

Provisional Translation

Convention on Nuclear Safety  
National Report of Japan  
for Second Review Meeting

October 2001

Government of Japan

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## Acronym and Abbreviation Used in this Report

ABWR	advanced boiling water reactor
APWR	advanced pressurized water reactor
AEC	Atomic Energy Commission
ALARA	as low as reasonably achievable
BSS	Basic Safety Standards
BTC	BWR Operation Training Center
BWR	boiling water reactor
CRIEPI	Central Research Institute of Electric Power Industry
Dose Limit Notification	Notification for Dose Limits on the basis of the Rules for Commercial Power Reactors
EIS	Environmental Impact Statement
Examination Guide for Safety Design	Examination Guide for Safety Design of Light Water Nuclear Power Reactor Facilities
Examination Guide for Safety Evaluation	Examination Guide for Safety Evaluation of Light Water Nuclear Power Reactor Facilities
Examination Guide for Seismic Design	Examination Guide for Seismic Design of Nuclear Power Reactor Facilities
Examination Guide for Nuclear Reactor Siting	Examination Guide for Nuclear Reactor Siting Evaluation and Application Criteria
Fugen	heavy water moderated boiling light water cooled reactor owned by JNC
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
INES	International Nuclear Event Scale
INPO	Institute of Nuclear Power Operations
ISI	in-service inspection
JAERI	Japan Atomic Energy Research Institute
JAPEIC	Japan Power Engineering and Inspection Corporation
JCO Criticality Accident	Criticality Accident at JCO Co. Uranium Fuel Fabrication Facility
JEAG	Japan Electric Association Guidelines
JNC	Japan Nuclear Cycle Development Institute
JPDR	Japan Power Demonstration Reactor
JSME	Japan Society of Mechanical Engineers
LCO	Limiting Conditions for Operation

METI	Ministry of Economy, Trade and Industry
Minister of METI	Minister of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
Minister of MEXT	Minister of Education, Culture, Sports, Science and Technology
MITI	Ministry of International Trade and Industry (METI at present)
Mj	Japan Meteorological Agency seismic intensity scale
Monju	prototype fast breeder reactor owned by JNC
NISA	Nuclear and Industrial Safety Agency
NPS	nuclear power station
NSC	Nuclear Safety Commission
NS Network	Nuclear Safety Network
NSRR	Nuclear Safety Research Reactor
NTC	Nuclear Power Training Center
NUPEC	Nuclear Power Engineering Corporation
NUSS	Nuclear Safety Standards, IAEA
OECD/NEA	Organization of Economic Co-operation and Development
PSA	probabilistic safety assessment
PSR	periodic safety review
PWR	pressurized water reactor
QA	quality assurance
Reactor Regulation Law	Law for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors
R & D reactor	Power reactors at the stage of research and development
RPS	reactor protection system
Special Law for Nuclear Emergency	Special Law of Emergency Preparedness for Nuclear Disaster
V&V	verification and validation
WANO	World Association of Nuclear Operators

## Preface

### 1. Preparation of the report

This report was prepared by the Nuclear and Industrial Safety Agency (NISA) in consultation with other relevant governmental organizations, and was reported to the Nuclear Safety Commission. In preparing the report, cooperation was obtained from the Nuclear Power Engineering Corporation, the Japan Power Engineering and Inspection Corporation, and the Federation of Electric Power Companies. The report was also sent to solicit comments from the Nuclear and Industrial Safety Subcommittee of the Advisory Committee for Natural Resources and Energy for the Ministry of Economy, Trade and Industry.

This report was prepared to provide supplementary information in response to the particular interest that was shown in the Summary Report of the first Review Meeting, and to address questions on our first report raised by the Contracting Parties as well as comments submitted during the review process. The length and depth of description of this report is as follows. The whole of the legislative and regulatory framework is concisely reproduced in this report with detailed description of modifications and supplementary information, dispensing with cumbersome references to the first report. On the other hand, description of operating experience, alterations of installations and progress in research and development is limited to the three years since the first Review Meeting (April, 1999), deleting duplication from the first report.

Nuclear installations, the safety of which this Convention shall apply, correspond to commercial power reactors and power reactors at the stage of research and development, under the national legislative and regulatory framework. The report deals with those installations.

### 2. Current status of nuclear installations and activities in Japan

As of September 2001, Japan has 52 nuclear installations in operation and 2 installations in the commissioning stage, with a total licensed output of about 46.2 GWe. Onagawa Unit 3 entered the commissioning stage in April 2001, and the operation of the fast breeder reactor Monju has been suspended since December 1995 due to the intermediate loop sodium leakage incident during its commissioning stage. In addition, an installation at Tokai Power Station has been in a decommissioning stage since 1998.

Nuclear installations accounted for about 20% of the nation's total electricity generation capacity, and supplied about 34% of total electricity generated during 1999. Average annual capacity factors have exceeded 80% since 1995. In this reporting period there has been no major incident at the nuclear installations and stable operations continue. The frequency of unplanned shutdowns are approximately 0.3 times a reactor-year.

The nuclear power generation project is expanding in Japan with three nuclear installations under construction and six nuclear installations in the planning stage, one being incorporated into the Basic Plan for Electric Power Development in the year of 1999, with two in 2000 and two more in 2001.

A reprocessing plant for light water reactor spent fuel at Rokkasho, Aomori Prefecture, is under construction, and is scheduled to be commissioned in the year 2005. The carry-in of spent fuel to the installation began in 2000.

Intermediate storage of spent fuel is aimed at providing flexibility to nuclear fuel cycle management. A law for its regulation was enacted in 1999 and a storage facility is scheduled to start operation before 2010.

In Japan, high level radioactive waste generated in spent fuel reprocessing plants are to be vitrified, stored for 30 to 50 years for cooling down, and then finally disposed of in a geological repository. The temporary storage of high-level radioactive vitrified waste has begun in Rokkasho, and final disposal is scheduled to begin in the latter half of the 2030s.

### 3. International activities ensuring safety of nuclear installations

Recognizing that international cooperation is essential in ensuring the safety of nuclear installations, Japan has been eagerly participating in various activities of the IAEA and the OECD/NEA such as information exchanges and discussions on safety related issues. Japan has made a positive commitment to cooperation programs establishing and enhancing regulatory bodies in other Asian countries by offering extrabudgetary funding to the IAEA. Moreover, Japan has been exchanging regulatory information on nuclear safety with China, France, Germany, Korea, Sweden, UK and USA through bilateral arrangements.

Through these activities, Japan shares its knowledge and experiences with regulatory bodies of Contracting Parties, and is contributing to international standardization and upgrading of safety regulation and management.

Electric Power Companies of Japan is also contributing to maintaining high levels of safety and reliability of nuclear installations in Asia through cooperation in managing the WANO Tokyo Center.

### 4. Specific topics in the report

#### 4.1 Establishment of the Nuclear and Industrial Safety Agency

The administrative organizations of the central government of Japan underwent extensive reorganization and realignment in January 2001. Under the new administrative structure, the Minister of Economy, Trade and Industry serves as the ministry in charge of safety regulation for all facilities and activities concerning utilization of nuclear energy, and NISA has been established as a special organization under the Ministry of Economy, Trade and Industry, dedicated to the administration of safety regulations.

Although prior to the reorganization, departments and divisions entrusted with overseeing safety regulation had been legally separated from those entrusted with development and utilization of nuclear energy, the establishment of NISA further clarifies responsibility and accountability for safety regulation and achieves effective “de jure” and “de facto” separation. Details are given in Section 8. 3.

#### 4.2 Strengthening the function of the Nuclear Safety Commission



The criticality accident at JCO Co. Uranium Fuel Processing Plant (the JCO Criticality Accident) led to an increase in personnel and a strengthening of the functions of the Nuclear Safety Commission (the NSC), with its Secretariat being transferred to the Prime Minister's Office in April 2000. The newly established Subsequent Regulation Review aims to observe adequacy of regulatory activities of NISA at each stage after issuing establishment licenses. The reorganization of governmental organizations in January 2001 resulted in the further expansion and strengthening of the NSC, and the Secretariat was transferred to the Cabinet Office.

#### 4.3 Response to the JCO Criticality Accident and the reconstruction of nuclear safety structure

The most serious event in the nuclear energy sector in Japan during this reporting period was the JCO Criticality Accident, where for the first time in Japan, two heavily irradiated workers lost their lives, radiation streamed out of the facility site, and local residents were instructed to find shelter or evacuate. It led to first time application of the Law on Compensation for Nuclear Damage. Although the facility was not a nuclear installation as defined by the Convention on Nuclear Safety, the national regulatory bodies, local governments, industries and academies viewed the accident as an alarm bell with regard to the safety of nuclear installations in Japan, and took a number of remedial actions.

The NSC established the JCO Criticality Accident Investigation Committee, which investigated the cause of the accident and issued an urgent proposition and final report. The White Paper on Nuclear Safety issued by the NSC in 2000, referring to the final report of the Investigation Committee, pointed out violations of authorized rules by the operating company as the direct cause of the accident, and a defective safety culture behind it. It also served to point out insufficiencies in the regulatory process, an erroneous emphasis with regard to safety examinations by the regulatory body on design validity of systems and facilities rather than on details of operating procedure, and that the Periodical Inspection by the regulatory body had not worked effectively to monitor the operating company's compliance with the Safety Preservation Rules.

The license issued to the company was annulled due to its violation of the Reactor Regulation Law. Considering the urgent proposition of the Investigation Committee, the government amended the Reactor Regulation Law to establish the Nuclear Safety Inspection System mandating resident Nuclear Safety Inspectors to confirm compliance with Safety Preservation Rules. An additional amendment to safety education procedures was also included in the Safety Preservation Rules, and the Allegation System by employees and the Periodical Inspection System on Fuel Fabrication Facilities were established. Moreover, the Special Law on Emergency Preparedness for Nuclear Disaster was enacted in December 1999 to strengthen national nuclear emergency preparedness.

Nuclear industries established the Nuclear Safety Network to enhance and maintain sound safety culture through dialogue among industries and with local residents.

Details are given in the reports of related articles.

#### 4.4 Specific topics in each article

Major safety reviews and upgrades of existing nuclear installations during the past three

years are given in Article 6 of the report.

Article 7 details amendments to the Reactor Regulation Law mentioned above, amendments to the Electricity Utilities Industry Law on the establishment of the Welding Safety Management Inspection, etc., and the enactment of the Special Law on Emergency Preparedness for Nuclear Disaster, in addition to the concise reproduction of the entire legislative and regulatory framework. The establishment of NISA and the strengthening of the NSC are the focal topics in Article 8.

Fundamental safety policy of utilities and the establishment of the Nuclear Safety Network are introduced in Article 10. Submission of Explanation on Quality Assurance Program of nuclear facilities by license holders and the improvement of fuel inspection system are the main topics in Article 13. Article 14 reports results and progress of periodic safety reviews, measures taken for ensuring safety of aged nuclear installations and probabilistic safety assessments. The incorporation of ICRP Recommendation 1990, Publication 60, into the national legislation is reported in Article 15, in addition to the release records of radioactive waste. Details of the Special Law on Emergency Preparedness for Nuclear Disaster, amendments to Basic Plan for Emergency Response, and training and exercises are dealt with in Article 16.

Article 17 reports the establishment of the Environmental Impact Assessment Law while implementation of accident management and progress in digital reactor protection systems are treated in Article 18. Article 19 discusses reduction of the duration of the Periodical Inspection, establishment of Nuclear Safety Inspectors, and the enhancement and clarification of Safety Preservation Rules.

## A. General Provisions

## Article 6 Existing Nuclear Installations

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

### 6.1 Existing Nuclear Installations

There are a total of 55 existing nuclear installations (as defined in Article 2 of the Convention) in Japan, including 53 commercial power reactors, 51 in operation (BWR: 28, PWR: 23), one (Onagawa Unit 3: BWR) in commissioning stage and one (Tokai Power Station) in decommissioning stage, and two more power reactors at the stage of research and development (R & D reactor), which are the heavy water moderated boiling light water cooled reactor Fugen in operation and the fast breeder reactor Monju in commissioning stage. In addition, three installations are under construction and six more are being planned, all of which are light water reactors for commercial operation. The existing nuclear installations, as well as those under construction and being planned, are listed in Annex 1, and their locations are given in Fig. 6-1.

### 6.2 Major Safety Assessments and Corrective Actions

Followings are the results of major safety assessments conducted on existing nuclear installations by the regulatory body, and the corrective actions taken.

#### (1) Periodical Inspection and Nuclear Safety Inspection

Periodical Inspection is conducted by NISA at least once every 13 months at each existing commercial power reactor and once a year at each R & D reactor. Moreover, Nuclear Safety Inspectors conduct the Nuclear Safety Inspection four times a year to confirm the compliance with Safety Preservation Rules by the licence holders, and release the results. None of the installations were found to require significant corrective action in those inspections during

these three years.

(2) Periodic Safety Review

NISA requests licence holders to perform Periodic Safety Reviews approximately once every 10 years at each nuclear installation and to report the results to NISA. Section 14.5 of this report shows results of Periodic Safety Reviews performed at 14 installations during these three years (1999-2001). None of the 14 installations were found to require significant corrective action.

(3) Assessment and Preparation of Accident Management

NISA evaluated the technical adequacy of probabilistic safety assessment of each operating commercial power reactor carried out by the electric utility and the proposed accident management based on the PSA, and found that the proposed accident management would enhance safety. Electric utilities will prepare and implement the accident management at 51 commercial power reactors in operation by February 2002. Details are given in Section 18.4.

(4) Assessment of Important Safety Related Events

NISA and the NSC assessed important safety related events at nuclear installations both domestic and foreign, and applied the result to improve their regulatory activities. Licence holders also studied such events and provided feedback to their installations. No events rated level 2 or above by the International Nuclear Event Scale (INES), occurred during the reporting period.

Following is a report of primary coolant leakage event occurred in July 1999 at Unit 2 (PWR) of Tsuruga Power Station, the Japan Atomic Power Co., which was the only event rated level 1 by INES. While in rated power operation, an alarm was lit indicating high water level in reactor containment sump, and the reactor was manually shut down. It was confirmed that 51 cubic meters of primary coolant leaked from a crack on a pipe connecting regenerating heat exchangers. The cause of the crack was identified to be high cycle thermal fatigue due to structural flaws of the heat exchangers. As the remedial actions, the heat exchangers were replaced, the related technical standard and inspection procedure were revised, and the leakage monitoring and operating procedure were improved. Moreover, automation of decontamination work and improvement of inspection procedure were initiated.

(5) Other Initiatives to Improve Safety by Electric Utilities

Electric utilities, in addition to confirmation of safety by Periodic Safety Review and assessment and preparation of accident management, took following initiatives in order to promote comprehensive preventive maintenance and enhance reliability.

#### 1) Initiative in boiling water reactors (BWR)

The core shroud of a BWR forms reactor coolant path and supports equipment inside reactor pressure vessel. A crack was found at core shroud at a foreign BWR in 1990, which was followed by domestic BWRs. The cause was found to be stress corrosion cracking of stainless steel, and various remedial measures were studied and implemented. A reinforcement method called bracket method was adopted at Unit 2 of Fukushima Daiichi Nuclear Power Station, Tokyo Electric Power Co., Inc. and other units.

BWR owners group carried out research and development on shroud replacement technique in cooperation with domestic and foreign BWR manufacturers. Design of replacement equipment began in 1996, and after a full-scale mock up test, replacement of core shroud of Unit 3 of Fukushima Daiichi Nuclear Power Station, the first attempt in the world, was successfully completed in March, 1998. Other BWRs followed.

#### 2) Initiatives in pressurized water reactors (PWR)

Reactor vessel head penetration cracks have been found in foreign PWR plants since 1991, and vessel heads have been replaced with improved ones. Although no crack has yet been found in domestic PWRs, it was decided that vessel heads in some PWRs with higher vessel head penetration temperature be replaced with improved ones, enhancing reliability.

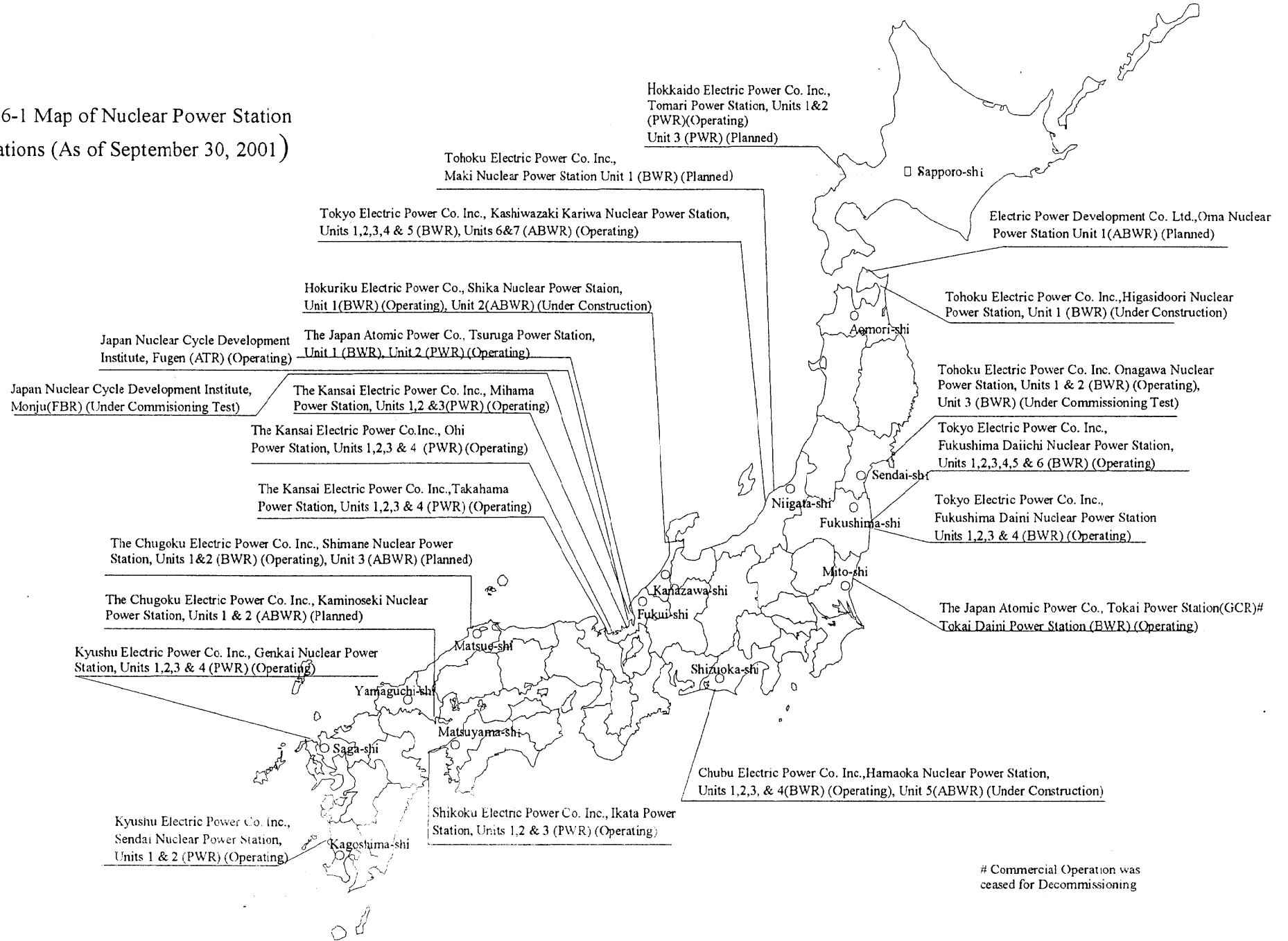
Defects have continuously been found on steam generator tubes made of Inconel MA600 in domestic PWRs. It is not much of a safety issue to keep using those steam generators with constant repair, as the defects can be detected by inspection well before penetration. As the technology to replace steam generators was well established, it was decided to replace those steam generators with improved ones, in order to enhance public confidence in nuclear power generation, to decrease radiation dose exposed to workers, and to reduce duration of Periodical Inspection. Nine PWRs completed replacement with good results, and two more PWRs will finish replacement before the end of 2001.

As shown in (1) to (5) above, apart from two nuclear installations in commissioning stage including Monju and one nuclear installation in decommissioning stage, none of 52 operating nuclear installations out of 55 existing nuclear installations is considered to require significant corrective actions for continued operation, on the basis of the assessment of Article 10 through Article 19. Monju has been shutdown since the intermediate loop sodium leakage incident in December 1995.

### 6.3 Position as to Continued Operation

On the basis of the results of the reviews described above, the Japanese government concluded that continued operation of the existing nuclear installations in Japan, except for installations at the commissioning and decommissioning stage, is appropriate.

Fig. 6-1 Map of Nuclear Power Station Locations (As of September 30, 2001)



-6-5-

# Commercial Operation was ceased for Decommissioning



## B. Legislation and Regulation

## Article 7 Legislative and Regulatory Framework

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

### 7.1 Basic Legislation Governing the Utilization of Nuclear Energy

Japan has enacted the Atomic Energy Basic Law as its basic law on the utilization of nuclear energy. The objectives of the Atomic Energy Basic Law are quoted as "to secure future energy resources, achieve progress in science and technology, and promote industry, by encouraging research, development, and the utilization of nuclear energy, and thereby contribute to improvement of the welfare of human society and the national living standard." The basic policy is prescribed as follows: "The research, development and utilization of nuclear energy shall be limited to peaceful purposes, on the basis of the priority of ensuring safety, and performed on a self-controlled basis under democratic administration, and the results therefrom shall be made public and actively contribute to international cooperation."

In order to attain these objectives and achieve the basic policy, the law prescribes the following:

- 1) Establishment of the Atomic Energy Commission and the Nuclear Safety Commission, and their duties, organization, administration, and authorities.
- 2) Regulations governing the nuclear fuel materials.
- 3) Regulations governing the construction, etc. of nuclear installations.
- 4) Prevention of radiation hazards.

The law also prescribes the assignment of these matters to the respective laws.

## 7.2 Legislative and Regulatory Framework Governing the Safety of Nuclear Installations

The major laws related to the safety regulation of nuclear installations are reported in this section, and shown in Fig.7-1. Apart from the laws in this section, the Law for Establishment of the Atomic Energy Commission and the Nuclear Safety Commission, the Ministry of Economy, Trade and Industry Establishment Law, etc. establish the administrative organizations involved in the safety regulation of the nuclear installations.

- (1) The Law for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (The Reactor Regulation Law) and the Electricity Utilities Industry Law

The Reactor Regulation Law, "in accordance with the spirit of the Atomic Energy Basic Law, to ensure that the uses of nuclear source material, nuclear fuel material, and reactors are limited to peaceful purposes, and carried out in a planned manner, and to ensure public safety by preventing the hazards due to the uses of nuclear source material, nuclear fuel material and reactors and providing physical protection of nuclear fuel material," provides for:

- 1) Refining of nuclear source material and nuclear fuel material
- 2) Fabrication of nuclear fuel
- 3) Establishment and operation of nuclear installations
- 4) Storage or reprocessing of spent nuclear fuel
- 5) Management and burial of radioactive wastes
- 6) Use of nuclear source material and nuclear fuel material
- 7) Use of internationally regulated substances, etc.

For the establishment and operation of nuclear installations, the law stipulates:

- 1) Regulations on the basic design or the design policy at the time of facility establishment (Licensing for Establishment)
- 2) Regulations on the detailed design at the time of facility construction (Approval of Design and Construction Methods)
- 3) Inspections at the time of facility construction (Welding Inspection, Pre-Service Inspection)
- 4) Regulations at the time of facility operation (Approval of the Safety Preservation Rules, and Nuclear Safety Inspection)
- 5) Inspections of facility during operation (Periodical Inspection of Facility)
- 6) Measures taken for safety preservation of installation and protection of specified nuclear fuel material
- 7) Regulations on facility transfer, and succession or merger of the licence holder
- 8) Dismantling of facility.

The main content of the regulations is as follows:

At the time of issuing the Licence for Establishment of a nuclear installation, the regulatory body conducts an examination to determine the adequacy of the site, and the basic design of structure and equipment from the points of emergency preparedness, focusing on the evaluation of the nuclear safety of the reactor core and the potential radiological hazards due to establishment of the nuclear installation. In addition, the regulatory body confirms that the applicant planning to establish the nuclear installation has sufficient technical capability to ensure safety and sufficient financial basis to execute the plan.

At the time of Approval of the Design and Construction Methods of nuclear installations, the regulatory body evaluates detailed design to determine whether the structures, system and components to be constructed have sufficient capability required by the basic design mentioned above. Also, it evaluates whether the integrity of pressure vessels and structural strength of equipment are adequate.

At the time of construction of a nuclear installation, the regulatory body conducts Welding Inspection during manufacturing, and Pre-Service Inspection of the structures, system, components and fuel assembly, confirming whether the construction of the facilities and the manufacturing of the components have been performed in accordance with the detailed design mentioned above. The regulatory body also conducts, during operation, the Periodical Inspection to continually confirm the integrity of the facilities and equipment.

The Electricity Utilities Industry Law has provisions for the Approval of Construction Plan, the Welding Safety Management Inspection, the Pre-Service Inspection and the Periodical Inspection of electric structures, and these provisions are applied to commercial power reactors, which are classified as electric structures by the Law, while the corresponding provisions of the Reactor Regulation Law are exempted from application. By the amendment of the Electricity Utilities Industry Law in 1999, the former provision of the Welding Inspection by the regulatory body or a body designated by it was replaced by the utility's self-inspection, the management system of which undergoes the Welding Safety Management Inspection by the regulatory body or a body designated by it. By another amendment of the law in 2000, the applicant for fabrication and import of fuel assembly submits description on quality assurance to be examined by the regulatory body.

At the operation of a nuclear installation, in addition to regulations focusing on the integrity of structural aspects described above, evaluation is also conducted concerning managerial aspects of the licence holder such as the organization, reporting system, operational procedure, equipment maintenance, surveillance, radiation dosage control for personnel, radioactive waste management, radioactive gaseous and liquid waste release management, radiation monitoring and safety education for personnel. These aspects are comprehensively documented in the "Safety Preservation Rules", which shall be approved by the regulatory body on the basis of the Reactor

Regulation Law.

By the amendment of the Reactor Regulation Law in December 1999, the Nuclear Safety Inspection System was established and the Nuclear Safety Inspectors who confirms compliance with the Safety Preservation Rules are stationed at each nuclear installation. The Safety Preservation Rules were strengthened to clarify the rules on safety education for personnel. Moreover, the Allegation System was established, encouraging personnel to allege violation of safety regulation at nuclear installation without unfavorable treatment.

(2) The Basic Law for Emergency Preparedness and the Special Law of Emergency Preparedness for Nuclear Disaster

The nuclear emergency preparedness had been addressed within the legal framework of the Basic Law for Emergency Preparedness before the outbreak of the JCO Criticality Accident in September 1999, which, revealing the special characteristics of nuclear emergency, resulted in the establishment of the Special Law of Emergency Preparedness for Nuclear Disaster in December 1999. The Special Law stipulates special measures for nuclear emergency, including obligation of licence holders for preventing nuclear emergency, the Declaration of Nuclear Emergency and establishment of the Nuclear Emergency Headquarters by the Prime Minister, activation of emergency measures, etc. It also stipulates that the Senior Specialist for Nuclear Emergency be stationed in the vicinity of each nuclear installation, who guides and advise the licence holder in preparing its Plan for Nuclear Emergency Preparedness and conducts its duty to prevent nuclear emergency and mitigate consequence should it occur.

Also, the nuclear emergency measures in the Basic Plan for Emergency Preparedness on the basis of the Basic Law for Emergency Preparedness have extensively been revised to clarify definition of occurrence of abnormal events, progression into nuclear emergency, and measures to be activated at each step of emergency. Details are given in the report of Article 16.

(3) Radiation Protection

The radiation protection at nuclear installations is regulated by the Reactor Regulation Law, the Electricity Utilities Industry Law and the Industrial Safety and Health Law.

The Reactor Regulation Law prescribes zone control in radiation protection, exposure control for personnel engaged in radiation work, measurement and monitoring of radiation levels, etc. in order to protect personnel and the public. The Electricity Utilities Industry Law regulates the radiation management equipment to be installed in nuclear installations. The Industrial Safety and Health Law regulates dosage control for personnel engaged in radiation work, which are equivalent to those of the Reactor Regulation Law. The Law for Technical Standards of Radiation Hazards Prevention maintains consistency among technical standards for radiation hazards prevention through establishment of the Radiation Review Council.

The ICRP Recommendation 1990 was incorporated into legislation in April 2001. Details are given in Section 15.1.

#### (4) The Environmental Impact Assessment Law

The Environmental Impact Assessment Law was enacted in June 1999, replacing the departmental decision, July 1977, of then MITI. The Law stipulates for the environmental impact assessment of nuclear installations other than safety assessment. Details are given in Section 17.5.

#### (5) The Law on Compensation for Nuclear Damage

The Law on Compensation for Nuclear Damage establishes the basic system on compensation for nuclear damage caused by the accident of a nuclear installation.

The Law adopts the “liability without fault” principle and imposes sole liability of compensation for nuclear damage on licence holders, exempting claimants from proving licence holder’s fault on the basis of the Civil Law. Also, infinite liability of compensation is imposed on the licence holder. To secure the fund of and to facilitate the compensation, the licence holder is required to make the Financial Arrangement for Nuclear Damage Liability. The amount of the Arrangement is sixty billion yen for a nuclear installation. The Arrangement consists of the Nuclear Damage Liability Insurance Contract with a civil insurer and the Indemnity Agreement for Compensation with the national government. The latter supplements the former in the case of large-scale accident such as caused by earthquake or volcanic eruption. And in case the total amount arranged by the licence holder is not sufficient for full compensation, the national government, on the basis of decision by the Diet, would aid to cover the licence holder. In the case of enormous natural disaster or social disturbance, the national government bears the compensation, exempting licence holders from liability for compensation.

### 7.3 Legislative and Regulatory Framework at Each Stage

Fig 7-2 presents an overview of the safety regulations on the basis of the Reactor Regulation Law etc. starting planning stage through operation stage. A summary of the safety regulations for a commercial power reactor is stated in this section.

#### (1) Planning Stage

When selecting a site for a nuclear installation, the electric utility, on the basis of the Environmental Impact Assessment Law and the Electricity Utilities Industry Law, performs environmental impact assessment, and submits to METI the draft Environmental Impact Statement (draft EIS) explaining current status of the environment and measures to protect it. The draft EIS is sent to the related local governments to be released for public comments. The utility provides their

views addressing comments expressed by the residents. Assessments on air, water, and soil pollution due to possible radioactive substances are performed under the Reactor Regulation Law and exempted from application of the Environmental Impact Assessment Law. METI conducts the evaluation, soliciting experts' opinion.

All of power generating facilities including nuclear installation are, on the basis of the Electric Power Development Promotion Law, to be incorporated into the national Basic Plan for Electric Power Development, after consulting with other relevant government organizations, receiving governors' views of relevant prefectures and passing through deliberations by the Electric Power Development Subcommittee, the Advisory Committee for Natural Resources and Energy for the Minister of METI.

The Basic Plan for Electric Power Development is established to facilitate and coordinate development, utilization and preservation of the land and to secure a coordinated supply of electric power. The R & D Reactors are not included in the Basic Plan.

METI, also, holds public hearings (primary public hearings) to obtain understanding and cooperation of local residents. The results of public hearings are taken into consideration in the safety examination.

## (2) Establishment Stage

The licence applicant, having completed the procedure of planning stage, shall submit application for the Establishment Licence to NISA in accordance with the Reactor Regulation Law. Applicants attach documents to the application including description on the safety design of the nuclear installation, radiation control, and accidents and failures.

NISA examines the application to determine whether it conforms to the licensing standards prescribed by the Reactor Regulation Law. In this examination, the examination guides in Table 7-1 and other documents established by the NSC are used. In the examination, site surveys, and analysis by a party other than the applicant are performed.

The Minister of METI consults with the AEC and the NSC on the results of its examination. The NSC conducts its review including holding a public hearing (secondary public hearing) concerning safety problems unique to the installation, and gives its views to the Minister of METI. The Minister of METI considers these views, asks for the consent of the Minister of MEXT, then issues the licence.

## (3) Construction Stage

On the basis of the Electricity Utilities Industry Law, the licence holder, before starting construction work, shall submit a Construction Plan of the establishment of an electric structure, and obtain the approval of NISA. NISA examines the Construction Plan to confirm that detailed design is consistent with the basic design and design policy approved at the Establishment Licence,

and with technical standards stipulated in the Electricity Utilities Industry Law.

Receiving the Approval of a Construction Plan, the licence holder, on the basis of the Electricity Utilities Industry Law, starts construction works, and undergoes Pre-Service Inspection by NISA at each process of construction and at the completion of all construction work, which confirms that the installation is constructed as approved and that consistency with the technical standards is maintained. Details of the Pre-Service Inspection are given in Section 14.3 and Table 14-1. The licence holder obtains the Design Approval for Fuel Assemblies to be loaded in reactor and undergoes the Fuel Assembly Inspection performed by NISA. The licence holder performs welding self-inspection on welded pressure-retaining parts and containment. The management system of self-inspection is subject to the Welding Safety Management Inspection by NISA or a body designated by it.

The licence holder may, as necessary for construction, use industry association-level guidelines in addition to the standards stipulated by the Electricity Utilities Industry Law. Fig. 7-3 shows technical standards stipulated by the Electricity Utilities Industry Law and Table 7-2 shows relevant major industry association-level guidelines.

#### (4) Operation Stage

At the start of operation, on the basis of the Reactor Regulation Law, the licence holder shall notify NISA of the Operation Plan and obtain approval of Safety Preservation Rules that prescribe the operation procedures, limiting conditions for operation and safety education of the personnel. The licence holder appoints a Chief Engineer of Reactors to supervise the safety preservation of the nuclear installation and designates a qualified Person Responsible for Operation. The licence holder notifies NISA of the Operation Plan annually.

The licence holder, on the basis of the Reactor Regulation Law, manages the radiation exposure of personnel so that the dose does not exceed statutory limits, and periodically reports the dose of personnel to NISA.

Gaseous and liquid radioactive waste generated in the operation of commercial power reactors is released outside the installation in compliance with the statutory concentration limits required by the Reactor Regulation Law. Also, to minimize radiation exposure of the public, the licence holder makes efforts to reduce the released amount of radioactive waste as low as reasonably achievable in accordance with the Guide for Dose Objectives in the Site Vicinity, so that the annual dose of the public is kept below 50 micro Sievert.

After starting operation, the licence holder, on the basis of the Electricity Utilities Industry Law, undergoes the Periodical Inspections by NISA in a period not exceeding thirteen months from the date of commissioning or completion of the previous one. The licence holder reports the incidents and failures of the installation immediately to NISA, according to the provisions of the Reactor Regulation Law and the Electricity Utilities Industry Law, and reports without delay to



NISA on the progression of the events and the measures taken against it.

As to any alteration and repair work after commissioning, approval or notification of the Construction Plan on the basis of the Electricity Utilities Industry Law is required just as at the construction stage, and Pre-Service Inspection is performed.

NISA, on the basis of the Reactor Regulation Law, assigns resident Nuclear Safety Inspectors at each nuclear installation, who conduct the Nuclear Safety Inspection four times a year and confirm the compliance with statutory safety regulations and self-controlled safety management by the licence holder. Also, NISA, if necessary, may make on-the-spot entry and inspect a commercial power reactor, to confirm rules and regulations are strictly complied with.

In order to promote preventive maintenance, NISA, by a notification in 1992, requests licence holders to perform Periodic Safety Review at fixed intervals (approximately every ten years). NISA receives result of the review including feedback of the operating experience from commissioning to date and the latest technical knowledge, and probabilistic safety assessment unique to the plant.

NISA, on the decision statement of the NSC in 1992, studies and evaluates the technical adequacy of accident management proposed by the licence holder. Details are given in Section 18.4.

#### 7.4 The Enforcement of Applicable Regulations and the Terms of Licence

On the basis of the Reactor Regulation Law, NISA may cancel an Establishment Licence or issue a nuclear installation Shut-Down Order for up to one year under circumstances such as operating a nuclear installation without an Establishment Licence, violating an order legally issued by NISA, failing to implement measures necessary for safety preservation prescribed by NISA, or failing to obtain approval of the Safety Preservation Rules.

The Reactor Regulation Law also prescribes imprisonment and/or fines under circumstances such as establishing a nuclear installation without an Establishment Licence, violating an Shut-Down Order, or failing to take relevant emergency measures. NISA may order changes in the Safety Preservation Rules whenever it is deemed necessary for preventing accident. Licence holders failing to abide by such orders would be punished with a fine.

On the basis of the Electricity Utilities Industry Law, if an electric structure is judged not to conform to the technical standards, NISA may order repair, alteration, relocation, temporary suspension of usage, or limitation of usage.

The Electricity Utilities Industry Law also prescribes fines or business licence cancellation under circumstances such as violation of a Technical Standard Conformance Order, establishment or alteration of an electric structure without obtaining necessary approval, or usage of an electric structure without undergoing or passing the Pre-Service Inspection, the Fuel Assembly Inspection, or the Welding Safety Management Inspection.

Table 7-1 Major Safety Examination Guides for Light Water Nuclear Power Reactor Facilities

Siting	- Examination Guide for Nuclear Reactor Siting Evaluation and Application Criteria
Design	<ul style="list-style-type: none"> <li>- Examination Guide for Safety Design of Light Water Nuclear Power Reactor Facilities</li> <li>- Examination Guide for Classification of Importance of Safety Functions for Light Water Nuclear Power Reactor Facilities</li> <li>- Examination Guide for Seismic Design of Nuclear Power Reactor Facilities</li> <li>- Examination Guide for Fire Protection of Light Water Nuclear Power Reactor Facilities</li> <li>- Examination Guide for Radiation Measurement in Accidents of Light Water Nuclear Power Reactor Facilities</li> <li>- Terms or Fundamentals to be Considered in Safety Examination of Liquid Radioactive Waste Treatment Facilities</li> </ul>
Safety Evaluation	<ul style="list-style-type: none"> <li>- Evaluation Guide for Safety Assessment of Light Water Nuclear Power Reactor Facilities</li> <li>- Evaluation Guide for Core Thermal Design of Pressurized Water Cooled Nuclear Power Reactors</li> <li>- Evaluation Guide for Emergency Core Cooling System Performance of Light Water Power Reactors</li> <li>- Evaluation Guide for Reactivity Insertion Events of Light Water Nuclear Power Reactor Facilities</li> <li>- Evaluation Guide for Dynamic Loads on BWR MARK-I Containment Pressure Suppression Systems</li> <li>- Evaluation Guide for Dynamic Loads on BWR MARK-II Containment Pressure Suppression Systems</li> <li>- Meteorological Guide for Safety Analysis of Nuclear Power Reactor Facilities</li> </ul>
Numerical Guide for Dose	<ul style="list-style-type: none"> <li>- Numerical Guide for Dose of General Public in the Vicinity of Light Water Nuclear Power Reactor Facilities</li> <li>- Evaluation Guide for Dose of General Public in the Vicinity of Light Water Nuclear Power Reactor Facilities</li> <li>- Guide for Measurement of Radioactive Materials Released from Light Water Nuclear Power Reactor Facilities</li> </ul>

Table7-2 Industry Association Level Guidelines  
(Guidelines and Rules of the Japan Electric Association)

Number	Title
JEAG 4101-2000	Guide of Quality Assurance for Nuclear Power Plants
JEAC 4201-2000	Method of Surveillance Tests for Structural Materials of Nuclear Reactors
JEAC 4202-1991	Drop-Test Method for Ferritic Steel
JEAC 4203-1994	Primary Reactor Containment Vessel Leakage Testing
JEAG 4204-1990	Guide for Inspection of Nuclear Fuel
JEAC 4205-1996	In-service Inspection of Light Water Cooled Nuclear Power Plant Components
JEAC 4206-2000	Methods of Verification Tests of the Fracture Toughness for Nuclear Power Plant Components
JEAG 4207-1996	Ultrasonic Examination for In-service Inspection of Light Water Cooled Nuclear Power Plant Components
JEAG 4208-1996	Eddy Current Test Guide for In-service Inspections of Steam Generator Heat Transfer Tubes for Light Water Type Nuclear Power Plants
JEAG 4209-1996	Guide for Maintenance and Inspection of Nuclear Power Plant Equipment
JEAG 4601-1987	Technical Guidelines for A seismic Design of Nuclear Power Plants
JEAG 4601-1984	Technical Guidelines for A seismic Design of Nuclear Power Plants: Allowable Stress, Classification
JEAG 4601-1991	Technical Guidelines for A seismic Design of Nuclear Power Plants: Supplement
JEAG 4602-1992	Definitions of Nuclear Reactor Coolant Pressure Boundary and Reactor Containment Boundary
JEAG 4603-1992	Guide for Design of Emergency Electric Power Supply Systems for Nuclear Power Plants
JEAG 4604-1993	Guide for Design of Safety Protection Systems for Nuclear Power Plants
JEAC 4605-1992	Definitions of Engineered Safety Features and Related Systems of Nuclear Power Plants
JEAG 4606-1996	Radiation Monitoring for Nuclear Power Plants
JEAG 4607-1999	Guide for Fire Protection of Nuclear Power Plants
JEAG 4608-1998	Lightning Protection Guidelines for Nuclear Power Plants
JEAG 4609-1999	Application Criteria for Programmable Digital Computer System in Safety-Related System of Nuclear Power Plants
JEAG 4610-1996	Personal Dose Monitoring for Nuclear Power Plants
JEAG 4611-1991	Guide for Design of Instrumentation & Control Equipment with Safety Functions
JEAG 4612-1998	Guide for Safety Grade Classification of Electrical and Mechanical Equipment with Safety Functions
JEAG 4613-1998	Technical Guide Lines for Protection Design against Postulated Piping Failures in Nuclear Power Plants
JEAG 4614-2000	Technical Guidelines on Seismic Base Isolation System for Structural Safety and Design of Nuclear Power Plants
JEAG 4801-1995	Guide for Operating Manual of Nuclear Power Plants
JEAG 4802-1997	Guide for Education and Training for Nuclear power Plant Operator
JEAG 4803-1999	Guide for Operational Safety Preservation of Light Water Cooled Reactors

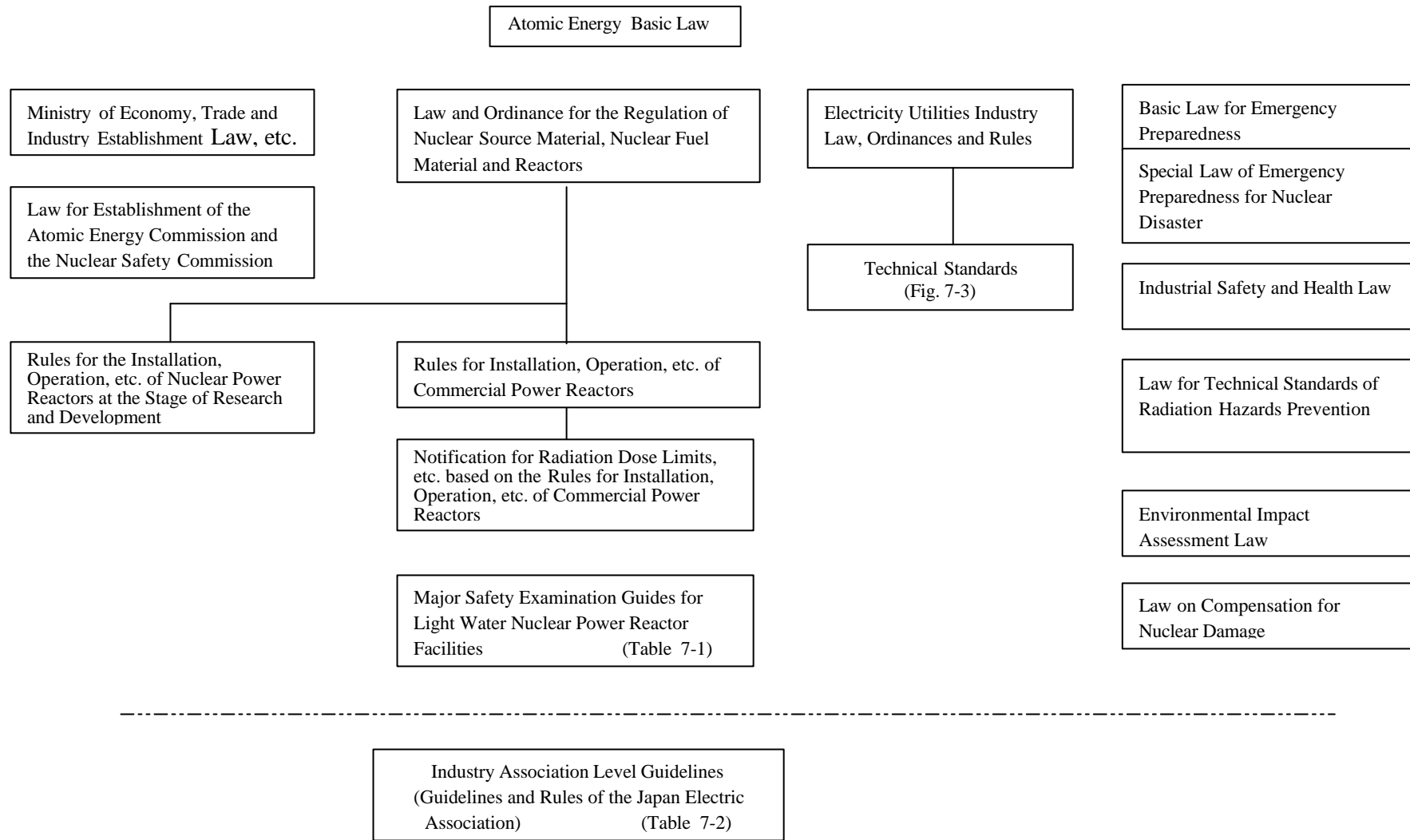


Fig.7-1 Major Laws Governing the Safety Regulation of Nuclear Installations

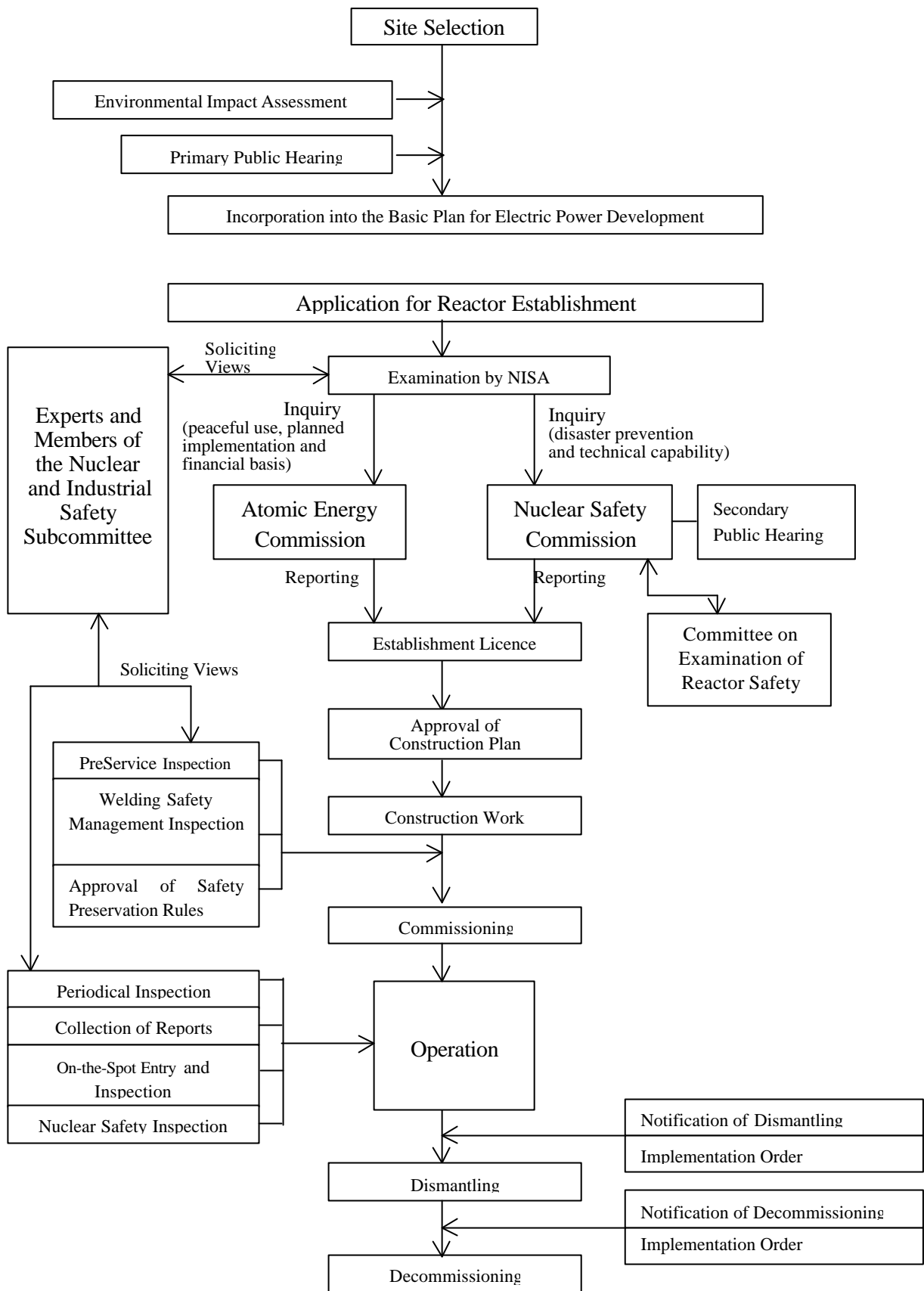


Fig. 7-2 Flow of Safety Regulations of Nuclear Installations Based on Laws, Etc.

