclear fuel materials		from the research and test reactor facilities and facilities using nuclear fuel materials	Research Institute of the Tokai Research and Development Center, JAEA
Radioisotope Center, the University of Tokyo	Facility managed by disposal service businesses *2	Tokyo	Disposing and storing waste from facilities using radioisotope	Storing waste after reducing the volume by incineration
Research Reactor Institute, Kyoto University	Research and test reactor facility (under operation: 2), facility using nuclear fuel materials	Osaka	Disposing and storing waste from research and test reactor facilities and facilities using nuclear fuel materials	Storing waste
Institute for Atomic Energy, Rikkyo University	Research and test reactor facility (under decommissioning: 1)	Kanagawa	Disposing and storing waste from research and test reactor facilities	Storing waste
Atomic Energy Research Institute, Tokyo City University (former Musashi Institute of Technology)	Research and test reactor facility (under decommissioning: 1)	Kanagawa	Storing waste from research and test reactor facilities	Storing waste
Atomic Energy Research Institute, Kinki University	Research and test reactor facility	Osaka	Storing waste from research and test reactor facilities	Storing waste
Radiotoxicology Experiment Building, National Institute of Radiological Science	Facility using nuclear fuel materials	Chiba	Storing waste from facilities using nuclear fuel materials	Storing waste
Tsukuba Center No. 2 Office, AIST	Facility using nuclear fuel materials	Ibaraki	Storing waste from facilities using nuclear fuel materials	Storing waste
On Site Laboratory, Rokkasho	Facility using nuclear fuel	Aomori	Disposing and storing waste	Storing waste

Safeguards Analytical Laboratory, Nuclear Material Control Center	materials		from facilities using nuclear fuel materials	
Tokai Safeguards Center, Nuclear Material Control Center	Facility using nuclear fuel materials	Ibaraki	Storing waste from facilities using nuclear fuel materials	Storing waste in storage
The Kaya Memorial Takizawa Laboratory, Japan Radioisotope Association	Facility managed by disposal service businesses*4	Iwate	Disposing and storing waste from facilities using radioisotope	Storing waste after reducing the volume by compressing or incineration
Ichihara Office, Japan Radioisotope Association	Facility managed by disposal service businesses *3	Chiba	Storing waste from facilities using radioisotope	Storing waste
Kanto Waste Relay Station 2, Japan Radioisotope Association	Facility managed by disposal service businesses *3	Chiba	Storing waste from facilities using radioisotope	Storing waste
Kansai Waste Relay Station, Japan Radioisotope Association	Facility managed by disposal service businesses*3	Osaka	Storing waste from facilities using radioisotope	Storing waste
Research Reactor Center, Toshiba Corporation	Research and test reactor facility (under decommissioning: 1)	Kanagawa	Storing waste from the research and test reactor facilities	Storing waste
Nuclear Engineering Lab., Toshiba Corporation	Facility using nuclear fuel materials, research and test reactor facility	Kanagawa	Storing waste from research and test reactor facilities and facilities using nuclear fuel materials	Storing waste
Ozenji Hitachi Training Reactor Center, Power & Industrial Systems Nuclear System Division, Hitachi, Ltd.	Research and test reactor facility (under decommissioning: 1)	Kanagawa	Storing waste from the research and test reactor facilities	Storing waste

NFD Hot Laboratory, Nippon Nuclear Fuel Development Co., Ltd.	Facility using nuclear fuel materials	Ibaraki	Disposing and storing waste from facilities using nuclear fuel materials	Commissioned to Oarai Research and Development Center, JAEA
Fuel Hot Laboratory, Nuclear Development Corporation	Facility using nuclear fuel materials	Ibaraki	Disposing and storing waste from facility using nuclear fuel materials	Storing waste after reducing the volume by compressing
Tsukuba Laboratory, T.N. Technos Co., Ltd.	Facility managed by disposal service businesses *2	Ibaraki	Disposing and storing waste from facilities using radioisotope	Storing waste after reducing the volume by incineration
Vesta Co., Ltd.	Facility managed by disposal service businesses *2	Chiba	Disposing and storing waste from facilities using radioisotope	Storing waste after reducing the volume by incineration

