Joint Convention
on the Safety of Spent Fuel Management
and on the Safety of Radioactive Waste

National Report of Japan
for the third Review Meeting

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Government of Japan

Joint Convention on the Safety of Spent Fuel Management
and on the Safety of Radioactive Waste Management

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Acronyms

ACNRE	Advisory Committee for Natural Resources and Energy
AEC	Atomic Energy Commission
ANRE	Agency of Natural Resources and Energy
ATR	Advanced Thermal Reactor
BWR	Boiling Water Reactor
ERSS	Emergency Response Support System
FBR	Fast Breeder Reactor
HLW	High-level radioactive wastes
JAEA	Japan Atomic Energy Agency
JAPCO	Japan Atomic Power Company Inc.
JNES	Japan Nuclear Energy Safety Organization
JNFL	Japan Nuclear Fuel Limited
LLW	Low-level radioactive wastes
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MHLW	Ministry of Health, Labour and Welfare
MOFA	Ministry of Foreign Affairs
NISA	Nuclear and Industrial Safety Agency, METI
NISS	Nuclear and Industrial Safety Subcommittee
NSC	Nuclear Safety Commission
NUCIA	Nuclear Information Archive
NUMO	Nuclear Waste Management Organization of Japan
MOX fuel	Uranium and Plutonium Mix Oxide fuel
PFSB	Pharmaceutical and Food Safety Bureau, MHLW
PWR	Pressurized Water Reactor
SPEEDI	System for Prediction of Environmental Emergency Dose Information
STPB	Science and Technology Policy Bureau, MEXT
TEPCO	Tokyo Electric Power Company Inc.

Definitions

Category 1 waste disposal	Activity of geological disposal for high-level radioactive wastes.
Category 2 waste disposal	Activity of the waste disposal other than geological disposal for low-level radioactive wastes.
Intermediate depth disposal	Disposal in the underground deeper than 50 meters. This disposal method is classified in Category 2 waste disposal.
Specific Radioactive Waste	High-level radioactive wastes generated from spent fuel reprocessing
TRU waste	Low-level radioactive wastes generated from MOX fuel fabrication or reprocessing facilities. Also known as “long-lived low-heat-generating radioactive wastes” in the radioactive waste regulation in Japan. Generally, this waste contains Trans Uranic material.
Waste Storage	Activity to store high-level radioactive waste canisters before disposal.

Section A Introduction

A1 Current status of management of spent fuel and radioactive waste in Japan

A1.1 Status of utilization and management of nuclear energy in Japan

Nuclear facilities in Japan are as listed in the following table, the details of which are described in Section D.

Nuclear facility	Number
Operating nuclear power plant	55
Nuclear power plant under construction	4
Nuclear power reactor at decommissioning stage	2
Nuclear fuel fabrication facility	5
Spent fuel reprocessing facility	2
Radioactive waste storage facility	2
Radioactive waste disposal facility	2
Operating research reactor	15
Research reactor at decommissioning stage	8
Nuclear fuel material utilization facility*	16

*: The facilities governed by Article 41 of the Enforcement ordinance of the Law for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Nuclear Reactors.

The current status of the preparation of radioactive waste disposal regulation system and the over view of spent fuel and radioactive waste management are shown in Table A1-1 and TableA1-2 respectively.

A1.2 Major activities in the nuclear facilities in Japan since the last report

1. Safety review of Recycle Fuel Storage Center

The Recycle Fuel Storage Company jointly established by the Tokyo Electric Power Company Inc. (hereinafter it is referred as TEPCO) and the Japan Atomic Power Company Inc. (hereinafter it is referred as JAPCO) filed an application for license for the Recycle Fuel Storage Center (See Fig.L5-1) to be established in Mutsu City of Aomori Prefecture. The proposed Recycle Fuel Storage Center has 3,000 tons (metallic uranium prior to irradiation) of the maximum storage capacity and stores spent fuel in dry metallic casks (See Fig.L5-2). The application is now under safety review by Nuclear and Industrial Safety Agency (hereinafter it is referred as NISA) of the Ministry of Economy, Trade and Industry (hereinafter it is referred as METI).

2. Application for clearance to the waste from decommissioning of the Tokai Power Station of the JAPCO

The Tokai Power Station of the JAPCO terminated its operation in 1998 and is in decommissioning process since December 2001. The clearance system was introduced upon the amendment of “Law for Regulation of Nuclear Source Material, Nuclear Fuel Material and Nuclear Reactors” (hereinafter referred to as “Reactor Regulation Law”) in May, 2005. A part of the waste which was generated from the dismantlement of the Tokai Power Station was classified as cleared materials in July 2007 after the confirmation of the radioactivity concentration by NISA.

3. Decommissioning of Advanced Thermal Reactor (ATR) “Fugen”

The ATR “Fugen” terminated its operation in March, 2003 and the licensee submitted the decommissioning program on November 7, 2006. The program was approved by the government on February 12, 2008 and decommissioning work started. In 2008, moderator (heavy water) will be removed and the turbine will be dismantled.

4. Rokkasho nuclear fuel cycle facilities

Japan focuses its nuclear policy on nuclear fuel cycle to reprocess spent fuel and to effectively utilize the recovered uranium and plutonium. The Japan Nuclear Fuel Limited has its nuclear fuel cycle facilities (uranium enrichment facility, reprocessing facility, waste storage facility and low level radioactive waste (LLW) disposal facility) in Rokkasho Village of Aomori Prefecture. All of those facilities, with the exception of the reprocessing plant which is currently under Pre-service tests, are already in operation.

As for the Pre-service tests of the main part of the reprocessing plant, the basic functional tests including flow test and chemical test and uranium test were already completed, and the active test with actual spent fuel is currently being carried out to confirm the performance of the reprocessing process.

The Rokkasho reprocessing facility is the first large-scale reprocessing facility in Japan and licensee plans the construction is going to be completed in November, 2008.

5. Selection of the final disposal site

The Nuclear Waste Management Organization of Japan (hereinafter it is referred as NUMO), the implementing entity of the high level radioactive waste (HLW) disposal, has been inviting public offering for the preliminary investigation areas as the first step of selecting disposal sites since December 2002.

In Toyo-Town of Kochi Prefecture, study meetings was held since September 2006, under the auspices of the Town and other organizations, and the mayor of the Town submitted an offer for the start of the preliminary investigation to NUMO, 2007. Upon receiving the offer of Toyo-Town, NUMO filed the application in accordance with the Specific Radioactive Waste Final Disposal Act (Final Disposal Act), but the Town cancelled the offer in April 2007 and the preliminary investigation is not performed.

Table A1-1 Classification of basic concepts for disposal and status of activities preparing relevant regulations

Classification			AEC: Disposal method	AEC: System and Responsibility	NSC: Fundamental concept of safety regulation	NSC: Upper bound of radioactive waste disposal	NSC: Safety review guidelines	Legislation etc. on safety regulations: Law	Legislation etc. on safety regulations: Government order	Legislation etc. on safety regulations: Rules
High-level radioactive waste			**Completed** "Policy on processing and disposal of radioactive wastes" (Interim Report) (August, 1984) "Fundamental concept toward disposal of high-level radioactive wastes" (May 1998)		**Completed** "Basic concept of safety regulation on high-level radioactive waste disposal " (November 6, 2000) "Environmental requirements to be considered at the selection of the preliminary investigation areas for high-level radioactive waste disposal" (September 30, 2002) "Licensing procedure relating to the safety regulation of specified radioactive waste disposal and involvement of Nuclear Safety Commission in these activities" (Interim Report) (May 7, 2007)		**Future discussion**	The Reactor Regulation Law*3	**Published** "Enforcement Ordinance for the Reactor Regulation Law" (April 2008)	**Published** "Rules for category 1 waste disposal for nuclear fuel material or those which are contaminated with" (April 1, 2008)
Low- level radioactive waste	Long Half Lives Low Heat Radioactive Waste		**Completed** "Fundamental concept of processing and disposal of radioactive wastes containing transuranic nuclides" (March 23, 2000) "Geological Disposal of Long Half Lives Low Heat Radioactive Waste, Technical Feasibility of Co-Disposal with High Level Radioactive Waste" (April 18, 2006)		**Completed** "Fundamental Basic concept of safety regulation on low-level radioactive waste burial" (Interim Report) (July 12, 2007)		**Partially under discussion** (Except for geological disposal)			**Partially Published** "Rule for Disposal of Category 1 Waste Disposal of Nuclear Fuel Material or Material Contaminated with Nuclear Fuel Material" (April 1, 2008) "Rule for Disposal of Category 2 Waste Disposal of Nuclear Fuel Material or Material Contaminated with Nuclear Fuel Material" (April 1, 2008)
	Waste from reactor facility	Waste of Core Structures etc. (Relatively higher radioactive waste)	**Completed** "Basic concept of disposal of low-level radioactive waste that exceeds the concentration limit value in the ordinance" (October 16, 1998)		**Completed** "Basic concept of safety regulation for the disposal of low-level radioactive waste which has concentration over existing upper bounds" (September 14, 2000) "Basic concept of safety regulation on low-level radioactive waste burial" (Interim Report) (July 12, 2007)	**Completed** "Reference radionuclide concentration values for safety regulations of land disposal of low-level radioactive Solid waste" (Third Report) (September 14, 2000)	**Under discussion**		**Published** "Enforcement Ordinance for the Reactor Regulation Law" (December 2000)	**Published** "Rules for category 2 waste disposal for nuclear fuel material or those which are contaminated there with" (April 1, 2008)
		Low-level radioactive waste (Relatively lower radioactive waste)	**Completed** "Policy on processing and disposal of radioactive wastes" (Interim Report) (August 7, 1984)	**Completed** "Policy on processing and disposal of radioactive wastes" (Final Report) (October 8, 1985)	**Completed** "Basic concept of safety regulation for land disposal of low-level solid radioactive waste" (October 24, 1985)	**Completed** "Reference radionuclide concentration values for safety regulation of land disposal of low-level radioactive solid waste" (Interim Report) (February 1987) "Reference radionuclide concentration values for safety regulations of land disposal of low-level radioactive solid waste" (Second Interim Report) (June 1992)	**Completed** "Basic guides for safety review for radioactive waste burial facilities" (March, 1988) Amendment of "Basic guides for safety review for radioactive waste burial facilities" (January 7, 1993, March 29, 2001)		**Published** "Enforcement Ordinance for the Reactor Regulation Law" (March 1987, September 1992)	
		Very low level Radioactive waste: Concrete, etc.				**Completed** "Reference radionuclide concentration values for safety regulations of land disposal of low-level radioactive solid waste" (Second Interim Report) (June 1992)	**Completed** Amendment of "Basic guides for safety review for radioactive waste burial facilities" (January 7, 1993, March 29, 2001)		**Published** "Enforcement Ordinance for the Reactor Regulation Law" (September 1992)	
		Very low level Radioactive waste: Metal, etc.				**Completed** "Reference radionuclide concentration values for safety regulations of land disposal of low-level radioactive solid waste" (Third Interim Report) (September 14, 2000)			**Published** "Enforcement Ordinance for the Reactor Regulation Law" (December 2000)	
	Uranium waste		**Completed** "Fundamental concept of processing and disposal of Uranium wastes" (December 14, 2000)		**Partially Completed**∗1	**Future discussion**			**Published** "Enforcement Ordinance for the Reactor Regulation Law" (April 2008)	**Future discussion**
	Waste from research facilities, etc.		**Completed** "Fundamental concept of processing and disposal of wastes generated at research laboratories, etc."(May 28, 1998) The report on "The approach to realize the disposal of radioisotopes and waste from research facility etc. (to be disposed of near surface)"(October 10, 2006) "The promotion of the approach to realize the disposal of waste from research facility etc." (February 5, 2008)		**Completed** "Near surface disposal of radioisotope wastes" (January 26, 2004) ∗2 "Basic concept of safety regulation for near surface disposal of solid radioactive waste generated from research laboratories, etc." (April 20, 2006) ∗4	**Future discussion**			**Published** "Enforcement Ordinance for the Radiation Hazards Prevention Law" (May 2005) "Enforcement Ordinance for the Reactor Regulation Law" (April 2008)	**Partially Published** "Rules for the enforcement of Radiation Hazards Prevention act" (June 2005)
Materials that need not be treated as radioactive wastes (Waste equivalent to clearance)			**Completed** "Policy on processing and disposal of radioactive wastes" (August 7, 1984) "Fundamental concept of processing and disposal of Uranium wastes" (December 14, 2000)		**Under discussion since May 1997** a: Completed: Major nuclear reactor facilities (March 17, 1999), Heavy water reactors, fast neutron reactors, etc. (July 16, 2001), Nuclear fuel material use facilities (facilities dealing with irradiated fuels and materials) (April 24, 2003), Radionuclide concentrations for materials not requiring treatment as radioactive wastes, generated from dismantling etc. of reactor facilities and nuclear fuel use facilities" (December 16, 2004), (Partial amendment, March 17, 2005) b. Under discussion: Uranium, TRU facilities c. Future discussion: Radioisotope facilities				**Published** "Enforcement Ordinance for the Reactor Regulation Law" (November 2, 2005)	**Published**

Common important issues for the safety regulation of radioactive waste disposal (June 10, 2004) **Completed**

Completed "Basic concept of safety regulation on low-level radioactive waste burial" (Interim Report) (July 12, 2007)

Concluded "Upper Bound Concentration on the disposal of low level radioactive solid waste" (May 21, 2007)

∗1): Basic concept of safety regulation of near surface disposal of solid radioactive waste generated from research laboratory etc. (April 20, 2006)
∗2): Basic concept of safety regulation of near surface disposal of solid radioactive waste generated from radioisotope use facility etc.
*3): Waste from research facilities, etc. includes not only the waste regulated under the Reactor Regulation Law but also the waste regulated under the Radiation Hazard Prevention Law, the Medical Care Law or the Pharmaceutical Affairs Law.
*4): "Basic concept of safety regulation on low-level radioactive waste burial" (Interim Report) (July 12, 2007)

Table A1-2 Over View of Policy and Practice on Spent Fuel Management and Radio-active Waste Management

Type of Liability	Long-term management policy	Funding	Current practice / Facilities	Planned Facilities
Spent fuel	Reprocessing	Utility pays fund for reprocessing	Domestic reprocessing plants	Interim storage facility
Nuclear fuel cycle waste	Geological, intermediate depth or near surface disposal	Utility pays fund for disposal of waste	HLW Storage Facility / LLW Disposal Facility	Geological, intermediate depth or near surface disposal facilities
Non-power waste	Geological, intermediate depth or near surface disposal	Under discussion	On site storage	Under discussion
Decommissioning liabilities	Immediate decommissioning of NPP	Operators pays into reserve fund	Decommissioning underway	-
Disused Sealed Source	Return to manufacturer / Long-term storage	User	Return to manufacturers / Storage inside facilities	-

A2 Main theme of the National Report

A2.1 Policies and Practices

The Agency for Natural Resources and Energy (hereinafter it is referred as ANRE) amended the Final Disposal Act, reviewed the total research and development program at the **"**Geological Disposal Basic Research and Development Coordinating Council" and compiled "Overall Research Programme on Basic R & D of Geological Disposal of HLW". The Agency is to promote international cooperation in this field using the frameworks of the IAEA, OECD/NEA, GNEP, etc.
The Ministry of Education, Culture, Sports, Science and Technology (hereinafter it is referred as MEXT) amended the "the Law for the Independent Administrative Agency, Japan Atomic Energy Agency" and designated the Japan Atomic Energy Agency (hereinafter it is referred as JAEA) as the implementation entity of the disposal of low level radioactive wastes generated at the facilities using radioisotopes and radiation generators and at other laboratories and research institutes.
The Recycle Fuel Storage Company applied for the license for the Recycle Fuel Storage Center in March 2007. The JAPCO carried some cleared materials out of the Tokai Power Station for the first time in Japan in June 2007 in accordance with the clearance system.

A2.2 Decommissioning

The JAEA terminated commercial operation of advanced thermal reactor "FUGEN" in March 2003 and "FUGEN" entered decommissioning stage after its decommissioning program was approved in February 2008.

A2.3 Legal and Regulatory systems

1. Development of legal systems for the final disposal of HLW

The promotion of nuclear fuel cycle is an important part of Japanese energy policy and nuclear fuel cycle facilities, such as spent fuel reprocessing facility, are going to start full-scale operation in near future. As a step for facilitating nuclear fuel cycle, the government of Japan amended relevant laws in 2007 in order to take necessary measures

for steady implementation of the disposal of high level radioactive wastes and long-lived low-heat-generating radioactive wastes (hereinafter it is referred as TRU wastes) generated in the processes of nuclear fuel cycle.
The amendments of laws are outlined below:

(1) Amendment of the Final Disposal Act

In addition to the HLW, the following wastes are also added to the waste that is disposed of NUMO.

a. TRU wastes generated from spent fuel reprocessing and from MOX fuel fabrication process
b. HLW to be returned from abroad (as exchanged wastes) in exchange for TRU wastes originally planned to be returned

In addition, TRU waste disposal costs were added to the disposal reserve funds that is paid to NUMO by the licensees of nuclear power plants and of reprocessing facility as the costs for the final disposal of Specific Radioactive Wastes.

(2) Amendment of the Act for Deposit and Administration of Reserve Funds for Reprocessing of Spent Fuel from Nuclear Power Generation.

An amendment was made to add the provisions to adjust the reserve funds for the decrease of the radioactive waste storage and disposal costs due to receiving of the exchanged wastes

(3) Amendment of the Reactor Regulation Law

The final disposal for HLW and TRU wastes exceeding a certain level of concentration were added to the activity governed by the Law and the safety regulation system for these disposal activities were prepared. In addition, operators of waste disposal that deal with plutonium beyond a certain amount were obligated to take physical protection measures.

2. Quality improvement of regulatory activities of the NISA

NISA started to develop a management system for the quality improvement of regulatory activities in fiscal 2006 and has been implementing the system since fiscal 2007.

A2.4 General provisions

1. Human Resources

The regulatory bodies and nuclear industries in Japan are striving to develop human resources as a part of ensuring future nuclear safety infrastructure.
In 2006, NISA established the Subcommittee for Nuclear Safety Infrastructure under the Nuclear and Industrial Safety Subcommittee of the Advisory Committee for Natural Resources and Energy (hereinafter it is referred as NISS/ACNRE) and the Subcommittee is discussing measures for developing and ensuring human resources for nuclear energy area.
MEXT and ANRE of METI are implementing the human resources development program since 2007 focusing on the research activities in the areas of basic nuclear technology.

A2.5 Safety of radioactive waste management

1. Development of the safety regulation system for final disposal of radioactive wastes

In order to establish nuclear safety regulation system under the Reactor Regulation Law amended in June 2007, the Subcommittee for Radioactive Waste Safety under the NISS/ACNRE issued the report titled “On the Safety Regulation of Geological Disposal of High Level Radioactive Wastes (January 2008) .” The report prescribes the technical standards for high level radioactive waste disposal facilities and waste packages,

measures for maintaining facility safety, periodic safety review, the steps for closing the facility, etc. The Subcommittee also discussed the safety regulation system for intermediate depth disposal and issued the report titled “Safety Regulation on Intermediate Depth Disposal of Low Level Radioactive Waste (January 2008)”. Concerning the waste of core structures etc., the report prescribes the disposal depth, requirements for design and construction of facilities, technical standards for waste packages, periodic safety review, monitoring and record-keeping. In addition, in March, 2008, the Subcommittee issued the report titled “On the Safety Regulation of the Near Surface Disposal of Low Level Radioactive Wastes”. The report published the result of the study on the technical standards for near surface disposal of low and very low level radioactive waste.

In response to the above discussions and studies, NISA developed the safety regulation system for the disposal of high level radioactive wastes, streamlined the existing safety regulation for radioactive waste disposal, established the “Rule for Disposal of Category 1 Waste Disposal of Nuclear Fuel Material or Material Contaminated with Nuclear Fuel Material” as the basis for safety regulation for geological disposal of HLW and established the “Rule for Disposal of Category 2 Waste Disposal of Nuclear Fuel Material or Material Contaminated with Nuclear Fuel Material” as the basis for safety regulation for intermediate depth disposal and near surface disposal of low level radioactive wastes. These safety regulation systems are described in Section H.

Waste disposal was provided in the amendment of the Law Concerning Prevention from Radiation Hazards due to Radioisotopes, etc. (Radiation Hazards Prevention Law) in June 2004.

A3 Other topics

A3.1 International activities

It is a policy of Japan to use nuclear energy only for peaceful purposes. In line with this policy, Japan was actively involved in the establishment of the International Atomic Energy Agency (IAEA) as a framework for international cooperation and has been participating in and will further contribute to the IAEA’s activities. For instance, the IAEA’s safety standard committees have been working for developing and updating the safety standards topped by the Safety Fundamentals (SF-1) and Japan has been striving to introduce those standards into deliberation on the nation’s policies for peaceful use of nuclear energy.

Japan, recognizing the importance of international cooperation in ensuring safety in spent fuel and radioactive waste management, will continuously take part in the activities of the IAEA and the Nuclear Energy Agency of the Organization of Economic Cooperation Development (OECD/NEA).

In October 2005, NISA hosted the IAEA’s international conference on the safety of radioactive waste disposal. The conference was held in Tokyo with a number of participants from 19 countries and 3 international organizations. After the conference, the 20th Waste Safety Standard Committee (WASSC) Meeting was held at the Ministry of Economic, Trade and Industry to discuss proposed safety standards documents.

In Asian region, Radioactive Waste Management project has been implemented since 1995 within the framework of the Forum for Nuclear Cooperation in Asia (FNCA). This project is intended to contribute to the safety improvement of radioactive waste management in Asian region through exchanging and sharing the experience, findings and information on radioactive waste management among participating countries. Japan has been playing a leading role for this activity. Particularly, this project prepares and updates, as appropriate, a consolidated report on radioactive waste management that summarizes the activities in the participating countries by using this Convention as a reference.

The Radioactive Waste Management Topical Group of the Asian Nuclear Safety Network (ANSN), which is being operated as a part of the IAEA’s Extra-Budgetary Program for Asia, helps non-contracting countries to prepare for becoming contracting parties to this Convention by using the results of FNCA activities.

In October 2006, the Japan Nuclear Energy Safety Organization (hereinafter it is referred as JNES) held a seminar in Vietnam on the Convention on Nuclear Safety and this Joint Convention for Vietnamese governmental officials and those involved in nuclear energy.

A3.2 Impacts of Niigataken Chuetsu-Oki earthquake

The Niigataken Chuetsu-Oki earthquake that occurred on July 16, 2007, affected Kashiwazaki-Kariwa Nuclear Power Station of the TEPCO. The operating units were automatically shut down by detecting the earthquake and safety of the station was ensured. However, a number of impacts were identified by the post-earthquake investigation. As for the impact on spent fuel management, some equipment held on the inner wall surface of the spent fuel pool dropped down on the fuel storage racks, however, the investigation confirmed that there was no effect or damage to the spent fuel stored in the pool and thus safety was ensured. As for the impact on radioactive waste management, drums that contained radioactive wastes and were stored in the solid waste depository fell down on the floor and lids of some drums came off, however, there was no release of radioactive material to the outside of the depository and no safety problem was caused by this occurrence. These occurrences were evaluated as “below scale” in the International Nuclear Event Scale (INES).
As for the impacts on other systems or equipment, the relevant organizations are analyzing them to make use of lessens learned from the earthquake in order to ensure nuclear safety.

A4 Preparation of the report

A4.1 Structure of the report

This report describes the steps taken in Japan for implementing the obligations under the “Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management” in accordance with the provision of Article 32 of the Convention.
The report was prepared in accordance with “the Guidelines regarding the Form and Structure of National Reports”. The text of each Article of the Convention is indicated at the top of the section.
This report is structured as described below for the purpose of comprehensive and systematical explanation of the spent fuel management and radioactive waste management activities in Japan. Section B describes the policy of the Government of Japan for facilitating management of spent fuel and radioactive waste and the activities of the Licensees in line with the policy. Section E describes the legal systems to facilitate management of spent fuel and radioactive wastes as well as the legal systems for safety regulation and the organizations responsible for safety regulation. The relevant organizations other than the regulatory bodies are also described in Section E. Section F describes, as in the previous national report, general activities for ensuring safety, not to specific to spent fuel management and radioactive waste management. Section G describes the safety regulation of spent fuel storage, as an example of the safety regulatory system for spent fuel management. Section H describes safety regulation of “waste disposal” which mainly deals with radioactive wastes, as an example of the radioactive waste management defined in the Convention.
The major items that made progress or was newly implemented during the period covered by the report are outlined in Section A.

A4.2 Organizations involved in the preparation of the report

The report has been prepared by the NISA of METI. The major organizations involved in the preparation of the report are as follows:

Governmental organizations

- The Atomic Energy Commission and the Nuclear Safety Commission of the Cabinet Office
- Agency for Natural Resources and Energy and Nuclear and Industrial Safety Agency of Ministry of Economy, Trade and Industry
- Research and Development Bureau, Research Promotion Bureau and the Science and Technology Policy Bureau of the Ministry of Education, Culture, Sports Science and Technology
- The Pharmaceutical and Food Safety Bureau and Health Policy Bureau of the Ministry of Health, Labor and Welfare
- Ministry of Foreign Affairs

Business operators

- The Federation of Electric Power Companies*
- The Nuclear Waste Management Organization of Japan
- Japan Atomic Energy Agency

In preparing the report, the NISA obtained advice from the NISS/ACNRE
In addition, cooperation was obtained from the following organizations in preparing the report.

- Japan Nuclear Energy Safety Organization
- Radioactive Waste Management Funding and Research Center
- Nuclear Safety Research Association
- Japan Society of Newer Metals

*:The Federation of Electric Power Companies consists of 10 electric power utilities, i.e., Hokkaido Electric Power Co. Inc., Tohoku Electric Power Co. Inc., Tokyo Electric Power Co. Inc., Hokuriku Electric Power Co., Chubu Electric Power Co. Inc., Kansai Electric Power Co. Inc., Chugoku Electric Power Co. Inc., Shikoku Electric Power Co. Inc., Kyushu Electric Power Co. Inc., and Okinawa Electric Power Co. Inc. In preparing the report, the Federation of Electric Power Companies also provided information on the activities of the Japan Atomic Power Company and Japan Nuclear Fuel Limited.

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.
In Japan, the Atomic Energy Commission established "the Framework for Nuclear Energy Policy" which provides a basic principle of Japanese nuclear energy policy. On the basis of the basic principle provided in "the Framework for Nuclear Energy Policy", the Agency for Natural Resources and Energy of the Ministry of Economy, Trade and Industry established concrete policies for the utilization of nuclear energy as energy source, and the Ministry of Education, Culture, Sports, Science and Technology established concrete policies for the utilization of nuclear energy and radioisotopes for science and technology and Ministry of Foreign Affairs formulates and establishes foreign policy with regard to international cooperation in the field of nuclear energy area.

B1 Spent Fuel Management Policy

In the Framework for Nuclear Energy Policy, the Atomic Energy Commission evaluated the "Basic Concepts of the Nuclear Fuel Cycle from the following ten viewpoints: safety, technical feasibility, economic viability, energy security, environmental protection, nuclear non-proliferation, international trends, issues resulting from policy changes, social acceptability, and adaptability to emerging circumstances (adaptability to future uncertainty).." and the Framework concluded "When promoting nuclear power generation in Japan, we should comprehensively consider such matters as ensuring economic viability, working to create a sound material-cycle society, ensuring energy security, and ensuring the capability to respond to future uncertainty." "We have reached the conclusion that our basic policy is, aiming at using nuclear fuel resources as effective as reasonably achievable, to reprocess spent fuel and to effectively use the recovered plutonium and uranium, while ensuring safety, nuclear non-proliferation, environmental protection, and paying due attention to economic viability. Spent fuel will be reprocessed, within the available reprocessing capacity, for the time being, and the surplus volume exceeding the capacity will be stored intermediately."
In accordance with the basic principle provided by the Framework for Nuclear Energy Policy, the "Act for Deposit and Administration of Reserve Funds for Reprocessing of Spent Fuel from Nuclear Power Generation" (see Section E) was established that requires the operators to deposit the funds for spent fuel reprocessing in a fund administration corporation. The objective of "the Act" is to ensure the proper implementation of spent fuel reprocessing, disposal of radioactive wastes generated from reprocessing, and disassembling of reprocessing facilities. The amount of reserve by the end of March 2007 is about 1,390 billion yen by 10 electric utilities. As a part of such steps, The Minister of Economy, Trade and Industry designated " Radioactive Waste Management Funding and Research Center" as a non-profit "fund administration corporation" (October, 2005) that is supervised by the

Minister through supervisory orders and on-the-spot inspection.

B2 Spent Fuel Management Practices

Spent fuel generated in power reactors are sent to reprocessing facilities after a certain period of on-site cooling and storage. The spent fuel has been reprocessed overseas in accordance with contracts with British and French companies, with the exception of a portion reprocessed by the Tokai Reprocessing Plant of the JAEA Tokai Research and Development Center (Hereinafter it is called Tokai Reprocessing Plant of the JAEA). In the meantime, considering national demand for reprocessing, JNFL began constructing the Spent Fuel Reprocessing Plant in Rokkasho village, based on operational experience accumulated at the Tokai Reprocessing Plant and on technologies and experience from advanced countries. The plant, as of March 2008, was undergoing active test using spent fuel, and would start operation within 2008. Storage of spent fuel at storage facility in the plant started since 1999, and export of spent fuel to foreign reprocessing plants ended in July 2001.
The Law for Regulation of Nuclear Source Material, Nuclear Fuel Material and Nuclear Reactors (Reactor Regulation Law) was amended in 1999 to incorporate provisions on interim spent fuel storage. Tokyo Electric Power Company and Japan Atomic Power Company jointly established “Recycle Fuel Storage Company” in order to prepare for commercial operation of the first interim fuel storage facilities in Japan by 2010. In March 2007, the company applied for the license for the construction and operation of Recycle Fuel Storage Center at Mutsu city, Aomori Prefecture (see Fig.L5-1), and the license application is now under the safety examination.
The spent fuel from research reactor facilities has been and is to be returned to the USA, UK or France, or is to be reprocessed or stored in Japan.

B3 Radioactive waste management Policy

Radioactive wastes may need extraordinarily long time for their effects to attenuate to an insignificant level and disposal of them has to be governed by four principles; “principle of generators’ liability”, “principle of minimization of radioactive wastes”, “principle of reasonable treatment and disposal” and “principle of implementation based on mutual understanding with the public”. On the basis of such recognition, the Atomic Energy Commission deems it important to appropriately categorize the wastes so that they may be safely treated and disposed of according to the categorization. From such viewpoint, the Commission categorized the wastes into “radioactive wastes subject to geological disposal” and “radioactive wastes subject to managed disposal” and indicated basic strategies for each category. In accordance with such strategies, the government of Japan developed the policy for promoting radioactive waste disposal as described below.

1. Radioactive waste to be geologically disposed of

(1) High level radioactive waste

In Japan, a site for geological disposal of high level radioactive waste is selected in three steps of the selection of “preliminary investigation areas”, “detailed investigation areas” and “construction site of final disposal facility”, in accordance with the “Specific Radioactive Waste Final Disposal Act (Final Disposal Act)” (see Section E). Pursuant to the Act, the Cabinet approved the “Basic Policy for Final Disposal” and the “Final Disposal Plan” and the Nuclear Waste Management Organization of Japan (NUMO) was established as an organization to implement final disposal. In addition, utilities are now depositing the reserve funds for final disposal. The amount of reserve by the end of March 2007 is about 500 billion yen. Open solicitation of candidate areas for literature search on possible installation of final disposal facility was conducted by the NUMO and some local authorities answered it, but selection has not yet been made.
Under such situation, the Atomic Energy Commission stated that the current activities should be enhanced to obtain understanding and cooperation of the electricity consumers

who are benefitted with nuclear power generation as well as the local residents of various sectors of local communities, including local authorities, across the country.
In response to that, the Radioactive Waste Subcommittee under the Nuclear Energy Subcommittee of the Advisory Committee for Natural Resources and Energy prepared an interim report on the enhancement of the activities to promote the final disposal. The report requires that the government should, by itself, ask local governments to conduct literature search, while maintaining the present procedure of open solicitation of candidate areas. The report also asks the government, NUMO and electric utilities to enhance national and regional public relations, to propose regional development plans, to enhance research and development and international cooperation for promoting the public understanding. Specifically, publicity works are conducted in each prefecture in Japan and workshops are organized associate with non political organizations in the outskirts of the site. It is proposed to build a “geological disposal concept demonstration facility” with ground and underground facilities, that facilitate public understanding of geological disposal concept and clarifies its engineering feasibility as well as long-term behaviors. This demonstration facility will be used for the demonstration of the emplacement of wastes, installation techniques, monitoring technology, and retrieval technology.
The “Coordination Council for Basic Research and Development of Geological Disposal” organized by the Agency for Natural Resources and Energy discussed and made up a master plan for the basic research on geological disposal (December, 2006), to facilitate effective and efficient implementation of the total research and development program by the government, Japan Atomic Energy Agency and other research organization. As for international cooperation, Japan has been studying, and using as reference, the cases in foreign countries where the selection of disposal site 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, GNEP, etc.

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

As for TRU wastes, the Atomic Energy Commission stated that the interaction in the case of geological disposal of TRU wastes by the side of high level radioactive wastes (single-site disposal: see Fig. L6-4-2) should be evaluated and necessary implementation steps, including function of the implementing body and government involvement, should be studied on the basis of the evaluation results.
In response to that, the Agency for Natural Resources and Energy amended the “Final Disposal Act”. 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 the Nuclear Waste Management Organization of Japan, and generators of such radioactive wastes were legally requested to provide the cost needed for final disposal.

2. Radioactive wastes disposed with institutional control

In Japan, disposal with institutional control is categorized in the following three type; namely “near surface trench disposal”, “near surface pit disposal” and “intermediate depth disposal.”
The AEC, in “the Framework for Nuclear Energy Policy” stated that” It is often effective and efficient to treat and dispose of radioactive waste in an integrated fashion according to the properties of the waste material regardless of the generators or waste sources, and therefore, the Government should coordinate various systems accordingly.”
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.

The Atomic Energy Commission, considering the results of operator's investigation and tests, indicated that necessary systems for implementing intermediate depth disposal including safety regulation system should be established without delay. In response to that, the Radioactive Waste Safety Subcommittee under the Nuclear and Industrial Safety Subcommittee of the Advisory Committee for Natural Resources and Energy prepared an interim report on safety regulation of intermediate depth disposal of low level radioactive waste. This report shows the outline of safety regulation and further technical study items. Considering the results of the study, the Nuclear and Industrial Safety Agency developed an Ordinance of the Ministry of Economy, Trade and Industry based on the Reactor Regulation Law.
Concerning the disposal of waste generated from the research, medical and industrial facilities for using radio-isotopes and radiation generating apparatus (hereinafter referred to as "Waste from Research Facilities, etc."), the report of the discussions in the committee on R&D in the Field of Atomic Energy/Sub-working Committee on Research and Evaluation/the Council on Science, Technology and Academism was published in Sep. 2006. Based on the report, MEXT amended the Law for the Independent Administrative Agency, Japan Atomic Energy Agency, in May 2008, and the JAEA was designated as the implementation entity of the disposal of the Waste from Research Facilities, etc.
In the Law Concerning Prevention from Radiation Hazards due to Radioisotopes, etc. (hereinafter referred to as "the Radiation Hazards Prevention Law"), the rules on the disposal has been established, and the near-surface disposal of the waste from the utilization facilities of radio-isotopes are planned

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, the AEC decided on November 2, 1993 to eliminate the option of sea dumping of radioactive waste. Based on this decision the Reactor Regulation Law was amended in May, 2005.

B4 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 Law, the Radiation Hazards Prevention Law and relevant regulations.

B4.1 High-Level Radioactive Waste Management Practices

In Japan, spent fuel has been reprocessed by the Rokkasho Reprocessing Plant of JNFL, Tokai Reprocessing Plant of the JAEA and reprocessing plants in France and the United Kingdom. JNFL is conducting active test of the vitrification facility of HLW, attached to its reprocessing plant, at Rokkasho Village in Aomori prefecture. This facility is to be completed within 2008 and 57 vitrified waste canisters would be generated during the test. High-level liquid waste generated at the Tokai Reprocessing Plant of the JAEA is stored in tanks within the facility. The vitrification facility started operation in January 1995. As of March 2008, about 400 cubic meters of liquid waste and 247 vitrified waste canisters are in storage.
Utilities in Japan have concluded reprocessing contracts with British and French companies for a total of 5,600 tU of spent fuel from light water reactors and 1,500 tU of spent fuel from a gas cooled reactor. In accordance with these contracts, vitrified waste canisters are returned to the utilities and are stored by JNFL. By March 2008, 1310 vitrified canisters had been returned from France, and the canisters from United Kingdom in total of 2,200 canisters together with those from France will be returned in the next ten-odd years.
Vitrified HLW will be disposed of by geological disposal. Based on the Final Disposal Act, the Nuclear Waste Management Organization of Japan (NUMO), the responsible implementing organization, will start disposal in mid 2030s after three steps procedure of site selection, that is, selection of the preliminary investigation areas, detailed investigation areas and final

disposal facility. NUMO, in 2002, started the first step by open solicitation of candidate of sites for the preliminary investigation areas, and published the “application format”, “outline of the disposal facility”, “investigation items” and “coexistence of disposal facility and local community”. In case of receiving proposal of candidate areas, NUMO will assess validity of the candidates by conducting survey of the site with existing literature on volcanic activities, active faults and other geological conditions. NUMO will decide the preliminary investigation areas based on the assessment.

B4.2 Low-Level Radioactive Waste Management Practices

LLW is classified into waste from power reactors, TRU waste, uranium waste and radioactive waste from medical, industrial and research facilities. The waste management strategy for each of these categories is as follows, while gaseous and liquid radioactive wastes are discharged under monitoring, after attenuation of radioactivity, filtering, adsorption and/or distillation. (See H.6.5)

1. Waste from Power Reactors

As of March 2008, fifty-six nuclear power reactors (of which fifty-five are commercial nuclear power reactors) were in operation*. Liquid waste concentrate is solidified with cement in drums after evaporation. Paper, clothing and other combustibles are placed in drums after incineration. Plastics, metals and other non-combustibles are placed in drums after compaction. These drums are stored in the on-site storage facilities. Replaced steam generators and other large-volume solid wastes are placed in depository. Replaced control rods and channel boxes, etc. are stored in spent fuel pools and spent ion exchange resins are stored in tanks. Near-surface disposal of drums (solidified liquid waste and compacted and solidified non-combustible wastes) started in 1992 at the disposal facility of JNFL at Rokkasho Village in Aomori Prefecture.

The Clearance system is in operation since December 2005 after the amendment of the Reactor Regulation Law and other related cabinet and ministerial ordinances. In June 2006, the Japan Atomic Power Co. filed an application for “the methods for measurement and assessment of radioactive concentration of waste generated from dismantling of the Tokai Power Station” in accordance with the amended Reactor Regulation Law and obtained approval of the government in September 2006. Clearance measurement was conducted on the waste in the Tokai Power Station and application for confirmation by the regulatory body was filed in April 2007. In June, the certified materials cleared from regulation were carried out from the Tokai Power Station for the first time after getting the confirmation certification. For the time being, the cleared material is recycled at the site related to the nuclear installations, namely they will be used as shielding material, bench and so on.

The clearance system would be applied to the wastes generated from the operation of light water reactors and the dismantling of “ATR-Fugen.”

JNFL, as a part of study on intermediate depth disposal of waste from power reactors, conducted research on geological features, underground water and ground from 2002 to 2006 at the site of uranium enrichment and waste disposal facilities. (See Fig.L6-3-3 and Fig.L6-3-4)

*: A period from the first criticality to the time before decommissioning

2. TRU Waste

At present, in Japan, the reprocessing of spent fuel is in progress at the Tokai Reprocessing Plant of the JAEA.

Liquid TRU waste generated at the Tokai Reprocessing Plant of JAEA is stored in tanks and concentrated by evaporation, and a portion of it is solidified in drums. Segmented fuel cladding, used filters and sampling bottles are put in containers and other solid waste is put in drums. These drums and the containers are being held in storage at on-site depositories.

The reprocessing plant of the JNFL at Rokkasho Village, Aomori prefecture is at the stage of the integrated operational test (active test) using actual spent fuel in preparation for the commercial operation in 2008, and full-scale operation is expected in the near future.
TRU waste generated at spent fuel reprocessing plant in France and UK will be returned to Japan after 2013.
Electric utilities are planning to build a storage facility to temporarily store the returned wastes
TRU waste generated from the fabrication of MOX fuel in Japan Atomic Energy Agency Tokai research and development center Nuclear Fuel Cycle Engineering Laboratories is held in storage at on-site depositories as well as TRU waste from reprocessing.
Research and development programs on TRU waste disposal have been promoted by JAEA and utilities.

3. Uranium Waste

Liquid waste containing uranium generated from enrichment or fuel manufacturing facilities of JAEA or other private facilities are stored in tanks. Solid uranium waste and ash resulting from incineration are put in drums. They are held in storage at on-site depositories.

4. Waste from Research Facilities, etc.

Radioactive waste generated from research, medical and industrial facilities using radioisotopes and radiation generating apparatus are collected by the license holders of the waste management business, who store it at their own depositories after compaction or incineration.
Radioactive waste generated in the facilities of research reactor and fuel material use of the Japan Atomic Energy Agency (JAEA) and universities are stored at their own depositories after compaction or incineration.

B5 Criteria used to define and categorize radioactive waste

In Japan, radioactive waste is categorized as shown in Table B5-1.
In May 2007, the Nuclear Safety Commission (NSC) issued a document which provides for upper bounds of concentration of radioactive elements in waste packages from power reactors and in TRU waste packages. (*1) The upper bounds of concentration of radioactive elements are so decided, that the public exposure due to waste packages is well within the reference value, and that the upper bounds are in conformity with the latest knowledge in the international community. Based on these concepts, disposal of radioactive waste is categorized into Category 1 Waste Disposal (geological disposal) and Category 2 Waste Disposal (Intermediate Waste Disposal, Near Surface Disposal with Artificial Barrier and Near Surface Disposal without Artificial Barrier).(see Fig.L6-1)
Concerning the waste that does not need to be dealt with as radioactive waste, the NSC has studied the clearance level of radionuclides concentrations and its calculation method, referring to the ICRP document (Pub. 46, 1985) and IAEA-TECDOC-855(*2), respectively. The results are reported as “Clearance Level for Major Nuclear Facilities” (March, 1999), “Clearance Level for Heavy Water Reactors, Fast Neutron Reactors, etc.” (July, 2001), and “Clearance Level for Nuclear Fuel Use Facilities (Facilities dealing with irradiated fuels and materials” (April, 2003).
Since IAEA issued the Safety Guide “Application of the Concepts of Exclusion, Exemption and Clearance”, Safety Standards Series No. RS-G-1.7 (2004), the NSC has made a re-evaluation of the above mentioned three reports on the clearance level. The results were issued as a report “Radionuclides Concentrations for Materials not Requiring Treatment as Radioactive Wastes, Generated from Dismantling etc. of Reactor Facilities and Nuclear Fuel Use Facilities” in December, 2004. The NSC concluded that as the re-evaluated values and the values of exemption level provided in the IAEA safety guide are comparable, it is suitable to use the values in the IAEA safety guide. The Radioactive Wastes Safety Subcommittee of the Nuclear and Industrial Safety Subcommittee also studied this matter and concluded that

it is essentially suitable to use the values of the IAEA safety guide (“Establishment of the Clearance System for Nuclear Facilities (December, 2004)”).
Through this process, the rule for the confirmation of radioactivity concentrations was formulated to provide clearance levels of 33 nuclides of wastes from reactor facilities.
The NSC showed the basic concept to distinguish “solid wastes that are not radioactive wastes” from radioactive wastes in the report “Reference Radionuclides Concentration Values for Safety Regulations of Land Disposal of Low-level Radioactive Solid Waste (The 2nd interim report)” (June, 1992). The report clarified that “solid wastes that are not radioactive wastes” are those materials; a) materials that is clearly identified as not contaminated or not activated, b) material where significantly contaminated portion is identified and is deleted and contamination of the remaining portion is negligible, c) materials where significantly activated operation is evaluated and is deleted and activation of the remaining portion is negligible.
The clearance levels for uranium and other nuclides for the exemption of regulatory control are under discussion in the NSC.

*1: “Reference Radionuclide Concentration Values for Land Disposal of Low-level Radioactive Solid Waste (interim report)”, NSC, December, 1986, “Reference Radionuclide Concentration Values for Land Disposal of Low-level Radioactive Solid Waste (2nd report)”, NSC, June, 1992, “Reference Radionuclide Concentration Values for Land Disposal of Low-level Radioactive Solid Waste (3rd report)”, NSC, September, 2000, and “Upper Bound of Radioactive Concentration for Burial of Low-level Radioactive Solid Waste”, NSC, May, 2007

*2: “Clearance levels for radionuclides in solid materials, Application of exemption principles, Interim report for comment” (January, 1996)

Table B.5-1 Classification of Radioactive Wastes

Classification			Example	Origin of Waste
High-Level Radioactive Waste			Vitrified Waste Canister	High radio-activity liquid waste or vitrified waste canister that contains fission products like Sr-90 and Cs-137 and Actinides elements like Am-241 and Np-237 separated from spent fuel during the reprocessing
Low-Level Radio-active Waste	Waste from Power Reactors	Waste of Core Structures etc.	Control Rods Core Internals	Waste Generated at Power Reactors
		Low Level Radioactive Waste	Liquid Waste Filters Used Equipment Expendables	
		Very Low-Level Radioactive Waste	Concrete Metals	
	Long-lived Low Heat Radioactive Waste (TRU Waste)		Parts of Fuel Elements Liquid waste Filters	Low Level Radioactive Waste Generated from the Operation and Dismantling of Reprocessing Facilities and MOX Fuel Fabrication Facilities
	Uranium Waste		Expendables Sludge Used Equipment	Radioactive Waste Generated from Enrichment and Fuel Fabrication Facilities
	Waste from Research Facilities, etc.		Liquid waste Metals Concrete Plastics Filters Disposable Syringe	Radioactive Waste Generated from the facilities of Research, Medical and Industrial Facilities for using radioisotopes, etc.
Material that need not be treated as radioactive waste (Waste below the Clearance Level)			Concrete Metals	Those waste generated from the operation and dismantling of nuclear installations and the radioactivity concentration of the waste is so low that no measures to avoid radiation hazards is necessary

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 Article 3, Paragraph 1, of the Convention, that reprocessing is part of spent fuel management, acceded to the Convention. Therefore Japan includes the spent fuel stored in reprocessing facilities in these scope of the Convention.
The government of Japan did not make declarations provided for in Article 3, Paragraphs 2, and 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.

D1 List of spent fuel management facilities

Spent fuel from power reactor facilities is being held in storage at spent fuel storage facilities within power reactor facilities or the Tokai Reprocessing Plant of Tokai Research and Development Center, Nuclear Fuel Cycle Engineering Laboratories, JAEA and Rokkasho Reprocessing Plant of JNFL. Spent fuel from research reactor facilities is being held in storage at spent fuel storage facilities of the research reactor facilities. The locations, main purposes and essential features of these spent fuel management facilities are listed in Tables D1-1 and D1-2.