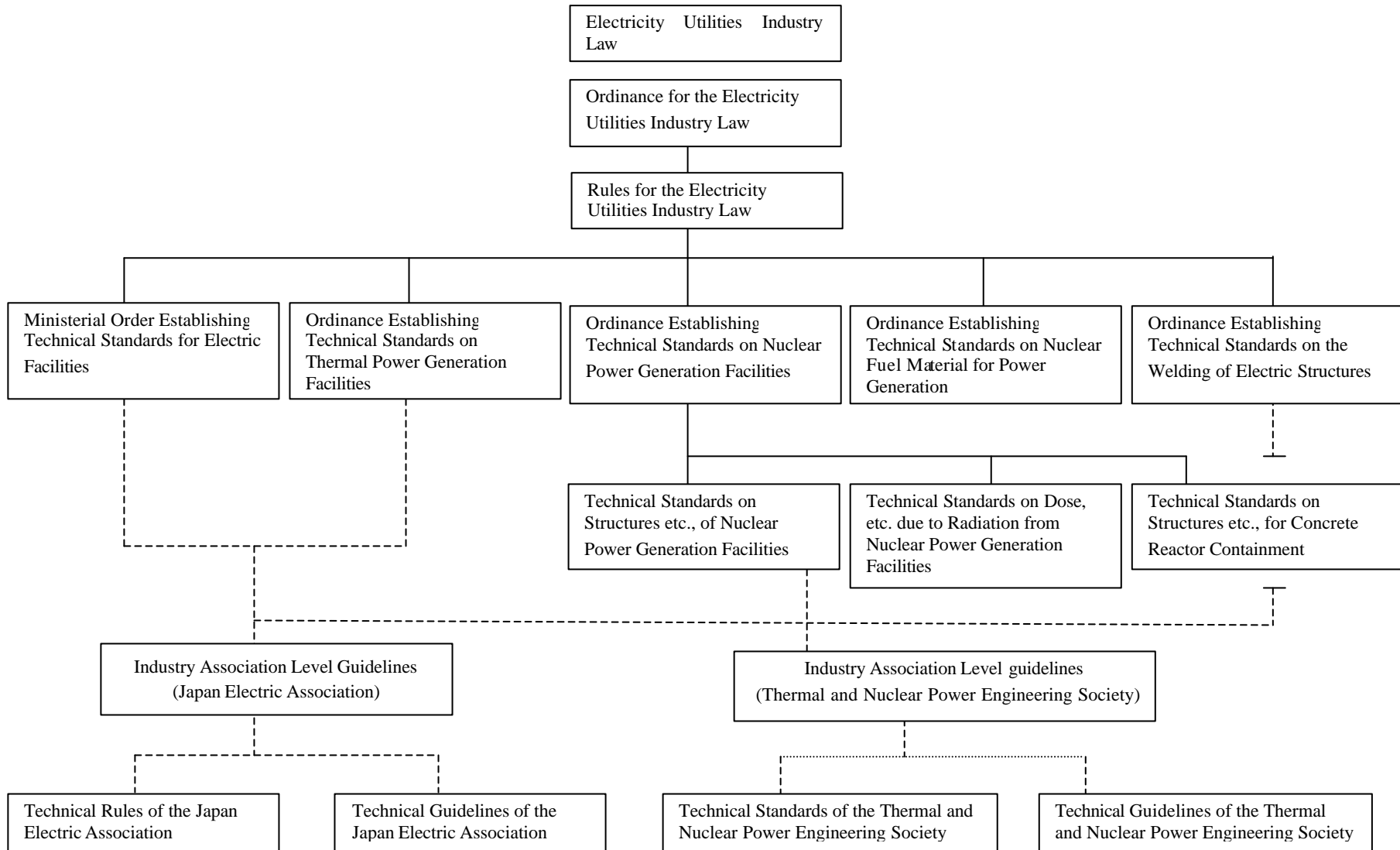


Fig. 7-3 Technical Standards

## Article 8 Regulatory Body

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

### 8.1 Mandate and Duties of the Regulatory Body

The mandate of the regulatory body is to ensure safety of nuclear installations, and its duties are to implement the legislative and regulatory framework described in the report of Article 7.

An important condition for the regulatory body to function relevantly in fulfilling its duties is, as indicated in Article 8, Paragraph 2 of the Convention on Nuclear Safety, to ensure effective separation between functions of the regulatory body and those of any other body or organization concerned with promotion or utilization of nuclear energy. Another important function of the regulatory body is to keep communicating with the public of its regulatory decisions, opinions and their background thoughts.

On the basis of the Atomic Energy Basic Law, the regulatory body is responsible to conduct regulatory activities prescribed in the Reactor Regulation Law, the Electricity Utilities Industry Law, etc..

### 8.2 Organizations for the Enforcement of Safety Regulation of Nuclear Installations

The administrative organizations of the central government of Japan underwent extensive reorganization and realignment in January 2001. Under the new administrative structure, the Minister of Economy, Trade and Industry serves as the ministry in charge of safety regulation for all facilities and activities concerning utilization of nuclear energy, and NISA has been established as a special organization under the Ministry of Economy, Trade and Industry (METI), dedicated to administration of safety regulation.

Although, prior to the reorganization, departments and divisions entrusted with overseeing safety regulation had been legally separated from those entrusted with development and

utilization of nuclear energy, the establishment of NISA further clarify the responsibility and accountability for safety regulation, and achieves effective “de jure” and “de facto” separation.

The Atomic Energy Commission (AEC) and the Nuclear Safety Commission (NSC) were established respectively in the Cabinet Office. The members of both of these commissions are appointed by the Prime Minister with the consent of the Diet. The AEC plans, deliberates, and makes decisions on policies relating to the utilization of nuclear energy, while the NSC plans, deliberates, and makes decisions on policies relating to regulations ensuring the safety of nuclear installations. As is stated in Section 7.3, NISA conducts examination on establishment of nuclear installations, and the Minister of METI asks views from the AEC and the NSC on the results of its examination. The NSC gives its views on them, after it conducts its own review including holding a public hearing (secondary public hearing) concerning safety problems unique to the installation. The NSC establishes examination guides to be used in the examination. The function of the NSC was much strengthened in the reorganized administration.

Fig. 8-1 presents an overview of organizations responsible for the safety regulation of nuclear installations.

### 8.3 The Structure of the Regulatory Body, its Technical and Support Experts and Organizations

NISA administers safety regulations for nuclear installations. NISA, under the Minister of METI who is the competent minister stipulated in the Reactor Regulation Law, has the authority to issue a licence for the establishment of a nuclear installation, after conducting examination of siting, structure, and equipment, so that (the occurrence of) disasters can be prevented. NISA has the authority to cancel the licence under circumstances such as violation of the Reactor Regulation Law by the licence holder. NISA has the authority to enforce ministerial orders on the Operation Plans, record keeping of operations, measures for safety preservation and protection of specified nuclear fuel materials, the Safety Preservation Rules, the Nuclear Installation Dismantling Notifications, the Chief Engineer of Reactors, emergency preparedness, etc. NISA has the authority 1) to approve Safety Preservation Rules, 2) to accept reports on Operation Plans, the Nuclear Installation Dismantling Notifications, and the appointment of Chief Engineer of Reactors, 3) to collect reports from licence holders, and 4) to order suspension of the operation of nuclear installations, dismissal of Chief Engineer of Reactors, measures relating to Dismantling Notifications and measures needed for emergency preparedness. The Minister of METI, as well as the Minister of MEXT, conducts examinations for Chief Engineer of Reactors and issues the licences.

NISA, under the Minister of METI who is the competent minister stipulated in the



Electricity Utilities Industry Law, has the authority 1) to enforce ministerial orders relating to technical standards, Pre-Service Inspections including commissioning tests, Fuel Assembly Inspections, Welding Safety Management Inspections, Periodical Inspection, etc., 2) to approve Construction Plans and conduct Pre-service Inspections including commissioning tests, Fuel Assembly Inspections, Welding Safety Management Inspections, Periodical Inspections, and 3) to issue a Conformance Order in the case of nonconformity to the technical standards. NISA also has the authority 1) to hold examinations for Chief Electrical Engineers, 2) to issue licences for Chief Electrical Engineer and Chief Engineer of Boilers and Turbines, and 3) to order the return of such licences in case of violation of the law by the Chief Engineers.

NISA was established as a special organization under METI, and has nine divisions dedicated to administration of the safety regulation of nuclear installations. They are Policy Planning and Coordination Division, Nuclear Safety Administration Division, Nuclear Power Licensing Division, Nuclear Power Inspection Division, Advanced Reactor and Fuel Regulation Division, Nuclear Fuel Cycle Regulation Division, Radioactive Waste Regulation Division, Nuclear Emergency Preparedness Division and Electric Power Safety Division. Table 8-1 shows the assigned duties of the divisions. Nuclear Safety Inspectors are assigned to resident position at each nuclear installation, with duties to conduct the Nuclear Safety Inspection four times a year to confirm the compliance with the Safety Preservation Rules on the basis of the Reactor Regulation Law, and to address abnormal events if they occur. Fig.8-2 shows the locations of the Nuclear Safety Inspectors Offices.

NISA has a total of approximately 270 staff engaged in nuclear safety regulation, out of which 100 are Nuclear Safety Inspectors and the Senior Specialists for Nuclear Emergency stationed at nuclear installations. In the reorganization of the central government, NISA, by newly recruiting 55 staff from industry with full of experiences and expertise in design and operation, strengthened its functions to conduct technical examination and inspection of nuclear installations and to provide advice and recommendation to the nuclear business operators.

Staff such as the Senior Specialists for Nuclear Emergency, the Nuclear Safety Inspectors, Nuclear Facility Inspectors, Electric Structures Inspectors and Safety Examiners, who are in charge of nuclear safety regulation for a nuclear installation, are required to have expertise in nuclear technology on the nuclear installation to fulfill their duties. The system of long term and multistage education and training programs necessary for the skill improvement of staff was developed, taking account of his experience and of the nature of the facility to which he is to regulate. Details of the program are given in Annex 4.1.

Moreover, NISA maintains and develops her ability, as well as contributes to improve international nuclear safety regulation, through exchange of technical experts and information on safety regulation and safety technology under bilateral cooperation arrangements with foreign regulatory bodies and in the framework of multilateral cooperation (IAEA and OECD/NEA).

On the basis of METI Establishment Law, the Advisory Committee for Natural Resources and Energy is established, a subcommittee of which is the Nuclear and Industrial Safety Subcommittee that propose the policies on nuclear safety and safety of electric power as the term of reference. The organization of the Subcommittee is given in Table 8-2.

When necessary in fulfilling her duties, NISA solicits views of experts and members of the Subcommittee. The members of the Subcommittee are assigned based on their knowledge and experience in specialized fields including nuclear and thermal-hydraulic design, fuel design, system design, equipment design, seismic design, material strength, radiation control, meteorology, geology, soil etc.

NISA entrusts the Institute of Nuclear Safety of Nuclear Power Engineering Corporation (NUPEC) with the evaluation of siting and the safety during abnormal transients and accidents of nuclear installation, which is an evaluation made by a party other than the applicant. The Institute is a specialized body in the safety analysis of nuclear installations with about 70 people engaged in it as of the end of September 2001. The Japan Power Engineering and Inspection Corporation (JAPEIC), Lloyd's Register Japan Co., Yasuda Risk Engineering Co. and H.S.B. Japan Co. are the designated organizations for Welding Safety Management Inspections, etc. In addition, NISA entrusts NUPEC with development and application of probabilistic safety assessment, reliability verification test and analysis, assessment of accident management and collection and analysis of operating experience, and entrusts the Center for Technology on Aging of JAPEIC with development and implementation of technology on aging.

#### 8.4 Atomic Energy Commission and Nuclear Safety Commission

##### (1) The Atomic Energy Commission (AEC)

The AEC was established, on January 1, 1956, under the Prime Minister's Office, on the basis of the Atomic Energy Basic Law and the Law for Establishment of the Atomic Energy Commission and the Nuclear Safety Commission, to conduct national policy concerning research, development, and utilization of nuclear energy in a planned manner and to ensure the democratic administration of nuclear energy policy. (The AEC was transferred to the Cabinet Office in January 2001.)

The AEC has duties of planning, deliberation, and decisions concerning the research, development and utilization of nuclear energy (excluding matters relating to regulations on ensuring safety). If the AEC deems it necessary as part of its assigned duties, it may advise, and request reports and cooperation including the submission of materials, statement of views, and explanation from, the heads of relevant administrative organizations by way of the Prime Minister. The Minister of METI, before issuing an establishment licence for nuclear installations, shall receive views of the AEC with regard to the following items: (1) the nuclear installations will not

be used for any purposes other than peaceful purposes, (2) the licence 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 installations.

The AEC is composed of the chairman and four other members appointed by the Prime Minister with the consent of the Diet.

## (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 NSC independently administers the function of safety regulation of the former AEC in order to strengthen the system of ensuring the nuclear safety. (The NSC was transferred from the Prime Minister's Office to the Cabinet Office with the Central Government Reform on January 6, 2001.)

The NSC is responsible for planning, deliberation and decisions on matters which are related to ensuring safety of the research, development, and utilization of nuclear energy. If the NSC deems it necessary as part of its assigned duties, it may advise, and request reports and cooperation including the submission of materials, statement of views, and explanation from, the heads of relevant administrative organizations by way of the Prime Minister. The Minister of METI, before issuing an establishment licence for nuclear installations, shall receive views of the NSC on the following matters: (1) the applicant for the licence of the nuclear installation has adequate technical capability to establish and reliably operate it, and (2) the site, the structure and the equipment of the nuclear installation may not cause any hindrance to the prevention of nuclear disaster caused by nuclear source materials or the nuclear installation.

The NSC is composed of five members appointed by the Prime Minister with the consent of the Diet, and these members elect a chairman from among themselves. The Secretariat of the NSC 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. Under the NSC, two Committees on Examination, seven Special Committees and others are organized, as shown in Table 8-3.

## 8.5 Other Administrative Bodies

The establishment of nuclear installations necessitates the compliance with the requirements of the laws such as the Fire Protection Law and the Port Regulation Law, and Fire Protection Agency and the Ministry of National Land and Transportation administer the related regulations.

As for nuclear emergency, administrative bodies having jurisdiction over the Basic Law for Emergency Preparedness, the Special Law of Emergency Preparedness for Nuclear Disaster and

other related laws are reported in Section 16.1.

## 8.6 Quality Management for Regulatory Activities and Information Disclosure to the Public

The Director-General of NISA directs the personnel and clarifies their norm of behaviors so that they discharge their duties with full awareness of their mandate, scientifically reasonable judgement, accountability and fairness. In this context, the Policy Planning and Coordination Division watches and assesses the performance of other NISA divisions in discharging their duties, and take, if necessary, timely remedial actions after consulting with the senior management.

NISA maintains high quality of regulatory activities through education and training of the personnel, international activities stated in section 8.3, and asking advice from experts such as members of the Nuclear and Industrial Safety Subcommittee.

NISA, at the web site of METI (<http://www.enecho.meti.go.jp/>), has been disclosing information on incidents and accidents, radiation control, capacity factor and results of the Periodical Inspection of nuclear installations and activities of nuclear energy related advisory committees, and keeping communication with the public through questions and answers. Also, NISA keeps a library in Minato Ward, Tokyo, on nuclear power generation, where the public can access to application documents for establishment of nuclear installations, reports of incidents and accidents, and books and booklets on energy and nuclear power generation. Moreover, the National Public Service Ethics Law was enacted in April 2000, demanding strict neutrality and fairness of personnel. The Law concerning Access to Information held by Administrative Organization enacted in April 2001, which prescribes disclosure of information on request, promotes the transparency of administration on safety regulation.

The NSC, independent organization from NISA, conducts its own review on the results of NISA's examination on application of establishment licence of a nuclear installation, and conducts the Subsequent Regulation Review to confirm safety in construction and operation stages after issuance of licence, so that the quality of regulatory activities can be assured. Also, all of the meetings of the NSC are open to the public, and the record is disclosed through the web site of the NSC (<http://nsc.jst.go.jp/>) and is reserved for public access at the Nuclear Energy Library.

Table 8-1 Assigned Duties of the Divisions Related to Safety Regulation of Nuclear Installations, Nuclear and Industrial Safety Agency, METI

Policy Planning and Coordination Division	- General administration of NISA
Nuclear Safety Administration Division	- Administration of the Nuclear Safety Inspectors and the Senior Specialists for Nuclear Emergency
Nuclear Power Licensing Division	- Regulation of commercial power reactors in establishment stage
Nuclear Power Inspection Division	- Regulation of commercial power reactors in construction and operation stages
Advanced Reactor and Fuel Regulation Division	- Regulation of power reactors at the stage of research and development
Nuclear Fuel Cycle Regulation Division	- Regulation of milling, fuel fabrication, spent fuel storage and reprocessing - Regulation of off-site transportation of nuclear fuel material
Radioactive Waste Regulation Division	- Regulation of radioactive waste business, and dismantling of nuclear installations including nuclear fuel cycle facilities
Nuclear Emergency Preparedness Division	- Planning of nuclear emergency preparedness - Prevention and investigation of incidents and accidents in nuclear businesses - Administration of activities in nuclear emergency
Electric Power Safety Division	- Regulation of turbine etc. - Environmental impact assessment

Table 8-2 Organization of the Nuclear and Industrial Safety Subcommittee,  
the Advisory Committee for Natural resources and Energy

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
Soil and Earthquake Engineering Subcommittee	- Technical matters on a seismic design of nuclear installations*
Nuclear Installation Operation Management and Emergency Preparedness Subcommittee	- Technical matters in operation, incidents and accidents, and emergencies of nuclear installations*
INES Evaluation Subcommittee	- Assessment of incidents and accidents against INES scale
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

\*: including nuclear fuel cycle facilities

Table 8-3 Committees, etc. under 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 advice in nuclear emergency
Special Committee on Comprehensive Nuclear Safety	- Safety regulation of radioactive waste - Safety of transportation of radioactive materials - Regulation of technical ability of licensees - Accident management - Safety of dismantling of nuclear facilities - Measures against aging of nuclear facilities - Risk assessment - Others
Special Committee on Safety Goal	- Safety goal, including quantitative goal with practical use of probabilistic safety assessment, etc.
Special Committee on Fundamentals of Prevention of Radiation Hazards	- Fundamentals of prevention of radiation hazards, and securing safety of radioisotopes - Environmental radiation monitoring in the vicinity of nuclear facilities and survey of general radioactive levels
Special Committee on Safety Standards	- Standards and guides of reactors, nuclear fuel facilities, intermediate storage facilities of spent fuel, etc. - Standards and guides of radioactive waste - Others
Special Committee on Nuclear Safety Research	- Planning of annual safety research program - Implementation of annual safety research program - Review of safety research program
Special Committee on Investigation of Nuclear Accident and Failures	- Analysis and evaluation of accidents and incidents domestic and abroad - Investigation of specific accidents and incidents indicated by the NSC, and assessment of the measures taken
Special Committee on Nuclear Emergencies	- Technical and expert matters on emergency measures taken in nuclear emergencies

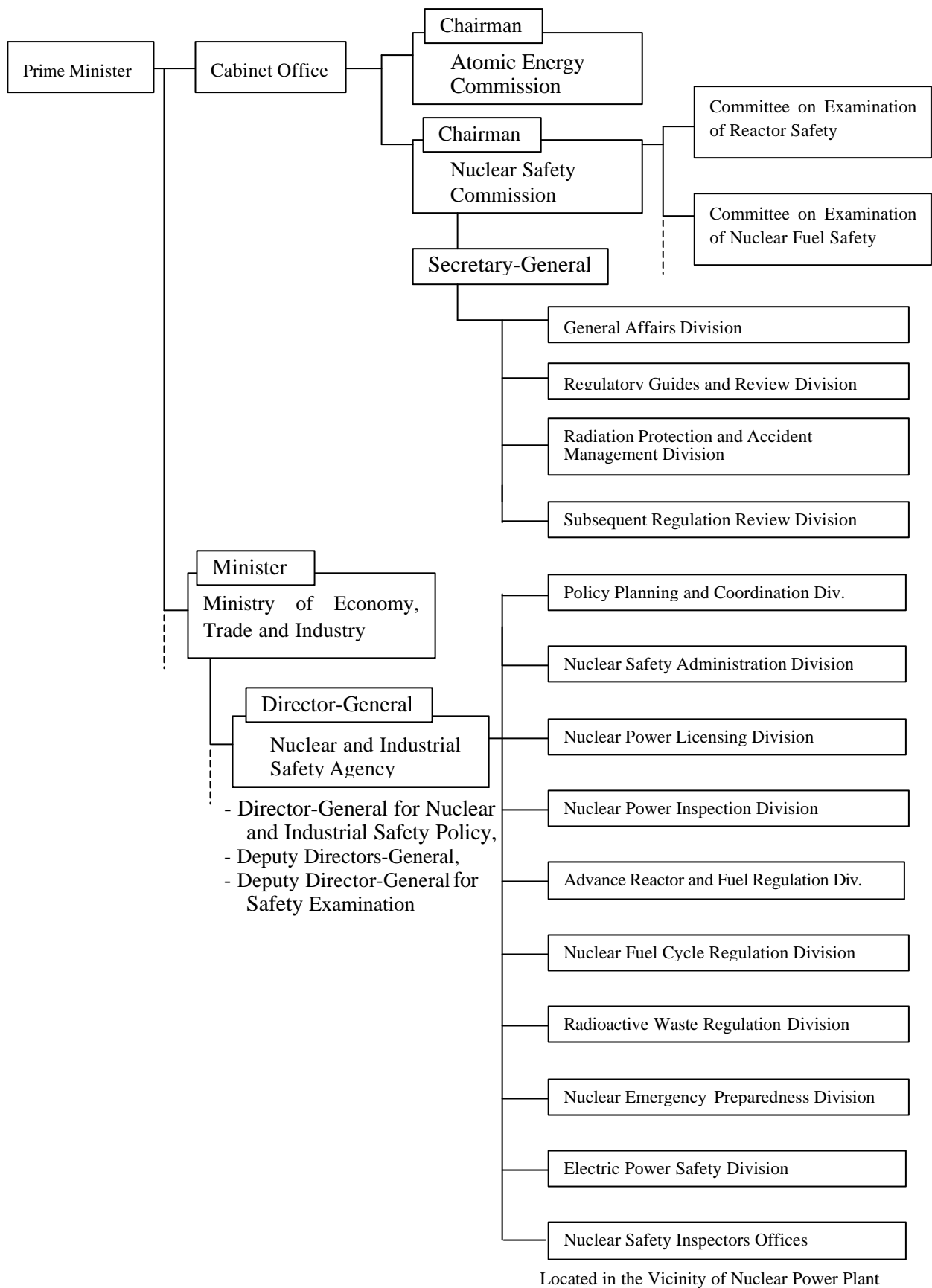


Fig. 8-1 The Outline of the Safety Regulation Organization for Nuclear Installations



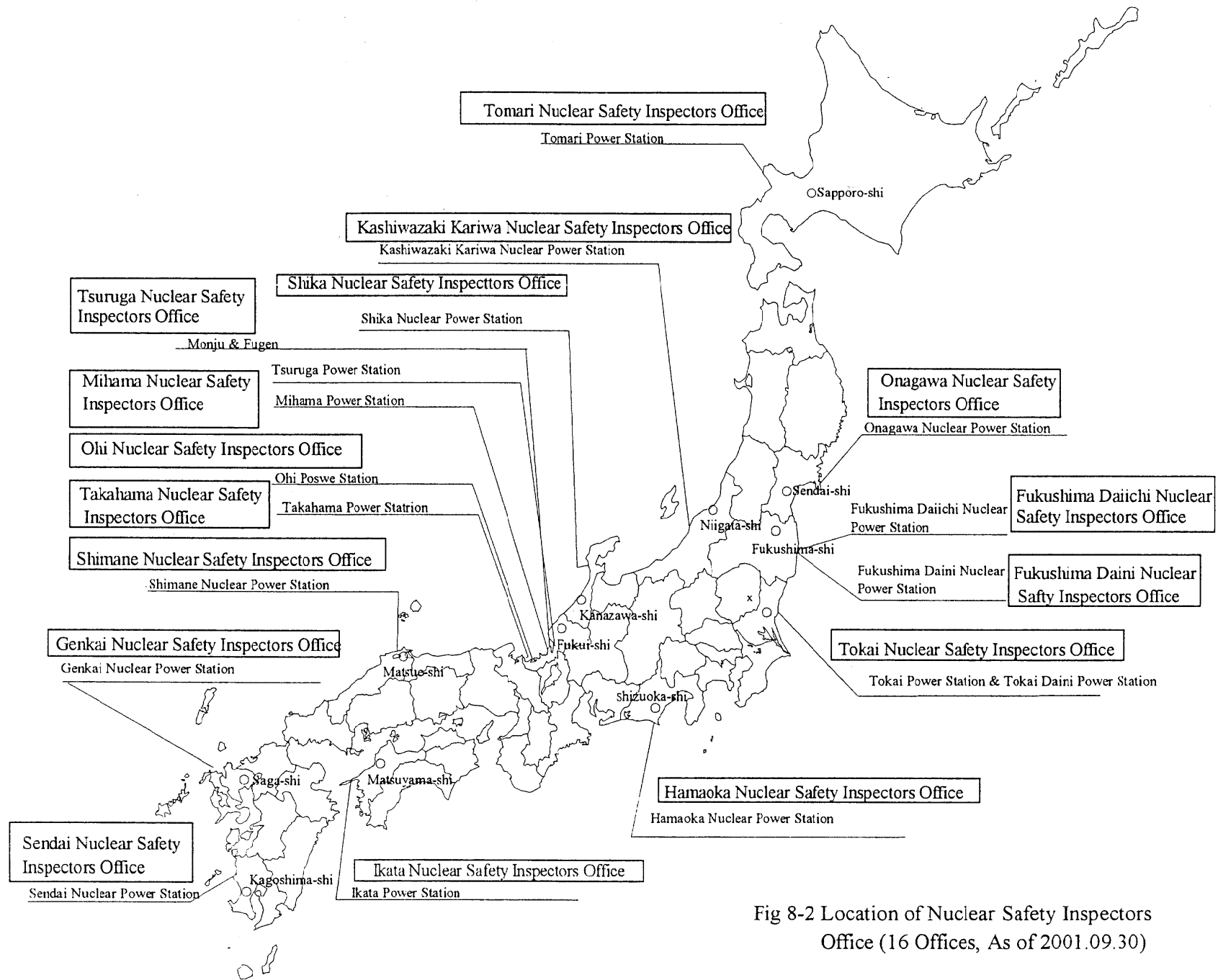


Fig 8-2 Location of Nuclear Safety Inspectors Office (16 Offices, As of 2001.09.30)

## Article 9      Responsibility of the Licence Holder

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

This article describes the responsibility of the licence holder of a commercial power reactor. The responsibility of the licence holder of an R & D reactor is practically identical to that of the licence holder of a commercial power reactor.

### 9.1      Responsibility of the Licence Holder

The prime responsibility for the safety of a nuclear installation rests with the licence holder of the nuclear installation. That is, the licence holder is responsible for adopting the necessary measures to fully meet the regulatory requirements stipulated in the Reactor Regulation Law, the Electricity Utilities Industry Law, etc. starting from reactor establishment through operation and maintenance. In addition to meeting with regulatory requirements, the licence holder is requested to make efforts for improving the safety and reliability of its nuclear installations, through education and training of personnel, preparing operation manuals, collecting, studying and sharing information on operating experience and applying it to design, operation and maintenance, adopting the latest progress in technology, performing safety research, and promoting quality assurance activities.

Followings are the statutory activities and voluntary activities of the licence holder.

#### (1) Statutory Activities of the Licence Holder

Statutory activities of a licence holder from reactor establishment through operation, stipulated in the Reactor Regulation Law, the Electricity Utilities Industry Law, etc., is described in Section 7, 3.

In addition, the licence holder, in conformance with the Special Law of Emergency Preparedness for Nuclear Disaster, develops a plan for emergency preparedness of its own, establishes the on-site organization for nuclear emergency preparedness, and designates manager for nuclear emergency preparedness, in order to prevent nuclear emergency and mitigate and restore the consequence of the emergency should it occur. In conformance with the Law on Compensation for Nuclear Damage, a licence holder is responsible to conclude the Nuclear Damage Liability Insurance Contract and the Indemnity Agreement for Compensation.

#### (2) Voluntary Activities of the Licence Holder

Regarding voluntary activities of the licence holder, priority to safety (Article 10), education and training of personnel (Article 11), preparation of operation procedures (Article 12), the Periodic Safety Review (Article 14), accident management (Article 18), collection of information on operating experience (Article 19) and research and development (Articles 18 and 19) are described in the reports of respective articles.

## 9.2 Mechanism for the Licence Holders to Ensure their Responsibility

The basic mechanism to ensure safety of a nuclear installation is that the regulatory body issues licence, orders the licence holder to bear the primary responsibility for safety, and supervises it within the legislative and administrative framework.

As the number of operating plants increases and the operating experience accumulates, a mechanism has been sought, where the regulatory body encourage licence holders to intensify their own safety preservation activities including adoption of the latest technical knowledge and implementation of preventive maintenance measures in addition to conforming to existing statutory regulations, and the regulatory body audits these activities. Some of the implementation of preventive maintenance activities are introduced in Article 6.

The following is an overview of the above mentioned mechanism.

### (1) Licensing

The Minister of METI issues a licence for the establishment of a nuclear installation after examining whether the site, the structure and the equipment of the nuclear installation may not cause any hindrance to the prevention of nuclear disaster caused by nuclear source materials or the nuclear installation. The safety regulation on the basis of the Reactor Regulation Law and the Electricity Utilities Industry Law starting planning stage through operation stage is described in section 7.3.

### (2) Collection of Reports, On-the-Spot Inspection, Licence Revocation, and Shut-down Order

NISA, on the basis of the Reactor Regulation Law or the Electricity Utilities Industry Law, collects reports from licence holders on their business and may conduct On-the-Spot Inspection if necessary. Also, NISA, by a ministerial notification, requests licence holders to report incidents of less importance than those incidents requiring reports on the basis of laws.

In cases where technical capabilities of a licence holder is deemed incompetent, NISA may impose penalties such as revoking of the nuclear installation licence or ordering operation shut-down, as prescribed in the Reactor Regulation Law and the Electricity Utilities Industry Law.

### (3) Establishment of the Nuclear Safety Inspection System and Nuclear Safety Inspector

NISA, on the basis of the Reactor Regulation Law, has established the Nuclear Safety Inspection System and has stationed Nuclear Safety Inspectors at each nuclear installation, who conduct the Nuclear Safety Inspection four times a year to confirm the licence holder's compliance with Safety Preservation Rules, and address incidents if they occur. Details are given in Section 19.1.

(4) The Senior Specialist for Nuclear Emergency

NISA, on the basis of the Special Law of Emergency Preparedness for Nuclear Disaster, has stationed a Senior Specialist for Nuclear Emergency at each nuclear installation, who guides and advises the licence holder in preparing its Plan for Emergency Preparedness, and conducts duties necessary to prevent nuclear emergency and mitigate the consequence should it occur. Details are given in Section 16.1.

(5) Periodic Safety Reviews and Accident Management

NISA, on the basis of a ministerial notification in 1992, requests licence holder to perform Periodic Safety Reviews at fixed intervals and receives the report on the results. Details are given in Section 14.5. NISA, on the basis of a decision of the NSC in 1992, studies and evaluates the technical adequacy of accident management proposed by licence holders. Details are given in Section 18.4.

(6) Development and Revision of Safety Standards and Regulations

NISA and the NSC make efforts to incorporate operating experience and the latest progress in technology into standards and regulations, taking international standards into consideration, which are used in evaluating the basic designs or design policies of nuclear installations.

## C. General Safety Considerations

## Article 10 Priority to Safety

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

### 10.1 Basic Policy for Priority to Safety

Priority to safety is a basic policy in all nuclear energy development and utilization in Japan. The Article 2 of the Atomic Energy Basic Law states that priority is given to ensure safety in all related activities.

### 10.2 Policies of the Regulatory Bodies

#### (1) Laws and Regulations Enacted to Ensure Nuclear Safety

1) The Reactor Regulation Law inherits the basic policy of the Atomic Energy Basic Law, and clearly states that prevention of accidents and protection of public are the primary objectives and that regulations on constructions, operations, etc. of nuclear installations are enforced on the basis of the Reactor Regulation Law. The details are shown in the report of Articles 7, and the amendments of the law since the previous report are as follows.

- Establishment of the Nuclear Safety Inspection System for the regulatory body to confirm the compliance with the Safety Preservation Rules by the licence holder
- Assignment of the resident Nuclear Safety Inspectors at nuclear installations
- Establishment of Allegation System

2) The Electric Utilities Industry Law, applied to commercial power reactors, also expresses that the objective of the law is to secure public safety in its Article 1.

3) The Special Law of Emergency Preparedness for Nuclear Disaster was established in December 1999 to cope with the special characteristics of the nuclear emergency, which was revealed at the JCO Criticality Accident in September 1999.

#### (2) Strengthening the Functions of the Regulatory Bodies

1) The Secretariat of the NSC was transferred to the Prime Minister's Office in April 2000, and then to the Cabinet Office in January 2001, in order to strengthen its function.

2) NISA was established under METI in January 2001, as a special organization dedicated to administration of the comprehensive and integral safety regulation on nuclear installations for energy use.

### 10.3 Policies of Business Operators

### (1) Policies of Business Operators as a Whole

The Japan Atomic Industrial Forum Inc., consisting of about 800 business operators (reactor operators, manufacturers, etc.) who are directly or indirectly engaged in the nuclear business, published a statement entitled "Toward Reform of Japan's Private-sector Nuclear Industry" in October 8, 1999, triggered by the JCO Criticality Accident. That says

- To renew the awareness that securing nuclear safety is the most crucial task for top management in each company, instilling that philosophy throughout the whole company, so as to place the highest priority on safety.
- In order to spread the nuclear safety culture based on such a policy, the management of each organization will work to make sure that all employees understand the significance of their jobs and their responsibilities -- especially the safety concepts incorporated in the rules and standards, and the importance of their observance -- so that they develop a safety consciousness. All safety-related items will be rechecked, including the response to emergency situations
- To prevent mistakes by individual sections in charge of separate areas, the management of each corporation will strive to carry out stricter auditing and realize the multi-check safety function.

Moreover, nuclear business operators (36 operators such as reactor operators, fuel fabricators, plant manufacturers, and research organizations) covering the whole country founded the "Nuclear Safety Network (NS network)" in December 1999, for sharing and improving "nuclear safety culture", and have developed following activities.

- a) The cultivation of "nuclear safety culture" among members through seminars and educational sessions, web site, and publication of periodicals
- b) Peer review among members for identification of issues and dissemination of good practices
- c) Exchange and circulation of the information on nuclear safety

In Tokai district, Ibaraki Prefecture, where 21 nuclear business operators are located, the "Nuclear Business Operators Safety Cooperation Agreement" was signed in January 2000, to make cooperative activities in nuclear emergency as well as to improve safety of installations and employee's abilities.

### (2) Policies of Electric Power Companies

The electric power companies have declared their policies to give priority to safety, respectively, with slight differences in expression. For example, the Tokyo Electric Power Co. Inc. made a statement in the Outline of Annual Business Activities 2000, that "-----Public confidence in safety of nuclear related installations was severely damaged by the criticality accident at a uranium processing plant in Tokaimura. ----- Our company, a nuclear business operator,

determined to make every effort to promote safety culture of nuclear industry as a whole. -----” Also, the company, disclosing its emergency response plan (June 2000), made a press release that “----- In operating nuclear power plants, we give the first priority to safety. -----“.

The Kansai Electric Power Co., in its medium-term business operation policy (April, 2000), put emphasis on safety of nuclear installations, safe and stable operations, intensification of quality assurance/quality control programs, measures addressing aging, prevention of human errors, etc. It also makes a statement in a brochure introducing nuclear power activity that "The continuous pursuit of safety and reliability should be given the first priority in nuclear power generation. The company will make every effort to improve safety and reliability of nuclear power generation."

Every electric power company, to give due priority to safety, has established a nuclear safety planning committee at its head office reporting directly to the director of the nuclear power generation department, and a nuclear safety management committee at each site chaired by the head of the installation. Through these committees, sharing of information and lessons learned from incidents of domestic and foreign plants, implementation of preventive maintenance, education of employees, and quality assurance activities are discussed and promoted.

The Federation of Electric Power Companies provides a forum for exchange and study of information on domestic and foreign operational experiences and coordination of measures for improvement, in addition to direct information exchange among persons in charge. Also, the electric power companies are engaged in international information exchange on operating experience through the Institute of Nuclear Power Operations (INPO), the World Association of Nuclear Operators (WANO), etc.

Moreover, electric power companies provide manufacturers with proposals on potential improvements based on operating experience, while manufacturers propose application of new technology to safety and work improvement, resulting in systematic upgrading of safety.

#### 10.4 Other Activities for Promotion of Safety Culture

The chairman and commissioners of the NSC regularly visit nuclear business operators, give personnel lectures on nuclear safety culture and exchange opinions with them.

The training center of JAERI provides training courses on safety of nuclear facilities including safety culture for nuclear engineers, regulatory personnel, etc. of neighboring Asian countries and East European countries.

Tokai-mura and its neighboring municipalities in Ibaraki Prefecture organized a mutual support system on nuclear energy, promoting nuclear safety culture and sharing safety information.

Japanese government has systems to award people of meritorious services in nuclear power operation or in nuclear safety, and to observe the Nuclear Safety Campaign Month in order to promote safety activities and safety consciousness of persons engaged in nuclear power generation and related industries (refer to the 1st Report, in detail).



## Article 11 Financial and Human Resources

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

### 11.1 Financial and Human Resources of a Licence Holder to Maintain Nuclear Installations

#### (1) Financial Resources

##### 1) Necessary steps in issuing establishment licence

In issuing establishment licence of a nuclear installation, the Minister of METI, in accordance with Article 24 (Criteria for the licence) of the Reactor Regulation Law, confirms that the applicant for the licence possesses necessary financial basis by requiring the applicant to submit “Amount of Funds Required for Construction and Finance Procurement Plan” attached to the application, and also consults the AEC. (Refer to section 7.3(2) and Fig. 7-2)

##### 2) Applicant for establishment licence of a nuclear installation

In Japan, applicant for licence of a commercial power reactor is an electric utility. Electric utilities, which supply electricity indispensable to the life of people and industrial activities, are closely linked to development of the national economy, and form a basic public service industry. The government has established a licensing system for electric utilities, and issues the licence for electric utility business only to electric utilities meeting certain criteria of financial basis, technical capability, etc., in order to protect the consumer’s interests and to achieve sound development of the electric utilities industry. The Minister of METI determines appropriate power rates, a reasonable cost under efficient management plus a reasonable profit, which provide electric utilities with financial basis to ensure safety of commercial power reactors.

METI, in accordance with the provisions of Article 35 of the Electricity Utilities Industry Law, enacted the Ministerial Order concerning Reserves for Decommissioning Nuclear Power Generation Facilities. On the basis of this order, electric utilities deposit reserves for decommissioning. They also deposit reserves covering final disposal cost of vitrified wastes and other wastes resulting from reprocessing of spent fuels. The deposit is reserved in financial accounts of the Nuclear Waste Management Organization of Japan, which is responsible for carrying out disposal, on the basis of the Law for Final Disposal of Specified Radioactive Waste enacted in June 2000.

On the other hand, the JNC, who owns R&D reactors of Monju and Fugen, is established by a law, and financial basis necessary for his business operation is provided by the government.

## (2) Human Resources

In issuing establishment licence of a nuclear installation, the Minister of METI confirms that the applicant possesses technical capability necessary to establish a nuclear installation and operate it adequately. The applicant submits description, attached to establishment application, on following items to prove its technical capability.

### 1) Resources of technical experts

- a. Departments and divisions in charge of nuclear power generation, and the number of technical experts
- b. The number of engineers trained in domestic and foreign training courses
- c. The number of qualified staff including Chief Engineers of Reactors, Persons Responsible for Operation, etc.