*1 One licensee operates one facility unless otherwise noted. When one licensee operates more than one facility or implements decommissioning measures for more than one facility, that situation will be clearly described.
*2: Facilities managed by disposal service businesses refer to those approved pursuant to Radiation Hazards Prevention Act .
*3: Facilities managed by disposal service businesses refer to those approved pursuant to the Radiation Hazards Prevention Act and the Medical Care Act.
*4: Waste facilities designated by the Medical Care Act and The Law on Securing Quality, Efficacy and Safety of Products Including Pharmaceuticals and Medical devices.

Amount of disposed radioactive waste

Name of facility		Major nuclides to be confirmed	Amount (drums)
Waste Disposal Facilities, Enrichment and Disposal Office, JNFL	Unit 1	Co-60、Ni-63、Cs-137、Sr-90、C-14	147,507*2
	Unit 2	Co-60、Ni-63、Cs-137、Sr-90、C-14	112,672*2
	Total	—	260,179*2
Nuclear Science Research Institute of the Tokai Research and Development Center, JAEA *1	Waste disposal facilities	Co-60, Ni-63, Cs-137, Sr-90, Ca-41, C-14, Eu-152, H-3	1,670 tons

*1: Disposing very low-level concrete waste generated by dismantling the JPDR, the decommissioning of which has been transferred to the phase of preserving the disposal site since October 1997
*2: Unit: 200-liter drum

L-4 Major nuclear reactor facilities under decommissioning

Name of facilities		Type	Approval date of decommissioning plan
Shikoku Electric Power Co., Inc.	Units 1, Ikata Power Station	Reactor type：PWR Power output ：566 MW	June, 2017
Chugoku Electric Power Co., Inc.	Units 1, Shimane Nuclear Power Station	Reactor type：BWR Power output ：460MW	Apr, 2017
Kansai Electric Power Co., Inc.	Units 1 and 2, Mihama Power Station	Reactor type：PWR Power output ： Units 1：340MW Units 2：500MW	Apr, 2017
Kyushu Electric Power Co., Inc.	Units 1, Genkai Nuclear Power Station	Reactor type：PWR Power output：559MW	Apr, 2017
JAPCO	Units 1, Tsuruga Power Station	Reactor type：BWR Power output ：357MW	Apr, 2017
Chubu Electric Power Co., Inc.	Units 1 and 2, Hamaoka Nuclear Power Station,	Reactor type： BWR Power output ：540MW [Units 1] 、840MW [Units 2]	Nov, 2009
JAPCO	Tokai Power Station	Reactor type： GCR Power output ：166MW	June, 2006
JAEA	Advanced Thermal Reactor *Fugen*	Reactor type： ATR Power output ：165MW	Feb, 2008
Hitachi, Ltd.	HTR	Reactor type：Light-water moderated and cooled reactor Thermal output：100kW	Apr, 2007
Tokyo City University (former Musashi Institute of Technology)	Research and test reactor of Musashi Institute of Technology	TRIGA- II Thermal output：100kW	June, 2007
Rikkyo University	Research and test reactor of Rikkyo University	TRIGA- II Thermal output：100kW	June, 2007
Toshiba	TTR-1	Training Reactor	May, 2007