Table D1-1 List of Spent Fuel Management Facilities (Related to Power Generation)

Nuclear facilities where spent fuel management facilities are located	Location	purpose	features
The Japan Atomic Power Co. Tokai-No.2 Power Station	Ibaraki	Storage	Wet storage (partly stored in dry casks)
The Japan Atomic Power Co. Tsuruga Power Station	Fukui	Storage	Wet storage
Hokkaido Electric Power Co., Inc. Tomari Power Station	Hokkaido	Storage	Wet storage
Tohoku Electric Power Co., Inc. Onagawa Nuclear Power Station	Miyagi	Storage	Wet storage
Tohoku Electric Power Co., Inc. Higashidori Nuclear Power Station	Aomori	Storage	Wet storage
Tokyo Electric Power Co., Inc. Fukushima Daiichi Nuclear Power Station	Fukushima	Storage	Wet storage (partly stored in dry casks)
Tokyo Electric Power Co., Inc. Fukushima Daini Nuclear Power Station	Fukushima	Storage	Wet storage
Tokyo Electric Power Co., Inc. Kashiwazaki Kariwa Nuclear Power Station	Niigata	Storage	Wet storage
Chubu Electric Power Co., Inc. Hamaoka Nuclear Power Station	Shizuoka	Storage	Wet storage
Hokuriku Electric Power Co., Inc. Shika Nuclear Power Station	Ishikawa	Storage	Wet storage
The Kansai Electric Power Co., Inc. Mihama Power Station	Fukui	Storage	Wet storage
The Kansai Electric Power Co., Inc. Takahama Power Station	Fukui	Storage	Wet storage

The Kansai Electric Power Co., Inc. Ohi Power Station	Fukui	Storage	Wet storage
The Chugoku Electric Power Co., Inc. Shimane Nuclear Power Station	Shimane	Storage	Wet storage
Shikoku Electric Power Co., Inc. Ikata Power Station	Ehime	Storage	Wet storage
Kyushu Electric Power Co., Inc. Genkai Nuclear Power Station	Saga	Storage	Wet storage
Kyushu Electric Power Co., Inc. Sendai Nuclear Power Station	Kagoshima	Storage	Wet storage
Japan Atomic Energy Research Agency Fugen Decommissioning Engineering Center (Fugen)	Fukui	Storage	Wet storage
Japan Atomic Energy Research Agency Tokai Research and Development Center Nuclear Fuel Cycle Engineering Laboratories Tokai Reprocessing Plant	Ibaraki	Storage	Wet storage
Japan Nuclear Fuel Limited Rokkasho Reprocessing Plant	Aomori	Storage	Wet storage
Japan Atomic Energy Research Agency Fast Breeder Reactor Research and Development Center (Monju*1)	Fukui	Storage	Wet storage

*1: Pre-service inspection stage (As of the end of March 2008)

Table D1-2 List of Spent Fuel Management Facilities (Research Reactors)

Nuclear facilities where spent fuel management facilities are located	Location	purpose	features
Japan Atomic Energy Research Agency Tokai Research and Development Center Nuclear Science Research Institute	Ibaraki	Storage	Dry storage
Japan Atomic Energy Research Agency Oarai Research and Development Center	Ibaraki	Storage	Wet storage
Kyoto University Research Reactor Institute	Osaka	Storage	Wet storage

(As of the end of March 2008)

D2 Inventories of spent fuel

Spent fuel stored in above-mentioned spent fuel management facilities are shown in Table D2-1.

Table D2-1 Spent Fuel Inventory

Nuclear facilities Categories	Types of Fuel Elements	Inventory
Commercial Nuclear Power Plants	Uranium Oxide Fuel Elements	12,190 ton
Power Reactors at the stage of Research and Development	Uranium Oxide Fuel Elements and Mixed Oxide Fuel Elements	70 ton
Reprocessing Plants	Uranium Oxide Fuel Elements and Mixed Oxide Fuel Elements	2,576 ton
Research Reactors	Uranium Oxide Fuel Elements and Mixed Oxide Fuel Elements	34 ton

(As of the end of March 2008)

D3 List of radioactive waste management facilities

Radioactive waste management facilities within power reactor facilities include the followings: waste treatment facilities where waste generated at the reactor facility is treated; solid waste depositories where drums (homogeneous solidification, fill-up solidification, miscellaneous solid and others), etc. filled with treated waste are being held in storage; depositories where the replaced steam generators and other large solid wastes are being

held in storage; spent fuel pools etc. where the disused control rods, the disused channel boxes, etc. are being held in storage; and tanks where the spent ion exchange resin is being held in storage.
Radioactive waste management facilities within enrichment and fuel manufacturing plants include the followings; waste treatment equipments that treats waste generated at the plants; and solid waste depositories where drums filled with treated waste are held in storage.
Radioactive waste management facilities within spent fuel reprocessing plants include the followings; waste treatment equipments that treats waste generated at the plant; waste depository where vitrified waste and high level liquid waste are being held in storage; and waste depository where low level liquid waste and low level solid waste are being held in storage.
Radioactive waste management facilities licensed under the waste related activities include the followings; radioactive waste dispose facilities where radioactive waste is disposed of, Waste Storage facilities being held in storage before disposal, waste treatment facilities where radioactive waste is treated.
Radioactive waste management facilities within research reactors and major fuel material use facilities include the followings; waste treatment equipments that treats low level radioactive waste generated at those facilities; and solid waste depositories where drums filled with treated waste are being held in storage.
Radioisotope waste management facilities licensed with waste management business under the Law concerning Prevention from Radiation Hazards due to Radioisotopes etc. (Radiation Hazards Prevention Law) include storage facilities, where drums, etc. filled with processed waste generated at radioisotopes use facilities, etc, are being held in storage.
Radioactive waste management facilities licensed on the basis of the Medical Care Laws etc. include the storage facilities, etc., where drums, etc. filled with processed radioactive medical waste generated at medical care facilities, etc, being are being held in storage.
The locations, main purposes and essential features of these radioactive waste management facilities are listed in Tables D3-1 and D3-2.

Table D3-1 List of Radioactive Waste Management Facilities (Power Reactors)

Nuclear facilities located radioactive waste management facilities	Location	Purpose	Features
The Japan Atomic Power Co. Tokai Power Station	Ibaraki	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
The Japan Atomic Power Co. Tokai-No.2 Power Station	Ibaraki	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
The Japan Atomic Power Co. Tsuruga Power Station	Fukui	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Hokkaido Electric Power Co., Inc. Tomari Power Station	Hokkaido	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Tohoku Electric Power Co., Inc. Onagawa Nuclear Power Station	Miyagi	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Tohoku Electric Power Co., Inc. Higashidori Nuclear Power Station	Aomori	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Tokyo Electric Power Co., Inc. Fukushima Daiichi Nuclear Power Station	Fukushima	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Tokyo Electric Power Co., Inc. Fukushima Daini Nuclear Power Station	Fukushima	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.

Tokyo Electric Power Co., Inc. Kashiwazaki Kariwa Nuclear Power Station	Niigata	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Chubu Electric Power Co., Inc. Hamaoka Nuclear Power Station	Shizuoka	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Hokuriku Electric Power Co., Inc. Shika Nuclear Power Station	Ishikawa	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
The Kansai Electric Power Co., Inc. Mihama Power Station	Fukui	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
The Kansai Electric Power Co., Inc. Takahama Power Station	Fukui	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
The Kansai Electric Power Co., Inc. Ohi Power Station	Fukui	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
The Chugoku Electric Power Co., Inc. Shimane Nuclear Power Station	Shimane	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Shikoku Electric Power Co., Inc. Ikata Power Station	Ehime	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Kyushu Electric Power Co., Inc. Genkai Nuclear Power Station	Saga	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Kyushu Electric Power Co., Inc. Sendai Nuclear Power Station	Kagoshima	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Japan Atomic Energy Research Agency, Fugen Decommissioning Engineering Center(Fugen)	Fukui	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, incineration, etc.
Japan Atomic Energy Research Agency Fast Breeder Reactor Research and Development Center (Monju)	Fukui	Processing and storage of waste from the power plant	Stored at a storage facility after volume reduction by compaction, etc.

(As of the end of March 2008)

Table D3-2 List of Radioactive Waste Management Facilities (Other Than Power Reactors)

Nuclear facilities where radioactive waste management facilities are located		Location	Purpose	Features
Global Nuclear Fuel Japan Co., Ltd.	Fuel fabrication facility	Kanagawa	Treating and storage of uranium waste	Stored at a storage facility, etc. after volume reduction by compaction, etc.
Mitsubishi Nuclear Fuel Co., Ltd.	Fuel fabrication facility	Ibaraki	Treating and storage of uranium waste	Stored at a storage facility, etc. after volume reduction by compaction, etc.
Nuclear Fuel Industries, Ltd. Tokai Works	Fuel fabrication facility	Ibaraki	Treating and storage of uranium waste	Stored at a storage facility, etc. after volume reduction by compaction, etc.
	Fuel material use facility		Treating and storage of waste from fuel material use facility	Stored at a storage facility, etc. after volume reduction by compaction, etc.
Nuclear Fuel Industries, Ltd. Kumatori Works	Fuel fabrication facility	Osaka	Treating and storage of uranium waste	Stored at a storage facility, etc. after volume reduction by compaction, etc.
	Fuel material use facility		Storage of waste from fuel material use facility	Stored at a storage facility, etc. after volume reduction by compaction, etc.

Japan Atomic Energy Research Agency Ningyo-toge Environmental Engineering Center	Enrichment facility	Okayama	Treating and storage of uranium waste	Stored at a storage facility, etc. after volume reduction by compaction, etc.
	Fuel material use facility		Treating and storage of waste from fuel material use facility	Stored at a storage facility, etc. after volume reduction by compaction, etc.
Japan Atomic Energy Research Agency Tokai Research and Development Center Nuclear Science Research Institute	Waste disposal facility	Ibaraki	Disposal of low level radioactive waste	Trench disposal of concrete waste
	Research reactor facility; Fuel material use facility; Radioisotope Waste Management facility*1		Treating and storage of radioactive waste from medical, industrial and research facilities	Stored at a storage facility, etc. after volume reduction by compaction, incineration, etc.
Japan Atomic Energy Research Agency Tokai Research and Development Center Nuclear Fuel Cycle Engineering Laboratories	Reprocessing facility	Ibaraki	Treating and storage of HLW and Trans uranium waste	HLW stored after vitrification, waste containing Trans uranic nuclides stored after volume reduction by incineration etc
	Fuel material use facility		Treating and storage of waste from fuel material use facility	Stored at a storage facility, etc. after volume reduction by compaction, incineration, etc.
Japan Atomic Energy Research Agency Oarai Research and Development Center	Waste management facility; Research reactor facility , Fuel material use facility; Radioisotope Waste Management facility*1	Ibaraki	Treating and storage of radioactive waste from research reactor facility , fuel material use facility; and radioisotope use facilities	Stored at a storage facility, etc. after volume reduction by compaction, incineration, etc.
Japan Atomic Energy Research Agency Aomori Research and Development Center Mutsu Office	Research reactor facility	Aomori	Treating and storage of waste from research reactor facility	Stored at a storage facility, etc. after volume reduction by compaction, etc.
Japan Nuclear Fuel Limited Reprocessing Business division	Reprocessing facility	Aomori	Treating and storage of HLW and Trans uranium waste	Storage facility of waste generated from spent fuel receipt and storage facility (Reprocessing Facility is now under construction)
	Waste storage facility		Storage of vitrified waste	A storage facility for returned vitrified waste
Japan Nuclear Fuel Limited Enrichment and Disposal Office	Waste disposal facility	Aomori	Disposal of low level radioactive waste	No.1 Disposal facility, No.2 Disposal facility
	Enrichment facility		treating and storage of uranium waste	Stored at a storage facility
The University of Tokyo, Nuclear Professional School, School of Engineering	Research reactor facility; Fuel material use facility	Ibaraki	Temporary storage of waste from research reactor facility and fuel material use facility	Treated in Japan Atomic Energy Agency Tokai Research and Development Center Nuclear Science Research Institute
The University of Tokyo, Radioisotope Center	Radioisotope Waste Management facility*1	Tokyo	Treating and storage of waste from radioisotope use facility, etc	Stored at a storage facility, etc. after volume reduction by incineration, etc.
Kyoto University Research Reactor Institute	Research reactor facility Fuel material use facility	Osaka	Treating and storage of waste from research reactor facility and fuel material use facility	Stored at a storage facility, etc

Rikkyo University Institute for Atomic Energy	Research reactor facility	Kanagawa	Treating and storage of waste from research reactor	Stored at a storage facility, etc
Musashi Institute of Technology Atomic Energy Research Institute	Research reactor facility	Kanagawa	Storage of waste from research reactor facility	Stored at a storage facility, etc.
Kinki University Atomic Energy Research Institute	Research reactor facility	Osaka	Storage of waste from research reactor facility	Stored at a storage facility, etc
National Institute of Radiological Sciences Radiotoxicology Building Operations Section	Fuel material use facility	Chiba	Storage of waste from fuel material use facility	Stored at a storage facility, etc.
National Institute of Advanced Industrial Science and Technology Tsukuba Central 2	Fuel material use facility	Ibaraki	Storage of waste from fuel material use facility	Stored at a storage facility, etc.
Nuclear Material Control Center Rokkasho Safeguards Analytical Laboratory	Fuel material use facility	Aomori	Treating and storage of waste from fuel material use facility	Stored at a storage facility, etc.
Nuclear Material Control Center Tokai Safeguards Center	Fuel material use facility	Ibaraki	Storage of waste from fuel material use facility	Stored at a storage facility, etc
Japan Radioisotope Association The Kaya Memorial Takizawa Laboratory	Radioisotope Waste Management facility*2	Iwate	Treating and storage of waste from radioisotope use facility, etc.	Stored at a storage facility, etc. after volume reduction by compaction, incineration, etc
Japan Radioisotope Association Kanto Storage Facility	Radioisotope Waste Management facility*2	Ibaraki	Storage of waste from radioisotope use facility, etc.	Stored at a storage facility, etc.
Japan Radioisotope Association Ichihara Office	Radioisotope Waste Management facility*2	Chiba	Storage of waste from radioisotope use facility, etc.	Stored at a storage facility, etc.
Japan Radioisotope Association Kanto Waste Relay Station	Radioisotope Waste Management facility*2	Chiba	Storage of waste from radioisotope use facility, etc.	Stored at a storage facility, etc.
Japan Radioisotope Association Kanto Waste Relay Station II	Radioisotope Waste Management facility*2	Chiba	Treating and storage of waste from radioisotope use facility, etc.	Stored at a storage facility, etc. after volume reduction by compaction, etc.
Japan Radioisotope Association Kansai Waste Relay Station	Radioisotope Waste Management facility*2	Kyoto	Storage of waste from radioisotope use facility, etc	Stored at a storage facility, etc.
Toshiba Corporation Research Reactor Center	Research reactor facility	Kanagawa	Storage of waste from research reactor facility	Stored at a storage facility, etc
Toshiba Corporation Nuclear Engineering Lab	Fuel material use facility, Research reactor facility	Kanagawa	Storage of waste from research reactor facility and fuel material use facility	Stored at a storage facility, etc.

Hitachi, Ltd. Power & Industrial Systems Nuclear System Division Ozenji Hitachi Training Reactor Center	Research reactor facility	Kanagawa	Storage of waste from research reactor facility	Stored at a storage facility, etc
Nippon Nuclear Fuel Development Co., Ltd. NFD Hot Laboratory	Fuel material use facility	Ibaraki	Treating and storage of waste from fuel material use facility	Disposition on treatment to JAEA Oarai
Nuclear Development Corporation Fuel Hot Laboratory	Fuel material use facility	Ibaraki	Treating and storage of waste from fuel material use facility	Stored at a storage facility, etc. after volume reduction by compaction, etc.
T.N. Technos Co. TUKUBA LABORATORIES	Radioisotope Waste Management facility*1	Ibaraki	Treating and storage of waste from radioisotope use facility, etc.	Stored at a storage facility, etc. after volume reduction by incineration, etc.
VESTA Co., Ltd.	Radioisotope Waste Management facility*1	Chiba	Storage of waste from radioisotope use facility, etc.	Stored at a storage facility, etc.

(As of the end of March 2008)

*1: facility with Radioisotope Waste Management Business licensed on the basis of the Radiation Hazards Prevention Law

*2: facility with Radioisotope Waste Management Business licensed on the basis of the Radiation Hazards Prevention Law and the Medical Care Laws etc.

D4 Inventories of radioactive waste

D4.1 Inventory of Radioactive Waste Being Held in Storage

The wastes stored in the above-mentioned radioactive waste management facilities of nuclear power reactor facilities include approximately 630,000 drums (converted to number of 200 litter drums) in solid waste storage facilities, 29 used steam generators in steam generator storage facilities, used control rods, disused channel boxes, spent resin in spent fuel pools and other facilities at the end of March 2008.

At facilities other than nuclear power reactor facilities, HLW of approximately 1,600 vitrified packages and approximately 400m^3 high level liquid waste are stored in fuel reprocessing facilities, and LLW of approximately 590,000 drums (converted to number of 200 litter drums) and approximately 5,400m^3 low level liquid waste are stored in fuel reprocessing facilities, fuel fabrication facilities, laboratories, research reactor facilities of universities, and storage facilities of Japan Radioisotopes Association at the end of March 2008.

Details of these inventories are indicated in Section L.

D4.2 Inventory of Radioactive Waste That Has Been Disposed of

A portion of LLW stored at radioactive waste management facilities of commercial power reactor facilities, which has comparatively low concentration of radionuclides, has been transported to a radioactive waste disposal facility of JNFL and disposed of at near surface disposal facility since 1992.

The amount of the waste emplaced at the disposal facility is listed in Table D4-1. Presently, the disposal facility of JNFL is in operation and has disposed of about 200,000 drums (each carrying 200 liters) of waste, as of the end of March 2008. At the disposal facility of Tokai Research and Development Center, Nuclear Science Research Institute of JAEA, about 1,670 tons of very low level wastes resulting from dismantling of JPDR were disposed of. The facility has started operation in 1995, and the disposal facility has been at the

preservation stage since October 1997.

D4.3 Inventory of Radioactive Waste that Has Resulted from Past Practices

None.

Table D4-1 The Amount of Waste Disposed of

Name of facility		Representative nuclides	Disposed amount
Japan Nuclear Fuel Limited, Enrichment and Disposal Office, Radioactive waste disposal facility*1	No. 1 disposal facility	Co-60, Ni-63, Cs-137, Sr- 90, C-14	138,555 drums*3
	No. 2 disposal facility	Co-60, Ni-63, Cs-137, Sr- 90, C-14	62,064 drums*3
Japan Atomic Energy Research Agency Tokai Research and Development Center Nuclear Science Research Institute *2	Waste disposal facility	Co-60, Ni-63, Cs-137, Sr- 90, Ca-41, C-14, Eu-152, H-3	1670 tons

*1: As of the end of March 2008
*2: Disposed of very low level concrete waste resulting from the dismantling of JPDR, and shifted to the preservation stage of the disposal facility since October 1997.
*3: 200-liter drums

D5 List and status of nuclear facilities in the process of being decommissioned

Nuclear facilities in the process of being decommissioned include Tokai Power Station of the Japan Atomic Power Co., JRR-2 of JAEA and the Advanced Thermal Reactor “Fugen” of JAEA.

A reactor at the Tokai Power Station of the Japan Atomic Power Co. ceased the operation in 1998 and has been in decommissioning stage since December 2001. Turbine, feed water pumps, etc. started to be dismantled first. Dismantling heat exchangers started in 2006. In 2011 the dismantling reactor vessel will be started and it will last for 6 years. The decommissioning will be completed by 2018.

Fugen Decommissioning Engineering Center of JAEA, ceased the operation of the advanced thermal reactor “Fugen” at the end of March 2003 and on 7 November 2006 the application of decommissioning program was filed and permitted on 12 February. Spent fuel has being transferred to Tokai Reprocessing Plant of Tokai Research and Development Center Nuclear Fuel Cycle Engineering Laboratories of JAEA, and the decommissioning is planned to be completed by fiscal year 2028.

The status of decommissioning activities, etc. is listed in Tables D5-1 and D5-2.

Table D5-1 List of Nuclear Facilities in the Process of Being Decommissioned and Planned to Be Decommissioned. Status of Decommissioning Activities at These Facilities (With Respect to Power Reactors)

Name of facility	Location	Reactor type	Electrical output (MW)	Commercial operation	Status of decommissioning
Japan Atomic Power Co., Tokai Power Plant	Ibaraki	GCR	166	Jul 1966 - Mar 1998	Decommissioning started in 2001
Japan Atomic Energy Research Agency, Fugen Decommissioning Engineering Center (Fugen)	Fukui	ATR	165	1979 - Mar 2003	Termination of operation in March 2003. Continue taking out of spent fuels and preparation for decommissioning. The decommissioning is planned to start from Feb. 2008 and be completed by fiscal year 2028.

(As of the end of March 2008)

Table D5-2 List of Nuclear Facilities in the Process of Being Decommissioned and Planned to Be Decommissioned. Status of Decommissioning Activities at These Facilities (With Respect to Research Reactors)

Name of facility	Location	Reactor type	Thermal output (kW)	Service period*	Status of decommissioning
Japan Atomic Energy Research Agency, Tokai Research and Development Center, Nuclear Science Research Institute , JRR-2	Ibaraki	Heavy water moderated cooling tank reactor	10000	Oct 1960 - Dec 1996	The following activities for decommissioning have been completed. Shipment of spent fuel and heavy water, isolation of reactor cooling system and reactor body, removal of secondary cooling system and experimental equipment.
Japan Atomic Energy Research Agency Tokai Research and Development Center Nuclear Science Research Institute VHTRC	Ibaraki	Graphite moderated reactor	0.01	May1985 - Jun 1999	Dismantling and removal of the reactor body and leveling of reactor (including resin painting) have been completed.
Japan Atomic Energy Research Agency Aomori Research and Development Center Mutsu Office The Reactor Facilities Of The First Nuclear Ship (Mutsu)	Aomori	Pressurized light water moderated and cooled reactor, PWR	36000	Aug 1974 - Feb 1992	Dismantling has been completed. Accessory land facilities are currently being maintained for the purpose of storing solid waste and processing liquid waste
Japan Atomic Energy Research Agency, Oarai Research and Development Center, Deuterium Criticality Assembly (DCA)	Ibaraki	Heavy water moderated reactor	1	Dec 1969 - Sep 2001	Deactivation has been completed. Carry out heavy-water and remove cooling system
Hitachi Ltd. Power & Industrial Systems Nuclear System Division Ozenji Hirachi Training Reactor Centor	Kanagawa	Light water moderated and cooled reactor	100	Dec 1961 - Feb 1975	Dismantling has been completed. Currently being proceeding are the maintenance of the pool storing spent fuel and the storage and maintenance of radioactive waste.
Toshiba Corporation Research Reactor Center, Toshiba Training Reactor-1 (TTR-1)	Kanagawa	Light water moderated inhomogeneous reactor	100	Mar 1962 - Jan 2001	Permanent suspension of operational functions and removal of reactor cooling system facilities. Carry out spent fuel
Rikkyo University Institute for Atomic Energy	Kanagawa	Zirconium hydride moderated light water cooled reactor	100	Dec 1961 - Dec 2001	Extended-shutdown, carry out spent fuel.
Musashi Institute of Technology Research Reactor	Kanagawa	Zirconium hydride moderated light water cooled reactor	100	Jan 1963 - Jan 2004	Extended-shutdown, carry out spent fuel

*: A period from the first criticality to the termination of operation (As of the end of March 2008)

Section E Legislative and Regulatory System

In Japan, legal systems are provided for promoting proper management of spent fuel and radioactive wastes, and also for safety regulation on them.
This section describes such legal systems.

E1 Implementing Measures

> Article 18
> 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.

In Japan, the steps necessary for implementing the obligations under this Convention are taken in accordance with relevant laws and regulations. The “Atomic Energy Basic Law” provides the fundamental objectives of promoting nuclear energy research and utilization; securing of future energy resources; promotion of the progress of science and technology and industrial development; and eventual contribution to the welfare of human society and improvement of the level of people’s living. The Law also provides for the basic principle that the research, development and utilization of nuclear energy shall be made only for peaceful purposes with ensuring safety, operating democratically and autonomously, publicizing the results, and actively contributing to international cooperation. In accordance with the objectives and basic principles provided by the “Atomic Energy Basic Law”, the government of Japan has established legal systems for safety regulation on spent fuel management and radioactive waste management. The relevant laws and regulations are outlined in E2.
To implement obligations under the Convention, the following organizations have been established to enforce legal systems described in this section. The roles of those organizations are summarized below.

1. The Atomic Energy Commission (AEC)

The AEC was established within Prime Minister’s office on January 1st 1956, in order to implement national policy on the research, development and utilization of nuclear energy in planned and democratic manner. (The AEC was transferred to the Cabinet Office in January 2001.)
The AEC has responsibility to 1) prepare the basic policy on the research, development and utilization of nuclear energy, 2) prepare allocation of the budget for the nuclear energy development, 3) express opinions on the application of license standards based on the Law for Regulation of Nuclear Source Material, Nuclear Fuel Material and Nuclear Reactors (Reactor Regulation Law), 4) to make planning, deliberation and decisions on coordinating the related administrative organizations in the matters that are related to the research, development, and utilization of nuclear energy. Based on the Law for Establishment of the Atomic Energy Commission and the Nuclear Safety Commission (the AEC and the NSC Establishment Law), when the AEC deems it necessary as a part of its assigned duties, the AEC may recommend the heads of relevant administrative organizations by way of the Prime Minister, may request reports and cooperation including submission of materials, statements of viewpoint, and explanation to the heads of relevant administrative organizations. Under the Reactor Regulation Law, the Minister of METI or Minister of MEXT shall, before granting a license to establish nuclear facility, receive views of the AEC with regard to the following items: 1) the nuclear facility will not be used for any purposes other than peaceful purposes, 2) the license will cause no hindrance to the planned development or utilization of nuclear energy, and 3) the applicant has an adequate financial basis to construct and maintain the nuclear facility
In 1956, The AEC established the Long-term Program for Development and Utilization of Nuclear Energy (hereinafter referred to as “the Long-term Program”) that showed the basic policy and implementation plan for the nuclear research and development in Japan. Since then the AEC revised the Long-term Program, approximately every five years. The latest

version of the Long-term Program was issued in October, 2005 with a new title of "Framework for Nuclear Energy Policy".
The AEC is composed of a chairman and four other commissioners appointed by the Prime Minister with the consent of the Diet. General affairs of the AEC are performed by the office of nuclear energy policy under the cabinet office. It coordinates the matters with related administrative organizations in order to implement the AEC decisions.
Under the AEC, specialists are assigned to investigate and deliberate the specific matters, and special committees, councils or other bodies may be established when necessary. There are 4 special committees (committee for policy evaluation, special committee for nuclear protection, special committee for research and development and special committee for Nuclear fusion), 2 councils (council for citizens participation and council for international issues). These committees and councils are deliberating assigned matters. Specialists are appointed by the Prime Minister from persons of knowledge and experience based on the AEC and the NSC Establishment Law.
The discussions of meetings of the AEC including the committees and councils are open to the public in principle and people can observe the meetings. The contents of the deliberations are provided for the public on a website of the AEC (http://aec.go.jp/) and at the Nuclear Energy Library.

2. The Nuclear Safety Commission (NSC)

The Atomic Energy Basic Law was partially revised on October 4, 1978 to establish the NSC under the Prime Minister's Office. The function of safety regulation, which had been belonged to the AEC, was transferred to the NSC, in order to strengthen the system of ensuring nuclear safety. (The NSC was transferred from the Prime Minister's Office to the Cabinet Office due to central government reform in January 6, 2001.)
The NSC is responsible for planning, deliberation and decisions on matters that are related to ensuring safety of the research, development, and utilization of nuclear energy.
The NSC conducts its own review of the results of NISA's examination on the application from the view points of the licensee's technical capability and prevention of nuclear hazards. The NSC supervises and audits the appropriateness of NISA's regulatory activity in construction and operation stages after Safety Review, from the viewpoint of adequacy, effectiveness and transparency. Thus, the framework that confirms the quality, effectiveness and transparency of the safety regulation is maintained. (see Fig E1-2)
When the NSC deems it necessary as a part of its assigned duties, the NSC may recommend the heads of relevant administrative organizations by way of the Prime Minister, may request reports and cooperation including submission of materials, statements of viewpoint, and explanation to the heads of relevant administrative organizations.
From April 2003 (partially, from October 2003), the NSC receives from NISA quarterly reports on the regulatory activities after licensing such as Approval of the Construction Plan, Pre-Service Inspection, Periodic Inspection, Audit of Licensee's Periodic Check System, Audit of Licensee's Welding Check System, Approval of Operational Safety Program, the Operational Safety Inspection and accidents and failures of nuclear installations. The NSC also has the authority to inquire directly of the licensees, and maintenance and inspection contractors in order to audit the safety regulation implemented by regulatory body.
In the case of a violation of safety regulations in any of nuclear facilities, the employee can directly allege the fact to the NSC, and the NSC has the authority to investigate the allegation.
The Minister of METI, before granting license to establish nuclear installations, must receive the opinion of the NSC on the following matters: (i) that the applicant for the license of a nuclear installation has adequate technical capability to establish and reliably operate a nuclear reactor, and (ii) that the site, structures and equipment of the nuclear installation would not cause any hindrance to the prevention of radiological hazards.
The NSC is composed of five commissioners appointed by the Prime Minister with the

consent of the Diet, and these commissioners elect a chairman among them. General affairs of the NSC are performed by the NSC Secretariat of the Cabinet Office. The NSC Secretariat is composed of the Secretary-General, the General Affairs Division, the Regulatory Guides and Review Division, the Radiation Protection and Accident Management Division and the Subsequent Regulation Review Division and has about 100 personnel.(see Fig E1-1)
Under the NSC, two safety examination committees and sixteen other special committees are organized as shown in Table E1-1. The Special Committees may organize working groups under them, if necessary.
The members of the Committee on Examination of Reactor Safety and the Committee on Examination of Nuclear Fuel Safety are appointed from persons of knowledge and experience by the Prime Minister in accordance with the AEC and the NSC Establishment Law. The Emergency Technical Advisory Body is composed of the commissioners of the NSC and the experts on the nuclear emergency who are also appointed by the Prime Minister from persons of knowledge and experience. Other special committees are composed of similar members.
Results of the safety examination committees and special committees are reported to the NSC and are deliberated by the NSC. At nuclear emergency, the NSC determines recommendation for nuclear emergency after the discussion of the Emergency Technical Advisory Body.
Deliberations of all committees, including the special committees and working groups under the NSC are open to the public. The contents of the deliberations are provided for the public on a website (http://www.nsc.go.jp/) and at the Nuclear Energy Library.

3. Ministry of Foreign Affairs (MOFA)

MOFA formulates foreign policy of on peaceful uses of nuclear energy and nuclear non-proliferation. MOFA has the responsibility for ratification, interpretation and implementation of international conventions concerned.

4. Organizations to promote the implementation of spent fuel management and radioactive waste management

(1) Agency for Natural Resources and Energy of the Ministry of Economy, Trade and Industry

The Agency for Natural Resources and Energy was established as an external agency of the Ministry of Economy, Trade and Industry, to be responsible for ensuring stable and efficient sharing of mineral resources and energy and for promoting their appropriate utilization. The Agency plans, develops and promotes comprehensive policies for mineral resources and energy, policies for energy saving and new energy, nuclear energy policies and basic policies for electric power resources development. It promotes utilization of nuclear energy, ensuring energy resources and developing industry.

(2) The Research and Development Bureau and the Research promotion Bureau of the MEXT

The MEXT promotes nuclear energy research and development for science and technology. In the MEXT, the Research and Development Bureau is promoting the research and development for fast breeder reactor (FBR) cycle technology, and for nuclear fusion including International Thermonuclear Experimental Reactor (ITER) project. In addition, the Bureau supervises the Japan Atomic Energy Agency and deals with nuclear liability matters.
The Research promotion Bureau promotes application of radiations, radioactive isotopes and quantum beams. Specifically, the Bureau is promoting the Japan Proton Accelerator Complex (J-PARC) project and research on heavy particle cancer therapy.

5. Regulatory bodies

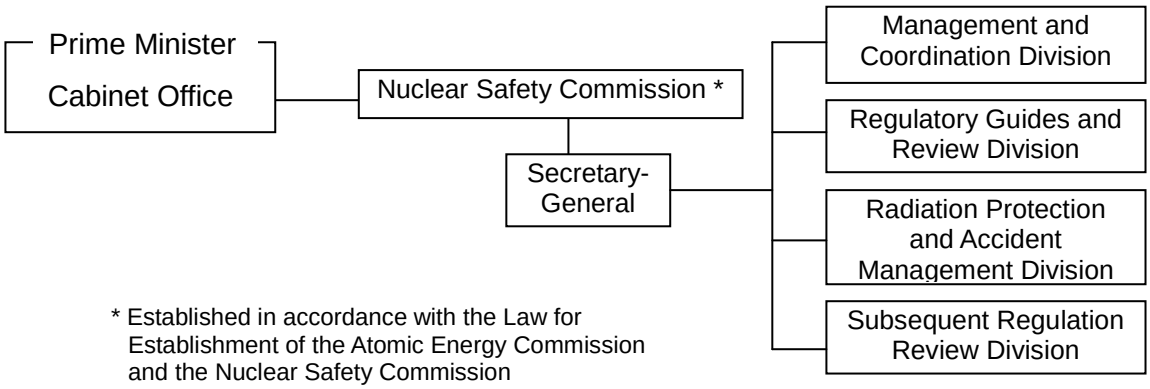
The following organizations have been established for the regulation in Japan. The roles of those organizations are summarized in E3.

(1) Nuclear and Industrial Safety Agency (NISA) of the METI
Safety regulation for nuclear energy use as energy source

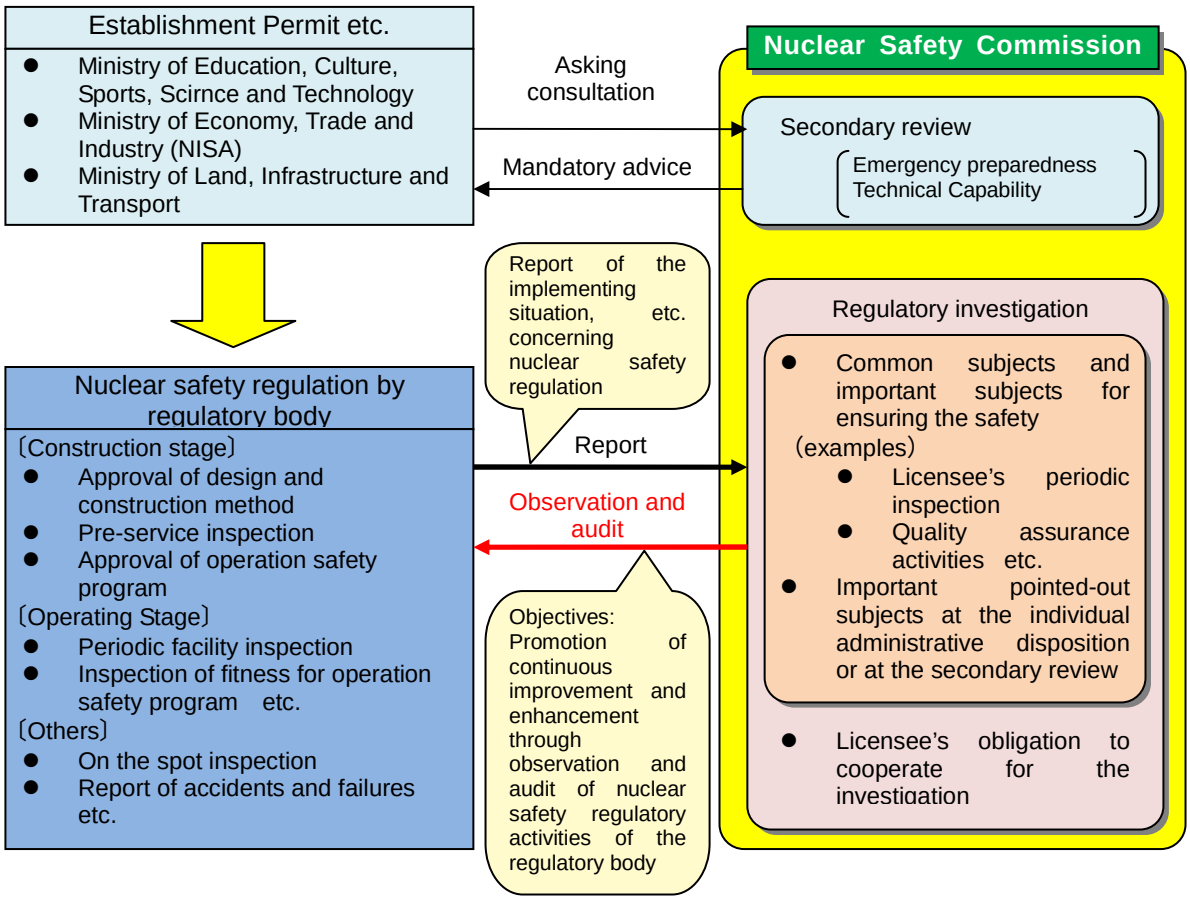
(2) Science and Technology Policy Bureau of the MEXT
Safety regulation for nuclear energy use for science and technology and radiation utilization

(3) Ministry of Land, Infrastructure, Transport and Tourism
Safety regulation for transportation of nuclear fuel materials for nuclear energy use

(4) Ministry of Health, Labor and Welfare (MHLW)
Safety regulation for radioactive materials etc. for medical use



E1-1 NSC Organizational Chart



E1-2 Observation, Audit, Inspection, etc. of the Safety Regulatory Administration by Nuclear Safety Commission

Table E1-1 List of Special Committees within the NSC

Committee on Examination of Reactor Safety	− Matters concerning the safety of nuclear reactor facilities
Committee on Examination of Nuclear Fuel Safety	− Matters concerning the safety of nuclear fuel material
Emergency Technical Advisory Body	− Technical advices pursuant to the Special Law for Nuclear Emergency
Emergency Technical Advisory Body for Disaster Prevention of Nuclear Carriers and Submarines	− Technical advices in emergencies/disasters of nuclear carriers and submarines
Emergency Technical Advisory Body for Nuclear Disaster Prevention due to Armed Attacks	− Technical advices in nuclear emergencies/disasters due to armed attacks
Special Committee for Nuclear Safety Standards and Guides	− Matters concerning safety standards and guides of nuclear reactors, nuclear fuel facilities, and other nuclear installations
Special Committee on Radioactive Waste and Decommissioning	−Matters concerning the safety assurance in radioactive waste disposal −Matters concerning the safety assurance in decommissioning nuclear installations
Special Committee on Safety Goals	− Establishment of safety goals
Special Committee on Radiation Protection	− Matters concerning the radiation protection considering domestic and international trends
Special Committee on Safe Transport of Radioactive Materials	− Matters concerning the safety assurance in transportation of radioactive materials considering domestic and international trends.
Special Committee on Analysis and Evaluation of Nuclear Accidents and Failures	− Analysis and evaluation of domestic and international nuclear accidents and failures
Special Committee on Nuclear Safety Research	− Planning of nuclear safety research programs − Monitoring of the nuclear safety research programs −Evaluation of the nuclear safety research programs
Special Committee on Nuclear Disaster	− Emergency preparedness in the vicinity of nuclear installations, etc.
Investigatory Advisory Board on Assessment of Seismic Safety −Committee on Evaluation of Earthquakes and Ground Motions − Committee on Assessment of the Nuclear Power Reactor Facility Integrities − Committee on the Guidelines for Safety Review concerning Geology and Ground of Nuclear Power Reactor Facilities	− Investigation and evaluation concerning the ensuring of seismic safety of nuclear facilities. Specifically: • Seismic safety checks of existing nuclear facilities; • In-depth checks of the impacts caused by the Niigataken Chuetsu-oki Earthquake in 2007 on the nuclear facilities at the Kashiwazaki-Kariwa Nuclear Power Station, TEPCO, and the integrity evaluation of them; • Relevant matters concerning the revision of the “Guidelines for Safety Review concerning Geology and Ground of Nuclear Power Reactor Facilities.”
Project Team on Safety Survey of Reprocessing Facilities	− Survey and analyses of matters relevant to the safety regulation activities during the test operation of the Rokkasho reprocessing facility
Advisory Board on High-level Waste Repository Safety	− Technical matters concerning the safety assurance in the final disposal of high-level radioactive wastes
Task Force for introduction of Safety Regulations Using Risk Information	− Review and analyses of the issues in the introduction of safety regulation using risk information

E2 Legislative and regulatory framework

Article 19

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) 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) 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.

E2.1 Legislative and Regulatory Framework

1. Legal system for promoting spent fuel management and radioactive waste management

In Japan, spent fuel management is carried out on the site of facilities such as nuclear power stations and reprocessing facility. In addition, Japan has an option to alternately store spent fuel in intermediate storage facility outside of reactor facility. The law currently working for the promotion of spent fuel management is the “Act for Deposit and Administration of Reserve Funds for Reprocessing of Spent Fuel from Nuclear Power Generation” for securing the future costs for reprocessing in a safe, reliable and transparent means.

As for radioactive waste management, a part of low level radioactive wastes (LLW) have been already being disposed of in a near surface disposal facility. Meanwhile, the "Specific Radioactive Waste Final Disposal Act (Final Disposal Act)" is applicable to taking necessary steps to systematically and securely carry out the final disposal of the radioactive wastes to be geologically disposed, such as vitrified waste of high level radioactive wastes (HLW) generated from reprocessing of spent fuel.

(1) Final Disposal Act

Final Disposal Act enacted in May, 2000 provides for the following basic framework for systematically and securely carrying out the final disposal of the high level radioactive wastes generated from spent fuel reprocessing (hereinafter referred to as “Specific Radioactive Wastes”); (i) development and public announcement of an basic policy and a plan (final disposal plan) for the final disposal of specific radioactive wastes by the Minister of METI; (ii) process for site selecting for a final disposal of specific radioactive wastes; (iii) securing of the expenses required for the final disposal of specific radioactive wastes; (iv) responsible licensee for the final disposal of specific 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. Nuclear Waste Management Organization of Japan (NUMO), which was established as an implementing organization based on the final disposal plan, carries out the activities of final disposal. Utilities shall pay deposits to the fund reserved for disposal, which is managed by an organization “Radioactive Waste Management Funding and Research Center” (RWMC) designated by the Minister of METI. NUMO promotes site selection by three steps procedure, that is, selection of the preliminary investigation area, detailed investigation area and the final disposal facility construction site, and NUMO obtains approval of the Minister of METI at each step of procedure.

The three step procedure for site selection is as follows, and items for investigation and

evaluation are clearly defined.

- Preliminary investigation of the area

Definition: The area to investigate by boring etc. whether the geological formation concerned is stable for long term.

Requirements for selection: There shall be no record of noticeable change of the geological formations by natural phenomena, such as earthquakes.

- Detailed investigation of the area

Definition: The area to investigate, by constructing underground facility with testing and measuring equipment, whether the characteristics of the geological formation concerned is suitable for construction of disposal facility.

Requirements for selection: Noticeable change of the geological formations by natural phenomena, such as earthquakes, has not occurred for long term.

- Selection of Final disposal facility construction site

Definition: The site where the final disposal facility is to be built.

Requirements for selection: It is expected that underground facility to be built within the geological formation will not be exposed to an extraordinary pressure, and that physical property of the geological formation is suitable for the final disposal facility.

When the Minister of METI is to advance a step further of the three-step procedure of site selection and to put it in the final disposal plan upon receiving NUMO's selection of an area or a site, the minister shall ask for opinion of the AEC and the NSC and shall consult relevant prefectural governors and mayors of municipalities and fully respect their opinions.

(2) "Act for Deposit and Administration of Reserve Funds for Reprocessing of Spent Fuel from Nuclear Power Generation" (May 2005)

This law provides for the frame work of deposit and management of the reserve funds for reprocessing of spent fuel from the nuclear power generation. The fund is managed by an organization designated by the Minister of METI (Fund Management Organization). The Minister of METI, every fiscal year, notifies utilities of the amount of deposit based on the amount of electricity generated by the nuclear fuel, and utilities deposit the amount in the Fund Management Organization. This law was enacted from the 1st of October 2005.

2. Legislative and Regulatory Framework on the Safety of Nuclear Utilization

Major laws established for the purpose of providing safety regulations on the utilization of nuclear energy and related laws include Reactor Regulation Law, "Electricity Utilities Industry Law", "the Law Concerning Prevention from Radiation Hazards due to Radioisotopes, etc." (hereinafter referred to as "the Radiation Hazards Prevention Law") and the Medical Care Law, the Clinical Laboratory Technicians and Health Laboratory Technicians Law, and the Pharmaceutical Affairs Law (These 3 laws are called "Medical Care Law, etc." hereafter) Also included are "the Basic Law for General Emergency Preparedness," "the Special Law of Emergency Preparedness for Nuclear Disaster (the Special Law for Nuclear Emergency Preparedness)," "the Law for Technical Standards of Radiation Hazards Prevention" etc. Overviews of these laws are provided in the following paragraphs.

(1) Reactor Regulation Law

In accordance with the objectives of "the Atomic Energy Basic Law", the Reactor Regulation Law is enacted to ensure that the uses of nuclear source material, nuclear fuel material, and reactors are only for the peaceful purposes, and carried out in a planned manner, to ensure public safety by preventing hazards and providing physical protection of nuclear fuel material and to ensure that use of internationally controlled material is regulated to comply with conventions on nuclear utilization or other international commitments.

The Law covers following activities and provides regulation for each of them:

- Refining

- Nuclear fuel fabrication
- Establishment and operation of reactor facilities
- Spent fuel storage
- Spent fuel reprocessing
- Radioactive waste storage and disposal
- Use of nuclear fuel material

The safety of spent fuel management is ensured through the each regulation for “establishment and operation of reactors”, “storage” and “reprocessing”, and the safety of radioactive waste management is ensured through the each regulation for “fabrication”, “establishment and operation of reactors”, “storage”, “reprocessing”, “disposal” and “use of nuclear fuel materials”.

The license for refining, fabrication, reactor establishment, storage, reprocessing, disposal and for use of nuclear fuel materials are granted on the basis that the location, structures and systems of the facility does not impair the prevention of hazards due to nuclear fuel materials, etc. and that the applicant has sufficient technological capability. The competent minister shall ask for opinions of the AEC and the NSC before granting license (except for license for use of nuclear fuel material).

The regulation after granting license includes regulation for ensuring facility safety (facility regulation) and regulation for ensuring operational safety and safety activities of the operator (operation regulation). The facility regulation includes “approval of design and construction methods”, “pre-service inspection”, “approval of welding method and welding inspection”, “periodical facility inspection” and “confirmation for waste disposal”. The “approval of design and construction methods” is to confirm that the facility has been designed in accordance with the “permitted” conditions and the “technical standard”, and the approval must be obtained before starting construction. The “pre-service inspection” is to confirm that the construction has been carried out in accordance with the approved "design and construction methods” and that the facility has the prescribed capability. The licensee cannot operate the facility without passing the pre-service inspection. Then, the “periodical facility inspection” is conducted periodically during operation to confirm that the facility and systems maintain the prescribed capability. The “confirmation for waste disposal” is to confirm that the waste disposal facility and related safety measures as well as the waste packages and related safety measures are in compliance with the technical standards.