### 2) Training program of technical experts

- a. On-the-job training program for technical experts through stages of construction and operation of the nuclear installation
- b. Training and retraining program of technical experts in domestic and foreign training facilities

Licence holder is responsible for safety of decommissioning and for preparing personnel for it. They implement technical development programs on decommissioning in cooperation with national research institutes, manufacturers and construction companies, and have trained and secured human resources through studying decommissioning activities abroad and participating in the project for dismantling and removal of the JPDR owned by JAERI

### 3) Infrastructure of human resources

The Advisory Committee for Resources and Energy of METI published a report titled “Infrastructures of Nuclear Safety” in July 2001. The report discussed how to reinforce infrastructures of nuclear safety, such as institutional infrastructure, knowledge-based infrastructure and infrastructure of human resources. Followings are the discussion in the report on infrastructure of human resources.

----- Quote -----

#### a. Challenges to the regulatory body

It is indispensable for the regulatory body to maintain and improve competency of its personnel in charge of safety regulation. -----

To conduct regulatory activities including safety management on sound scientific and rational knowledge, the personnel are demanded to improve their knowledge of on safety examination, operation and maintenance of nuclear installations. It is also an important task for the regulatory body to train its personnel so that they will be able to exchange information with foreign regulatory bodies and to participate in the activities of international organizations. -

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What is needed for the regulatory body is a planned and strategic human resource policy, to prepare and carry out highly professional programs for education and training of young

personnel including fieldwork experiences, and to provide them with career path so that they will accumulate administrative experiences in nuclear safety necessary for the higher management.

In today's mobile human resource market, the regulatory body should continuously recruit people from a variety of fields including persons experienced in the operation and management of nuclear installations.

The regulatory body should expand opportunities for its personnel to attend international meetings or take jobs in international organizations or foreign regulatory bodies for a long term. Also, it should provide specialists from supporting organizations with opportunities to participate in activities in the international arena.

The regulatory body should expand its knowledge base of various data and procedures including that of foreign regulatory bodies. It should also establish a system for seeking professional advice on problems of risk communication, business management and other human, cultural and social sciences, from people with academic knowledge and experience in variety of fields and from those engaged in other industries.

A policy should be clarified to provide supporting organizations with human resources and funds necessary to discharge their duties effectively and efficiently, which are engaged in the development and application of safety analysis codes required for safety examination, collection and analysis of information on accidents and incidents in Japan and in foreign countries and maintenance of data bases.

#### b. Challenges to the industry

Dwindling nuclear power generation market and pressure for cost reduction have resulted in decreasing number of engineers engaged in design and manufacturing of nuclear installations, and in increasing difficulty of transfer of technology and experiences to the next generation. ----  
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The personnel who have been engaged in operation, maintenance of nuclear installations with accumulated experiences from early stages of nuclear power development are getting older and approaching their retirement. -----

Measures to sustain the morale of, and improve capability of, personnel in charge of safety management are needed. The industry should promote capable personnel to a higher position, by granting qualification or certification to personnel who have learnt necessary knowledge or establishing study and training course for career development in the organization.

Technology and experiences to be transferred to the new generation should be documented and integrated in training courses. ----- Unquote -----

## 11.2 Qualification, Training and Retraining of Personnel Engaged in Safety Activities

### (1) Staff Qualification

A licence holder appoints a Chief Engineer of Reactors to supervise safety preservation in the operation of nuclear installation, a Chief Electrical Engineer and a Chief Engineer of Boiler and Turbine to supervise safety preservation during construction, operation and maintenance of electric structures, and a Person Responsible for Operation who is qualified by the Thermal and Nuclear Power Engineering Society, an organization designated by METI.

Table 11-1 shows numbers of qualified personnel in nuclear installations in Japan.

(2) Staff Training and Retraining, and Resource Allocation

Safety education of those who are in charge of operation and management of a nuclear installation is integrated in the Safety Preservation Rules.

Licence holders prepare and carry out long-term and short-term staff training programs, to maintain and improve their capabilities. A ministerial notification specifies that licence holders should submit their long-term programs to NISA.

Licence holders, in addition to in-house operator training course using simulators (Table 11-2), periodically send their operators to external operation training centers for retraining. There are two centers: the BWR Operation Training Center (BTC) for BWRs and the Nuclear Power Training Center (NTC) for PWRs. A curriculum suitable for the ability/skill of each operator is prepared in these training centers.

Each licence holder has established a Maintenance Training Center (Table 11-3) for education and training of maintenance personnel. Various simulation devices, inspection devices and training devices, etc, simulating plant facilities for training purposes, have been used to maintain and improve the knowledge, skills and work management capabilities of personnel involved in maintenance and inspection.

Table 11-1 Numbers of Qualified Persons Belonging to Licence Holders of Nuclear Installations  
(as of December 2000)

Type of Qualification	Number of Qualified Persons
Chief Engineer of Reactors	513
Class I Chief Electrical Engineer	176
Class I Chief Engineer of Boiler and Turbine	358
Class I Supervisor of Radiation Protection	1196
Persons Responsible for Operation	418

Table 11-2 Operator Training Facilities of Nuclear Installations

Organization	Location	Simulator
BWR Operator Training Center Corp.	Okuma-machi, Futaba-gun, Fukushima Prefecture Kariwa Village, Kariwa-gun, Niigata Prefecture	Full Scale Full Scale
Nuclear Power Training Center Ltd.	Tsuruga, Fukui Prefecture	Full Scale
Hokkaido Electric Power Co., Inc.	On site of Tomari Power Station	Full Scale
The Japan Atomic Power Co.	The Japan Atomic Power Company Training Center (Tokai Village)	Compact
Tohoku Electric Power Co., Inc.	Nuclear Power Engineering Training Center (on site of Onagawa Nuclear Power Station)	Compact Full Scale
Tokyo Electric Power Co., Inc.	On site of Fukushima Daiichi Nuclear Power Station On site of Fukushima Daini Nuclear Power Station On site of Kashiwazaki Kariwa Nuclear Power Station	Compact Full Scale Full Scale
Chubu Electric Power Co., Inc.	Nuclear Power Training Center (on site of Hamaoka Nuclear Power Station)	Full Scale
Hokuriku Electric Power Co., Inc.	Nuclear Power Engineering Training Center (on site of Shika Nuclear Power Station)	Full Scale
The Kansai Electric Power Co., Inc.	On site of Mihama Power Station On site of Takahama Power Station On site of Ohi Power Station	Compact Compact Compact
The Chugoku Electric Power Co., Inc.	Ohno Training Center (Ohno-machi)	Full Scale
Shikoku Electric Power Co., Inc.	Nuclear Engineering Training Center (Matsuyama) On site of Ikata Power Station	Full Scale Compact
Kyushu Electric Power Co., Inc.	Nuclear Power Training Center (on site of Genkai Nuclear Power Station) Nuclear Power Training Center (on site of Sendai Nuclear Power Station)	Full Scale Full Scale
Japan Nuclear Cycle Development Institute	On site of Fugen Power Station On site of Monju Power Plant	Compact Full Scale

Table 11-3 Maintenance and Repair Training Centers of Licence Holders

Reactor Establisher	Name	Location
Hokkaido Electric Power Co., Inc.	Nuclear Power Training Center	On site of Tomari Power Station
The Japan Atomic Power Co.	The Japan Atomic Power Company Training Center	Tokai Village, Naka-gun, Ibaraki Prefecture
Tohoku Electric Power Co., Inc.	Nuclear Power Engineering Training Center	On site of Onagawa Nuclear Power Station
Tokyo Electric Power Co., Inc.	Fukushima Nuclear Power Plant Training Center	On site of Fukushima Daiichi Nuclear Power Station
	Kashiwazaki Kariwa Nuclear Power Plant Training Center	On site of Kashiwazaki Kariwa Nuclear Power Station
Chubu Electric Power Co., Inc.	Nuclear Power Training Center	On site of Hamaoka Nuclear Power Station
Hokuriku Electric Power Co., Inc.	Nuclear Power Engineering Training Center	On site of Shika Nuclear Power Station
The Kansai Electric Power Co., Inc.	Nuclear Power Maintenance Training Center	On site of Ohi Power Station, Fukui Prefecture
The Chugoku Electric Power Co., Inc.	Engineering Training Center, Shimane Nuclear Power Station	On site of Shimane Nuclear Power Station
Shikoku Electric Power Co., Inc.	Nuclear Engineering Training Center	Matsuyama City, Ehime Prefecture
Kyushu Electric Power Co., Inc.	Nuclear Power Training Center	On site of Genkai Nuclear Power Station
	Nuclear Power Training Center	On site of Sendai Nuclear Power Station
Japan Nuclear Cycle Development Institute	General Training Facility for FBR Cycle	On site of Monju Power Plant

## Article 12 Human Factors

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

Human performance has significant implications in ensuring safety of a nuclear installation. While a human being may cause failures due to his own errors, he has the capability to take proper steps to meet unexpected occurrences, holding their progression or preventing spread of its consequences. Although equipment reliability has been improved and automation has developed with progress of technology, human performance still remains one of important factors supporting nuclear installation. However complete a system may be designed, it will not function effectively without any human beings who operate it and any management based on sufficient understanding of human characteristics and limitations. Factors that influence human characteristics and limitations must be fully understood and be given full consideration throughout life of a nuclear installation, so that human performance may function most effectively.

The Examination Guide for Safety Design specifies that the preventive measures against human errors should be taken account of at the design stage of a commercial power reactor. At the operation stage, reactor establishers (licence holders) pay efforts for self-controlled safety preservation management such as preparation of procedures, staff education and training, and management of operation and maintenance, etc. Such systems had resulted in good performance in operating nuclear installations. However, the outbreak of the JCO Criticality Accident in 1999 rang an alarm bell to the people in nuclear industry in Japan. Urged by the accident, measures to restore high level of safety were taken, such as revision of the Safety Preservation Rules and establishment of the Nuclear Safety Inspection System.

### 12.1 Methods for Prevention and Correction of Human Errors

#### (1) Regulatory Efforts

The Examination Guide for Safety Design requires that "reactor facilities be designed to reflect appropriate preventive considerations against operators' mis-operation". Furthermore, the practice for this guide describes that "In designing, attention should be given in consideration of ergonomics-oriented factors, to panel layout, operability of operating devices, valves, etc., instrument and alarm indication for accurate and quick grasp of reactor status and prevention of errors during maintenance and inspection." and that "In designing, measures should be taken so that necessary safety function is maintained without operator's actions for a certain length after the occurrence of an abnormal condition."

As to design of control room, the guide requires that "it be so designed that the situation of

operations and principal parameters of reactor and principal related principal facilities can be monitored and that prompt manual control can be performed, whenever required, to maintain safety.” In conformity to these requirements in safety design, the Examination Guide for Safety Evaluation requires that “safety analysis be performed in consideration of the following: In case that operator actions are expected at the occurrence of abnormal situations, sufficient time and adequate information be available so that operator may be able to properly judge the situations and take necessary acts with a high degree of confidence.”

In the process of the Construction Plan approval, it is confirmed whether the design is in conformity to the Examination Guide for Safety Design.

The Reactor Regulation Law specifies that in the operation stage the reactor establisher develops, and obtains approval of, the Safety Preservation Rules and complies with them. The rules specify preparation of operation management system, safety education, procedures etc. The NISA confirms and approves the Safety Preservation Rules and the resident Nuclear Safety Inspectors inspect the compliance with the rules by the reactor establisher.

The reactor establisher reports failures of the installation to NISA in accordance with the laws. Especially, in the case that the failures are identified to be caused by human errors, reactor establisher reports to NISA measures addressing failures including improvement of equipment. NISA consults on the failure with experts as necessary (Refer to section 12.1(3)), and urges reactor establishers to apply the experience to other installations.

## (2) Efforts by Reactor Establishers

### 1) Efforts at the stage of design

A reactor establisher takes following considerations in designing central control room to prevent and correct human errors.

#### a) Considerations for operator actions

Central control room is designed so that operating conditions of reactor and other important equipment and principal plant parameters can be monitored at a glance and necessary actions can be taken in the room during normal operation and abnormal transients, and in accidents.

In the advanced main control panels, adopted for ABWR (See Fig. 12.1), large-size display panels make it easy to grasp operating conditions at a glance, to share information among operators and to increase opportunities of prevention and correction of errors. Moreover, the scope of automation is expanded, reducing routine operation by operator following a reactor scram. These measures have improved the reliability of monitoring and operator actions.

#### b) Considerations for a control room

Following measures are taken to prevent operator human errors.

- i) Control panels allow monitoring of the whole of main systems of the installation, and the layout provides easy access for operation.
- ii) Operating devices are easily discernible by colors, shapes, name plate, etc., and are laid



out in proximity of related indicators, eliminating human errors in operation, maintenance and checks.

- iii) The alarm labels clearly indicate content of alarm, and important alarms are discernible from others by color, layout, etc.
- iv) Instruments are laid out so that related plant parameters may be monitored easily.
- v) Monitoring capacity can be improved by CRT display and clearly discernible alarm indicators.



Fig. 12.1 Main Control Panel of Kashiwazaki-Kariwa Unit-6 (ABWR)  
of Tokyo Electric Power Company

## 2) Efforts at the stage of operation and maintenance

A reactor establisher performs appropriate operational management during normal operation and abnormal transients, and in accidents.

- a) Operational management
  - i) Organizations for operation

The manager of power generation division, responsible for the operation of a nuclear installation, controls operating shifts in charge of the operation and their supporting groups.

The shift supervisors have authority and responsibilities to take measures required in an accident, and are selected from the Persons Responsible for Operation, qualified for their managerial and practical capabilities in operation.

- ii) Shift of operators

Operators work in six shifts rotating by three shifts. There are shifts devoted to education and training, in addition to operating shifts, to maintain and improve operator's capability. The education and training of operators is one of the important elements of human factors. Details are given in the report of Article 11.

When turning over shift duties, the shift supervisor makes sure to pass on the logbook, the supervisor logbook, keys, and precise description of operations to the succeeding supervisor. Each Operator also transfers information of plant operation to the succeeding operator.

b) Preparation and revision of operation procedures

Operation procedures are prepared for normal operation, failures and accidents and are constantly amended by lessons learned from incidents and accidents or by alteration of facilities.

Symptom-based procedures for multiple failures are prepared in addition to scenario-based procedures for design basis events. The symptom-based procedures enable prevention of accident progression without identification of the accident.

Preparation of procedures for shift operators addressing severe accidents exceeding design basis events, and accident management guidelines for the staff group supporting shift operators, are expected to be effective for mitigation of stress of operators in an emergency.

c) Maintenance management

The maintenance and repair divisions of a reactor establisher controls the works of regular checks, modification works, etc. of a nuclear installation carried out by the reactor manufacturer and many affiliated companies. A majority of human errors in the past occurred in the works associated with maintenance and repair, which means that the maintenance management is very important.

Director of a nuclear installation manages modification works, clarifying scope of work, scope of responsibility and authority. Maintenance of important equipment is carried out with a prior mock-up test.

Chief engineers (Chief Engineer of Reactors, Chief Electrical Engineer, Chief Engineer of Boiler and Turbine) perform verification and assessment of methods and results of regulatory inspections through attending the regulatory inspections or confirming inspection records. They also perform verification and assessment, as appropriate, of the plans and results of regular checks or modification works to prevent human errors in maintenance and management works.

(3) Feedback of Experiences of Incidents and Failures, etc.

As described in (1) 4), a reactor establisher investigates incidents caused by human errors and feedbacks lessons learned to other facilities as necessary. Reactor establishers reported their result of investigation to the former Nuclear Power Plant Operations Management Subcommittee of the Advisory Committee on Nuclear Power Generation. Some examples are given in Annex 4.2.

## 12.2 Management and Organization Problems

The management system, based on full understanding of the characteristics of individual systems and components, and human beings operating them, plays an important role in ensuring safety of nuclear installations. Defects in management or organizations may cause more serious consequences than those caused by errors committed by an individual.

There have been no serious problem associated with the organizations of existing nuclear installations in Japan, which is considered due to high capabilities of personnel obtained through systematic education and training, their positive posture and high morale for their duties and good communication among personnel.

### 12.3 Role of Regulatory Body and Reactor Establishers in Human Factors

A reactor establisher has a direct responsibility for ensuring safety. It is important for a reactor establisher to ensure safety through development of the Safety Preservation Rules, education and training, proper sharing of safety information, etc. NISA encourages and supervises self-controlled safety activities of a reactor establisher keeping sound and official relation with it.

While emphasis has so far been placed on how we could improve technical integrity, and the capability, qualification etc. of personnel engaged directly in operations, emphasis should be moved to the improvement of effectiveness and efficiency of organizations.

## Article 13 Quality Assurance

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

Quality assurance (hereinafter referred to as QA) activities for a nuclear installation in Japan are conducted by NISA, reactor establisher (licence holder), plant manufacturer and equipment suppliers (hereinafter referred to as reactor manufacturer), through mutual communication and coordination at each stage starting from design to operation and maintenance.

This article reports QA activities including framework of QA, activities of NISA, outline of QA program, and implementation and assessment of QA program.

### 13.1 Framework of QA in a Nuclear Installation

NISA instructs the reactor establisher to implement appropriate QA activities throughout stepwise regulation from design to operation such as safety examination, approval of construction plan and inspection of equipment, on the basis of the Reactor Regulation Law and the Electricity Utilities Industry Law.

The reactor establisher prepares QA program and carries out QA activities on it, in accordance with the Guide for Quality Assurance of Nuclear Power Plants (referred to as “JEAG 4101” hereinafter and see Article 7; Table 7-2) of the Japan Electric Association which is equivalent to the 50-C/SG-Q “Quality Assurance for Safety in Nuclear Power Plants and Other Nuclear Installations”, the IAEA document on QA.

### 13.2 Confirmation of QA by Regulatory Body

NISA requires applicant or licence holder of a nuclear installation to submit appropriate QA program, and confirms implementation of QA program as follows.

#### (1) Examination of Policy for Quality Assurance at Reactor Establishment

NISA requires the applicant to submit the “Policy for Quality Assurance” attached to the application document at safety examination for establishment licence of a nuclear installation,

#### (2) Examination of QA Program in Construction Stage

At examining the Construction Plan, NISA requires the licence holder to submit the “Description on Quality Assurance Program” as specified in the Rules for the Enforcement of the Electricity Utilities Industry Law, which licence holder should carry out through design, manufacturing, installation and functional tests. Triggered by the data falsification problem in 1998 of spent fuel transportation cask for the Japan Atomic Power Co., NISA instructs the reactor establisher to promote and oversee subcontractor’s quality control, material control, etc., in addition to its QA audit of primary contractor and primary contractor’s own management of manufacturing process.

### (3) Improvement of Fuel Assembly Inspection System

NISA had required licence holder to submit application document for fuel assembly design approval, which describes performance, strength, and flow sheet of fabrication process, etc. of fuel assembly. Triggered by the quality control data falsification in September 1999 of mixed oxide fuel assembly for Takahama Power Station Unit 3 of the Kansai Electric Power Co., Inc., which was fabricated by the BNFL in the UK, NISA has amended Articles 77 and 78 of the Rules for the Enforcement of the Electricity Utilities Industry Law in July 2000, so that applicant for fuel assembly fabrication and/or importation is required to attach the “Description on Quality Assurance Program” to application document for the examination conducted by NISA.

### (4) Confirmation of QA Activities Throughout Service Life

NISA confirms QA activities of the licence holder throughout service life of nuclear installation by

- 1) requiring the licence holder to specify QA program in the Safety Preservation Rules and to comply with it,
- 2) requesting explanation on QA management plan in the Periodical Inspection, and
- 3) periodically receiving report on QA activities in the nuclear installation.

## 13.3 Outline of QA Program for a Nuclear Installation

In issuing establishment licence of a nuclear installation, NISA examines that main function and safety design of nuclear power station conform to the criteria given by the safety examination guides. In construction stage, NISA examines Construction Plan and conducts Pre-Service Inspection in accordance with the Technical Standards for Nuclear Power Generation Equipment based on the Electricity Utilities Industry Law. NISA confirms at each stage that nuclear facilities are designed and manufactured in accordance with defined procedures and satisfy assigned functions, through record inspection, the Welding Safety Management Inspection, and the Pre-Service Inspection including functional tests for each

equipment and commissioning tests for overall performance.

Furthermore, NISA confirms that an operating nuclear installation conforms to the statutory Technical Standards by the Periodical Inspection, etc. The reactor establisher carries out QA activities in accordance with JEAG 4101 from construction stage to operation stage.

JEAG 4101 refers to the “Quality Assurance for Safety in Nuclear Power Plants” by the IAEA in 1988, and describes details of QA activities with examples. JEAG 4101 is now being revised in accordance with the IAEA Safety Series 50-C/SG-Q “Quality Assurance for Safety in Nuclear Power Plants and Other Nuclear Installations”, and will be ready in 2002.

#### 13.4 Implementation and Assessment of QA Program in a Nuclear Installation

##### (1) Establishment of QA Program

In accordance with JEAG 4101, reactor establisher prepares the “Comprehensive Quality Assurance Program” and local QA programs based on it to control QA activities in nuclear departments of headquarters and site offices of nuclear installations or construction offices. These programs cover document management, design control, procurement control, management of inspection and testing, nonconformity management, and audit, etc.

The licence holder submits the “Policy for Quality Assurance” and “Description on Quality Assurance Program” to NISA as shown in section 13.2.

##### (2) QA activities in Design, Construction, Commissioning, Operation and Maintenance

As QA activities are carried out by many organizations, reactor establisher may oversee overall QA program and entrust reactor manufacturer, and the manufacturer entrust the subcontractors, with QA activities clarifying role and responsibility of each organization in QA activity.

##### (3) QA Audit

The reactor establisher, in addition to internal QA audit by QA section of nuclear department and QA audit of reactor manufacturer, performs an internal independent QA audit by departments other than nuclear department reporting directly to senior management. The independent internal QA audit started learning lessons from the steam generator tube rupture accident at Mihama Power Station, Unit 2 in 1991.

JEAG 4101 defines that QA system of reactor manufacturers undergoes prior review and periodical audits by reactor establisher. The reactor manufacturer audits subcontractors’ QA activities in addition to its own internal audit of QA activity.

## Article 14 Assessment and Verification of Safety

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

- (i) comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation and throughout its life. Such assessments shall be well documented, subsequently updated in the light of operating experience and significant new safety information, and reviewed under the authority of the regulatory body;**
- (ii) verification by analysis, surveillance, testing and inspection is carried out to ensure that the physical state and the operation of a nuclear installation continue to be in accordance with its design, applicable national safety requirements, and operational limits and conditions.**

The legislative framework for the assessment and verification of safety is described in the report of Article 7, and detailed explanations at the stages of planning, establishment, construction and operation are given in the reports of Art.17, Art.18, and Art.19 respectively.

### 14.1 Assessment and Verification of Safety at Planning Stage

Proposed commercial power reactors are incorporated into the national Basic Plan for Electric Power Development, as indicated in section 7.3(1), after consulting with related government organizations, and receiving opinion of the members of the Electric Power Development Subcommittee of the Advisory Committee for Energy and Resources, environmental impact assessment and primary public hearing being carried out at this stage.

### 14.2 Assessment and Verification of Safety at Establishment Stage

The applicant for a licence to establish a commercial power reactor submits a licence application document to NISA on the basis of the Reactor Regulation Law.

NISA examines whether the contents of an application conform to the licensing criteria prescribed in the Reactor Regulation Law. NISA uses the examination guides in Table 7-1, established by the NSC, in the examination and confirms through conducting site surveys and evaluating safety analysis that basic design or design concept of an applied commercial power reactor conforms to the Reactor Regulation Law, soliciting opinions of members of the Nuclear and Industrial Safety Subcommittee of the Advisory Committee for Natural Resources and Energy. The minister of METI consults with the AEC and the NSC on the results of its examination.

The NSC reviews the applicant's documents and the results of the examination

conducted by NISA, focusing on a) adoption of different basic design than the formerly licensed ones, b) application of new standard or experimental data, and c) site specific conditions, etc. The NSC also holds a public hearing (secondary public hearing) to hear opinions concerning safety issues specific to the commercial power reactors.

The Minister of METI issues a licence, after obtaining views from of the AEC and the NSC with receiving consent of the Minister of MEXT.

The outline of application documents, evaluation methods and the acceptance criteria is described below.

#### (1) Establishment Licence Application Document

An application document to establish a commercial power reactor consists of a main text and attached documents detailing safety design, safety analysis, siting assessment, etc. required by the Reactor Regulation Law and the Rules for the Installation, Operation, etc. of Commercial Nuclear Power Reactors (hereinafter called, the Rules for Commercial Power Reactors). The application document supplies description of basic design sufficient for examining the safety. The safety examination is carried out in accordance with the Examination Guide for Safety Design of Light Water Nuclear Power Reactor Facilities and the Examination Guide for Safety Evaluation of Light Water Nuclear Power Reactor Facilities (hereinafter called, the Examination Guide for Safety Design and the Examination Guide for Evaluation, respectively)

#### (2) Evaluation Methods and Acceptance Criteria

##### 1) Siting evaluation

The siting evaluation of a commercial power reactor is conducted on the basis of the Examination Guide for Nuclear Reactor Siting Evaluation and Application Criteria (herein after the Examination Guide for Nuclear Reactor Siting), which requires that a) there have as yet been no event (natural disaster) liable to induce large accident and no such event is expected to occur in the future, b) in relation to its engineered safety features, nuclear reactors shall be located at a sufficient distance from the public, and c) the environment of the nuclear reactor site including its immediate proximity shall be such that appropriate measures for the public can be implemented as required. The details of the siting evaluation are described in the report of Article 17.

##### 2) Safety evaluation

In the safety examination conducted by NISA, it is verified that basic design or design concept of the commercial power reactor applied conforms to the Examination Guide for Safety Design, and the safety is evaluated as a whole on the basis of the Examination Guide for Safety Evaluation

The Examination Guide for Safety Design requires that a certain structure, system and component of commercial power reactor function in appropriate measures to ensure the safety in



postulated abnormal conditions as well as in normal operating conditions. Specifically, two postulated event categories of "anticipated transients during operation" and "accidents" are defined and the safety against these events is evaluated based on the Examination Guide for Safety Evaluation. The definition of event categories is almost the same as that of the nuclear safety standards (NUSS) of the IAEA.

The applicant performs safety analysis on these postulated events and proves the adequacy of the safety design of the plant referring the results to the acceptance criteria. NISA examines the results of this analysis and conducts independent analysis if necessary and confirms the adequacy.

Selections of postulated events and their evaluations are as follows. A single failure or a single erroneous operation for each system and component is identified and the representatives of events leading to similar consequences in transients but with the severest results are selected. These postulated events are classified into anticipated transients during operation or accidents through their probability and consequence.

a) Anticipated transients during operation

Anticipated transients during operation are those events that may be caused by a single failure or malfunction of component or a single erroneous operation by the operator during a plant life, or an external disturbance. Fourteen events are selected for PWR and twelve events for BWR. In the analysis of these events, the adequacy of the safety design of such important safety systems as reactor protection system, reactor shutdown system, etc. are confirmed through verifying the integrity of reactor core and reactor coolant pressure boundary.

b) Accidents

Accidents are events more serious and less frequent than anticipated transients during operation, which have the potential of releasing radioactive substances from a commercial power reactor. Ten events for PWR and nine events for BWR are selected. In the analysis, the adequacy of the safety design of engineering safety features is confirmed by verifying that there would be no significant damage to the core, that reactor containment boundaries would remain sound, and that there would be no significant risk of radiation exposure to the public in the vicinity.

Among the accidents, loss of coolant accident is analyzed and evaluated according to the Examination Guide for Safety evaluation and the Evaluation Guide for Emergency Core Cooling System Performance, and reactivity insertion accident is analyzed and evaluated according to the Examination Guide for Safety Assessment the Evaluation Guide for Reactivity Insertion Events.

### 14.3 Assessment and Verification of Safety at Construction Stage

#### (1) Verification of Safety at Approval of Construction Plan, and Pre-service Inspection

As indicated in section 7.3 (3), reactor establisher prepares the Construction Plan and receives approval of NISA prior to construction after granted an establishment licence on the basis of the Electric Utilities Industry Law.

Reactor establisher, after receiving the Approval of Construction Plan, undergoes Pre-Service Inspection by NISA at each construction stage and at the completion of all construction works, to verify that the construction is completed in accordance with the Approval of Construction Plan and the technical standards. The Pre-Service Inspections includes those inspections from inspections on structure, strength or leakage of each component to inspections on function and performance of overall system of commercial power reactor. Details are shown in Table 14-1. The tests for inspection at the time of the criticality achievement and the completion of construction works in the table are so-called commissioning tests.

#### (2) Verification of safety through the Approval of Fuel Assembly Design and the Fuel Assembly Inspection

A person who intends to use fuel assembly submits an application for the Approval of Fuel Assembly Design to NISA, receives the approval and undergoes the Fuel Assembly Inspection, based on the Electricity Utilities Industry Law. NISA, in issuing the approval, verifies that the proposed fuel design takes into consideration heat resistance, radiation resistance, corrosion resistance, etc. required corresponding to operating conditions, and that it maintains sufficient strength through the years in service. NISA confirms in inspection that fabrication of fuel assemblies is performed in accordance to the approved design and technical standards. The Fuel Assembly Inspection is also required for the replacement fuel, regardless of whether or not there have been design changes.

In addition, imported fuel assemblies are also required to undergo and pass the Fuel Assembly Inspection by NISA.

#### (3) Verification of Safety through Welding Safety Management Inspection

The reactor establisher performs welding self-inspection on welded pressurized parts and welded containment, and the management system of self-inspection undergoes the Welding Safety Management Inspection by NISA or a body designated by it.

### 14.4 Assessment and Verification of Safety at Operation Stage

In an operation stage, safety of commercial power reactors is assessed and confirmed by the Approval of the Safety Preservation Rules, the Periodical Inspection, the Nuclear Safety Inspection, investigation of incidents and failures and prevention of their recurrence, on-the-spot entry and inspection conducted at any time, etc. Details are described in the report of Article 19.

### 14.5 Other Activities on Assessment and Verification of Safety

## (1) Periodic Safety Reviews

The Periodic Safety Review (PSR) is performed on the basis of ministerial notification of NISA (then MITI) dated June 1992. The reactor establisher performs comprehensive review of its safety related activities, including investigation, analysis and feedback of domestic and foreign operating experiences, incorporation of the latest technical knowledge in improving safety, identification of possible measures to improve safety based on PSA, etc. in order to continue safe operation of the commercial power reactor. The reactor establisher reports the result of its review to NISA. The PSR is carried out approximately every ten years.

The PSR started in 1994, and reviews of 27 units of commercial power reactors have been carried out up to June 2001, total number of reviews being 29. The reviews performed in the reporting period are shown in Table 14-2. The safety verifications performed and improvements identified in the 5th and 6th rounds of the PSR are shown in Table 14-3.

In addition, assessment of aging related technology and long-term maintenance plan was included in the scope of the review of two units of reactors in the 7th round of the PSA, which had been operating 30 years after commissioning. Details of the aging related matters are described later.

The outline of the results of the assessment by NISA on the reactor establisher's PSR report is as follows.

- 1) Comprehensive evaluation of operation experience; The reactor establisher have adequately taken measures to improve safety, which include feedback of operating experience, preventive maintenance, reduction of radiation dose to workers, etc.
- 2) Incorporation of the latest technical knowledge; The reactor establishers have adequately incorporated the achievement of safety research and technological development since commissioning in improving the safety of commercial power reactors.
- 3) Probabilistic safety assessment; The reactor establishers have properly performed probabilistic safety assessment, and applied its results effectively in improving the safety of their own commercial power reactors with recognizing the safety features.

## (2) Measures Addressing Aging

NISA (then MITI) discussed the policy addressing aging of commercial power reactors and issued a report titled "Basic Policy on Aged Nuclear Power Plant" in April 1996.

The report said that technical assessment of main components such as reactor pressure vessel, primary system piping, etc. indicated that long-term safe operation was possible through intensifying the Periodic Inspection and other inspections, that technical assessments and proper maintenance program of all of aged structures and components with safety function were needed, and that continuous development of inspection technology and repair technology were important.

According to this policy, reactor establishers of the aged plants, that are, Unit 1 of the Tsuruga Power Station, Unit 1 of the Mihama Power Station, and Unit 1 of the Fukushima Daiichi Power Station, carried out technical assessment and developed long-term maintenance programs intensifying current maintenance activities, and reported to NISA.

NISA examined the reactor establishers' activities on those three plants, solicited views of the then Advisory Committee on Nuclear Power Generation, and published a report in February 1999 titled "Assessment of reactor establishers' measures addressing aging of nuclear power plants and implementation program".

NISA stresses importance of following items addressing aging in this report.

- 1) Enhancement of PSRs; Reactor establishers enhance the PSR by developing long-term maintenance programs based on technical assessments of aging phenomena of main structures and components of commercial power reactors. NISA assesses the results.
- 2) Intensification of the Periodic Inspections, etc.; NISA intensifies the Periodic Inspections for installations more than 30 years in operation by shortening the interval of in-service inspection of components constituting reactor coolant pressure boundary from ten years to seven years. NISA also receives report on the implementation of long-term maintenance program from the reactor establisher, and confirms it, as necessary, after reviewing the report.
- 3) Development of technical standards; NISA will establish related technical standards for inspections and monitoring methods of aged plants, preventive maintenance and repair methods and aging assessment methods based on the result of technical developments. An example is 'rules for flaw acceptance' of vessel and piping constituting the reactor coolant pressure boundary, based on fracture mechanics.
- 4) Promotion of technical development; NISA conducts technical developments on inspections and monitoring technology, preventive maintenance and repair technology and aging assessment technology, to achieve more reliable audits. NISA entrusts the Center for Technology on Aging, established under the JAPEIC in April 2000, with development and implementation of aging-related technology including;
  - a) Integrated management and assessment of the technical knowledge about aging,
  - b) Coordinated planning of technical developments on aging among industry, administration and academics,
  - c) Practical application of results of technical development,
  - d) Information sharing about aging technology.

### (3) Probabilistic Safety Assessment

The probabilistic safety assessment (PSA) is not a statutory requirement but an effective complementary tool to improve design and operation management of commercial power reactors, to develop measures for accident management, etc.

For examples, the NSC is developing safety goal on the basis of accumulated knowledge of PSA, while NISA utilizes PSA in regulatory activities such as assessment of measures for accident management proposed by reactor establishers, assessment of revision of the Safety Preservation Rules, etc.

Methodology development and utilization of PSA are as follows.

1) Development of PSA methodology

JAERI, NUPEC and industries etc. are engaged in developing PSA methodology for internal events and external events (earthquake, fire, etc.), and methodology to utilize PSA in incident and failure analysis or risk-informed operational management. JAERI puts emphasis on developing PSA methodology, while NUPEC and industry put emphasis on developing methodology to utilize PSA to improve reliability of commercial power reactors and operation management, and on developing necessary database such as the rate of component failures, the rate of human errors, etc.

2) Utilization of PSA

a) Assessment of measures for Accident Management

Reactor establishers carried out PSA for internal events leading to reactor core disruption (level 1 PSA) or containment failure (level 1.5 PSA) in order to develop and assess measures for Accident Management for all 51 operating commercial power reactors. Details are described in section 18.4.

b) Utilization in the PSR

Reactor establishers have carried out PSA for internal events during operation in the PSR to identify safety features of commercial power reactor, assess the validity of the measures for accident management, etc. Furthermore, they included PSA for shut down condition in the PSR in and after 2001.

c) Utilization in setting acceptance criteria in the Safety Preservation Rules

Reactor establishers utilized PSA in setting allowable outage time of safety related systems at revising the Safety Preservation Rules and applied for approval to NISA. NISA confirmed the validity of the revised rules with obtaining experts' opinion from NUPEC.

d) Utilization in in-service inspection (ISI), etc.

NISA has developed, based on PSA, importance categorization of components and pipes, to be used in setting scope and/or frequency of in-service inspection of welded parts of pipes, pumps and valves, no negative impact on safety being identified so far.

Table 14 – 1 Outline of Pre-Service Inspections

Time of Inspection	Contents of Inspection
(1) At the time of installation of each item	Test of structure, strength and/or leakage of reactor, each component of reactor cooling system, instrumentation and control system, fuel handling system, radiation management system, waste processing system or reactor containment structure is performed, when each item has been installed and reached the state allowing such testing. Specifically, material inspection, structure inspection, pressurized leak test, inspection on foundation and inspection on support structure are performed
(2) At the time of installation of steam turbine	Test of structures of steam turbine is performed when installation of bottom half part of compartment is completed. Test of structure, strength and/or leakage on auxiliary boiler is performed when its main part completed to assemble.
(3) At the time of fuel loading	When the reactor reached the state allowing fuels to be loaded, inspections of systems around reactor, items required ensuring safety before fuel loading, and items for which inspection would be difficult after fuel loading are performed. In the case of BWR, inspection of main steam bypass valves, inspection of function and performance of those systems as control rod drive system, core spray system, residual heat removal system, etc. and functional inspections of safety protection system, etc. are performed.
(4) At the time of criticality	When the reactor reaches criticality, inspections are performed on nuclear characteristics of reactor core, and function and performance of overall commercial power reactor which can be performed only after fuel loading In the case of BWR, an inspection to confirm shutdown margin at full fuel loading, inspections of control rod full stroke test, effective multiplication factor at first criticality and moderator temperature coefficient are performed.
(5) At the time of completion of construction	When all construction work under the Construction Plan has been completed, inspections are performed on performance of systems around reactor, functions and performances of overall commercial power reactor that can be confirmed after fuel loading, and functions and performance of systems other than those around reactor. In the case of BWR, inspections are performed on one control rod scram test, loss of external power-supply test, generator load interception inspection, plant trip inspections, load inspections.

Table 14 – 2 Periodic Safety Reviews Performed During Reporting Period

5th round (announced June, 1999 )

Fukushima Daiichi Nuclear Power Station Unit 6 (Tokyo Electric Power Co., Inc.: BWR)

Onagawa Nuclear Power Station Unit 1 (Tohoku Electric Power Co., Inc.: BWR)

Hamaoka Nuclear Power Station Unit 2 (Chubu Electric Power Co., Inc.: BWR)

6th round (announced May, 2000)

Fukushima Daini Nuclear Power Station Unit 1 (Tokyo Electric Power Co., Inc.: BWR)

Mihama Power Station Unit 3 (The Kansai Electric Power Co., Inc. : PWR)

Ohj Power Station Unit 1 (The Kansai Electric Power Co., Inc. :PWR)

Ohj Power Station Unit 2(The Kansai Electric Power Co., Inc. :PWR)

Genkai Nuclear Power Station Unit 2 (Kyushu Electric Power Co., Inc. :PWR)

7th round (announced June, 2001)

Fukushima Daiichi Nuclear Power Station Unit 2 (Tokyo Electric Power Co., Inc.: BWR) \*

Fukushima Daini Nuclear Power Station Unit 2 (Tokyo Electric Power Co., Inc.: BWR)

Mihama Power Station Unit 2 (The Kansai Electric Power Co., Inc.: PWR.) \*

Takahama Power Station Unit 3 (The Kansai Electric Power Co., Inc.: PWR.)

Takahama Power Station Unit 4 (The Kansai Electric Power Co., Inc.: PWR.)

Ikata Power Station Unit 2 (Shikoku Electric Power Co., Inc.: PWR)

\*: Reviewed also on the measures against aging.

Table 14 – 3 Example of the Safety Confirmation and Improvements in 5th and 6th Round PSR

Items	Examples of Confirmation of Safety and Improvements
(1) Comprehensive Evaluation of Operation Experience	<p>1) Operation Performance</p> <ul style="list-style-type: none"> <li>- Steady improvement in availability of each commercial power reactor</li> <li>- Steady decrease of unscheduled shut down</li> </ul> <p>2) Operation Management and feedback of lessons learned from incidents:</p> <ul style="list-style-type: none"> <li>- Improvement of operation organization and operation manuals as a result of lessons learned from the TMI-2 accident of USA in 1979</li> <li>- Refinement and reinforcement of operation organization as a result of the recirculation pump damage accident in Fukushima Daini Nuclear Power Station Unit 3 in 1989</li> <li>- Improvements of ordinary onsite power supply systems as a result of the steam generator tube rupture accident in Mihama Power Station Unit. 2 in 1991</li> <li>- Development of the manual corresponding to severe accidents and the accident management guide</li> </ul> <p>3) Maintenance management</p> <ul style="list-style-type: none"> <li>- Confirmation of the integrity of component by regular inspections based on the Safety Preservation Rules, in addition to the Periodical Inspections</li> <li>- Quality assurance activities such as measures against aging of components (appropriate replace of components) as a measure to maintain and improve reliability.</li> </ul> <p>4) Radiation management</p> <ul style="list-style-type: none"> <li>- Based on the principle of ALARA, Steady dose reduction has been achieved by adoption of condenser filters, suitable shielding for piping in containment vessel, automatic CRD exchanger, automatic ISI equipment, etc.</li> </ul> <p>5) Radioactive waste management</p> <ul style="list-style-type: none"> <li>- Reduction of gaseous and liquid radioactive wastes by improvements of fuel integrity and of radioactive waste processing equipment.</li> <li>- Reduction of solid wastes by installation of incineration facility, etc.</li> <li>- Reduction of stored solid waste by incineration of inflammables and repacking of incombustibles</li> </ul>
(2) Reflection of the Latest Technical Knowledge	<p>1) Reflection of results from safety researches</p> <p>Verification of sufficient safety of existing components by knowledge obtained from experiment on breach behaviors of fuels and full-scale simulation experiment of loss of reactor coolant events, etc.</p> <p>2) Reflection of results of technical development:</p> <ul style="list-style-type: none"> <li>- Results of the Improvement and Standardization program, etc. have been reflected as appropriate.</li> <li>- Improvement of reliability by advanced fuel design, measures to prevent stress corrosion cracking, measures to prevent valve stem seal leakage, etc.</li> <li>- Improvement in operational surveillance by intensive monitoring of plant parameters with CRT in central control rooms</li> <li>- Improvement in waste management by solid waste pelletization equipment</li> <li>- Introduction of computer aided dose management system.</li> </ul>
(3) PSA	<p>The probabilistic safety assessment was performed to identify safety features of each commercial power reactor. From the results, improvement of safety by measures for accident management was verified. Moreover, importance assessment contributed to identification of safety functions and/or initiating events that serve as large contributors to reactor core damage.</p>



## Article 15 Radiation Protection

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

### 15.1 Summary of Laws, Regulations, and Requirements on Radiation Protection for a Nuclear Installation

The national standards of radiation protection for a nuclear installation are provided in the Reactor Regulation Law, the Electricity Utilities Industry Law and the Industrial Safety and Health Law, etc. and related government ordinances, ministerial orders and notifications based on these laws, and guidelines. The recommendations of the ICRP are given due consideration and are incorporated into legislation and regulation.

A ministerial ordinance, the Rules for Commercial Power Reactors, established on the basis of the Reactor Regulation Law, prescribes area control for radiation protection, radiation control of personnel engaged in the radiation controlled areas, measurement and surveillance of radiation levels, monitoring of discharged radioactive materials, and maintenance of radiation control equipment. METI enacted the Notification for Dose Limits on the basis of the Rules for Commercial Power Reactors (hereinafter referred to as the Dose Limit Notification), which prescribes dose limits and concentration limits of radioactive materials both inside controlled area and 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.

In order to ensure those rules are complied with, the reactor establisher is required to prescribe in the Safety Preservation Rules, 1) controlled areas, conservation areas and peripheral monitoring area and access control to these areas, 2) monitoring equipment at air ventilation and water discharge, 3) monitoring of the dose, dose equivalent, the concentration of radioactive materials and the density of the surface radioactive materials of objects contaminated by radioactive materials, and the decontamination, 4) maintenance of radiation monitoring equipment.

Ministerial order “the Technical Standards of Nuclear Power Generation Equipment” based on the Electricity Utilities Industry Law, provides the technical standards for radiation control equipment (biological shielding walls, ventilation facilities, instrumentation devices, alarm devices, and waste processing equipment, etc.) at nuclear installations. NISA confirms that such radiation

control equipment conforms to the ministerial order at issuing approval and conducting inspection of the equipment.

The Industrial Safety and Health Law provides that business operators (reactor establisher) take measures to prevent damage to health of personnel engaged in radiation works, including radiation exposure, throughout the period of employment, and requires them to take actions for safety and health education, work environment monitoring and medical examination of workers. On the basis of the law, the Ministry of Health, Welfare and Labor has enacted a ministerial order, the Rules for Prevention of Damage from Ionizing Radiation, which prescribe controlled areas, dose limits and measurement, protection from external radiation, and prevention of radioactive contamination.

In examining the application of an establishment licence for a nuclear installation, it is confirmed that the application conforms to the Examination Guides established by the NSC as well as the legislation and technical standards. The Guide for Dose Objective in the Site Vicinity, one of these Examination Guides, gives numerical guides to reduce the discharge of radioactive materials from a nuclear installation into environment and the dose rate of the public as low as reasonably achievable (ALARA).