Name of facilities		Type	Approval date of decommissioning plan
Corporation		Thermal output：100kW	
JAEA	JRR-2	Reactor type：Heavy-water-moderated cooling tank reactor Thermal output：10MW	Nov. 2006
JAEA	Mutsu	Reactor type：Pressurized light-water moderated and cooled reactor; PWR Thermal output：36MW	Oct, 2006
JAEA	DCA	Reactor type：Heavy-water moderated reactor Thermal output：10MW	Oct, 2006
the University of Tokyo	YAYOI	Reactor type：Air cooling fast reactor using uranium as fuel Thermal output：2kW	Aug, 2012
JAEA	TRACY	Reactor type：Transient Experiment Critical Facility Thermal output：10kW（in static operation） 5000MW（in transient operation）	June, 2017
JAEA	JRR-4	Reactor type：Light water moderated and cooled, swimming pool-type reactor with low-enriched uranium Thermal output：3,500kW	June, 2017

L-5 List of IRRS Review Result

RECOMMENDATIONS (R), SUGGESTIONS (S) AND GOOD PRACTICES (GP)

AREA		Recommendations, Suggestions or Good Practices
1. LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES	GP 1	Good Practice: The prompt establishment of a legal and governmental framework supporting a new independent and transparent regulatory body with increased powers.
	GP 2	Good Practice: NRA's prompt and effective incorporation of the lessons learnt from the TEPCO Fukushima Daiichi accident in the areas of natural hazards, severe accident management, emergency preparedness and back-fitting of existing facilities, into the new regulatory framework.
	R1	Recommendation: The government should ensure that the Japanese regulatory authorities having responsibilities relevant to nuclear and radiation safety develop and implement an effective, collaborative process for the exchange of information regarding policies, authorizations, inspections and enforcement actions to provide coordinated and effective regulatory oversight that should also ensure a harmonized regulatory framework under their respective responsibilities.
	S1	Suggestion: NRA should consider improving its liaison with the relevant organizations for joint inspections and oversight of outsourced inspections.
	R2	Recommendation: The Government should empower the regulatory body to establish requirements for authorization or approval processes for service providers for monitoring of occupational and public exposures, and environmental monitoring in general, and verify that these requirements are met by licensees.
3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY	R3	Recommendation: NRA should put greater priority and allocate more resources on its oversight of the implementation of radiation protection measures by licensees as well as its participation in the development of international standards in radiation protection and related research activities in collaboration with NIRS.
	R4	Recommendation: NRA should evaluate the effectiveness of its current organizational structure, implement appropriate cross cutting processes, strengthen the collection of information from interested parties when planning its annual activities and develop tools to measure its performance and use of resources.
	R5	Recommendation: NRA should further develop and implement the activities related to the evaluation of competencies, execution of training programmes, on the job training, internal job rotation, and strengthening safety research, co-operation with technical support organizations (JAEA), universities, research

AREA		Recommendations, Suggestions or Good Practices
		organizations and international and overseas organizations, to ensure it has both qualified and experienced staff to fulfil its regulatory responsibilities in nuclear and radiation safety.
	S2	Suggestion: NRA should consider developing a strategy for attracting new and retaining its current technical expertise through seeking to improve the attractiveness of NRA as an employer of choice and the roles that its staff undertake by providing them with more responsibilities, the ability to directly influence safety performance of licensees, options to regulate in all various sectors of the industry, ability to develop legislative requirements that impact national policy, and having a clear career path to senior levels within the NRA.
	S3	Suggestion: NRA should consider reviewing the effectiveness of the mechanisms to communicate the outcomes of the regulatory review and assessment, further regulatory expectations and current issues to licenses/ applicants.
4. MANAGEMENT SYSTEM OF THE REGULATORY BODY	R6	Recommendation: NRA should complete, document and fully implement its integrated management system for all regulatory and supporting processes needed to deliver its mandate. Grading of the application of management system should be applied consistently and generic processes should be fully developed such as control of documents, products, records and management of change. The effectiveness of the NRA management system should be monitored and measured in a comprehensive way to identify opportunities for improvement.
	S4	Suggestion: NRA should consider introducing specific measures such as awareness training or surveys to promote and sustain high level of safety culture in the conduct of its activities.
	S5	Suggestion: NRA Commissioners should consider taking a strategic approach to the implementation of the management system demonstrating their commitment to the project by initiating a specific multi-year management system development plan and by reviewing its implementation on periodic basis.
	S6	Suggestion: NRA should consider developing a hierarchical structure for the management system that is easy to use and which supports effective and consistent implementation of regulatory activities. Specific descriptions of each process should be developed in a unified format including requirements, risks, interactions, inputs, process flow, outputs, records and measurement criteria.
5. AUTHORIZATION	S7	Suggestion: NRA should consider enhancing the interfaces and overall coherence of the existing three regulatory processes related to NPP ageing management.
	R7	Recommendation: NRA should incorporate the findings of the facility inspection into the review and assessment and the