Operational safety regulation for spent fuel management and radioactive waste management includes the “approval of the Operational Safety Program and the Operational Safety Inspection to inspect observance”, “assignment of the Chief Technician for Nuclear Fuel or the Chief Technician for Waste Handling”, “approval of the Physical Protection Program and the Operational Safety Inspection to inspect observance” and “assignment of the physical protection manager”. The “the Operational Safety Program” prescribes the measures for ensuring safety and facility maintenance including “operation and management of facility”, “patrol and check”, “radiation control” and “radioactive waste management”, and must be prepared by licensee and approved by the regulatory body. Licensee must have “the Operational Safety Program” approved before starting operation and must undergo periodically the “the Operational Safety Inspection” after the commissioning.

In addition, the Reactor Regulation Law provides for restriction of ocean dumping of radioactive wastes, reporting of facility accident and other event, measures in emergency and penalties. Penalties are the steps to ensure the compliance with applicable regulation and license condition. If an licensee has built a nuclear facility without obtaining license, has violated a cease-operation order, or has not take necessary measures for emergencies, imprisonment with hard labor or fine or both is imposed on the licensee. It is also provided for that if an operator does not observe the Operational Safety Program or does not follow an order to amend the Operational Safety Program, the licensee is subject to penalties such as revocation of license.

The NSC establishes the Regulatory Guides for design, safety review, etc. which specify

technical requirements for safety regulation of activities under the Reactor Regulation Law. The guides are used in the safety review of license application as the criteria for judging adequacy of the application. Ministerial orders for each of activities under the Reactor Regulation Law provide for regulation for each activity. Safety regulation on spent fuel management and radioactive waste management are described in Section G and Section H, respectively.

The Reactor Regulation Law was amended as follows since the last national report:

June 2007

Establishment of the safety regulation system for the final disposal of HLW

This amendment was to establish the safety regulation system for the geological disposal of HLW and introduced a licensing system for HLW disposal. This licensing system requires the Minister of METI to approve the design and construction methods before the start of construction and to conducts pre-service inspection for the construction and capability of the facility, inspection on welding method, periodical facility inspection during operation, to approve the Operational Safety Program with the Operational Safety Inspection to inspect observance and to approve the Physical Protection Program with the Operational Safety Inspection to inspect observance".

To establish an adaptable safety regulation system for radioactive waste disposal, making two classifications in the regulatory system. The conventional radioactive waste disposal of LLW was categorized as "Category 2 waste disposal" and disposal of HLW was categorized as "Category 1 waste disposal".

Following this amendment of the Law, ministerial ordinances prescribing detailed procedures for the Category 1 and 2 waste disposals were established and enacted in April, 2008. The details of the safety regulation for the Category 1 and 2 waste disposals are described in Section H.

June 2008

Improvement of fire protection system

The Kashiwazaki-Kariwa Nuclear Power Station of the Tokyo Electric Power Co. Inc. was extensively affected by the Niigataken Chuetsu-Oki earthquake in July 2007, including the damages to the fire-fighting system such as main fire-fighting water pipe. The damage made it difficult to promptly extinguish the transformer fire that broke out immediately after the earthquake, and caused flooding of fire-fighting water into the reactor building of the unit 1.

In response to this event, the NSC revised the "Regulatory Guide for Reviewing Fire Protection of Light Water Nuclear Power Reactor Facilities" to add fire detection, mobile fire-fighting equipment and in-house fire-fighting squad, recognizing importance of fire preparedness in operation in addition to design consideration against fire caused by big earthquake.

NISA, also, called a council of the experts from Nuclear and Industrial Safety Subcommittee of the Advisory Committee for Natural Resources and Energy to obtain advice for fire protection in nuclear facilities. On the basis of the advice of the council, NISA decided to add the requirement of fire protection provisions, such as in-house fire-fighting activities by operators and notification to the local fire station (initial fire-fighting activities), to the Operational Safety Programs as a measures to maintain safety. Specifically, NISA required the licensees to add provisions to the Operational Safety Programs on the preparation of fire-fighting vehicle equipped with chemical fire extinguisher, preparation of equipment to send alarm to local fire station and first response stuff for firefighting on regular basis. NISA confirms the implementation of such provisions by the Operational Safety Inspection.

The MEXT required the operators that operate large-scale research reactors to confirm the compliance with the "Regulatory Guide for Reviewing Fire Protection of Light Water Nuclear Power Reactor Facilities" issued by the Nuclear Safety Commission and also requested to report on the programs for enhancing fire protection measures. The Ministry

confirms the implementation of such programs within the scope of the Operational Safety Inspection.

(2) The Radiation Hazards Prevention Law

It is the purpose of the Radiation Hazard Prevention Law, based on the Atomic Energy Basic Law, to prevent from possible radiation hazards and to secure public safety, by regulating the use, sale, lease, disposal and others in which radioisotopes are handled and regulating the use of radiation generating apparatus, disposal and others in which the materials contaminated by radioisotope are handled.

Under the Law, the Enforcement Ordinance for the Radiation Hazards Prevention Law are established.

A license holder for use, sale, lease and waste management of radioisotopes, who has a storage facility with a capacity equal to or more than a specified amount or has radiation generating apparatuses, shall undergo the Facility Inspection before starting operation and the Periodic Inspection after starting operation.

Those who use the facility licensed under the Radiation Hazard Prevention Law must compile a set of the Internal Rules for Prevention of Radiation Hazards, assign the Supervisor of Radiation Protection, who is to supervise the prevention of radiation hazards, and notify these matters to the regulatory body before use of facility. Furthermore, those who use the facility have an obligation to conform to the criteria for facilities to be used, which have been established by legislation. Other obligations include: measuring the radiation doses within the premises or on the boundary of the establishment; measuring the exposure doses of the occupational personnel; providing education and training; and conducting medical surveillance, etc (with some exemption).

The management of radioisotopes or materials contaminated by radioisotopes generated within radioisotopes use facility shall be carried out in conformity with the criteria established by Law and regulations. They shall be stored within the premises of licensed facility or the premises of the licensed facility of radioisotope waste management.

The basic framework for radioactive waste disposal by disposal business operators is provided by the Radiation Hazard Prevention Law amended in June 2004 and by subsequent amendments of the enforcement ordinances and regulations. Currently, MEXT is developing the technical details such as dose criteria for the disposal site for progress of waste disposal.

Those who intend to cease the use of radioisotopes or radiation generating devices shall notify the Minister of MEXT of it, and report on the measures taken to cease operation.

If it is necessary, MEXT instructs the Radiation Inspectors to conduct an on-site inspection in order to confirm the compliance with the standards established by laws and regulations.

(3) Medical Care Law, etc.

The management of radioisotope waste generated from medical use is conducted only by waste management facility operators designated by the Minister of MHLW on the basis of the Medical Care Law etc.

Site, structure, and equipment of the waste management facility shall be complied with related technical criteria (standards) in order to be designated by the Minister of MHLW.

In addition, Periodical Inspection, Radiation Hazard Prevention Rules, conformance order to the standards of waste management facilities, education and training, notification of closure of waste management facility, etc, are provided by these laws equivalent to the Radiation Hazards Prevention Law.

(4) The Special Law for Nuclear Emergency Preparedness and the Basic Law for General Emergency Preparedness

The measures to be taken at a nuclear emergency are addressed by the Special Law for Nuclear Emergency Preparedness which was enacted in December 1999. The Special Law stipulates specific measures for nuclear emergency, including obligation of operators

on the preparedness for nuclear emergency, the Declaration of Nuclear Emergency and establishment of headquarters for the nuclear emergency, and enforcement of emergency measures. The Senior Officer for Nuclear Emergency is stationed in the vicinity of each nuclear facility, to direct and advise the operator in preparing its Plan for Nuclear Emergency Preparedness, as well as to conduct its duty to prevent occurrence of nuclear emergency and mitigate consequences should it occur.
Moreover, in the part of the nuclear emergency measures of the Basic Plan for Emergency Preparedness on the basis of the Basic Law for General Emergency Preparedness, measures necessary to the stages of abnormal event, nuclear emergency and recover from the emergency are clearly described.

(5) The Law for Technical Standards of Radiation Hazards Prevention

The objectives of the Law for Technical Standards of Radiation Hazards Prevention and its relevant regulation are to clarify the basic policy for defining technical standards for radiation hazards prevention and to establish the Radiation Council of MEXT, so that consistency of technical standards for radiation hazards prevention among the facilities and activities regulated by different ministries can be realized. “ The Radiation Council Orders” are stipulated under this Law.

E2.2 Clear Allocation of Responsibilities in the Different Steps

October 8, 1985, the AEC published a report titled "Policy on Radioactive Waste Processing and Disposal" prepared by the Special Committee on Radioactive Wastes. About allocation of the responsibilities, the report says that while the waste generators should bear overall responsibility for management of the wastes, it is more appropriate to put the legal responsibility to ensure safety on the operator of radioactive waste disposal facility when it operates centralized facilities. And it also says that it is important the waste generator should make every support for the operator of the centralized waste disposal facilities.
According to the basic concept mentioned above, in Japan, licensees of reactor facilities or other facilities are responsible for the safety of in-house management of the radioactive wastes generated in their facilities, while a disposal operator is responsible for the safety of waste management once the wastes are carried into the waste disposal facility. The Reactor Regulation Law regulates in-house management of spent fuel and radioactive wastes and provides for the measures to be taken by nuclear operators in transporting spent fuel of radioactive wastes outside the facilities. Thus the Reactor Regulation Law, while defining the competent minister responsible for safety regulation, provides for a system to consistently ensure the safety in each step of generation of spent fuel and radioactive wastes, on-site treatment and storage, transportation to disposal facility and disposal by disposal operators.

E2.3 The NSC’s Audit on Safety Review of License

The NSC decided “Basic Guides for Safety Review for Radioactive Waste Burial Facility” in March 1998 and amended it in March 2001, and, based on the decision, audited the safety review conducted by the regulatory body on radioactive waste disposal activity of JNFL.
The NSC, in preparation for license application for the Category 2 waste disposal (intermediate depth disposal, pit disposal, trench disposal) of radioactive solid waste, decided “Upper Bounds of Radioactivity Concentration for Burial of Low-Level Radioactive Solid Waste” in May 2007, published interim report on “Basic Concept of Safety Regulation on Low-Level Radioactive Waste Burial” in July 2007, and started study to amend “Basic Guides for Safety Review for Radioactive Waste Burial Facility” of the category 2 waste disposal in November 2007.

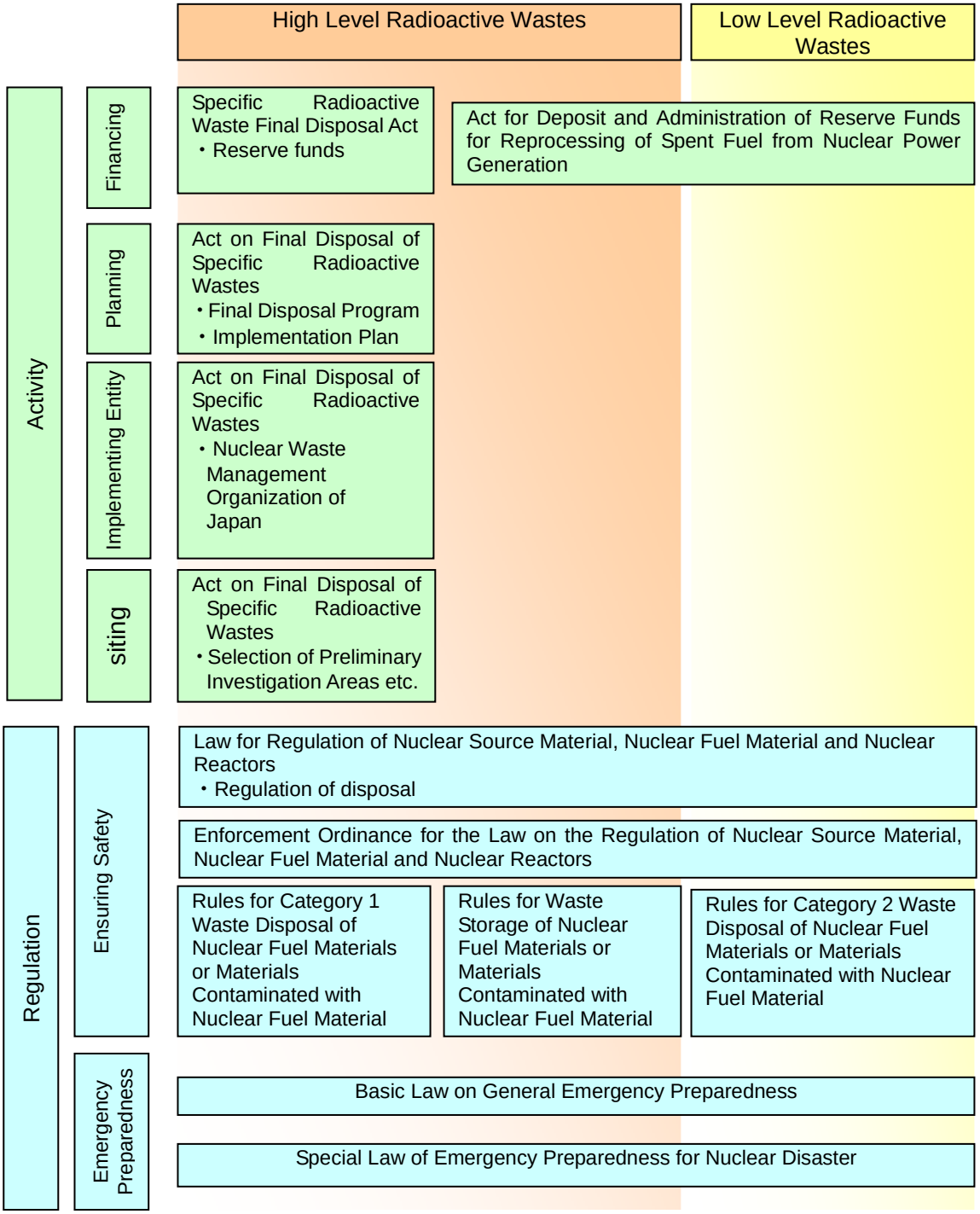


Figure E2-1 Legal System for Safety Management of Radioactive Waste Related to Nuclear Power Generation

E3 Regulatory Body

Article 20

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 19, and provided with adequate authority, competence and financial and human resources to fulfill 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.

The regulatory bodies in Japan are responsible for reliable implementation of regulation provided by the Reactor Regulation Law, the Radiation Hazard Prevention Law and other relevant laws. The structures and duties of the regulatory bodies are clearly specified in each Establishment Acts and financed by the government budget.
The regulatory bodies share the responsibilities for nuclear safety regulation according to the types of nuclear energy utilization. The Minister of METI regulates the safety in the utilization of nuclear energy as an energy source, the Minister of MEXT regulates the safety in the utilization of radioisotopes excluding medicines and in the utilization of nuclear energy for science and technology, and the Minister of MHLW regulates the safety of the activities in medical facilities.
The subordinate agency or bureau of each ministry takes charge of the practical implementation of safety regulation: NISA of the METI; the Science and Technology Policy Bureau of the MEXT; the Pharmaceutical and Food Safety Bureau (hereinafter it is called PFSB) and the Health Policy Bureau of the MHLW.
The NSC, whose members are appointed by the Prime Minister with the consent of the Diet, audits the activities of regulatory bodies, and establishes fundamental policy on the safety regulation, coordinating activities among regulatory bodies.

E3.1 Regulatory Bodies

1. Nuclear and Industrial Safety Agency (NISA), METI

NISA administrates the safety regulations for nuclear installations related to the utilization of nuclear energy. Specifically, NISA, entrusted by the Minister of METI, administers following duties under the competence of the Minister of METI.
The Minister of METI is responsible for ensuring the safety of nuclear power facilities and nuclear fuel cycle facilities. The Minster has the authority to grant the license for establishing such nuclear facilities and, for that purpose, examines that the location, structures and systems of the proposed facility do not impair the prevention of hazards. The Minister has also the authority to revoke the license, when a licensee violates the Reactor Regulation Law.
The Minister of METI establishes the ordinances that provide for the operational safety, measures to be taken for protection of specific nuclear fuel materials, the Operational Safety Program, measures in emergency, etc. for the safety regulation of nuclear fuel material processing and fabrication, establishment and operation of nuclear reactors, storage of spent fuel, reprocessing of spent fuel, storage of radioactive wastes and disposal of radioactive wastes. The Minister approves the design and construction methods of facility, conducts inspection, approves the Operational Safety Program, approves decommissioning program of nuclear facility, collects reports from licensees and carries out on-the-spot inspection when necessary.
The Minister of METI has the competence to revoke or suspend a license, to order measures for operational safety, to dismiss a Chief Engineer of Reactors, to order measures for decommissioning or emergency preparedness, etc.
The Minister of METI, and the Minister of MEXT, conducts examinations for Chief Engineers of Reactors and issues the certificates. The Minister of METI has the authority

also to order to return such certificates in a case of violation of the law by the Chief Engineers.
NISA has 11 divisions dedicated to the administration of the safety regulation of nuclear installations. They are Policy Planning and Coordination Division, Nuclear Safety Public Relations and Training Division, Nuclear Safety Regulatory Standard Division, Nuclear Safety Special Investigation Division, Nuclear Power Licensing Division, Nuclear Power Inspection Division, Nuclear Fuel Transport and Storage Regulation Division, Nuclear Fuel Cycle Regulation Division, Radioactive Waste Regulation Division, Nuclear Emergency Preparedness Division and Electric Power Safety Division. The assigned duties of those divisions are provided in Fig. E3-1.
Nuclear Safety Inspectors are assigned to each site of the nuclear installations. Fig. E3-2 shows the locations of the Nuclear Safety Inspectors Offices.
NISA has a total of approximately 350 staff engaged in the nuclear safety regulation, out of which 100 staff members are Nuclear Safety Inspectors and Senior Specialists for Nuclear Emergency stationed at nuclear installations.
The Nuclear and Industrial Safety Subcommittee under the Advisory Committee for Natural Resources and Energy was established as an advisory council to NISA, that proposes policies on nuclear safety and safety of electric power. The members of the subcommittees are assigned based on their expertise and experience from the fields of nuclear and thermal-hydraulic design, nuclear fuel design, system design, equipment design, seismic design, material strength, radiation control, meteorology, geology, soil etc.
"What challenges exist in the future in order to assure safety in nuclear power generation and safety in the electric power system operation, while under rapid social and economical change" were entrusted to the subcommittee to be discussed. The subcommittee and other subcommittees have deliberated on what nuclear safety regulation systems should be, and the results were reported to NISA.
NISA, when necessary, asks for opinion from experts of the subcommittee, etc. The Nuclear Fuel Cycle Safety Subcommittee and the Radioactive Waste Safety Subcommittee under the Advisory Committee for Natural Resources and Energy are advisory councils to NISA in the area of spent fuel management and radioactive waste management. (See Table E3-2)
NISA provides a strong commitment to its mission, scientific and reasonable judgments, transparency, neutrality and fairness as the code of conduct for their activities. In this context, the Policy Planning and Coordination Division watches and assesses the performance of other divisions of NISA in discharging their duties, and take timely remedial actions after consulting with the senior managements. In order to improve the quality of regulatory activities, the development of the NISA Work Management System started in fiscal year 2006 and implemented from fiscal year 2007. According to the NISA Work Management System, NISA's goals in the medium term and tasks in fiscal year 2008 were released in July, 2008
In addition, NISA makes a continuous effort to maintain the high quality of regulation through education and training of the personnel, international activities and the hearing of advice from experts e.g. members of the Nuclear and Industrial Safety Subcommittee.
September 2001, NISA started information disclosure activity systematically integrating it with the regulatory work process, and introduced public relations management program (RM) as a new effort, which makes feedback from outside into quality enhancement of the regulatory activities. The objectives of the RM are to improve stakeholders' recognition and understanding of NISA's daily activities, to make appropriate response to the stakeholders' concerns, to activate discussion of a better regulatory system, to improve emergency preparedness and to activate internal communication.
In April 2004, NISA allocated a new budget in order to enhance further activities to hear from the public, and at same time, established the Nuclear Safety Public Relations and Training Division formed in NISA, and appointed the Resident Public Relations Officers.
The main items of NISA's information disclosure activity are as follows, (i) NISA

executive's visit to the local government, (ii) publication of newsletters and mail magazines, (iii) explanation of policies and activities of the nuclear safety regulation to the public, (public meeting on the clearance system and amendment of the Reactor Regulation Law, Pu-thermal symposium, public meeting on seismic safety, "one-day seminars to introduce NISA" were held in major cities and site municipalities), (iv) making dialogue with local residents, (v) activities to hear from the public at the Nuclear Safety Inspector's Offices, (vi) implementation of risk-communication training course for local-government personnel etc., (vii) utilization of local CATV, website, etc. to communicate with the local residents, where NISA's executives introduce its main policies such as the new inspection system or the locally stationed Nuclear Safety Inspectors Offices.

Also, NISA opens the Nuclear Energy Library in JNES, where the public can access documents for the reactor establishment license, reports of incidents and accidents of nuclear installations and, books and booklets on energy and nuclear power generation.

2. Japan Nuclear Energy Safety Organization (JNES)

In October 2003, JNES was established as a supporting organization for NISA in ensuring safety in utilization of nuclear energy, and has 460 officers and staffs. The missions of JNES are

- to implement their duties effectively and rationally
- to contribute to the enhancement of nuclear safety regulation,
- to deliver safety information to the public by utilizing its expertise and
- to foster public confidence in the safety of nuclear energy.

JNES implements the following activities to accomplish the above missions:

- Inspection of nuclear facilities, reactor facilities, etc.;
- Safety analysis and evaluation of design of nuclear facilities and reactor facilities;
- Activities to prevent occurrence of nuclear emergencies, to prevent progression of a nuclear emergency, and to recover from the nuclear disaster;
- Investigation, testing, research, and training concerning ensuring safety in utilization of nuclear power as energy; and
- Collection, analysis and transmission of information relating to ensure nuclear safety.

The framework for JNES to implement activities and the relation with NISA are as follows:

- NISA develops a plan on each activity based on the regulatory needs, and defines the medium-term objective in accordance with the Law of the General Rules for Incorporated Administrative Agency, and the Minister of METI assign it to JNES.
- JNES prepares a medium-term program to accomplish the medium-term objective, submits the program to the Minister of METI, obtains approval, prepares annual plan (fiscal year) in accordance with the medium-term program, notifies the plan to the minister of METI and implements it.

The budget for JNES consists of government budget and commission of inspections.

3. Science and Technology Policy Bureau (STPB), MEXT

The safety regulation concerning the activities on the nuclear utilization from a scientific and technological aspect and utilization of radioisotopes and radiation generating apparatus (excluding medicines, etc.) is regulated by the Minister of MEXT as the competent minister, and is administered by the Science and Technology Policy Bureau (STPB). With regard to the licensing of establishment of test and research reactor facilities and use of nuclear fuel materials under the Reactor Regulation Law and the radioisotope waste management which carried out as business under the Radiation Hazards Prevention Law the Minister of MEXT has the authority to permit the respective licenses, after conducting an examination of the site, structure and equipment from the standpoint of nuclear disaster prevention. The Minister also has the authority to revoke the licenses under certain circumstances, such as the violation of applicable laws and regulations by the license holder.

STPB contains the Nuclear Safety Division, which has a further four offices. The assigned

role of the divisions and offices are listed in Table E3-1. In addition, MEXT deploys a resident inspector for the safety management of nuclear facility to each site where the research reactor facility or the major fuel material use facility. Their missions are to conduct examinations and inspections stipulated in the Reactor Regulation Law to confirm the compliance with the Operational Safety Program and surveillance of reactor operation management, investigation of implementation of education and training, periodic licensee's inspection and to respond to an emergency situation. The locations of offices of Nuclear Safety Inspectors are illustrated in Figure E.3-2. As to the education and training programs for the staff members in charge of nuclear safety regulations are conducted in order to enhance competency of regulatory personnel.

The Radiation Council is established within MEXT under "the Law for Technical Standards of Radiation Hazards Prevention". The mandate of the Radiation Council is to clarify basic policy on establishing technical standards for prevention of radiation hazards and to maintain consistency among related technical standards. The basic policy is that the radiation doses of occupational personnel and the general public shall be less than the dose that may cause radiation hazards. The council report to the consultation from the heads of the administrative organization concerning technical standards for prevention of radiation hazards, and state its opinion to the heads of administrative organization to keep consistency among technical standards. The Radiation Council consists of a maximum of 20 members, and the Basic Committee composed of experts from different fields is established under the council.

The STPB holds Advisory Committee on Nuclear Safety Regulation, etc. with an objective to contribute to the transparent and efficient administration of nuclear safety by MEXT. Under this committee, sub-committees are held, as listed in Table E3-3, in order to study safety regulations for research reactor, and radiation protection, etc.

As to the activities of the STPB related to the safety regulation for the nuclear facility, Japan Nuclear Energy Safety Organization is designated as an organization for welding inspections of the nuclear facility under the Reactor Regulation Law. Nuclear Safety Technology Center is registered as an organization for periodic inspections of the facilities for services of radioisotope waste management under the Radiation Hazards Prevention Law.

4. Ministry of Health, Labor and Welfare (MHLW)

The MHLW administer the safety regulations for radioactive medicines, the regulations for the protection against clinical radiation, and handling, etc. of radiopharmaceutical and medical equipment at medical institutions.

The PFSB regulates the production of radioactive medicines based on the Regulations for Structures and Equipments for Pharmacies, etc. and the Regulations for Manufacturing and Handling of Radio Pharmaceuticals under the Pharmaceutical Affairs Law. The Independent Administrative Agency, Pharmaceuticals and Medical Devices Agency, conducts periodic inspections of manufacturing plants that produce radioactive medicines. And, the PFSB also regulates disposal of radioactive pharmaceuticals.

The Compliance and Narcotics Division regulates preventive measures against the radiation hazard caused by, and the standards for the structure and equipment of, an X-ray device, based on the Rules for the enforcement of the Medical Care Law, etc. This enforcement rule also provides standards for the storage, and disposal, etc. of clinical radioisotopes, etc.

E3.2 Ensuring of effective independence of regulatory functions from other functions

Regulatory bodies have clearly defined authorities and competences on safety regulation based on the Reactor Regulation Law. Although each of the regulatory bodies is established within a ministry which has departments promoting utilization of nuclear energy or radioisotopes, etc., the competence of each regulatory body is clearly separated from that of promotional department by its establishment law and order. Each regulatory body

administers safety regulation independently, and the NSC audits activity of each regulatory body. (See Fig. E3-3)
NISA is established as “special organization” of ANRE (Agency for Natural Resources and Energy) by the METI Establishment Law. The responsibility is clearly defined as “Agency to ensure the safety in the utilization of nuclear energy” by the law.
NISA have clearly defined authorities and competences on safety regulation based on the Reactor Regulation Law. Regulatory activities based on the Law such as licensing, approval of construction plan, inspection for facilities or operation safety, are conducted by the name of Minister of METI. NISA independently makes decision or proposes of decision to the Minister without any interference of ANRE.
The regulatory activities of NISA are supervised and audited by the NSC that is the Commission established by “the AEC and NSC Establishment Law”. The commissioners of the NSC are designated by the Prime Minister with the consent of Diet.
NISA have to consult with the NSC before granting the license of nuclear business facility and activities based on the Reactor Regulation Law. And NISA have to report to the NSC of the regulatory activities such as approval of construction plan and the inspections of operational safety activities afterwards. The NSC has the authority to make recommendation through Prime Minister if it deems necessary.
With these arrangements, the effective independence of NISA as a regulatory body has been ensured.
The STPB of MEXT have clearly defined authorities and competences on safety regulation based on the Reactor Regulation Law and the Radiation Hazards Prevention Law. Regulatory activities based on these Laws such as licensing, approval of construction plan, inspection for facilities or operation safety, are conducted by the name of Minister of MEXT. STPB, which is assigned to conduct these regulatory activities by the order for organization of MEXT, independently makes decision or proposes of decision to the Minister without any interference of promotion body.
Based on the AEC and NSC establishment Law, the NSC may require the head of each administrative organization to report matters necessary to accomplish the assigned mission and make recommendation through Prime Minister if it deems necessary.
With these arrangements, the effective independence of STPB of MEXT as a regulatory body has been ensured.

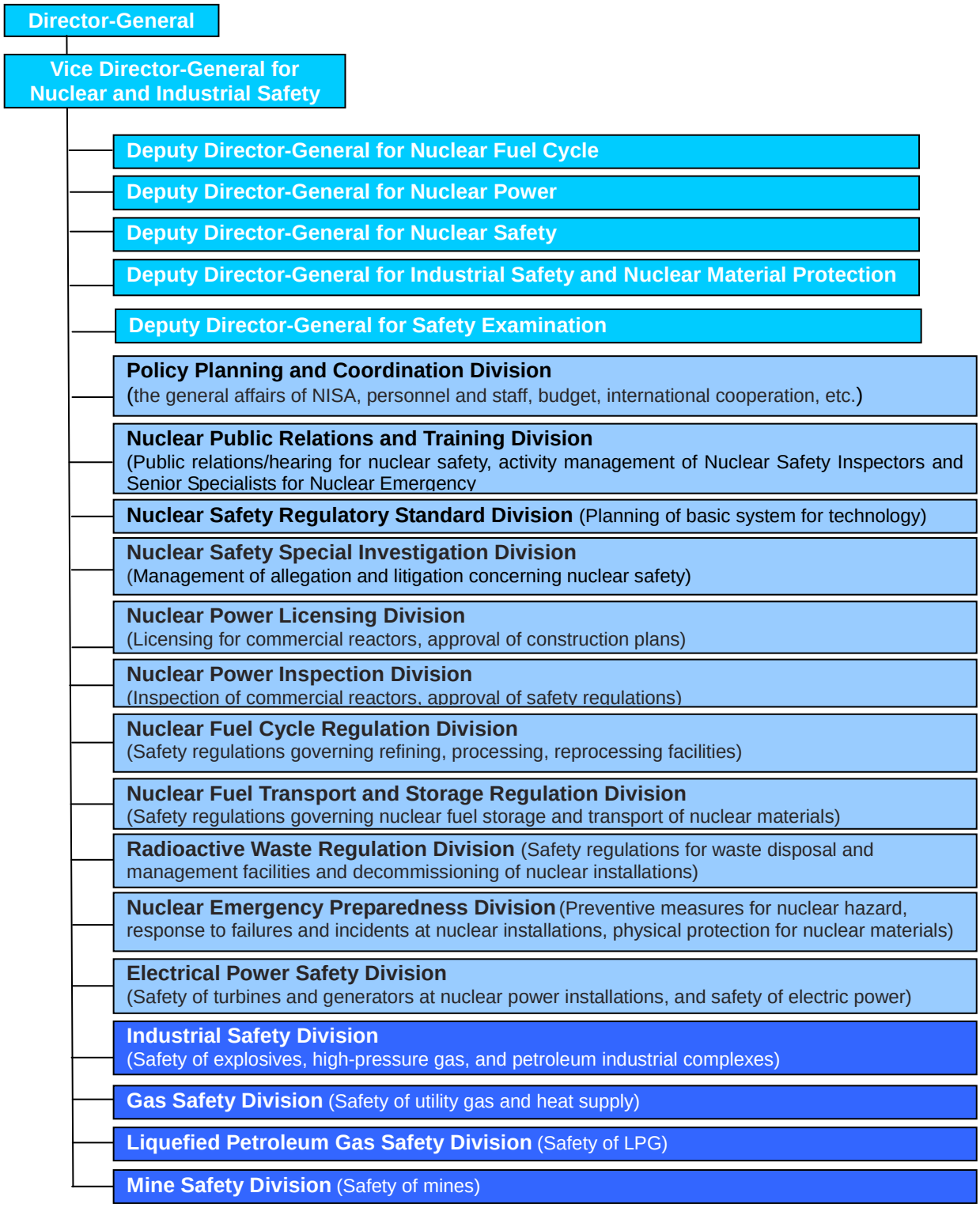
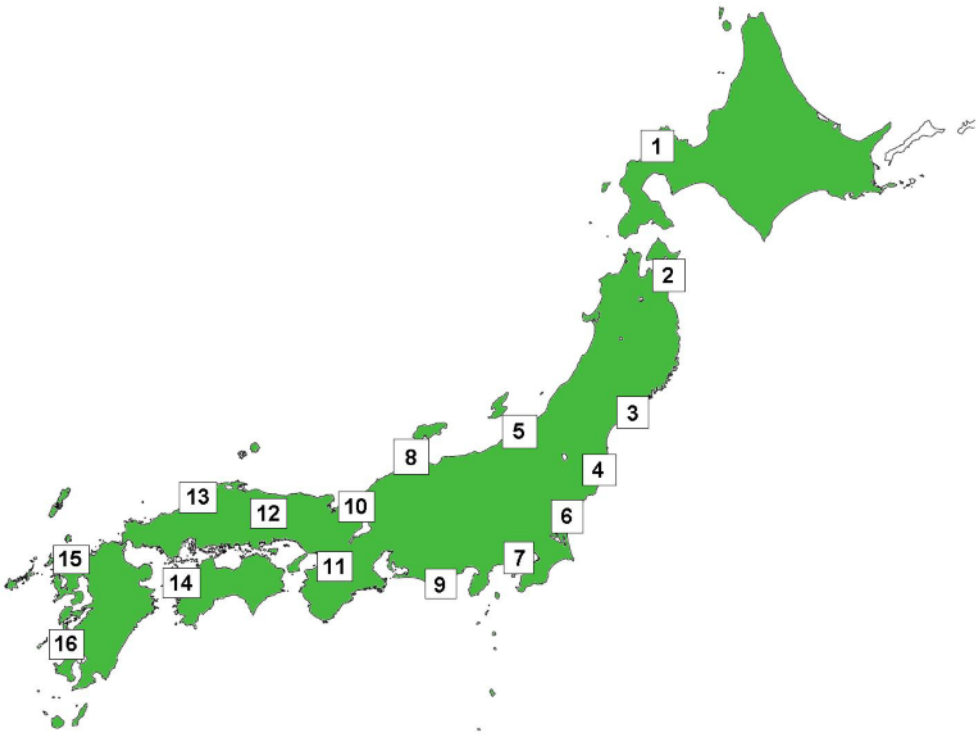


Fig. E3-1 Organization of Nuclear and Industrial Safety Agency



	Name of Office	Competent ministry
1	Tomari Nuclear Safety Inspectors Office	METI
2	Higashidori Nuclear Safety Inspectors Office	METI
	Rokkasho Nuclear Safety Inspectors Office	METI
	Rokkasho Nuclear Safety Administration Office	MEXT
3	Onagawa Nuclear Safety Inspectors Office	METI
4	Fukushima-Daiichi Nuclear Safety Inspectors Office	METI
	Fukushima-Daini Nuclear Safety Inspectors Office	METI
5	Kashiwazaki-Kariwa Nuclear Safety Inspectors Office	METI
6	Tokai & Ooarai Nuclear Safety Inspectors Office	METI
	Ibaraki Nuclear Safety Administration Office	MEXT
7	Kanagawakita Nuclear Safety Administration Office	MEXT
	Yokosuka Nuclear Safety Inspectors Office	METI
8	Shika Nuclear Safety Inspectors Office	METI
9	Hamaoka Nuclear Safety Inspectors Office	METI
10	Tsuruga Nuclear Safety Inspectors Office	METI
	Mihama Nuclear Safety Inspectors Office	METI
	Ohi Nuclear Safety Inspectors Office	METI
	Takahama Nuclear Safety Inspectors Office	METI
11	Osaka Nuclear Safety Administration Office	MEXT
	Kumatori Nuclear Safety Inspectors Office	METI
12	Kamisaibara Nuclear Safety Inspectors Office	METI
	Kamisaibara Nuclear Safety Administration Office	MEXT
13	Shimane Nuclear Safety Inspectors Office	METI
14	Ikata Nuclear Safety Inspectors Office	METI
15	Genkai Nuclear Safety Inspectors Office	METI
16	Sendai Nuclear Safety Inspectors Office	METI

Fig. E3-2 Nuclear Safety Inspectors Offices and Nuclear Safety Administration Offices

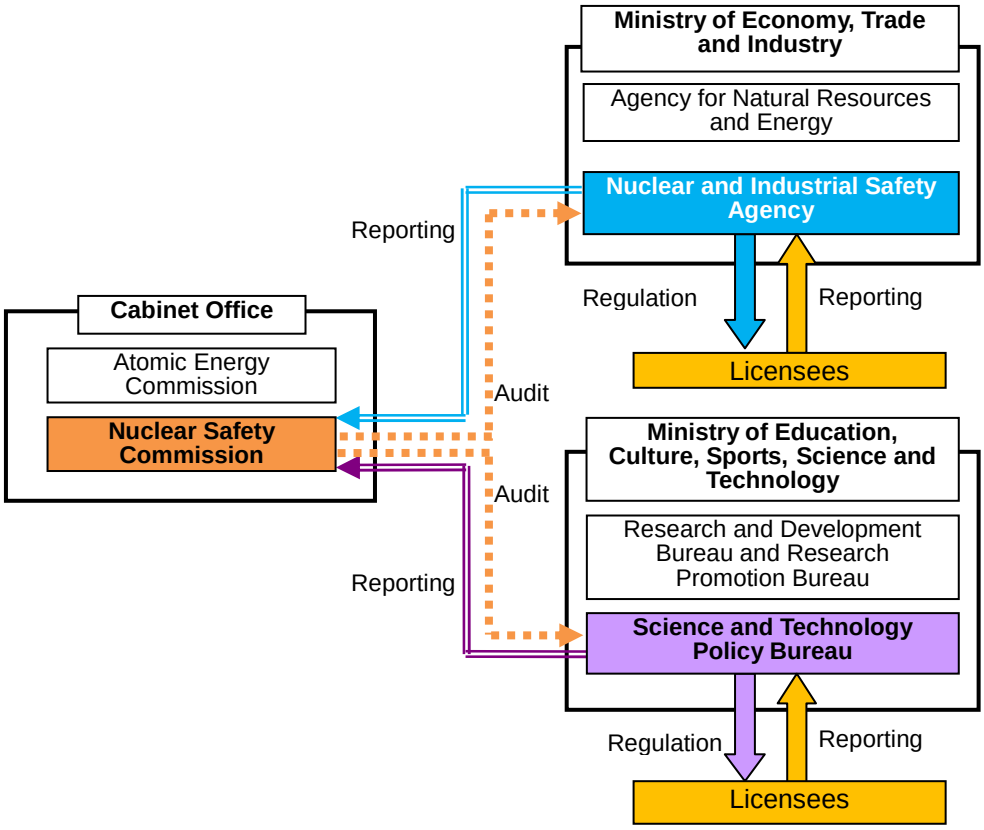


Fig. E3-3 Relation among nuclear safety regulatory bodies in subsequent stage regulation

The “Agency for Natural Resources and Energy (ANRE)”, which is an organization to promote the utilization of nuclear energy as energy source, belongs to the Ministry of Economy, Trade and Industry (METI). However, as for nuclear safety regulation, ANRE and the NISA are completely separated to ensure the effective independence of regulatory functions. The “Research and Development Bureau” and “Research Promotion Bureau”, which are organizations to promote utilization of nuclear energy, belongs to the Ministry of Education, Culture, Sports, Science and Technology (MEXT). However, as for nuclear safety regulation, the Science and Technology Policy Bureau and the Research and Development Bureau / Research Promotion Bureau are completely separated. The Nuclear Safety Commission established in the Cabinet Office is independent of the METI and the MEXT, requires the NISA and the Science and Technology Policy Bureau of the MEXT to report their regulatory activities and audits those regulatory bodies.

Table E3-1 Organization of MEXT and MHLW

1. Ministry of Education, Culture, Sports, Science and Technology; Science and Technology Policy Bureau

Nuclear Safety Division	General management of Nuclear Safety Division
Nuclear Safety Division Office of Nuclear Regulation	Regulations for research reactor facility and fuel material use facility
Nuclear Safety Division Office of Radiation Regulation	Regulations for radioisotopes, etc.
Nuclear Safety Division Office of Emergency Planning and Environmental Radioactivity	Nuclear emergency measures Environmental radiation measures
Safeguards Office	Implementation of Safeguards

2. Ministry of Health, Labor and Welfare

Pharmaceutical and Food Safety Bureau, General Affairs Division	Regulations concerning the entrustment of disposal of radioactive medicines, etc.
Pharmaceutical and Food Safety Bureau, Compliance and Narcotics Division	Regulations for Manufacturing, etc. of Radioactive Medicines
Health Policy Bureau, Guidance of Medical Service Division	Provision of preventive measures against the radiation hazard and regulations for the structure and equipment, etc
Health Policy Bureau, Economic Affairs Division	Regulations for medical equipment etc. concerning radioisotope medicines at medical institutions

Table E3-2 The Organization of the Nuclear and Industrial Safety Subcommittee

Basic Safety Policy Subcommittee.	- General matters securing safety
Nuclear Reactor Safety Subcommittee.	- Technical matters on commercial power reactors and power reactors at the stage of research and development
Nuclear Fuel Cycle Safety Subcommittee.	- Fabrication and reprocessing of nuclear fuel, storage of spent fuel, transportation of nuclear fuel material, and the technical standards
Decommissioning Safety Subcommittee.	- Decommissioning of nuclear installations
Radioactive Wastes Safety Subcommittee.	- Securing safety of disposal and storage of radioactive wastes
Seismic and Structural Design Subcommittee.	- Technical matters on seismic safety and structural integrity of nuclear installations
Nuclear Emergency Preparedness Subcommittee.	- Measures for incidents and failure, and general crisis management for emergencies of nuclear installations and physical protection of nuclear material
INES Evaluation Subcommittee.	- INES Evaluation on incidents and accidents of nuclear installations
Subcommittee. for the Convention on Nuclear Safety	- Matters related to the Convention on Nuclear Safety and international standards on nuclear safety
Electrical Power Safety Subcommittee.	- Securing safety of electrical power
Study Group on the Way of Inspection	- Matters concerning inspection system of nuclear power generation facilities and nuclear fuel cycle facilities
Subcommittee. for the Joint Convention on Radioactive Waste and Spent Fuel Safety	- Matters etc. related to the Convention on Joint Convention Radioactive Waste and Spent Fuel Safety
Subcommittee. for the Institution of Nuclear Safety Regulation	- Study of the legal system for the Institution of Nuclear Safety Regulation
Subcommittee. for fitness-for-service assessment etc. of nuclear power system	- Study of the Verification of validity in the check methods for nuclear power plant
Study Group on Countermeasures for Aging	- Clarification of basic standards, guides etc. for aging
Study Group on Use of Risk Information	- Study of Risk-Information usage to Nuclear Safety Regulations
Nuclear Safety Infrastructure Subcommittee	- Study of safety infrastructure, - Study of safety infrastructure on codes and standards

Table E3-3 Subordinate Organization of Advisory Committee on Nuclear Safety Regulation, etc.

Subcommittee. on Safety Regulation for Research Reactors, etc.	Directions for safety regulation of research reactors, nuclear fuel materials, etc.
Subcommittee. on Safety Regulation for Radiation Protection.	Directions for safety regulation of radiation protection.
Subcommittee on Nuclear Emergency Preparedness	Comprehensive assessment of institutional and business-operational aspects of the Act on Special Measures for Nuclear Emergency Preparedness
Subcommittee on Evaluation of Radioactivity in Environment	Assessment of the Results of Survey on Radioactivity in Environment and of the Contents of the Survey

Section F Other General Safety Provisions

F1 Responsibility of the license holder

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

F1.1 Steps to ensure that each license holder meets its responsibility

The prime responsibility for the safety of nuclear facility and activities of spent fuel or radioactive waste management rests with the license holder of the nuclear facility. That is, the license holder is responsible for adopting necessary measures to fully meet the regulatory requirements stipulated either in the Law for Regulation of Nuclear Source Material, Nuclear Fuel Material and Nuclear Reactors (Reactor Regulation Law), the Electricity Utilities Industry Law or the Law concerning Prevention from Radiation Hazards due to Radioisotopes etc. (Radiation Hazards Prevention Law), etc. at all of the stages of planning, establishment, operation, maintenance and decommissioning of the nuclear facility. In addition to meeting with regulatory requirements, the license holder is required to make efforts for improving safety and reliability of the nuclear facility, through implementing education and training programs of personnel, preparing operation manuals.
In accordance with the Reactor Regulation Law, the regulatory body conducts inspections to confirm the compliance of the performance of facilities and systems with the legal technical standards and to confirm the observance of Operational Safety Program and Regulations by an operator. The regulatory body also can conduct on-the-spot inspection when necessary, and can impose administrative penalties including revocation of license if an operator violates laws and regulations.
For the radioisotope waste management facilities subject to the Radiation Hazards Prevention Law, the regulatory body conducts the Periodic Inspection to confirm nuclear facility's compliance with the technical standards, and the Radiation Inspector conducts the On-the-spot Inspection of a use facility as necessary. In case the operator does not observe provisions of the Radiation Hazards Prevention Law, regulatory body has authority to revoke the license or order shutdown of the operation.
In addition, on the basis of the Reactor Regulation Law and the Electricity Utilities Industry Law, the license holder shall cooperate inquiry by the Nuclear Safety Commission (NSC) when the NSC reconfirms the adequacy of the activities of the regulatory body.

F1.2 Steps to ensure that if there is no license holder or other responsible party exists

In Japan, there may be a case where no license holder exists when the license for a facility and activities under the Reactor Regulation Law is revoked or an operator is dissolved. Such a case is deemed to be a case where the facility and activity is taken over under the Reactor Regulation Law and the legal entity surviving the merger or a legal entity incorporated upon the merger assumes the legal status of the operator after receiving approval for the merger. In the case of succession, the successor assumes the legal status of the operator.
In the case of revocation of the license or in the case of absence of succession following dissolution, the license holder whose license was revoked or the liquidator or trustee in bankruptcy, respectively, shall be responsible for record keeping, taking physical protection of nuclear materials and observing the Operational Safety Program, and shall develop a decommissioning program, have it approved by the competent minister, carry out decommissioning and obtain confirmation of the Minister of Economy, Trade and Industry for the completion of decommissioning.
Under the Radiation Hazards Prevention Law, provisions similar to the Reactor Regulation

Law are applied to the case of succession following dissolution and to the case of absence of succession. In the case of no succession of the business, a liquidating partner shall take appropriate measures, such as removal of contamination by radioisotopes, etc, on cessation of the business.
As described above, it is ensured in Japan to avoid a case where no license holder exists due to succession of business, and the business is closed if nobody succeeds the business. A license holder of radioisotope waste management facility issued under to the Medical Care Law etc. is allowed to close its operation only after it completes necessary measures for the closure of facility and activities stipulated by the law.

F2 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.

F2.1 Measures for maintain human resources

1. Human resources

The regulatory body confirms in the review for the license application that the applicant has technical competence including human resources sufficient for installing the facility and appropriate operation. The applicant has to verify that its technical competence is sufficient for its activity. For confirming the technical competence, objective and reasonable examination is carried out by applying the “Examination Guide for Technical Competence of License Holders of Nuclear Power” issued by the NSC in May, 2004. This Regulatory Guide defines the technical competence as organizational management capability to appropriately operate the activity with ensuring safety including knowledge, technology and expertise, and provides fundamental requirements to be met by the license applicant.
As a prerequisite to operate the activities, the Reactor Regulation Law requires licensees to appoint the following chief engineers from qualified employees for safety supervision of operation; Chief Reactor Engineer for reactor operation, Chief Engineer for Nuclear Fuel Material Handling in fabrication or reprocessing activity, Chief Engineer for Spent Fuel Handling in spent fuel storage facility, and Chief Engineer for Radioactive Waste Handling for handling nuclear fuel materials and other radioactive wastes in disposal facility.
Furthermore, regarding education and training, the Reactor Regulation Law requires operators to provide, in the Operational Safety Program, for the policy, the implementing program and contents of operational safety education. The regulatory body confirms the compliance with these requirements through the Operational Safety Inspection.
Operator of a business licensed under the Radiation Hazards Prevention Law has to select and appoint a Chief Engineer for Radiation Protection before commencing the business. The "Rule for Preventing Radiation Hazards" of an operator provides for the duties and organization for the persons engaged in the safety control of radioisotopes and works that handle radioisotopes, as well as the matters related to the education and training necessary for preventing radiation hazards. Thus necessary technical competence is ensured.