The ICRP 1990 Recommendation (Publication 60) was, after examination by the Radiation Review Council, incorporated into national legislations and regulations on radiation protection, by revision of related ministerial orders and notifications in April 2001 with following additional considerations. First, controlled area is defined where dose may exceed 1.3 mSv/ 3months, corresponding to 5 mSv/year which is the special allowable dose limit to the public. Second, the occupational dose limit for female personnel is set at 5mSv/3months, allocated value for the shorter period, reducing possible dose for a potential embryo. The allowable dose limits in emergency remain twice of the annual dose limits as before, considering the IAEA Basic Safety Standard (BSS).

The Radiation Review Council is an organization established under MEXT for the purpose of coordinating technical standards on prevention of radiation hazards. It submits reports to inquiries from related administrative organizations, or gives its views to them if necessary.

## 15.2 Implementation of Laws, Regulations and Requirements on Radiation Protection

### (1) Allowable Dose Limits

#### 1) Allowable Dose Limits for Controlled Areas

The Rules for Commercial Power Reactors and the Dose Limits Notification requires reactor establishers to establish controlled area including reactor room, and spent fuel storage

facilities and radioactive waste disposal facilities, where the dose of external radiation may exceed 1.3mSv for three months, or where the concentration of radioactive materials in the air or the surface density of radioactive materials may exceed the values specified in the Notification, respectively, and to establish necessary measures to be taken in these areas.

2) Allowable Dose Limits for Occupational Exposure

The allowable dose limits for personnel engaged in radiation works are specified in the Dose Limits Notification as listed in Table 15- 1

Table 15- 1 Dose limits for personnel engaged in radiation work

Items	Limit
1. Effective dose limits a) Personnel engaged in radiation works b) Female personnel c) Pregnant Female personnel	100 mSv / 5 year, but do not exceed 50 mSv for any year 100 mSv / 5 year, but do not exceed 5 mSv for any 3 months 100 mSv / 5 year, but do not exceed 1 mSv from internal exposure during pregnancy
2. Equivalent dose limits a) Eye lens b) Skin c) Female abdominal region	150 mSv/ year 500 mSv/ year 2 mSv from notification of pregnancy to delivery
3. Dose limits for the personnel engaged in emergency radiation works a) Effective dose b) Equivalent dose for eye lens c) Equivalent dose for skin	100 mSv/ incident 300mSv/ incident 1Sv/ incident

Reactor establishers have paid much effort not only to comply with the allowable dose limits but also to reduce doses in line with ALARA concept by taking following activities:

- a. reducing radiation source in systems and components of a nuclear installation,
- b. keeping distances from or setting shields against radiation sources,
- c. reducing working time in radiation environment.

Consequently, the exposure dose of workers has been successfully reduced to the level as shown in Annex 2.

### 3) Dose Limits for the Public

The dose limits for the public are also given in the Dose Limit Notification as listed in Table 15-2.

Table 15-2 Dose limits for the public

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

#### (2) Conditions for Discharge of Radioactive Materials

##### 1) Numerical Guide to Reduce Dose of the Public in Vicinity and Discharge Control (ALARA)

In the Guide for Dose Objective in the Site Vicinity, the NSC has prescribed the numerical guide of 0.05 mSv, one twentieth of the dose limit to the public, in order to reduce dose for the public due to discharge of radioactive material to the environment during normal operation of a nuclear installation as low as reasonably achievable.

The reactor establisher establishes an annual numerical discharge control guide, which corresponds to the numerical guides at the site vicinity, and makes efforts to keep the discharges of radioactive effluents below the numerical discharge control guide. NISA acknowledges the numerical discharge control guide and receives report on it from the reactor establisher.

##### 2) The Discharge Data and the Measures Taken to Reduce the Amount of the Discharge

The discharge records of radioactive gaseous and liquid waste from the nuclear installations (BWR and PWR) over the past seven years are shown in Tables 15-3 to 15-5. The tables clearly show that the discharge quantities are substantially below the numerical discharge control guide, gas discharge from the PWR being only one thousandth of the numerical guides. This is due to the fact that the radiation management of the nuclear installation is carried out in line with the ALARA principle, including following measures.

Gaseous waste is discharged from ventilation port, while being measured and monitored, after particles are removed by high efficiency filter, and noble gas and iodine are decayed in a holdup tank or charcoal bed noble gas holdup equipment.

All liquid waste are collected in a disposal facility, and equipment drain is recovered after being processed in a filter equipment or demineralizer. Floor drain is recovered after being processed in a concentrator and demineralizer. Floor drain is reused in general, though a part of it may be discharged through the discharge outlet after the concentration is measured. Recovered liquid waste from resin is reused after treated in a concentrator and demineralizer. Concentrated

liquid waste generated in this process is treated as a solid waste. Low-level laundry wastewater, etc. are usually drained to the environment after being treated through filter and monitored.

Moreover, substantive reduction of fuel leak (the BWR fuel leak is 0.0006% for the recent high burn-up 8x8 fuel compared to 0.4% for the conventional 7x7 fuel, while the PWR fuel leak is 5 assemblies in the 1990s compared to 31 assemblies in the 1980s), filtering ventilation during maintenance through local high efficiency filter, and other efforts to minimize generation of liquid waste resulted in very low level of discharge of gaseous and liquid radioactive wastes.

### (3) Environmental Radiation Monitoring

Environmental radiation monitoring equipment during normal operation of a nuclear installation, which the reactor establisher is required to install, includes monitoring devices of the dose inside the control area and outside the peripheral monitoring area and automatic devices to alarm any abnormal increase of concentration of radioactive materials or dose rates.

The reactor establisher conducts radiation monitoring at the site vicinity during normal operation, assesses the impact upon the environment of the discharge of radioactive materials from the nuclear installation, and feedbacks the results in improving discharge control and facility management. Local governments (prefectures with nuclear installations) also monitor radiation level independently at the site vicinity to protect public health and safety.

The NSC indicates fundamentals of the monitoring plan and implementation and the evaluation of radiation dose in the Guide on Environmental Radiation Monitoring, in order to improve and to standardize monitoring technology. Local governments and reactor establishers implement monitoring in accordance with this guide.

## 15.3 Regulatory Control Activities

### (1) Discharge Control of Radioactive Materials

By the Rules for Commercial Power Reactors, the reactor establisher is required to report immediately to the NISA when concentration of radioactive materials in the air outside the peripheral monitoring area exceeds the allowable limit in discharging gaseous radioactive waste, or when the concentration of radioactive materials in the water at the outer boundary of the peripheral monitoring area exceeds the allowable limit in discharging liquid radioactive waste, and report the status of the event and measures taken against it within ten days.

### (2) Control of Personal Exposure

The Rules for Prevention of Damage from Ionizing Radiation require business operators (reactor establisher) to measure dose due to external and internal exposure of workers who are engaged in radiation work or in emergency work, or enter temporarily into control area. The rules

require that the reactor establisher monitor and check daily dose due to external exposure, if it is expected to exceed the specified value of 1mSv at 1cm dose equivalent, and calculate, without delay, the dose of the personnel engaged in radiation works using the method prescribed by the Minister of Health and Labor, and keeps those records for a period of thirty years.

The Radiation Workers' Registration Center of the Association of Radiation Impact was established in November 1977, to address the difficulty of controlling the personal dose of workers who work in more than one radiation environment. The Center unitarily collects and controls such personal radiation control data of the workers who work under the Reactor Regulation Law, as personal identification control, personal radiation control booklet, periodical dose registration and transfer and custody of personal radiation dose record.

Table 15-3 Annual discharge of radioactive noble gas in gaseous waste

(unit: Bq/year)

Year Station	1994	1995	1996	1997	1998	1999	2000	Numerical guides
Station - A	N.D.*	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	$6.7 \times 10^{15}$
Station - B	$6.0 \times 10^{11}$	$5.1 \times 10^{11}$	$4.3 \times 10^{11}$	$4.3 \times 10^{11}$	$6.1 \times 10^{11}$	$1.2 \times 10^{11}$	$5.7 \times 10^{10}$	$3.7 \times 10^{15}$

\*: N.D. indicates a value below the detection limit concentration of  $2 \times 10^{-2}$  Bq/cm<sup>3</sup>.

Table 15-4 Annual discharge of radioactive iodine (I-131) in gaseous waste

(unit: Bq/year)

Year Station	1994	1995	1996	1997	1998	1999	2000	Numerical guides
Station - A	N.D.*	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	$2.3 \times 10^{11}$
Station - B	$2.2 \times 10^5$	N.D.	N.D.	$8.6 \times 10^5$	$1.2 \times 10^5$	$1.6 \times 10^5$	$1.1 \times 10^6$	$1.0 \times 10^{11}$

\*: N.D. indicates a value below the detection limit concentration of  $7 \times 10^{-9}$  Bq/cm<sup>3</sup>.

Table 15-5 Annual discharge of radioactive materials (excluding <sup>3</sup>H) in liquid waste

(unit: Bq/year)

Year Station	1994	1995	1996	1997	1998	1999	2000	Numerical guides
Station - A	N.D.*	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	$2.5 \times 10^{11}$
Station - B	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	$1.4 \times 10^{11}$

\*: N.D. indicates a value below the detection limit concentration of  $2 \times 10^{-2}$  Bq/cm<sup>3</sup>.

(Represented by <sup>60</sup>Co.)

(Note) Station - A : Kashiwazaki-kariwa Nuclear Power Station (BWR)

Station - B : Ohi Nuclear Power Station (PWR)

## Article 16 Emergency Preparedness

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

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

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

### 16.1. 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 responses, coordinated cooperation among the national government and local governments, strengthening of the national emergency preparedness and the clarification of nuclear business operator's (licence holder's) responsibilities. The Special Law of Emergency Preparedness for Nuclear Disaster (hereinafter referred to Special Law for Nuclear Emergency) was enacted in December 1999 and enforced in June 2000, addressing the special characteristics of nuclear emergency mentioned above. The Special Law for Nuclear Emergency was enacted within the legal framework already established by the Basic Law on Emergency Preparedness, which had defined roles of the national government, local governments, etc. in emergencies such as earthquakes, typhoons, and conflagrations.

The Part 10 "Nuclear Emergency Preparedness" in the Basic Plan for Emergency Preparedness based on the Basic Law on Emergency Preparedness, was extensively revised in accordance with the Special Law for Nuclear Emergency, clarifying roles and responsibilities



of the national government, local governments, and licence holders etc. (See Annex 3.9)

The NSC, also taking into consideration the Special Law for Nuclear Emergency and the lessons learned from the JCO Criticality Accident, revised in May 2000 the "Emergency Preparedness Guidelines" on technical and special matters of a nuclear emergency measures, to include

- research reactors and nuclear fuel cycle facilities in addition to commercial power reactors, and,
- accidental release of nuclear fuel material etc. in addition to release of rare gas and iodine.

The said guidelines were amended in June 2001 to reflect the improvement in emergency medical treatment. The outline of the Emergency Preparedness Guidelines is shown in Annex 3.12 (4).

#### (1) Outline of the Emergency Preparedness concerning Nuclear Installations

The Special Law for Nuclear Emergency has prescribed measures in nuclear emergency at power reactors, research reactors, nuclear fuel cycle facilities, etc. Emergency preparedness of a commercial power reactor is given below (see Fig. 16-1).

##### 1) Initial Responses in Nuclear Emergency

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

- The Special Law for Nuclear Emergency defines specific initial events in a power reactors (see Table 16-1), the occurrence of which the licence holder shall immediately notify the Minister of METI and the heads of related local governments of.
- The Minister of METI, 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 Specialist for Nuclear Emergency collects information and coordinates activities preventing expansion of the events.
- When the Minister of METI 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 or evacuation 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" in the district where emergency measures are to be taken.

- Local governments establish their own emergency response headquarters following declaration of "Nuclear Emergency."
- In order to tighten cooperation among the national government, related local governments etc., the "Joint Council for Nuclear Emergency Response" is established at the Off-Site Center mentioned later.

## 2) Strengthening of the National Emergency Preparedness

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

- METI stations a Senior Specialist for Nuclear Emergency in the vicinity of each nuclear installation, who guides and advise licence holder in preparing Operator's Plan for Emergency Preparedness and, in emergency, takes necessary measures preventing expansion of the emergency.
- The Minister of METI designates a facility in the vicinity of a nuclear installation as Off-Site Center to be used in an emergency. In the case of an emergency, the national government, the local governments and the licence holder 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 will be built on the point shown in Fig. 16-2 by March 2002, provisional off-site centers being prepared for the meantime. Off-Site Centers have communication equipment with the Prime Minister's Official Residence, the Cabinet Office, NISA, MEXT and related local governments, and other necessary equipment.
- The national government establishes arrangements to secure quick and coordinated activities in an emergency.
- The national government carries out comprehensive nuclear emergency exercise.

## 3) Clarification of the Licence Holder's Responsibility

- The licence holder develops its own Operator's Plan for Nuclear Emergency Preparedness after consulting with related local governments, and submits it to the Minister of METI.
- The licence holder 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.

## (2) On-site and Off-site Nuclear Emergency Preparedness of Nuclear Installations

Organizations related to nuclear emergency preparedness keep themselves 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 of Nuclear Installations

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

The licence holder, to cope with emergency properly, 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 of, 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 licence holder.

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

#### 2) Off-Site Emergency Preparedness of Nuclear Installations

Roles and responsibilities of the national government and local governments in emergency preparedness are defined in the Special Law for Nuclear Emergency and the Basic Plan for Emergency Preparedness. Each local government develops its own detailed local plan for emergency preparedness. They carry out emergency environmental radiation monitoring, and implement evacuation or sheltering of residents receiving advice or direction from the Prime Minister based on the report of the Minister of METI.

Emergency activities are roughly divided into five categories.

- a) to convey information, directions, etc. to residents
- b) to conduct emergency environmental radiation monitoring
- c) to advise or direct local residents on sheltering or evacuation.
- d) to restrict consumption of foods and drinks.
- e) to conduct emergency medical treatment

### 16.2. Trainings and Exercises

The purpose of nuclear emergency exercise is 1) to enhance understanding of the nuclear emergency preparedness by responsible personnel of the national government, local governments and the licence holder, and residents, and 2) to verify whether emergency measures function in predetermined way, and whether information sharing and cooperation among related organizations are adequate. The national government, local governments, designated public organizations and the licence holder cooperate and participate in exercises, which cover communication, monitoring, decision on emergency measures to be taken,

sheltering or evacuation etc., ranging from large scale national exercise to licence holder's on-site exercise. Exercises in the past years are shown below.

#### 1) Exercise Planned by the National Government (Table 16-2 (1))

Nuclear emergency exercise had been planned and conducted by local governments with support and coordination of national government before the JCO Criticality Accident. But the Special Law for Nuclear Emergency, which was established after the JCO accident, stipulated exercise to be planned and conducted by the national government.

- a) A comprehensive exercise at No. 2 Unit of Tsuruga Power Station, Tsuruga City, Fukui Prefecture, was conducted on March 23, 2000, just after the establishment of, and before the enactment of, the Special Law for Nuclear Emergency, in order to learn lessons from exercise under the new legal framework. The exercise was participated in by 57 organizations including the national government, local governments, designated public organizations and the licence holder, and by 1,900 persons including local residents taking part in sheltering or evacuation.
- b) The first comprehensive exercise after the enactment of the Special Law for Nuclear Emergency was conducted on October 28, 2000, at Unit 2 of Shimane Nuclear Power Station, Kashima Town, Shimane Prefecture. The exercise was participated in by 83 organizations and 13,000 persons, as well as the Prime Minister, the then Minister of MITI and other ministers. The exercise included the declaration of "Nuclear Emergency" and the establishment of the Nuclear Emergency Headquarters, in addition to verifying function of the Joint Council for Nuclear Emergency Response established at the Off-Site Center, and communication with local residents.

#### 2) Exercises Planned by Local Governments (Table 16-2 (2))

The local plan for emergency preparedness prescribes local exercise to be planned and conducted by local governments, which METI supports by sending expert staff.

#### 3) Exercise Planned by the Licence Holder

The licence holders have conducted on-site exercises once a year including establishment of emergency response headquarters, communication, monitoring, evacuation or sheltering, etc. based on Operator's Plan for Emergency Preparedness for each site, and have participated in exercises conducted by local governments.

#### 4) Participation in International Nuclear Emergency Exercise

Japan participated in the Joint International Nuclear Emergency Exercise (JINEX1) held in May 2001 sponsored mainly by the IAEA, learning lessons on cross border radiological emergency, and will participate in future international exercises.

### 16.3 International Framework and Relationship with Neighboring Countries

Japan is a contracting party to the Convention on Early Notification of a Nuclear Accident, and to the Conventions on Assistance in the Case of a Nuclear Accident or Radiological Emergency. The following system has been established for the notification of a nuclear accident to neighboring countries:

- (1) The Ministry of Foreign Affairs has been designated as the authority for notification, and the Ministry of Foreign Affairs and METI have been designated as competent authorities for nuclear installations.
- (2) METI receives a report on an accident in a nuclear installation on the basis of legal obligation of the licence holder.
- (3) Competent authorities for nuclear installations notify the IAEA and the countries, which may be affected by the accident, when the occurrence of the accident is confirmed and it is predicted that release of radioactive materials may affect neighboring countries.

In accordance with an arrangement concluded with the People's Republic of China, on the basis of the bilateral agreement for peaceful use of nuclear energy, the government notifies without delay, and is notified by, China of serious events of nuclear installations. Bilateral inter-governmental agreement with the Republic of Korea calls for cooperation in the establishment and operation of an early notification network for nuclear safety.

If an accident should occur at a foreign nuclear installation and a request for assistance is made, Japan will dispatch, on the basis of the Conventions on Assistance in the Case of a Nuclear Accident or Radiological Emergency, specialists in emergency monitoring and emergency medical treatment, and provides materials and equipment such as radiation monitoring equipment and radiation protection equipment.

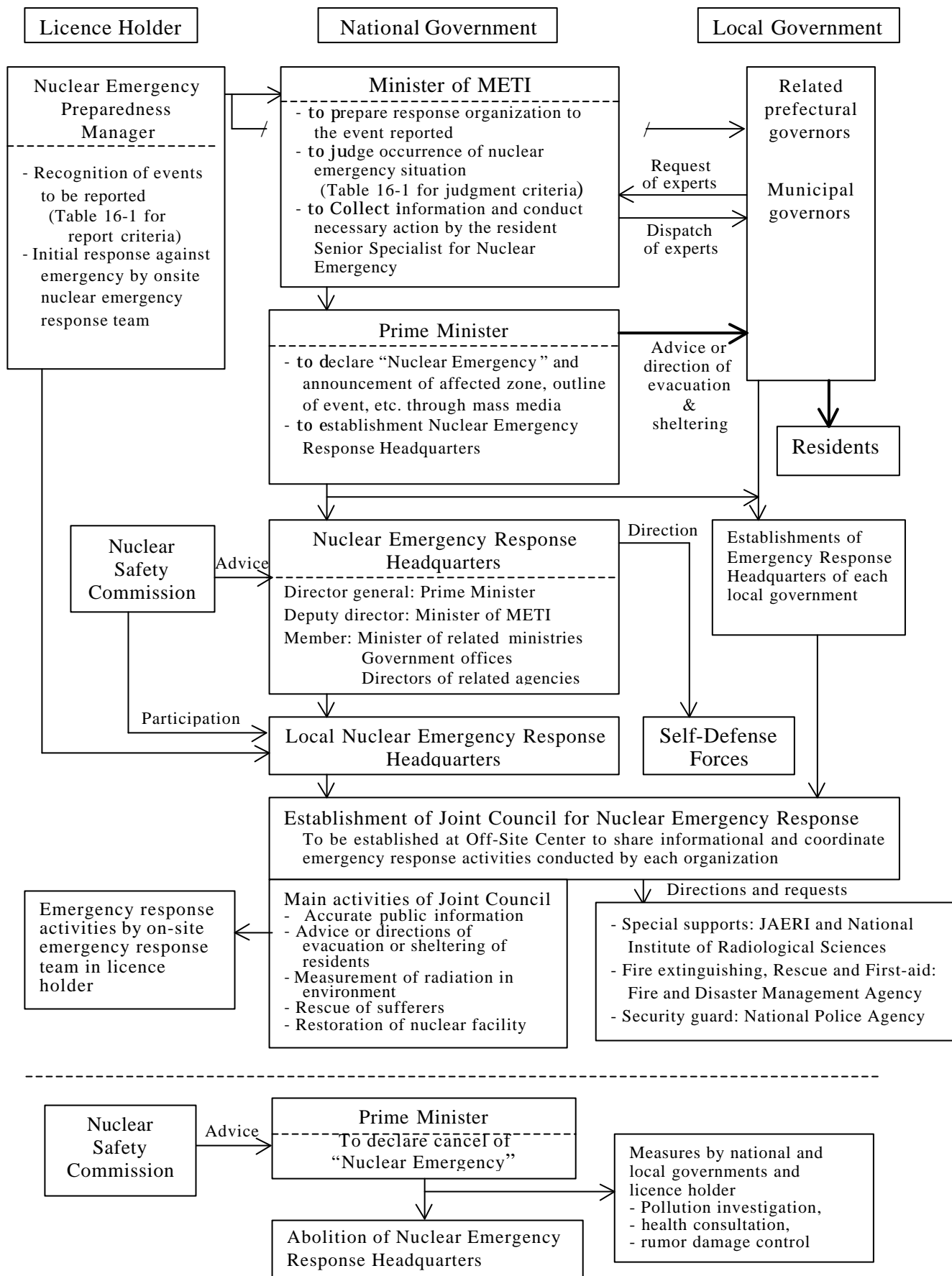


Fig.16-1 Measures based on the Special Law for Nuclear Emergency

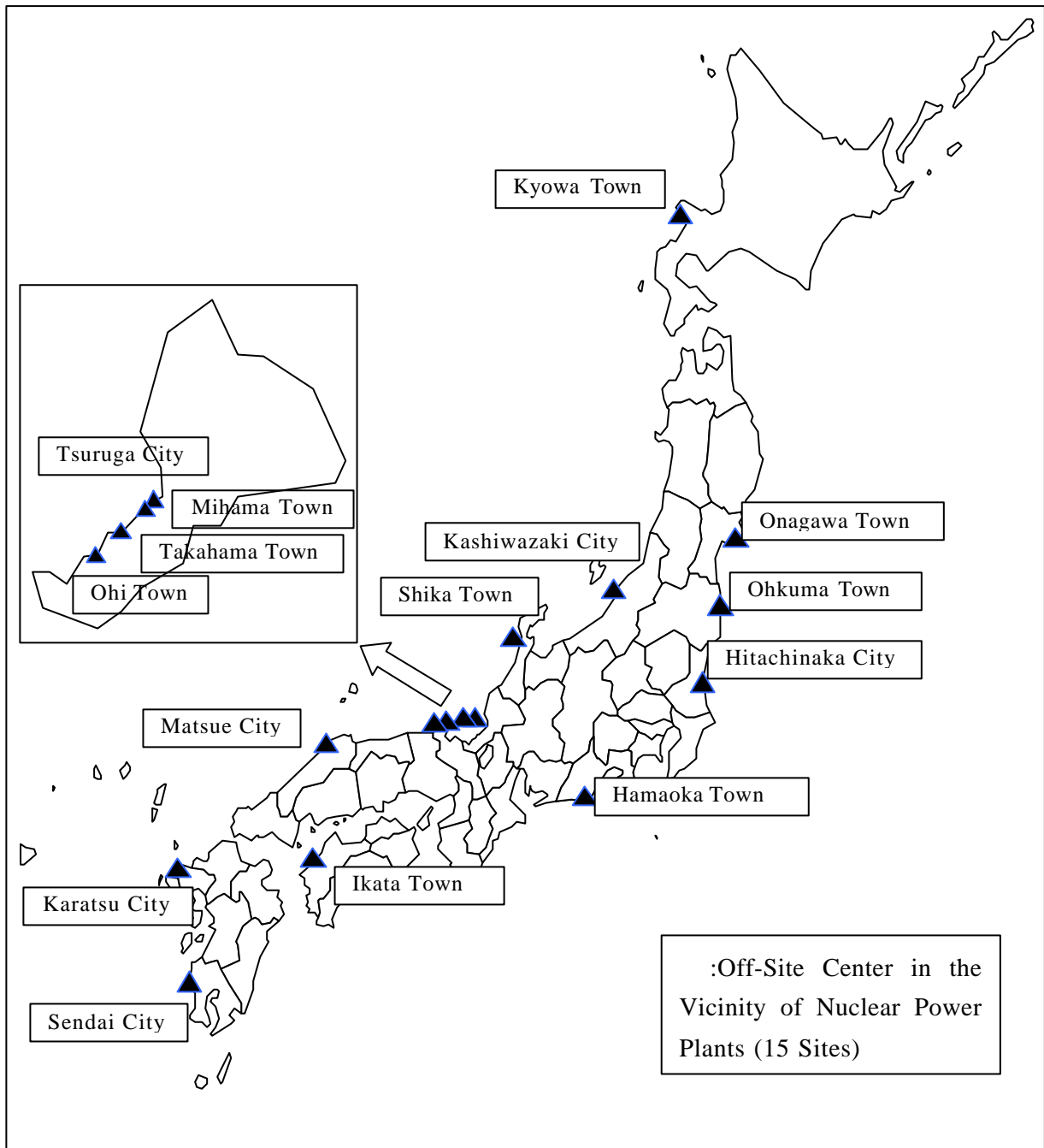


Fig. 16.2 Location of Off-Site Center

**Table 16-1 Main Specific Events and the Nuclear Emergency specified in the Special Law for Nuclear Emergency**

	Events	Criteria for reporting by licence holders and ‘Nuclear Emergency’ declaration by national government	
			conditions of declaration of ‘Nuclear Emergency’
Events that business operators should report.	a) Dose of radiation near the site boundary detected dose b) Detection of the radioactive materials in usual release points, such as exhaust pipes c) Radiation by fire, explosion, etc. or detection of radioactive materials (outside the management zone) d) Individual events of each nuclear installations (Example for reactor) - Failure of scram - Loss of reactor coolant - Loss of all AC power supplies	5 microSv/h at one point for more than 10 min 5 microSv/h at more than 2 points at the same time Radioactive materials worth to more than 5 microSv/h  Radiation dose of more than 50 micro Sv/h Release of radioactive materials worth to more than 5 microSv/h  When the nuclear reactor shutdown cannot be performed by usual neutron absorbers Occurrence of leakage of nuclear reactor coolant which needs operation of the emergency core coolant system (ECCS) When all AC power supplies stops power supply for more than 5 minutes	500 microSv/h at one point for more than 10 min, 500 microSv/h at more than 2points at the same time Radioactive materials worth to more than 500 microSv/h  Radiation dose of more than 5 mSv/h Release of radioactive materials worth to more than 500 micro Sv/h  When all of reactor shutdown functions are lost  When water cannot be poured to the nuclear reactor by all ECCSs  When all measures for cooling reactor core are lost with loss of all AC power supplies.
Response of the national government		- The Minister of METI sends staff with expertise on request of local governments. - The resident Specialist on Nuclear Emergency Preparedness carries out necessary works. <hr/> Following responses are carried out based on the agreement of related ministries, not specified in the Special Law for Nuclear Emergency. - Related ministries and agencies organize joint task group for the incidents in Tokyo. - Related local organizations organize joint local task group in the Off- Site Center.	- The Minister of METI reports the nuclear emergency to the Prime Minister immediately after confirming the situation. - The Prime Minister declares ‘Nuclear Emergency’ and takes following responses; - to advice or direct related local governments on necessary measures such as sheltering or evacuation. - to establish the Nuclear Emergency Response Headquarters in Tokyo and Local Nuclear Emergency Response Headquarters at Off-Site Center. - to establish the Joint Council for Nuclear Emergency Response for information exchange among the national government and local governments.



Table 16-2. Nuclear Emergency Exercise

Conductor	Date	Nuclear Power Station
(1) Exercises conducted by National Government		
METI	03/23/2000 (Thurs.)	Tsuruga Power Station (Japan Atomic Power, Inc.)
METI	10/28 /2000 (Sat.)	Shimane Nuclear Power Station (Chugoku Electric Power Co., Inc.)
(2) Exercises conducted by Local Governments (April, 2000 - March, 2001)		
Tokai-mura (Ibaraki Pref.)	09/30/2000 (Sat.)	The Tokai Daini Power Station (the Japan Atomic Power, Inc.)
Niigata Pref.	10/27/2000 (Fri.)	The Kashiwazaki Kariwa Nuclear Power Station (the Tokyo Electric Power Co., Inc.)
Ehime Pref.	10/31/2000 (Tue.)	Ikata Power Station (Shikoku Electric Power Co., Inc.)
Ishikawa Pref.	11/17/2000 (Fri.)	Shiga Nuclear Power Station (Hokuriku Electric Power Co.)
Saga Pref..	11/27/2000 (Mon.)	Genkai Nuclear Power Station (Kyushu Electric Power Co., Inc.)
Fukushima Pref.	11/28/2000 (Tue.)	Fukushima Daiichi Nuclear Power Station (the Tokyo Electric Power Co., Inc.)
Kagoshima Pref.	02/06/2001 (Tue.)	Sendai Nuclear Power Station (Kyushu Electric Power Co., Inc.)
Hokkaido	02/08/2001 (Thurs.)	Tomari Power Station (the Hokkaido Electric Power Co., Inc.)
Fukui Pref.	03/22/2001 (Thurs.)	Takahama Power Station (the Kansai Electric Power Co., Inc.)
Shizuoka Pref.	03/23/2001 (Fri.)	Hamaoka Nuclear Power Station (Chubu Electric Power Co., Inc.)

## D. Safety of Installations

## Article 17. Siting

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

- (i) for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;**
- (ii) for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;**
- (iii) for re-evaluating as necessary all relevant factors referred to in sub-paragraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation;**
- (iv) for consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they are likely to be affected by that installation and, upon request providing the necessary information to such Contracting Parties, in order to enable them to evaluate and make their own assessment of the likely safety impact on their own territory of the nuclear installation.**

### 17.1 Basic Concept on the Siting of Nuclear Installations

The following assessments must be taken into consideration when deciding upon the siting of nuclear installations, and are incorporated in the relevant legislation, etc.

- (1) Safety assessment on a nuclear installation by natural phenomena and postulated external human induced events
- (2) Safety assessment on the radioactive impact to the environment by a nuclear installation should reactor accidents occur
- (3) Environmental impact assessment other than radioactive impact due to the siting of a nuclear installation

While this fundamental concept is applied to all nuclear installations established in Japan, the application to the siting of commercial power reactors is described here.

### 17.2 Principal Assessment System Concerning the Siting of Commercial Power Reactors

The Reactor Regulation Law requires that location of a commercial power reactor must be selected and its structures and components must be designed so that the nuclear disaster can be prevented. The adequacy of siting is examined in accordance with the Examination Guide for Reactor Siting as part of safety examination of establishment licence.

The Guide requires that no such event that might cause serious accidents has occurred in the past or could be expected to occur in the future at the proposed site and furthermore, there should not be events

that may aggravate disaster, and that reactors are located at a sufficient distance from the public in consideration of engineered safety features.

When deciding a site, an adequate attention in design shall be paid to the postulated external initiating event peculiar to the site, in addition to the site conditions stipulated by the Guide.

In this respect, the Guide prescribes that structures, systems and components with safety functions shall be designed to sufficiently withstand appropriate design basis seismic forces. As well, they shall be so designed that the safety of the commercial power reactor will not be impaired by other possible natural phenomena than earthquake and also by postulated external human initiated events.

The Guide also prescribes that the dose to the public shall meet with the application criteria in consideration of the engineered safety features by establishing an exclusion area and low population zone and ensuring sufficient distance from high population zones, when assessing radiation impact to the public in the vicinity imposed by the postulated accidents in commercial power reactor. Meanwhile, the Examination Guide for the Safety Evaluation provides events to be evaluated in siting, acceptance criteria and specific conditions, etc. to be used in the analysis.

Environmental impact assessment of all of the power stations including nuclear power stations is performed in accordance with the Environmental Impact Assessment Law enforced in June 1999, before when the departmental council decision of MITI (present METI) dated in July 1977 was applied. Details are described later in section 17.5.

### 17.3 Evaluation for Events Caused by External Factors

The Examination Guide for the Safety Design prescribes that the earthquakes, natural phenomena other than earthquake and external human initiated events shall be addressed in the design, being in accordance with the prescription in the Examination Guide for Reactor Siting, stating “no such event that might cause serious accidents has occurred in the past or could be expected to occur in the future at the proposed site and furthermore, there should not be events that may aggravate disaster”. Details are described in the report of Article 18.

### 17.4 Evaluation for the Impacts to the Public Posed by the Anticipated Accident

In order to ensure safety of the public even from a worst accident, the Examination Guide for Reactor Siting prescribes, as a fundamental siting condition, that a commercial power reactor be located with a sufficient distance from the public taking into account the engineered safety features. The conditions for fulfilling this requirement are as follows:

- 1) The area within a specified distance from a commercial power reactor shall be the exclusion area, and no radiation hazard is imposed on the public in the vicinity outside the exclusion area, even postulating the occurrence of a major accident.

A major accident is defined in the above Guide to be an accident, occurrence of which is conceivable as a worst scenario from a technical point of view with considering such factors as the conditions at the site vicinity, the characteristics of the reactor and the engineered safety features.

- 2) The area within a specified distance beyond the exclusion area shall be the low population zone, and no substantial radiation damage is imposed on the public in the vicinity of the low population zone, even postulating the occurrence of a hypothetical accident.

A hypothetical accident is defined in the above Guide to be an accident, which exceeds a major accident, and the occurrence of that is not conceivable from a technical point of view. The Guide for example, hypothesizes that some of engineered safety features in the reactor, which are assumed to be effective in postulating a major accident do not function and corresponding release of radioactive materials occurs.

- 3) A site of a nuclear reactor shall be located at a specified distance from high population zones.

The specified distance means a distance where cumulative value of whole-body dose in case of a hypothetical accident shall be small enough to be deemed acceptable based on the collective dose of view.

The application criteria on dose rate are specified in the attachments of the Guide. The meteorological observation methods, the statistical processing methods of the observed data and the methods for the analysis of the atmospheric diffusion of the released radioactive materials, to be used in the dose assessments, are prescribed in the Meteorological Guide for Safety Analysis of Nuclear Power Reactor Facilities.

## 17.5 Environmental Impact Assessment

The Environmental Impact Assessment Law was established to ensure business operators, that are undertaking large-scale projects that could have a serious impact on the environment, to conduct an environmental impact assessment properly and reflect the results of the assessment in implementing the project in term of protecting the environment, and also set forth the procedures in conducting the environmental impact assessment. The assessment for commercial power stations including nuclear power station must be performed in accordance with the provisions of the Environmental Impact Assessment Law and the Electricity Utility Industry Law. All of nuclear power reactors are subject to assessment regardless of their scale. The procedure is summarized in Figure 17-1.

Business operator, prior to application for reactor establishment, must prepare a Scoping Document presenting information concerning the contents of the project, items to be considered in an environmental

impact assessment, method of survey, prediction, and assessment method to be utilized, and must submit it to NISA, as well as to the local governments having jurisdiction over the area deemed likely to be environmentally impacted by the project. NISA examines the Scoping Document taking into consideration the comments submitted by the related prefectural governor(s), as well as the comments of the residents and the views of the business operators regarding such comments, and gives recommendations on the contents of Scoping Document to the business operator, if needed.

Then business operator shall prepare a draft environmental impact statement (draft EIS) after conducting survey, prediction and assessment in consideration with the recommendation received from NISA and establishing the measures for protecting the environment. The draft EIS must be submitted to NISA, as well as to the related local governments. NISA, after examining the draft EIS, taking into account the opinion of the Minister of Environment and the related Governors as well as the comments of the residents and the views of the business operators regarding such comments, and receiving the view of advisers on the environment protection, gives recommendations on the environmental assessment to the business operator if needed. Meanwhile, concerning the items with large environmental impact, business operators shall check and provide the necessary measures for protecting the environment so that the environmental impact by the project would be reduced as low as practical, considering the project plan and the state of the area environmentally impacted by the project.

Finally, business operator shall prepare the environmental impact statement (EIS), taking into account the recommendation on the draft EIS, and submit it to NISA. NISA, after examining the EIS, orders alteration of the EIS if needed, otherwise notices acceptance of the EIS to business operator. The accepted EIS is distributed to the Ministry of Environment and related local governments.

At the stage of examining construction plan, NISA does not approve it in case that the plan does not conform to the accepted EIS.

#### 17.6 Re-evaluation of Site Related Factors

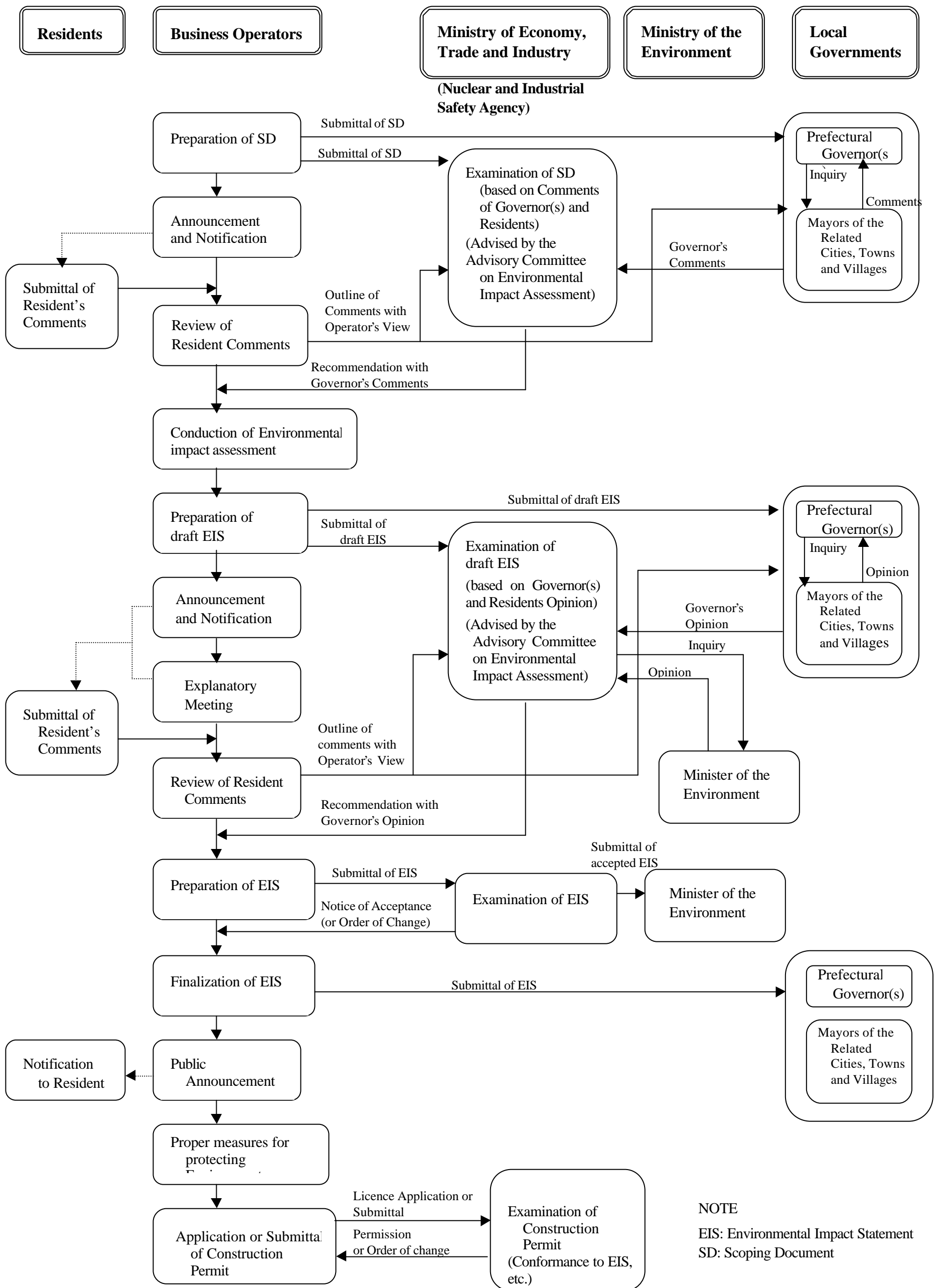
All the factors related to site selection must be re-evaluated at the time of alteration of an establishment licence, such as new plant construction at the existing site, so as to review and assure the continuous safe operation of commercial power reactors. Adequacy of the safety design is re-evaluated referring to new findings and new experiences having impact on the design.

#### 17.7 Arrangements with Neighboring Countries on Safety Impact of Nuclear Installations

Commercial power reactor in Japan is so located at the place where there are no events liable to induce serious accidents and so designed to secure the safety against postulated initiating events including natural phenomena. It also implements the measures for the accident management. Furthermore, because of the fact that Japan is an archipelago country and separated from neighboring countries by a considerable distance, adverse impact of Japanese commercial power reactor over neighboring countries is deemed to be

extremely small. Accordingly, no consultation has been made so far with neighboring countries on the siting of commercial power reactors.

Fig. 17-1 Outline of the Environmental Impact Assessment on Nuclear Power Plant





## Article 18 Design and Construction

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

- (i) the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defense in depth) against the release of radioactive materials, with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur;**
- (ii) the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;**
- (iii) the design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.**

### 18.1 Licensing Process at the Design and Construction Stages of Nuclear Installations

Processes of licensing a nuclear installation (hereinafter referred to as commercial power reactor) to be newly installed in Japan are described in the report of Article 7 with laws and regulations applied. Assessment and verification on safety of commercial power reactor are described in the report of Article 14 with laws and regulations applied.

In case of design alteration of licensed commercial power reactor, the licence holder must make an application of the design alteration along with the revised safety analysis report. The application must be examined by NISA and the altered items be inspected through same process as licensing a new installation.

### 18.2 Implementation of the Concept of Defense in Depth

Commercial nuclear power reactors (BWRs and PWRs) in Japan are designed, constructed and operated based on the safety design principals, which are common among most countries and almost the same concept of defense-in-depth as prescribed in the Nuclear Safety Standards (NUSS) of the IAEA. Original design of light water reactors in Japan was introduced from the United States. But, the later design of reactors has been improved to be safer and easier in maintaining the facilities through series of Improvement and Standardization Program led by METI (then MITI), reflecting the operating experiences of the reactor establishers and knowledge obtained in research and development program of nuclear power industries.

#### (1) Prevention of Accidents and their Mitigation by the Concept of Defense-in-Depth

The multiple physical barriers are provided in the Japanese commercial power reactors to prevent radioactive substances from being released to the environment so as to protect the health and safety of the public, which is similar concept as most countries and conforms to the safety design principles prescribed in NUSS. These physical barriers are constituted by fuel pellet, fuel cladding, reactor pressure vessel and reactor containment vessel, and make the possible release of radioactive substances limited to be extremely low level.

Measure to ensure the safety of a commercial power reactor starts at the very beginning of site selection. These measures are developed to reduce release of radioactive materials to the environment during normal operation and to implement the concept of defense-in-depth aiming at reduction of abnormalities, prevention of accidents and mitigation of their consequences. The final measure is to establish the nuclear emergency preparedness against the accident beyond design base.

It is the principle of site selection of commercial power reactor to avoid any places where accident-inducing event as earthquake occurs and keep an adequate distance between the public and commercial power reactor. All of the Japanese commercial power reactors are sited at seaside with firm bedrock.

Measures to reduce release of radioactive materials to the environment during normal operation are implemented by strictly controlling release of radioactive wastes and thoroughly monitoring the environmental conditions as well as installing the multiple barriers. For example, all the condensate water in PWRs are demineralized through ion exchanger resin to prevent corrosion of tubes of steam generator, thus the integrity of barrier is preserved.

The most important point of ensuring the safety is to avoid occurrence of abnormalities, escalation to accident and abnormal release of radioactive materials, which are implemented based on the concept of defense-in-depth.

To prevent abnormalities, structures, systems and components important to safety are designed with sufficient margin and made with high reliability. For example, reactor pressure vessel was made out of the material with high neutron embrittlement resistance by lowering the impurities and the welded portions were reduced by adopting integrated forging method. Also, sophisticated operation support system equipped with larger screen that discernibly displays operating status was introduced in order to enhance man-machine interface.

Reactor shutdown system is available to any case of abnormalities and accident conditions. It detects deviation from normal operation surely through the various operating parameters. Two independent shutdown systems with different actuation mechanism are provided in order to shutdown the reactor without fail, and not to exceed the allowable design

limit to fuel at an anticipated operational occurrence.

Emergency core cooling system is provided to cool the core down at loss of coolant accidents and reactor containment vessel is provided to confine the radioactive materials at accidents to prevent potential releases of radioactive materials to the environment. Reactor containment vessel is equipped with flammability control system and standby gas treatment system and is isolated automatically when triggered.

Design requirements for structures, systems and components important to safety are defined in “Examination Guide for Safety Design” and “Examination Guide for Classification of Importance of Safety Functions for Light Water Nuclear Power Reactor Facilities”, and adequacy of the design are verified through “Examination Guide for Safety Evaluation”.