AREA		Recommendations, Suggestions or Good Practices
		authorization process for radiation sources.
	R8	Recommendation: NRA should establish requirements relating to consideration of decommissioning during all life stages of nuclear and radiation facilities and criteria for the release of sites at the end of decommissioning.
6. REVIEW AND ASSESSMENT	S8	Suggestion: NRA should consider reviewing its current operating experience feedback process to: • determine whether its criteria allow the reporting of enough safety significant events; • ensure lessons learned from these events, including return to service from extended shutdowns, are taken into account by the licensees and actually result in appropriate and timely measures at the facilities.
	S9	Suggestion: NRA should consider reviewing the regulatory requirements for all nuclear facilities to ensure that submissions by licensees give full systematic consideration to human and organizational factors and human errors in the design of the plant, and the sufficiency of qualified and experienced NRA resource to assess this.
7. INSPECTION	R9	Recommendation: The government should improve and simplify the inspection framework to: • Increase NRA flexibility to provide for efficient, performance based, less prescriptive and risk informed regulation of nuclear and radiation safety; • Ensure NRA inspectors have formal rights for free access to all facilities and activities at any time; • Allow NRA decisions about reactive inspections to be made at the lowest possible level. Based on the revised inspection framework the NRA should develop and implement a programme of inspection of all facilities and activities specifying types and frequency of regulatory inspections (including scheduled inspections and unannounced inspections) in accordance with a graded approach.
	S10	Suggestion: NRA should consider improving training and retraining of its inspectors in order to improve their competencies for inspections, associated assessments and decision making.
8. ENFORCEMENT	R10	Recommendation: NRA should establish a documented enforcement policy with criteria and processes for determining graded sanctions or penalties for non-compliances, and a provision for processing orders to minimize the decision time for corrective actions if there is imminent likelihood of safety significant event.
9. REGULATIONS	R11	Recommendation: NRA should:

AREA		Recommendations, Suggestions or Good Practices
AND GUIDES		• improve and document its process for regularly evaluating and reviewing regulations and guides and as the emerging need arises; • supplement the regulations with guidance documents where necessary; and • improve its guidance on periodic safety assessments.
10. EMERGENCY PREPAREDNESS AND RESPONSE	R12	Recommendation: NRA and other authorities having jurisdiction for radiation sources should develop a single set of requirements and guidance for EPR in relation to radiation sources including requirements related to emergency plans, arrangements for timely notification and response, and quality assurance programme using graded approach.
	S11	Suggestion: NRA should consider strengthening its plans and procedures to consistently respond to emergencies related to radiation sources.
	R13	Recommendation: NRA should establish: • complete set of Emergency Action Levels for nuclear facilities other than NPPs and associated guidance to promptly define Emergency Action Levels for all licensees; • verification process that licensees participate in provision of information to the public within emergency planning zones around nuclear facilities at the preparedness stage.
	S12	Suggestion: The Government should consider ensuring that the relevant authorities establish consistent requirements for categories of emergency workers performing similar tasks.
12. INTERFACE WITH NUCLEAR SECURITY	S13	Suggestion: NRA should consider expediting improvements in the arrangements to assess, oversee and enforce nuclear safety and security in an integrated manner.