2. Activities to ensure human resource infrastructure in Japan

In Japan, both regulatory body and nuclear industry are striving to ensure human

resources as a part of activities for ensuring future nuclear safety infrastructure.
Nuclear and Industrial Safety Agency (NISA) is preparing a strategy to develop and secure human resources in the area of nuclear energy at the Nuclear Safety Infrastructure Subcommittee established in 2006 under the Nuclear and Industrial Safety Subcommittee of the Advisory Committee for Natural Resources and Energy. This Subcommittee is working for the development and securing of human resources starting with the identification of technological areas that need human resources in near future (for example, specific technology areas and basic technology areas), considering the current situation of external experts supporting the regulatory body.
In parallel with the above activities, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Ministry of Economy, Trade and Industry (METI) are implementing a nuclear human resources development program since 2007 by focusing on: 1) support for educational activities such as enhancement of basic nuclear education and research, reinforcement of internship and improvement of core nuclear curriculum, and 2) support for research activities in basic nuclear technologies from the view point of human resource development for continuous research activities.

(1) Training of Experts in MEXT and NISA

Staff members, who are in charge of nuclear regulation in MEXT and NISA, are the Senior Specialist for Nuclear Emergency, the Nuclear Safety Inspector, the Nuclear Facility Inspector, the Electric Facilities Inspector, the Safety Examiner and the Senior Specialist for Fire Protection.
A Senior Specialist for Nuclear Emergency is stationed at each nuclear installation, guides and advises the licensees in preparing its Plan for Emergency Preparedness, and conducts duties necessary to prevent progression of nuclear emergency should it occur.
A Nuclear Safety Inspector is stationed at each nuclear installation, conducts the Nuclear Safety Inspection to confirm licensee’s compliance with the Operational Safety Program, conduct investigation, communicate with the staff of nuclear installation at incident if they occur, and supervises operation management of a nuclear installation.
A Nuclear Facility Inspector conducts inspection activities, such as the Pre-Service Inspection and the Periodic Inspection of a nuclear installation.
An Electric Facilities Inspector is dispatched from NISA head office, and conducts inspection activities, such as the Pre-Service Inspection of Electric Facilities, the Fuel Assembly Inspection, and the Periodic Inspection of Electric Facilities.
Safety Examiners conduct the Safety Examination of a nuclear installation.
A Senior Specialist for Fire Protection is stationed at each nuclear installation, guides and advises the licensees in fire protection measures in collaboration with local fire protection agency.
A staff of Nuclear Regulatory is required to have expertise in nuclear technology. The system of long term and multistage education and training programs necessary for improvement of his/her expertise is developed, taking account of his/her experience and of the nature of the facility to which he/she is assigned. In order to increase effectiveness of the training, the contents of the training being implemented are also reviewed and improved suitably. The capability of the personnel engaged in securing safety of nuclear installations is improved through these training. Summary of training for nuclear safety regulation is shown in Fig. F2-1. Besides developing professional human resources as mentioned above, NISA recruits professional human resources for nuclear safety from industries or other ministries.
NISA has appointed six Special Inspection Instructors in December 2003. They advise inspectors for the Nuclear Safety Inspection, the Periodic Inspection, etc. in each power station, instruct them to equalize the levels of inspections, and they collect opinions and proposals from inspectors and licensees for the purpose of opinion exchanges at the site.
In the future, the training curriculum for the staff to acquire the required regulatory skills effectively will be established, and a training management system that keeps and manages every personnel's training status and offers appropriate training at suitable time

will be developed. Moreover, measures, such as preparation of training facilities for practical inspection skills etc. through with mock-up will be taken.

(2) Training of Experts in JNES

The Electricity Utilities Industry Law or the Reactor Regulation Law stipulates that activities such as Electric Facilities Inspection, the Nuclear Facility Inspection, the Welding Inspection, the Audit of Licensee's Periodic Check System, the Audit of Licensee's Welding Check System, the Safety Confirmation of Disposal Facility, the Safety Confirmation of Radioactive Waste Package, the Confirmation of Transportation Packaging, and the Confirmation of Transportation Method shall be conducted by Japan Nuclear Energy Safety Organization (JNES)'s qualified personnel under the instruction of NISA. JNES prepares various training courses for its staff members to get appropriate qualification in their respective activities. President of JNES assigns inspectors from those qualified persons. JNES develops training courses for its personnel, putting emphasis on inspection activities. JNES also is recommending its staff to obtain relevant official qualification, and to participate outside lectures and academic seminars in order to brush up the capability for inspection and safety review and knowledge in his specialty.

(3) Efforts by Nuclear Industry

The nuclear industry has concerns in the succession of expertise and experiences, and the maintaining sufficient number of skilled workers. In Japan, the first generation experts are in the age of retirement. Each organization in the industry has made various efforts including revitalization of research and development activity, practical use of IT technology, etc. The Japan Atomic Industrial Forum, Inc. established the "Subcommittee for Human Resources" consisting of senior managers in the industry and experts from outside, and studied on human resources in the future.

The subcommittee has made the proposals for training and career development of experts in June 2003; establishment of an industry's qualification system of nuclear maintenance and repair technicians, simplification of organizations, establishment of an engineering center to share training facilities and resources of maintenance and repair technicians, establishment of a nuclear educational network system to share common educational infrastructure to ensure resources for future.

Main activities currently performed for human resource training and succession of expertise in the nuclear industry are shown in the following;

a. Training of on-site technicians and succession of skills

In the area where the nuclear installation is established, the training for qualification, training of practical skills for maintenance and repair, OJT training at the power station, etc. are implemented beyond the frame of an individual operator.

b. Study on qualification and certification system for private sectors

For the purposes of improved skills of maintenance-and-repair workers, appropriate staffing, and ensuring future human-resources, the common standards and qualification / certification procedures for objective evaluation of skill level are being studied. These standards etc. will be made to harmonize with the licensee's in-house qualification system.

c. Acquisition of advanced expertise

Licensees' engineers are sent to the graduate school in nuclear engineering to acquire advanced expertise.

Moreover, the Japan Atomic Industrial Forum, Inc., consisting of enterprises related to the nuclear power and developing industry-wide policies, has investigated and studied the current status of universities, graduate schools and research institutes, in order to improve the effectiveness of "the nuclear human resource training program. The study will be continued.

(4) Efforts by University and Research Institutes

The Tokyo University established a graduate school, in April 2005, consisting of three

courses of the “Nuclear Reactor Specialist Course”, the “Nuclear Fuel Specialist Course”, and the “Administrator Course”.
Since 1958, then JAERI, now JAEA has been operating training courses for engineers and technicians in radioisotope, radiation and nuclear technologies. Recently, JAEA started a course for nuclear emergency preparedness in close cooperation with national and local governments.

(5) Establishment of Professional Engineers System for Nuclear and Radiation Technologies

The MEXT who has jurisdiction over the Professional Engineers System established a nuclear and radiation technology department for professional engineers in 2004 fiscal year. The qualification examination has been implemented every year, and a total of 248 people were qualified as the Professional Engineer by the end of 2007 fiscal year. The purposes of the Professional Engineers System are such to enhance nuclear engineering capabilities, to utilize the capability in the nuclear safety regulation, to strengthen the safety management system in each corporation.

F2.2 Financial Resources and Financial Rules

In permission of establishment license of a nuclear facility, except for nuclear fuel material use facility, the regulatory body, in accordance with the Reactor Regulation Law, confirms that the applicant for the license possesses necessary financial basis. The applicant should submit business plan that explains about the financial base of the business.
For the financial base of the decommissioning of nuclear installations, METI stipulated the Ministerial Order established under the Electricity Utilities Industry Law on the reserves for decommissioning of nuclear power generation facilities. Based on the Ministerial Order, Electric Utilities internally reserved the money for the decommissioning as the expense of dismantling and removal of commercial power reactor facilities, and as the expense of the processing and disposal of the waste from decommissioning. The amount of reserve by the end of March 2007 is about 1,200 billion yen by 10 electric utilities.
In addition, the electric utilities are depositing money to be used for spent fuel reprocessing from electricity sales, in a fund administered by an administrative agency, designated by the Minister of Economy, Trade and Industry in accordance with the “Act for Deposit and Administration of Funds for Reprocessing of Spent Fuel from Nuclear Power Generation” enacted in May 2005. The total funds deposited by 10 electric utilities amount to about 1,300 billion yen at the end of March 2007.
In accordance with the Specific Radioactive Waste Final Disposal Act enacted in May 2000, operators of power reactor facilities deposit funds for disposal of high level radioactive waste to the Nuclear Waste Management Organization of Japan, the implementing body for disposal, who entrusts management of the fund to the Radioactive Waste Management Funding and Research Center. The Minister of METI, every year, notifies utilities of the amount of money to be deposited to the fund. The amount of deposit per vitrified package was 40,413,000 yen in the year of 2007. The amount of money for construction of depository and disposal of about 40,000 vitrified packages of high level waste is estimated about 3 trillion yen. The amount of the money deposited to the Radioactive Waste Management Funding and Research Center at the end of March 2007 was about 500 billion yen.
As for disposal of radioactive waste from Research, Medical and Industrial Facilities, a generator of waste must pay for the disposal under the principle of the liability of generator, as set forth in the Framework for Nuclear Energy Policy. The largest generator of the above waste, JAEA started funding for disposal basing on the amendment of The Law for the Independent Administrative Agency, Japan Atomic Energy Agency in May 2008. The amount of budget plan for fiscal year 2008 is about 4.3 billion yen.
Financial basis of a license holder of nuclear fuel material use is to be confirmed through procedures to approve the Operational Safety Program and the steps to be taken at the time of decommissioning.

Financial basis of the operator of radioisotope waste management facility licensed under the Radiation Hazards Prevention Law (except for disposal business) is to be confirmed through the Periodical Inspection, obligation to maintain the facility in compliance with technical standards, implementation of education and training programs, notification of the Internal Rules for Prevention of Radiation Hazards and the steps to be taken at the time of decommissioning.
Financial basis of disposal business is an essential condition of licensee.

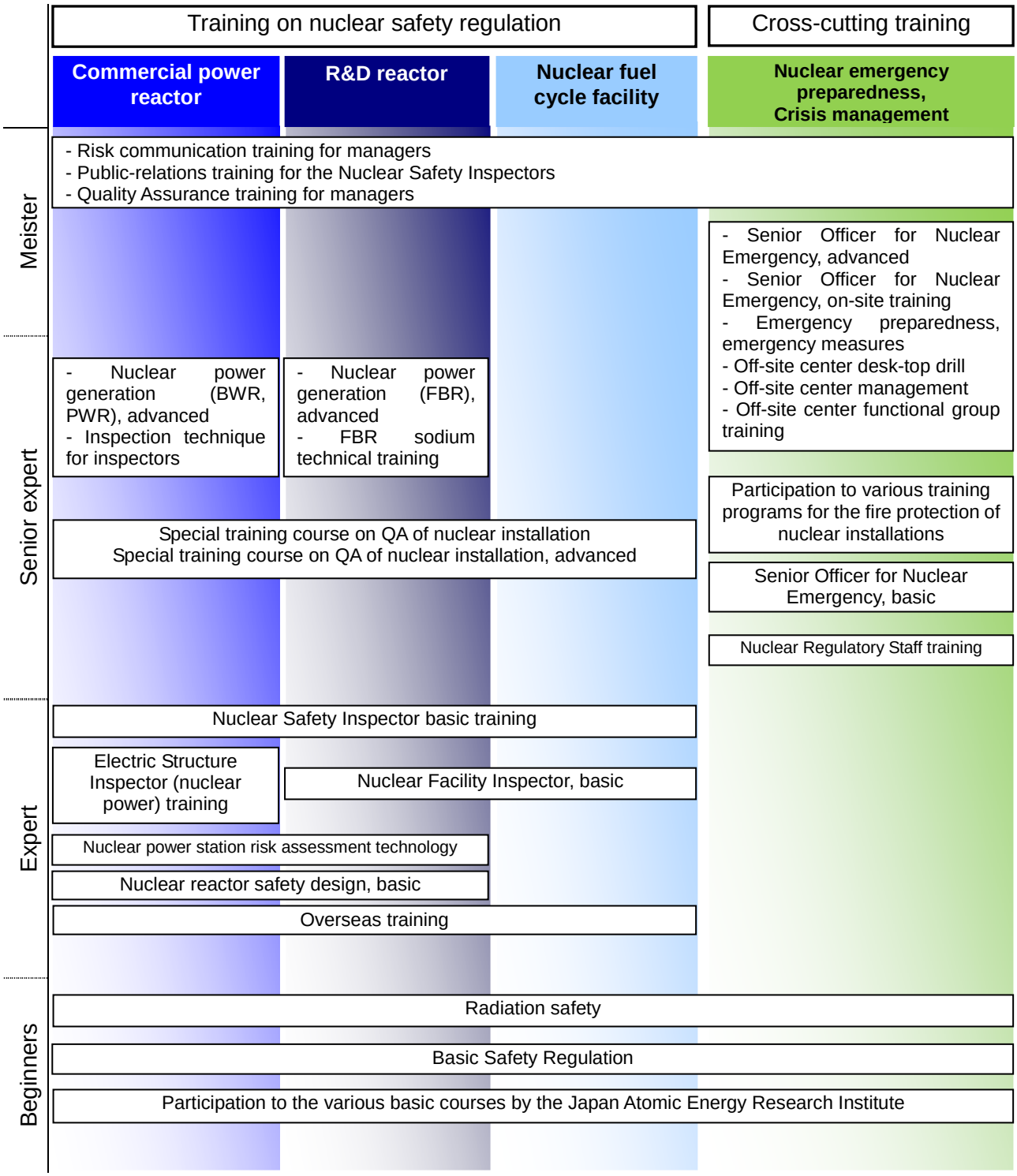


Fig.F2-1 Summary of training for nuclear safety regulation

F3 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.

By the amendment of the Reactor Regulation Law enacted in October 2003 and February 2004, it is provided that the licensee establishes quality assurance plan for the operational safety activities, and plan, do, check and improve the operational safety activities, and improve quality assurance plan continually. And it is provided that the quality assurance system should be included in the Operational Safety Program. NISA confirms operator's compliance with it through the Nuclear Safety Inspection. The quality assurance activities at the nuclear facilities except for research reactor facilities and fuel material use facilities are described in the followings.

F3.1 Regulatory Requirements on QA of Nuclear Installations

NISA's regulatory activities on major nuclear facilities, based on the Reactor Regulation Law and the Electricity Utilities Industry Law, include licensing, approval of design and construction methods, pre-service inspection, periodical facility inspection, etc., are covering from planning stage to operation stage.
By the Reactor Regulation Law, an licensee is required to integrate its quality assurance program into the Operational Safety Program. NISA approves the Operational Safety Program and confirms the operator's compliance with it through the Nuclear Safety Inspection.
This establishment of the quality assurance system provides a mechanism for systematic implementation of the activities that influence the quality. By establishing the quality assurance system, a licensee can have confidence in its safety activities, and by achieving its accountability for the quality assurance, the licensee can obtain public understanding.
The key points of QA activities are; i) to involve top management, ii) to be based on international standards on QA (ISO9001:2000), iii) to improve them by Plan-Do-Check-Act cycle, iv) to establish an in-house independent audit organization.
The Reactor Regulation Law stipulates that licensee's QA program should include i) organization managing QA activities, ii) plan for operational safety activities, iii) implementation of operational safety activities, iv) evaluation of operational safety activities, and v) improvement of operational safety activities.

Note) The term, operational safety activities, means activities necessary for maintenance of major nuclear facilities, use of major nuclear facilities, and shipment, storage and disposal of nuclear fuel materials or materials contaminated by nuclear fuel materials.

Licensees prepare their QA program of the nuclear facilities and implement them, according to JEAC 4111-2003, "Rules of Quality Assurance for Safety of Nuclear Power Plants", which was developed by the Japan Electric Association (JEA) in autumn of 2003 based on the ISO9001:2000 to specify QA management, top management, management of resources, business plan, and evaluation/improvement in QA program for nuclear power plant. NISA evaluated the standard and endorsed that it meets the regulatory requirements for nuclear facilities other than test and research reactors and use facilities.
The features of JEAC4111-2003 are as follows.

i) It is based on ISO 9001:2000, being modified for user-friendliness.
ii) It takes account of IAEA Safety Standards for Quality Assurance 50-C/SG-Q (1996).
iii) The definitions of some terms are different from ISO 9001:2000, based on legal expression in national legislature.
iv) Explanation is added on the terms, "product", "customer", and "quality", in the requirements of ISO 9000:2000.

Moreover, NISA is studying to clarify requirements of quality assurance during not only operating stage but also construction stage in legislation.

As for research reactors and nuclear fuel material use facility, MEXT confirms the implementation of QA program described in Operational Safety Program based on the Reactor Regulation Law through Operational Safety Inspection.

F3.2 Confirmation of Quality Assurance by NISA

1. Examination of the Policy for QA at Licensing Stage

NISA confirms the applicant's technical capability in the process of Safety Review. In addition, NISA requests the applicant to submit the "Policy for Quality Assurance" attached to the application format, and examines it.

2. Examination of QA Program in Construction Stage

At the construction stage of a commercial power reactor facility, NISA requests the license holder to submit the "Description on Quality Assurance Program" as specified in the Rules for the Electricity Utilities Industries Law, which describes license holder's QA activities during detailed design, manufacturing, installation and functional tests, and examines it. Also, NISA confirms that license holder of nuclear power reactor oversees subcontractor's quality control, material control, etc. in appropriate procedures, in addition to its QA audit of primary contractor and primary contractor's own management of manufacturing process.

3. Confirmation of QA Activities Throughout Operation Stage

NISA confirms QA activities of the license holder throughout service life of major nuclear facilities by the Nuclear Safety Inspection. Furthermore, at the commercial power reactor facility, NISA, at the Periodic Safety Management Review, examines adequacy of operator's organization and methods for the Licensee's Periodic Inspection.

F4 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.

In Japan, necessary steps are taken as described in F4.1 and F4.2 for (i) and (ii) of Item 1 and (i) and (ii) of Item 2 of Article 24 of the Convention, in F4.3 for (iii) of Item 1, and in F4.4 for Item 3 of the Article.

F4.1 Laws, Regulations and Requirements on Radiation Protection

The national standards for radiation protection at nuclear facilities are prescribed by the

Reactor Regulation Law, the Electric Utilities Industry Law, the Radiation Hazards Prevention Law, Medical Care Law, etc. and related government ordinances, ministerial ordinances, orders and notifications, and guidelines based on these laws. The recommendations of the International Commission on Radiological Protection (ICRP) are given due consideration and are incorporated into national legislation and regulation. The Radiation Council coordinates these technical standards in the laws and regulations on prevention of radiation hazards.

In examining application of a license for a nuclear facility, it is confirmed that the application conforms to the Examination Guides established by the NSC as well as the legislation and technical standards. In these guides, operators are required to reduce the radiation dose received by the public in the vicinity of the facility site as low as reasonably achievable.

Ministerial ordinances on the basis of the Reactor Regulation Law and the Radiation Hazards Prevention Law prescribe area control for radiation protection, radiation control of personnel engaged in radiation activities in controlled areas, measurement and surveillance of radiation levels, monitoring of discharged radioactive materials, and maintenance of radiation control equipment. The Notification for Dose Limits on the basis of each of these rules prescribes dose limits and concentration limits of radioactive materials in air and surface activity density of the material contaminated by radioactive materials inside controlled area and dose limits and concentration limits of radioactive materials outside peripheral monitoring area, and dose limits and concentration limits of radioactive materials for personnel engaged in radiation work, and dose limits for personnel engaged in emergency activities. All these limits are shown quantitatively in the Notification for Dose Limit.

In order to ensure compliance with these regulations, in the Reactor Regulation Law for example, operators are required to prescribe in the Operational Safety Program, i) controlled areas, access controlled areas and peripheral monitoring area and access control to these areas, ii) monitoring equipment at air ventilation and water discharge, iii) monitoring of dose, dose equivalent, concentration of radioactive materials in the air and density of radioactive materials on the surface of contaminated objects, and the decontamination, and iv) maintenance of radiation monitoring equipment. And operators are also required to keep the records regarding occupational exposure.

F4.2 National Requirements on Radiation Protection and the Implementation

1. Allowable Dose Limits

(1) Definition of Controlled Areas

The abovementioned rules and dose limit notifications define a controlled area as an area where dose of external radiation may exceed 1.3mSv for a period of three months, the concentration of radioactive material in the air, excluding natural background, may exceed the limit specified in the notification, or the density of radioactive material on the surface of contaminated objects may exceed the limit specified in the notification, and request operators to take necessary measures in the area.

(2) Allowable Dose Limits for Occupational Exposure

The abovementioned rules and dose limit notifications provide for the allowable dose limits for occupational exposure listed in Table F4-1.

Table F4-1 Dose limits for personnel engaged in radiation work

Items	Limits
1. Effective dose limits	
(1) Personnel engaged in radiation work (2) Female personnel (3) Pregnant female personnel	100mSv/5 years (do not exceed 50mSv/year) In addition to the provision (1), 5mSv/3 months In addition to the provision (2), 1mSv for internal exposure during a period after her employer etc. knows her pregnancy until the childbirth
2.Equivalent dose limits	
(1) Eye lens (2) Skin (3) Pregnant female's abdominal region	150mSv/1 year 500mSv/1 year 2mSv during a period after her employer etc. knows her pregnancy until the childbirth
3.Dose limits for the personnel engaged in emergency radiation work	
(1) Effective dose limits (2) Equivalent dose limits for eye lens (3) Equivalent dose limits for skin	100mSv 300mSv 1Sv

(3) Dose Limits for the Public

The abovementioned rules and dose limit notifications provide for the allowable dose limits for the public listed in Table F4-2.

Table F4-2 Dose limits for the public

Items	Limits
Dose limits outside the peripheral monitoring area	
Effective dose	1mSv/year
Equivalent dose for eye lens	15mSv/year
Equivalent dose for skin	50mSv/year

2. Numerical Guide to Reduce Dose to the Public in Vicinity and Discharge Control

At major nuclear facilities licensed on the basis of the Reactor Regulation Law, operators are required to keep the radiation dose received by the public in the vicinity of the facility low taking the ALARA principle, in addition to comply with dose limits and concentration limits of radioactive materials outside peripheral monitoring area due to the discharge of radioactive materials.

For nuclear power reactors, the guidelines prepared by the NSC, "the Guides for the Dose Target Value in the Vicinity of the Light Water Nuclear Power Reactors", defines the target value for radiation doses received by the public in the vicinity of the facilities as 50μSv per year due to the release of radioactive materials to the environment during normal operation. Operators establish the annual numerical discharge control guide that satisfies the above-mentioned target, put it in the Operational Safety Program, and obtain approval of the regulatory body.

For the reprocessing facility, fabrication facility, use facility, waste disposal facility, and waste management facility and spent fuel intermediate storage facility, the operators are required to reduce radiation doses based on the ALARA principle at the license examination. Operators define the control target value smaller than the dose limit of 1mSv / year, put it in the Operational Safety Program, and obtain approval of the regulatory body.

During the decommissioning, operators continue the radiation control, setting the control target value equivalent or lower than the value during operation.

The regulatory body approves the control target value, confirms compliance with the Operational Safety Program, and collects report from operators.

At radioisotope waste management facilities licensed on the basis of the Radiation Hazards Prevention Law, an operator, in addition to comply with concentration limits of gaseous and liquid discharge, makes efforts to keep dose at site boundary below 250μSv/3

months

3. Measurement of Environmental Radiation

A licensee on the basis of the Reactor Regulation Law conducts radiation monitoring at the site vicinity during normal operation, assesses the impact upon the environment of the discharge of radioactive materials from the facility, and feedbacks the results in improving discharge control and facility management.

Local governments hosting nuclear facilities also monitor radiation level independently at the site vicinity to protect public health and safety.

Meanwhile, the NSC indicates fundamentals of the monitoring plan and its implementation and the evaluation of radiation dose in the “Guideline for Environmental Radiation Monitoring” which was established in March 2008, integrating the existing “Guideline for Environmental Radiation Monitoring” and the “Guideline for Environmental Radiation Monitoring in Emergencies”, in order to improve and standardize monitoring technology. Local governments and licensees implement monitoring in accordance with the guide.

An operator of radioisotope waste management facility licensed on the basis of the Radiation Hazards Prevention Law monitors radiation level and measures contamination by radioactive materials at controlled area boundary, site boundary and any appropriate points.

F4.3 Measures taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment

The abovementioned rules provide that three-month-averaged concentration of radioactive materials in air outside peripheral monitoring area shall not exceed the concentration limits for discharge of gaseous radioactive waste, that three-month-averaged concentration of radioactive materials in water at the outside of the boundary of the peripheral monitoring area shall not exceed the concentration limits for discharge of liquid radioactive waste with a discharge facility, and that doses due to liquid discharge of radioactive wastes from reprocessing facilities monitored at the outlet to the ocean shall not exceed the dose limit. The rules also provide that licensees shall immediately report to the competent minister when any of these limits are exceeded, and report within 10 days on details of the event and corrective measures taken.

F4.4 Provision for mitigate the effects by an unplanned or uncontrolled release of radioactive materials

Licensees of Nuclear Facilities, on the basis of abovementioned rules, shall prepare the Operational Safety Program and have them approved by the regulatory body, which provide that operators, in case of unplanned or uncontrolled release of radioactive materials, should take measures against the spread of contamination by nuclear fuel materials or radioisotopes and carryout decontamination work without delay.

And as an example, the Safety Examination Guide for Reprocessing Facility, which is used in safety examination of reprocessing facility with large inventory of radioactive materials, provides that fire and explosion due to fine metal particles from fuel cladding or organic solvent, criticality accident, leakage or loss of function due to damage or failure of equipment or piping, or spent fuel handling failure do not cause excessive exposure of radiation to the public.

When an unplanned or an uncontrolled release of radioactive materials initiates any specific events (Table F5-1) defined in the Special Law of Emergency Preparedness for Nuclear Disaster (Special Law for Nuclear Emergency Preparedness), emergency activities start according to the procedure, and the Prime Minister declares Nuclear Emergency if the initial event progresses and exceeds the predetermined level. Nuclear emergency will be described in detail in the ensuing section.

F5 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.

F5.1 Laws, Regulations and Requirements for Nuclear Emergency Preparedness

The JCO Criticality Accident in September 1999 was a very serious accident when local residents were instructed for sheltering or evacuation for the first time in Japan, shattering basic premise of securing safety in promoting utilization of nuclear energy. Lessons learned from the accident clarified the special characteristics of nuclear emergency, which would demand quick initial response, coordinated cooperation among the national and local governments, strengthening of the national emergency preparedness and the clarification of operator's responsibilities. The Special Law for Nuclear Emergency Preparedness was enacted in December 1999 and enforced in June 2000, addressing the special characteristics of nuclear emergency*[1] mentioned above.

The law was enacted within the legal framework already established by the Basic Law for General Emergency Preparedness, which had defined roles of the national government, local governments, etc. in emergencies such as earthquakes, typhoons, conflagrations and nuclear emergency.

The part of "Nuclear Emergency Preparedness" in the Basic Plan for Emergency Preparedness based on the Basic Law for General Emergency Preparedness, was extensively revised in accordance with the Special Law for Nuclear Emergency Preparedness, clarifying roles and responsibilities of the national government, local governments, and nuclear operators*[2].

The NSC, taking into consideration the Special Law for Nuclear Emergency Preparedness and the lessons learned from the JCO Criticality Accident, revised the "Guideline on Emergency Measures for Nuclear Facilities" on technical and specialized matters for nuclear emergency in May 2000,

- to correspond to the Special Law for Nuclear Emergency Preparedness,
- to expand the scope for research reactors and nuclear fuel related facilities in addition to the nuclear power stations, reprocessing facilities, etc., and
- to include measures against the nuclear fuel material release and the nuclear criticality accident in addition to the noble gases and iodine release.

After that, the Guideline has been revised several times by the NSC as followings since the 2nd National Report.

- to specify the purposes of the Guideline and the objective facility, and to describe the effectiveness of preventive protection according to the international trends of IAEA and so on (May 2007). And the Guideline was adjusted with the Special Law for Nuclear Emergency Preparedness and related guides issued by the NSC
- to change the titles of reference guide according to the establishment of the Guideline for Environmental Radiation Monitoring (March 2008)

As the Special Law for Nuclear Emergency Preparedness provides that its enforcement situation is subject to review five years after its enforcement, the enforcement situation was investigated by MEXT and METI. Results of the investigation were reported to the Special Committee on Nuclear Disaster, the NSC in March 2006.

NISA checked the enforcement situation concerning four issues that were presupposed to be noted when the Special Law for Nuclear Emergency Preparedness was enacted, and reported the following:

- Concerning the speeding up of the initial response, non-scenario-based training should

be carried out, and the effort should be continued;

- Concerning enhancing the cooperation between the national government and local governments, the "Integrated Nuclear Emergency Preparedness Network", which is a large-scale system and preparation of a fast unified network of communication among them, should be established;
- Concerning enhancing the emergency response system of the national government, necessary renewal of materials and equipment of the Emergency Preparedness Center should be promoted; and,
- In relation to clarification of the licensees' duties, effective functioning of nuclear emergency specialists in an emergency should be verified and improved.

In this section, emergency preparedness of main nuclear facilities in accordance with the Special Law for Nuclear Emergency Preparedness is described.

*1 The term "nuclear emergency" means unusual release of radioactive materials or unusual radiation streaming outside of a nuclear facility, by operation of a nuclear reactor, fabrication, reprocessing and use of nuclear fuel materials, storage of spent fuels, management of nuclear fuel materials or the materials contaminated with nuclear fuel materials, and the accompanying shipment, and the term "nuclear disaster" means the damage caused by a nuclear emergency to the life, health or property of the public, according to the Special Law for Nuclear Emergency Preparedness.

*2 The term "an operator" means a license holder for fuel manufacturing operation of nuclear reactors, spent fuel storage , reprocessing , radioactive waste disposal , or use of nuclear fuel materials, according to the Special Law for Nuclear Emergency Preparedness.

F5.2 Nuclear Emergency Preparedness and the Emergency Measures

The responsibilities of related authorities for nuclear emergency preparedness and the emergency measures concerning operators and major nuclear facilities in accordance with the Special Law for Nuclear Emergency Preparedness are as follows.

1. Outline of Nuclear Emergency Preparedness at Nuclear Facilities (Fig. F5-1)

Quick response and coordinated cooperation among related organizations are important in a nuclear emergency.

- The Special Law for Nuclear Emergency Preparedness defines specific initial events in a major nuclear facilities (see Table F5-1), the occurrence of which the operator shall immediately notify the competent minister and the heads of related local governments of.
- The competent minister, receiving the notification, starts activities according to the procedure stipulated by the law. Staff with expertise in emergency measures will be sent to local governments on request. The Senior Officer for Nuclear Emergency collects information and coordinates activities preventing expansion of the events.
- When the competent minister recognizes that the specific initial event exceeds the predetermined level and has developed into an emergency, the minister immediately reports it to the Prime Minister.
- The Prime Minister declares "Nuclear Emergency", and advises or directs related local governments on necessary measures such as sheltering, evacuation or preventive use of stable iodine tablets to be taken by them.
- The Prime Minister establishes the "Nuclear Emergency Response Headquarters" in Tokyo, which he will head, and the "Local Nuclear Emergency Response Headquarters".
- The NSC, when a nuclear emergency occurs, calls the Emergency Technical Advisory Body that consists of members from the NSC and the Investigation Committee for Emergency Measures and makes technical advices to the Prime Minister.
- Local governments establish their own emergency response headquarters.
- The national government, local governments and related operators etc. establish the "Joint Council for Nuclear Emergency Response" at the Off-Site Center in order to

share information and coordinate their emergency measures.

2. On-site and Off-site Nuclear Emergency Preparedness at Nuclear Facilities

Organizations related to nuclear emergency preparedness keep themselves always ready to collect and send information and start quick response against an emergency, and conduct exercises, disseminate knowledge and promote research on emergency preparedness. Outline of roles and responsibilities of related organization are as follows.

(1) On-Site Emergency Preparedness at Nuclear Facilities

When the operator detects abnormal release of radioactive material or abnormal level of radiation at a nuclear facility, it takes necessary measures to prevent progression of the event into an emergency.

The operator develops Operator's Plan for Nuclear Emergency Preparedness after consulting with related local governments, which provides for prevention of, emergency measures against, and post-emergency restoration from, a nuclear emergency, including on-site and off-site cooperation with other organizations. Especially, quick and accurate notification of occurrence of specific initial events to related organizations is a very important obligation of the operator.

Moreover, the operator is required to take part in comprehensive exercise with related organizations, and keep close contact with them.

(2) Off-Site Emergency Preparedness of Nuclear Facilities

Roles and responsibilities of the national government and local governments in emergency preparedness are defined in the Special Law for Nuclear Emergency Preparedness and the Basic Plan for General Emergency Preparedness. Each local government develops its own Local Plan for Emergency Preparedness. They conduct emergency environmental radiation monitoring, and recommend or instruct evacuation, sheltering or preventive use of stable iodine to the resident, receiving advice or direction from the Prime Minister.

3. Responsibility of the National Government, Local Governments and Operators concerning the Nuclear Emergency Preparedness

(1) Responsibility of the National Government

The national government establishes following preparation to prevent occurrence of nuclear emergency and to take measures in emergency.

- The competent minister stations a Senior Officer for Nuclear Emergency in the vicinity of each nuclear facility, who guides and advises the operator in preparing Operator's Plan for Emergency Preparedness and, in emergency, takes necessary measures preventing progression of the emergency.
- The NSC, when a nuclear emergency occurs, calls the Emergency Technical Advisory Body that consists of members from the NSC and the Investigation Committee for Emergency Measures and makes technical advices on dissolution of nuclear emergency, change of area for emergency measures, and other technical matters to the Head of the Nuclear Emergency Preparedness Headquarter (the Prime Minister).
- The competent minister designates a facility in the vicinity of a nuclear facility as Off-Site Center to be used in an emergency. In case of an emergency, the national government, the local governments and the operator establish at the Off-Site Center the "Joint Council for Nuclear Emergency Response", in order to share information and to coordinate their activities. Off-Site Centers, located on the points shown in Fig.F5-2, have communication equipment with the Prime Minister's Official Residence, the Cabinet Office, the Emergency Response Centers of NISA or MEXT and related local governments, and other necessary equipment.
- The Off-site Center is provided with equipment to monitor the environmental radiation

level in the vicinity of the facility and display it on-line. Also, it is provided with equipment to display on-line information on accident condition in the nuclear facility except for the temporary data, and information on accident progression predicted by ERSS (Emergency Response Support System). Also SPEEDI (System for Prediction of Environmental Emergency Dose Information) net work was developed that predict quickly the radioactivity concentration in the air and exposure around the area based on the radiation source information provided by ERSS, meteorological condition and topographical data.

- The national government establishes arrangements to initiate quick and coordinated activities in an emergency.
- The national government conducts comprehensive nuclear emergency exercise once a year according to the plan prepared by the competent minister.

(2) Responsibilities of Local Governments

The local governments are required to develop and revise Local Plan for Emergency Preparedness in accordance with Article 40 of the Basic Law on General Emergency Preparedness, consulting with the Prime Minister beforehand.

(3) Licensee's Responsibility

- The licensee develops its own Operator's Plan for Nuclear Emergency Preparedness after consulting with related local governments, and submits it to the competent minister before operation of the nuclear facilities.
- The licensee establishes on-site organization for nuclear emergency preparedness, and designates a Manager for Nuclear Emergency Preparedness who administers the organization.
- The Manager for Nuclear Emergency Preparedness shall notify specific initial events to the competent authorities.

F.5.3 Implementation of the Nuclear Emergency Exercises

Plans for Nuclear Emergency Preparedness are developed in the vicinity of each nuclear facility in accordance with the Special Law for Nuclear Emergency Preparedness, and an Off-Site Centers is located in the vicinity of each nuclear facility. Exercises of various levels are conducted to confirm the effectiveness of the emergency preparedness. The purpose of exercise includes 1) to enhance understanding of the nuclear emergency preparedness by responsible personnel of related organizations and local residents, and 2) to verify whether emergency measures function in predetermined way, and whether information sharing and cooperation among related organizations are adequate. Exercises cover communication, monitoring, decision making on emergency measures to be taken, sheltering or evacuation etc., ranging from large scale national exercise to operator's on-site exercise. Exercises in the past years are shown below.

1. Exercise Planned by the National Government (Table F5-2 (1))

The national government started nation-wide comprehensive exercises for nuclear emergency involving national and local governments, designated public organizations, operators of the nuclear facility and the local residents once a year, upon enforcement of the Special Law for Nuclear Emergency Preparedness established after the JCO Criticality Accident, increasing its involvement in exercises planned and executed mainly by local governments in the past. The exercise for power reactor facilities includes a scenario assuming core damage and relevant accident management activities.

The following exercises were conducted since 2005.

- On November 9 and 10, 2005, the national government, Niigata Prefecture, concerned cities/towns/villages, Tokyo Electric Co., and other emergency-preparedness-related organizations conducted a joint exercise for the Kashiwazaki-Kriwa Nuclear Power Station (Niigata Prefecture) with a participation of about 2,600 persons including local

residents. Field trainings for emergency dispatch of government officials and experts and transportation of materials and equipment were conducted within this exercise. The lessons learned from the Niigataken-Chuetsu earthquake (October 23, 2004) were also taken into account.

- On October 25 and 26, 2006, the national government, Ehime Prefecture, concerned cities/towns/villages, Shikoku Electric Co., and other emergency-preparedness-related organizations conducted a joint exercise for the Ikata Power Station (Ehime Prefecture) with a participation of about 3,700 persons including local residents. This exercise took account of enhanced immediate emergency measures (preparation) at an alert stage.
- On October 24, 2007, the national government, Aomori Prefecture, concerned cities, towns, villages, Japan Nuclear Fuel Ltd., and other emergency-preparedness-related organizations conducted a joint exercise for the Reprocessing Plant (Rokkasho Village, Aomori Prefecture) with a participation of about 1,800 persons including local residents. This was the first exercise for the reprocessing plant and a fire drill on the assumption of radioactive material release was conducted. Enhancement of public relations activities including information release to foreign media was also intended.

The results of the exercises are well evaluated and fed back to the items and methods of the exercises to be conducted in the subsequent years. The evaluation uses three types of methods: questionnaires to the participants, checking by the third party evaluation organization and opinions of external experts.

2. Exercise Planned by the NSC

The NSC implements exercise for improvement of the emergency communication system, and for activation of the Emergency Technical Advisory Body and improvement of its effectiveness.

3. Exercise Planned by Local Governments (Table F5-2 (2))

The Local Plan for Emergency Preparedness prescribes local exercise to be planned and conducted by local governments, which national government and the NSC support by sending expert staffs etc.

4. Exercise Planned by Licensees

The licensees have conducted on-site exercises including establishment and operation of emergency response headquarters, communication, emergency environmental radiation monitoring, etc. based on Operator’s Plan for Emergency Preparedness for each site about once per year. The operators conduct the exercise etc. involving accident management activities, to confirm its effectiveness.

The licensee participates in the exercise planned and executed by the local government.

5. Participation in international exercise

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. Japan has been participating and will continue to actively participate in the international emergency response exercise (ConvEx) organized by the IAEA

F5.4 Response to radiological emergencies in neighboring countries

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". To implement the provisions of these conventions, the Ministry of Foreign Affairs (MOFA) is designated as "National Warning Point (NWP)" and "National Competent Authority for an Emergency Abroad, NCA(A)" in the case of a nuclear accident and a radiological emergency out side the Japanese territory

When a radiological emergency occurs outside Japanese territory including neighboring

countries, the MOFA through the established response system, receives notifications and forwards them to appropriate authorities to share the information and to take necessary steps. In relation to the Assistance Convention, the response system has been reviewed for its important by considering registration for RANET and other so that Japan as a contacting party could dispatch personal and provide material and equipment to the extent possible under the Convention

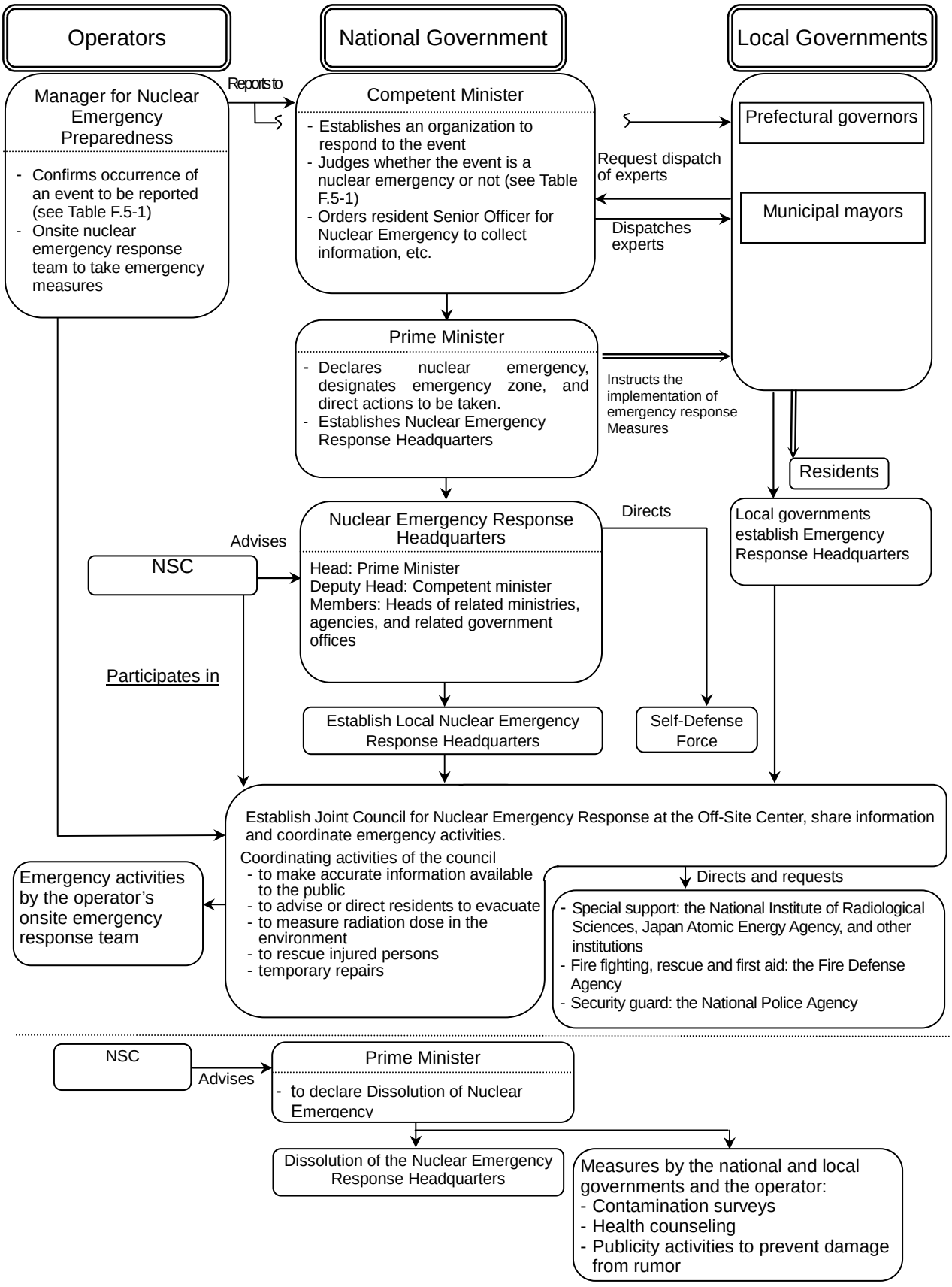


Fig.F5-1 Measures Based on the Special Law for Nuclear Emergency Preparedness

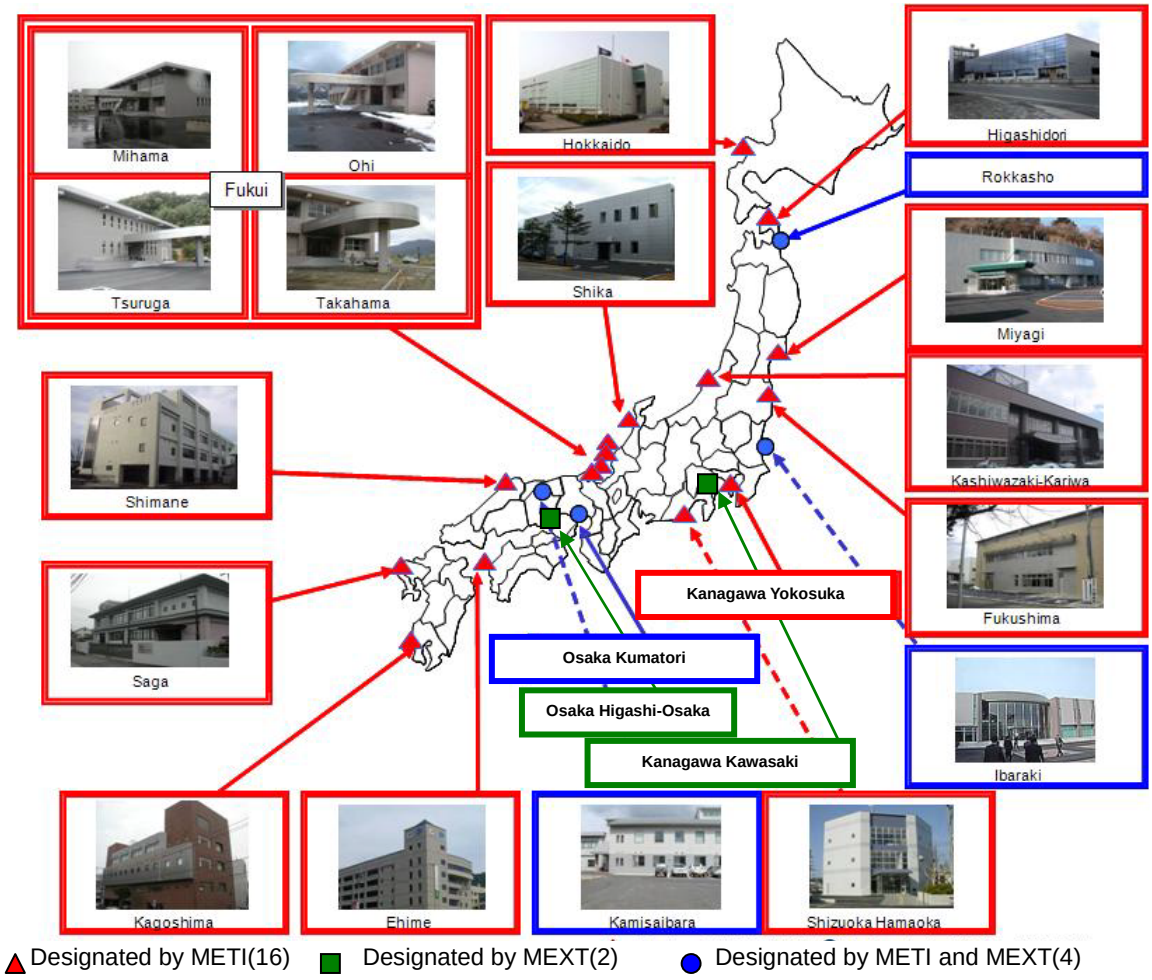


Fig.F5-2 Locations of Off-Site Centers

Table F5-1 Main Specific Events, Nuclear Emergencies and Responses Prescribed in the Special Law for Nuclear Emergency Preparedness

Events		Criteria of Specific Event	Criteria of Emergency
a	Dose rate near the site boundary	Exceeding 5μSv/h at one point for more than 10 minutes	Exceeding 500μSv/h at one point for more than 10 minutes
		Exceeding 5μSv/h simultaneously at more than two points	Exceeding 500μSv/h simultaneously at more than two points
b	Detection of radioactive materials at exhaust stack or other normal release points	Release of radioactive materials that results in more than 50μSv of dose or more than 5μSv/h of dose rate for more than 10 minutes	Release of radioactive materials that results in more than 5mSv of dose or more than 500μSv/h of dose rate for more than 10 minutes
c	Detection of radiation or radioactive materials due to fire or explosion, outside controlled areas	More than 50μSv/h of radiation dose rate	More than 5mSv/ h of radiation dose rate
		Release of radioactive materials that results in more than 5μSv/h of dose rate	Release of radioactive materials that results in more than 500μSv/h of dose rate
d	Individual event in consideration of facility characteristics		
	Failure of scram	Reactor cannot be shut down with normal neutron absorbers	Emergency reactor shutdown is required, but all reactor shutdown functions are unavailable
	Loss of reactor coolant	Emergency core cooling system (ECCS) is actuated due to reactor coolant.	All ECCS injections are unavailable.
	Loss of all AC power supplies	All AC power supply is unavailable more than 5 minutes.	All AC power supply is lost and all core cooling functions are lost.
	A decrease of spent fuel pool water level at a reprocessing facility	Fuel assemblies are exposed due to drop of water level	

- The competent minister dispatched expert staff to local governments at their request. - Resident Senior Officer for Nuclear Emergency conducts prescribed response operations.	The competent minister confirms the occurrence of nuclear emergency and reports it to Prime Minister. Prime Minister declares nuclear emergency and takes following measures - To advise or instruct the local governments on evacuating etc. - To establish Nuclear Emergency Response Headquarters in Tokyo and Local Nuclear Emergency Response Headquarters(Off-site Center) - To set up the Joint Council for Nuclear Emergency Response in order to exchange information among the national and local governments.
- Officials from concerned ministries and agencies assemble for the accident response liaison conference (Tokyo). - Designated parties assemble in the Off-site Center for local accident response liaison conference.	