While Japanese commercial power reactors are designed based on the concept of defense-in-depth as described above, it has been proved that the possibility of human induced external events is very low owing to the stable societal conditions such as low frequency of blackout or very few terrorism threat. Considering these situations, it is possible to reduce possible occurrence of a severe accident to the extent that its actual occurrence would be technologically inconceivable, and to maintain the potential risk of commercial power reactors at a sufficiently low level. Nevertheless, accident management against severe accident is prepared in Japan. It is considered as a measure to lessen this low risk even further. The reactor establishers are expected to prepare the measure for accident management. The details are described in section 18.4.

Measures concerning emergency preparedness are described in the report of Article 16.

## (2) Design for External Event

Examination Guide for Safety Design requires addressing natural phenomena including earthquakes, and human induced external events in design.

As Japan is located along the circum-Pacific earthquake zone where earthquakes occur frequently, measures for earthquakes are thoroughly addressed in reactor design. After the Southern Hyogo Earthquake (7.2 in Mj) in January 1995, completeness of the seismic design methodology was reconfirmed and the seismic safety for the aged commercial power reactors was reconfirmed through the seismic analysis. At the Northeastern Kagoshima Earthquake (6.5 in Mj) in March 1997, the Sendai nuclear power station, 25 km distant from the epicenter found no abnormality during operation. Moreover, at the Western Tottori Earthquake (7.3 in Mj) in October 2000, no impact was observed in the Shimane nuclear power station, 45 km distant from the epicenter.

Regarding seismic design, the Examination Guide for Seismic Design requires that the structures, systems and components with safety function shall be designed in accordance with

classification of seismic importance. Two types of design basis earthquake ground motions for seismic design are defined. One is derived from design basis maximum earthquake 'S<sub>1</sub>', specified from the recorded earthquakes and active faults at the proposed site and its surroundings. The other is derived from design basis extreme earthquake 'S<sub>2</sub>' that exceeds S<sub>1</sub> and would have the greatest effect on the proposed site.

This Examination Guide and relevant guideline are under review reflecting recent insights. The task group on seismic design guide was organized on July 10, 2001 under the Special Committee on Safety Standard in the NSC.

It is also required that the safety of commercial power reactor shall not be impaired by the postulated natural phenomena other than earthquake (floods, tsunami, breeze, freezing, snowfall, landslides, etc.). Those structures, systems and components with safety function of particularly high importance must be designed to withstand any of the natural phenomena even at the severest conceivable condition or to bear combined load of such natural forces and loads induced by accident condition.

The structures, systems and components with safety functions are required to be so designed that the commercial power reactor should not be impaired by postulated human induced external event (airplane crashes, dam collapse, explosions etc.). Especially for airplanes, flight over the commercial power reactor is limited in principle. However, when commercial power reactor is located under a regular aviation route, it is required to confirm the probability of airplane crash into the commercial power reactor is sufficiently low.

The commercial power reactor is required to provide appropriate measures against illegal access to the reactor.

### 18.3 Measures to Ensure the Technical Reliability by Experience, Test and Analysis

To enhance the safety and reliability of commercial power reactors, those activities such as feedback of the operating experience and utilization of the technical knowledge obtained through testing and analysis have been conducted, as describe below. Those insights newly obtained through these activities have been timely incorporated in existing guides and used to develop new guides.

#### (1) Feedback of Operating Experience of Commercial Power Reactors

- a) The good practices and failure experiences identified through annual Periodical Inspection of commercial power reactor as well as the experience in design, construction and operation, both domestic and foreign, are analyzed. These results are incorporated in design and construction method, if recognized to be valid, after regulatory approval of licence for establishment alteration or Construction Plan and Pre-Service Inspection.

- b) In case of incidents in a commercial power reactor as well as other domestic and foreign reactors, the corrective measures are implemented after identifying the cause of failure.
- c) Periodical Safety Review is performed for each commercial power reactor at intervals of approximately 10 years, in which its safety and reliability are to be enhanced reflecting the results of comprehensive evaluation on operating experiences and the latest technical knowledge. Details are described in the report of Article 14.

(2) Feedback of Knowledge Obtained Through Safety Research and Reliability Verification Test

Safety research program and reliability verification test are promoted vigorously, recognizing the importance of assuring the safety in utilizing nuclear energy.

a) Safety research programs of the NSC

The NSC has continuously promoted the safety researches on nuclear installations, environmental radioactivity and radioactive waste since 1976. The purpose of the safety research on nuclear installations is to respond to the future expansion and diversification of development and utilization of nuclear energy, and to contribute forming a national consensus with respect to the safety of nuclear installations. The research program has been under way at JAERI and some other research organizations aiming at the enhancement of the safety, as well as the preparation of such crucial materials as safety standards, safety guides and the materials for regulatory judgments in safety examination

In the fifth five-year research program completed in 2000, safety researches on the fuel safety (high burn-up fuel and mixed oxide fuel), aging, severe accident, probabilistic safety assessment and human factor were conducted.

In the fuel safety research program, for example, high burn-up fuel behavior during normal operation and abnormal transients were evaluated. As for reactivity insertion event, the fuel behavior and the threshold of fuel damage were clarified in the pulse irradiation experiment at NSRR (Nuclear Safety Research Reactor) of JAERI. The leakage of high burn-up BWR fuel was observed for the first time in the world. These results were used in the evaluation guide for reactivity insertion events.

As for the research program on severe accidents, study on accident management to prevent severe accidents and to mitigate the consequences of them, and study on the next generation reactor equipped with passive safety features have been conducted. Concerning the next generation reactor, cooperative research was performed with USNRC for the AP-600 reactor, using LSTF. NRC used the results for the design certification of AP-600. Research program on next generation reactor and its safety features proposed in Japan is under way.

In the research on probabilistic safety assessment, level 3 PSA and seismic PSA of

LWR were conducted and the result of PSA has been applied to address the safety issue. These results will be used as the basic information in setting the safety goal, applying risk informed regulation and defining the design basis earthquake ground motions based on seismic PSA.

In the sixth five-year research program beginning from 2001, research on decommissioning and research on nuclear emergency preparedness were added with high priority.

b) Reliability verification tests and analyses by regulatory body

METI (then MITI) prepared “Safety Advancement Program - Safety 21” and this program was entrusted to NUPEC and JAPEIC as reliability verification programs and analyses.

The principal items of the program are seismic verification test for main components such as reactor containment vessel, flow-induced vibration test of tube bundles of steam generator, irradiation test and thermal hydraulic test of fuel assembly, research on severe accident, development of decommissioning technology, research on human factor, and aging technology of main components.

Among these programs, the results obtained from a series of research on severe accidents are used by NISA as the basis of review on measures of accident management submitted by reactor establishers. Some of the research items have been performed with foreign countries as international cooperation program and the results are utilized for the enhancement of safety in those countries as well as in Japan.

Cooperative research on core cooling capability with the Kazakhstan National Nuclear Center, for example, showed that the steam explosion are unlikely to occur. Another example is the cooperative research on flammable gas combustion test with the United States that proved the multi-sectional layout adopted in actual facilities had the capability to suppress spread of fire. The containment integrity test also started with NRC at Sandia National Laboratory, and showed that BWR Mark-II containment vessel (SCV) had sufficient strength. The data on the prestressed concrete containment vessel (PCCV) of PWR is under evaluation. The other cooperative research is the Fission Product Transition Behavior Test (PHEBUS-FP) at the Cadarache Research Institute of France. The test results obtained have been utilized to improve and verify of the simulation code for evaluating the measures of Accident Management.

Regarding the analysis, the safety analysis codes necessary for the evaluation performed by a party other than the applicant are prepared and improved by NUPEC. Safety analysis for the newly applied commercial power reactor and regulatory evaluation of the measures of accident management of operating reactors are performed using those codes.

#### c) Reliability Enhancement Activity by reactor establishers

Reactor establishers and manufacturers are also playing an active role in developing the technology through the Improvement and Standardizing Program and introducing new technology. CRIEPI is also conducting the research such as human factor.

The remarkable results of Improvement and Standardization Program are reflected to the design of Advanced BWR (ABWR) characterized by adopting internal pumps and deleting the large scale piping under the reactor core level, and Advanced PWR (APWR) characterized by improvement of emergency core cooling system. Two ABWRs are now being operated, another two under construction. APWR has not yet been installed but will certainly be a strong candidate in the future.

Newly introduced technologies are demineralizer to process all of condenser flow, reactor pressure vessel made of high embrittlement-resistant material, both of which are described in section 18.2, low pressure turbine with a monoblock rotor with increased local SCC-resistance and vibration-tolerance, and condenser with high corrosion-tolerant titanium tubes.

As for the recent result of research and development, BWR owners group installed training simulators specified for accident management in 1998 and is using it for the staff training and in-site emergency exercise.

### 18.4 Accident Management Preparation

#### (1) Background

Since the TMI-2 accident, the researches on severe accidents and PSA have been conducted extensively worldwide. Reactor establishers in Japan also have voluntarily implemented their own measures for preventing severe accidents and for mitigating their consequences.

In May of 1992, the NSC strongly encouraged reactor establishers to prepare plans for effective accident management, defining accident management as means to extensively reduce the latent risk of nuclear installations in the paper of "Accident Management as a Measure for Severe Accidents at Light Water Nuclear Power Reactor Facilities". At the same time, the NSC indicated that NISA should make clear the administrative role of the Agency in the development and settlement of accident management.

NISA urged reactor establishers to prepare the measures for accident management in July 1992, clarifying that it would not take any specific statutory requirements. The reactor establishers submitted to NISA study reports on accident management for each operating commercial power reactor in March 1994. The measures for accident management implemented

and proposed by reactor establishers are shown in Tables 18-1 and 18-2.

Reviewing the study reports from the reactor establishers, NISA had concluded that the PSA performed and the measures for accident management chosen by the reactor establishers were adequate for enhancing the safety of each commercial power reactor, and NISA urged reactor establishers to implement the proposed measures for accident management further and reported it to the NSC in October 1994. The NSC approved those measures for accident management in December 1995 after reviewing them.

The NSC recommended that licence holder of newly applied commercial power reactor should incorporate the measures for accident management before initial fuel loading. The first case was Onagawa NPS Unit 3 of the Tohoku Electric Power Company. NISA and the NSC approved adequacy of the proposal in March 1996. The accident management in other three commercial power reactors, which received the establishment licence, is to be reviewed by NISA and the NSC.

In April 1999, NISA clarified its position on accident management and published "Fundamental Recommendations for Accident Management" which include the recommendations on management organization, facility and system, knowledge base, information and communication, and education of staff, and presented it to the NSC.

## (2) Implementation of Measures for Accident Management in Operating Commercial Power Reactors

Reactor establishers have been making efforts voluntarily in implementing the measures for accident management approved by the NSC, by installing the necessary systems and components during the periodical outage and establishing the management organization, preparing procedures and making the training program. As of September 2001, 44 among 51 operating commercial power reactors have completed the measures for accident management. The other 7 are scheduled to complete it by February 2002.

The measures for accident management implemented by reactor establishers are to be reported to NISA in the first half of year 2002 together with the results of PSA performed to quantitatively assess measures for accident management to each reactor type. NISA will review the report, referring to the advice of specialists of the subcommittee of the Advisory Committee on Nuclear and Industrial Safety and report the result of review to the NSC.

## 18.5 Consideration of Human Factors and the Man-Machine Interface

It is the safety principle regarding operating management to make commercial power reactor more reliable, stabler and more easily manageable by considering human factors and the



man-machine interface. This principle is implemented in actual commercial power reactor.

To improve man-machine interface, the prototype of advanced operation support system including automatic plant operation and abnormal event diagnosis has been developed by the initiative of METI based on the recent advance of information processing technology. This system is under way towards practical installation in the actual system. Details are described in section 12.1.

## 18.6 Preparation for the New Regulatory Issue: Digital Reactor Protection System

The Japanese commercial power reactors first equipped with the digital reactor safety system (RSS) were Kashiwazaki-Kariwa NPS Units 6 and 7 (ABWR, each 1,356MWe) of the Tokyo Electric Power Company. The establishment licences were applied in May 1988. The instrument and control system of ABWR is fully computerized including safety system.

Industries was convinced that the symbolic language, which so far widely used in non-safety control system and by which application software was easily composed, was suitable for the RSS which executed comparison logic frequently, and developed a method to secure reliability of software composed by the symbolic language. They also established an industry association-level design guide concerning key element on quality assurance, such as verification and validation in producing safety critical software (V&V) for producing highly reliable computer-based system worth to nuclear safety system.

Meanwhile, NISA had conducted the verification tests in order to prove the industry association-level design guide, as well as to confirm the reliability of computer-based safety system itself and obtained the database for the safety examination of actual system.

At the stage of safety examination on basic design of Kashiwazaki-Kariwa NPS Units 6 and 7, the key issue was whether it was possible to eliminate bugs and demonstrate to be bug-free for the software used in the safety system through the V&V specified in the industry association-level design guide. As a part of the examination, the factory audit of software vendor was performed to verify their quality assurance in producing critical safety software. It was concluded that the proposed design of computer-based RPS was appropriate based on the insight from these examinations and surveys, in which the software was produced through simplified design and production, enabling the effective V&V and realizing high reliability.

At the stage of the examination of detailed design (application of Construction Plan), quality assurance program for the production of critical safety software was demanded to submit, considering the necessity of the establishment of proper quality assurance by the licence holder. At Pre-Service Inspection, the records concerning V&V activities in implementation of quality assurance program was to be confirmed, but was exempted as there was no problem found in

the regulatory functional test. The digital RPS of Kashiwazaki-Kariwa NPS Units 6 and 7 have been used without any problem since the beginning of operation (November 1996 and July 1997 respectively).

In the ABWR plants applied and established since then, the same type of RSS were adopted, and a new PWR that adopts the digital RSS is under safety examination.

Table 18-1 Outline of the Measures for Accident Management (BWR)

Function	Items implemented by 1994	Items to be implemented by 2002
Reactor shutdown	<ul style="list-style-type: none"> <li>i) Manual scram</li> <li>ii) Water level control &amp; manual operation of boric acid water injection</li> </ul>	<ul style="list-style-type: none"> <li>i) A separate signal system from the emergency reactor shutdown system is established which causes the reactor power drop, for example by the insertion of substitute control rods.</li> </ul>
Injection of water into the nuclear reactor and the containment	<ul style="list-style-type: none"> <li>i) Manual actuation of ECCS</li> <li>ii) Manual depressurization of reactor</li> <li>iii) Alternative water injection                             <ul style="list-style-type: none"> <li>- Injection of water into reactor by feed water system and control rod hydraulic system</li> <li>- Injection of water into reactor and containment vessel by pump of sea water system</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>i) Automation of the reactor pressure reduction</li> <li>ii) Alternative water injection                             <ul style="list-style-type: none"> <li>- Injection of water by the fire fighting system and the condensation feed water system into reactor and containment vessel</li> </ul> </li> </ul>
Heat removal from the containment	<ul style="list-style-type: none"> <li>i) Manual actuation of containment spray cooling system</li> <li>ii) Vent using ventilation system duct</li> </ul>	<ul style="list-style-type: none"> <li>i) Substitute heat removal by the reactor core cooling and purification system, etc.</li> <li>ii) Pressure-proof reinforcement vent</li> <li>iii) Restoration of malfunctioning equipment in the residual heat removal system</li> </ul>
Support to safety function	<ul style="list-style-type: none"> <li>i) Restoration of external power supply</li> <li>ii) Manual actuation of emergency generator</li> <li>iii) Utilization of alternative power (6.9kV from adjacent plant)</li> </ul>	<ul style="list-style-type: none"> <li>i) Utilization of alternative power (480V from adjacent plant)</li> <li>ii) Restoration of emergency diesel generator</li> </ul>

Table 18-2 Outline of the Measures for Accident Management (PWR)

Function	Items implemented by 1994	Items to be implemented by 2002
Reactor shutdown	<ul style="list-style-type: none"> <li>i) Manual reactor shutdown</li> <li>ii) Emergency boric acid water injection</li> <li>iii) Emergency secondary system cooling</li> </ul>	<ul style="list-style-type: none"> <li>i) Diversity of emergency secondary cooling</li> </ul>
Cooling of reactor core	<ul style="list-style-type: none"> <li>i) Alternative injection</li> <li>ii) Low pressure injection by secondary system forced cooling</li> <li>iii) Low pressure re-circulation by secondary system forced cooling</li> <li>iv) Sump water cooling</li> <li>v) Continual injection by alternative supply</li> <li>vi) Alternative containment air phase cooling</li> <li>vii) Primary system depressurization and injection</li> <li>viii) Alternative feed water</li> <li>ix) Secondary system feed water make up</li> <li>x) Feed and bleed</li> </ul>	<ul style="list-style-type: none"> <li>i) Utilization of the turbine bypass system</li> <li>ii) Continual injection by alternative supply and alternative recirculation</li> <li>iii) Cool down and recirculation</li> <li>iv) Natural circulation cooling within the containment</li> <li>v) Alternative auxiliary component cooling</li> </ul>
Confinement of radioactive materials	<ul style="list-style-type: none"> <li>i) Alternative containment air phase cooling</li> <li>ii) Manual containment isolation</li> </ul>	<ul style="list-style-type: none"> <li>i) Natural circulation cooling within the containment</li> <li>ii) Water injection within the containment</li> <li>iii) Forced cooling by primary system</li> </ul>
Support to safety function	<ul style="list-style-type: none"> <li>i) Restoration of power supply</li> <li>ii) Ensuring D.C. power source</li> <li>iii) Restoration of auxiliary component cooling system</li> <li>iv) Alternative instrument air supply</li> </ul>	<ul style="list-style-type: none"> <li>i) Alternative auxiliary equipment cooling</li> <li>ii) Utilization of alternative power supply</li> </ul>

## Article 19 Operation

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

- (i) the initial authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;**
- (ii) operational limits and conditions derived from the safety analysis, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;**
- (iii) operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;**
- (iv) procedures are established for responding to anticipated operational occurrences and to accidents;**
- (v) necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;**
- (vi) incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body;**
- (vii) programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies;**
- (viii) the generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and any necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal.**

### 19. 1 Safety Regulations for Operation

Details of safety regulations from the siting to the commissioning of commercial power reactor are described in the report of Article 7 and Article 14.

#### (1) Initial Licence

Licence holders (hereinafter called reactor establisher(s)) are required by the Reactor Regulation Law to take the necessary measures for safety preservation of reactor facility and protection of specified nuclear fuel materials. Pursuant to this principle, basic design items in the main text of establishment licence application document, approved by NISA, must be observed throughout each stage of detailed design, construction and operation. In addition to the main text, items in the attached documents are to be observed as well. Reactor establisher is also required to observe licensing conditions in the approval of construction plan (design approval for fuel assembly), in which detailed design for each element of a commercial power reactor is reviewed after establishment licence. At some specified stages of construction of a commercial

power reactor, NISA conducts pre-service inspections (see Table 14-1) to ensure the compliance with the licensing conditions.

After fulfilling regulatory procedures up to the construction stage shown in Fig. 7-2, a reactor establisher can start the operation of commercial power reactor.

The regulatory requirements for safe operation are prescribed in the Reactor Regulation Law. Thus, a reactor establisher must develop safety measures necessary for operation and maintenance of the reactor, transportation and disposal of the nuclear fuel materials, prepare the Safety Preservation Rules and obtain approval of them from the Minister of METI and comply with them, assign a Chief Engineer of Reactors and designate a Person Responsible for Operation to the specified safety preservation duty and to make and preserve operational records. In the Electricity Utilities Industry Law, it is specified to assign a Chief Electrical Engineer and a Boiler and Turbine Chief Engineer and undergo annual Periodical Inspection by METI.

## (2) Limiting Conditions for Operation to be Observed

The operation and maintenance of commercial power reactors is complied with the Safety Preservation Rules approved by the Minister of METI. The Safety Preservation Rules, shown in Table 19-1, practically describes the Limiting Conditions for Operation (LCOs) such as shutdown margin and reactor thermal limits, etc. Table 19-2 shows the items of LCOs.

The Minister of METI could order reactor establisher to stop the operation, should an LCO be violated.

## (3) Regulations for Operation, Maintenance, Inspection and Experiment

While the safety of commercial power reactor is ensured based on the principle of self-imposed safety preservation by reactor establisher, NISA posts a resident Nuclear Safety Inspector at each commercial power reactor to supervise the reactor establisher's performance on the Safety Preservation Rules. Moreover, NISA is authorized to access to the facility and examine their records, documents and other necessary matters at any time with approval of the Minister of METI.

The Safety Preservation Rules of all commercial power reactors were simultaneously revised in January 2001 after refining the Rules as described later. Various kinds of operational procedures and test procedures are prepared to describe actual detailed operating procedures under the Rules.

Reactor establisher sets up a committee to discuss in advance some important matters related to safety preservation such as the modification of the Rules and operational procedures.

A Chief Engineer of Reactors qualified by governmental examination is assigned to each reactor, and any appointment or dismissal is to be reported to NISA. The Chief Engineer of

Reactor is supposed to express its view of safety preservation to the site superintendent if necessary, give advice or recommendation to site staff and participate in planning the safety preservation.

Persons Responsible for Operation qualified by the designated agency are assigned to every reactor. Its essential duty is recognizing the operational status and the situation of safety preservation through periodically patrolling in the plant.

Operational records made and kept by reactor establisher, required by the Reactor Regulation Law are the ones concerning fuel management, operation, maintenance and check of reactor, radiation management, incidents or failures, and meteorology.

Under the Electricity Utilities Industry Law, reactor establisher undergoes and passes the Periodical Inspection by NISA on systems and components important to safety. The Periodical Inspection is conducted in a period not exceeding thirteen months after the date of commissioning or the completion of previous inspection.

Reactor establisher performs regular checks to confirm the compliance with the LCOs in the Safety Preservation Rules. The items of the regular checks were reviewed and refined when the Safety Preservation Rules were revised. The items of regular checks in the period of shut down and operation are shown in Table 19-3. Reactor establisher, in addition to the above, performs the voluntary checks for other components in commercial power reactor.

Moreover, reactor establisher conducts the Periodic Safety Review of each reactor every 10 years, as described in the report of Article 14.

#### (4) Response to Accidents and Anticipated Operational Occurrences

Reactor establisher is required to describe “Items related to operation of commercial power reactor” in the Safety Preservation Rules, in which the operational procedures for accidents and anticipated operational occurrences as well as normal operation are described. In the procedures of “Measures prepared for incidents”, recognition of the situation, mitigation of the initiator, initial responses, measure after reactor automatic scram and manual startup of emergency AC power supply and gas treatment system are described.

Moreover, reactor establisher is required to prepare “Measures to be taken in an emergency” under the Reactor Regulation Law. The Measures described in the Safety Preservation Rules are emergency response organization and personnel, securing of necessary materials, maintenance of communication system among the related parties, nuclear emergency exercise, official announcement and abolition of an emergency response organization and other necessary elements, as required by the Special Law for Nuclear Emergency.

The details of emergency preparedness are described in the report of Article 16.

#### (5) Engineering and Technical Support: Application of the Results of Research and Development

METI has been promoting reliability verification test and research programs on major components and systems to enhance the safety of commercial power reactors. For example, the NUPEC had completed the demonstration test on the replacement method of BWR core shroud in 1997 and the results have been utilized to confirm the reliability of the installation method and the welding method for actual replacement.

MEXT has been conducting safety research program as a part of nuclear science research. For example, the research on deterioration and damage of the major components important to safety as reactor pressure vessel under condition of the neutron irradiation is under way in JAERI, accumulating the basic materials for decision making on the safety of long-term operation of power reactors.

On the other hand, reactor establishers have made efforts to accumulate the latest technical information through the collection of domestic and foreign operating experiences, the self-invested technical development and the actual modification works. For example, verification tests on aging effects and relevant inspection methods have been conducted for major components of commercial power reactors older than 30 years. The objectives are to investigate the proper intervals of the Periodical Inspection and voluntary checks, and appropriate inspection sub-items for these components.

Various private sectors also have been conducting complementary activities. The Japan Society of Mechanical Engineers (JSME) set up the Standard Committee for Power Generation Components in October 1997, which would compile, revise and repeal the standards for power generating components in order to establish and refine the standards. This committee is managed with the agreements of the stakeholders such as electric utilities, manufactures, research institutes, based on the principle of neutrality, fairness and transparency. In May 2000, the rule for flaw acceptance for the vessel and the piping consisting of reactor coolant pressure boundary had been compiled, as the first one of these kinds in Japan. Any tiny defects on those important components had been so far repaired or replaced just after detected. This industry association level rule adopts the principle to allow continuous operation of reactor under the prescribed conditions of the flaw.

#### (6) Reporting of Incidents

Reactor establishers are required by the Reactor Regulation Law and the Electricity Utilities Industry Law to report the situation and measures of incidents or failures occurred in commercial power reactors to NISA. The reporting criteria prescribed in these laws are shown in Table 19-4. Furthermore, some failures below the criteria are also to be reported under the



ministerial notification of METI.

Reactor establishers are making efforts to perform feedback of the lesson learned that derived from the situation and measures of these incidents, their causes and recurrence-preventive methods to other commercial power reactors.

The frequency of unplanned reactor shutdowns per year of commercial power reactors in Japan is around 0.3 in recent year and well below the average of the world. The International Nuclear Event Scale (INES) was introduced in August 1992 to assess events occurred in commercial power reactors. Since then, no incident or accident of level 2 or above has occurred and more than half of events occurred are rated as level 0. INES results in Japan are shown in Appendix 2.5.

#### (7) Collection, Utilization and Sharing of Information from Operating Experience

NISA makes the incidents or failures public immediately upon receiving the report and announces the causes and recurrence-preventive methods when finalized. NISA assesses each incidents or failures in detail to get the lessons learned with respect to the safety, being advised by subcommittee members for the Advisory Committee on Nuclear and Industrial Safety, which are experts on operation management, inspection and radiation control. The results are reflected to the safety regulations as well as to the operation and maintenance, if necessary.

NISA entrusted the NUPEC with the establishment of a system to collect and analyze domestic and foreign operating experiences and to disseminate these information to relevant organizations. NISA utilizes various international mechanisms to exchange and share the information on nuclear incidents with the IAEA and OECD/NEA as well as in the bilateral corporations with China, France, Korea, Sweden and the United States.

Meanwhile, reactor establishers collect and analyze information on domestic and foreign operating experiences by themselves and through CRIEPI. Overseas information exchange is performed through INPO and WANO Tokyo Center. Furthermore, each reactor establisher utilizes individual agreements on information exchange with utilities and manufacturers in France, Germany and the United States. While learning the lesson from JCO Criticality Accident, recognizing the importance to share safety information and foster safety culture in all nuclear industries, all of the relevant nuclear industries established a private organization “Nuclear Safety Network” in December 1999, as described in the report of Article 10.

There are much feedback of operating experience by reactor establishers, which are in preventive maintenance and planned repair and replacement of parts. Examples for BWR are replacements of the core shroud and the in-core monitoring housing, which are to be completed by the end of 2002. An example for PWR is replacement of upper head of reactor vessel.

#### (8) Management of Spent Fuel and Radioactive Waste

The method for handling, storage and disposal of the spent fuel and that for processing, storage and disposal of the radioactive waste, except the final disposal of high-level waste, are reviewed in the safety examination of establishment licence. The management and operation of the relevant facilities is described in the Safety Preservation Rules of each commercial power reactor, and the state of management is periodically reported to NISA.

With respect to the spent fuel storage in site, the Examination Guide for Safety Design requires the proper radiation shield, sufficient capacity for decay-heat removal and measure for prevention of its criticality. Though spent fuels have been stored in the spent fuel pool in commercial power reactor until transportation for the reprocessing, additional storage facility would be needed, considering the current storage capacity of the pool, the prospective generation of spent fuel and the treatment capacity of the reprocessing plant under construction. The legislative activity for the interim spent fuel storage was completed in 1999 and some preparations are on the way aiming at commissioning by 2010.

The stock of spent fuel must be reported to NISA at any time of its change from the viewpoint of safeguards, besides the annual report on the state of fuel management. NISA reports these results to the IAEA under the nuclear nonproliferation treaty and positively accepts the inspection by the IAEA, thus contributing to the monitoring of the spent fuel storage facility.

The design of radioactive waste treatment facilities follows the Examination Guide for Safety Design and the Guide on Dose Objective in the Site Vicinity. The processing facilities for radioactive gaseous and liquid waste must be so designed that the concentration and quantity of radioactive materials released to the environment can be reduced as low as reasonably achievable. The processing facility for radioactive solid wastes must be so designed to reflect preventive considerations against the dispersion of radioactive materials during the processing. The radioactive solid waste storage facility must have sufficient capacity to store radioactive solid wastes and be so designed to reflect preventive considerations against spread of contamination by the wastes.

Reactor establisher periodically reports to NISA the release records of radioactive gaseous and liquid waste, the amount of radioactive solid waste generated and in storage under the Reactor Regulation Law. The amount of the radioactive wastes generated in commercial power reactors has been decreasing over the past 20 years (see Appendix 29-2.11). These reductions are mainly due to less fuel damages for radioactive gas waste (I-131), the adoption of low cobalt material and corrosion resistant material and re-use of processed water for radioactive liquid waste and the adoption of incinerators and high performance volume reduction facilities for radioactive solid waste.

The Low-Level Radioactive Waste Disposal Center is operating in the Rokkasyo village,

Aomori Prefecture.

## 19. 2 Reportable Matters since the Previous Report

The commercial nuclear power reactors in commercial operation in Japan are 51 and the licensed capacity is about 45 GWe. No commercial power reactor has been commissioned for the past 3 years.

Recently, the commercial power reactors in Japan have generally scored a good operating performance. The capacity factor has been keeping over 80% in latter half of the 1990s, assisted by the shortened duration of the Periodical Inspection. The doses of workers engaged in radiation work and the frequency of unplanned shutdown have been kept at the lowest level.

The remarkable achievements since the previous report are the reduction of duration of the Periodical Inspection and the refinement of the Safety Preservation Rules.

### (1) Reduction of Duration of the Periodical Inspection

The capacity factor of commercial power reactors in Japan reached the level of 70% for the first time in 1983, exactly 71.5%. Since then it had continuously scored more than 70%. Since 1995, it has been keeping over 80%. This could be said to be due to almost full power operation except the duration of the Periodical Inspection. The reasons for the recent improved capacity factor are as follows;

- i) Reduction of the duration of the Periodical Inspection
- ii) Extension of in-service period by the improvement in reliability of systems and components and fuel design change
- iii) Decline of incidents and failures during operation

Reduction of the duration of the Periodical Inspection is due to voluntary efforts of reactor establishers. While measures are a little different among reactor establishers, reasons for reduction are as follows;

- i) Reduction of each sub-work duration
- ii) Improvement of working method
- iii) Schedule control hour by hour
- iv) Alternate usage of spare components
- v) More shipping of components back to factory to check
- vi) Mechanization and automation of works

Reactor establishers will be to continue to review the working scope and the interval of

check, maintaining the safety level.

## (2) Introduction of the Nuclear Safety Inspection and Refinement of the Safety Preservation Rules

The Reactor Regulation Law was amended in 1999 in order to make nuclear safety preservation faultless after reviewing JCO Criticality Accident. While the safety regulation in the stage of operation in Japan had been focused on the Periodical Inspections in those days, NISA amended the Law to introduce the Nuclear Safety Inspection and refine the Safety Preservation Rules, trying to improve the nuclear safety preservation further.

The Nuclear Safety Inspection is introduced aiming to sustain strong safety consciousness in the works. The resident Nuclear Safety Inspector is posted to each nuclear related facility to supervise the compliance with the Safety Preservation Rules. Personnel recruited as the Nuclear Safety Inspectors include those who have experiences of design or construction for commercial power reactors. They conduct the three-week Nuclear Safety Inspection four times a year, as well as conduct the nonscheduled investigation, patrol in the facility and witness at the regular inspections. The first Nuclear Safety Inspection was successfully carried out in July 2000 and the fact that the Safety Preservation Rules had been properly complied with was released to the public.

NISA took initiative to revise the Safety Preservation Rules and refined the contents referring to the related provisions in the IAEA-NUSS and the U.S. standard technical specification. After being reviewed by the technical advisers, the Safety Preservation Rules for each commercial power reactors were revised in January 2001, under which commercial power reactors are now operating. The contents of refinement are as follows;

- i) The essential items to be secured for safety preservation by the Nuclear Safety Inspectors who assessed the compliance with the Safety Preservation Rules were clearly described, excluding an ambiguous expression.
- ii) The conditions for the safety preservation of commercial power reactors are described in the establishment licence application document and the application document for licence of construction plan. Those items to be secured through appropriate operation and maintenance were incorporated in the Safety Preservation Rules.
- iii) LCOs are more conservative than actual safety limits. While the previous Safety Preservation Rules merely described LCOs, the revised Rules clearly added up operator actions to be done in case of deviation from LCOs and specified the Completion Time to do those actions.
- iv) The items to be complied with were compiled in the revised Rules to each operation mode including start-up operation, hot shutdown and cold shutdown as well as power

operation.

- v) Allowed Outage Times for safety systems were clearly defined.
- vi) Items to be complied with relating to fosterage of safety culture, education and training for plant personnel and quality assurance were reviewed or newly incorporated.
- vii) Emergency preparedness and its response were clearly specified.
- viii) The documentation such as various kinds of procedures and instructions was clearly obliged.

Table 19-1 Items to be Described in the Safety Preservation Rules

Provided by the law

- 1) The duties of personnel engaged in the operation and management of commercial power reactor, and organization
- 2) The following items with respect to the safety preservation education for personnel engaged in the operation and management of commercial power reactor
  - a. Policy for the safety preservation education  
(including preparation of education program)
  - b. The contents of the safety preservation education as follows
    - Relevant laws and the Safety Preservation Rules
    - Constitution, performance and operation of commercial power reactor
    - Radiation management
    - Handling of nuclear fuel materials and objects contaminated by them
    - Measures to be taken in emergencies
  - c. Other necessary items for the safety preservation education of commercial power reactor
- 3) Operation of commercial power reactor
- 4) Safety reviews on the operation of commercial power reactor
- 5) Designation of control areas, conservation areas and environment monitoring areas, and restriction of access to these areas
- 6) Ventilation and drainage monitoring equipment
- 7) 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
- 8) Management of radiation measuring instruments
- 9) Patrols and checks of commercial power reactor and their associated measures
- 10) Voluntary regular inspections of commercial power reactor
- 11) Receipt, delivery, transport, storage and other handling of nuclear fuel materials
- 12) Disposal of radioactive waste
- 13) Measures to be taken in emergency
- 14) Records on safety preservation of commercial power reactor (including observance status)
- 15) Other necessary items for the safety preservation of commercial power reactor

Table 19-2 (Part 1) Items of LCOs (BWR)

System	Item
Reactivity control system	Shutdown margin, Reactivity monitoring, Control rod motion monitoring, Control rod scram time, Control rod operation, Boron water injection system
Power distribution	Reactor thermal limit, Reactor thermal power and core flow
Control & Instrumentation	Instrument and control equipment
Reactor coolant system	Reactor re-circulation pump, Jet pump, Main steam relief and safety valve, Reactor coolant leak rate, System pressure monitoring of the emergency core cooling system and reactor isolation cooling system, Concentration of Iodine 131 in reactor coolant, Reactor shutdown cooling system, Limit of temperature & temperature change rate limit of primary coolant, Reactor pressure
Emergency core cooling system	Emergency core cooling system, Reactor core isolation cooling system
Reactor containment vessel system	Main steam isolation valve, Reactor containment vessel & Isolation valve, Vacuum break valve from suppression chamber to drywell, Average temperature of suppression pool, Flammability control system, Oxygen concentration in containment vessel, Reactor building, Reactor building H&V isolation valve, Standby gas treatment system
Plant system	Cooling system and cooling sea water system for residual heat removal system, Emergency diesel generator cooling system, Cooling system and cooling sea water system for Diesel generator of High pressure core spray system, Water level & temperature of spent fuel pool, Central control room H&V system
Emergency power supply system	Offsite power supply system, Emergency diesel generator, Emergency diesel fuel, DC power supply, Station power system
Others	Withdrawal of single control rod during reactor shutdown Removal of single control rod drive mechanism, Inspection with withdrawal of multiple control rods, In-service leak-rate or hydrostatic test, Inspection with switching of reactor mode

Table 19-2 (Part 2) Items of LCOs (PWR)

System	Item
Reactivity control system	Shutdown margin, Critical boron concentration, Moderator temperature coefficient, Control rod motion function, Control rod insertion limit, Control rod position indication, Exception items during reactor physics test, Chemical and volume control system (function of boron concentration)
Power distribution	Reactor thermal power limit, Heat flux hot channel factor, Nuclear enthalpy rise hot channel factor, Axial neutron flux power distribution deviation, Quarter core power deviation
Control & Instrumentation	Instrument and control equipment
Primary coolant system	DNB ratio, Limit of temperature & pressure and temperature change rate of primary coolant, Primary coolant, Pressurizer, Pressurizer safety valve, Pressurizer relief valve, Low temperature & over-pressurization protection, Primary coolant leak rate, Steam generator small tube leak monitoring, Residual heat removal system isolation valve, Limit of Iodine 131 concentration in primary coolant, Limit on increase of Iodine 131 in primary coolant
Emergency core cooling system	Pressure accumulator tank, Emergency core cooling system, Refueling water tank, Boron injection tank
Reactor containment	Reactor containment vessel, Reactor containment vessel vacuum relief valve, Reactor containment vessel spray system, Annulus air cleanup system, Annulus
Plant system	Main steam safety valve, Main steam isolation valve, Main feedwater isolation valve, Main feedwater control valve, Main feedwater bypass control valve, Main steam relief valve, Auxiliary feedwater system, Condensate water tank, Cooling system of reactor auxiliaries, Sea water system for cooling of reactor auxiliaries, Emergency circulation system of central control room, Iodine removal system of auxiliary building, Air cleanup system of safety auxiliary equipment room, Air cleanup system of fuel handling building
Emergency power supply system	Offsite power supply, Diesel generator, Emergency diesel fuel & lubricating oil and starting air for emergency diesel generator, Emergency DC power supply, Bus bar for station emergency
Others	Boron concentration in primary coolant, Water level of reactor cavity, Reactor containment penetrations, Water level & temperature of spent fuel pit



Table 19-3 (part1) Periodic al Inspection items  
stipulated in the Safety Preservation Rules (BWR)

Inspection items during the Periodic al Inspection
<ol style="list-style-type: none"> <li>1. Function inspection of control rod drive hydraulic system</li> <li>2. Function inspection of boron water injection system</li> <li>3. Confirmation inspection of set points of safety protection system</li> <li>4. Function inspection of reactor protection system interlock</li> <li>5. Function inspection of process monitor</li> <li>6. Function inspection of main steam safety valve</li> <li>7. Function inspection of main steam safety relief valve / safety valve function</li> <li>8. Function inspection of main steam safety relief valve / relief valve function</li> <li>9. Function inspection of emergency core cooling system</li> <li>10. Function inspection of reactor isolation cooling system</li> <li>11. Function inspection of main steam isolation valve</li> <li>12. Leak rate inspection of main steam isolation valve</li> <li>13. Leak rate inspection of primary containment vessel</li> <li>14. Function inspection of primary containment vessel isolation valve</li> <li>15. Function inspection of primary containment vessel vacuum break valve</li> <li>16. Function inspection of flammability control system</li> <li>17. Performance inspection of reactor building leak tightness</li> <li>18. Function inspection of standby gas treatment system</li> <li>19. Performance inspection of filter of standby gas treatment system</li> <li>20. Function inspection of emergency diesel generator</li> <li>21. Check and calibration of radiation measuring instruments</li> <li>22. Function inspection of field monitoring</li> <li>23. Class 1 component in-service inspection</li> <li>24. Function inspection of emergency re-circulation system of central control room</li> <li>25. Performance inspection of filter of emergency re-circulation system of central control room</li> <li>26. Function inspection of DC power supply</li> <li>27. Function inspection of process monitor</li> </ol>
Inspection items during operation
<ol style="list-style-type: none"> <li>1. Function inspection of reactor scram</li> <li>2. Measurement of born water concentration</li> <li>3. Function inspection of boron water injection system</li> <li>4. Function inspection of the emergency core cooling system</li> <li>5. Function inspection of the reactor core isolation cooling system</li> <li>6. Function inspection of the emergency gas treatment system</li> <li>7. Function inspection of the emergency diesel generator</li> </ol>

Table 19-3 (part2) Periodic al inspection Items  
Stipulated in the Safety Preservation Rules (PWR)

Inspection items during the Periodic al Inspection
<ol style="list-style-type: none"> <li>1. Function inspection of control rod drive system</li> <li>2. Function inspection of safety protection system</li> <li>3. Confirmation inspection of set points of safety protection system</li> <li>4. Function inspection of emergency power supply</li> <li>5. Function inspection of pressurizer safety valve</li> <li>6. Function inspection of pressurizer relief valve</li> <li>7. Function inspection of block valve to pressurizer relief valve</li> <li>8. Steam generator tube volumetric examination</li> <li>9. Function inspection of area and process monitor</li> <li>10. Function inspection of radiation monitoring equipment</li> <li>11. Class 1 component in-service inspection</li> <li>12. Function inspection of high and low pressure injection system</li> <li>13. Leak rate inspection of reactor containment</li> <li>14. Function inspection of reactor containment isolation valve</li> <li>15. Function inspection of reactor containment spray system</li> <li>16. Measurement of caustic soda concentration in iodine removal chemical tank</li> <li>17. Performance inspection of filter of annulus circulation ventilation system</li> <li>18. Function inspection of annulus circulation ventilation system</li> <li>19. Function inspection of main steam safety valve</li> <li>20. Function inspection of main steam relief valve</li> <li>21. Function inspection of auxiliary feed water system</li> <li>22. Function inspection of cooling system for reactor auxiliaries</li> <li>23. Performance inspection of filter of iodine removal system of auxiliary building</li> <li>24. Function inspection of iodine removal system of auxiliary building</li> <li>25. Function inspection of field monitoring</li> </ol>
Inspection items during operation
<ol style="list-style-type: none"> <li>1. Control rod motion inspection</li> <li>2. Inspection of startup of boron pump</li> <li>3. Measurement of boron concentration in boron tank</li> <li>4. Logic inspection of reactor protection system</li> <li>5. Measurement of boron concentration in boron tank</li> <li>6. Inspection of startup of charge / high- pressure injection pump</li> <li>7. Inspection of startup of residual heat removal pump</li> <li>8. Measurement of boron concentration in water tank for refueling</li> <li>9. Measurement of boron concentration in boron injection tank</li> <li>10. Inspection of startup of reactor containment spray pump</li> <li>11. Inspection of startup of fan of annulus circulation ventilation system</li> <li>12. Inspection of startup of auxiliary feed-water pump</li> <li>13. Inspection of startup of fans for iodine removal and exhaust system of auxiliary building, and for circulation ventilation system of safety auxiliary's room</li> <li>14. Load inspection of diesel generator</li> </ol>

Table 19-4 Reporting Criteria of Incidents and Failures under the Laws

Provision of the Reactor Regulation Law
<ol style="list-style-type: none"> <li>1. When nuclear fuel material is stolen or its whereabouts is unknown.</li> <li>2. When the reactor is shut down by failure of the reactor facility or when it has become necessary to cease the operation of reactor during operation.</li> <li>3. When a failure of reactor facility is found during reactor shutdown that could cause undue influence on the operation of reactor.</li> <li>4. When the concentration of radioactive materials in the air outside the environment monitoring area exceeds the allowable limit in the case of discharge of gaseous radioactive waste through the ventilation facilities.</li> <li>5. When gaseous nuclear fuel materials or gaseous substances contaminated by them leak outside the control area.</li> <li>6. When the concentration of radioactive materials in the water outside the environment monitoring area exceeds the allowable limit in the case of the discharge of liquid radioactive waste through the drainage facilities.</li> <li>7. When liquid nuclear fuel materials or liquid substances contaminated by nuclear fuel materials leak outside the control area.</li> <li>8. When measures such as restrictions on the access of persons and key control and other necessary measures in the area where the leakage occurs are newly taken, or when the leaked substances spread outside the control area, in case of the occurrence of leakage of nuclear fuel materials or substances contaminated by them inside the control area.</li> <li>9. When the dose of workers engaged in radiation work exceeds or could exceed the allowable dose limit.</li> <li>10. When persons get injured or could be injured in the reactor facility, except for minor injury other than radiation hazard.</li> </ol>
Provision of the Electricity Utilities Industry Law
<ol style="list-style-type: none"> <li>1. Fatal and injury accident from electric shock</li> <li>2. Electrical fire accident</li> <li>3. Human casualty accident by defect, damage, destruction or operation of electric structure, or accident with significant property damage</li> <li>4. Radiation accident</li> <li>5. Accident with the destruction of main electrical structure</li> <li>6. Accident obstructing power generation</li> <li>7. Accident obstructing electric ity supply</li> <li>8. Accident obstructing electric ity supply of other electric utilities by defect, damage or destruction of electric structure</li> <li>9. Accident by natural disasters such as typhoons or floods, etc.</li> <li>10. Accident during the construction of electric structure, or one with social influence</li> </ol>

## Planned Activities to Improve Safety

## Planned Activities to Improve Safety

Planned future activities to improve safety are summarized as follows:

### 1. Enhancement of regulatory activities

In January 2001, NISA was established to administer the safety regulation. Furthermore, effective and efficient regulatory activities have been initiated such as establishment of the Nuclear Safety Inspection System, assignment of the resident Nuclear Safety Inspectors, and clarification of rules on safety education for personnel in the Safety Preservation Rules. These regulatory activities will be maintained and enhanced further.

### 2. Development and revision of safety standards and guides

In July 2001, the Task Group on A Seismic Design, the Special Committee on Safety Standards, the NSC, started investigation and deliberation to revise, and incorporate the latest knowledge into, the Examination Guide for Seismic Design of Nuclear Power Reactor Facilities and the Practice of the Safety Examination on Geology and Soil of Nuclear Power Reactor Facilities. The activity will be continued further.

### 3. Securing safety of existing nuclear installations

NISA requests licence holders to perform the Periodic Safety Review approximately once every 10 years at each nuclear installation and to report the results to NISA. The activity will be continued further.

The licence holders will prepare and implement measures for the accident management at all of the commercial power reactors in operation by February 2002. The measures for accident management will be reported to NISA, together with the results of PSA confirming quantitatively the effectiveness of the measures to enhance safety. NISA will review the report.

Measures addressing aging of existing nuclear installations include enhancement of the Periodic Safety Reviews, intensification of the Periodical Inspections, the development of technical standards and promotion of technical development. These activities will be continued further.

### 4. Nuclear emergency exercise

The purpose of nuclear emergency exercise is to promote understanding of the nuclear emergency preparedness by responsible personnel of the national government, local governments and the licence holder, and local residents, and to verify whether emergency measures function in predetermined way. Exercises including participation in international exercises will be continued further.

## 5.Promotion of safety research and reliability verification tests

The NSC has continuously promoted the safety research on nuclear installations by long-term programs, while NISA has taken initiatives to conduct reliability verification tests. These activities will be continued further.

In the future, emphasis will be put on researches on decommissioning and nuclear emergency preparedness, as well as ongoing researches on fuel safety (high burn-up fuel and mixed oxide fuel), aging, severe accident, probabilistic safety assessment and human factors.

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# Annex 1. List of Nuclear Installations

(As of September, 2001)

## (1) Commercial Power Reactors

	License Holder	Power Station & Unit	Reactor Type	Power [MWe]	Commissioning	
In Operation	The Japan Atomic Power Co.	Tokai Power Station *	GCR	166	07/25/66	
		Tokai Daini Power Station	BWR	1,100	11/28/78	
		Tsuruga Power Station, Unit 1	BWR	357	03/14/70	
		Unit 2	PWR	1,160	02/17/87	
	Hokkaido Electric Power Co., Inc.	Tomari NPS, Unit 1	PWR	579	06/22/89	
		Unit 2	PWR	579	04/12/91	
	Tohoku Electric Power Co., Inc.	Onagawa NPS, Unit 1	BWR	524	06/01/84	
		Unit 2	BWR	825	07/28/95	
	Tokyo Electric Power Co., Inc.	Fukushima Daiichi NPS, Unit 1	Unit 1	BWR	460	03/26/71
			Unit 2	BWR	784	07/18/74
			Unit 3	BWR	784	03/27/76
			Unit 4	BWR	784	10/12/78
			Unit 5	BWR	784	04/18/78
			Unit 6	BWR	1,100	10/24/79
		Fukushima Daini NPS, Unit 1	Unit 1	BWR	1,100	04/20/82
			Unit 2	BWR	1,100	02/03/84
			Unit 3	BWR	1,100	06/21/85
			Unit 4	BWR	1,100	08/25/87
		Kashiwazaki Kariwa NPS, Unit 1	Unit 1	BWR	1,100	09/18/85
			Unit 2	BWR	1,100	09/28/90
Unit 3			BWR	1,100	08/11/93	
Unit 4			BWR	1,100	08/11/94	
Unit 5	BWR		1,100	04/10/90		
Unit 6	ABWR		1,356	11/07/96		
Unit 7	Unit 7	ABWR	1,356	07/02/97		
Chubu Electric Power Co., Inc.	Hamaoka NPS, Unit 1	BWR	540	03/17/76		
	Unit 2	BWR	840	11/29/78		
	Unit 3	BWR	1,100	08/28/87		
	Unit 4	BWR	1,137	09/03/93		
Hokuriku Electric Power Co.	Shika NPS, Unit 1	BWR	540	07/30/93		

In Operation	The Kansai Electric Power Co., Inc.	Mihama Power Station, Unit 1	PWR	340	11/28/70
		Unit 2	PWR	500	07/25/72
		Unit 3	PWR	826	12/01/76
		Takahama Power Station, Unit 1	PWR	826	11/14/74
		Unit 2	PWR	826	11/14/75
		Unit 3	PWR	870	01/17/85
		Unit 4	PWR	870	06/05/85
		Ohi Power Station, Unit 1	PWR	1,175	03/27/79
		Unit 2	PWR	1,175	12/05/79
		Unit 3	PWR	1,180	12/18/91
		Unit 4	PWR	1,180	02/02/93
		The Chugoku Electric Power Co., Inc.	Shimane NPS, Unit 1	BWR	460
		Unit 2	BWR	820	02/10/89
Shikoku Electric Power Co., Inc.	Ikata Power Station, Unit 1	PWR	566	09/30/77	
	Unit 2	PWR	566	03/19/82	
	Unit 3	PWR	890	12/15/94	
Kyushu Electric Power Co., Inc.	Genkai NPS, Unit 1	PWR	559	10/15/75	
	Unit 2	PWR	559	03/30/81	
	Unit 3	PWR	1,180	03/18/94	
	Unit 4	PWR	1,180	07/25/97	
	Sendai NPS, Unit 1	PWR	890	07/04/84	
	Unit 2	PWR	890	11/28/85	
Subtotal			(52 units)	45,083	
Under Construct- ion	Tohoku Electric Power Co., Inc.	Onagawa NPS, Unit 3**	BWR	825	2002/1 (Planned)
		Higashidori NPS, Unit 1	BWR	1,100	2005/7 (Planned)
	Hokuriku Electric Power Co. Chubu Electric Power Co., Inc.	Shika NPS, Unit 2	ABWR	1,358	2006/3 (Planned)
		Hamaoka NPS, Unit 5	ABWR	1,380	2005/1 (Planned)
	Subtotal			(4 units)	4,663
In Planning	Hokkaido Electric Power Co., Inc.	Tomari NPS, Unit 3	BWR	912	2008
		Electric Power Development Co.	Ohma NPS, Unit 1	ABWR	1,383
	Tohoku Electric Power Co., Inc.	Maki NPS, Unit 1	BWR	825	2012
		The Chugoku Electric Power Co., Inc.	Shimane NPS, Unit 3	ABWR	1,373
	Kaminoseki NPS, Unit 1	ABWR	1,373	2012	
		Unit 2	ABWR	1,373	2015
Subtotal			(6 units)	7,239	

(2) Reactors at the stage of research and development

	License Holder	Power Station & Unit	Reactor Type	Power [MWe]	Commissioning
In Operation	Japan Nuclear Cycle Development Institute	Fugen	ATR	165	03/20/79
Under Construction		Monju **	FBR	280	04/05/94 (Criticality)

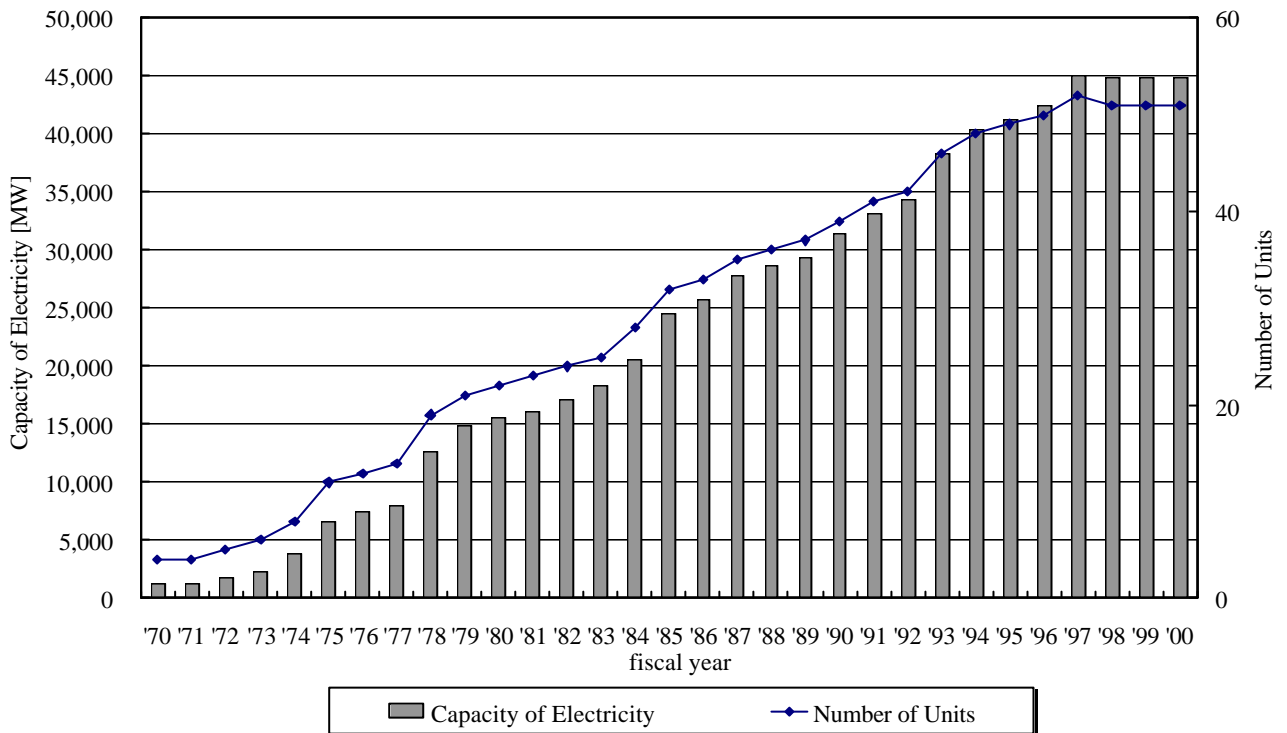
Note: In planning: Projects that were incorporated into the Basic Plan for Electric Power Development

\* : Commercial operation was ceased for decommissioning on March 31,1998.

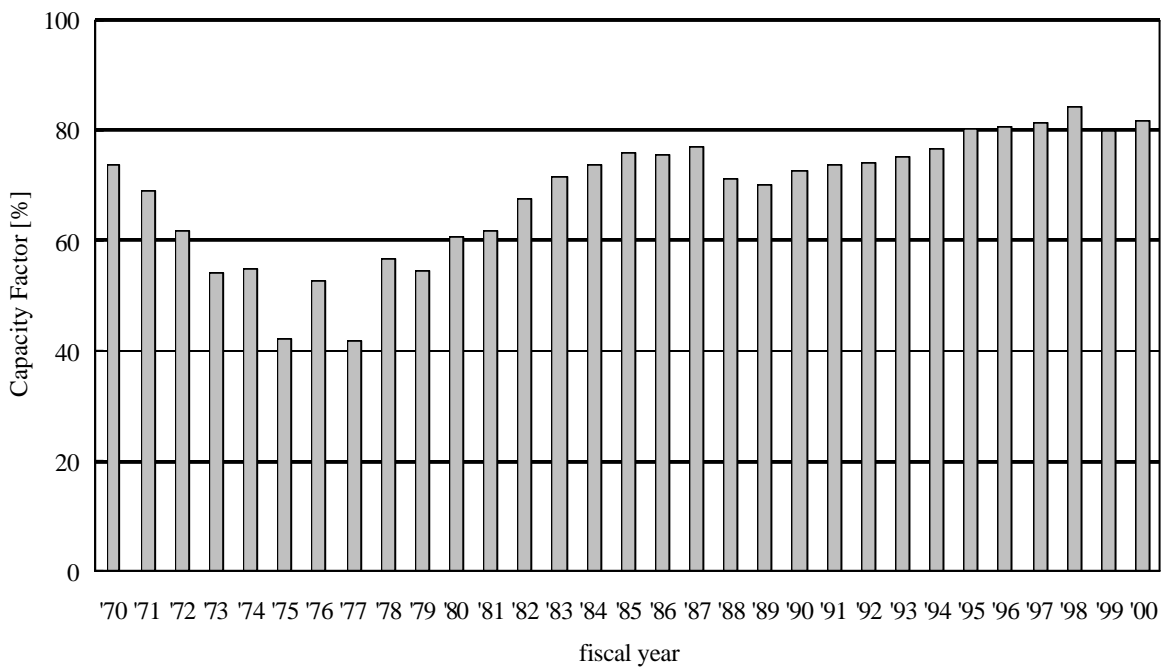
\*\* : These plants reached criticality and correspond to the category “reactor in operation” of the Convention on Nuclear Safety

## Annex 2. Data on Nuclear Installations

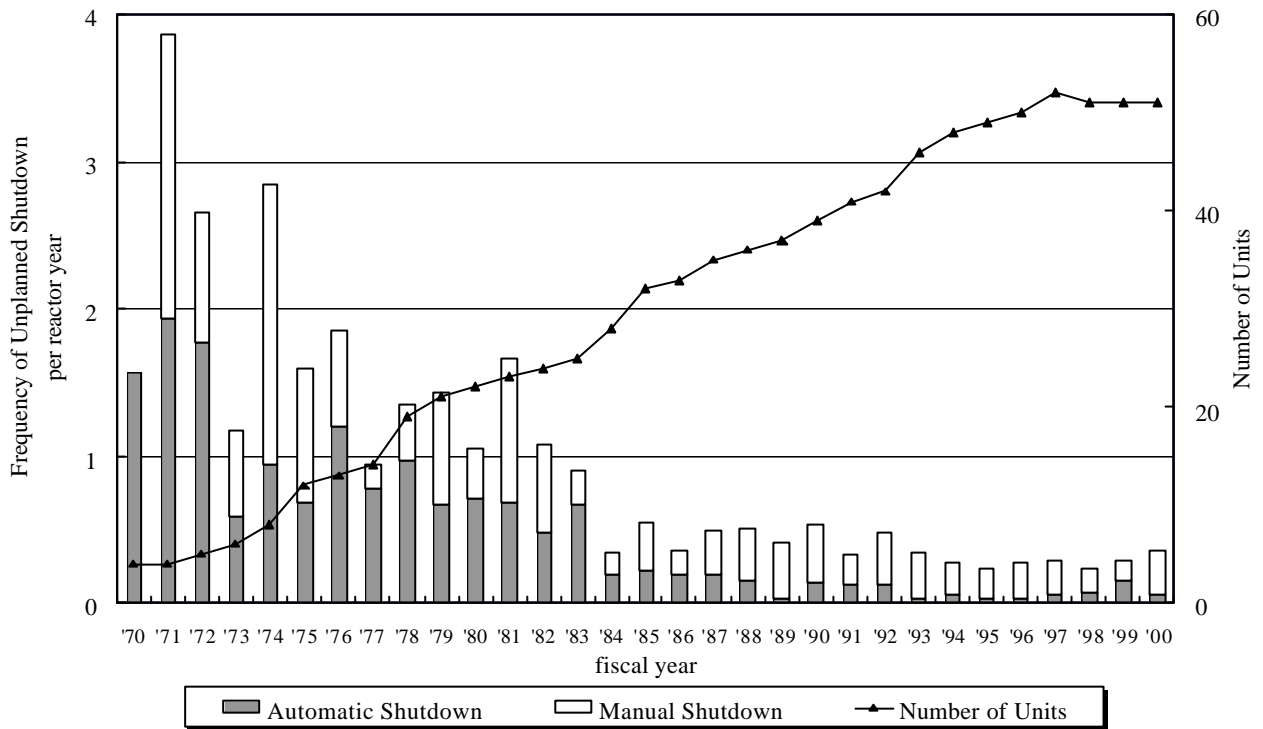
2.1 Capacity of Electricity of Commercial Nuclear Power Reactor



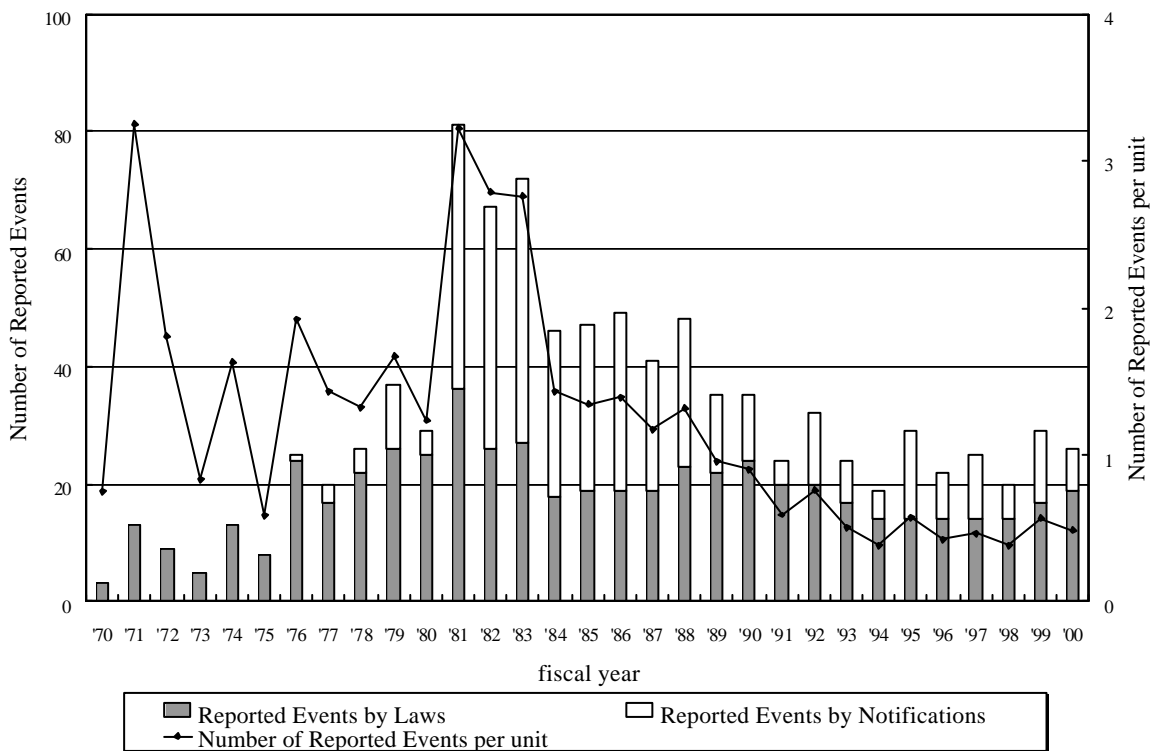
2.2 Capacity Factor of Commercial Nuclear Power Reactor



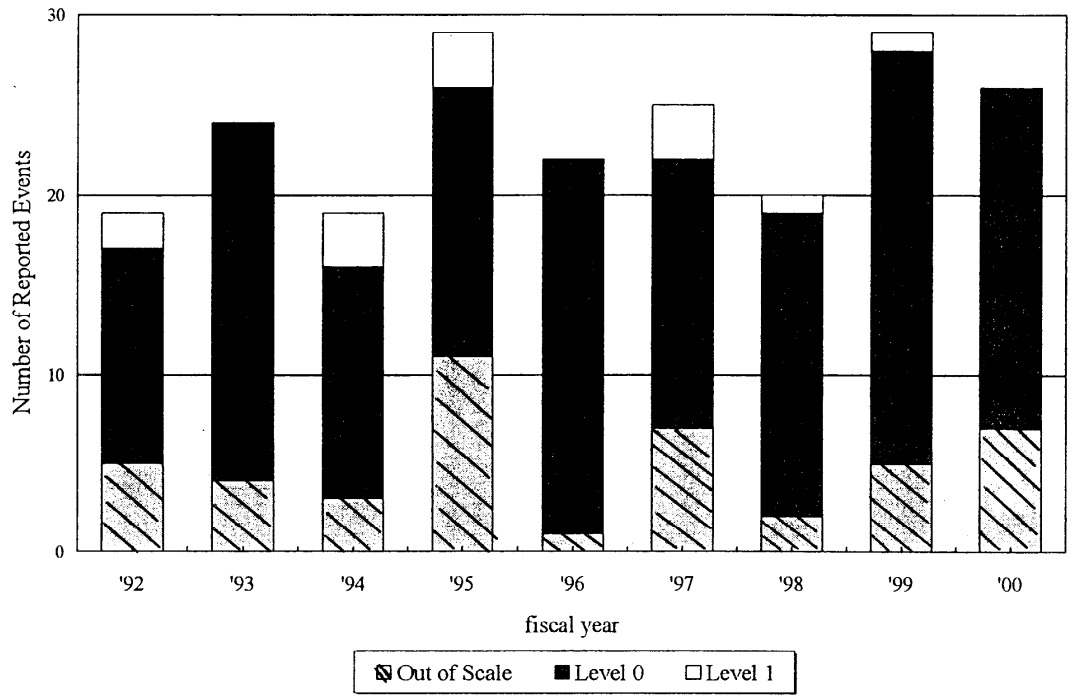
2.3 Frequency of Unplanned Shutdown at Commercial Nuclear Power Reactor  
(except during commissioning)



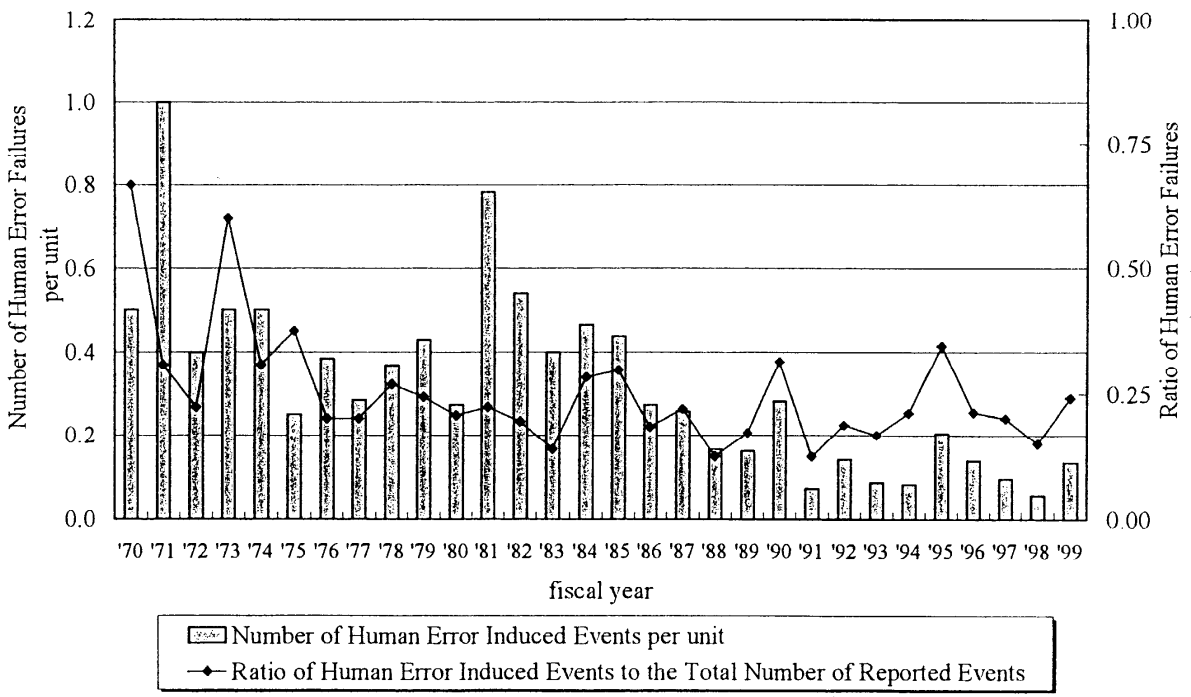
2.4 Reported Events (by Laws & Notifications)  
of Commercial Nuclear Power Reactor



2.5 Assessment of Events by INES for Commercial Nuclear Power Reactor

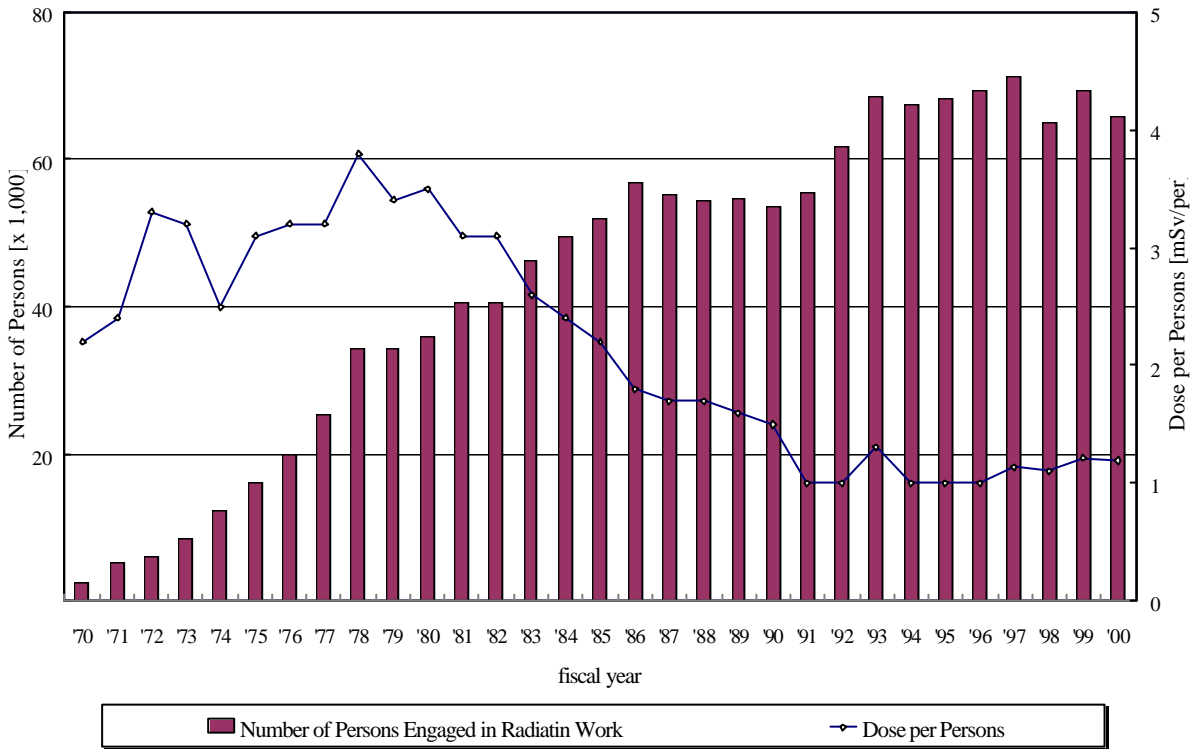


2.6 Human Error Induced Events Reported

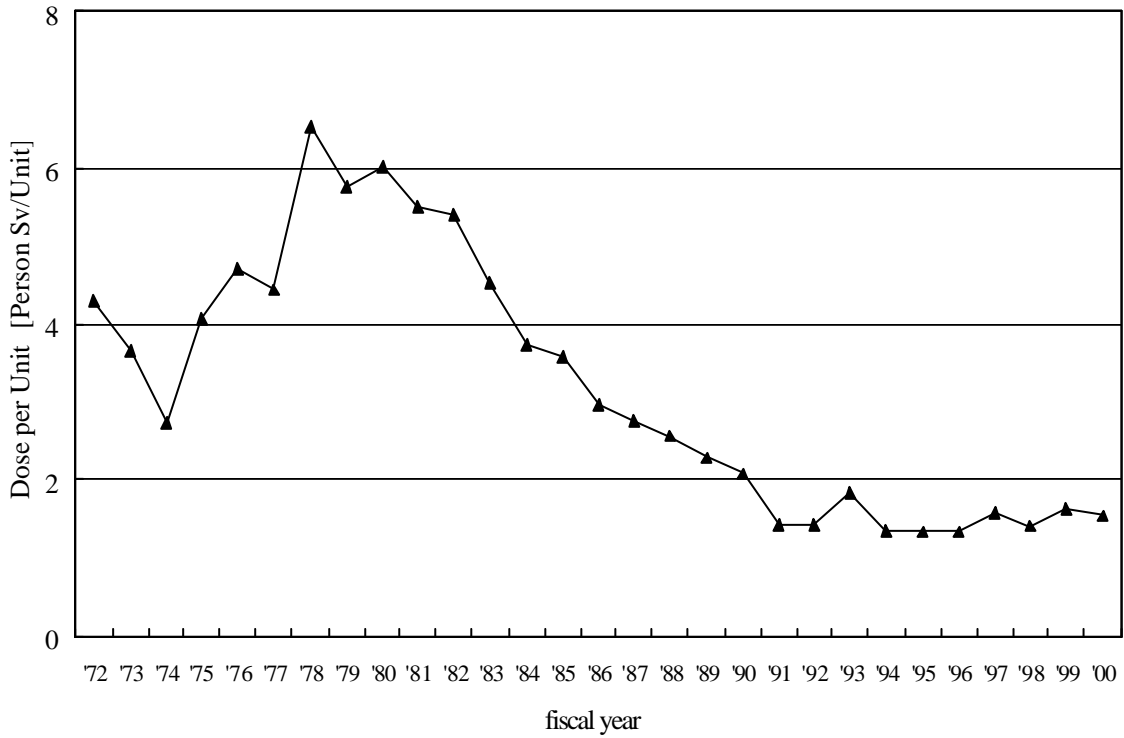




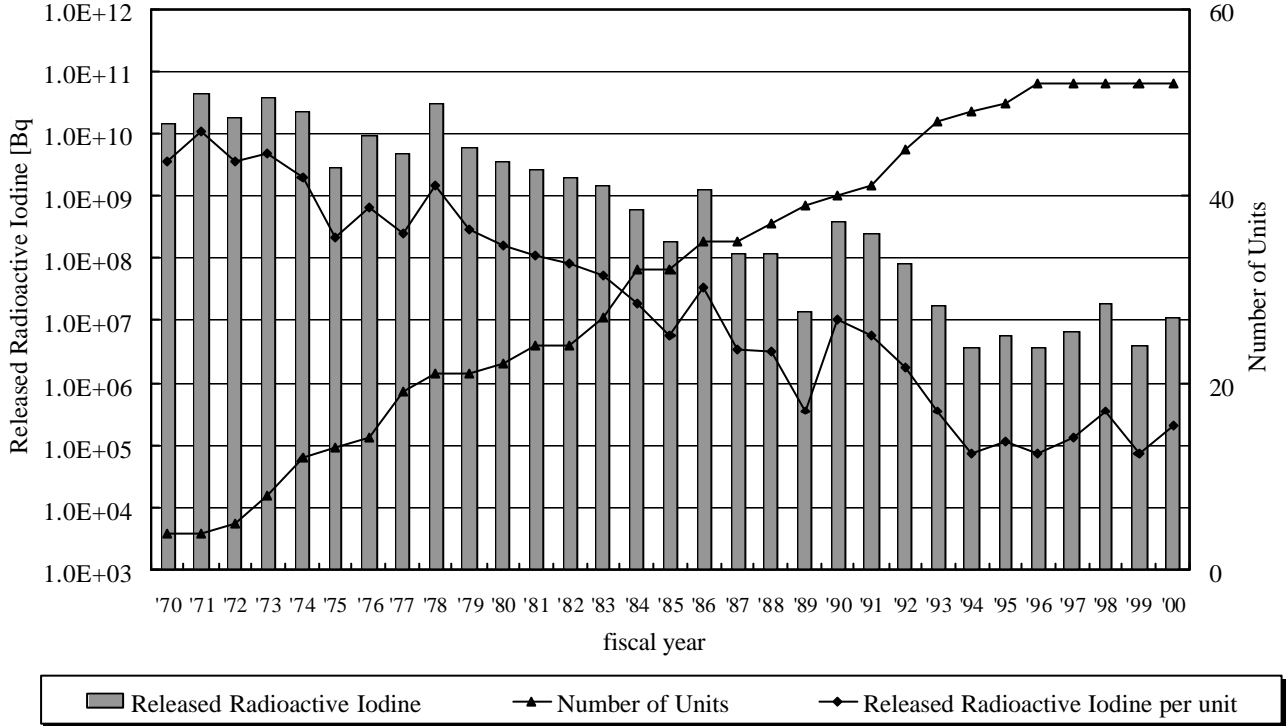
### 2.7 Dose per Persons at Commercial Nuclear Power Reactor



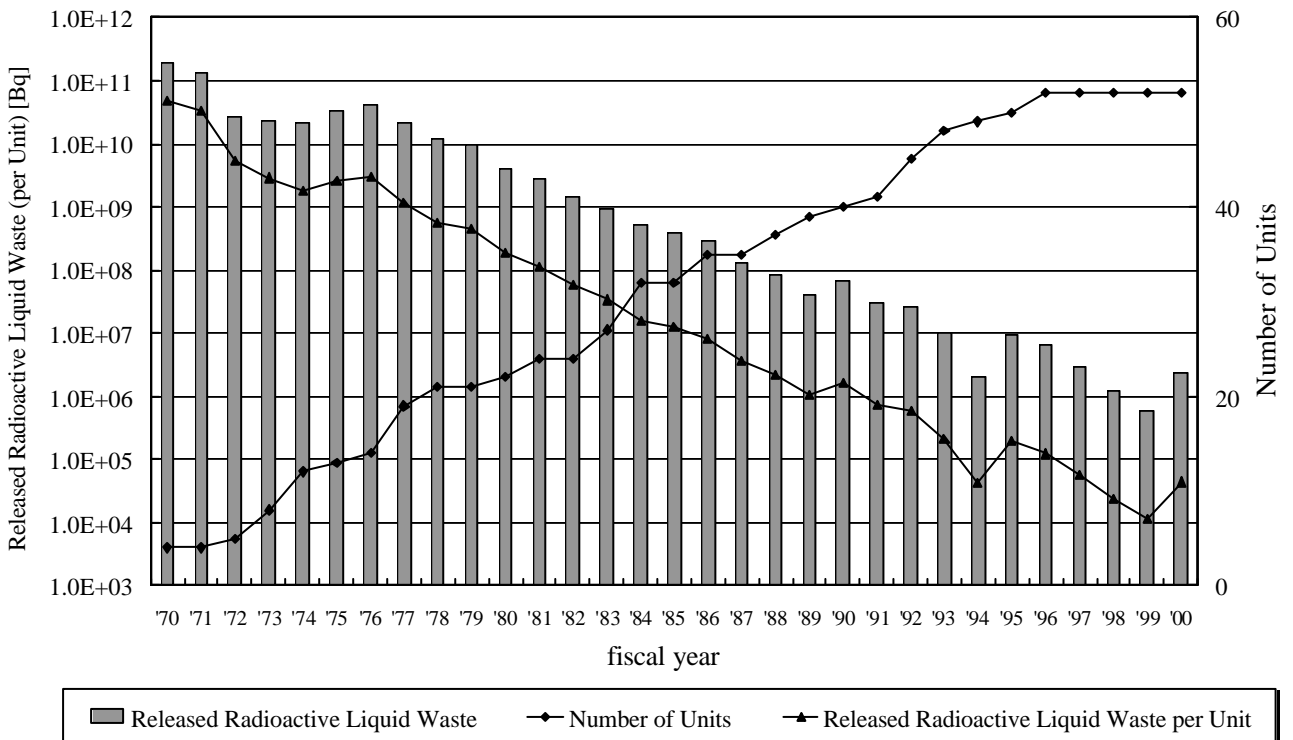
### 2.8 Averaged Dose at Commercial Nuclear Power Reactor



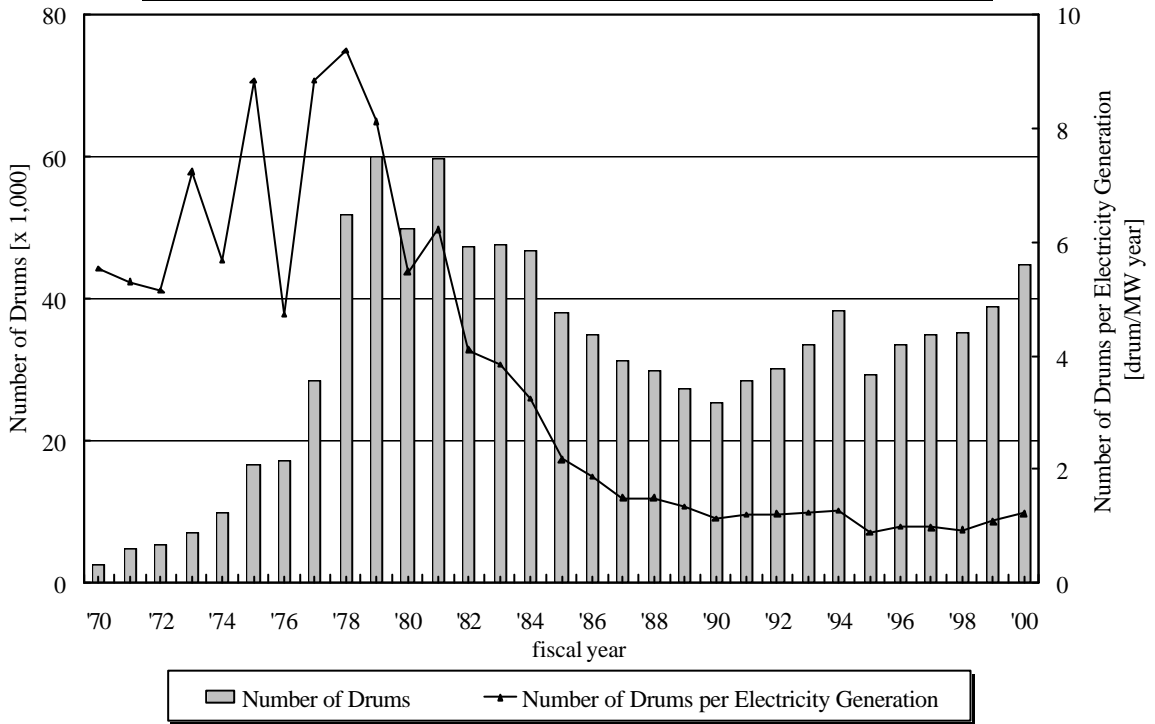
**2.9 Radioactive Gaseous Waste (I-131) Released  
from Commercial Nuclear Power Reactor  
(Number of units is summed from their initial criticality.)**



**2.10 Radioactive Liquid Waste (except H-3) Released  
from Commercial Nuclear Power Reactor**



2.11 Radioactive Solid Waste Generation per Electricity Generation of Commercial Nuclear Power Reactor  
 (Total quantity of radioactive solid waste is converted to the drum of 200-liter capacity.)



## Annex 3 Legislation and Guidelines

### 3.1 Atomic Energy Basic Law(Excerpt)

(Law No.186, December 19, 1955)

Latest Revision: Law No. 102, July 16, 1999

(Objectives)

**Article 1.** The Objectives of this Law shall be to secure energy resources in the future, to achieve the progress of science and technology and the promotion of industries by encouraging the research, development and utilization of nuclear power and thereby to contribute to the improvement of the welfare of the human society and of the national living standard.

(Basic Policy)

**Article 2.** The research, development and utilization of nuclear power shall be limited to peaceful purposes, shall aim at ensuring safety, giving priority, and shall be performed independently under democratic administration, the results therefrom shall be made public and shall actively contribute to international cooperation.

(Establishment)

**Article 4.** In the Cabinet Office, there shall be established the Atomic Energy Commission and the Nuclear Safety Commission for the purposes of carrying out the planned national policies on the research, development and utilization of nuclear power and of realizing the democratic operation of nuclear power administration.

(Functions)

**Article 5.** The Atomic Energy Commission shall plan, consider and determine the matters (excluding those related to implementing regulation for ensuring safety) related to the research, development and utilization of nuclear power.

**2.** The Nuclear Safety Commission shall plan, consider and determine the matters related to ensuring safety in the research, development and utilization of nuclear power.

(Organization, Operation and Authority)

**Article 6.** The matters concerning the organizations, operations and authorities of the Atomic Energy Commission and the Nuclear Safety Commission shall be provided by other law.

(Control over Nuclear Source Materials)

**Article 10.** The import, export, transfer, receipt and purification of nuclear source materials shall be entrusted, as provided by other law, only to those designated by the Government.

(Regulation concerning Nuclear Fuel Materials)

**Article 12.** Those who attempt to produce, import, export, possess, hold, transfer, receive, use or transport nuclear fuel materials shall be subject to the regulations to be enforced by the Government as provided by other Law.

(Regulation over Construction Etc. of Reactors)

**Article 14.** Those who attempt to construct reactors shall be subject to the regulations to be enforced by the Government as provided by other law. The same shall apply also to those who attempt to reconstruct or remove them.

**Article 15.** Those who attempt to transfer or receive reactors shall be subject to the regulations to be enforced by the Government as provided by other Law.

**Article 16.** Those who have constructed, reconstructed, removed received reactors in compliance with the regulations referred to in the preceding two Articles shall, as provided by other law, obtain the approval of the Government for the operation plan prior to their operation.

(Measures for Prevention of Radiation Hazards)

**Article 20.** The regulations on the manufacture, sale, use, measurement, etc. and any other safety and hygienic measures relating to radioactive materials and radiation generating devices in order to prevent radiation hazards and to ensure the public safety shall be provided by other Laws.

### 3.2 Law for Establishment of the Atomic Energy Commission and the Nuclear Safety Commission

#### (1) Law for Establishment of the Atomic Energy Commission and the Nuclear Safety Commission (Excerpt)

(Law No. 188, December 19, 1955)

Latest Revision: Law No. 156, December 17, 1999

(Objectives and Establishment)

**Article 1.** In order to ensure the democratic administration of the research, development and utilization of nuclear energy (hereinafter referred to as "utilization of nuclear power"), there shall be established the Atomic Energy Commission and the Nuclear Safety Commission in the Cabinet Office.

(Assigned Duties)

**Article 2.** The Atomic Energy Commission (hereinafter referred to as "the Commission" in this chapter) shall plan, deliberate and determine the matters referred to in the following items.

- (i) Matters concerning policies on the utilization of nuclear energy.
- (ii) Matters concerning the comprehensive adjustment of affairs relating to the utilization of nuclear energy of related administrative agencies.

- (iii) Matters concerning the estimation and the allocation of the expenses for the utilization of nuclear energy of related administrative agencies.
- (iv) Matters concerning the regulations on nuclear fuel materials and nuclear reactors (excluding matters that is under the assigned duties of the Nuclear Safety Commission).
- (v) Matters concerning the encouragement of testing and research relating to the utilization of nuclear energy.
- (vi) Matters concerning the education and training (excluding matters concerning the teaching and research at universities) of researchers and engineers engaged in the utilization of nuclear energy.
- (vii) Matters concerning the collection of data, the preparation of statistics and the investigation relating to the utilization of nuclear energy.
- (viii) Matters important relating to the utilization of nuclear energy, other than those referred to in the preceding items (excluding matters that is under the assigned duties of the Nuclear Safety Commission).

(Organization)

**Article 3.** The commission shall be organized of one chairman and four commissioners.

2. Two commissioners may be as part-time service.

(Chairman)

**Article 4.** The chairman acts as a manager for the Commission matters, and represents the Commission.

2. The chairman shall designate the person from the full-time commissioners beforehand, who acts for the chairman when the chairman fails to act.

(Appointment of the Chairman and the Commissioners)

**Article 5.** The Prime Minister appoints the chairman and the commissioners after the approval of both Parliaments.

2. When the official term of the chairman or the commissioner expires or when a vacant is produced, the Prime Minister can appoint the chairman or the commissioners irrespective of the provision of the foregoing paragraph when the approval of both Parliaments cannot be acquired due to the closing of the diet, or the disbandment of the house of representatives.

3. In the case of the foregoing paragraph, approval of both Parliaments shall be acquired at the first diet after the appointment. In this case, the Prime Minister must dismiss the chairman or the commissioner right away when the subsequent approval of both Parliaments cannot be acquired.

(Official Term of the Chairman and the Commissioners)

**Article 6.** The official term of the chairman and the commissioners shall be three years. However, a supplementary chairman or the supplementary commissioners shall work for the predecessor's remaining length of the official term.

2. The chairman and commissioners may be reappointed.

3. Irrespective of the provision of the first paragraph, the chairman and the commissioners shall work for the post consecutively until the successor is appointed even when the official term expires.

(Dismissal of the Chairman and the Commissioners)

**Article 7.** When the chairman or the commissioners are recognized that execution of the task cannot be performed for the failure of the mind and the body or when they are recognized that the wrongdoing unsuitable as the chairman or as the commissioner as well as the violation of obligations on a task to the chairman or the commissioners, the Prime Minister may dismiss them after obtaining the approval of both Parliaments.