Table F5-2 Records of Nuclear Emergency Exercise

Planned by	Date of exercise	Nuclear facility
(1) Exercise planned by National Government		
National Government	2005/11/9 (Wed) -10 (Thu)	Kashiwazaki-Kariwa Nuclear Power Station (Tokyo Electric Power Co., Inc.)
	2006/01/20 (Fri)	Nuclear Science Laboratory (JRR-3), Tokai Research-and-Development Center, (IAA) Japan Atomic Energy Agency.
	2006/10/25(Wed) -26 (Thu)	Ikata Nuclear Power Station (Shikoku Electric Power Co., Inc.)
	2007/10/24 (Wed)	Fuel Reprocessing Plant, (Japan Nuclear Fuel Ltd.)
(2) Exercise planned by Local Government (April, 2005 - as of March 31, 2008)		
Fukui	2005/8/2 (Tue)	Mihama Nuclear Power Station (Kansai Electric Power Co., Inc.)
Aomori	2005/8/10 (Wed)	Higashidori Nuclear Power Station (Tohoku Electric Power Co., Inc.)
Ibaragi	2005/9/30 (Fri)	Fuel fabrication facility (Mitsubishi Nuclear Fuel Co., Inc.)
Hokkaido	2005/10/21 (Fri)	Tomari Nuclear Power Station (Hokkaido Electric Power Co., Inc.)
Ehime	2005/10/21 (Fri)	Ikata Nuclear Power Station (Shikoku Electric Power Co., Inc.)
Miyagi	2005/10/28 (Fri)	Onagawa Nuclear Power Station (Tohoku Electric Power Co., Inc.)
Fukushima	2005/11/15 (Tue)	Fukushima Daini Nuclear Power Station (Tokyo Electric Power Co., Inc.)
Shimane	2005/11/17 (Thu)	Shimane Nuclear Power Station (Chugoku Electric Power Co., Inc.)
Ishikawa	2005/11/17 (Thu)	Shika Nuclear Power Station (Hokuriku Electric Power Co., Inc.)
Kagoshima	2005/11/19 (Sat)	Sendai Nuclear Power Station (Kyushu Electric Power Co., Inc.)
Saga	2005/11/21 (Mon)	Genkai Nuclear Power Station (Kyushu Electric Power Co., Inc.)
Aomori	2005/11/22 (Tue)	Reprocessing facility (Japan Nuclear Fuel Ltd.)
Fukui (Public protection exercise)	2005/11/27 (Sun)	Mihama Nuclear Power Station (Kansai Electric Power Co., Inc.)
Tottori	2006/1/24 (Tue)	Enrichment engineering facility, Ningyotoge Environmental Engineering Center, (IAA) Japan Atomic Energy Agency
Okayama	2006/2/9 (Thu)	Enrichment engineering facility, Ningyotoge Environmental Engineering Center, (IAA) Japan Atomic Energy Agency
Shizuoka	2006/2/15 (Wed)	Hamaoka Nuclear Power Station (Chubu Electric Power Co., Inc.)
Aomori	2006/7/27 (Thu.)	Rokkasho reprocessing facility (Japan Nuclear Fuel Ltd.)
Fukui	2006/8/1 (Tue)	Ohi Nuclear Power Station (Kansai Electric Power Co., Inc.)
Ishikawa	2006/8/20 (Sun)	Shika Nuclear Power Station (Hokuriku Electric Power Co., Inc.)
Ibaragi	2006/9/29 (Fri)	Tokai No.2 Power Station (Japan Atomic Power Co.)
Miyagi	2006/10/23 (Mon) -24 (Tue)	Onagawa Nuclear Power Station (Tohoku Electric Power Co., Inc.)
Hokkaido	2006/10/30 (Mon)	Tomari Nuclear Power Station (Hokkaido Electric Power Co., Inc.)
Niigata	2006/11/10 (Fri)	Kashiwazaki-Kariwa Nuclear Power Station (Tokyo Electric Power Co., Inc.)
Aomori	2006/11/14 (Tue)	Higashidori Nuclear Power Station (Tohoku Electric Power Co., Inc.)
Kagoshima	2006/11/17 (Fri)	Sendai Nuclear Power Station (Kyushu Electric Power Co., Inc.)
Fukui	2006/11/19 (Sun)	Ohi Nuclear Power Station (Kansai Electric Power Co., Inc.)
Saga	2006/11/26 (Sun)	Genkai Nuclear Power Station (Kyushu Electric Power Co., Inc.)
Okayama	2006/11/27 (Mon)	(Enrichment engineering facility, Ningyotoge Environmental Engineering Center, (IAA) Japan Atomic Energy Agency
Shimane	2007/1/30 (Tue)	Shimane Nuclear Power Station (Chugoku Electric Power Co., Inc.)
Shizuoka	2007/2/1 (Thu)	Hamaoka Nuclear Power Station (Chubu Electric Power Co., Inc.)
Fukushima	2007/2/6 (Tue)	Fukushima Daiichi Nuclear Power Station (Tokyo Electric Power Co., Inc.)
Kanagawa	2007/2/6 (Tue)	Nuclear Fuel Fabrication Facility (Global Nuclear Fuel Japan Co., Ltd.)
Fukui	2007/8/2 (Thu)	Tsuruga Power Station (Japan Atomic Power Co.)

Ibaragi	2007/09/28 (Fri)	Experimental Fast Reactor “Joyo”, Oharai Research and Development Center, (IAA) Japan Atomic Energy Agency
Okayama	2007/10/11 (Thu)	Prototype Uranium Enrichment Plant, Ningyo-toge Environmental Engineering Center, (IAA) Japan Atomic Energy Agency
Fukushima	2007/10/22 (Mon) -23 (Tue)	Fukushima Daini Nuclear Power Station (Tokyo Electric Power Co., Inc.)
Kagoshima	2007/10/23 (Tue)	Sendai Nuclear Power Station (Kyushu Electric Power Co., Inc.)
Hokkaido	2007/10/30 (Tue)	Tomari Nuclear Power Station (Hokkaido Electric Power Co., Inc.)
Shimane	2007/11/2 (Fri)	Shimane Nuclear Power Station (Chugoku Electric Power Co., Inc.)
Ehime	2007/11/6 (Tue)	Ikata Nuclear Power Station (Shikoku Electric Power Co., Inc.)
Fukui	2007/11/18 (Sun)	Tsuruga Power Station (Japan Atomic Power Co.)
Ishikawa	2007/11/22 (Thu)	Shika Nuclear Power Station (Hokuriku Electric Power Co., Inc.)
Saga	2007/11/25 (Sun)	Genkai Nuclear Power Station (Kyushu Electric Power Co., Inc.)
Miyagi	2008/1/23(Wed) -24 (Thu)	Onagawa Nuclear Power Station (Tohoku Electric Power Co., Inc.)
Shizuoka	2008/2/13 (Wed)	Hamaoka Nuclear Power Station (Chubu Electric Power Co., Inc.)

F6 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

The Framework for Nuclear Energy Policy issued by the Atomic Energy Commission states that “it is important to carry out decommissioning of a nuclear facility such as commercial power reactor, experimental research reactor and nuclear fuel cycle facility, ensuring safety, on the operator's own responsibility, in accordance with the revised Reactor Regulation Law, under the government's regulation and obtaining local communities' understanding and cooperation."
The regulatory policy for dismantling or decommissioning of reactor facilities has been investigated and discussed, resulting in following three reports;

- "Basic Philosophy to Assure Safety for the Dismantling Nuclear Reactor Facilities" (December 1985, Decision by the NSC, revised in August 2001)
- "Aiming at Decommissioning of Commercial Nuclear Power Facilities " (January 1997, Nuclear Energy Subcommittee, Advisory Committee for Natural Resources and Energy)
- "Philosophy for Safety Assurance and Safety Regulation on the Decommissioning of Commercial Power Reactor Facilities" (August 2001, Decommissioning Safety Subcommittee, Nuclear and Industrial Safety Subcommittee, Advisory Committee for Natural Resources and Energy)

Based on these reports, in order to ensure the safety during the decommissioning of commercial nuclear power reactors, the regulation was implemented by applying existing provisions in the Reactor Regulation Law, such as “notification of dismantling” or “modification of Operational Safety Program, by the operators.
So far, the decommissioning of reactor facilities was implemented at the Power Demonstration Reactor of the Japan Atomic Energy Agency (JPDR) and the Tokai Power Station of Japan Atomic Power Co. Inc., etc. and the development and application of dismantling technologies have been progressed, and the know-how for decommissioning has been accumulated through these processes.
Under such a circumstance, in October 14, 2004, the NSC pointed out, that “it is required to investigate the development of a graded approach in safety regulation system to cope with the progress of dismantling processes, considering that the main activities during the period

after the cease of operation are safety management of spent fuels, dismantling works and the radiation control, and handling of radioactive wastes, and that the regulatory experiences concerning dismantling and decommissioning of test and research reactors have been accumulated", as the conclusion of the regulatory activities investigation concerning the safety regulation system during the period after the cease of operation of reactor facilities.

The Decommissioning Safety Subcommittee has investigated appropriate regulatory system of decommissioning, based on the regulatory experiences on decommissioning of reactor facilities under the current system. The investigation is conducted on the graded regulatory approach to cope with the progress of the decommissioning process, the diversity of each facilities, reflecting the experiences of decommissioning, and development of technology in the near future, and reported in "The Way of the Decommissioning Regulation of the Nuclear Facilities" (December 9, 2004)).

In this investigation, the Subcommittee recognized that the decommissioning of nuclear reactors is becoming to a routine activity, and the amendment of legislation must cope with graded regulatory approach and clarification of the responsibilities of licensees. It is considered important (i) to clarify the requirement in decommissioning regulations, (ii) to keep the transparency on procedures for the operators, and (iii) to obtain in the understanding and confidence of the national people and local residents on decommissioning regulations.

The Subcommittee proposed the way of decommissioning regulations, as;

- replacing "dismantling notification by licensee", to the "approval of the licensee's decommissioning plan of dismantling processes, methods etc. by regulatory body "
- implementation of the decommissioning as approved in the plan
- completion of decommissioning is confirmed by regulatory body and after the confirmation of the completion of decommissioning, the operation license loses its effect
- the regulatory activities during the decommissioning process (example: Periodical Inspections, Nuclear Safety Inspections etc.) should be changed in accordance with the changes of the functions of the facilities and safety operation activities as the decommissioning proceeds (graded regulatory approach)

On the basis of such recognition, the Reactor Regulation Law was amended on May, 2005 and the safety regulation for decommissioning of reactors and other facilities was updated. In response to this amendment of the Law, the Enforcement Ordinance for the Reactor Regulation Law and related ministerial ordinances (rules for Refinery, Commercial Power Reactors, Reactors at Development Stage, Research Reactors, Fuel Fabrication, Spent Fuel Storage, Reprocessing, Waste Disposal, Waste Storage and Use of Nuclear Material) were amended in November, 2005 and put into force in December of the same year.

The above amendment of laws and regulations clarified the legal process of decommissioning. An licensee applying for approval of decommissioning has to submit a decommissioning program that describes the facility to be dismantled and dismantling method, transfer of nuclear fuel materials, removal of contamination with nuclear fuel materials, management of nuclear fuel materials or materials contaminated with nuclear fuel materials, process of decommissioning work, radiation exposure control, safety assessment, systems with functions to be maintained and their performance, financial plan, implementation organization, etc. The regulatory body approves the decommissioning program after examining its conformity with the technical standards. At the final stage of decommissioning, the licensee submits a document that describes the implementation status of dismantling, transfer of nuclear fuel materials, removal of contamination with nuclear fuel materials, management of nuclear fuel materials or materials contaminated with nuclear fuel materials and the final distribution of contamination with nuclear fuel materials, and requests the regulatory body's confirmation. The decommissioning is completed after the regulatory body confirms that the measures for radiation hazard prevention is no more necessary and management of nuclear fuel materials or materials contaminated with nuclear fuel materials is completed.

In addition, a graded regulation system was introduced. For example, the annual periodic facility inspection by the government is no more conducted when nuclear fuel materials are cleared from the facility.

The Radiation Hazard Prevention Law requires the license holders to take steps, such as transferring the radioisotopes to another user, eliminating contamination with radioisotopes and disposing radioisotopes or material contaminated by radioisotopes, etc, to remove radioisotope contamination when they intend to cease the waste management business or use of radioisotopes and/or radiation generating apparatus. The procedure of cessation is conducted adequately in a law-abiding manner.

F6.1 Qualified staff and adequate financial resources are available

1. Human Resources

Licensees clarify, 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 (Nuclear Safety Inspection).

2. Financial Resources

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

F6.2 Operational radiation protection

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

F6.3 Emergency preparedness

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

F6.4 Records of information important to decommissioning are kept.

The Reactor Regulation Law requests to keep important records such as inspection records, radiation control records, etc. even at decommissioning stage.
And other records specific to decommissioning such as each equipment or system being dismantled, schedule and method for dismantling it, etc. are required to be recorded and kept at the end of each dismantling process.
Thus the regulatory body can confirm that the decommissioning has been appropriately completed ensuring safety and in compliance with the Decommissioning Plan of that facility by keeping records to show it.

Section G Safety of Spent Fuel Management

The Government of Japan regulates spent fuel management on the activity basis in accordance with the Law for Regulation of Nuclear Source Material, Nuclear Fuel Material and Nuclear Reactors (Reactor Regulation Law). Specifically, in the licensing process of a nuclear activity, the facility to be used for the proposed activity, i.e. a reactor facility that generates spent fuel, an independent spent fuel storage facility or a reprocessing facility, is required to demonstrate its adequateness in terms of nuclear disaster prevention. This requirement is applied to the whole facility including its spent fuel storage sub-facility.

The major safety functions required for the handling and storage of spent fuel within a facility are "confinement of radioactive materials", "shielding of radiations", "prevention of criticality" and "removal of residual heat" which are common requirements of the laws and regulations governing any kind of spent-fuel-related activity.

Spent fuel storage activity became practical when the Reactor Regulation Law was amended in 1999. The first licensing application in Japan was filed in March, 2007 by Recycle Fuel Storage Company, for a spent fuel storage facility outside of nuclear power station to store spent fuel intermediately before reprocessing. The application is now under safety review. The proposed spent fuel storage facility is the “Recycle Fuel Storage Center” (see Fig.L5-1) that is planned to be built in Mutsu City of Aomori Prefecture. The capacity of the Storage Center will be 3,000 tons in total, 2,600 tons and 400 tons for BWR and PWR spent fuel, respectively, and the fuel will be stored in dry metal casks that are used also for transportation.

Since the Reactor Regulation Law requires almost same safety regulatory procedures for all types of spent fuel management activities, the explanation on the procedures in this Section focuses on “spent fuel storage activity”.

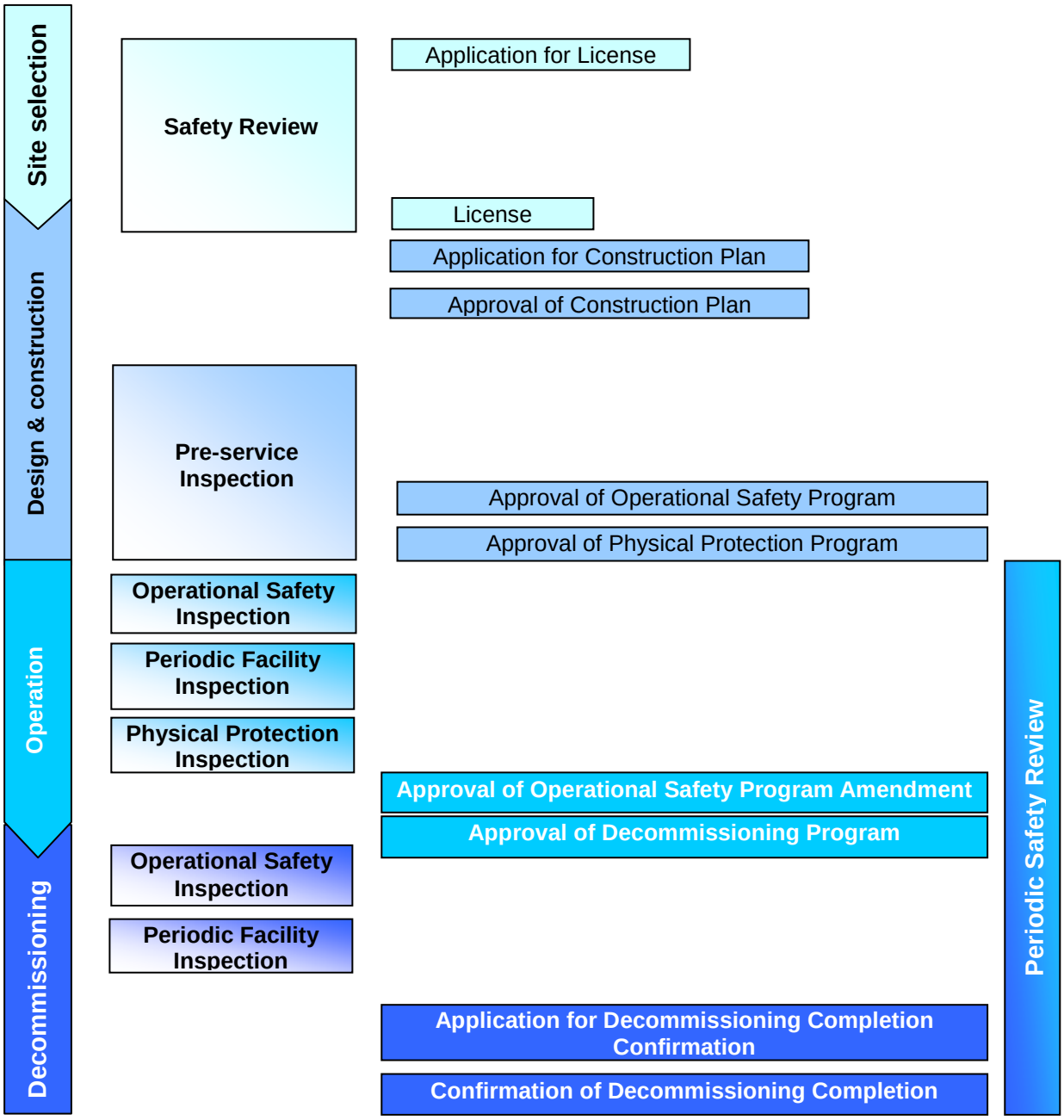


Fig.G-1 Regulatory Flow for Spent Fuel Storage

G1 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.

G1.1 Prevention of criticality and removal of residual heat

In Japan, spent fuel is handled and/or stored in commercial nuclear power plants, reprocessing facilities and spent fuel storage facilities. The Reactor Regulation Law requires an applicant for license for such activity to demonstrate that the location, structures and systems of the facility to be used for the activity are adequate for preventing a nuclear-material-related disaster.
When applying for permission for a spent fuel storage license, the applicant is required by the relevant laws and regulations to demonstrate that the structures and systems of the proposed spent fuel storage facility, especially those for “prevention of spent fuel criticality” and “heat removal of spent fuel”, are safety-designed so as not to hinder disaster prevention.
In addition, prior to actually starting construction of the licensed spent fuel storage facility, the applicant has to obtain approval of the Minister METI for design and construction plan. The Minister gives approval after confirming that the design and construction plan is consistent with the licensed design and is in compliance with applicable technical standards. These standards provide safety requirements such as to take adequate measures to maintain sub-criticality of spent fuel, for instance, through geometrically safe configurations and to provide systems capable of safe removal of decay heat of spent fuel.
During construction, the facility must undergo the pre-service inspection conducted by the Minister of METI. This inspection is conducted to make sure that the construction works are being carried out in accordance with the approved design and construction plan and the performance of the facility meets the requirements of the technical standard. The facility has to get through this inspection to be put into operation.
Spent fuel is stored in the depositories that are associated with a reactor facility or reprocessing facility as well as in an independent spent fuel storage facility. Such associated storage facilities are regulated similarly by the laws and regulations governing the relevant activities.
As above, it is ensured in spent fuel management in Japan that criticality and removal of residual heat generated during spent fuel management are adequately addressed.

G1.2 Minimization of the generation of radioactive waste

Japanese laws and regulations do not require to minimize the radioactive waste amount, however, the capacities of radioactive waste storage facilities such as those in reprocessing facility etc. as well as the capacities of radioactive waste disposal sites are limited and, which leads to a common understanding of the necessity to reduce the radioactive waste

generation.
In Japan, spent fuel is reprocessed to recycle valuable nuclear materials in accordance with the nation's fundamental nuclear energy policy. It is understood that reprocessing of spent fuel is more effective than direct disposal in reducing the amount of high level radioactive wastes.
Licensees are striving to minimize the amount of radioactive wastes generated from their activities by appropriate measures such as evaporating and concentrating liquid radioactive wastes and incinerating solid radioactive wastes.
By establishing the clearance system, materials of insignificant radiation level, which are part of concrete and metals generated from decommissioning of nuclear facilities, can be released from regulatory control of radioactive wastes as clearance materials, and recycle of such materials can result in reduction of radioactive waste amount.

G1.3 Interdependencies among the different steps in spent fuel management

Spent fuel is generated in a reactor facility, temporally stored there and then transported to spent fuel storage facility or reprocessing facility. Spent fuel that was stored in a spent fuel storage facilities is also transferred to reprocessing facility. In reprocessing facility, spent fuel is stored for a certain period and finally reprocessed.
The information such as specifications and irradiation record of spent fuel is shared among the licensees of the different steps in spent fuel management and the facilities for those steps are designed considering forms, burn-up, cooling term and other properties of spent fuel. For getting license, applicant is required by the relevant laws and regulations to clearly show the specifications of spent fuel that will be handled and thus it is ensured that safety is not impaired through the different steps in spent fuel management.

G1.4 Protection of individuals, society and the environment

Description on radiation protection for the safety of spent fuel management is provided in F4.

G1.5 Biological, chemical and other hazards that may be associated with spent fuel management

The Reactor Regulation Law requires that nuclear facilities are adequate for preventing a disaster that involves radioactive materials. For getting license, any spent fuel management facility, i.e. reactor facility, spent fuel storage facility or reprocessing facility, has to take into account the measures against the events that may affect the facility, such as leakage of radioactive materials, fire, explosion and earthquake, to prevent radiological effects on the public and employees. These measures have to be considered also in the detailed facility design to get approval for the design and construction plan. Such consideration as well as subsequent pre-service inspection ensures that the hazards that may affect spent fuel management are duly taken into account.

G1.6 To avoid imposing impacts on future generations

The Government of Japan makes it a basis of its nuclear energy policy to establish a national nuclear fuel cycle in which spent fuel is reprocessed in order to make effective use of uranium resources. Spent fuel generated by nuclear power plant is considered as a useful recyclable fuel resource, so that all the spent fuel is reprocessed and recyclable fuel is re-used as nuclear fuel. There is no fuel stored in future generations thus no greater impacts than those permitted for the current generation will be considered.

G1.7 To avoid imposing undue burdens on future generations

The laws and regulations require to ensure the costs for spent fuel reprocessing not to

impose undue burdens on future generations. (see Section B)

G2 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.

G2.1 Review the safety of existing spent fuel management facility

Periodical Safety Review is implemented in Japan to maintain the safety of nuclear facilities. The Rule for Interim Storage of Spent Fuel requires to make assessments, at an interval of not exceeding 10 years, of the safety activities at the spent fuel storage facility and the introduction of the latest technological knowledge into the safety. It is also required to make a technical assessment of aging degradation and to develop a 10-year maintenance plan for the spent fuel storage facility based on the aging assessment, before the operation period reaches 20 years.
The regulatory body conducts the following inspections for the spent fuel management facilities attached to nuclear facilities. Up to now, no major modification of facility has been suggested by those inspections for continuous operation.

1. Periodical Inspection of Facility
The regulatory body conducts the Periodical Inspection of Facility once a year (once every 13 months in the case of commercial power plants) to confirm if the performance of the facilities and equipment complies with the technical standards prescribed by laws and ordinances.

2. Operational Safety Inspection
The regulatory body conducts the Operational Safety Inspection by a resident Nuclear Safety Inspector four times a year to confirm operators' compliance with the Operational Safety Program.

G3 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.

G3.1 Evaluation of site-related factors

In Japan, evaluation of relevant site-related factors and safety impact of the proposed facility is conducted during the licensing process of each activity. The criteria for the license are that "granting of the license does not impair the planned implementation of the nuclear development and utilization programs; the applicant has adequate technical capability and

financial basis to appropriately carry out the proposed activity; and the location, structure and systems of the proposed facility does not impair the prevention of the hazards due to nuclear fuel materials or the materials contaminated with nuclear fuel materials". The specific evaluation items for the technical capability and the prevention of hazards are listed in a guides developed by the Nuclear Safety Commission (NSC) and are used for the review of an application by the regulatory body.
The progress since the previous report is that an application was filed for the license of a spent fuel storage. This application will be processed according to the procedures described in this section.
One who plans to operate a spent fuel storage facility has to be licensed by the Minister of Economy, Trade and Industry in accordance with the provisions of the Nuclear Reactor Regulation Law.
The license application document must include the descriptions on "the type and storage capacity of spent fuel to be stored", "the location, structure and systems of the spent fuel storage facility and the storage method", and "the method for removing spent fuel after the termination of storage". The document must be supplemented by explanatory materials on "the conditions of meteorology, ground structure, hydrology, seismology, social environment at the site of the proposed spent fuel storage facility" and "the safety design of spent fuel storage facility". With these information, the applicant is required to make an evaluation of site conditions for the spent fuel storage facility.
The Ministry of Economy, Trade and Industry examines the application and confirms that "granting of the license does not impair the planned implementation of the nuclear development and utilization programs"; "the applicant has adequate technical capability and financial basis to appropriately carry out the proposed activity"; and "the location, structure and systems of the proposed facility does not impair the prevention of the hazards due to nuclear fuel materials or the materials contaminated with nuclear fuel materials". Based on this confirmation, the Minister grants the license after consulting with the Atomic Energy Commission and the NSC.
The NSC established "Safety Review Guide for Spent Fuel Interim Storage Facility using Metallic Dry Casks" (see Section L Table G5-1), which is being applied to the safety evaluation of the spent fuel storage facility currently under safety review.
The above Guide provides that the following matters shall be taken into account as basic siting conditions to ensure the safety of the facility.

1. Natural phenomena
   (1) Natural phenomena such as earthquake, tsunami, landslide, depression, typhoon, high tide, flooding, abnormal cold weather and heavy snow
   (2) Geological conditions and landform etc. such as ground condition, soil bearing capacity and faults,
   (3) Meteorological conditions such as wind direction, wind velocity and waterfall
   (4) Hydrospheric and hydraulic conditions such as rivers and underground water

2. Social environment
   (1) Fires and explosions at a neighboring factory etc.
   (2) Missiles etc. by air craft crash etc.
   (3) Conditions of land use in relation to food production such as agriculture, livestock farming and fishery industry, and conditions of population distribution etc.

G3.2 Information for general public

The license application documents and other related information are made open to the public at the Nuclear Energy Library and at the Nuclear Library Room of the Japan Nuclear Energy Safety Organization, except for the information relevant to nondisclosure causes such as safeguards and commercial sensitiveness. Such information is also accessible and available at the National Diet Library. A document requested to an administrative agency

under the ”Act on Access to Information held by Administrative Organs“ is also disclosed in accordance with the provisions of the Act, unless it is subject to nondisclosure causes.

G3.3 Relation with neighboring contracting parties

Being an insular country, Japan is located at a considerable distance from its neighboring countries. Therefore, as long as the safety of nuclear facilities is properly secured within Japan, nuclear facilities in the country are unlikely to have safety impacts on the neighboring countries. The government of Japan does not have it a rule to consult the neighboring countries about siting of nuclear facilities. The Government of Japan provides neighboring countries with information on nuclear energy through bilateral consultation, etc. The government of Japan will release information promptly in the case when any significant event has occurred at any of nuclear installation in Japan.

G4 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.

G4.1 Prevention of radiological impacts on individuals, society and the environment

A licensee for nuclear reactor establishment, spent fuel storage or reprocessing must describe the design and construction methods for the relevant spent fuel storage facility in the application document for the approval of the design and construction methods for the proposed facility and must attach a document demonstrating the conformity of design and construction methods to the technical standards applicable to the proposed facility. The Minister of Economy, Trade and Industry examines the application and gives approval after confirming that the design and construction methods are consistent with the "contents of license” and the “technical standards”.
The "technical standards for the design and construction methods” for spent fuel storage facility provides the standards for confinement function, shielding, etc., to prevent radiation hazards (see Section L: Table G4-1).
The design, construction and inspection of a commercial nuclear power reactor facility is governed by the “Electricity Utilities Industry Law” instead of the “Reactor Regulation Law”, but the requirements are essentially the same.

G4.2 Provisions for the decommissioning of a spent fuel management facility at the design stage

Reactor facility and reprocessing facility as well as spent fuel storage facility have spent fuel storage system which is regulated by the Reactor Regulation Law and other relevant laws individually for each activity. When abolishing the facility, the operator has to establish a decommissioning program and get the approval for it from the Minister of Economy, Trade and Industry.

G4.3 Technologies incorporated in the design and construction of a spent fuel management facility

At the stage of design and construction, a licensee applies the proven technologies inside and outside Japan.
The regulatory body is promoting the studies on the safety of nuclear facilities, environmental radiations and radioactive waste. The safety studies on nuclear facilities are being conducted with the objectives to respond to the expansion and diversification of future nuclear development and utilization and to promote the public consensus on the safety of nuclear facilities. In particular, the studies for developing safety standards, safety guides and reference documents for safety review and the studies for safety improvement are being conducted by the Japan Atomic Energy Agency (JAEA), the Japan Nuclear Energy Safety Organization (JNES), the Central Research Institute of Electric Power Industry and other institutes. For example, JNES is conducting the development of the standards, the long-term integrity tests, and the development and improvement of safety analysis codes for the intermediate storage of spent fuel.
In the process of safety review of nuclear facilities, the regulatory body conducts, as appropriate, independent analyses to confirm the validity of applicant's safety analysis results. A recent example related to this Convention is that the regulatory body conducted independent analyses for criticality, shielding, heat removal, structures and seismic design as a part of the safety review for the license application of the Recycle Fuel Storage Center.

G5 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).

G5.1 Safety and environmental assessment of a spent fuel management facility

In Japan, activities concerning the spent fuel storage within reactor facilities, spent fuel storage facilities, and reprocessing facilities are corresponding to spent fuel management defined in the Convention. These activities are individually subject to the license under the Reactor Regulation Law. An applicant for an each license carries out a systematic safety assessment and an assessment of radiological impacts on the environment, including the assessment of the meteorology, ground structure, hydraulic phenomena, earthquake, social environments around the site and safety design of the facility. On the basis of such assessments, the regulatory body examines the appropriateness of siting and basic design of the facility, systems and components from the viewpoint of hazard prevention.
The guide "Safety Review Guide for Spent Fuel Interim Storage Facility using Metallic Dry Casks" provides for radiation control, environmental safety, criticality safety and other safety measures assuming 40-60 year period of spent fuel storage.

G5.2 Update of safety and environmental assessment of a spent fuel management facility

The Reactor Regulation Law provides for the procedures for "licensing and notification of modification" to appropriately address a change of the descriptions in the application documents for the license granted in accordance with the Law. Thus the procedures are in place for updating and detailing the safety assessment and environmental assessment when deemed necessary to complement those assessments.

G6 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.

G6.1 Permission to operate a spent fuel management facility

The Reactor Regulation Law provides that spent fuel storage facility shall not be used before getting through the inspections conducted by the Minister of METI for the construction and performance of the facility. The facility passes the pre-serve inspection only if it is confirmed that "the construction has been done in accordance with the approved design and construction plan" and "the performance of the facility meets the technical standards for performance". "The technical standards for performance" are specified by the Minister of METI as follows:

- The alarm system, emergency power supply system and other emergency systems and interlocks (devices to actuate the systems or equipment only under specific conditions) described in the license application documents or their annexes shall operate reliably under the conditions described in those documents.
- The radioactive waste disposal systems shall have more capability than described in the license application documents or their annexes.
- The main radiation control systems shall the capability described in the license application documents or their annexes.
- Dose equivalent rate and concentrations of airborne radioactive materials in the always-manned areas of the spent fuel storage facility, the areas with workers during the operation of the facility, and other areas that require radiation control shall be less than those described in the license application documents or their annexes.
- Capabilities for preventing spent fuel from reaching criticality and for confining spent fuel and spent-fuel-contaminated materials within restricted areas shall meet the capabilities described in the license application documents or their annexes.

The same steps as described above for spent fuel storage facility are taken also for reactor facility and reprocessing facility that are within the scope of spent fuel management facilities defined in this Convention.
As described above, steps are taken in Japan to ensure that the license to operate a spent fuel storage facility is based upon appropriate assessments as specified in Article 8 and is conditional on the completion of the pre-service inspection demonstrating that the facility, as constructed, is consistent with design and safety requirements.

G6.2 Operational limits and conditions

The operator regulated by the Reactor Regulation Law must establish “Operational Safety Program” and obtain approval before starting operation of the facility. The Operational

Safety Program have to specify concrete steps for operation of the facility, checks and the maintenance of the facility, radiation monitoring and quality assurance and so on. The operation and maintenance of the facility have to be performed in accordance with the specific operational limits defined in the Operational Safety Program. The operator must undergo quarterly inspection (Operational Safety Inspection) by the regulatory body to confirm the compliance with the Operational Safety Program. In addition, the conformity of the facility performance to prescribed technical standards and measures for the maintenance of the facility are confirmed by annual periodic inspection of the facility and other inspections. When any violation is found by those inspections, the Minister of METI may order the operator to take necessary safety steps such as suspension of operation, modification, repair, or instruction on the facility operation.

G6.3 Operation, maintenance, monitoring, inspection and testing of a spent fuel management facility

When operating a spent fuel storage facility, the operator must take safety steps for “maintenance of spent fuel storage facility”, “operation of spent fuel storage facility ” and “transportation of spent fuel or transportation, storage and disposal of the materials contaminated with spent fuel” in accordance with the provisions of the Reactor Regulation Law. As safety steps, “access control to controlled areas”, “measures for radiation dose”, “patrol and inspection of spent fuel storage facility”, “periodical self-inspection of spent fuel storage facility”, “operation of spent fuel storage facility”, “on-site transportation”, “on-site waste management”, and “Periodical Safety Review of spent fuel storage facility” are provided in a ministerial ordinance.
The operator must establish its Operational Safety Program covering the above steps and obtain approval of the Minister of Economy, Trade and Industry before starting operation of the facility. (Items to be described in the Operational Safety Program are shown in the Section L Table G6-1.)
In addition, operator must undergo Safety Inspection conducted quarterly by the Minister of Economy, Trade and Industry to check the status of compliance with the Operational Safety Program.
The same steps are taken also for reactor facility and reprocessing facility that are within the scope of spent fuel management facilities defined in this Convention.

G6.4 Engineering and technical support in all safety-related fields

During operation of a facility, the regulatory body obtains engineering and technical advice of expert committees on operational management, inspection and radiation control and feeds it back, when necessary, to the safety regulation on operation and maintenance.
For example, the NISA has a system to collect experts' engineering and technical advice through the deliberations on the specific safety regulation policies by the advisory councils set up under the Nuclear and Industrial Safety Subcommittee of the Advisory Committee for Natural Resources and Energy.
Operators are accumulating the latest technological information through collecting domestic and overseas operational experience information, technological development on their own funds, maintenance activities, etc. Contractors, Academic Societies and Industrial Associations are also making a variety of supporting activities.

G6.5 Report to the regulatory body in a timely manner by the licensee

The Reactor Regulation Law provides that an operator shall report without delay the status of the event and other necessary matters when an accident accompanying personal injury (including the case with potential personal injury) or a failure or other event has occurred in a reactor facility, a spent fuel storage facility, or a reprocessing facility. Reportable events are specified by a ministerial ordinance that regulates the business concerned. Examples of

reportable events are shown in the Section L table G6-3.

G6.6 Programs to collect and analyze relevant operating experience

Upon receipt of a report on an accident or failure, the regulatory body immediately makes it open, examines and evaluates the status of cause investigation and recurrence-prevention measures and publicize the results. The information on the accident or failure is further investigated to extract lessons on safety and to improve safety regulation as appropriate.
For the accumulation of information, the NISA instructs the JNES to maintain a system to collect and evaluate domestic and overseas safety information. The accumulated information is shared between NISA and JNES through the regular “Safety Information Study Meeting” to appropriately feed back the information to a regulatory response or its follow-up.
As for international information exchange, Japan shares accident/failure information through cooperation with international organizations such as the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD/NEA) as well as through bilateral cooperation.
The electric utilities collect and analyze domestic and overseas information on operating experiences in their own companies and in the Central Research Institute of Electric Power Industry. The electric utilities established the Nuclear Information Archive “NUCIA”, as a tool for national sharing of safety information about domestic commercial nuclear power plants including information on minor events, and released to the public on internet (http://www.nucia.jp/) in October, 2003. The electric utilities exchange information on operating experience with foreign counterparts through the Institute of Nuclear Power Operations (INPO) and the World Association of Nuclear Operators (WANO) Tokyo Center. In addition, each electric utility has information exchange agreements with reactor manufacturers and electric utilities in France, Germany, the United States and other countries to collect information. Based of recognition of the importance of safety information sharing and cultivation of safety culture throughout the nuclear industry, a private organization "NS Net" was established in December, 1999 jointly by concerned bodies to make continuous activities including peer reviews. NUCIA and NS Net were integrated into the Japan Nuclear Technology Institute (an intermediate corporation limited) in April, 2005 and have been actively continuing their activities.

G6.7 Decommissioning plans for a spent fuel management facility

An operator that plans to abolish its facility must take necessary steps for “decommissioning” such as dismantling of the facility, assignment of nuclear fuel material inventory and disposal of materials contaminated with nuclear fuel materials. For that purpose, the operator has to establish a “decommissioning program” and obtain an approval of the Minister of Economy, Trade and Industry for it.
The criteria for approving decommissioning program are that all nuclear fuel materials have been removed from the facility; nuclear fuel materials are appropriately assigned; nuclear fuel materials and materials contaminated with nuclear fuel materials are appropriately managed and disposed; decommissioning work is appropriately implemented in a way to prevent a hazard due to nuclear fuel materials or materials contaminated with nuclear fuel materials. The information obtained during operation of the facility to be decommissioned should be used for the management and disposal of contaminated material and hazard prevention. Therefore, the decommissioning program is developed by using the information obtained during the operating period of the facility. The procedures for “Approval for Modification of Decommissioning Program” are provided to allow update of the decommissioning program when necessary. In addition, the process of approval for decommissioning program ensures that the plan is reviewed by the regulatory body.

Section H Safety of Radioactive Waste Management

In Japan, activity related to radioactive waste consists of following activities; waste treatment, storage and disposal. Waste treatment means all activities that relate to the handling, pretreatment, treatment, conditioning, or on-site storage of radioactive waste. Radioactive waste management in all Japanese nuclear facilities including nuclear reactor facility and reprocessing facility is in the scope of the Convention. Since the waste management in a fuel processing facility, spent fuel storage facility and reprocessing facility is governed by the similar safety regulation system to that for the specific waste storage, the safety regulation system for the specific waste storage is described in this section as a representative, unless specially noted. The design, construction and inspection of a commercial nuclear power reactor is governed by the “Electricity Utilities Industry Law” instead of “Law for Regulation of Nuclear Source Material, Nuclear Fuel Material and Nuclear Reactors (Reactor Regulation Law)”, but the requirements of both Laws are essentially the same.

Therefore, this section describes the safety regulation of “waste disposal and waste storage.”

In Japan radioactive wastes are grouped into “high level radioactive waste (hereinafter referred to as “HLW”)” that is generated from spent fuel reprocessing and other “low level radioactive waste (hereinafter referred to as “LLW”).” The LLW is further classified into “long-lived low-heat-generating radioactive waste (hereinafter referred to as “TRU waste”)” which is generated from operation and dismantling of reprocessing facilities or MOX fuel fabrication facilities, “uranium waste” which is generated mainly from nuclear fuel fabrication facilities, “power-plant waste” which is generated from nuclear power plants, and “research-facility waste” which is generated from research facilities and radioisotope utilization facilities.

Depending on radioactivity characteristics of radioactive waste to be disposed of and on the conditions of geological environment, radioactive waste is finally disposed of with any of the “geological disposal” in a stable geologic stratum, “intermediate depth disposal” in the underground deeper than 50 meters, “near surface pit disposal” in a structure such as concrete pit in relatively shallow underground near the surface and the “near surface trench disposal” directly in shallow underground (see Fig.L6-1). Wastes with very low radioactive concentration which does not need to be dealt with as radioactive waste (wastes cleared from regulation) can be exempted from the radioactive waste control, after confirmed by the regulatory body.

The HLW is a stabilized waste in the form of “vitrified waste.” The liquid effluent containing fission products separated through the spent fuel reprocessing process is solidified with glass frit at an elevated temperature and put into a stainless steel canister and sealed to form vitrified waste. The vitrified waste is stored for 30 to 50 years for cooling in the specific waste storage facility, and then finally disposed of (geological disposal, see Fig.6-4-1), being isolated from the environment.

Highly radioactive “TRU waste” is to be geologically disposal of like high level radioactive waste, and is regulated in the same way.

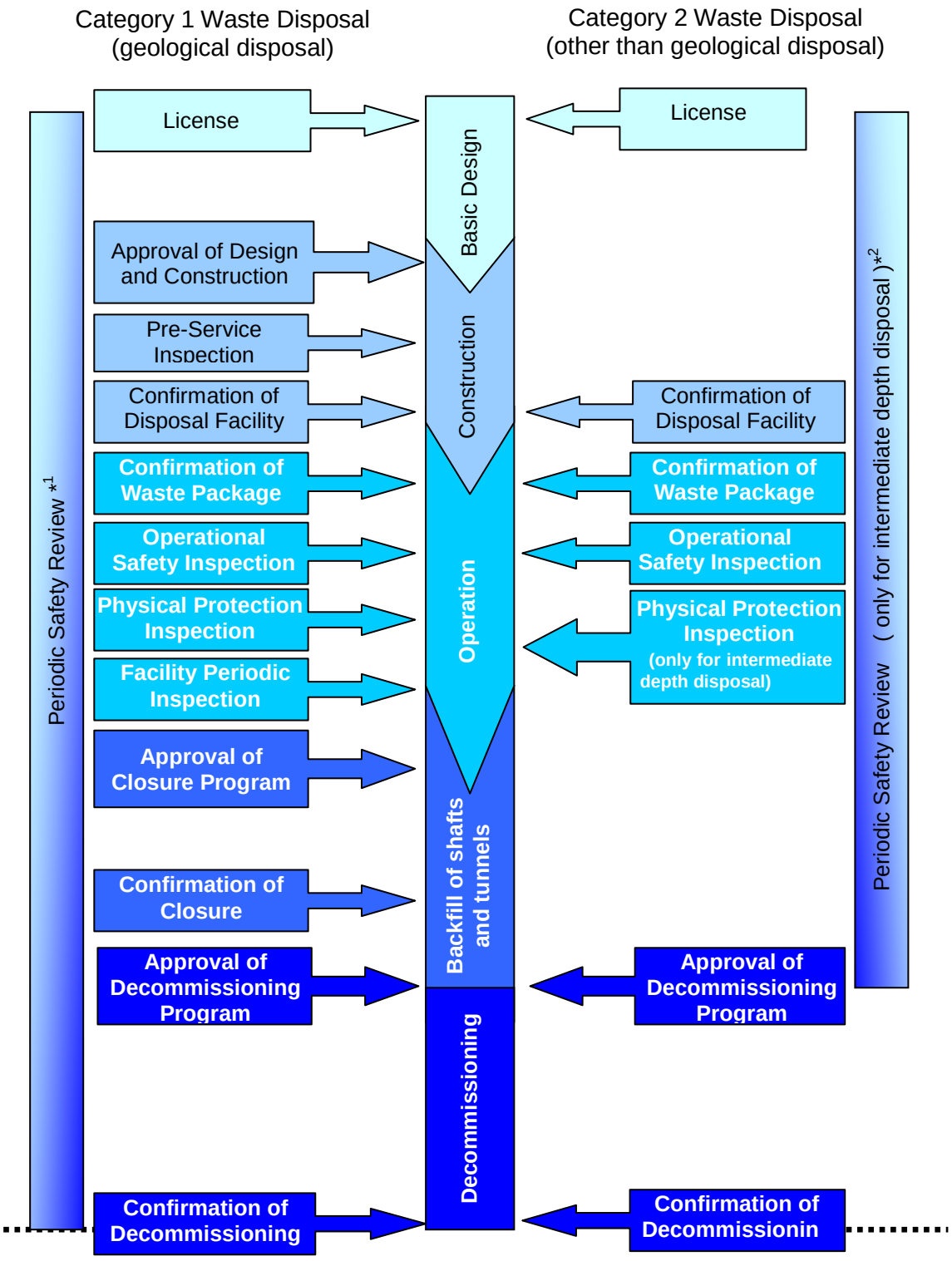
Geological disposal deals with high radioactive TRU waste containing many long-lived nuclides that require very careful radiation control (see Fig.L6-4-2). Since HLW needs to be isolated from the environment over a long period of time, enhanced regulatory procedures are applied, in addition to the safety regulation for LLW, to ensure reliable closure of an underground facility through approval of a closure program and confirmation that the steps have been taken as described in the approved closure program.

Low radioactive TRU wastes generated from the operation and disassembling of reprocessing facility or MOX fuel fabrication facility and power-plant wastes are finally disposed of with any of the “intermediate depth disposal (see Fig.L6-3-1)”, “near surface pit disposal (see Fig.L6-2)” or “near surface trench disposal”, depending on the radioactive nuclides and their radioactivity concentration, and step-wise control is conducted according to radioactive decay.

Waste from Research Facilities, etc. is to be disposed of by the method of “near surface trench disposal” or “near surface pit disposal”

Figure H-1 shows the safety regulation process for Category 1 disposal and Category 2

disposal.
The amendment of the Law concerning Prevention from Radiation Hazards due to Radioisotopes etc. (Radiation Hazards Prevention Law) in June 2004 and subsequent rules and ordinances amendment provides basic framework of disposal.



*1: At an interval not exceeding 20 years after grant of license or when closure program or decommissioning program of auxiliary facility is planned.
*2: At an interval not exceeding 20 years after grant of license or when stage of step-wise control advances.

Fig.H-1 Safety regulation processes for “Category 1 waste disposal” and “Category 2 waste disposal.”

H1 General safety requirements

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.

H1.1 Prevention of criticality and removal of residual heat

1. Measures to prevent criticality

In Japan, spent fuel is to be reprocessed and, therefore, is not dealt with as radioactive waste.

As the radioactive wastes dealt with in Japan contain almost no fissile nuclide. When there is no need to consider the criticality due to extremely low concentration of nuclear material such as uranium-235 or plutonium-239, criticality-prevention capability is not required.

2. Measures for residual heat removal

Adequate heat removal measures are taken in every step of handling process for HLW that generate decay heat.

Specifically, for the “specific waste storage” to temporarily store HLW, adequate removal of decay heat is taken into consideration in the safety design of the facility.

HLW disposal facility is designed to prevent degradation of barrier material or waste itself by increasing temperature by residual heat. However, through the term from receive the HLW, settlement and burial, closure, under some conditions of types, quantities concentrations and of radioactive materials, significant heat could be generated by radioactive decay. If such heat could significantly degrade the confinement or shielding function, cooling function should also be considered as appropriate.

H1.2 Minimization of generation of radioactive waste

Laws and regulations in Japan do not require the minimization of radioactive waste generation, but the "Framework for Nuclear Energy Policy" provides for the principle of minimization of radioactive waste generation. In addition, radioactive waste storage facilities and radioactive waste disposal site have only limited capacities. Therefore, the necessity to minimize radioactive waste generation is widely recognized.

In Japan, spent fuel is reprocessed to recycle valuable materials as a part of fuel cycle in accordance with the nation’s fundamental nuclear energy policy. It is understood that reprocessing of spent fuel is more effective than direct disposal in reducing the amount of high level radioactive wastes.

Operators are striving to minimize the amount of radioactive wastes generated from the operation of their activity by appropriate measures such as evaporation/concentration of liquid radioactive wastes and incineration of solid radioactive wastes.

By establishing the clearance system, a part of concrete waste generated from the decommissioning of a nuclear facility can be dealt with as an object cleared from regulation which does not need to be dealt with as radioactive waste. That can contribute to the

reduction of radioactive wastes.

H1.3 Interdependencies among the different steps in radioactive waste management

The waste treatment processes for disposal are designed considering final disposal of waste. For example, high level vitrified radioactive waste is packed enclosed into a container called canister, the geometry of which is designed for common handling at reprocessing facility where the waste is generated, waste storage facility for temporary storage, and Category I waste disposal facility for final disposal.
Radioactive waste controlled by Radiation Hazards Prevention Law, is also handled in the similar way in the waste treatment process, considering the final disposal, etc.

H1.4 Protection of individuals, society and the environment

Japanese laws and regulations adopt the recommendations of the International Commission on Radiological Protection (ICRP) as the criteria for radiation protection. One of the criteria unique to radioactive waste disposal facility is the reference dose set up for the termination of regulatory control. The “Basic Guides for Safety Review for Radioactive Waste Burial Facilities” established by the Nuclear Safety Commission (NSC) defines the reference dose as “a dose low enough for terminating control of public exposure from a waste repository”. The Basic Policy Subcommittee of the Radiation Council adopted 10μSv/y as the dose that exempts regulatory control, in its report “The Dose Level for Regulatory Control Exemption for Near Surface Disposal of Solid Radioactive Wastes (1978)”. This value was officially adopted by the Radiation Council on the basis of the ICRP recommendations and the IAEA standards and is used as the reference dose that exempts radiation control.
In July 2007, the NSC made a report on the introduction of risk assessment to take the uncertainty into the consideration for very long term safety evaluation of final disposal after the termination of regulatory control period. In the repot, based on the concept of ICRP, the three scenarios “Basic Scenario”, “Changeable Scenario” and “Human/Very Rare Event Scenario” were proposed for the safety evaluation. Using dose/probability resolution approach in which the each possibility of occurrence and effect was compared with each scenario, the risk was assessed and the criteria to the each scenario of radiation protection were also proposed as 10μSv/y, 300μSv/y and 10-100mSv/y according to the ICRP recommendation.
Now the NSC is in process to revise “Basic Guides for Safety Review for Radioactive Waste Burial Facilities” basing on the above concept.

H1.5 Biological, chemical and other hazards that may be associated with radioactive waste management

The Reactor Regulation Law requires that nuclear facilities shall not impair the prevention of hazards due to nuclear fuel materials and materials contaminated with nuclear fuel materials, and also requires the measures for preventing loss of functions to confine the wastes due to various causes. For example, in the process of radioactive waste treatment for disposal, a fabrication facility is required to use waste containers of corrosion-resistant leak-tight design to prevent leakage of waste and to take account of effects of chemicals.
In a reprocessing facility, various chemicals including organic solvent are used and they could be entrained into the wastes generated at the facility. To cope with that, the “Rule on the Technical Standard for the Design and Construction Methods of Reprocessing Facility” provides for legal requirements, for example, for the handling of organic solvent to prevent damages due to fire, the measures to prevent hydrogen gas generated from high level liquid radioactive waste from accumulating in a storage tank, and the storage methods of extremely oxidizable solid waste like zirconium metallic powder.
As for a waste disposal facility, the “Rules on the Technical Standard for the Design and Construction Methods of Specific Waste Disposal Facility or Specific Waste Storage Facility”

requires that a disposal facility shall take explosion-prevention measures for the systems to handle or manage radioactive waste that could generate hydrogen. In addition, the law and regulation on disposal business provide necessary measures to prevent a waste package from containing materials that could impair its integrity. The similar measures are required by Radiation Hazards Prevention Law.

H1.6 To avoid impacts on future generations

In Japan, radioactive wastes generated from the operation of individual nuclear related activities are finally disposed of at a waste disposal site after appropriate treatment and storage within the site. According to the safety regulation for final disposal of radioactive waste, HLW and TRU wastes containing radioactive materials that exceed the level specified in the Enforcement Ordinance for the Reactor Regulation Law are disposed of in a stable stratum according to radiological characteristics and geological environment, other TRU wastes are disposed of at an intermediate depth more than 50 meters, and other wastes are disposed of at a near surface pit or trench. These steps are to isolate radioactive wastes from the environment appropriately according to their characteristics and conditions. By taking such safety regulatory steps, it can be avoided as far as reasonably achievable to impose impacts on future generations than those permitted for the current generation.

H1.7 To avoid imposing undue burdens on future generations

In order to avoid imposing undue burdens on future generations, the cost and management of disposal are legally specified. (see Section B)

H2 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.

H2.1 Review the safety of existing radioactive waste management facility

In Japan, the regulatory body regularly inspects the performance of the facilities and the compliance with the Operational Safety Program for the radioactive waste management facilities defined in the Convention. In addition, periodic assessment system is implemented in order to ensure the safety of nuclear facilities. For waste disposal, the ministerial ordinance governing such activity requires as follows:

1. Category 1 waste disposal
For the waste disposal site with geological disposal, periodic assessment of the control of radiation exposure due to nuclear fuel materials or materials contaminated with nuclear fuel materials shall be performed with the latest technical knowledge at an interval not exceeding 20 years after obtaining license, and steps necessary for the preservation of the waste disposal facility shall be taken on the basis of the assessment results. In addition, the same steps shall be taken when a closure program or decommissioning program of auxiliary facility is to be established.

2. Category 2 waste disposal

For the waste disposal site with intermediate depth disposal, periodic assessment of the control of radiation exposure due to nuclear fuel materials or materials contaminated with nuclear fuel materials shall be performed with the latest technical knowledge at an interval not exceeding 20 years after obtaining license, and steps necessary for the preservation of the waste disposal facility shall be taken on the basis of the assessment results. In addition, the same steps shall be taken when the stages of step-wise control advances in response to radioactive decay.

The above inspections conducted up to now identified no items which should be improved for continuous operation of the facilities.

H2.2 Review the results of past practices

As a result of review it is found that the past practices caused neither radioactive wastes nor nuclear facilities that require any intervention for reasons of radiation protection.
In Japan, there are small amount of waste rock and mill tailings generated by past activities (test and research) as shown below.*[1]

- Tunnel prospecting and mining and milling tests carried out in Ningyo Toge area, Okayama prefecture from 1957 to 1978.
- Tunnel prospecting carried out in Togo area, Tottori prefecture from 1958 until 1962.
- Tunnel prospecting, solution mining test, and earth sciences research of geologic environment carried out in Tono area, Gifu prefecture from 1972 until 2003.

These sites are managed as ceased mine under the Mine Safety Law. The amounts of waste rock and mill tailings are shown in the following table.

Table H2-1 The amounts of waste rock and mill tailings

Area	Classification	Volume
Ningyo Toge mine	waste rock	about 330000 m^3
	mill tailings	about 34000 m^3
Togo mine	waste rock	about 32000 m^3
Tono mine	waste rock	about 10000 m^3

For radiation protection, these sites are managed under the Mine Safety Law so as not to exceed 1 mSv/year at the boundary of peripheral monitoring area.
The operator related to these sites is Japan Atomic Energy Agency (Independent Administrative Agency) and the operator is studying to use these waste rocks as a construction material.

*1: As these waste rock and mill tailings are not defined as radioactive wastes in Japan, these materials are out of scope of the Convention in accordance with Article 2 of the Convention. However the status of these wastes are reported here in accordance with Paragraph 70 of the Summary Report JC / RM.1 / 06 / Final version (••••In relation to uranium mining and milling wastes, Contracting Parties with such wastes agreed to include them in their National reports. ••••).

H3 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 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.

H3.1 Evaluation of site-related factors

In Japan, evaluation of relevant site-related factors and safety impact of the proposed facility is conducted during the licensing process of each activity. In the Reactor Regulation Law, the criteria for the license are that “granting of the license does not impair the planned implementation of the nuclear development and utilization programs; the applicant has adequate technical capability and financial basis to appropriately carry out the proposed activity; and the location, structure and systems of the proposed facility does not impair the prevention of the hazards due to nuclear fuel materials or the materials contaminated with nuclear fuel materials”. The specific evaluation items for the technical capability and the prevention of hazards are listed in a guide developed by the NSC and are used for the review of an application by the regulatory body.

The regulatory body, when approving operation of a radioisotope waste management facility in accordance with the Radiation Hazards Prevention Law, conducts safety review to confirm the descriptions in the application are in compliance with the siting conditions, standards on facility, technical standards etc, provided in the Radiation Hazards Prevention Law and related regulations and standards, and approves when the application is confirmed appropriate. It is provided that facilities should be located at a site where landslide and inundation are unlikely to occur.

The progress since the previous report is the development of the safety regulation system for waste disposal. An example is described below for waste disposal.

One who plans to operate a radioactive waste disposal facility shall be licensed by the Minister of Ministry of Economy, Trade and Industry in accordance with the provisions of the Reactor Regulation Law.

The license application document must include the descriptions on “conditions and quantity of nuclear fuel material or matters contaminated with nuclear fuel material to be disposed of”, “the location, structure and systems of the waste disposal facility and the disposal method”, and “time schedule to advance the stages of step-wise control for the Category 2 waste disposal facility in response to radioactive decay”. The document must be supplemented by explanatory materials on “the conditions of meteorology, ground structure, hydrology, seismology, social environment at the site of the proposed waste disposal facility” and “the safety design of the waste disposal facility”. With these information, the applicant is required to make an evaluation of site conditions for the waste disposal facility.

The Ministry of Economy, Trade and Industry (METI) examines the application and confirms that “granting of the license does not impair the planned implementation of the nuclear development and utilization programs"; "the applicant has adequate technical capability and financial basis to appropriately carry out the proposed activity"; and "the location, structure and systems of the proposed facility does not impair the prevention of the hazards due to nuclear fuel materials or the materials contaminated with nuclear fuel materials”. Based on this confirmation, the Minister grants the license after consulting with the Atomic Energy

Commission (AEC) and the NSC.
As for specific radioactive waste, basing on the Specific Radioactive Waste Final Disposal Act (Final Disposal Act), the METI has to consult for the amendment of final disposal plan and basic policy on site selection of preliminary investigation areas, etc., with the AEC and the NSC.
In September 2002 the NSC made the report on the environmental requirements, those were for earthquake, fault activity, volcano/volcanic activity, etc., at the stage of site selection of preliminary investigation areas, to give necessary comments from the point of safety regulation view and to establish the criteria to environmental requirements in the process of amendment for final disposal plan, etc.

H3.2 Information for general public

The license application documents and other related information are made open to the public at the Nuclear Energy Library and at the Nuclear Library Room of the Japan Nuclear Energy Safety Organization (JNES), except for the information relevant to nondisclosure causes such as safeguards and commercial sensitiveness. Such information is also accessible and available at the National Diet Library. A document requested to an administrative agency under the ”Act on Access to Information held by Administrative Organs“ is also disclosed in accordance with the provisions of the Act, unless it is subject to nondisclosure causes.
Also as for the safety related information on a facility for waste disposal regulated by the Radiation Hazards Prevention Law, a document requested under the ”Act on Access to Information held by Administrative Organs“ is disclosed, unless it is subject to nondisclosure causes.
In September 2006, the Radioactive Waste Subcommittee under the Nuclear Energy Subcommittee of the Advisory Committee for Natural Resources and Energy reported to expect the comprehensive safety explanatory (safety case), etc., when a business entity makes the report on preliminary investigation result and detailed investigation.

H3.3 Relation with neighboring contracting parties

Being an islands country, Japan is located at a considerable distance from its neighboring countries. And then, as long as the safety of nuclear facilities is properly secured within Japan, nuclear facilities in the country are highly unlikely to have impacts on the neighboring countries safety. Therefore the government of Japan does not have a rule to consult the neighboring countries about siting of nuclear facilities. The government of Japan provides neighboring countries with information on the status of the nuclear energy of Japan through bilateral consultation, and various exchange of opinions. Moreover, in the case when a safety significant event should occur at a facility in our country, Japan will provide prompt and comprehensive information to the neighboring countries.

H4 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.

H4.1 Prevention of radiological impacts on individuals, society and the environment

1. Waste Storage facility

The holder of the license for Waste Storage must describe, in the application document for the approval of the design and construction methods for the activity, the methods of the design and construction of the on-site waste treatment and storage systems for the radioactive wastes generated from the operation of the activity, and must demonstrate in the attachments to the application document that the design and construction of the facility are consistent with relevant technical standards. The Minister of Economy, Trade and Industry reviews the application and issues a license when compliance with the technical standards is confirmed.

The “Technical Standard for the Design and Construction Methods” provides the standards for the confinement function, shielding and other necessary features for the prevention of radiological hazards. As an example of the technical standard for the design and construction methods, the “Technical Standard for the Design and Construction Methods for Specific Waste Disposal Facility or Specific Waste Storage Facility” are shown in the Section L Table H4-1.

2. Category 1 waste disposal facility

The holder of the license for Category 1 waste disposal (Category 1 waste disposal licensee) is required to obtain the approval for the design and construction methods for the specific waste disposal facility including waste receiving system, waste handling system and radiation control system prior to the start of construction, and to pass the Pre-Service Inspection conducted by the Minister of Economy, Trade and Industry before starting operation. The procedures and the technical standards for the design and construction methods are the same as those for Waste Storage facility.

In addition, a Category 1 waste disposal facility is required to undergo Confirmation of Disposal Facility by the Minister of Economy, Trade and Industry for the disposal site and the shafts and tunnels for the duration of operation. The confirmation is made on the geography, geology and groundwater at the disposal site as well as the design and structure of the disposal facility, with the criteria “to be consistent with the contents described in the license documents”, “not to dispose explosive materials, materials that significantly corrode other materials and other hazardous materials in the waste disposal site” and “to backfill the site as stated in the license document”. The waste to be disposed of has to undergo the Confirmation of Waste Packages carried out by the Ministry of Economy, Trade and Industry to confirm that “the waste is encapsulated or solidified”, “radioactive concentration does not exceed the licensed level”, “the waste package has sufficient strength to endure the loads imposed when disposed” and “the waste is not significantly damaged.”

3. Category 2 waste disposal facility

The holder of the license for Category 2 waste disposal (Category 2 waste disposal licensee) is not required to obtain the approval for the design and construction methods or

to undergo pre-service inspection for the waste disposal facility by the Minister of Economy, Trade and Industry, but is required to undergo Confirmation of Disposal facility performed by the Minister of Economy, Trade and Industry for the duration of operation. The waste to be disposed of has to undergo the Confirmation of Waste Packages carried out by the Ministry of Economy, Trade and Industry.

4. Waste management facility under the Radiation Hazards Prevention Law

A person to obtain a permission of waste management service shall submit an application for the permission to the MEXT. The application shall include the description documents on the method of management, the locations, structures and equipments of waste refilling facility, waste storage facility and waste management facility as attachments.

The provisions concerning the location, structure and equipment of each facility require the applicant, in order to restrain possible radiological effects, to ensure that shielding walls, other shields, ventilation equipments, and drainage equipments are consistent with the technical standards prescribed by laws and ordinances:

The license holder of the radioisotope waste management services is obligated to take Pre-Service Facility Inspections by the Minster of MEXT or his/her representative and obtain its confirmation that the facilities comply with these technical standards.

H4.2 Provisions for the decommissioning of a radioactive waste management facility other than a disposal facility at the design stage

Radioactive waste depositories are installed as auxiliary facilities for the nuclear fuel fabrication facility, reactor facility, spent fuel storage facility, reprocessing facility and radioactive waste storage facility. The decommissioning procedures for each of these facilities are provided for by the Reactor Regulations Law and other relevant laws and regulations. At the stage of decommissioning, the license holder must establish a decommissioning program for each facility and have it approved by the Minister of Economy, Trade and Industry.

Also, under the Radiation Hazards Prevention Law, at each stage (including decommissioning) of license application, the license holder shall be subject to the approval for the conformity to the technical standards applicable to the storage or processing facility

H4.3 Provisions for the closure of a disposal facility

Implementation of closure of a waste disposal facility must be described in the license application documents for the radioactive waste disposal. When the Category 1 waste disposal licensee plans to close the shafts and tunnels, the licensee is required to establish a closure program and have it approved by the Minister of Economy, Trade and Industry.

H4.4 Technologies incorporated in the design and construction of a radioactive waste management facility

When applying for approval of the design and construction methods, the operator must demonstrate with analysis, etc. that the design and construction methods meet relevant technical standards. The regulatory body reviews the application and issues an approval after confirming that the design and construction methods meet relevant technical standards.

The operator must pass the pre-service inspection conducted by the regulatory body before operating the facility.

Under the Radiation Hazards Prevention Law, similar process is applied.

H5 Assessment of safety 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).

H5.1 Safety and environmental assessment of a radioactive waste management facility

1. General provisions

In Japan, fuel fabrication, establishment and operation of reactors, spent fuel storage, reprocessing, waste storage, waste disposal and utilization of nuclear fuel materials fall within the scope of the radioactive waste management defined in the Convention. These activities are individually subject to the license under the Reactor Regulation Law. An applicant for a license carries out a systematic safety assessment and an assessment of radiological impacts on the environment, taking into account the meteorology, ground structure, hydraulic phenomena, earthquake, social environments around the site and safety design of the facility. On the basis of such assessments, the regulatory body examines the appropriateness of siting and basic design of the facility, systems and components from the viewpoint of hazard prevention.

The guide prepared by the NSC for the safety review for each license provide, as the siting conditions common to nuclear facilities, that “there should be no factor that could induce a serious accident” and that “there should be little factors that could expand a disaster”. The “Basic Guides for Safety Review for Radioactive Waste Burial Facilities” is shown in Section L Table H5-1 as an example of safety review guidelines.

2. Waste Storage facility

The “Basic Approach for Safety Assessment of Radioactive Waste Management Facilities” prepared by the NSC for the safety review of a Waste Storage provides that the seismic design of a high level solid radioactive wastes storage facility shall be assessed including that shielding function as well as confinement function is adequately maintained during an earthquake.

In Japan, radioactive waste storage facility, same as one established with reprocessing facility, etc., is established as an independent facility. In spite of the differences of type or treatment process of waste, it is possible to conduct the safety evaluation of radioactive waste storage facility in accordance with the same principal concept as reprocessing facility, because the processes of the radioactive waste storage are involved in the waste storage system of the reprocessing facility etc.

The general provisions described above are applied also to a waste storage.

3. Category 1 waste disposal facility

An applicant for the Category 1 waste disposal license has to show the conditions and quantities of nuclear fuel materials or materials contaminated with nuclear fuel materials to be disposed of, the location, structure and systems of the waste disposal facility as well as disposal method to the Minister of Economy, Trade and Industry, and obtain license from the Minister. The application will be reviewed, as is the case with other activities, in accordance with the safety review guides prepared by the NSC. A basic approach to safety review will be established by the NS in near future considering the progress of the disposal activity.

4. Category 2 waste disposal facility

As for Category 2 waste disposal, the NSC prepared the “Basic Guides for Safety Review for Radioactive Waste Burial Facilities” for “near surface disposal” (see attached table H5-1). The safety assessment for the existing low level radioactive waste disposal has been carried out according to this guide.

As for “intermediate depth disposal”, a basic approach to safety review will be established by the NSC in near future considering the progress of the disposal activity.

5. Disposal Facility under the Radiation Hazards Prevention Law

For granting the license for the disposal facilities under the Radiation Hazards Prevention Law, the competent regulatory body examines the appropriateness of the site conditions and the compliance with the technical standards. Relevant guidelines and standards require that the facility be constructed at a site that has little chance to be affected by land slide or flooding, to adopt fire-proof structures or to use incombustible materials for the essential parts of the facility, and to provide with shielding function such as shielding walls.

H5.2 Safety and environmental assessment of after closure of a disposal facility

The safety of disposal facilities is regulated in accordance with the provisions of the Reactor Regulation Law and its enforcement ordinance, and the Ministerial Ordinances or Notifications such as the “Rules for Category 1 Waste Disposal” and the “Rules for Category 2 Waste Disposal.” These rules require the license application document to be attached by “explanation on the control of radiation exposure due to nuclear fuel materials, etc.” that also describes long-term safety assessment including post-closure period. In addition, Periodic Safety Review is conducted on the basis of the latest knowledge, to confirm that long-term safety will be ensured also after the construction of a geological disposal facility or intermediate depth disposal facility. The assessment is performed at an appropriate timing (including timing necessary for technical succession in operators) as a part of safety steps and the necessary measures are taken based on the assessment results. Through this Periodic Safety Review, a systematic safety assessment and an assessment of radiological impacts on the environment for the period following closure until termination of the activity are carried out.

Regarding the period that requires radiation control, the “Basic Guides for Safety Review for Radioactive Waste Burial Facilities” provides 300 to 400 years as a target period for low level radioactive wastes. This target period was determined considering foreign practices and the fact that radioactivity of the nuclides important to radiation protection at waste disposal facilities, Co-50 and Cs-137, is reduced by 1/1000 to 1/10000 after 300 to 400 years and becomes negligible. At disposal facilities without artificial barrier, only un-solidified concrete wastes with low radioactivity are disposed of, therefore the radiation control of the site is deemed to terminate in a reasonable period of time, as is the case with foreign practices. The disposal stage plus subsequent 50 years of preservation stage is used as a target of this “reasonable period of time”.

The Radiation Hazards Prevention Law is also in process to provide the same requirements.

H5.3 Update of safety and environmental assessment of a spent fuel management facility

The Reactor Regulation Law provides for the procedures for "licensing or notification of change of license" to appropriately address a change of the application documents for the license granted in accordance with the Law.

The detailed design of the facility has to follow the procedures for “approval for the design and construction methods” and any change of the design or construction methods is also subject to such procedures. In addition, the government confirms that the facility has been built as approved through “pre-service inspection”.

The Radiation Hazards Prevention Law also provides the similar requirements.

H6 Operation of facilities

Article 16

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

(i) the license 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 license to the regulatory body;

(vii) programmes to collect and analyze 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.

H6.1 Permission to operate a radioactive waste management facility

1. Waste Storage and Category 1 waste disposal

The Reactor Regulation Law provides that Waste Storage facility and Category 1 waste disposal facility shall not be used before getting through the Pre-Service inspections conducted by the Minister of Economy, Trade and Industry for the construction and performance of the facility. The facility passes the pre-serve inspection only if it is confirmed that "the construction has been done in accordance with the approved design and construction plan" and "the performance of the facility meets the technical standards for performance". "The technical standards for performance" are specified by the Minister of Economy, Trade and Industry as follows:

- The alarm system, emergency power supply system and other emergency systems and interlocks (devices to actuate the systems or equipment only under specific conditions) described in the license application documents or their attached documents shall operate reliably under the conditions described in those documents.
- The radioactive waste disposal systems shall have more capability than described in the license application documents or their attached documents.
- The main radiation control systems shall have the capability described in the license application documents or their attached documents.
- Dose equivalent rate and concentrations of airborne radioactive materials in the always-manned areas of the Waste Storage facility and Category 1 waste disposal facility, the areas with workers during the operation of the facility, and other areas that require radiation control shall be less than those described in the license application documents or their attached documents.

2. Category 2 waste disposal

Category 2 waste disposal requires no approval for the design and construction methods nor pre-service inspection. However the waste disposal facility has to undergo the Confirmation of Disposal Facility by the Minister of Economy, Trade and Industry. The confirmation is conducted at the following timing:

- The confirmation regarding installation of the waste disposal facility is conducted when the dimensions of the major parts of individual system become measurable, except for radiation control system.
- The confirmation regarding installation of radiation control system is conducted when the installation of the system is completed.
- Confirmation regarding the shafts and tunnels (only for intermediate depth waste disposal facility) is conducted when backfill of the shafts and tunnels and closure of the mouth are carried out.
- Confirmation regarding other items is conducted when the waste disposal facility is covered with earth and sand or when the Minister of Economy, Trade and Industry deems appropriate.

The confirmation is conducted according to the technical standards shown in the Section L Table H6-1: “1. Technical Standard for Waste Disposal Facilities” and “2.Technical Standard for Radioactive Waste to be Disposed.”

3. Radioactive waste management under the Radiation Hazards Prevention Law

The operator of the waste management facility under the Radiation Hazards Prevention Law shall be subject to the approval for the license as described in the previous section (paragraph H5.1). And the license holder shall be subject to pass the pre-service inspection before the operation of the facility and shall not use the facility until after it has passed the inspection.

As described above, Government of Japan takes steps to ensure that the license to operate a waste disposal facility or waste storage facility is based upon appropriate assessments as specified in Article 15 of the Convention and is conditional on the completion of a commissioning program demonstrating that the facility, as constructed, is consistent with design and safety requirements.

H6.2 Operational limits and conditions

The operator regulated by the Reactor Regulation Law must establish “Operational Safety Program” and obtain approval before starting operation of the facility. The Operational Safety Program have to specify concrete steps for operation of the facility, inspections of maintaining the facility, radiation monitoring and quality assurance. The operation and maintenance of the facility have to be performed in accordance with the specific operational limits defined in the Operational Safety Program. The operator must undergo quarterly inspection (Operational Safety Inspection) by the regulatory body to confirm the compliance with the Operational Safety Program. In addition, when the annual facility Periodic Inspection indicates that performance of the Waste Storage facility and Category 1 waste disposal facility does not comply with the technical standards, or the operational safety measures for the maintenance of the facility violate provisions of the ministerial order, the Minister of Economy, Trade and Industry may order the operator to take necessary operational safety measures such as suspension of operation, modification, repair, or instruction on the facility operation.

Operator licensed under the Radiation Hazards Prevention Law, before the start of operation, shall prepare the Internal Rules for Prevention of Radiation Hazards specifying details of inspections, radiation measuring and treatment of radioactive wastes, and notify it to the Minister of MEXT. The Internal Rules shall specify operational requirements, and the facility shall be operated and maintained in compliance with the Rules.

H6.3 Operation, maintenance, monitoring, inspection and testing of a radioactive waste management facility

1. Waste Storage

When operating a Waste Storage facility, the operator must take operational safety measures for “maintenance of waste storage facility”, “operation of waste storage facility” and “transportation and treatment (only within the premises of the facility that is installed with the waste storage facility) of the nuclear fuel material or material contaminated by nuclear fuel material” in accordance with the provisions of the Reactor Regulation Law. Other measures for, “access control to controlled areas”, “measures for radiation dose”, “patrol and inspection of waste storage facility”, ”maintenance of waste storage facility”, “periodical self-inspection of waste storage facility”, “operation of facility relevant to waste storage facility”, “Periodical Safety Review of waste storage facility”, “on-site transportation” and “on-site disposal” are provided for in a ministerial ordinance.

The operator must establish the Operational Safety Program covering the above measures and obtain approval of the Minister of Economy, Trade and Industry before starting operation of the facility. (Items to be described in the Operational Safety Program are shown in the Section L TableH6-2.)

In addition, operator must undergo Operational Safety Inspection conducted quarterly by the Minister of Economy, Trade and Industry to confirm the status of compliance with the Operational Safety Program.

2. Category 1 and 2 waste disposal

For the use of waste disposal facility, the Reactor Regulation Law requires the same steps as described above for Waste Storage facility. The Ministerial Ordinance provides for “periodic evaluation, etc. of waste disposal facility” as the steps to be taken after closure of the waste disposal facility. Specifically, the Ministerial Ordinance requires “to evaluate the radiation exposure control due to nuclear fuel materials, etc. in the light of the latest technical knowledge” and “to take necessary measures for the preservation of waste disposal facility on the basis of the results of such evaluation”.

The timing of the assessment shall be: for Category 1 waste disposal, at an interval of less than 20 years after the date of grant of license and when a closure program or decommissioning program is developed; and for Category 2 waste disposal of intermediate depth disposal, at an interval of less than 20 years after the date of grant of license and when the stage of step-wise control.

3. Waste management under the Radiation Hazards Prevention Law

Waste management license holder under the Radiation Hazards Prevention Law, before the start of operation, shall prepare the Internal Rules for Prevention of Radiation Hazards and notify it to the Minister of MEXT. The conformity to the Internal Rules shall be confirmed through Periodic Inspections and the On the Spot Inspections conducted by the Minister of MEXT or his representative, through these procedures the appropriate operation of the facility is maintained. The results of the inspections are to be reflected in the safety evaluation as it necessitate.

H6.4 Engineering and technical support in all safety-related fields

During operation of a facility, the regulatory body obtains engineering and technical advice of expert committees on operational management, inspection and radiation control and feeds it back, when necessary, to operation, maintenance or safety regulation.

For example, the NISA has a system to collect experts' engineering and technical advice through the deliberations on the specific safety regulation policies by the advisory councils set up under the Nuclear and Industrial Safety Subcommittee of the Advisory Committee for Natural Resources and Energy.

Operators are accumulating the latest technological information through collecting domestic and overseas operational experience information, technological development on their own funds, maintenance activities, etc. Private technical support organizations are also making a variety of supporting activities.

H6.5 Characterization and classification of radioactive waste

The Reactor Regulation Law regulates the on-site waste treatment, grouping the wastes into "gaseous waste", "liquid waste" and "solid waste", and provide for the methods of on-site treatment of these groups of waste. Examples of the provisions are shown in Section L Table H6-3.
In addition, the disposal methods by burial are categorized into "Category 1 disposal" and "Category 2 disposal" according to the concentrations of radioactive nuclides in the wastes that are provided for in the Enforcement Ordinance for the Reactor Regulation Law.
By the Radiation Hazards Prevention Law, the equivalent procedures are required in accordance with the specification of wastes except for disposal by burial that is in process of establishment.

H6.6 Report to the regulatory body in a timely manner by the licensee

The Reactor Regulation Law provides that an operator shall report without delay the status of the event and other necessary matters when an accident accompanying personal injury (including the case with potential personal injury) or a failure or other event has occurred in a milling facility, a fuel fabrication facility, a reactor facility, a spent fuel storage facility, a reprocessing facility, waste storage facility, waste disposal facility or a fuel material use facility. Reportable events are specified by a ministerial ordinance that regulates the activity concerned. Examples of reportable events are shown in Section L Table H6-4.
The Radiation Hazards Prevention Law requires the operators to report to regulatory body without delay about the content and counter-measure of accident in radioactive waste management facility.

H6.7 Programs to collect and analyze relevant operating experience

Upon receipt of a report on an accident or failure, the regulatory body immediately makes the report open to the public. It examines and evaluates the status of cause investigation and recurrence prevention measures, and distributes the results. The information on the accident or failure is further investigated to extract lessons on safety and to improve safety regulation as appropriate.
For the accumulation of information, the NISA instructs the JNES to maintain a system to collect and evaluate domestic and overseas safety information. The accumulated information is shared between NISA and JNES through the regular “Safety Information Study Meeting” to appropriately feed back the information to a regulatory response or its follow-up.
As for international information exchange, Japan shares accident/failure information through cooperation with international organizations such as the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD/NEA) as well as through bilateral cooperation.

H6.8 Decommissioning plans for a radioactive waste management facility other than a disposal facility

An operator that plans to terminate its activity must take necessary steps for “decommissioning” such as dismantling of the facility, assignment of nuclear fuel material inventory and management of materials contaminated with nuclear fuel materials. For that purpose, the operator has to establish a “decommissioning program” and obtain an approval of the Minister of Economy, Trade and Industry for it.

The criteria for approving decommissioning program are that all nuclear fuel materials have been removed from the facility; nuclear fuel materials are appropriately transferred; materials contaminated with nuclear fuel materials are appropriately managed; and decommissioning work is appropriately implemented in a way to prevent a hazard due to nuclear fuel materials or materials contaminated with nuclear fuel materials. The decommissioning program is developed by using the information obtained during the operating period of the facility. The procedures for “Approval for Modification of Decommissioning Program” are provided for to allow update of the decommissioning program when necessary, which ensures that the plan is reviewed by the regulatory body.
An operator of the facility of radioisotope waste management services licensed under the Radiation Hazards Prevention Law, in order to terminate the services, shall notify to the Minister of MEXT. The operator shall take measures such as decontamination of materials contaminated by radioisotopes, and the action program shall be prepared by reflecting the operational experience of the facility and the operator shall report to the Minister of MEXT about the measures taken.

H6.9 Plans for the closure of a disposal facility

When the Category 1 waste disposal licensee plans to close the tunnels and shafts, it must take "closure steps" including backfill of tunnels and shafts, closure of pit mouths and dismantling of the underground waste disposal structures. Prior to that, the operator must establish a "closure program" and have it approved by the Minister of Economy, Trade and Industry.
The criteria for approving the closure program are that the closure of the facility is carried out according to the conditions described in the license application documents and in an adequate way to prevent radiological hazards due to nuclear fuel materials or other radioactive materials. The closure program is prepared using such information obtained during the operating period of the facility. The procedures for “Approval for Modification of Closure Program” are provided for to allow update of the Closure Program when necessary, which ensures that the program is reviewed by the regulatory body.
An operator of the facility of radioisotope waste disposal licensed under the Radiation Hazards Prevention Law, in order to terminate the operation of disposal facility, shall take necessary measures to prevent radiation hazards. The action program shall be prepared by reflecting the information obtained during the operation of the disposal facility and he shall report to the Minister of MEXT about the measures taken.

H7 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.

H7.1 Preserve of required records

1. Category 1 waste disposal

Licensee shall preserve the following records concerning the waste disposal for a period of time pursuant to the provisions of the Reactor Regulation Law.

- Records on disposal of Category 1 waste
- Inspection records on specific waste disposal facility
- Radiation control records

- Operation records
- Maintenance records
- Records of accidents in waste disposal facility
- Meteorological records
- Level of groundwater
- Records on operational safety education
- Documents and records on plans, implementation, evaluation and improvement of quality assurance program
- Results of periodic assessment of waste disposal facility for geological disposal
- Records on physical protection
- Results of closure confirmation
- Methods and time of decommissioning, and names of auxiliary systems of the repository to be decommissioned
- Records on materials subject to clearance confirmation

2. Category 2 waste disposal

As in the case of Category 1 waste disposal, licensee shall preserve the following records concerning the disposal for a period of time pursuant to the provisions of the Reactor Regulation Law.

- Records on disposal of Category 1 waste
- Radiation control records
- Maintenance records
- Records of accidents in waste disposal facility
- Rainfall records
- Level of groundwater
- Records on operational safety education
- Documents and records on plans, implementation, evaluation and improvement of quality assurance program
- Results of periodic assessment of waste disposal facility for intermediate depth disposal
- Records on physical protection
- Methods ant time of decommissioning, and names of auxiliary systems of the repository to be decommissioned
- Records on materials subject to clearance confirmation

H7.2 Active or passive institutional controls

1. Category 1 waste disposal

The Reactor Regulation Law provides for decommissioning procedures (dismantling of auxiliary systems of waste disposal site, removal of contamination with nuclear fuel materials, transfer of nuclear fuel materials and other radioactive materials and transfer of radiation control records to an organization assigned by the Minister of Economy, Trade and Industry) after closure of a Category 1 waste disposal. Decommissioning Program of a waste disposal facility is subject to approval by the Minister of Economy, Trade and Industry. For establishing a decommissioning program, the operator is required to perform an assessment of the control of radiation exposure due to nuclear fuel materials and other radioactive materials with the latest technical knowledge and to take necessary measures for the preservation of the waste disposal facility on the basis of the assessment.

The activity terminates after getting confirmation that no radiation hazard prevention measure is required for the site of auxiliary facilities to be decommissioned as well as for the remaining facilities in the site; disposal of nuclear fuel materials, etc. has been completed; and transfer of radiation control records to an organization assigned by the Minister of Economy, Trade and Industry has been completed.

Institutional control of a closed facility is deemed to be helpful to further reduction of undue human activities such as careless intervention in waste and to the promotion of public

acceptance of geological disposal and safety.
As an example of specific institutional control, the Final Disposal Act designates the released site as a preservation area in response to the operator's request and restricts excavation work within the conservation area.

2. Category 2 Waste Disposal

The "Basic Guides for Safety Review for Radioactive Waste Burial Facilities" issued by the NSC require that operators of disposal facilities should, in accordance with the ALARA principle, manage a disposal facility taking account of types and radioactivity levels of waste disposed of, until the radioactivity of waste disposed of in a near surface disposal facility decays with time to the level as low as it poses no hazards to the public (hereinafter referred to as Step-wise Control).
The regulatory body requests a license applicant for waste disposal to submit a plan for step-wise control and examines the conformity to the requirements specified in the "Basic Guides for Safety Review for Radioactive Waste Burial Facilities."
The Radiation Hazards Prevention Law also provided the similar system.
The Step-wise Control required by the above guidelines is as follows.

(1) A disposal facility with engineered barrier*1:

1) The First Stage:
In a disposal facility, a peripheral monitoring area where access is controlled and a disposal facility preservation area where patrol and inspection are conducted should be established. Leakage of radioactive materials out of engineered barrier*2 is monitored, and if leakage occurs remedial measures are taken. (Monitoring and prevention of leakage from engineered barriers)

2) The Second Stage:
In a disposal facility a peripheral monitoring area where access is controlled, and a disposal facility preservation area where patrol and inspection are conducted, are established. Leakage of radioactive materials out of engineered barrier with groundwater to the biosphere is monitored. (Monitoring of leakage and migration from engineered barrier, and retardation of migration by natural barrier*3 and engineered barrier)

3) The Third Stage:
A disposal facility preservation area where patrol and inspection are conducted is established. Farming and other specific human activities in this area are restricted or prohibited. (Retardation of migration by natural barrier, and prohibition or restriction of specific human activities)

*1: The case that wastes solidified in a container etc. are disposed of in a near surface disposal facility with engineered barrier.
*2: "Engineered barrier" is an artificial structure such as the concrete pit, filling materials such as soil and sand for open space between and around waste packages emplaced, and monolithically consolidated waste packages for prevention and reduction of leakage from the wastes disposed of into the biosphere.
*3: "Natural barrier" is the soil etc. surrounding engineered barrier or waste packages and is expected to retard migration of radioactive materials leaked from the wastes disposed of into the biosphere.

(2) A disposal facility without engineered barrier*4

1) The Disposal Stage:
A peripheral monitoring area where access is controlled, and a disposal facility preservation area where patrol and inspection are conducted, are established. Leakage of radioactive materials out of disposal facility with groundwater to the living environment is monitored. (Retardation and monitoring of migration into the biosphere)

2) The Preservation Stage:
A disposal facility preservation area where patrol and inspection are conducted is established. Farming and other specific activities in this area are restricted or prohibited

(Retardation of migration into the biosphere, and prohibition or restriction of specific activities)

*4: The case that wastes such as concrete not solidified in a container etc. are disposed of in a near surface disposal facility without engineered barrier.

The control period is supposed to last 300 to 400 years for a disposal facility with engineered barrier referring to foreign cases. And, in the case of disposal without engineered barrier, as the disposed waste is non-solidified concrete etc. with low radioactivity level, disposal stage and the following preservation stage of about fifty years are regarded as the “institutional control period”.

H7.3 Intervention measures

When issuing a license, the regulatory body requests the operator to take following measures during each stage of institutional control.
In the First Stage, if a leakage of radioactive material from engineered barriers is detected, the operator who would dispose radioactive waste in the Category 2 disposal facility without artificial barrier should immediately repair the barriers to prevent leakage. In the Second Stage, the operator should monitor leakages from engineered barriers and, if necessary, take measures to retard migration of radioactive material. At the same time, the operator should conduct patrol and inspection of the disposal facility and, if necessary, restore the cover soil and others. In the Third Stage, the operator should conduct patrol and check and, if necessary, restore the soil cover and others.
The Radiation Hazards Prevention Law also requires similar control to the waste disposal in its scope.

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 British and French firms and had exported 7,100 tons of spent fuel between 1969 and 2001.They, in return, receive nuclear fuel material recovered from the spent fuel and vitrified packages (HLW) generated in the reprocessing. 1,310 vitrified packages were sent back to Japan between 1995 and March 2008 and the remaining packages will be returned in the next ten-odd years. As they are constructing a reprocessing plant at Rokkasho Village in Aomori Prefecture since 1993, there would be no plan to export more spent fuel originated from commercial nuclear power reactors after 2002.

I1 Transboundary movement

I1.1 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 Ministry of Economy, Trade and Industry. 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.

I1.2 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.

I1.3 Consent as a State of Destination

After being notified by a State of origin of a transboundary movement to Japan of the spent fuel or the radioactive waste, the government of Japan decides whether it gives consent to the transport, and notifies its decision to the State of origin.
Japan expressed that, upon notification from a State of origin, it would consent to the import of returned radioactive waste as long as such transport would comply with the safety regulation of Japan.

I1.4 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 Ministry of Economy, Trade and Industry for the export of the spent fuel or the radioactive waste. The Minister of Ministry of Economy, Trade and Industry 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.

I1.5 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.

I2 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 shall not be granted for the export of spent fuel or radioactive waste to a destination south of latitude 60 degrees south for storage or disposal.

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 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.

J1 The infrastructure for regulatory control of sealed sources

The use of radioisotope and radiation generation apparatus etc, are regulated by the Law Concerning Prevention of Radiation Hazards due to Radioisotope etc. (the Radiation Hazards Prevention Law), as mentioned in paragraph E2.1 Sealed sources are also regulated by this Law.
As there are about 5000 licensees, each licensee is responsible for the safety and radioisotopes including sealed sources are properly controlled.
Ministry of Education, Culture, Sports, Science and Technology (MEXT), as the competent regulatory authority, has been carrying out safety review and on-spot inspection.
It is recognized that Radiation Hazards Prevention Law has been functioning effectively as stated below.

- The person who intends to use more quantities of radioactive sources than specified shall apply to MEXT for license, or notify MEXT.
- Radiation Hazards Prevention Law provides technical criteria and requirements, such as criteria relating to the use of facilities, dose limits for radiation workers, etc. For example, the licensee is required, from the point of radiation safety, to; a) be equipped with lock in all facilities for uses, storage and disposal of radioisotopes; b) install walls or fences to restrict easy access to the boundary of controlled area; c) restrict access to controlled area without permission of supervisor of the facility. These safety measures will effectively work also for security, such as physical protection.
- Licensee is responsible for annually reporting to MEXT regarding facility management such as the inventory of radioactive sources. MEXT carries out on-spot inspections of the facility if needed, and check that the inventory of radioactive sources is in conformity with the license.

As a result of this strict regulation system as described above, there has been no incident, such as excess exposure to the public by “orphan sources”.

J2 Management of radioactive sources

The licensee is regulated by law to hand over highly radioactive sources only to license holders who are authorized to receive and use the sources, and the disused radioactive sources are by practice handed over from the licensees to specific licensees. Licensees have obligation to report the results of such handover to MEXT when they terminate the use of sources.
The licensee has a responsibility to do an annual inventory check of both sealed and unsealed radioactive sources and to report the results to MEXT.
The “Radiation Hazards Prevention Law” provides for penalty and clarifies licensee have the responsibility for safe control of the radioactive sources.
Most of sources in Japan are imported from foreign countries and the sources with long half-life and high activity are sent back to the original foreign manufactures.
Regarding the distribution of radioisotopes and sealed sources in Japan, one supplier (Japan Radioisotope Association) carries out consistently from distribution and delivery of almost all radioactive sources to recovery of disused radioactive sources.
As the result of this, there have been no incidents of serious radiation hazard involving

radioactive sources or serious radiation hazard involving orphan sources until now.

J2.1 Criteria for the Storage of Disused Sealed Radioactive Sources

The Radiation Hazards Prevention Law lays down technical criteria relating to the storage of sealed sources as stated below.