(Assigned Duties)

**Article 13.** The Nuclear Safety Commission (hereinafter referred to as "the Commission" in this chapter) shall plan, deliberate and determine the matters referred to in the following items:

- (i) Matters concerning policies on the regulations to ensure nuclear safety among the policies on utilization of nuclear energy.
- (ii) Matters concerning the regulations to ensure nuclear safety among the regulations of the nuclear fuel material and nuclear reactors.
- (iii) Matters concerning the fundamentals of preventing hazards due to the utilization of nuclear energy.
- (iv) Matters concerning the fundamentals of measures for preventing hazards due to the fallout of radioactive materials.
- (v) Matters concerning the regulations to ensure nuclear safety among important matters in utilization of nuclear energy besides the matters referred to in the preceding item (i) to (iii).

(Organization)

**Article 14.** The commission shall be organized of five commissioners.

2. Two commissioners may be as part-time service.

(Chairman)

**Article 15.** One chairman is assigned in the Commission mutually elected from full-time commissioners.

2. The provisions of Article 4 shall be applied correspondingly for the chairman.

(Committee on Examination of Reactor Safety)

**Article 16.** There shall be established the Committee on Examination of Reactor Safety in the Commission which shall consist of the Examiners, the largest number of which is provided for in the Government Ordinance.

2. The Committee on Examination of Reactor Safety shall investigate and consider the matters concerning safety of nuclear reactors by the direction of the Chairman.

(Committee on Examination of Nuclear Fuel Safety)

**Article 19.** There shall be established the Committee on Examination of Nuclear Fuel Safety in the Commission, which shall consist of the Examiners, the largest number of which is provided for in the Government Ordinance.

2. The Committee on Examination of Nuclear Fuel Safety shall investigate and review the matters concerning safety of

nuclear fuel materials by the direction of the Chairman.  
(Investigator for Emergency Preparedness and Response)

**Article 20**

2. Several Investigators for Emergency Preparedness and Response (hereinafter referred to as "the Investigator"), the largest number of which is provided for in the Government Ordinance, shall be assigned to carry out the investigation and review of the matters authorized in the provisions of Article 15, Paragraph 4, and Article 20, Paragraph 5 and 6 of the Special Law of Emergency Preparedness for Nuclear Disaster (Law No. 156, 1999).

(Recommendation)

**Article 24.** The Atomic Energy Commission or the Nuclear Safety Commission may make recommendation to the heads of the related administrative agencies through the Prime Minister about the assigned duties specified in the each Paragraphs of Article 2 and Article 13, when necessary.

(Report etc.)

**Article 25.** The Atomic Energy Commission or the Nuclear Safety Commission may require the report and other necessary cooperation such as submittal of references, presentation of opinions, and explanation to the heads of the related administrative agencies to perform the assigned duties, when necessary.

**(2) Rules of Nuclear Safety Commission Secretariat Organization(Excerpt)**  
**(Order No. 2 of Cabinet Office, January 6, 2001)**

(Divisions of the Secretariat)

**Article 1.** There shall be established four divisions in the Nuclear Safety Commission secretariat:

General Affairs Division

Regulatory Guides and Review Division

Radiation Protection and Accident Management Division

Subsequent Regulation Review Division

(Assigned duties of the General Affairs Division)

**Article 2.** The General Affairs Division manages the following matters:

(Abbreviated)

(x) he matters concerning policies on the regulations to ensure nuclear safety among the policies on the utilization of nuclear energy (excluding matters that is under the assigned duties of other divisions)..

(xi) The matters concerning regulations to ensure nuclear safety among the regulations of the nuclear fuel material and reactors (excluding matters that is under the assigned duties of other sections).

(Assigned Duties of the Regulatory Guides and Review Division)

**Article 3.** The Regulatory Guides and Review Division shall manage the matters of the secretariat works referred to in the following items:

(i) Matters concerning to the establishment of standards and guidelines to ensure nuclear safety.

(ii) Matters concerning the consultation based on provisions of the Law on the Regulation of Nuclear Source Material, Nuclear Fuel Material, and Reactors (Law No. 166, 1957, hereinafter referred to as "Reactor Regulation Law").

(Assigned Duties of the Radiation Protection and Accident Management Division)

**Article 4.** The Radiation Protection and Accident Management Division shall manage the matters of the secretariat works referred to in the following items:

(i) Matters concerning to ensure nuclear safety of nuclear installations in service (excluding matters that is under the assigned duties of the Subsequent Regulation Review Division).

(ii) Matters concerning to ensure safety of the transportation of the nuclear source material, the nuclear fuel material, and the radioisotope.

(iii) The matters concerning the fundamentals of preventing hazards due to utilization of nuclear energy.

(iv) Matters concerning the implementation of nuclear emergency response and other necessary measures.

(v) The matters concerning the fundamentals of measures preventing hazards due to fallout of radioactive materials (excluding matters that is under the assigned duties of the Regulatory Guides and Review Division) besides the matters referred to in the preceding item, such as.

(Assigned Duties of the Subsequent Regulation Review)

**Article 5.** The Subsequent Regulation Review Division shall manage the matters concerning regulation investigation (investigation of regulation after the designation, licensing, or approval of business, / licensing or approval of the establishment, / licensing or approval of usage based on Reactor Regulation Law are meant here; the same meaning for the next article) among the secretariat responsibilities.

(Safety Investigation Officer and Regulation Investigation Officer)

**Article 6.** Two Safety Investigation Officers and one Regulation Investigation Officer are assigned in the Nuclear Safety Commission secretariat.

2. The Safety Investigation Officer shall take part of the secretariat works by receiving order concerning the important item of investigation other than regulation investigation.

3. The Regulation Investigation Officer shall take part of the secretariat works by receiving order concerning the important items of regulation investigation .

### **3.3 Law for Establishment of the Ministry of Economy, Trade and Industry**

#### **(1) Law for Establishment of the Ministry of Economy, Trade and Industry (Excerpt)**

**(Law No. 99, July 16, 1999)**

**Latest Revision: Law No.120, November 17, 2000**

**Chapter 2.** The establishment of the Ministry of Economy, Trade and Industry and its duties and assigned affairs  
(Assigned Duties)

**Article 3.** Ministry of Economy, Trade and Industry shall engage in enhancement of economical vitality of private sector and the growth of economy and industries with emphasis on the harmonized development in international economical relation and shall engage in ensuring stable and efficient supply of mineral resources and energy.

(Assigned Affairs)

**Article 4.** In order to achieve assigned duties as described in the preceding article, the Ministry of Economy, Trade and Industry shall administer the following affairs.

53. Matters relating to ensuring stable and efficient supplies of electricity, gas and thermal power.

54. Matters relating to planning, projecting and promotion of the fundamental policy concerning to the electricity development.

55. Matters relating to the nuclear power policy as for utilization of energy.

56. Matters relating to the technology development of nuclear power as for utilization of energy.

57. Matters relating to the regulations for the refining, fabrication, storage, reprocessing and waste disposal business in nuclear fuel cycle and the nuclear power installations and matters relating to ensure the safety of these business and installations

58. Matters relating to ensuring the safety of nuclear power as for utilization of energy.

**Chapter 4.** External Agencies

**Section 1.** Establishment

**Article 14.** According to the definitions described in Article 3, Paragraph 3 of the National Government Organization Law, the following external agency shall be established in the Ministry of Economy, Trade and Industry.

Agency of Natural Resources and Energy

**Section 2.** Agency of Natural Resources and Energy

**Subsection 1.** Duties and Assigned Affairs

(Director-General)

**Article 15.** The head of the Agency of Natural Resources and Energy shall be named as the Director-General of the Agency of Natural Resources and Energy.

(Assigned Duties)

**Article 16.** The Agency of Natural Resources and Energy shall engage in ensuring stable and efficient supply and the promotion of appropriate utilization of mineral resources and energy and engage in ensuring industrial safety.

(Assigned Affairs)

**Article 17.** In order to achieve assigned duties as described in the preceding article, the Agency of Natural Resources and Energy shall administer the affairs referred in No. 48 to No.59 of Article 4.

**Subsection 2.** Councils etc.

(Establishment)

**Article 18.** The Advisory Committee for Resources and Energy is established in Agency of Natural Resources and Energy.

(Advisory Committee for Resources and Energy)

**Article 19.** The Advisory Committee for Natural Resources and Energy shall administer the following affairs:

- (1) Investigate and examine the important matters concerning the comprehensive policies relating to security of stable and efficient supply for mineral resources and energy, and an adequate utilization of energy, in response to an inquiry issued from Minister of the Ministry of Economy, Trade and Industry.

**Subsection 3.** Special Agency

(Nuclear and Industrial Safety Agency)

**Article 20.** Nuclear and Industrial Safety Agency shall be established in the Agency of Natural Resources and Energy.

2. The Nuclear and Industrial Safety Agency shall be an organization for ensuring the safety of nuclear and other energy, and industrial safety.
3. The Nuclear and Industrial Safety Agency shall manage the assigned duties defined in Article 4, Paragraph 1, No.57 to No.59.
4. The head of the Nuclear and Industrial Safety Agency shall be named as the Director-General of the Nuclear and Industrial Safety Agency. .
5. The Director-General shall appoint or dismiss the staff and personnel of the Nuclear and Industrial Safety Agency.
6. The place and internal organization of the Nuclear and Industrial Safety Agency shall be determined by the government ordinance.

#### **(2) Ordinance for Organization of Ministry of Economy, Trade and Industry (Excerpt)**

**(Government Ordinance No. 254, June 7, 2000)**  
**Latest Revision: Ordinance No.176, April 25, 2001**

**Chapter 2.** External Agencies

**Section 1.** Agency of Natural Resources and Energy

**Subsection 3.** Special Agency

(The Location of Nuclear and Industrial Safety Agency)

**Article 132.** The Nuclear and Industrial Safety Agency shall be placed in Tokyo.

(The Organization of the Nuclear and Industrial Safety Agency )

**Article 133.** One General for Nuclear and Industrial Safety shall be assigned in the Nuclear and Industrial Safety Agency.

2. The Director-General for Nuclear and Industrial Safety shall assist the Director-General of the agency, and shall manage the affairs of the agency.

3. The remaining internal organization of the agency shall be provided by the Ministerial Order of Ministry of Economy, Trade and Industry.

**(3) The Rules for Organization of the Ministry of Economy, Trade and Industry (Excerpt)**  
**(Ministerial Order No. 1 of METI, January 6, 2001)**

**Latest Revision: Ministerial Order No.162 of METI, May 15, 2001**

**Chapter 2.** External Agencies

**Section 1.** Agency of Natural Resources and Energy

**Subsection 2.** Specific Agency

**Title 1.** Establishment of Specific Assignments etc.

(Deputy Director-General and Director-General for Safety Examination)

**Article 261.** Three Deputy Director-General and one Deputy Director-General for Safety Examination shall be assigned in the Nuclear and Industrial Safety Agency.

2. Upon official orders, the Deputy Director-Generals shall participate in activities for planning and projecting of the matters important to the assigned affairs of the Nuclear and Industrial Safety Agency and shall manage the related affairs.

3. The Director-General for Safety Examination shall manage the assigned duties and affairs concerning to the examination on the important items regarding to regulations for the nuclear related business of refining, processing, storing and disposing of wastes and commercial nuclear power reactors (hereinafter referred to as “nuclear business, etc.”), upon official orders.

**Title 2.** Establishment of Divisions etc.

(Divisions Established in the Nuclear and Industrial Safety Agency )

**Article 262.** The following fourteen Divisions shall be established in the Nuclear and Industrial Safety Agency :

- Policy Planning and Coordination Division
- Nuclear Safety Administration Division
- Nuclear Power Licensing Division
- Nuclear Power Inspection Division
- Advanced Reactor and Fuel Regulation Division
- Nuclear Fuel Cycle Regulation Division
- Radioactive Waste Regulation Division
- Nuclear Emergency Preparedness Division
- Electric Power Safety Division
- (Other divisions, omitted)

(Assigned Affairs of the Policy Planning and Coordination Division)

**Article 263.** The Policy Planning and Coordination Division shall manage the assigned affairs as shown in the followings:

1. Matters relating to the secrecy.
2. Matters relating to the positions, appointment and dismissal, salary, punishment, service and other personnel affairs, and education and training of personnel (excluding the affairs assigned to Nuclear Safety Administration Division ) in the Nuclear and Industrial Safety Agency .
5. Matters relating to the deliberation and transmission of proposal of laws, ordinances and orders, and other official documents, etc.
6. Matters relating to disclosure to the public of such information possessed at the Nuclear and Industrial Safety Agency .
7. Matters relating to the general coordination concerning to the assigned duties of the Nuclear and Industrial Safety Agency .
8. Matters relating to examination of administration performed by the Nuclear and Industrial Safety Agency .
9. Matters relating to public relation.
10. Matters relating to the organization and members of the Nuclear and Industrial Safety Agency .

----- omission -----

19. Matters relating to projecting and planning, and promoting of the fundamental policy for ensuring nuclear safety and



industry safety of nuclear energy and other energy utilization.

20. Matters relating to overall coordination of matters concerning to the law-suits on the assigned affairs of the Nuclear and Industrial Safety Agency.
21. Matters relating to international cooperation concerning to regulating and ensuring the safety of nuclear business, etc.
22. Matters relating to the international cooperation concerning to ensuring the safety in nuclear energy utilizations.
23. Matters relating to overall coordination of international cooperation concerning the assigned affairs of the Nuclear and Industrial Safety Agency.
24. Matters relating to the enforcement of Nuclear Regulation Law on Nuclear Raw Materials, Nuclear Fuel Materials and Nuclear Reactors (Law No. 166, 1957. Hereinafter referred to as “Nuclear Regulation Law”).

(Assigned Affairs of Nuclear Safety Administration Division)

**Article 264.** The Nuclear Safety Administration Division shall manage the affairs as shown in the followings.

1. Matters relating to communication and coordination of the affairs on the Nuclear Safety Inspectors and Senior Specialists for Nuclear Emergency.
2. Matters relating to the budgets and numbers of Nuclear Safety Inspectors and Senior Specialists for Nuclear Emergency.
3. Matters relating to the necessary training and education in order to perform occupational works of Nuclear Safety Inspectors, Senior Specialists for Nuclear Emergency and other personnel who engage in the affairs for ensuring nuclear safety.
4. Matters relating to the collection, analysis and publishing of safety related information on nuclear business.
5. Matters relating to the examination and license certificate for the Chief Engineer of Reactors and Chief of Nuclear Fuel Management.
6. Matters relating to affairs concerning to overall coordination of allegation defined in Article 66, Paragraph 2 of the Nuclear Regulation Law
7. Matters relating to affairs concerning to reporting defined in Article 67, Paragraph 1 of the Nuclear Regulation Law.

(Assigned Affairs of the Nuclear Power Licensing Division)

**Article 265.** The Nuclear Power Licensing Division shall manage the affairs as shown in the followings:

1. Matters relating to the licensing for establishment and transfer of the commercial nuclear power reactors.
2. Matters relating to the succession of the title of commercial nuclear power reactor establishers.
3. Matters relating to the licensing of construction plan of nuclear power generating facilities (except turbine and auxiliary boiler, same as in Paragraph 5) in the commercial nuclear power reactors.
4. Matters relating to the licensing for design of nuclear fuel materials in the commercial nuclear power reactors.
5. In addition to the above defined items, the items related to the regulations of the nuclear power generating facilities in the commercial nuclear power reactors (except the items related to the affairs defined in the paragraphs of the next article, Article 268, Paragraph 5 and Paragraph 6, Article 269, Paragraph 2 and Paragraph 3, and Article 271, Paragraph 9) and others for ensuring safety (except matters relating to international cooperation) of these facilities (except the assigned affairs of the Nuclear Safety Administration Division and Nuclear Emergency Preparedness Division).

(Assigned Affairs of Nuclear Power Inspection Division)

**Article 266.** The Nuclear Power Inspection Division shall manage the affairs as shown in the followings:

1. Matters relating to the inspections of the nuclear power installations of commercial nuclear power reactors based on the Electric Utilities Industry Law and the regulation by orders based on the law (except affairs assigned to the Electric Power Safety Division).
2. Matters relating to the inspections for the nuclear fuel materials of the commercial nuclear power reactors.
3. Matters relating to the operation plan of commercial nuclear power reactors.
4. Matters relating to the approval of the safety preservation rules concerning to the commercial nuclear power reactors.
5. Matters relating to the inspection of the compliance with safety preservation rules concerning to the commercial nuclear power reactors.
6. Matters relating to the Chief Engineer for Reactors concerning to the commercial nuclear power reactors (except the assigned affairs of the Nuclear Safety Administration Division).
7. Matters relating to the physical protection of nuclear materials.
8. Matters relating to the allegation defined in Article 66-2, Paragraph 1 of the Regulation of Commercial Nuclear Power Reactors.
9. Matters relating to the reporting that defined Article 67, Paragraph 1 of the Regulation of Commercial Nuclear Power Reactors (except the assigned affairs of the Nuclear Emergency Preparedness Division).

(Assigned Affairs of the Advanced Reactor and Fuel Regulation Division)

**Article 267.** The Advanced Reactor and Fuel Regulation Division shall manage the affairs as shown in the followings:

1. Matters relating to the licensing of establishment and transfer for the nuclear power reactors at the stage of research and development (hereinafter referred to as “advanced reactor”).
2. Matters relating to succession of the title of the advanced reactor establisher.
3. Matters relating to the licensing of design and construction procedures for the advanced reactor.
4. Matters relating to the inspection during pre-operation of the advanced reactor.
5. Matters relating to the licensing of welding procedure for the advanced reactor.
6. Matters relating to the welding inspection for the advanced reactor.

7. Matters relating to the periodical inspection of the advanced reactor.
8. Matters relating to the operation plan of the advanced reactor.
9. Matters relating to the approval of safety preservation rules for the advanced reactor.
10. Matters relating to the inspection of compliance with the safety preservation rules for the advanced reactor.
11. Matters relating to the Chief Engineer of the advanced reactor (except items assigned to the Nuclear Safety Administration Division).
12. Matters relating to the physical protection of nuclear materials for the advanced reactor.
13. Matters relating to the allegation defined in Article 66-2, Paragraph 1 of the Nuclear Regulation Law for the advanced reactor.
14. Matters relating to reporting defined in Article 67, Paragraph 1 and Paragraph 2 of Nuclear Regulation Law for the advanced reactor.
15. Matters relating to the construction plan of nuclear power reactor (except turbine and auxiliary boiler. The same in Paragraph 17 and Paragraph 18) for the advanced reactor.
16. Matters relating to licensing for design of nuclear fuel materials for the advanced reactor.
17. Matters relating to the inspections of the nuclear power installations of advanced reactors based on the Electric Utilities Industry Law and the regulation by orders based on the law (except affairs assigned to the Electric Power Safety Division).
18. In addition to the above defined items, the items related to the regulations of the advanced reactors (except the items related to the affairs defined in the next article, Paragraph 5 and Paragraph 6, Article 269, Paragraph 2 and Paragraph 3, and Article 271, Paragraph 9) and others for ensuring safety (except matters relating to international cooperation) of these facilities (except the assigned affairs of the Nuclear Safety Administration Division and Nuclear Emergency Preparedness Division).

----- omission for Article 268 (Nuclear Fuel Cycle Regulation Division) and  
Article 269 (Radioactive Waste Regulation Division) -----

(Assigned Affairs of the Nuclear Emergency Preparedness Division)

**Article 270.** The Nuclear Emergency Preparedness Division shall manage the affairs as shown in the followings:

1. Matters relating to projecting and planning, and promoting of the policy concerning to the nuclear emergency.
2. Matters relating to the investigation and prevention of the nuclear accidents and incidents.
3. Matters relating to overall coordination of the assigned affairs concerning to ensuring nuclear safety in response to nuclear emergency (as provided in Article 2, Paragraph 2 of the Special Law of Emergency Preparedness for Nuclear Disaster, Law No. 156, 1999) and other incidents.
4. Matters relating to enforcement of the Special Law of Emergency. Preparedness for Nuclear Disaster

(Assigned Affairs of the Electric Power Safety Division)

**Article 271.** The Electric Power Safety Division shall manage the affairs as shown in the followings:

1. Matters relating to construction, maintenance and operation of the electric equipment (limited to turbines and auxiliary boilers for the nuclear power reactors).  
----- omission of item 2 to 7 -----
8. Matters relating to the investigation on the environmental preservation of the area influenced by establishment of the hydraulic generating power installation, the fossil generating power installation and the nuclear power installation.
9. Matters relating to the welding safety management inspection for the machinery and equipment of the fossil generating power installation and the nuclear power installation.
3. her important policy assigned to the Division upon official orders.

### **3.4 The Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors**

#### **(1) The Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors (Excerpt)**

**(Law No. 166, June 10, 1957)**

**Latest Revision: Law No.220, December 22, 1999**

(Objectives)

**Article 1.** This Law, in accordance with the spirits of the Atomic Energy Basic Law (Law No. 186, 1955), is enacted for the purposes of providing the necessary regulations on the refining business, the fabricating business, the storage business, the reprocessing business and the waste disposal business, as well as on the establishment and operation of reactors, and also for the purpose of providing necessary regulations on the uses of internationally regulated substances to execute the agreements or other international arrangements concerning the research, development and use of atomic energy, in order to ensure that the uses of nuclear source material, nuclear fuel material and reactors are limited to peaceful ones and carried out in a planned manner, and at the same time, to ensure the public safety by preventing the hazards due to these materials and reactors and protecting nuclear fuel material.

(Licensing for Establishment)

**Article 23.** Any person who wishes to establish a nuclear reactor shall obtain the license of the Minister as provided for in the government ordinance in accordance with the classification of nuclear reactors set out in the following items.

- (i) Nuclear reactors for the purpose of electrical generation (to the exclusion of those coming under any of the following

- three items; hereinafter referred to as "commercial power reactors"): Minister of Economy, Trade and Industry .
- (iv) Nuclear reactors for the purpose of electrical generation as specified by government ordinance as reactors in the stage of research and development: Minister of Economy, Trade and Industry .
2. Any person who wishes to obtain the license under the preceding paragraph shall present to the competent minister (minister as provided for in the government ordinance in accordance with the classification of nuclear reactors in the preceding Paragraph) an application containing the following items.
- (i) The name and the address and, in case of a juridical person, the name of its representative.
  - (ii) The purpose for which reactors are to be used.
  - (iii) The type, the thermal power and the number of reactors.
  - (iv) The name and the address of the factory or the place of business where reactors are to be established.
  - (v) The location, structure and equipment of reactors and their attached facilities (hereinafter referred to as "reactor facilities").
  - (vi) The construction plan of reactor facilities.
  - (vii) The type of nuclear fuel material to be used in reactors and the annual amount scheduled for use
  - (viii) The method of disposal of spent fuel.
3. When the Minister of Education, Culture, Sport < Science and Technology , the Minister of Economy, Trade and Industry and the Minister of Land and Transportation plan to enact, amend or repeal the Government ordinance relating to item 4 of paragraph 1, they must hear and pay due respect, in advance, to the opinions of the Atomic Energy Commission and the Nuclear Safety Commission.

(Criteria for the License)

**Article 24.** When an application for the license under Paragraph 1 of the Article 23 is rendered, the competent minister shall not give the license unless he recognizes that the application comes under each of the following items.

- (i) That reactors will not be used for non-peaceful purposes.
  - (ii) That the license will cause no hindrance to the planned development and utilization of atomic energy.
  - (iii) That the applicant has technical ability and financial position sound enough to establish reactors, and has such technical ability as to operate them competently.
  - (iv) That the location, structure and equipment of reactor facilities are such that they will cause no hindrance to the prevention of the hazard by nuclear fuel material (including spent fuel, and so in the following), by materials contaminated by nuclear fuel material (including fission products, and so in the following) and by reactors.
2. In giving license under Paragraph 1 of the preceding Article, the competent minister shall hear and respect, in advance, the opinion of the Atomic Energy Commission with respect to the application of standards specified in items (i),(ii) and (iii) (regarding the portion related to the financial position only) of the preceding paragraph, and the opinion of the Nuclear Safety Commission with respect to the application of standards specified in item 3 (regarding the portion related to the technical ability only) and item 4 of the said paragraph.

(Ineligibility for the License)

**Article 25.** No person who comes under one of the following items shall be given the license under Article 23 , Paragraph 1.

- (i) A person whose license under Article 23, Paragraph 1 has been cancelled as provided in the rule of Article 33, Paragraph 2 and whom two years have not yet elapsed from the day of the cancellation.
- (ii) A person who has been condemned to the penalty heavier than the fine for violation of the rules of this Law or the Orders based on this Law, and for whom two years have not yet elapsed after having executed or suspended to execute the penalty.
- (iii) A legally incompetent person.
- (iv) A juridical person any of whose executive officers comes under one of the preceding items.

(License and Report of the Change, Etc.)

**Article 26.** When a reactor establisher wishes to change any matter provided for in Paragraph 2 items (ii),(iii),(iv),(v) or (viii) of Article 23, he shall obtain the permission of the competent minister, as provided by the government ordinance provided that this is not applicable to the case provided for in item (iv) of the said paragraph, where only the name of a factory or a place of business is to be changed.

2. When a reactor establisher has changed any matter provided for in Article 23, Paragraph 2, item (i),(vi) or (vii), except case provided for in Article 32 ,Paragraph 1, he shall report the change to the competent minister within thirty days of the day of the change. This shall also apply to the matters provided for in item (iv) of the said paragraph, where only the name of a factory or a place of business has been changed.

4. The provisions of Article 24 shall apply mutatis mutandis to the permission under Paragraph 1.

(Approval of Design and Construction Methods)

**Article 27.** Any reactor establisher shall, as provided by the order of competent ministry , (the order issued by competent minister: same as in this chapter) obtain the permission of the competent minister, with respect to the design and method of construction of the reactor facilities (except for welding in the reactor facilities defined in Paragraph 1 of Article 28-2 in which welding is performed - same in the following paragraph and Paragraph 3) before starting of the construction. This shall also apply to the alteration of the reactor facilities.

2. When any reactor establisher wishes to change the design and method of construction of the reactor facilities for which the approval provided on the preceding paragraph has been obtained, they shall obtain the approval of the competent minister, as provided by the order of the competent ministry; this shall not apply to any of the minor changes provided by

the order of the competent ministry.

3. The competent minister shall give the approval provided for in the preceding two paragraphs, if he recognizes that the design and method of construction relevant to the application for approval provided for in the preceding two paragraphs satisfy each of the following items.

- (i) The design and method of construction have been given approval based on Paragraph 1 of Article 23 or Paragraph 1 of Article 26 or have been reported according to the provisions of Paragraph 2 of the said Article.
- (ii) The design and method of construction are in conformity with the technical standards defined by the order of the competent ministry.

(Inspection Prior to Usage)

**Article 28.** Any reactor establisher shall not use reactor facilities until they have been put successfully through the inspection of the competent minister as to the construction work (except for welding in the reactor facilities defined in Paragraph 1 of Article 28-2 in which welding is performed - same in the following paragraph) and performance of the reactor facilities, as provided by the order of the competent ministry. The same apply to the reactor facilities when they are altered.

2. The performance inspection is considered as passed when the reactor facilities conform to each of the following items.

- (i) That the construction work has been done in accordance with the design and methods of construction provided for in the preceding Article.
- (ii) That their performance is, in accordance with the technical standards provided by the order of the competent ministry.

(Method of Welding and Inspection)

**Article 28-2.** A reactor vessel and other reactor facility in which welding is performed shall be inspected by the competent minister as provided for by the order of the competent ministry, and the reactor establisher may not use the reactor facility until it passes the inspection. However, this shall not be applied to the cases specified in Paragraph 4 and the cases specified by the order of the competent ministry.

2. A person who wishes to receive the inspection mentioned in the above paragraph, he must obtain the approval of the competent minister concerning the method of welding according to the order of the competent ministry.

3. The inspection mentioned in paragraph 1 shall be considered as passed if the welding satisfies each of the following items.

- (i) That the welding has been carried out according to the method approved as provided for in the previous paragraph.
- (ii) That the welding is in conformity with the technical standards defined by the order of the competent ministry.

4. The reactor facility involving welding defined in Paragraph 1 that has been imported shall be inspected by the competent minister concerning welding as provided for by the order of the competent ministry, and the reactor establisher may not use the reactor facility until it passes the inspection.

5. The inspection mentioned in the preceding paragraph shall be considered as passed if the welding is in conformity with the technical standards mentioned in item 2 of Paragraph 3.

(Periodical Inspection of Installation)

**Article 29.** Any reactor establisher shall, according to the order of the competent ministry, submit those reactor facilities designated by government ordinance to the annual inspection of the competent minister that is made regularly once a year.

2. The Periodical inspection provided for in the preceding paragraph shall be made as to whether or not the performance of the reactor facilities is up to the technical standards provided by the order of the competent ministry.

(Operation Plan)

**Article 30.** As provided by the order of the competent ministry ( ministry of education, culture, sport, science and technology for the nuclear reactor as defined by item 3 of paragraph 1 of Article 23 with the purpose of electrical generation and ministry of international trade and industry ), any reactor establisher is required to draw up a plan for the operation of the nuclear reactor which he establishes, and submit it to the competent minister ( . minister of education, culture, sport, science and technology for the nuclear reactor as defined by item 3 of paragraph 1 of Article 23 with the purpose of electrical generation and minister of international trade and industry ). The same applies to the case when the plan is modified.

(Merger)

**Article 31.** In case of a merger of juridical persons who are reactor establishers (except in case of a merging a juridical person who is a reactor establisher with a juridical person who is not a reactor establisher, with where the juridical person who is a reactor establisher continues to exist), when the approval of the competent minister has been obtained for the merger, the juridical person who is to continue to exist after the merger, or the juridical person who has been establisher by the merger shall succeed to the status of the reactor establisher.

(Inheritance)

**Article 32.** In case of an inheritance with regard to a reactor establisher, the inheritor shall succeed to the status of the reactor establisher.

2. The inheritor who has succeed to the status of the reactor establisher as provided for in the preceding paragraph, shall report the inheritance to the competent minister with the documents to prove the inheritance within thirty days of the day of the inheritance.

(Cancellation of the License, Etc.)

**Article 33**

2. When a reactor establisher comes under one of the following items, the competent minister may cancel the license under

Article 23 ,Paragraph 1 or order the suspension of operation for a period not exceeding one year.

- (i) When a reactor establisher comes under one of the items (ii),(iii), and (iv) of Article 25.
- (ii) When he has changed the items for which he should have obtained the license as provided for in the provisions of Article 26 Paragraph 1 without the license.
- (iii) When he violated the order based on the rules of Article 36.
- (iv) When he has violated the rules of Article 37 ,Paragraph 1 or 4, or the order based on the provisions of Paragraph 3 of the said Article.
- (v) When he has violated the order based on the rules of Article 43.
- (xvi) When he has violated the provisions of Article 6 of the Law on Compensation for Nuclear Damage.

**Article 34.** Any reactor establisher shall, as provided by the order of the competent ministry, record items provided by the order of the competent ministry concerning the operation of the reactor and other uses of the reactor facilities, and keep this record at the factory or the place of business.

(Measures for Safety Preservation and the Protection of Specified Nuclear Fuel Material)

**Article 35.** Any reactor establisher shall, as provided by the order of the competent ministry take necessary safety preservation measures concerning the following items.

- (i) Maintenance of reactor facilities.
- (ii) Operation of reactors.
- (iii) Transportation, storage or disposition of nuclear fuel material or material contaminated by nuclear fuel material.  
(Transportation and disposition shall be restricted to transportation and disposition to be carried out in the factory or the place of business where reactor facilities are installed. The same applies to Paragraph 1 of the following Article).

2. Any reactor establisher, when disposing of nuclear fuel material or material contaminated by nuclear fuel material outside the factory or the place of business where reactor facilities are installed, shall take the necessary measures for safety preservation, as provided by the order of the competent ministry.

(Suspension of the Use of Facilities, Etc.)

**Article 36.** When the competent minister recognizes that the performance of reactor facilities is not in conformity with the technical basis provided for in Paragraph 2 of Article 29, or the measures for the maintenance of reactor facilities, or the operation of reactors, or the transportation, storage or disposal of nuclear fuel material or material contaminated by nuclear fuel material, are in violation of the provisions of the order of the competent ministry or ministry of land and transportation based on the rules of Paragraph 1 of the preceding Article, he may order any reactor establisher to suspend use, to remodel, to repair or to change the location of reactor facilities, or to take necessary safety preservation measures such as the designation of the method of operation of reactors.

2. When the competent minister recognizes that measures for the physical protection are in violation of the order of the competent minister based on Paragraph 2 of the preceding Article, he may order the reactor establisher to take remedial measures.

(Safety Preservation Rules)

**Article 37.** Any reactor establisher shall, as provided by the order of the competent ministry, lay down the safety preservation rules (including the rules on the safety education on operation of the reactor, the same as in this article)and obtain the approval of the competent minister before starting the operation of reactors. This shall also apply to the alteration of it.

2. The competent minister shall not give the approval under the preceding paragraph, when he deems that the safety regulations is not sound enough to prevent accidents by nuclear fuel material, material contaminated by nuclear fuel material or reactors.

3. When the competent minister deems it necessary to prevent accidents by nuclear fuel material, material contaminated by nuclear fuel material, or reactors, he may order any reactor establisher to alter their safety preservation rules.

4. Any reactor establisher and employees of them shall observe the safety preservation rules.

5. Any reactor establisher shall, according to the order of the competent ministry, be inspected regularly by the competent minister of the compliance to the requirement of the preceding paragraph

6. The requirement of the paragraph 6 to 8 of Article 12 shall apply to the inspection referred in the preceding paragraph.

(Decommissioning of Reactors)

**Article 38.** When any reactor establisher (including person who is provided for in Article 66 Paragraph 1 and so in the next paragraph) wishes to dismantle reactors, they shall, as provided by the order of the competent ministry, report to the competent minister in advance.

2. When the report as provided for in the preceding paragraph is made, the competent minister may, if he deems it necessary, designate the method of dismantling reactors or order any reactor establisher to eliminate the contamination by nuclear fuel material or to take other necessary measure to prevent accidents by nuclear fuel material, material contaminated by nuclear fuel material or reactors.

(Transfer of Reactors)

**Article 39.** Any person who wishes to receive reactors or whole facilities including reactors from any reactor establisher shall obtain the permission of the competent minister, as provided by government ordinance.

3. The rules of Article 24 and Article 25 shall apply mutatis mutandis to the permissions under the two preceding paragraphs.

4. A person who, with the permission under Paragraph 1, has received reactors or whole facilities including reactors forms

a reactor establisher shall succeed to the status of the reactor establisher with respect to the reactors.

(Chief Engineer of Reactors)

**Article 40.** Any reactor establisher shall, as provided by the order of the competent ministry, appoint the chief engineer of reactors among the persons who have a certificate of the chief engineer of reactors as provided for in Paragraph 1 of the following Article, to make him supervise safety preservation concerning the operation of reactors.

2. Any reactor establisher have assignment the chief engineer of reactors as provided for in the provisions of the preceding paragraph, they shall report the notification to the competent minister within thirty days of the day of the notification. This shall also apply to the dismissal of him.

(Certificate for the Chief Engineer of Reactors)

**Article 41.** The minister of MEXT and the minister of METI shall grant a certificate of the chief engineer of reactors to a person who comes under one of the following item.

(i) A person who has passed the qualification test of the chief engineer of reactors executed by the minister of MEXT and the minister of METI.

(ii) A person whom minister of MEXT and the minister of METI recognizes. as provided by the government ordinance, to have knowledge and experience equal to or more than those person provided for in the preceding paragraph.

2. The minister of MEXT and the minister of METI may not to grant a certificate for the chief engineer of reactors to a person who comes under one of the following items.

(i) A person who has been ordered to return his certificate of the chief engineer of reactors provided for in the provisions of the following paragraph, and for whom one year has not yet elapsed from the day ordered to return.

(ii) A person who has been condemned to the penalty heavier than the fine for violation of the rules of this Law or the order based on this Law, or has been executed the penalty or suspended the execution of it, and for whom two years have not yet elapsed after having executed or suspended to execute the penalty.

3. When a person who has been granted a certificate of the chief engineer of reactors has violated the rule of this Law or the order on this Law, minister of MEXT and the minister of METI may order him to return his certificate.

4. The subjects, the procedures or other details of the qualification test for the chief engineer of reactors provided for in Paragraph 1, item (i), and the procedure for granting and returning certificate of the chief engineer of reactors shall be provided by the order of MEXT and METI.

(Duties of the Chief Engineer of Reactors, Etc.)

**Article 42.** The chief engineer of reactors shall be faithful in the discharge of his duties.

2. Any person who is engaged in the operation of reactor shall obey the instructions for the safety preservation given by the chief engineer of reactors.

(Order to Dismiss the Chief Engineer of Reactors)

**Article 43.** When the chief engineer of reactors has violated the rules of this Law or the order based on this Law, the competent minister may order any reactor establisher to dismiss him.

(Designated Inspection Organization)

**Article 61-24.** According to the division of inspection listed in the following items, the minister as referred in the cognizant paragraph (hereinafter referred to as the competent minister in this Chapter) may, as provided by the order of the competent ministry (the order issued by competent minister: same as in this chapter), designate persons (hereinafter referred to as "designated inspection organization") to carry out all or part of the inspection listed in relevant items.

(ii) The inspection in Paragraph 1 or Paragraph 4 of Article 28-2 (limited to the commercial nuclear reactor and the nuclear reactor established by item 4, paragraph 1 of Article 23 and its related facilities): the minister of METI.

(Criteria for Designation)

**Article 61-26.** When an application for the designation under Article 61-24 is rendered, the competent minister shall not give the designation unless he recognizes that the application comes under each of the following items.

(i) Inspection is carried out by persons who have knowledge and experience satisfying the conditions defined by the order of the competent ministry and the number of person is not less than the number of the person specified by the order of the competent ministry.

(ii) The applicant has the technical ability and accounting basis sufficient to carry out the work of inspection accurately.

(iii) The applicant is a juridical person established under the provisions of Article 34 of the Civil Code and the constitution of its executive officer or staff is not liable to impede fair execution of inspection.

(iv) If the applicant is engaged in business other than inspection, the execution of the business is not liable to cause unfairness in inspection.

(v) The designation will not obstruct accurate and smooth execution of inspection related to the application.

(Ineligibility for the Designation)

**Article 61-27.** No person who comes under one of the following items shall be given the designation under Article 61-24.

(i) A person whose designation under Article 61-24 has been cancelled as provided for in the provisions of Article 61-37 and whom two years have not elapsed from the day of cancellation.

(ii) A person who has been condemned to the fine or heavier penalty for violation of the provisions of this Law or the orders based on this Law, and for whom two years have not yet elapsed after the execution of or after the relief from the execution of the penalty.

(iii) A juridical person any of whose executive officers comes under one of the following:

(a) A person who comes under the preceding item.

(b) A person who has been dismissed under the rules of Article 61-33 and for whom 2 years have not yet elapsed from the day of the dismissal.

(Business Rules)

**Article 61-30.** Designated inspection organization shall make rules for inspection work (hereinafter referred to as "business rules" in this Chapter) and obtain the approval of the competent minister. The same shall also apply when they plan to change them.

2. Particulars to be specified in business rules shall be prescribed by the order of the competent ministry.

3. When the competent minister considers that business rules approved in accordance with Paragraph 1 have turned out to be impertinent for the appropriate execution of inspection work, he may order their modification.

(Order to Dismiss Inspector)

**Article 61-33.** When a inspector has violated the provisions of this Law, the provisions of the order based on this Law or the business rules, or otherwise he is considered inappropriate for his duties, the competent minister may order the designated inspection organization that the executive officer or inspector should be dismissed.

(Orders for Conformity)

**Article 61-35.** When the competent minister considers a designated inspection organization to have ceased to conform to items from (i) to (iv) of Article 61-26, he may order the designated inspection organization to take measures necessary to conform to those rules.

(Revocation of Designation)

**Article 61-37.** When a designated inspection organization falls under one of the following items, the competent minister may revoke such designation as mentioned in Article 61-24 or order, for a period not longer than one year, the suspension of all or part of its inspection work.

(i) When it has violated the provisions of this Chapter (limited to the provisions related to designated inspection organization).

(ii) When it has come to fall under item (ii) or (iii) of Article 61-27.

(iii) When it has done inspection work without following the business rules sanctioned in accordance with Paragraph 1 of Article 61-30.

(iv) When it has violated orders based on the rules of Paragraph 3 of Article 61-30, Article 61-33, or Article 61-35.

(v) When it has obtained the designation under Article 61-24 by unlawful means.

(vi) When it has violated the conditions stated in Paragraph 1 of Article 62.

(Accounting Books)

**Article 61-38.** Any designated inspection organization must keep accounting books and record the items specified by the order of the competent ministry concerning the inspection work.

2. The accounting books mentioned in the preceding paragraph must be stored according to the provisions of the order of the competent ministry.

(Conditions of the Authorization or the License)

**Article 62.** Except as established in the following paragraphs, the conditions may be attached to the authorization or the license provided by this Law.

2. In the licensing of paragraph 1 of Article 23, necessary condition to observe international commitment in relation to the limitation of utilization and transfer of international restricted material may be attached.

3. The conditions of the preceding two paragraph shall be confined to the minimum necessary to ensure the enforcement of the items concerning the authorization or the license, and shall not be such that they may obligate unreasonably the persons who wishes to obtain the authorization or license.

(Emergency Measures)

**Article 64.** With respect to the nuclear fuel material the material contaminated with nuclear fuel material or the reactor which is possessed by a reactor establisher, a business operator, etc., (hereinafter referred to as "business operators" in this Article), and any person who has been entrusted with transportation or storage by those persons, when there is a possibility of accident by nuclear fuel material, material contaminated with nuclear fuel material or a reactor through earthquake, fire or any other disaster, or when such accident has actually occurred, they shall take the emergency measures at once, as provided by the order of the competent ministry.

2. Any person who has discovered the situation provided for in the preceding paragraph shall inform it to a police officer or a maritime security officer.

3. When the minister of MEXT, minister of METI or minister of MLT considers it urgently necessary for the purpose of preventing hazards due to nuclear fuel material, the material contaminated with nuclear fuel material or reactors, in the case stated in Paragraph 1, he may order such persons as mentioned in the said paragraph, in accordance with the division of business operators mentioned in the following items, to suspend the use of reactor facilities; to change the place where nuclear fuel material or the material contaminated with nuclear fuel material is located; or to take other measures necessary to prevent hazards from nuclear fuel material, the material contaminated with nuclear fuel material or reactors.

(iii) Reactor establishers and the person who is entrusted to transportation: the minister established in the item corresponding to the division of the reactor according to the item no. of paragraph 1 of Article 23.

(Cancellation of the Authorization or the License, Measures Taken in Consequent of the Discontinuance of Business, Etc.)

**Article 66.** A reactor establisher whose authorization has been cancelled, in accordance with the provisions of Article 33 shall, as provided by the order of the competent ministry, take measures to transfer nuclear fuel material to eliminate contamination with nuclear fuel material or to dispose of nuclear fuel material or the material contaminated with nuclear

fuel material, or to transfer internationally regulated substances (except nuclear fuel material).

4. When the competent minister recognizes that the measures taken by the persons defined in Paragraph 1 of Article 4 shall not be appropriate, he may order the persons defined in said paragraph to take the following measures.

(i) Measures necessary for the prevention of hazards due to nuclear fuel material, the material contaminated with nuclear fuel material or reactors.

(Allegation to Competent Minister)

**Article 66-2** The employee of any reactor establisher may allege the fact of violation when any reactor establisher violates the law or the order based on the law.

2. The reactor establisher shall not dismiss or act against him for his allegation.

(Collection of Reports)

**Article 67.** The minister of MEXT, minister of METI, minister of MLT or prefectural public safety commissions may request reactor establishers, as far as necessary for the enforcement of this Law, to produce reports on their operations, as provided by the government ordinance, in accordance with the division of business operators listed in the items of Paragraph 3 of Article 64.

2. The minister of MEXT, minister of METI, minister of MLT may request designated inspection organization, as far as necessary for the enforcement of this Law, to produce reports on their operations, as provided by the government ordinance, in accordance with the division of business operators listed in the following items.

(i) Designated inspection organization, ;Competent Minister established in Paragraph 4 of Article 61-24.

(Nuclear Installation Inspector and Nuclear Safety Inspector)

**Article 67-3** Nuclear Installation Inspector and Nuclear Safety Inspector are placed in MEXT and METI.

2. Nuclear Installation Inspector of METI shall engage in the affairs concerning the inspection of Article 28 to 29.

3. Nuclear Safety Inspector of METI shall engage in the affairs concerning Paragraph 5 of Article 37( as to the inspection of paragraph 5 of Article 37, it is confined to that of the reactor established in item 1 and 4 of Paragraph 1 of Article 23 ).

4. The necessary items concerning the number and qualification of Nuclear Installation Inspector and Nuclear Safety Inspector are shall be defined by Ordinance.

(Entry and Inspection, Etc.)