- 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 a) installing a shield, b) distancing personnel from sealed sources, and c) shortening the time during which personnel may be exposed to radiation, shall be taken in order to prevent personnel engaged in handling of radioactive substances from being exposed to radiation exceeding the effective dose limit.
- Appropriate measures, such as immobilizing storage bins, shall be taken in order to prevent containers storing sealed sources from being carried from one place to another without permission.
- Appropriate measures shall be taken to prevent surface contamination from exceeding the surface contamination limit.
- Radioactive contaminated substance whose surface concentration exceeds one-tenth of the surface concentration limit shall not be taken out from the controlled area without permission.
- Notice showing the remarks necessary to prevent radiation hazards shall be posted at appropriate location within the controlled area.
- Appropriate measures shall be taken in order to prevent unauthorized persons from entering the controlled area.

J2.2 Response to Missing Radioactive Sources

In case of loss of any radioactive source, the licensee shall immediately report the matter to the police and MEXT. While MEXT orders the licensee immediately to search the sources, the police carry out criminal investigations, if the loss relates to criminal acts.
In April 2008, MEXT introduced the notification system for evaluated rating of radioactive source events based on the additional guidance of the International Nuclear Event Scale (INES).

J2.3 Response to Orphan Sources

In case of find of any orphan source, the police immediately take an initial action including setting of exclusion area, radiation survey and immediate assessment of the situation. MEXT requests the discoverer of the source and relevant people that safety measures should be taken and also dispatch a radiation inspector to confirm that the safety measure has been properly taken. The found orphan source is to be recovered by the experts.

J2.4 Detection for Orphan Sources

About 30 percent of the operators of scrap metal recycle industry voluntarily carry out radiation monitoring with gate type monitors or portable monitors. At the gateway of almost all the blast furnace or electric furnace steel companies, which use such scrap metal, carry out radiation monitoring on acceptance of the scrap metal for use.
The steel industry and the scrap metal recycle industry are voluntarily taking measures such as development of manuals and training courses to cope with the discovery of orphan sources.
The Customs conducts inspections to detect such sources by having set up radiation measurement equipment and X-ray machines in main ports.

J2.5 Response to Accident Relating Radioactive Sources

In case of accidents involving radioactive sources, the police and fire service perform initial response immediately depending on the notification. MEXT dispatches radiation inspectors to advise the licensee to take suitable measures.

J2.6 Progress in Establishing a System of National Registry of Sealed Sources

Users of radioactive source must obtain licenses of MEXT, or submit notification to MEXT by the Radiation Hazards Prevention Law, and MEXT as the regulatory body oversees and verify the radioactive sources used by the licensees as follows.

Before Use:
These who intend to use radioactive sources must apply for license to MEXT. In this application, the applicant has to indicate the nuclide and activity of each radioactive source, and the number of sources.

After the beginning of use:
The licensee must perform an annual inventory check of radioactive sources, the result of which should be included in the annual report of facility management. This report includes not only all the sealed sources including Category 1 and 2* but also all the unsealed sources, and MEXT verifies the consistency with the relevant license application. In case of disused sources, MEXT asks the licensee for the report that the licensee has handed over the sources to another licensee.

MEXT requests no information by the above report regarding the source ID number and the manufacturer, etc. The regulatory authority, however, will can such information through supplier, because in Japan only one supplier imports and delivers Category 1 and 2 sources to the domestic users, and the supplier records such information.
In 2009, MEXT will introduce the system of national registry of sealed sources including source ID number and the manufacturer, etc. at least for Category 1 and 2 sources, taking into consideration consistency with source registration systems in other countries.

*: Classification based on RS-G-1.9 “Categorization of Radioactive Sources Safety Guide” issued by IAEA

J3 Reentry of Returning Sealed Sources

As long as a manufacturer has license and meets the regulations specified in the Radiation Hazards Prevention Law, reentry of approved type of sealed sources returning from abroad are allowed within the license of storage capacity. In this case, legal procedure on export and import that is consistent to the “IAEA Guidance on Export and Import of Radiation Sources” (hereinafter referred to as “Guidance”) shall be applied. The manufacturer intending to possess or renew returned sealed sources is required to store them in accordance with the above mentioned storage criteria.

J4 Compliance with the Code of Conduct on the Safety and Security of Radioactive Sources

As mentioned in the paragraph J1 and J2 above, the Code of Conduct on the Safety of Radioactive Sources (hereinafter referred to as “the Code”) is substantially implemented under the regulation based on the Radiation Hazards Prevention Law and administrative advices to the licensees, etc. Currently, the system of national registry of sealed sources is under development for fully implementation of the Code as described in the paragraph J2.6 above. And MEXT is planning to establish an interim guideline providing the security

measurements of which the licensees should take to their facilities. MEXT made the interim guideline as provisional edition in May 2006 and is to complete the guideline referring to the guideline for security of radioactive sources, which will be scheduled for publication by IAEA. Regarding the Guidance, which was developed to support the import and export provisions of the Code, it has been fully implemented from January 2006 by amendment of the “Export Trade Control Order”.

Section K Planned Activities to Improve Safety

K1 Development of laws and related rules

There are safety examination guides and legislations, etc. to be prepared for safety regulations of radioactive waste management from now on, such as disposal of high level radioactive wastes (HLW), disposal of low-level radioactive wastes with a comparatively high radioactivity level, disposal of uranium wastes, disposal of wastes containing transuranic nuclides, and the value of materials not requiring treatment as radioactive wastes. These are shown in Table A1-1 as the status of activities concerning preparation of regulation on radioactive waste disposal.
The NSC and the related regulatory bodies continue to study and prepare these safety examination guidelines and legislations etc.

K2 Measures to ensure reliability of technology by experiences, tests and analyses

For management of radioactive wastes, especially for disposal, it is important to improve its safety and reliability of disposal technologies.
Therefore, regulatory bodies continuously obtain specialist's engineering and technical advices and reflect them in operation and maintenance and safety regulations, as needed,
Following safety researches are conducted based on regulation needs of the Nuclear and Industrial Safety Agency in the area of the safety of spent fuel management and the safety of radioactive waste management;

- Study on safety technology of radioactive waste disposal (Scheduled to be completed in 2013)
- Study on related technology of decommissioning (preparation of standards, environmental impact, site refurbishment and nuclear fuel cycle facilities: Scheduled to be completed in 2011)

On the other hand, operators continuously promote to buildup the latest technical information by collection of the internal and external information on operational experiences, technological developments by self-finance, maintenance and repair activities, etc.
For researches and developments of reliability improvement, the implementing body continues to takes charge of technical development on geological disposal of HLW, aiming at safe operation and improvement for economical and efficient final disposal.
The national government and agencies concerned implement researches and developments necessary for establishing safety regulations and safety evaluation for final disposal, fundamental researches and developments such as scientific investigation of deep layer, etc., and technical developments etc. for reliability improvement of geological disposal technologies.
Especially, the institutes leaded by Japan Atomic Energy Agency (JAEA) promotes R&D for scientific research on deep geological layer, confirmation of the reliability of geological disposal technologies, fundamental R&D for the enhancement of safety evaluation methodology and R&D on safety regulation along with “the basic research program on geological disposal of high level radioactive waste” (Agency of Natural Resources and Energy, METI and JAEA December,2006) and “Important Research Program on the Nuclear Safety ”(The NSC 2004).
And also, these deep layer research facilities of JAEA are planned and expected to facilitate not only as the place of research and development of geological disposal, but also used as a cooperation to the activities of the government and the implementing body to deepen public understanding of the research and development for the geological disposal in Japan.
Since fiscal year 1976, the NSC has been promoting research projects concerning the safety of environmental radioactivity and radioactive waste at nuclear installations. The products of these safety research projects have been reflected in the formulation of various standards and guidelines, including principles such as safety policy and basic ideas, standards on specific means of achieving safety, and specific guidance.

The Committee, decided the “Important Research Programs on the Nuclear Safety” in July 2004, in coordination with the status of preparation of relevant regulations (Table A1-1), requirements on geological environment for the stepwise procedure of site selection of radioactive waste final disposal and the development schedule of the “Basic Guides for Licensing Review”.
The report "Important Research Programs on the Nuclear Safety" indicates the safety researches on radioactive wastes and decommissioning field to be conducted intensively in five years starting from 2005.
In 2007, the steady progress of each research program was confirmed by the interim evaluation of the research status. The program is scheduled to be completed in fiscal 2009, and the discussion of the development of succeeding “Important Research Program on the Nuclear Safety” beginning from fiscal 2010 has been started.
Moreover, in July 2003, the Radioactive Wastes Safety Subcommittee, Nuclear and Industrial Safety Subcommittee, Advisory Committee for Natural Resources and Energy showed the important research tasks which should be investigated from now on in the “Toward Ensuring Foundation for the Safety Regulation of High-Level Radioactive Waste Disposal”, and those tasks will be promoted by the supporting organization for safety regulations, the Japan Nuclear Energy Safety Organization, as a center, utilizing the results of researches of all organizations including the above-mentioned deep layer research facilities, and the outcomes will be reflected in the preparation of the future safety regulation system.

Section L Annexes

L1 Inventory of spent fuel

Nuclear operators and facilities		Inventory (t)	Stored spent fuel
The Japan Atomic Power Co.	Tokai-No.2 Power Station	320	Uranium oxide fuel assemblies
	Tsuruga Power Station	560	
Hokkaido Electric Power Co., Inc.	Tomari Power Station	330	
Tohoku Electric Power Co., Inc	Higashidori Nuclear Power Station	10	
	Onagawa Nuclear Power Station	340	
Tokyo Electric Power Co., Inc.	Fukushima Daiichi Nuclear Power Station	1,580	
	Fukushima Daini Nuclear Power Station	980	
	Kashiwazaki Kariwa Nuclear Power Station	2,140	
Chubu Electric Power Co., Inc.	Hamaoka Nuclear Power Station	840	
Hokuriku Electric Power Co., Inc.	Shika Nuclear Power Station	100	
The Kansai Electric Power Co., Inc.	Mihama Power Station	290	
	Ohi Power Station	1,200	
	Takahama Power Station	1,090	
The Chugoku Electric Power Co., Inc.	Shimane Nuclear Power Station	360	
Shikoku Electric Power Co., Inc.	Ikata Power Station	520	
Kyushu Electric Power Co., Inc.	Genkai Nuclear Power Station	760	
	Sendai Nuclear Power Station	770	
Japan Atomic Energy Agency	Reactor Decommissioning R&D Center	70	Uranium oxide fuel assemblies MOX fuel assemblies
	FBR Research and Development Center	0	
	Tokai Research and Development Center, Nuclear Fuel Cycle Technology Development Directorate, Reprocessing Facility	41	Uranium oxide fuel assemblies MOX fuel assemblies
	Tokai Research and Development Center, Nuclear Science Research Institute	18	Uranium oxide fuel assemblies
	Oarai Research and Development Center	16	Uranium oxide fuel assemblies MOX fuel assemblies
Japan Nuclear Fuel Limited	Rokkasho Reprocessing Plant	2,535	Uranium oxide fuel assemblies
Total		14,870	

L2 Inventory of radioactive waste

L2.1 High level radioactive waste

Facility		Vitrified waste (number of containers*)	High level liquid waste
Japan Atomic Energy Agency	Reprocessing facility	247	404 m^3
Japan Nuclear Fuel Limited	Reprocessing facility	57	0
	Waste Storage Facility	1,310	0

* : 120 litter container

L2.2 Power station waste

1. Homogeneous solid, packed solid and miscellaneous solid

Power station		Homogeneous solid (drum)	Packed solid (drum)	Miscellaneous solid (drum)	Total (drum)
The Japan Atomic Power Co.	Tokai- Power Station	0	0	1393	1,393
	Tokai-No.2 Power Station	230	158	51,538	51,926
	Tsuruga Power Station	2,716	174	62,231	65,121
Hokkaido Electric Power Co., Inc.	Tomari Power Station	1,020	0	4,735	5,755

Tohoku Electric Power Co., Inc	Onagawa Nuclear Power Station	2,792	0	22,516	25,308
	Higashidori Nuclear Power Station	0	0	2,524	2,524
Tokyo Electric Power Co., Inc.	Fukushima Daiichi Nuclear Power Station	13,680	4,089	161,524	179,293
	Fukushima Daini Nuclear Power Station	599	2,603	14,716	17,918
	Kashiwazaki Kariwa Nuclear Power Station	0	0	22,378	22,378
Chubu Electric Power Co., Inc	Hamaoka Nuclear Power Station	3,295	1,116	31,627	36,038
Hokuriku Electric Power Co., Inc.	Shika Nuclear Power Station	8	440	3,836	4,284
The Kansai Electric Power Co., Inc.	Mihama Power Station	2,196	1,066	23,919	27,181
	Takahama Power Station	4,669	0	35,108	39,777
	Ohi Power Station	3,207	2,409	19,621	25,237
The Chugoku Electric Power Co., Inc.	Shimane Nuclear Power Station	239	833	26,327	27,399
Shikoku Electric Power Co., Inc.	Ikata Power Station	1,577	0	26,444	28,021
Kyushu Electric Power Co., Inc.	Genkai Nuclear Power Station	3,550	0	25,666	29,216
	Sendai Nuclear Power Station	2,131	0	11,751	13,882
Japan Atomic Energy Agency	Reactor Decommissioning R&D Center	2,016	0	16,890	18,906
	Prototype Fast Breeder Reactor “Monju”	20	0	3,592	3,612

Inventories are in the number of 200 litter drums (or converted into number of drums for miscellaneous solid).

2. Steam generator (SG)

Power station		Number of 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

3. Control rod, channel box, etc.

Power station		Control rod (number)*	Channel box (number)	Others (m^3)	Resin, etc. (m^3)
The Japan Atomic Power Co.	Tokai- Power Station	91 m^3	0	1,310	60
	Tokai-No.2 Power Station	235	3,248	14	874
	Tsuruga Power Station Unit 1	165	1,893	47	825
	Tsuruga Power Station Unit 2	346	0	0	80
Hokkaido Electric Power Co., Inc.	Tomari Power Station	270	0	0	75
Tohoku Electric Power Co., Inc	Onagawa Nuclear Power Station	110	2,610	1	433
	Higashidori Nuclear Power Station		78	0	23
Tokyo Electric Power Co., Inc.	Fukushima Daiichi Nuclear Power Station	1,175	19,871	182	3,579
	Fukushima Daini Nuclear Power Station	561	8,287	32	4,714
	Kashiwazaki Kariwa Nuclear Power Station	616	12,044	0	2,261
Chubu Electric Power Co., Inc	Hamaoka Nuclear Power Station	437	9,301	23	2,564
Hokuriku Electric Power Co., Inc.	Shika Nuclear Power Station	35	731	0	103
The Kansai Electric Power Co., Inc.	Mihama Power Station	676	0	0	110
	Takahama Power Station	1,320	0	0	111
	Ohi Power Station	1,085	0	0	105
The Chugoku Electric Power Co., Inc.	Shimane Nuclear Power Station	220	4,210	56	820

Shikoku Electric Power Co., Inc.	Ikata Power Station	633	0	0	139
Kyushu Electric Power Co., Inc.	Genkai Nuclear Power Station	691	0	0	150
	Sendai Nuclear Power Station	412			128
		Control rod (number)	Neutron detector (number)	Others (number)	Resin, etc. ($m^{3)}$
Japan Atomic Energy Agency	Reactor Decommissioning R&D Center	5	102	0	216
		Control rod drive mechanism guide tube, etc .(number)			
Japan Atomic Energy Agency	Prototype Fast Breeder Reactor "Monju"	5			

* For other than Tokai Power Station.

L2.3 Long-lived low heat generation radioactive waste

Facility		Drum (drums)	Bituminized solid (drums)	Plastic solid (drums)	Other waste (drums)	Total (drums)
Japan Atomic Energy Agency	Reprocessing facility	31,726	29,967	1,812	11,733	75,238
Japan Nuclear Fuel Limited	Reprocessing plant	9,236*1	0	0	12,152	21,388
		Sheared cladding (drums)	Spent filter (drums)	Sample bottle (drums)	Total (number)	
Japan Atomic Energy Agency	Reprocessing facility	4,892	302	1,328	6,522	
Japan Nuclear Fuel Limited	Reprocessing plant	157*2	0	0	157	
		Low activity concentrated liquid waste (m^3)	Sludge (m^3)	Waste solvent (m^3)		
Japan Atomic Energy Agency	Reprocessing facility	2,685	1,117	106		

The storage unit is (or is converted into) 200 litter drum.
*1: Including 784 drums of wastes dtored in the Waste Storage Facility located in Reprocessing Site.
*2: The sheared cladding pieces are stored in 1,000 litter drums.

L2.4 Uranium waste

		Drum (drums)	Other waste (drums)	Total (drums)	Low level liquid waste (m^3)
Global Nuclear Fuel - Japan Co., Ltd.		11,817	3,913	15,730	0
Mitsubishi Nuclear Fuel Co., Ltd.		9,560	1,041	10,601	1.74
Nuclear Fuel Industries, Ltd.	Tokai Works	4,924	1,190	6,114	8.05
	Kumatori Works	6,459	149	6,608	11.4
Japan Atomic Energy Agency	Prototype Uranium Enrichment Plant	497	56	553	0
Japan Nuclear Fuel Limited	Enrichment and Disposal Office	4,101	400	4,533	0

The storage unit is (or is converted into) 200 litter drum.

L2.5 Waste stored in research facilities

<Waste Inventory data reported under the Reactor Regulation Law>

Facility		Solid waste (drums)	Liquid waste (m^3)	Description
Japan Atomic Energy Agency	Tokai Research and Development Center Nuclear Science Research Institute	135,574	–	Reactor facility, using facility for nuclear material (hereinafter referred to as “using facility”)
	Tokai Research and Development Center Nuclear Fuel Cycle Engineering Laboratories	61,762	–	Using facilities
	Oarai Research and Development Center(North Area)	29,614	–	Reactor facility, Using facilities, Waste management facility
	Oarai Research and Development Center(South Area)	121 (*1)	0.03 (*2)	(*1)Reactor facility (temporary storage) (*2)Using facility
	Ningyo-toge Environmental Engineering Center	14,401	10.1	Using facility
	Aomori Research and Development Center Mutsu Office	1,053	22.4	Reactor facility
The University of Tokyo, Nuclear Professional School, School of Engineering		24 (*1)	5.3 (*2)	(*1)Reactor facility, Using facility (temporary storage) (*2)Reactor facility.
Kyoto University, Research Reactor Institute		60	0.0	Reactor facility, Using facility
National Institute of Radiological Science		768	–	Using facility
Nuclear Material Control Center	Tokai Safeguards Center	59	–	Using facility
	Rokkasho Safeguards Analytical Laboratory	84	–	Using facility
Rikkyo University Institute for Atomic Energy		15	6.6	Reactor facility
Musashi Institute of Technology Atomic Energy Research Institute		5	–	Reactor facility
Kinki University Atomic Energy Research Institute		3	–	Reactor facility
Nuclear Fuel Industries, Ltd, Tokai Works		6,114	8.1	Using facility(same in the Table L2.4; this facility is also categorized as fabrication facility)
Nippon Nuclear Fuel Development Co., Ltd.		195	9.1	Using facility
Nuclear Development Corporation		1,630	–	Using facility
Toshiba Corporation	Research Reactor Center	72	–	Reactor facility
	Nuclear Engineering Lab.	1,597 (*1)	0.7 (*2)	(*1)Reactor facility, Using facility (*2)Using facility.
Hitachi, Ltd. Power & Industrial Systems Nuclear System Division Ozenji Hitachi Training Reactor Center		494	–	Reactor facility
Other small Using Facilities（189 facilities）		78388 drums		The sum of solid waste inventory and liquid waste inventory

* This data includes the data of inventory of Long-lived low hear generation radioactive waste and Uranium waste which generated in the using facilities. The storage unit is (or is converted into) 200 litter drum.

<Waste Inventory data reported under the Radiation Hazards Prevention Law>

		Waste (drums)	Description
Facilities of the waste management business		-	
The University of Tokyo, Radioisotope Center		1	
Japan Radioisotope Association	Kanto Waste Relay Station	14,875	
	Kanto Waste Relay Station II	9,330	
	The Kaya Memorial Takizawa Laboratory	15,261	
	Ichihara Office	72,300	
	Kansai Waste Relay Station	0	
	Kanto Storage Facility	0	
VESTA Co., Ltd.		7,006	
Japan Atomic Energy Agency	Tokai Research and Development Center Nuclear Science Research Institute	135,574	This data is also reported under the Reactor Regulation Law.
	Oarai Research and Development Center (North Area)	28,157	This data is also reported under the Reactor Regulation Law
T.N. Technos Co., Ltd. TSUKUBA LABORATORIES		238	
Facilities of the using radioisotopes, etc.		12,541	

The storage unit is (or is converted into) 200 litter drum. This data includes the inventory of liquid waste.

L3 Excerpt of Regulation Relevant to Section G

Table G4-1 Technical Standard for the design and construction methods of Spent Fuel Storage Facility

(Prevention of spent fuel criticality)

Article 3 A spent fuel storage facility shall be provided with adequate measures such as criticality-safe geometries to eliminate the possibility of spent fuel going critical.

(Prevention of fire damage)

Article 4 If the safety of a spent fuel storage facility could be significantly impaired by a fire, the facility shall be provided with fire extinguishing and alarm systems as appropriate (limited to systems that automatically detect a fire and set off an alarm, such as automatic fire-alarm box and electric fire alarm system).

2 Any failure, damage or malfunction of the fire extinguishing system and alarm system in the preceding paragraph shall not significantly impair the safety of the spent fuel storage facility.

3 A System important to safety, such as emergency power supply system, that could be damaged by a fire shall consist of noncombustible or nonflammable materials as far as possible and shall be provided with adequate fire protection measures such as fire walls where necessary.

(Seismic design)

Article 5 A spent fuel storage facility shall be designed so as not to have a serious radiological impact on the public when damaged by seismic forces applied on it.

2 The seismic forces mentioned in the preceding paragraph shall be estimated taking account of the conditions of foundation ground, degree of earthquake damages in the region estimated from past earthquake records, characteristics of seismic activities and other various factors, on the basis of the structures of the spent fuel storage facility and the degree of hazards due to the damages to the facility.

(Materials and structures)

Article 6 The materials and structures of the vessels, pipes and support structures in a spent fuel storage facility that are important to ensure the safety of the facility (hereinafter in this Article referred to as “vessels”) shall be adequate for ensuring the strength and corrosion resistance required by the design of the vessels.

2 The vessels and pipes in the spent fuel storage facility that are important to ensure the safety of the facility shall be designed so as to endure appropriate pressure test or leakage test without significant leakage.

(Heat removal)

Article 7 A spent fuel storage facility shall be designed so as to safely remove the decay-heat of spent fuels.

(Confinement function)

Article 8 A spent fuel storage facility shall be so designed to have the function for confining spent fuel or materials contaminated with spent fuel (hereinafter referred to as “spent-fuel-contaminated materials”) within restricted areas pursuant to the following requirements:

(1) The structure of a container containing spent fuel shall not allow any leakage of spent fuel or spent-fuel-contaminated materials to the outside.

(2) When a pipe delivering any liquid not containing spent-fuel-contaminated materials is connected to a vessel or pipe containing spent-fuel-contaminated materials, the structure shall ensure that the contaminated liquid does not flow back into the pipe delivering liquid not containing spent-fuel-contaminated materials.

(3) A facility that has equipment for handling any liquid contaminated with spent fuel (solely for those areas where leakage of the liquid contaminated with spent fuel may expand), shall be designed pursuant to the following requirements:

(a) The surfaces of floors and walls inside of the facility shall have structures to inhibit the leakage of the liquid contaminated with spent.

(b) The periphery of a facility handling the liquid contaminated with spent fuel or gateways leading to the outside of the facility or its vicinity shall be provided with lashers to prevent the liquid contaminated with spent fuel from leaking outside the facility, unless the floors inside of the facility are lower than the floors of the adjacent facilities or the ground surface and the liquid contaminated with spent fuel cannot leak to the outside of the facility.

(c) The floors of a spent fuel storage facility shall be above the discharge water channels that discharge effluent to the outside of the facility site (excluding ground water drainage channels which have no opening in the controlled areas that could be contaminated with materials contaminated with spent fuel), unless those discharge water channels are provided with the system that safely disposes the effluent containing spent-fuel-contaminated materials and instrumentation to monitor the items listed in Article 15-2.

(Shielding)

Article 9 Shielding with capability required for preventing radiation hazards shall be provided if the prevention of the radiation hazards due to external radiation in a spent fuel storage facility site is required. For the prevention of radiation hazards. In such case, measures to prevent radiation leakage shall be taken if necessary to prevent radiation hazards due to any opening, pipe or other penetration in the shielding structures.

(Ventilation)

Article 9-2 Ventilation system that meets the following requirements shall be provided, if it is required to prevent radiation hazards due to the air contaminated with spent fuel or spent-fuel-contaminated materials in the spent fuel storage facility:

(1) The ventilation system shall have necessary capability for preventing radiation hazards.

(2) The structure of the ventilation system shall prohibit reverse flow of the air contaminated with spent fuel or spent-fuel-contaminated materials.

(3) Filtering system, if it is installed, shall be capable for appropriate maintenance of its filtering function and shall have a structure to allow easy removal of the materials contaminated with spent fuel or spent-fuel-contaminated materials or easy replacement of the system.

(4) The ventilation system shall have air intake ports that prohibit intake of the air contaminated with spent fuel or spent-fuel-contaminated materials.

(Prevention of contamination by spent-fuel-contaminated materials)

Article 10 As for the spent fuel storage facility buildings that are frequently accessed, the surfaces of their walls, floors and other parts, that could be contaminated by spent-fuel-contaminated materials and could be touched by people, shall be easy to remove the spent-fuel-contaminated materials.

(Systems important to safety)

Article 11 The systems important to safety such as emergency power supply system shall be designed to meet the following requirements:

(1) If a system is shared among two or more nuclear facilities (such as fabrication facility, reactor facility, spent fuel storage facility, reprocessing facility, waste disposal facility and nuclear material utilization facility), the functions to ensure the safety of spent fuel storage facility shall not be impaired by such sharing.

(2) Inspection or test to confirm the functions to ensure the safety of spent fuel storage facility, and maintenance or repair for maintaining the integrity of such functions shall be possible.

(Transportation and receiving systems)

Article 12 The systems used for the transportation and receiving of containers containing spent fuel shall be designed to meet the following requirements:

(1) The systems for the transportation and receiving of containers containing spent fuel shall have capability for safe handling of the containers.

(2) The containers containing spent fuel shall be safely retained in case of loss of power supply for the transportation and receiving systems.

(Instrumentation and control systems)

Article 13 A spent fuel storage facility shall be provided with the instrumentation to measure the following parameters. If it is difficult to directly measure any of such parameters, indirect instrumentation may be used as an alternative:

(1) Surface temperature of container containing spent fuel.

(2) Pressure at the closure head of container containing spent fuel for monitoring seal performance of the head (excluding welded closure head).

(3) Temperatures of air supply and exhaust of the buildings where spent fuel is stored.

2 A spent fuel storage facility shall be provided with the devices for reliable detection and quick alarming of such situations as: when safety of spent fuel storage facility could be significantly impaired due to loss of equipment function, malfunction or any other cause; when the concentration of radioactive materials described in Article 15 (ii) or the dose equivalent of external radiation described in Article 15 (iv) shows significant increase; or when significant amount of liquid radioactive materials

could leak from liquid radioactive waste disposal system.

(Disposal systems)

Article 14. Radioactive waste disposal system (excluding radioactive waste retaining system) shall meet the following requirements:

(1) Radioactive waste disposal system shall be capable of disposing radioactive wastes generated in the spent fuel storage facility so that concentration of airborne radioactive materials outside the environmental monitoring area and concentration of radioactive materials in the water at the outer boundary of the environmental monitoring do not exceed the values specified by the Minister of Economy, Trade and Industry.

(2) Radioactive waste disposal system shall be installed separately from non-radioactive waste disposal system, unless the system that leads non-radioactive liquid waste to radioactive liquid waste disposal system is provided with the measures to prohibit for radioactive liquid waste to flow back into non-radioactive liquid waste systems.

(3) Gaseous radioactive waste disposal system shall not discharge gaseous wastes at any part of the system other than exhaust port.

(4) If filtering system is installed in the gaseous radioactive waste disposal system, it shall be capable for appropriate maintenance of its filtering function and shall have a structure to allow easy removal of the materials contaminated with spent fuel or spent-fuel-contaminated materials or easy replacement of the system.

(5) Liquid radioactive waste disposal system shall not discharge liquid waste at any part of the system other than water discharge outlet.

(Radiation control system)

Article 15 A spent fuel storage facility site shall be provided with the radiation instrumentation to measure the values listed below. If it is difficult to directly measure any of such parameters, indirect instrumentation may be used as an alternative:

(1) Dose equivalent rate at the side wall of radiation shielding structure of spent fuel storage facility

(2) Concentration of radioactive materials in exhaust gases at or near the gaseous radioactive waste exhaust port

(3) Concentration of radioactive materials in discharge water at or near the liquid radioactive waste discharge outlet

(4) Dose equivalent of external radiation, concentration of airborne radioactive materials and densities of radioactive materials on the surface of contaminated items in the controlled area

(5) Dose equivalent of external radiation in the environmental monitoring area

(Emergency Power Supply System)

Article 16 A spent fuel storage facility shall be provided with power generating system driven by internal combustion engine, or other power generating system with equal or more capability, in order to maintain the function of the systems necessary for ensuring the safety of the facility in the event of loss of electric power supply from off-site power grid.

2 Systems especially important for ensuring the safety of spent fuel storage facility shall be provided with an uninterruptible power supply device or other power supply system with equal or more capability.

Table G5-1 Regulatory Guide for Reviewing Safety Assessment of the Spent Fuel Interim Storage Facility Using Metal Dry Casks

Siting Condition

Guideline 1 Basic conditions

The following events shall be investigated for the site and its surroundings of the spent fuel interim storage facility, and it shall be confirmed that the adverse conditions for ensuring safety does not exist.

1. Natural environment

(1)Natural phenomena such as earthquake, tsunami, landslides, depression, typhoon, high tide, flood, abnormal cold weather, heavy snowfall.

(2)Geological conditions and landform etc. such as ground conditions, soil bearing capacity, fault.

(3) Meteorological conditions such as wind direction, wind velocity, waterfall.

(4) Hydrological and hydraulic conditions of rivers, underground water, etc.

2. Social environment

(1) Fire, explosion at a neighboring factory etc.

(2) Missiles etc. by air craft crash, etc.
(3)Conditions of land use in relation to food production such as agriculture, livestock farming, fishery industry and condition of population distribution etc.

Guideline 2 Normal conditions

The dose in normal condition of the general public due to the spent fuel interim storage facility shall be lower than the dose limit specified by the law and regulation, and it shall be as low as reasonably achievable.

Guideline 3 Accident conditions

Under the assumption of the occurrence of the maximum credible accident at the spent fuel interim storage facility, the general public shall not receive excessive radiation exposure.

1. Selection of accidents

In the design of the spent fuel interim storage facility, accidents, which occurrence is technically possible to be assumed in the worst case and is considered important in view of radiation exposure to the general public, shall be selected by thoroughly studying the possibility of occurrence of accidents that may significantly fail the fundamental safety functions of metal casks from the technical point of view considering aging of metal cask components by long term storage, such as:

(1)Collision or fall of metal cask caused by wrong operation etc. during transfer in the facility
(2)Natural disaster etc.

2. Calculation of release amount of radioactive materials etc.

The release amount of radioactive materials etc. shall be calculated for each accident selected in accordance with the paragraph 1 above, applying appropriate analytical model and parameters and setting appropriate conditions with safety margin, by thoroughly studying the followings:

(1)Amount of leakage of radioactive materials from the fuel cladding
(2)Integrity of metal casks concerning their confinement function and radiation shielding function
(3)Number of metal casks to be assumed for leakage of radioactive materials
(4)Conditions of atmospheric dispersion of radioactive materials
(5)Period of release for the evaluation

3. Dose evaluation

It shall be confirmed that the general public does not receive excess radiation exposure from the dose even in case of the maximum credible accident, which is defined as an accident which effect to the general public is the maximum among accidents selected by the paragraph 1 as the result from the calculation in accordance with the paragraph 2 above. However, this evaluation is not required when there is no radiation exposure to the general public due to the accident selected by the paragraph 1.

Radiation Control

Guideline 4 Confinement function

The spent fuel interim storage facility shall be designed to confine radioactive materials in the limited area with the following measures.

1. The metal cask shall be designed to maintain the negative pressure in the space where spent fuel assemblies are contained throughout the design storage period.
2. The metal cask shall be designed to isolate the space where spent fuel assemblies are contained from outside of the cask with the multi-layered confinement structure at the cap portion. And its confinement function shall be monitored.
3. The metal cask shall be designed with considerations of the restoration capability of confinement function such a design as that allows the attachment of an additional cap to cope with unlikely event of confinement function abnormality of cap structure.
4. The metal cask shall be designed to maintain the temperature of fuel claddings low throughout the design storage period in view of maintaining the integrity of fuel cladding.
5. The metal cask shall be designed to keep the temperature within the range to maintain the integrity of the structures throughout the design storage period in view of maintaining its confinement function.

Guideline 5 Radiation shielding

The spent fuel interim storage facility shall be appropriately shielded to lower the exposure dose of the general public by the direct and sky shine ray.

In addition, the sufficient radiation shielding shall be provided considering working conditions of personnel engaged in radiation work.

In case the radiation shielding of concrete etc is used, in addition to the metal cask, the shielding material shall be designed to maintain the temperature low enough not to impair its radiation shielding capability.

Guideline 6 Radiation exposure control

1. Radiation exposure control in working environments

(1) In order to monitor and control working environments of personnel engaged in radiation work, the monitoring system and measuring equipment for dose rates etc. and alarm system for unusual increase in the dose rate should be prepared.
(2) The important information from the above-mentioned monitoring system and alarm system should be designed that the centralized monitoring is possible at an appropriate place.

2. Equipments, such as dosimeters required for individual exposure control for personnel engaged in radiation work should be prepared.
3. The control area of the spent fuel interim storage facility shall be designed so that the appropriate access control could be implemented in accordance with the dose rate and surface contamination density.

Environmental safety

Guideline 7 Discharge control of radioactive wastes

The spent fuel interim storage facility should be designed so that the concentration of radioactive materials released to the environment is as low as reasonably achievable with appropriate treatment of radioactive wastes generated during the storage.

Guideline 8 Consideration for long-term storage etc.

The spent fuel interim storage facility should be designed to maintain the integrity of spent fuel assemblies and the integrity of the components that have fundamental safety functions throughout the design storage period by taking the following measures, in considerations of degradation etc. accompanied by the long-term storage.

1. Components of metal cask important to maintain fundamental safety functions should be designed not to lose required safety function maintaining required strength and performance by selecting materials that have sufficient reliability in the environments such as temperature and radiation during design storage period and to the degradation such as corrosion, creeping, and stress corrosion cracking under the above environments.
2. The metal cask should contain and store the spent fuel assemblies together with sealing inert gases.
3. The metal cask should be designed to be able to remove the decay heat from spent fuels in view of maintaining the integrity of spent fuel assemblies and the integrity of the components that have fundamental safety functions.
4. The storage building should be designed to be able to maintain the room temperature in the building low in view of the heat removal from the surface of a metal cask. And, it should be designed to be able to monitor that the room temperature in the storage building will not elevate to the unusual level.

Guideline 9 Radiation monitoring

The spent fuel interim storage facility should be provided with measures to monitor the concentration etc. of radioactive materials in the release path of radioactive wastes appropriately. Moreover, measures to monitor the dose rates, concentrations etc. of radioactive materials in the surrounding environment should be taken appropriately in consideration to the potential release of radioactive materials.

Criticality

Guideline 10 Criticality safety of a single metal cask

A single metal cask in the spent fuel interim storage facility should be designed to prevent the criticality under any technically conceivable conditions when spent fuel assemblies are contained in the cask.

In case the internal basket shares the criticality prevention function, the metal cask should be designed to keep the structural integrity of the basket throughout the design storage period.

Guideline 11 Criticality safety of multiple metal casks

The spent fuel interim storage facility should be provided with measures to prevent the criticality under any technically conceivable conditions considering the neutron interference among metal casks in the facility.

Guideline 12 Consideration for nuclear criticality accidents

If any possibility of a nuclear criticality accident caused by operational error etc. at the spent fuel interim storage facility should not be neglected, appropriate measures for the unlikely event of nuclear criticality accident shall be prepared.

When Guideline 10 and Guideline 11 are conformed and when spent fuels are contained in the metal cask, criticality could not physically occur, so that the application of this guideline is exempted.

Other safety measures

Guideline 13 Consideration for earthquake

The spent fuel interim storage facility should be designed to maintain the fundamental safety functions against design earthquake force considered to be the most appropriate referring to the results of site investigation of past records at the site and its peripheral area.

Guideline 14 Consideration for natural phenomena other than earthquakes

The facilities important to safety of the spent fuel interim storage facility should be designed considering the severest natural force of natural phenomena other than earthquake referring to the results of site investigation of past records at the site and its peripheral area.

Guideline 15 Consideration for fire and explosion

The spent fuel interim storage facility should be provided with appropriate measures to prevent occurrence of a fire and a explosion, and measures to prevent propagation of fire and explosion, and to control excessive release of radioactive materials into the outside of facility.

1. The spent fuel interim storage facility should be designed to use nonflammable or fire-retardant materials as much as reasonably possible.
2. In case flammable material is used in the spent fuel interim storage facility, appropriate measures such as elimination of fire source, prevention of unusual temperature rise, prevention of leakage-out or leakage-in of flammable material etc. should be taken.
3. In order to prevent propagation of a fire, the appropriate measures to reduce the influence by fire should be taken in addition to installation of appropriate detection and alarm systems and the fire protection equipment.

Guideline 16 Consideration for loss of electric power

A power supply system with sufficient capacity and reliability to operate following equipments required for safety should be installed in the spent fuel interim storage facility to be prepared for the loss of function of external power supply systems such as blackout.

1. Monitoring equipment for confinement function of metal casks
2. Radiation monitoring equipment
3. Equipment such as fire alarm equipment, emergency communication equipment, and emergency lightning equipment

Guideline 17 Consideration for transfer of metal casks

The spent fuel interim storage facility should be provided with appropriate measures for shipping-out of metal casks containing spent fuels considering the basic safety functions.

Guideline 18 Consideration of accident

The spent fuel interim storage facility should be provided with the appropriate measures for, such as alarm, communication and evacuation of radiation workers depending on the accident condition.

1. Appropriate radiation measuring devices, the radiation protection equipment etc. should be available as required.
2. In the design of the facility, the lighting equipment for evacuation, which function is not lost in a case of loss of normal lighting power source, should be installed and safety evacuation passages with simple, clear and durable signs should be established.

Guideline 19 Consideration for sharing of facilities

The facilities important to safety of spent fuel interim storage facility, which are shared with nuclear facilities other than the concerned spent fuel interim storage facility or shared within the concerned spent fuel interim storage facility, should not cause any inconvenience on the safety of the concerned spent fuel interim storage facility by the sharing judged by its function, structure etc.

Guideline 20 Applicable codes and standards

The design, material selection, manufacturing, construction, and inspection of the facilities important to safety of the spent fuel interim storage facility should be in conformity with codes and standards recognized as appropriate.

1. The spent fuel interim storage facility should be in conformity with Japanese laws and regulations such as the "Reactor Regulation Law", "Construction Standard Law", "Fire Protection Law" etc.
2. The design, material selection, manufacturing, construction, inspection etc. of facilities important to safety should be in conformity with domestic codes and standards recognized as appropriate. For items for which no domestic applicable codes or standards is exist, the codes or standards of foreign countries that are experienced and reliable may be applied.

Guideline 21 Consideration for inspection, repair etc.

The spent fuel interim storage facility should be made to be able to perform inspection, test, maintenance and repair with appropriate methods according to the importance to safety and the needs.

Table G6-1 Contents of the Operational Safety Program for the Spent Fuel Interim Storage Facility (Article 37 paragraph 1 of the Rule for Interim Storage of Spent Fuel)

(1) The duties of personnel engaged in the operation and management of the spent fuel storage facility and organization
(2) The following items with respect to the operational safety education for radiation workers at the spent fuel storage facility
 (a) Policy for the operational safety education
 (including preparation of education program)
 (b) The contents of the operational safety education as follows
  1) Relevant laws and the Operational safety program
  2) Structure, performance and operation of the spent fuel storage facility
  3) Radiation management
  4) Handling of nuclear fuel materials and objects contaminated by them
  5) Measures to be taken in emergencies
 (c) Other necessary items for the operational safety education of the spent fuel storage facility
(3) Operation of the equipment especially necessary to be managed in view of safety preservation.
(4) Designation of controlled areas, and environment monitoring areas, and restriction of access to these areas
(5) Matters related to gaseous and liquid discharge monitoring equipment
(6) Monitoring of the dose, the dose equivalent, the concentration of radioactive materials and the density of radioactive materials on the surface of objects contaminated by radioactive materials, and the decontamination
(7) Management of radiation measuring instruments and the method of radiation measurement
(8) Patrols and checks of the spent fuel storage facility and their associated measures
(9) Voluntary periodical inspections of the spent fuel storage facility
(10) Receipt, delivery, transport, storage and other handling of spent fuels
(11) Disposal of radioactive waste
(12) Measures to be taken in emergency
(13) Records on safety preservation of the spent fuel storage facility (including observance status)
(14) Periodic Assesment of the spent fuel storage facility
(15)Quality assurance of the spent fuel storage facility
(16) Other necessary items for safety preservation of the spent fuel storage facility

Table G6-2 Contents of Decommissioning-related Operational Safety Program (Article 37 paragraph 2 of the Rules for Interim Storage of Spent Fuel)

In order to obtain the license for decommissioning program of a spent fuel storage facility, the operator shall revise the Safety Rules and Regulations for the following points and shall get approval for the revision.
 (1) Duties and organization of a person who will carry out decommissioning work.
 (2) The following safety training items for radiation workers for decommissioning:
  (a) Implementation principle of safety training (including development of an implementation plan)
  (b) Safety training contents on the following items:
   1) Relevant laws and regulations and Safety Rules and Regulations.
   2) Structures and performance of the spent fuel storage facility.
   3) Decommissioning of the spent fuel storage facility.
   4) Radiation control.
   5) Handling of nuclear fuel materials and materials contaminated with nuclear fuel materials.
   6) Measures to be taken at an emergency.
  (c) Other necessary matters for safety training on the spent fuel storage facility.
 (3) Operation of systems requiring special control for safety.
 (4) Establishment f the controlled area, conservation area, and environmental monitoring area, and access control to those areas.
 (5) Exhaust monitoring system and discharge water monitoring system.
 (6) Monitoring of radiation dose, dose equivalent, concentration of radioactive materials and radioactive material density on the surface of items contaminated with radioactive materials, and removal of contamination.
 (7) Control of radiation measuring devices and radiation measurement methods.
 (8) Periodic self-imposed inspection of the spent fuel storage facility.
 (9) Patrol of the spent fuel storage facility and handling of findings.

(10) Disposal of radioactive wastes.
(11) Measures to be taken at an emergency.
(12) Records on the safety of the spent fuel storage facility (including the compliance with the Safety Rules and Regulations).
(13) Records on the safety of the decommissioning (including the compliance with the Safety Rules and Regulations).
(14) Quality assurance for the spent fuel storage facility.
(15) Quality assurance for the decommissioning work.
(16) Decommissioning management.
(17) Other necessary items for the safety and decommissioning of the spent fuel storage facility.

Table G6-3 Incident and Failure Reporting Standards at the Spent Fuel Interim Storage Facility (Article 43-13 of the Rule for Interim Storage of Spent Fuel)

Upon the occurrence of any of the following events, operators of spent fuel storage facilities shall immediately give notice to that effect to the Minister of Economy, Trade and Industry, and shall report to the minister about the situation of the event and corrective actions taken within ten days of the event:

(1) The spent fuel is stolen or its whereabouts is unknown;

(2) A failure of the spent fuel storage facility is found (excluding a failure that cause minor affection on spent fuel storage);

(3) The concentration of radioactive material in air on the boundary outside a peripheral monitoring area has exceeded the concentration limits provided in the Ministerial Ordinance of METI Minister due to the gaseous radioactive waste release through discharge facilities;

(4) The concentration of radioactive material in water on the boundary outside a peripheral monitoring area has exceeded the concentration limits provided in the Ministerial Ordinance of METI Minister due to the liquid radioactive waste release through discharge facilities;

(5) Spent fuel etc. has leaked outside the controlled area;

(6) Leakage of spent fuel or spent-fuel-contaminated materials inside a radiation controlled area due to a failure of the spent fuel storage system or other unexpected situation except for the following cases (excluding the cases that access control to the leakage area has been implemented, a new measures such as key control have been taken, or leaked material has spread outside of the radiation controlled area) where:
(a) Leakage of liquid spent fuel or materials contaminated with spent fuel has not spread out of the lasher provided around the leaked equipment.

(b) The function of relevant ventilation system has been properly maintained when gaseous spent fuel or materials contaminated with spent fuel has leaked.

(7) Workers engaged in the radiation work have been exposed to radiation that exceeds or is likely to exceed the dose limits provided in he Ministerial Ordinance of METI Minister; or

(8) In addition to the events of the above paragraphs, a hazard to personnel (excluding minor hazards other than radiation hazards) has occurred or is likely to occur at the spent fuel storage facility.

L4 Excerpt of Regulation Relevant to Section H

Table H4-1 “Technical Standard for the Design and Construction Methods for the Specific Waste Disposal Facility or Specific Waste Storage Facility”

(Prevention of fire damage)
Article 3 If the safety of a specific waste disposal facility or specific waste storage facility could be significantly impaired by a fire, the facility shall be provided with fire extinguishing and alarm systems as appropriate (limited to systems that automatically detect a fire and set off an alarm, such as automatic fire-alarm box and electric fire alarm system).
2 Any failure, damage or malfunction of the fire extinguishing system and alarm system in the preceding paragraph shall not significantly impair the safety of the specific waste disposal facility or specific waste storage facility.
3 A system important to safety, such as emergency power supply system, that could be damaged by a

fire shall consist of noncombustible or nonflammable materials as far as possible and shall be provided with adequate fire protection measures such as fire walls where necessary.

4 Systems for handling or managing radioactive wastes that could generate hydrogen shall be designed to prohibit retention.

5 Cells and rooms containing systems for handling or storage radioactive wastes that could generate hydrogen (excluding non-explosive systems) shall be provided with appropriate measures to prohibit hydrogen retention and to prevent explosion in case of hydrogen leakage from those systems.

(Seismic design)

Article 4 A specific waste disposal or storage facility shall be designed so as not to have a serious radiological impact on the public when damaged by seismic forces applied on it.

2 The seismic forces mentioned in the preceding paragraph shall be estimated taking account of the conditions of foundation ground, degree of earthquake damages in the region estimated from past earthquake records, characteristics of seismic activities and other various factors, on the basis of the structures of the specific waste disposal facility or specific waste management facility and the degree of hazards due to the damages to the facility.

(Materials and structures)

Article 5 The materials and structures of the vessels, pipes and support structures in a specific waste disposal facility or specific waste storage facility that are important to ensure the safety of the facility (hereinafter in this Article referred to as “vessels”) shall be adequate for ensuring the strength and corrosion resistance required by the design of the vessels.

2 The vessels and pipes in the specific waste disposal facility or specific waste storage facility that are important to ensure the safety of the facility shall be designed so as to endure appropriate pressure test or leakage test without significant leakage.

(Confinement functions)

Article 6 A specific waste disposal facility or specific waste storage facility shall be provided with the functions to confine radioactive wastes within restricted areas pursuant to the following requirements:

(1) When a pipe delivering liquid not containing radioactive waste is connected to a vessel or pipe containing liquid radioactive waste, the structure shall ensure that the liquid radioactive waste does not flow back into the pipe delivering the liquid not containing radioactive waste.

(2) The air flow at the opening of a hood for handling of non-sealed radioactive waste shall be maintained at an appropriate speed.

(3) Inner pressure of a room where contamination by radioactive waste could occur shall be maintained negative as required.

(4) A facility that has a liquid radioactive waste handing system (solely for those areas where leakage of liquid radioactive waste could expand), shall be designed pursuant to the following requirements:

(a) The surfaces of floors and walls inside of the facility shall have structures to inhibit the leakage of liquid radioactive waste.

(b) The periphery of a facility handling liquid radioactive waste or gateways leading to the outside of the facility or its vicinity shall be provided with lashers to prevent the liquid radioactive waste from leaking outside the facility, unless the floors inside of the facility are lower than the floors of the adjacent facilities or the ground surface and the liquid radioactive waste cannot leak to the outside of the facility.

(c) The floors of a specific waste disposal facility or specific waste storage facility shall be above the discharge water channels that discharge effluent to the outside of the facility site (excluding ground water drainage channels which have no opening in the controlled areas that could be contaminated with radioactive waste), unless those discharge water channels are provided with the system that safely disposes the effluent contaminated with radioactive waste and the instrumentation to monitor the items listed in Article 15-3.

(Shielding)

Article 7 Shielding with capability required for preventing radiation hazards shall be provided if the prevention of radiation hazards due to the external radiation in a specific waste disposal facility or specific waste storage facility site is required. In such case, measures to prevent radiation leakage shall be taken if necessary to prevent radiation hazards due to any opening, pipe or other penetration in the shielding structures.

(Ventilation)
Article 8 Ventilation system that meets the following requirements shall be provided, if it is required to prevent radiation hazards due to the air contaminated with spent fuel or spent-fuel-contaminated materials in the specific waste disposal facility or specific waste storage facility:
(1) The ventilation system shall have necessary capability for preventing radiation hazards.
(2) The structure of the ventilation system shall prohibit reverse flow of the air contaminated with spent fuel or spent-fuel-contaminated materials.
(3) Filtering system, if it is installed, shall be capable for appropriate maintenance of its filtering function and shall have a structure to allow easy removal of the materials contaminated with spent fuel or spent-fuel-contaminated materials or easy replacement of the system.
(4)The ventilation system shall have air intake ports that prohibit intake of the air contaminated with spent fuel or spent-fuel-contaminated materials.

(Prevention of contamination by spent-fuel-contaminated materials)
Article 9 As for the specific waste disposal facility or specific waste management facility buildings that are frequently accessed, the surfaces of their walls, floors and other parts, that could be contaminated by spent-fuel-contaminated materials and could be touched by people, shall be easy to remove the spent-fuel-contaminated materials.

(Receiving system or management system)
Article 10 The radioactive waste receiving system of specific waste disposal facility or radioactive waste management system of specific waste storage facility that could be overheated by decay heat and radiations from radioactive waste shall be provided with measures necessary for cooling.

(Treatment and disposal systems)
Article 11 Radioactive waste disposal system (excluding radioactive waste retaining system) shall meet the following requirements:
(1) Radioactive waste disposal system shall be capable of disposing radioactive wastes generated in the specific waste disposal facility or specific waste storage facility so that concentration of airborne radioactive materials outside the environmental monitoring area and concentration of radioactive materials in the water at the outer boundary of the environmental monitoring do not exceed the values specified by the Minister of Economy, Trade and Industry.
(2) Radioactive waste disposal system shall be installed separately from non-radioactive waste disposal system, unless the system that leads non-radioactive liquid waste to radioactive liquid waste disposal system is provided with the measures to prohibit for radioactive liquid waste to flow back into non-radioactive liquid waste systems.
(3) Gaseous radioactive waste disposal system shall not discharge gaseous wastes at any part of the system other than exhaust port.
(4) If filtering system is installed in the gaseous radioactive waste disposal system, it shall be capable for appropriate maintenance of its filtering function and shall have a structure to allow easy removal of the materials contaminated with spent fuel or spent-fuel-contaminated materials or easy replacement of the system.
(5) Liquid radioactive waste disposal system shall not discharge liquid waste at any part of the system other than water discharge outlet.

(Systems important to safety)
Article 12 The systems important to safety such as emergency power supply system shall be designed to meet the following requirements:
(1) If a system is shared among two or more nuclear facilities (such as fabrication facility, reactor facility, spent fuel storage facility, reprocessing facility, waste disposal facility and nuclear material utilization facility), the functions to ensure the safety of specific waste disposal facility or specific waste storage facility shall not be impaired by such sharing.
(2)If necessary for maintaining the functions to maintain the safety of specific waste disposal facility or specific waste storage facility, the system or its parent system shall have appropriate redundancy.
(3)Inspection or test to confirm the functions to ensure the safety of specific waste disposal facility or specific waste storage facility, and maintenance or repair for maintaining the integrity of such functions shall be possible.

(Transport system)
Article 13 Transport system for radioactive wastes (excluding those which have no significant impact

on personal safety) shall be designed to meet the following requirements:
(1) Transport system shall be capable of normal transport of radioactive wastes.
(2) When Radioactive wastes shall be safely retained in case of loss of power supply for the transportation of radioactive waste.

(Instrumentation and control system)
Article 14 A specific waste disposal facility or specific waste storage facility shall be provided with the devices for reliable detection and quick alarming of such situations as: when the safety of the facility could be significantly impaired due to loss of equipment function, miss-operation or any other cause; when the concentration of radioactive materials provided in Article 15 (2) or the dose equivalent provided in Article 15 (4) shows significant increase; or when significant amount of liquid radioactive materials could leak from the liquid radioactive waste disposal system.
2 A specific waste disposal facility or specific waste storage facility shall be provided with the circuits to actuate the necessary systems immediately and automatically, when the safety of the facility could be significantly impaired due to loss of equipment function, miss-operation or any other cause and it is required to quickly actuate the system to maintain the function to confine radioactive waste within restricted areas or the system to prevent fire or explosion.

(Radiation control system)
Article 15 A specific waste disposal facility or specific waste storage facility site shall be provided with the radiation instrumentation to measure the values listed below. If it is difficult to directly measure any of such parameters, indirect instrumentation may be used as an alternative:
(1) Dose equivalent rate provided by the Minister of METI at the side wall of radiation shielding structure of waste storage facility and waste receiving facility.
(2) Concentration of radioactive materials in exhaust gases at or near the gaseous radioactive waste exhaust port
(3) Concentration of radioactive materials in discharge water at or near the liquid radioactive waste discharge outlet
(4) Dose equivalent of external radiation, concentration of airborne radioactive materials and densities of radioactive materials provided by the Minister of METI on the surface of contaminated items in the controlled area
(5) Dose equivalent of external radiation provided by the Minister of METI in the environmental monitoring area

(Emergency Power Supply System)
Article 16 A specific waste disposal facility or specific waste storage facility shall be provided with power generating system driven by internal combustion engine, or other power generating system with equal or more capability, in order to maintain the function of the systems necessary for ensuring the safety of the facility in the event of loss of electric power supply from off-site power grid.
2 Systems especially important for ensuring the safety of specific waste disposal facility or specific waste storage facility shall be provided with an uninterruptible power supply device or other power supply system with equal or more capability.

Table H5-1 Fundamental Guidelines for Licensing Review of Land Disposal Facilities of Low-Level Radioactive Waste (Excerpt)

Fundamental Site Conditions
It shall be considered that the initiating event to the big accident does not occur in or around the site of the waste disposal facility. Moreover, if the accident occurs, events shall be seldom to escalate the effect.
Dose Evaluation
1 Evaluation under Normal Conditions
The radiation dose of the general public in normal times shall be as low as reasonably achievable in the planning of a step-wise control, in the design of the waste disposal facility, and in relation with the situation of the site and ite vicinity.
2 Safety Evaluation
When it is presupposed that the technically assumed abnormal event occurs, excessive radiation exposure shall not be imposed to the general public.
Radiation Control
1 The Function of Enclosure
In the case of disposal at the waste disposal facility installed with engineered barriers, the design shall be provided with function to enclose radioactive materials in the restricted area of the waste

disposal facility in the first step.

2 Inhibition of Radioactive Nuclides Migration

In the case of disposal at the waste disposal facility not installed with engineered barriers, appropriate measures shall be taken with due consideration of migration inhibition of radioactive nuclides from the waste disposal facility to the human environment in the disposal step.

3 Radiation Protection

(1) The waste disposal facility shall be installed with radiation shields to reduce the radiation dose of the general public as low as reasonably achievable by direct gamma ray and the sky shine gamma ray.

(2) In the case of disposal in non-engineered barriers type disposal facility, and when there is the possibility of scattering of radioactive materials, measures shall be taken to reduce the radiation dose of the general public by the scattering as low as reasonably achievable.

(3) The waste disposal facility shall be installed with appropriate radiation shields and the ventilation etc. with due consideration of the working conditions of the personnel engaged in radiation work.

4 Radiation Exposure Control

Measures for monitoring and controlling of the radiation doses of the personnel engaged in radiation work shall be taken at the waste disposal facility.

Environmental Safety

1 Discharge Control of Radioactive Gaseous and Liquid Wastes

Concentrations of radioactive materials discharged to the environment shall be controlled as low as reasonably achievable at the waste disposal facility by appropriate processing of radioactive gaseous waste and the radioactive liquid waste generated at the associated facilities in the waste disposal facility.

2 Radiation Monitoring

(1) Measures shall be taken at the waste disposal facility to appropriately monitor the concentration of radioactive materials etc. on the discharge route of radioactive gaseous and liquid wastes that is discharged from the associated facilities of the waste disposal facility.

Measures shall be taken to appropriately monitor the radiation dose, the concentration etc. of radioactive materials in the environment in accordance with the amount of released radioactive materials.

(2) Measures shall be taken at the waste disposal facility to appropriately monitor the concentration of radioactive materials etc. leaking out from the waste disposal facility to the underground water etc. and migrating to the human environment in the 1st step and the 2nd step, or in the disposal step.

Other Safety Measures

1 Design Considerations to Earthquakes

The waste disposal facility shall be designed for the design base earthquake force to preserve safety functions required for the appropriate time period.

This design base earthquake force shall be defined corresponding to the C class facility in the classification of importance for seismic design specified in the "Examination Guide for Seismic Design of Nuclear Power Reactor facilities".

2 Design Considerations to Natural Phenomena other than Earthquake

The waste disposal facility shall be designed taking into considerations of the expected natural phenomena other than the earthquake to preserve required safety functions required for the appropriate time period referring to the past record, at-the-spot observation, etc. in the site and its vicinity.

3 Considerations to Fire and Explosion

Measures shall be taken at the waste disposal facility to prevent occurrence of the fire and explosion, and to prevent excessive release of radioactive materials to the outside of the facility even at the emergency of fire and explosion.

4 Considerations to Loss of Power Supply

Measures shall be taken at the associated facilities of the waste disposal facility responding to the loss of function of the external power supply system.

5 Conformity to Standards and Criteria

The waste disposal facility shall be designed and constructed based on the standards and the criteria accepted as appropriate.

Termination of Control Time Period

Management and control of the waste disposal facility carried out from a viewpoint of the exposure control may be terminated by the end of the limited time span, and the radiation dose of the general public assumed to be imposed from the waste disposed shall be low enough so as the control is no more necessary after the termination of the control.

Table H6-1 Technical standards for Waste Disposal Facilities etc.

1. The Technical standards for radioactive waste disposal facility

(1) Technical standards provided in Article 7 of the Rule for Disposal of Category 1 Waste Disposal of Nuclear Fuel Material or Material Contaminated with Nuclear Fuel Material

(1) A waste repository shall be in consistent with the license application documents set forth in Article 51-2 paragraph 1 or Article 51-5 paragraph 1 of the Law and a document describing the conditions for the license granted in accordance with Article 62-2 paragraph 1 of the Reactor Regulation Law (hereinafter referred to as "the license documents").
(2) Tunnels and shafts shall be in consistent with the license documents.
(3) The total radioactivity of specific radioactive materials contained in the radioactive wastes disposed in a waste disposal facility site shall not exceed, due to disposal, the total radioactivity described in the license documents.
(4) Explosive materials, materials that significantly corrode other materials and other hazardous materials shall not be disposed in a waste repository.
(5) A waste repository shall be backfilled in the way described in the license documents.

(2) Technical standards provided in Article 6 of the Rule for Disposal of Category 2 Waste Disposal of Nuclear Fuel Material or Material Contaminated with Nuclear Fuel Material

Article 6
(1) The total amount of the radioactivity for each type of radioactive materials contained in the radioactive waste to be emplaced at the place of business where the waste disposal facility is constructed shall not exceed the total amount of radioactivity for each type of radioactive materials indicated on the application concerning the license as provided in the provisions of Article 51-2 paragraph 1 or Article 51-5 paragraph 1 of the Law, and the document which describe the conditions required for the license as provided in the provision of Article 62-2 Paragraph 1 of the Law ("referred to as "the application etc.", hereinafter in this article, Article 6-3 and Article 8);
(2) Before starting waste repository disposal, the stagnant water at the places for disposal in the waste disposal facility (when the waste disposal facility is demarcated with internal partition equipment of Subparagraph (3) of the following article, the demarked area for the waste repository disposal, the same, hereinafter in this subparagraph) shall be removed, and at the time of waste repository disposal, measures shall be taken to prevent the infiltration of rain water etc. into the places concerned;
(3) In the case of waste repository disposal of solidified concrete etc., measures shall be taken to prevent the scattering of radioactive materials when there is a possibility that the materials may disperse out of the waste disposal facility;
(4) The waste disposal facility shall be taken measures by filling up with the soil etc., so that a void does not remain after waste repository disposal is completed in the waste disposal facility concerned;
(5) Explosive materials, materials that corrode other materials remarkably, and other hazardous substances shall not be disposed of in the waste disposal facility;
(6) The waste disposal facility where the disposal is completed, the surface shall be covered with the soil, so that the disposed materials and the equipment installed in the waste disposal facility does not expose easily; and
(7) Waste disposal facilities shall have the structure and equipment described in the application etc. other than those provided in the preceding subparagraphs.
2 In case where waste repository disposal is carried out by disposal facility with outer artificial barrier shall be as described in the following subparagraphs, in addition to those provided in the preceding paragraphs:
(1) It shall be constructed following the methods provided by the Minister of METI for the prevention of radiation hazards;
(2) The artificial barrier structure shall be in conformity with the following requirements;
(a)The structure shall be safe from the view point of yield strength against the self weight, earth pressure, seismic force, etc.; and
(b)The measure shall be taken for the effective corrosion prevention according to the quality of the surface water, underground water, and the soil.
(3) The waste disposal facility, which area of opening exceeds 50 square meters or which disposal volume exceeds 250 cubic meters, shall be in conformity with the requirements of the preceding article, and for the prevention of radiation hazards, the place shall be demarcated so that one demarcated area shall not exceed about 50 square meters or one demarcated disposal volume not exceed about 250 cubic meters by a method applied with the internal partition equipment

provided by the Minister of METI;
(4) When the waste repository disposal is carried out, the artificial barrier structure and the internal partition equipment described in Subparagraph (3) shall be inspected at any time, and when there is a possibility of destruction of these equipments or leak of radioactive materials, required measures shall be taken to prevent destruction of these equipments, or leak of radioactive materials; and
(5)Waste disposal facility where the waste repository disposal is completed, or where the place is demarcated by the internal partition equipment described in Subparagraph (3), the demarcated area where the disposal is completed, shall be covered by the method provided in the Subparagraph (2) and provided by the Minister of METI for the prevention of radiation hazards as provided in Subparagraph (6) of the preceding article, soon before covering with the soil.

3 In the case of waste repository disposal is carried out by disposal facility without outer artificial barrier shall be as described in the following subparagraphs, in addition to those provided Paragraph 1:
(1) It shall be constructed following the methods provided by the Minister of METI for the prevention of radiation hazards; and
(2) Radioactive waste materials etc. solidified in one piece shall be in conformity with the requirements described in Subparagraph (2) of the preceding Paragraph, and the volume shall not exceed about 500 cubic meters,

2. Technical standards for radioactive wastes to be disposed

(1) Technical standards provided in Article 12 of the Rule for Disposal of Category 1 Waste Disposal of Nuclear Fuel Material or Material Contaminated with Nuclear Fuel Material

(1) Radioactive waste to be disposed shall be waste form.
(2) Technical standards of radioactive waste form shall be as described in the following subparagraphs:
(a) For the prevention of radiation hazards, radioactive wastes shall be enclosed or solidified in the container;
(b) The radioactivity concentration shall not exceed the maximum radioactivity concentration indicated in the application etc.;
(c) Any materials with a possibility of spoiling the integrity of waste form;
(d) It shall have enough strength to bear the potential load that may be extended during waste repository disposal;
(e) There shall be no marked damage; and
(f) Waste form etc. shall be labelled with tag with serial number identifying the waste form as provided by application of the preceding Article. These tag should use the method which does not disappear easily, and be marked at visible spot

(2) Technical standards provided in Article 8 of the Rule for Disposal of Category 2 Waste Disposal of Nuclear Fuel Material or Material Contaminated with Nuclear Fuel Material

Article 8
(1) For intermediate depth disposal
(a) Radioactive waste to be disposed shall be from a plant or site provided with a fabrication facility (limited to a facility that fabricates only uranium-plutonium mixed oxide fuel), reactor facility or reprocessing facility.
(b) Radioactive waste to be disposed shall be waste packages.
(c) Waste packages shall meet the following requirements.
(2) For pit disposal
(a) Radioactive waste to be disposed shall be from a plant or site with a reactor facility..
(b) Radioactive waste to be disposed shall be waste package or solidified concrete waste.
(c) The waste package or solidified concrete waste shall meet the following requirement or the requirements described in paragraph 3.
(3) For trench disposal
(a) Radioactive waste to be disposed shall be from a plant or site with a reactor facility.
(b) Radioactive waste to be disposed shall be solidified concrete waste.
(c) The solidified concrete waste shall meet the requirement described in paragraph3.

2 Technical standards of radioactive waste form for intermediate depth disposal and for disposal with artificial barrier shall be as described in the following subparagraphs:
(1) For the prevention of radiation hazards, radioactive wastes shall be enclosed or solidified in the container using the methods provided by the Minister of METI;
(2) The radioactivity concentration shall not exceed the maximum radioactivity concentration indicated in the application etc.;

(3) The density of radioactive materials on the surface shall not exceed one tenth of the surface density limit specified in Article 14 Paragraph 1 Item (c);
(4) Any materials with a possibility of spoiling the integrity of radioactive waste materials shall not be contained;
(5) It shall have enough strength to bear the potential load that may be extended during waste repository disposal;
(6) There shall be no marked damage; and
(7)Waste form etc. shall be labelled with tag indicating the radioactive waste with serial number identifying the waste form as provided by the application of the preceding Article. These tag should use the method which does not disappear easily, and be marked at visible spot
3 The technical standards to wastes, such as solidified concrete waste shall be as described in the following subparagraphs:
(1) An explosive material shall not be included;
(2) The measure to compare with items described in the application shall be taken for the solidified concrete waste. and
(3) The radioactivity concentration shall not exceed the maximum radioactivity concentration indicated in the application etc.

Table H6-2 Items that should be described in Operational Safety Program (Article 63 paragraph 1 of the Rule for Disposal of Category 1 Waste Disposal of Nuclear Fuel Material or Material Contaminated with Nuclear Fuel Material)

(1) Duties and organization of personnel engaged in management of the radioactive waste disposal facility
(2) Safety education for personnel engaged in radiation work at the disposal facility concerning:
  (a) Safety education policy (including its implementation plan);
  (b) Details of safety education concerning:
    1) related laws, regulations and the Operational Safety Program;
    2) structure, performance and operation of disposal facility;
    3) radiation control;
    4) handling of nuclear fuel material ; and
    5) emergency preparedness;
  (c) Other necessary matters concerning safety education concerning waste disposal facilities.
(3) Operation of systems to be specially controlled for safety reasons
(4) Establishment of a controlled area, a peripheral monitoring area and preservation area of a disposal facility, and restriction of access to these areas;
(5) Gaseous and liquid discharge monitoring equipment;
(6) Monitoring of dose, dose equivalent, radioactive material concentration and surface contamination density by radioactive materials, and decontamination;
(7) Management of radiation measurement equipment and measuring method;
(8) Patrol and inspection of disposal facility and measures to be taken after patrol and inspection;
(9) Self-imposed periodic facility inspection of waste disposal facility
(10) Receipt, transport, storage and handling of radioactive waste;
(11) Emergency preparedness;
(12) Records of the safe operation of disposal facility (including compliance with the Operational Safety Program); and
(13) Periodic assessment of waste disposal facility
(14) Quality assurance for waste disposal facility
(15) Other matters necessary for the safe operation of disposal facility.

Table H6-3 Methods for Disposal (summary of Article 61 of the Rule for Disposal of Category 1 Waste Disposal of Nuclear Fuel Material or Material Contaminated with Nuclear Fuel Material)

1. Gaseous waste disposal
Gaseous wastes shall be disposed of by any of the following methods:
(1) Discharge through ventilation facilities;
The concentration of radioactive materials under ventilation shall be controlled as low as possible by filtering, decay radioactivity, dilution with a lot of air, etc. at the ventilation facilities. In this case, the concentration of radioactive materials in the air at the ventilation port, or at the exhaust monitoring equipment shall be monitored, so as not to exceed the concentration limits provided by the Minister of METI at outside boundary of peripheral monitoring area;
(2) Retain and store in a gaseous waste storage tank that is effective for the prevention of radiation hazards.

2.Liquid waste disposal

Liquid wastes shall be disposed of by any of the following methods:

(1) Discharge through discharge facilities;

The concentration of radioactive materials under discharge shall be made as low as possible by filtering, evaporation, adsorption by an ion exchange resin method etc., decay radioactivity, dilution by plenty of water, and other methods at the discharge facility. In this case, the concentration of radioactive materials in the underwater at the discharge port, or at the discharge water monitoring equipment, shall be monitored so as not to exceed the concentration limits at outside boundary of peripheral monitoring area provided by the Minister of METI;

(2) Retain and store in a liquid waste storage tank that is effective for the prevention of radiation hazards;

(3) Enclose in a container or solidify in a container, and store in a storage facility that is effective for the prevention of radiation hazards;

(a) When enclosing radioactive wastes in a container, the container concerned shall be in conformity with the following standards:

- The structure shall have low permeability, corrosion resistant and low leakage of radioactive wastes;
- There shall be no possibility of crack or damage; and
- The lid of the container shall not be taken off easily.

(b) When solidifying radioactive wastes in a container, the container used for solidifying the radioactive wastes shall be protective against dispersion or leakage of the radioactive waste;

(c) When storing in a storage facility that is capable of prevention of radiation hazards, the following items shall be subjected:

- When radioactive wastes are enclosed in a container, and are stored, the container concerned shall be wrapped with materials which are capable to absorb all of the enclosed radioactive wastes, or provided with a saucer which is capable to accommodate all of the wastes, when a crack or a damage arises to prevent spread of the contamination;
- The container in which radioactive wastes were enclosed or solidified, shall be attached with marks that shows that the content is radioactive wastes, and a serial number corresponding to the radioactive waste whose recorded content based on the provisions of Article 44 shall be displayed to compare; and
- Post up notes for administration and control of the disposal facility concerned in the place easily visible.

(4) Incinerate by an incineration facility that is effective for the prevention of radiation hazards

(5) Solidify by a solidifying facility that is effective for the prevention of radiation hazards; or

(6) Waste repository disposal in a waste disposal facility in accordance with the technical standards for disposal facility and radioactive waste to be disposed;

The concentration of radioactive materials in the underwater at the boundary of the outside of an peripheral monitoring area shall be controlled not to exceed the concentration limits provided by the Minister of METI by monitoring the concentration of radioactive materials in the underwater of the peripheral monitoring area

3. Solid waste disposal

Solid wastes shall be processed and stored of by any of the following methods:

(1) Incinerate by an incineration facility that is effective for the prevention of radiation hazards;

(2) Enclose in a container or solidify in a container, and store in a storage facility that is effective for the prevention of radiation hazards, and dispose;

(a) When enclosing radioactive wastes in a container, the container concerned shall be in conformity with the following standards:

- The structure shall have low permeability, corrosion resistant and low leakage of radioactive wastes;
- There shall be no possibility of crack or damage; and
- The lid of the container shall not be taken off easily.

(b) When solidifying radioactive wastes in a container, the container used for solidifying the radioactive wastes shall be protective against dispersion or leakage of the radioactive waste;

(c) When storing in a storage facility that is capable of prevention of radiation hazards, the following items shall be subjected:

- The container in which radioactive wastes were enclosed or solidified, shall be attached with marks that shows that the content is radioactive wastes, and a serial number corresponding to the radioactive waste whose recorded content based on the provisions of Article 44 shall be displayed to compare; and
- Post up notes for administration and control of the disposal facility concerned in the place

easily visible.
(3) Radioactive waste such as a large machine, which is very difficult to process by the method of Item (2) or any radioactive waste that needs the decay of radio-activities with time, shall be stored in a depository that is effective for the prevention of radiation hazards, and dispose; Post up notes for administration and control of the disposal facility concerned in the place easily visible.
(4) Waste repository disposal in a waste disposal facility in accordance with the technical standards for disposal facility and radioactive waste to be disposed;
The concentration of radioactive materials in the underwater at the boundary of the outside of an peripheral monitoring area shall be controlled not to exceed the concentration limits provided by the Minister of METI by monitoring the concentration of radioactive materials in the underwater of the peripheral monitoring area

Table H6-4 The Incidents Reporting Criteria (Article 89 of the Rule for Disposal of Category 1 Waste Disposal of Nuclear Fuel Material or Material Contaminated with Nuclear Fuel Material)

Upon occurrence of any of the following incidents, the Licensee of a Category 1 Waste Disposal shall immediately give notice to the Minister of METI, and report within ten days on the details of the incidents and corrective measures taken:
(1) Theft or loss of nuclear fuel material;
(2) Failures of a disposal facility that disturb category 1 waste disposal work as special measures are needed for repair of the failure;
(3) Failures of a disposal facility that disturb category 1 waste disposal work as a result of loss or potential loss of confinement function of nuclear fuel materials etc. in the limited area, radiation shielding function to prevent radiation hazards by external radiation, or fire or explosion protection function in a waste disposal facility;
(4) Abnormal condition of discharge of gaseous radioactive wastes at ventilation facility or discharge of liquid radioactive wastes from a discharge facility due to failures of a disposal facility or other unexpected events;
(5) Atmospheric radio-nuclides concentrations by radiation monitoring outside peripheral monitoring area exceeding limit provided by the Minister of METI because of discharge of gaseous radioactive waste;
(6) By radiation monitoring, radio-nuclides concentrations in discharged water at the outer boundary of peripheral monitoring area exceeding limits provided by the Minister of METI ;
(7) Leakage of nuclear fuel materials, etc. outside the controlled area;
(8) Leakage of nuclear fuel materials, etc. inside the controlled area due to a failure of disposal facility or other unexpected events excluding following cases (excluding the case when the measures such as access control or key control for the area related to the leakage or when the leaked material spreads outside the controlled area);
- When the leaked liquid nuclear fuel materials etc. does not spread outside the curb readily installed around the equipment for prevention of spreading of leakage;
- The function of ventilation related to the area of the leakage of gaseous nuclear fuel materials etc. is maintained appropriately;
- The amount of radioactivity of leaked nuclear fuel materials etc. is very small or the degree of leakage is minor.

(9) Effective dose by radiation exposures of personnel in the controlled area exceeding or likely to exceed dose limits of 5mSv for radiation workers and 0.5mSv for non-radiation workers due to a failure of a disposal facility or other unexpected events;
(10) Radiation exposures of radiation workers exceeding or likely to exceed the dose limits specified by the Minister of METI ;
(11) Any other hazards to personnel occurring or likely to occur at the facility (excluding minor non-radiation hazards).

L5 Illustrations related to spent fuel storage

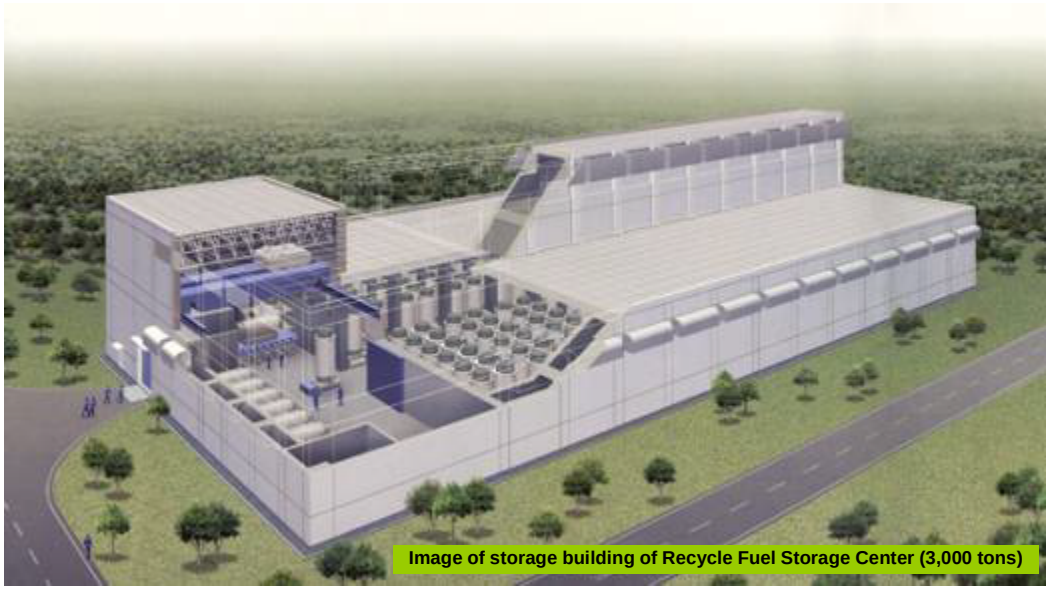


Fig. L5-1 Conceptual Drawing of Recycle Fuel Storage Center
(Source: Home page of Recycle Fuel Storage Company)

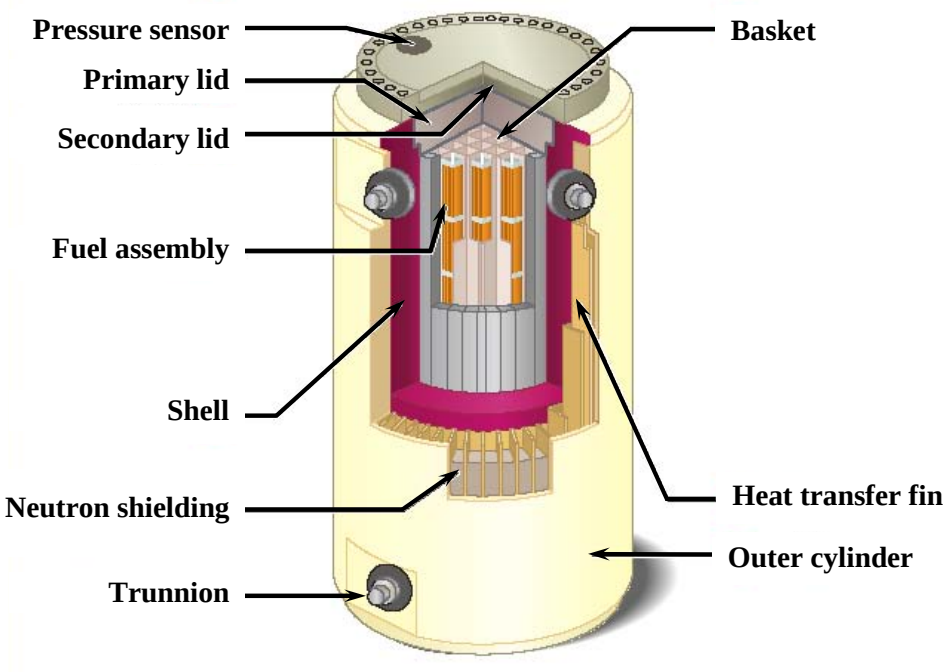


Fig. L5-2 Concept of metallic cask
(Source: Home page of Recycle Fuel Storage Company)

L6 Illustrations related to waste disposal

L6.1 Categorization of waste disposal methods

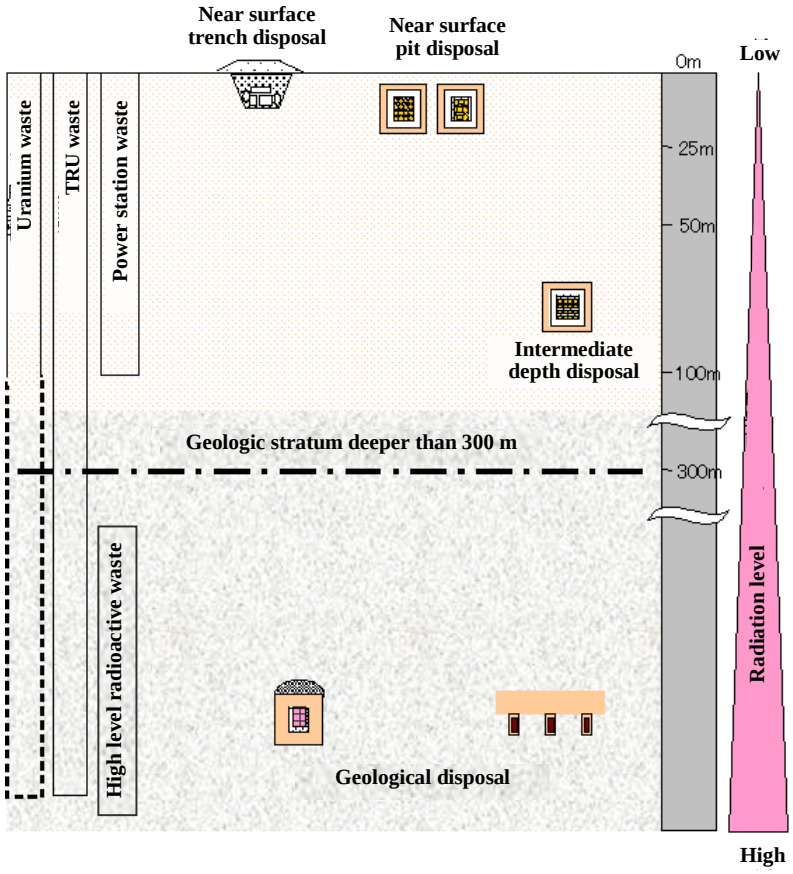


Fig. L6-1 Categorization of radioactive waste disposal methods in Japan
(Source: Home page of the Agency for Natural Resources and Energy)

L6.2 Near surface pit disposal

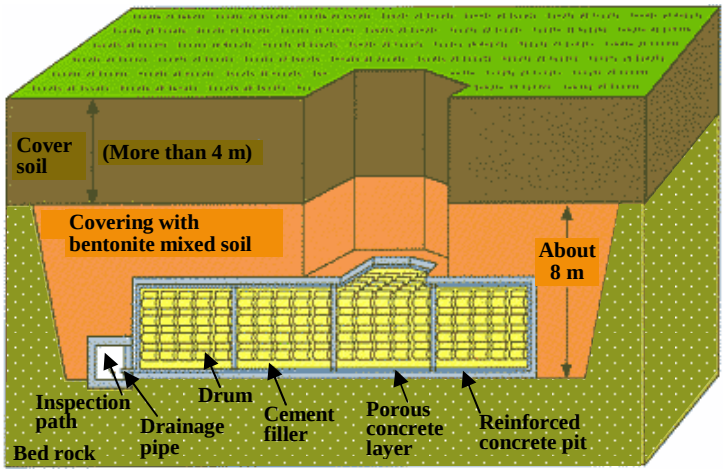


Fig. L6-2 Example of near surface pit disposal
(Source: Home page of the Agency for Natural Resources and Energy)

L6.3 Intermediate depth disposal

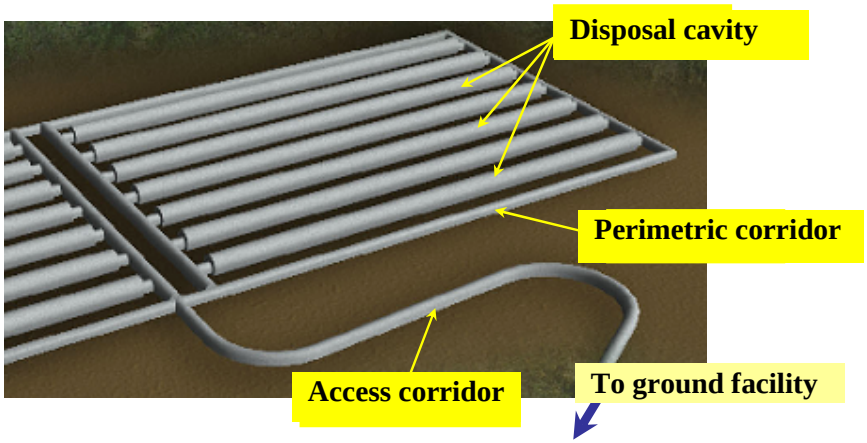


Fig. L6-3-1 Underground structure of waste disposal facility
(Source: "Safety Regulation on Intermediate depth disposal of low level radioactive waste", Waste Safety Subcommittee, Subcommittee on Nuclear and Industrial Safety, Advisory Committee for Natural Resources and Energy, January 2008)

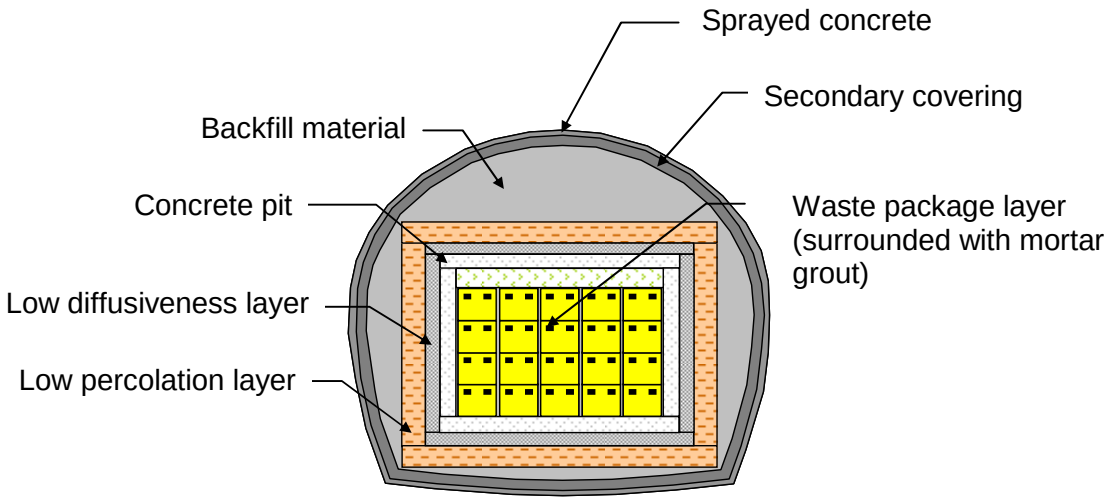


Fig. L6-3-2 Vertical sectional view of disposal cavity
(Source: "Safety Regulation on Intermediate depth disposal of low level radioactive waste", Waste Safety Subcommittee, Subcommittee on Nuclear and Industrial Safety, Advisory Committee for Natural Resources and Energy, January 2008)

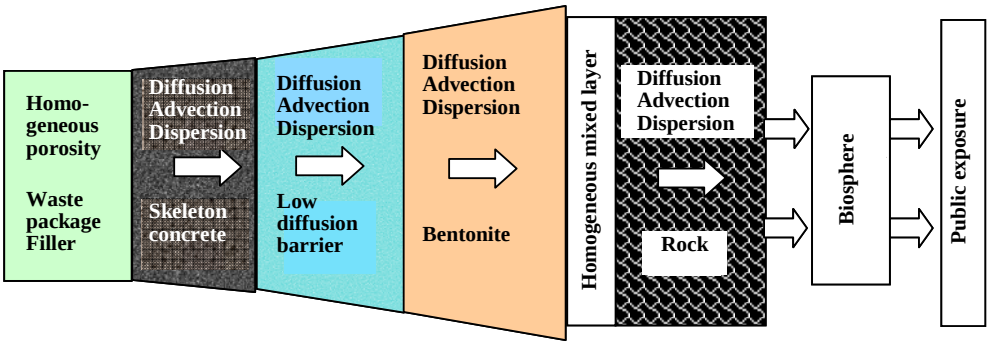


Fig. L6-3-3 Performance evaluation model for safety evaluation
(Source: "Safety Regulation on Intermediate depth disposal of low level radioactive waste", Waste Safety Subcommittee, Subcommittee on Nuclear and Industrial Safety, Advisory Committee for Natural Resources and Energy, January 2008)

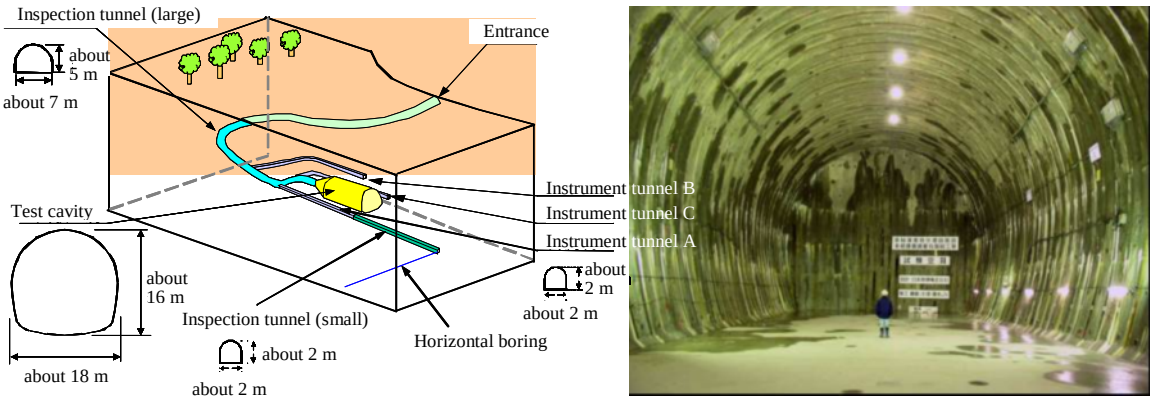


Fig. L6-3-4 Inspection tunnel
(Source: "Safety Regulation on Intermediate depth disposal of low level radioactive waste", Waste Safety Subcommittee, Subcommittee on Nuclear and Industrial Safety, Advisory Committee for Natural Resources and Energy, January 2008)

L6.4 Geological disposal

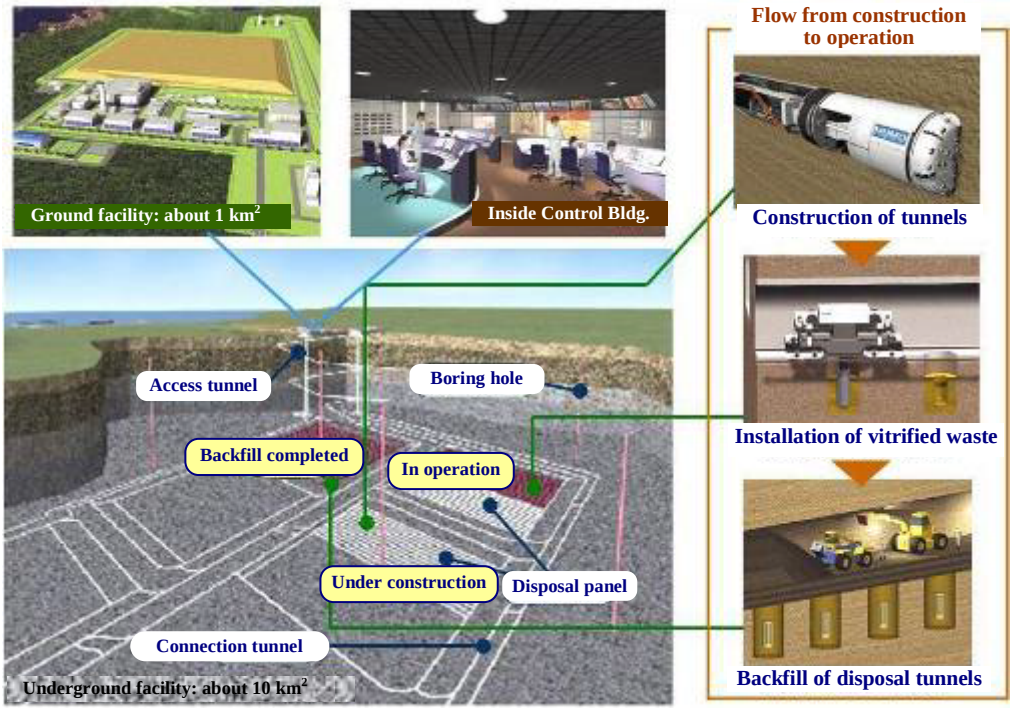


Fig. L6-4-1 Concept of geological disposal
(Source: Home page of Nuclear Waste Management Organization of Japan)

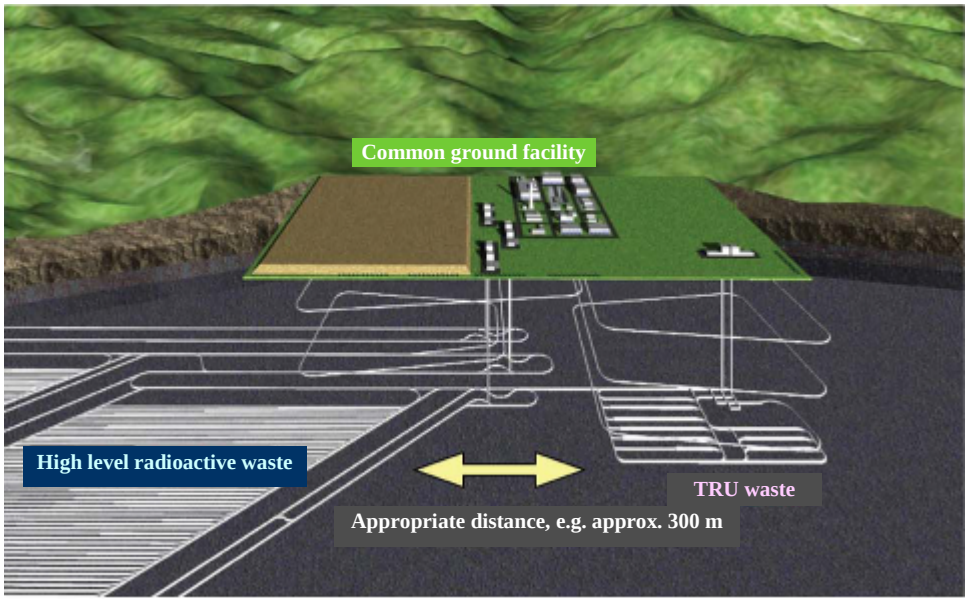


Fig. L6-4-2 Concept of single-site disposal
(Source: Home page of the Agency for Natural Resources and Energy)