**Article 68.** The minister of MEXT, minister of METI, minister of MLT or prefectural public safety commissions may cause their officials, as far as necessary for the enforcement of this Law (for the enforcement of this Law according to the division of business operators listed in the items of Paragraph 3 of Article 64, to enter the offices, factories or places of business so as to examine their books, documents and other necessary matters, ask questions of persons concerned, and take samples of nuclear source material, nuclear fuel material and other necessary materials in the minimum of amount required for test.

2. The minister of MEXT, minister of METI or minister of MLT may cause their officials, as far as necessary for the enforcement of this law (for the enforcement of the provisions of Paragraph 1 of Article 28-2 related to commercial power reactors and their related facilities : the Minister of Economy, Trade and Industry), to enter the offices factories, or the places of business of the persons who conduct welding of the facilities specified in Paragraph 1 of Article 28-2 so as to examine their books, documents and other necessary matters and ask questions of persons concerned.

5. When officials make entrance in accordance with the provisions of the preceding three paragraphs, they shall carry their identification cards with them and show them when requested by persons concerned.

6. The authority provided for in the provisions from Paragraph 1 through Paragraph 4 shall not be construed as having been granted for the purpose of criminal investigation.

**Article 68-2.** The minister of MEXT, minister of METI or minister of MLT may, according to the division of designated inspection organization, etc. listed in the items of Paragraph 2 of Article 67, may cause their officials, as far as necessary for the enforcement of this law, to enter the offices or the places of business of designated inspection organization, etc. so as to examine their books, documents and other necessary matters and ask questions of persons concerned.

2. The provisions of Paragraph 5 and 6 of the preceding Article shall apply mutatis mutandis to such on-the-spot inspection as prescribed in the preceding paragraph.

(Exception from Application)

**Article 73.** The provisions of Article 27,28 and 29 shall not apply to the commercial power reactors which are the reactor facilities which are to be inspected by the provisions of the Electricity Utilities Industry Law (Law No.170,1964) and the order based on that Law.

(Mandate to the Director-General of the Science and Technology Agency)

**Article 74-2.** The Inspection concerning the safeguard shall be submitted to the officer of METI in accordance with the provision of Ordinance.

2. The affairs that can be managed by the officer of MEXT in accordance with the provision of Paragraphs 1, 4, 10 and 11 of Article 68, may be managed by the officer of METI in accordance with the provision of Ordinance.

3. The requirement of paragraph 5 and 6 of Article 68 shall apply mutatis mutandis to such on-the-spot inspection as prescribed in the preceding paragraph.

**Article 77.** Any person who comes under one of the following items shall be condemned to penal servitude of not more than 3 years and/or the fine of not more than one million yen;

(iv) A person who has established reactors without the permission under Article 23, Paragraph 1.

(v) A person who has violated the order of suspension of operation of reactors provided for in Article 33, Paragraph 2.

(vi) A person who has received reactors or whole facilities including reactors without obtaining the permission provided for



in Article 39, Paragraph 1.

**Article 78.** Any person who, comes under one of the following items shall be condemned to penal servitude of not more than 1 year and/or to the fine of not more than one million yen.

(iii) A person who, with regard to the matters for which the permission must be obtained as provided for in the provisions of Article 26, Paragraph 1, has changed matters provided in Article 23, Paragraph 2 Items (ii), (iii), (iv), (v) or (viii), without the permission provided for in the said paragraph.

(iv) A person who has used reactor facilities in violation of the provisions of Paragraph 1 of Article 28 or Paragraphs 1 or 4 of Article 28-2.

(v) A person who has violated the provisions of Article 40, Paragraph 1.

(x) A person who has violated the provisions of Article 64, Paragraph 1 or of the order based on the provisions of Paragraph 3 of the said Article.

**Article 78-3.** When the orders for the suspension of inspection work, as provided by Article 61-37 are violated, the executives or personnel of the designated inspection organization, etc. that has committed the violation shall be punished with penal servitude for a term not exceeding 1 year or a fine not exceeding five hundred thousand yen.

**Article 79.** Any person who comes under one the following items shall be condemned to the fine of not more than five hundred thousand yen.

(i) A person who has violated orders based on the provisions of Paragraphs from 1 or 2 of Article 36.

(ii) A person who has violated the provisions of Paragraph 1 of Article 37.

(iii) A person who has violated the orders based on the provisions of Paragraph 3 of Article 37.

(vii) A person who has dismantled reactors without making a report provided for in Article 38, Paragraph 1, or who has violated the order based on the provisions of Paragraph 2 of the said Article.

(xix) A person who has violated the conditions of Article 62, Paragraph 1.

(xx) A person who has violated the provisions of Article 66, Paragraph 1, or who has violated the order based on the provisions of Paragraph 4 of the said Article.

**Article 80.** Any person who comes under one of the following items shall be condemned to the fine of not more than three hundred thousand yen.

(i) A person who has failed to record, recorded falsely or failed to keep records, in violation of the provisions of Articles 34.

(v) A person who has failed to make a report provided for in Article 67, Paragraph 1, or who has reported falsely.

(vi) A person who has refused, obstructed, or evaded the entry inspection or collection of samples provided for in Paragraph 1 or 2 of Article 68, or who has made no statement or made a false statement in response to relevant questions.

**Article 80-4.** When any of the following violations has been committed, the executives or personnel of the designated inspection organization, etc. that has committed the violation shall be punished with a fine not exceeding two hundred thousand yen.

(i) The organization has abolished all of its inspection work, disposal confirmation work, the work of confirming the items transported in approved containers or the work of confirming the method of transportation without obtaining the permission mentioned in Article 61-36.

(ii) The organization does not have account books, does not enter records in the books or made false entry into account books in violation of the provisions of Paragraph 1 of Article 61-38.

(iii) The organization has not stored account books in violation of the provisions of Paragraph 2 of Article 61-38.

(iv) The organization has not made the report mentioned in Paragraph 2 of Article 67 or has made false report.

(v) The organization has refused, obstructed or evaded the entry and inspection mentioned in Article 68-2, or it has made no statement or has made false statement in response to relevant questions.

**Article 81.** When a representative of a juridical person, or an agent or any other employee of a juridical person or of a person has violated the provisions of Article 77, 78, 78-4, 79 or 80 with respect to the business of the juridical person or the person, the juridical person or the person shall be punished with such fine as provided for in the respective Article, in addition to the punishment of the actual offender.

**Article 82.** Any person who comes under one of the following items shall be condemned to the administrative fine of not more than one hundred thousand yen.

(v) A person who has failed to report as provided for in Article 30, or Article 46-4, or reported falsely.

(vi) A person who has failed to report as provided for in Article 40 paragraph 2.

(vii) A person who has failed, without any justified reason, or return the certificate for the chief engineer of reactors, in violation of the order based on the provisions of Article 41, Paragraph 3.

**Article 83.** A person who has failed to report as provided for in Article 26, Paragraphs 2 or Article 32, Paragraph 2, shall be condemned to the fine of not more than fifty thousand yen.

**(2) Ordinance for the Enforcement of the Law for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (Excerpt)**  
**(Government Ordinance No.324, November 21, 1957)**  
**Latest Revision: Ordinance No.531, December 22, 2000**

(Application for License for the Establishment of Reactors)

**Article 6.** Such license as mentioned in Paragraph 1, Article 23 of the Law shall be obtained for every factory or place of business (in the case of a nuclear reactor being installed in a ship, every ship) in which a nuclear reactor is to be installed.

2. Persons proposing to obtain such permission as mentioned in the preceding paragraph shall make an application together with their plan for raising the funds necessary for the construction of a reactor and other papers specified by the order of the competent ministry.

(Reactor at the Stage of Research and Development)

**Article 6-2.** Such reactors determined by government ordinance as mentioned in item (iv), Paragraph 1, Article 23 of the Law shall for the time being be listed among the reactors of a type identical with that of those which had by January 3, 1979, been given such license as mentioned in paragraph 1, Article 23 of the Law before its revision under the Law for Partial Revision of the Atomic Energy Basic Law and Others (Law No.86, 1978) or with that of those (referred to as "special reactors" in the following paragraph) which had by that time been scheduled for construction under the basic program for the development of power reactors as provided for in Paragraph 1, Article 25 of the Power Reactor and Nuclear Fuel Development Corporation Law (Law No.73, 1967) for purposes as reactors designed for electric power generation, provided that those designed for electric power generation shall come under items (i) and (ii).

(i) Fast breeder reactors (the fast breeder reactors as referred to in Paragraph 1, Article 2 of the Power Reactor and Nuclear Fuel Development Corporation Law).

(ii) Heavy water-moderated, boiling light water-cooled reactors (reactors using heavy water for moderator and boiling light water for coolant).

(Application for Permission for Alterations affecting the Establishment of Reactors)

**Article 8.** Reactor establisher, when proposing to obtain such license for alterations as provided for in Paragraph 1, Article 26 of the Law, shall, as provided by the order of the competent ministry, submit to the competent Minister an application in which the following particulars are entered.

(i) Their names or titles, domiciles and if they are juridical persons, the name of their representative,

(ii) The name and address of the factory or place of business dependent on the alteration.

(iii) Details of the alteration.

(iv) Reason for the alteration.

(v) If the alteration involves construction work, the plan for the work.

(Reactor Facilities subject to Periodical Inspection of Installation)

**Article 10.** Those determined by government ordinance of such reactor facilities as provided for in Paragraph 1, Article 29 of the Law shall be reactors, nuclear fuel material handling facilities, storage facilities, reactor cooling system facilities, instrumentation and control system facilities, disposal facilities, radiation management facilities, reactor containment facilities, emergency power supply facilities and other facilities attached to reactors determined by order of the competent ministry.

(Application for Permission of Transfer of Reactors)

**Article 12.** Persons proposing, in accordance with the provisions of Paragraph 1, Article 39 of the Law, to obtain license to receive a reactor or facilities as a whole including a reactor, shall, as provided for in the order of the competent ministry, submit to the competent minister an application in which the following particulars are entered.

(i) Their names or titles, domiciles and if they are juridical persons, the name of their representative.

(ii) The names or titles and domiciles of their opponents, and if they are juridical persons, the name of their representative.

(iii) Purpose of use.

(iv) Type, thermal power and number of reactors.

(v) The name and address of the factory or place of business where the reactor is installed.

(vi) Location, structure and equipment of reactor facilities.

(vii) The type of nuclear fuel material for use as fuel in the reactor and its annual amount scheduled for use.

(viii) Method of the disposal of spent fuel.

(Reporting)

**Article 22.**

The Minister of METI, under the provisions of Paragraph 1, Article 67 of the Law, may cause refining business operators, fabrication business operator, commercial nuclear reactor operator (Reactor establisher of the reactor specified in either item 1 or 4 of the paragraph 1 of the Article 23 of the Law, the same to the paragraph following) spent fuel storage business operator, reprocessing business operator and disposal business operator etc. to report on, in addition to the particulars mentioned in the preceding paragraph, such particulars as listed in the left column of the following Table with respect to such persons as listed correspondingly in the lower column of the Table.

Establishers of commercial power reactors, etc.	<ul style="list-style-type: none"> <li>(i) Status of inventory or the change in quantity of nuclear fuel materials.</li> <li>(ii) The quantity of nuclear fuel materials inserted as fuel and its takeout.</li> <li>(iii) The burn-up of nuclear fuel material.</li> <li>(iv) The operating time and thermal power of the reactor.</li> <li>(v) Status of radiation management.</li> <li>(vi) Status of accidents damaging to persons in the reactor facilities.</li> <li>(vii) Status of failures (with the exception of such failure may cause little trouble to the operation of reactor) in the reactor facilities.</li> <li>(ix) Status of disposal or transport of nuclear fuel material, etc. outside of the facilities or place of business in which reactor facilities are established.</li> <li>(x) Status of accidents damaging to persons in the course of disposal or transport of nuclear fuel material, etc. outside of the factories or place of business in which reactor facilities are established.</li> </ul>
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6. The Minister of MEXT, the Minister of METI or the Minister of MNLT may, under the provisions of Paragraph 2 of Article 67 of the Law, cause designed inspection organization, etc. to report on the matters concerning the operation of their business.

(The number and the qualification of nuclear installation inspector and nuclear safety inspector)

**Article 23**

The number of the nuclear installation inspectors in METI is 30.

2. The number of nuclear safety inspector in METI is 115.

3. The nuclear installation inspector of METI shall have enough knowledge and experience on structure, performance and safety of nuclear installation.

4. The nuclear safety inspector of METI shall have enough knowledge and experience on the measures to be taken by the reactor establisher in order to ensure safety, structure and the performance of nuclear installation.

**(3) The Rule for the Installation, Operation, etc. of Commercial Nuclear Power Reactors (Excerpt)**  
**(Ordinance No.77 of the MIII, December 28, 1978)**

**Latest Revision: Ordinance No.124 of the METI, March 30, 2001**

(Definitions)

**Article 1.**

The meaning of the terms used in this ministerial order are after that of the terms used in the Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors (herein after called Law)

2. In this ministerial order, the meaning of the following terms shall be as defined in the following respective items.

(iv) "Control zones" means the reactor chamber, the spent fuel storage facility, the radioactive waste disposal facility, etc. where there is a hazard that the dose equivalent may exceed the limit specified by the Minister of METI, and that the concentration of radioactive material in the air may exceed the level specified by METI or that the density of radioactive material on the surface of objects contaminated by radioactive material may exceed the level specified by the Minister of METI.

(vi) "Environmental monitoring area" means that area surrounding control zones, the outside of which there is no possibility of the dose equivalent at any location exceeding the limit of the dose equivalent specified by the Minister of METI.

(Application of License for Establishment of Nuclear Reactor)

**Article 2.** Pursuant to Paragraph 2, Article 23 of the Law, the entries in the application for the license for the installation of nuclear reactors shall be made in accordance with the following items.

(i) For the thermal power of a nuclear reactor under Item (iii), Paragraph 2, Article 23 of the Law, the continuous maximum thermal power shall be entered.

(ii) For the location, structure and equipment of a nuclear reactor facility under Item (iv), Paragraph 2, Article 23 of the Law, the entry shall be made under the following divisions.

A. Nuclear reactor facility locations

(a) Site area and shape

(b) Locations of main nuclear reactor facilities within the site

B. Nuclear reactor facility general structure

(a) The aseismatic structure

(b) Other main structures

C. Reactor core structure and equipment

(a) Reactor core

(1) Structure

(2) Maximum amount of fuel assemblies to load into the core

(3) Main nuclear limitation values

(4) Main thermal limitation values

(b) Fuel assembly

- (1) Fuel material type
- (2) Cladding type
- (3) Fuel element structure
- (4) Fuel assembly structure
- (5) Maximum burn-up
- (c) Moderator and reflector types
- (d) Reactor vessel
  - (1) Structure
  - (2) Maximum operating pressure and temperature
- (e) Radiation shield structure
- (f) Other main items
- D. Nuclear fuel material handling and storage facility structure and equipment
  - (a) Nuclear fuel material handling equipment structure
  - (b) Nuclear fuel material storage equipment structure and storage capacity
- E. Reactor cooling system facility structure and equipment
  - (a) Primary cooling equipment
    - (1) Coolant type
    - (2) Number and structure of main components and piping units
    - (3) Coolant temperature and pressure
  - (b) Secondary cooling equipment
    - (1) Coolant type
    - (2) Number and structure of main components
  - (c) Emergency cooling equipment
    - (1) Coolant type
    - (2) Number and equipment of main components and piping units
  - (d) Other main items
- F. Instrumentation and control facility structure and equipment
  - (a) Instrumentation
    - (1) Nuclear instrumentation types
    - (2) Other main instrumentation types
  - (b) Safety protection circuits
    - (1) Reactor shutdown circuit type
    - (2) Other main safety protection circuit types
  - (c) Control equipment
    - (1) Number and structure of control material units
    - (2) Number and structure of control material units drive equipments
    - (3) Reactivity control capability
  - (d) Emergency control equipment
    - (1) Number and structure of control material units
    - (2) Number and structure of main components
    - (3) Reactivity control capability
  - (e) Other main items
- G. Radioactive waste disposal facility structure and equipment
  - (a) Gaseous waste disposal facility
    - (1) Structure
    - (2) Waste disposal capacity
    - (3) Exhaust vent location
  - (b) Liquid waste disposal equipment
    - (1) Structure
    - (2) Waste disposal capacity
    - (3) Discharge port location
  - (c) Solid waste disposal equipment
    - (1) Structure
    - (2) Waste disposal capacity
- H. Radiation management facility structure and equipment
  - (a) Indoor management main equipment types
  - (b) Outdoor management main equipment types
- I. Reactor containment facility structure and equipment
  - (a) Structure
  - (b) Design pressure, temperature and leakage rate
  - (c) Other main items
- J. Structure and equipment of other facilities attached to the reactor
  - (a) Structure of emergency power supply

(b) Other main items

- (iii) For the construction plan as provided for in Item (6), Paragraph 2, Article 23 of the Law, the construction sequence and schedule shall be entered.
  - (iv) For the nuclear fuel material type and the yearly projected consumption amount of the nuclear fuel material which is to be used as the fuel of the reactor as provided for in Item (7), Paragraph 2, Article 23 of the Law, their yearly projected loading amount and burn-up shall be entered for the respective material types.
  - (v) For the spent fuel disposal method as provided for in Item (viii), Paragraph 2, Article 23 of the Law, the parties to whom it is to be sold, loaned or returned, and the method thereof, or its disposal method shall be entered.
2. The documents specified by the order of the competent ministry as provided for in Paragraph 2, Article 6 of the Ordinance for the Enforcement of the Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors (hereinafter referred to as "the Ordinance") shall be as specified under the following items.
- (i) Expository documents related to the purpose of use of the reactor.
  - (ii) Expository documents related to the thermal power of the reactor.
  - (iii) Documents describing the fund amount required for and the procuring plan for the construction.
  - (iv) Documents describing the procurement plan for the nuclear fuel material required for the operation of the reactor.
  - (v) The expository documents related to the technical capability for the installation and operation of the reactor facility.
  - (vi) Expository documents on the meteorological, ground, hydraulic, seismic, social environment and other conditions of the location where the reactor facility is to be installed.
  - (vii) A 1:200,000 map for the area covering the distance of 20 km from the location of the planned reactor or its main related facilities, and a 1:50,000 map for the area covering the distance of 5 km from the said location.
  - (viii) Expository documents related to the safety design of the reactor facility
  - (ix) Expository documents related to the management of the radiation exposure to be caused by the nuclear fuel material and by the objects contaminated by the nuclear fuel material, and on the disposal of the radioactive waste.
  - (x) Expository documents related to the types, levels, impacts, etc. of reactor accidents to be assumed to occur in the event of operational error of the reactor, of the faults of the machinery or devices, of earthquakes, of fire, etc.
  - (xi) In the case of a juridical person, the articles of association or the endowment, the abridged copies of the register and the recent inventory, balance sheet and profit and loss statement

3. The number of copies for the application as specified under Paragraph 1 shall be one original and two duplicates. (Operation Plan)

**Article 4.** The operation plan of the reactor as specified in Article 30 of the Law shall be prepared for each reactor, using Form 1, and the operation plan for the 3 years starting from April 1 of the relevant year shall be submitted by January 31 of the year preceding the relevant year, every year after the year (each year from April 1 to March 31 of the following year, the same applying hereinafter) in which the scheduled day of operation commencement belongs.

2. The operation plan for the case where a reactor installation license, or a license for alteration under Paragraph 1, Article 26 of the Law is received between Feb.1 and March 31, and the operation is to be started within this time shall be submitted forthwith after the receipt of said license, notwithstanding the provision of the preceding paragraph.

3. When the operation plan under the preceding two paragraphs is changed, the changed operation plan shall be prepared using Form 1, and shall be submitted for each reactor, within 30 days from the day of the change.

4. The number of copies of the operation plan of the preceding paragraphs 3 shall be one original. (Record)

**Article 7.** The record as specified under Article 34 of the Law must be recorded for each reactor, regarding the subjects listed in the left column of the following table, in the manners specified in the middle column of the table, and shall be retained for the period specified in the right column of the table.

Contents to be recorded	Occasion of recording	Retention
Reactor facility inspection record Result of periodical self inspection under Article 11	Each inspection	Until next inspection for the same subject
(ii) Operation record		
A. Thermal power, and the neutron flux density and temperature in the core	Continuous	10 years
B. Temperature, pressure and flow rate of coolant at reactor core inlet and outlet	Every 1 hour during operation	10 years
C. Position of control element	Every 1 hour during operation	1 year
D. Temperature within recombiner	Every 1 hour during operation	1 year
E. Purity and daily makeup volume of coolant and moderator (liquid only) used in reactor	Once a day	1 year
F. Fuel assembly arrangement within reactor	Each arrangement or re-arrangement	10 years after removal
G. Reactor facility checking before and after start-up and shutdown	Each startup and shutdown	1 year
H. Day and hour of operation start, criticality attainment, operation change, emergency shutdown and operation shutdown	Each of these events	1 year

Names of operation supervisor and operator, their shift day and hour, and transferred message	Each operation start and shift	1 year
(iii) Record of fuel assembly		
A. Amount of received and shipped fuel assembly (except for spent fuel), by type	Each receiving and shipping	10 years
B. Amount of fuel assemblies loaded to the reactor, by type	Each loading	10 years after removal
C. Amount of spent fuel assemblies discharged, by type	Each removal	10 years
D. Burnup of discharged spent fuel	Each discharge or once every month	10 years
E. Arrangement of fuel assemblies in spent fuel storage facility	Each arranging or rearranging	5 years
F. Amount of spent fuel shipped, by type, the period from discharge to shipping and their radio-activity.	Each shipping	10 years
G. Inspection result of fuel assembly shape or property	Before loading and after discharge	10 years after discharge
(iv) Radiation management record		
A. Dose equivalent rate at the radiation shield side wall of reactor core, spent fuel storage facility, radioactive waste disposal facility, etc.	Once a day during operation	10 years
B. Mean concentration of radioactive substance for one day and 3 months, at radioactive waste vent port or exhaust monitor equipment and drain port or drain monitoring equipment	Once a day for daily mean concentration, and once in 3 months for 3-month mean concentration	10 years
C. One-week dose equivalent of the external radiation in the control zone, mean 1-week concentration of radioactive substance in the air, and radioactive substance concentration on the surface of radioactive contaminated matter	Once a week	10 years
D. One-year dose of personnel engaged in radiation work starting from April 1. For female personnel engaged in radiation work (except those who diagnosed as sterility and those who notified will for no pregnancy to the reactor establisher with document the same applying hereinafter) for 3 months starting from April 1, July 1, October 1 and January 1. And one month dose of female personnel engaged in radiation work whose pregnancy is known by the reactor establisher through the notification of the pregnant female herself starting from the first day of the every month until the delivery.	Once a year for 1-year dose, once in 3 months for 3-month dose and 1 month for 1 month dose.	The period specified under Paragraph 5
E. Dose for the five years ( including the year of the over exposure exceeding 20 mSv starting April 1) specified by the Minister of METI of the personnel engaged in radiation work.	Once a year for 5-years that the Minister of METI specified(during the period after the year listed in the left column).	The period specified under Paragraph 5
F. Radiation exposure history of personnel engaged in radiation work prior to the day of starting the radiation management work, during the year in which said day belongs	At the time of the worker's starting said work	The period specified under Paragraph 5
G. Quantity, by type, of nuclear fuel material or objects contaminated by nuclear fuel material which is transported outside the plant or business place, the type of container used for their transport, and the day, time and route of the transport	Each transporting occasion	1 year

H. Type of radioactive waste delivered to waste facility or dumped into the sea, the quantity of radioactive substances contained in said radioactive waste. In case of radioactive waste contained in container, or solidified integrally with the container, quantity of said containers, specific gravity, damping day, time location and method.	Each occasion of disposal or dumping	Until the reactor dismantling
I. In case radioactive waste is sealed in or solidified together with containers, the method for them	Each sealing or solidifying	Reactor dismantling
J. In case of taking measures for prevention of spreading and decontamination for radioactive substance, their conditions and the name of the person responsible for them	Each spreading prevention and decontamination	1 year
(v) Maintenance record		
A. Patrolling and checking conditions of reactor facility, and the name of person in charge	Once a day	1 year
B. Repairing condition of reactor facility, and the name of person in charge	Each repairing	1 year
(vi) Accident record of reactor facility, etc.		
A. Day and hour of accident occurrence and restoration	Each event	Until the dismantling of reactor
B. Conditions of and measures taken for accident	Each event	Until the dismantling of reactor
C. Causes of accident	Each event	Until the dismantling of reactor
D. Measure taken after accident	Each event	Until the reactor dismantling
(vii) Meteorological records		
A. Wind direction and velocity	Continuous	10 years
B. Precipitation	Continuous	10 years
C. Atmospheric temperature	Continuous	10 years
(viii) Record of Safety Education		
A. Implementation Plan of Safety Education	Every time planned	3years
B. Date and Item of Education implemented	Every time implemented	3years
C. The name of educated	Every time implemented	3years

2. When direct measuring is difficult for the items to be recorded in accordance with the specifications in the preceding paragraph, those records which allow the measuring results to be estimated may be used instead of the record of these items.

3. The dose equivalent rate under A, Item (iv), in the table of Paragraph 1 and the dose equivalent under C and dose D and E of the same item shall be respectively recorded in accordance with the conditions specified by the Minister of Economy, Trade and Industry

4. In recording the dose for Item (iv), in the table of Paragraph 1, the condition of exposure and the method of measurement shall also be recorded, when, as a part of the radiation exposure records, the value exclusively related to the exposure caused by the respiration of the air contaminated by radioactive substances is recorded.

5. The retention period for the records under D to E, Item (iv) in the table of Paragraph 1 shall be the record retention period exceeded 5 years and the reactor establisher has submit the record to the organization specified by the Minister of Economy, Trade and Industry, or in case the person related to the retention of the record lost the status of a personnel engaged in radiation work.

6. The reactor establisher shall issue the copy of the record to the personnel engaged in radiation management work under D, Item (iv) in the table of Paragraph 1, when said worker leaves his duty assignment.  
(Prevention from Entering into Control Zones, Etc.)

**Article 8** Pursuant to the provision of Paragraph 1, Article 35 of the Law, the reactor establisher shall set up control zones, the maintenance and repair areas and the environmental monitoring areas, and shall execute the measures specified under the following respective items.

(i) The following measures shall be taken for the control zones.

A. In addition to demarcating the area with walls, fences and other demarcation structures, the establisher shall distinguish the area clearly from other areas with the provision of signs, and shall take such measures as personal entry restriction and lock control, etc. in proportion to the level of hazard by radiation.

B. The installer shall prohibit eating, drinking and smoking where there is a danger of the oral ingestion of radioactive substances.

C. The establisher shall take measures to ensure that the radioactive substance concentration on the surface of the floor, wall and other objects which are liable to come in contact with persons and which are contaminated by radioactive

substances does not exceed the surface concentration limit specified by the Minister of Economy, Trade and Industry

- D. For a person leaving or carrying objects out of the control zones, the installer shall take measures to assure that the concentration of radioactive substances on the surfaces of body of that person, of the cloths, footwear and other articles worn on the body, and of the articles to be carried (when the articles are contained in containers or packaged, the containers or the package) does not exceed one tenth of the surface concentration limit specified under C.
- (ii) For the maintenance and repair area, the establisher shall clearly distinguish the area from other areas through such methods as the installation of signs, and shall take such measures as the restriction of personal entry, the control of the locks and the restriction on the out-transport of articles, according to the control requirements.
- (iii) For the environmental monitoring area, the installer shall take the following measures.
- A. The prohibition of the habitation of persons.
- B. The restriction of the entry of persons other than those who have duty assignments in the area, through such means as the installation of fences of signs, etc. However, this provision does not apply when it is obvious that there is no possibility of personal entry into the said area.

(Measures Related to Dose, Etc.)

**Article 9.** Pursuant to the provision of Paragraph 1, Article 35 of the Law, the reactor installer shall, with respect to the dose, etc., for the personnel engaged in radiation management work, take the measures listed under the following items.

- (i) Measures for preventing the for the personnel engaged in radiation management work from exceeding the dose limit specified by METI .
- (ii) Measures for preventing the concentration of radioactive substance in the air breathed by the personnel engaged in radiation work from exceeding the concentration limit specified by METI.

**2.** Notwithstanding the provision of the preceding paragraph, in the case of emergency without alternative recourse, such as the occurrence or potential occurrence of hazard in the reactor facility, and the occurrence of damage in the reactor facility which may seriously obstruct the operation of the reactor, the personnel engaged in radiation management work (for female workers only to those who diagnosed as sterility and those who notified will for no pregnancy to the reactor establisher with document ) may be made to perform emergency operations of which the dose equivalent does not exceed the dose equivalent limit specified by METI.

(The Patrol and Checking of Reactor Facility)

**Article 10.** Pursuant to the provision of Paragraph 1, Article 35 of the Law, the reactor establisher shall make personnel engaged in radiation management work who are normally attendant in the control zone works patrol on the reactor facility, at least once a day, and perform checking on the facilities and equipment items listed in the following items.

- (i) The reactor cooling system facilities.
- (ii) The control element drive equipment.
- (iii) The power supply, water supply and drain, and ventilation facilities.

(The Periodical Self Inspection of Reactor Facility)

**Article 11.** Pursuant to the provision of Paragraph 1, Article 35 of the Law, the reactor establisher shall take the following measures related to the inspections listed under the following items.

- (i) On the instrumentation control system facility, the performance inspections for emergency shutdown, to be conducted for all the conditions which require emergency shutdown, once every month, and an emergency shutdown inspection, to be conducted once in the inspections period in Paragraph 1, Article 54 of the Electricity Utilities Industry Law (Law 170, 1964).
- (ii) On the instruments that are directly related to the safety preservation of the reactor facility and the radiation measuring instruments, calibration shall be performed once in the inspections period provided for in Paragraph 1, Article 54 of the Electricity Utilities Industry Law (Law 170, 1964).

(The Operation of the Reactor)

**Article 12.** Pursuant to the provision of Paragraph 1, Article 35 of the Law, the reactor establisher shall take the measures related to the operation of the reactor as listed under the following items.

- (i) Entrusting the operation of the reactor to persons who have necessary knowledge in the operation of reactors.
- (ii) Not allowing the operation of the reactor to start, unless all the constituent persons required for the operation of the reactor are present.
- (iii) Ensuring that the person responsible for operation among the constituent persons as mentioned under the preceding item is a receiver of a license from a party designated by the notice of METI .
- (iv) Specifying the matters to be confirmed before starting operation, the matters required for the procedure of operation and the matters to be confirmed after the interruption of operation, and making the operators observe them.
- (v) When an emergency shutdown occurs, investigating the cause of the shutdown and the possible presence of damage, and restarting operation shall be made after verifying the absence of conditions preventing the restarting of operation.
- (vi) Specifying the measures to be taken in an emergency, and making the operators observe them.
- (vii) When conducting a trial operation, allowing it to be conducted upon confirming its purpose and method, and the measures to be taken in an emergency.
- (viii) When operating the reactor for the purpose of training trainees, specifying the matters to be observed by the trainees, and making the matters observed under the supervision of the operator.

(The Transporting within the Plant or Place of Business)

**Article 13.** Pursuant to the provision of Paragraph 1, Article 35 of the Law, the reactor establisher shall, in transporting nuclear fuel material or objects contaminated by nuclear fuel material (hereinafter in this article to be called "nuclear fuel



material, etc.") within the plant or place of business in which the reactor facility is installed, take the measures listed under the following items.

- (i) The transporting of nuclear fuel material shall be conducted in such a manner that in no case, the nuclear fuel material may reach the criticality.
- (ii) When transporting nuclear fuel material, etc., they shall be sealed in a container. However, this requirement does not apply in either of the following cases:
  - A. When transporting those objects contaminated by nuclear fuel material (only those with which the radiation concentration does not exceed the limit specified by the Minister of Economy, Trade and Industry ) which are treated for preventing the scattering or leaking of radioactive material or for other hazard prevention measures specified by the Minister of Economy, Trade and Industry .
  - B. When transporting those objects contaminated by nuclear fuel material which are large machinery, etc. and are very difficult to be sealed in containers owing to their large size, but are treated for hazard prevention in the manner approved by the Minister of Economy, Trade and Industry .
- (iii) The container under the preceding item shall conform to the following criteria:
  - A. All the sides of the cube that circumscribes the said container are longer than 10 cm.
  - B. The container allows easy and safe handling, and is free from cracking, breaking, etc. under the influence of changes in temperature and internal pressure, vibration, etc. to be expected during transportation.
- (iv) The dose equivalent rate on the surface and at a distance of 1 meter from the surface of the container in which nuclear fuel material, etc. are sealed (when the objects contaminated by nuclear fuel material, etc. are transported without being sealed in containers in accordance with the provisory provision of A or B, Item (ii), these objects which are contaminated with nuclear fuel material, etc.; which objects to be referred to as "transported objects" hereinafter in this article) and the vehicles or other machinery or devices (hereinafter in this article to be referred to as "transportation devices") for transporting nuclear fuel material, etc. which are used to carry or contain them shall not exceed the respective dose equivalent rates specified by the Minister of Economy, Trade and Industry , and the concentration of radioactive material on the surface of the transported substance shall not exceed one tenth of the surface concentration limit under C, Item (i), Article 8.
- (v) The transported objects shall be secured to the transportation device in such manners as to prevent shifting, toppling or falling over during the transportation.
- (vi) The nuclear fuel material, etc. shall not be carried together with dangerous objects as specified by the Minister of Economy, Trade and Industry , in the same transportation device.
- (vii) Entry of persons other than those engaged in the transportation and of vehicles other than those used for the transporting into the transporting route shall be restricted by such method as the posting of signs, and watchers shall be posted at locations along the transporting route according to requirements.
- (viii) When vehicles are used in the transportation, the vehicles shall be driven slowly, and in case the route is long, another vehicle shall be made to accompany the transporting vehicles for the purpose of safety preservation.
- (ix) A person possessing reasonable levels of knowledge and experience in the handling of nuclear fuel material, etc. shall be made to participate in the transportation, for supervision needed for safety preservation.
- (x) On the transported objects [or a container, when they are contained in a container (a transportation device made to transport objects without the need for remounting the objects themselves during the transportation, having reusable structure and strength, and is provided with devices for mounting and dismounting by mechanical means, excluding open type ones; the same applying hereinafter)] and on the vehicles carrying them, signs specified by the Minister of Economy, Trade and Industry shall be affixed at the proper place.

2. In the cases of the previous paragraph, when all or parts of the measures specified under Paragraph 3 and 4 are extremely difficult to take for special reasons, a measure approved by the Minister of Economy, Trade and Industry may be used in substitution. However, this substitution is not available when the dose equivalent rate on the surface of the said transported object exceeds the dose equivalent rate specified by the Minister of Economy, Trade and Industry .

3. The provisions under Item (ii) through (iv) and Item (vii) through (x), Paragraph 1 are not applicable to the transportation conducted within the control zone.

(Storage)

**Article 14.** The reactor installer shall, pursuant to the provisions of Paragraph 1, Article 35 of the Law, take the measures related to the storage of nuclear fuel material, as listed under the following items.

- (i) Nuclear fuel material shall be stored in storage facilities.
- (ii) At easily visible locations of the storage facilities, the cautions on storage shall be displayed.
- (iii) When persons other than those engaged in the storage of nuclear fuel material enter the storage facilities, they shall be made to obey the instructions of the persons engaged in the storage.
- (iv) Necessary measures of cooling shall be taken on spent fuel.
- (v) Nuclear fuel material shall be stored in such a manner that under no circumstance, the nuclear fuel material reaches the criticality.

(Disposal Made at the Plant or Place of Business)

**Article 15.** The reactor establisher shall, pursuant to the provisions of Paragraph 1, Article 35 of the Law, in disposing the radioactive waste in the plant or place of business where reactor facility is installed, take the measures listed under the following items.

- (i) The disposal of radioactive waste shall be executed under the supervision of persons who possess the necessary

- knowledge in disposal and radiation protection related to disposal, and during the disposal process, the persons engaged in the said disposal process shall wear working cloths.
- (ii) When persons other than the persons engaged in the disposal of radioactive waste enter the disposal facility, they shall be made to obey the instructions of the persons engaged in the disposal.
  - (iii) Gaseous radioactive waste shall be disposed by any one of the following listed methods:
    - A. Discharging through a gas exhausting facility
    - B. Storage-disposing in a disposal tank which is provided with an effect of hazard prevention.
  - (iv) When disposing by the method A in the preceding paragraph, the concentration of the radioactive material in the exhaust gas shall be reduced as low as possible in the exhausting facility through such methods as filtration, the attenuation of radioactivity through the lapse of time and the dilution with large volume of air. In this case, the radioactive material concentration in the air outside the environmental monitoring area shall be maintained within the concentration limit specified by the Minister of Economy, Trade and Industry, through the monitoring of the concentration of radioactive material in the exhaust gas at the exhausting port or in the exhaust gas monitoring equipment.
  - (v) When disposing by the method B, Paragraph 3, if there is a possibility of excessive overheating by the decay heat, etc. of the said storage-disposed radioactive waste, necessary cooling measures shall be taken.
  - (vi) Liquid radioactive waste shall be disposed by any of the following listed methods:
    - A. Discharging through an effluent facility.
    - B. Storage-disposing in a disposal tank which is provided with a hazard prevention effect.
    - C. Sealing in a container, or solidifying with a container into an integral mass, and storage-disposing in a storage-disposal facility having a hazard prevention effect.
    - D. Incinerating in an incineration equipment possessing a hazard prevention effect.
    - E. Solidifying in a solidifying equipment possessing a hazard prevention effect.
  - (vii) When disposing by the method A in the preceding paragraph, the concentration of the radioactive material in the effluent shall be reduced as low as possible through such methods in the effluent facility as filtration, evaporation, adsorption by ion exchange resin, the attenuation of radioactivity through the lapse of time and the dilution with large volume of water. In this case, the radioactive material concentration in the water at the outside boundary of the environmental monitoring area shall be maintained within the concentration limit specified by the Minister of Economy, Trade and Industry, through the monitoring of the concentration of radioactive material in the effluent at the effluent discharge port or in the effluent monitoring equipment.
  - (viii) When disposing by the method B, Item (vi), if there is a possibility of excessive overheating by the decay heat, etc. of the said storage-disposed radioactive waste, necessary cooling measures shall be taken.
  - (ix) When disposing by method C, Item (vi), in case the radioactive waste is to be sealed in a container, the said container shall meet the following listed criteria:
    - A. The structure shall be impermeable to water, resistant to corrosion, and highly leak-proof against radioactive waste.
    - B. Freedom from the possibility of cracking or breaking
    - C. The lid of the container shall be hard to be removed.
  - (x) When disposing by method C under Item (vi), in case the radioactive waste and the container are solidified integrally, the container integrally solidified with the radioactive waste shall be capable of preventing the scattering or leaking of the radioactive waste.
  - (xi) When disposing by method C under Item (vi), in case the radioactive waste is storage-disposed of in a storage-disposal facility provided with a hazard prevention effect, the following shall be observed:
    - A. When storage-disposing radioactive waste by sealing it in a container, necessary measures for preventing the diffusion of contamination through an eventual occurrence of cracking or breaking in the said container such as the enveloping of the said container in material that can absorb all the sealed radioactive waste, or the provision of a receiving saucer that can contain all the sealed radioactive waste shall be taken.
    - B. When there is a possibility of excessive overheating by the decay heat, etc. of the said storage-disposed radioactive waste, necessary cooling measures shall be taken.
    - C. On the container in which radioactive waste is sealed, or integrally solidified with solidified radioactive waste, a sign indicating radioactive waste shall be affixed, and a control number that allows the collation against the contents recorded on the basis of the provision of Article 7 with respect to the said radioactive waste shall be displayed.
    - D. On the said storage-disposal facility, control cautions shall be displayed in the easily visible area.
  - (xii) Solid radioactive waste shall be disposed by any of the following listed methods:
    - A. Incinerating in incineration equipment provided with a hazard prevention effect.
    - B. Sealing in a container, or solidifying integrally with the container, and storage-disposing in a storage-disposal facility provided with a hazard prevention effect.
    - C. Those radioactive wastes such as large machines which are very difficult to dispose by the method of B, or other radioactive waste which requires decay over long time shall be storage-disposed in a storage-disposal facility provided with a hazard prevention effect.
  - (xiii) In the disposal method specified under B, Item (xii), when the radioactive waste is sealed in a container for disposal, the examples described under Item (ix) and (xi) (excluding A) shall be adopted.
  - (xiv) In the disposal method specified under B, Item (xii), when the radioactive waste is solidified integrally with the container, the examples described under Item (x) and (xi) (excluding A) shall be adopted.

(xv) In the disposal method specified under C, Item (xii), the examples described under B and D, Item (xi) shall be adopted.  
(Rules of Safety Preservation)

**Article 16.** Persons intending to have their Rules of Safety Preservation approved under the provisions of Paragraph 1, Article 37 of the Law shall specify the safety preservation rule for the particulars listed in the following items, for each plant or business place, and shall submit an application describing them.

- (i) Matters pertaining to the duty assignment and organization of persons engaged in the operation and management of the nuclear reactor facility
- (ii) Matters pertaining to the safety preservation education of persons engaged in the operation and management the nuclear reactor facility as described below
  - A Matters on implementation policy of the safety preservation education (including procedure of planning)
  - B Matters on the contents of the safety preservation education and as follows
    - (1) Matters on related regulations and the safety preservation rule
    - (2) Matters on the structure, performances and the operation of the nuclear installation
    - (3) Matters on radiation management
    - (4) Matters on the handling of nuclear fuel materials and materials contaminated by nuclear fuel material
    - (5) Matters on measures to be take at an emergency
- (iii) Matters pertaining to the operation of the nuclear reactor facility.
- (iv) Matters pertaining to the safety review of the operation of the nuclear reactor facility
- (v) Matters pertaining to the establishment of the control zone, the preservation area and the environmental monitoring area, and to the entry restrictions, etc. into these areas
- (vi) Matters pertaining to the ventilation monitoring equipment and drain monitoring equipment
- (vii) Matters pertaining to the monitoring of the dose and dose equivalent, the radioactive material concentration and the surface radioactive material concentration on objects contaminated by radioactive material, and to the decontamination
- (viii) Matters pertaining to the management of the radiation measuring instruments
- (ix) Matters pertaining to the patrolling and checking of the nuclear reactor facility, and their related measures
- (x) Matters pertaining to the periodical self inspection of the nuclear reactor facility
- (xi) Matters pertaining to the receiving and shipping, transport, storage and other handling of nuclear fuel material
- (xii) Matters pertaining to the disposal of radioactive waste
- (xiii) Matters pertaining to the measures to be taken in the case of emergency
- (xiv) Matters pertaining to the recording of matters related to the safety preservation of the nuclear reactor facility
- (xv) Other necessary matters related to the safety preservation of the nuclear reactor facility

2. The number of copies of the application under the preceding paragraph shall be one original.

(Inspection of compliance to the Rule for Safety Preservation)

**Article 16-2.** Inspection based on the provision of paragraph 5 of Article 37 shall be implemented quarterly.

2. Matters provided in paragraph 5 of Article 37 apply mutatis mutandis to such as of paragraph 6 of Article 12 which is provided by the order of METI are as follows

- A Access to Office, the Factory or business place
- B Inspection of books, documents, facilities, components and other necessary items
- C Inquiry to employees and or related personnel
- D Submission of nuclear source material, nuclear fuel material and the material contaminated by nuclear fuel material and other necessary sample ( limited to the least necessary amount for testing )

(Assignment, Etc. of Chief Engineer of Reactors)

**Article 19.** Pursuant to the provisions of Paragraph 1, Article 40 of the Law, the appointment of a chief engineer of reactors shall be made for each reactor. However, for reactors of the same type in the same plant or business place, the appointment of one chief engineer of reactors to two or more reactors is acceptable.

2. The number of copies of the notification document to be submitted under the provision of Paragraph 2, Article 40 of the Law shall be one original.

(Measures in Emergency)

**Article 20.** Pursuant to the provisions of Paragraph 1, Article 64 of the Law, a reactor establisher shall take the emergency measures as provided in the following.

- (i) Wherein fire breaks out in the reactor facility, or wherein there is a possibility of fire reaching the reactor facility, to make every effort to extinguish the said fire or to prevent its expansion and, at the same time, to report the situation to the fire authorities.
- (ii) Wherein there is a possibility of transferring the nuclear fuel material to other locations, to transfer it to a safe location as necessary, and to prohibit the entry of persons other than those related by demarcating the periphery of the location with a rope, by installing signs, etc., and by stationing guards.
- (iii) Wherein there is a need to prevent the occurrence of radiation hazard, to warn persons present both within the reactor facility and its vicinity to evacuate.
- (iv) Wherein contamination by the nuclear fuel material has taken place, to prevent its expansion and to remove it speedily.
- (v) Wherein there are persons suffering or who may possibly suffer from radiation hazard, to take emergency measures such as their speedy rescue and evacuation.
- (vi) To take other necessary measures for the prevention of radiation hazards.

(Measures Accompanying Revocation of License)

**Article 23.** The reactor installer who has had their permission revoked in accordance with the provisions of Article 33 of the Law, the reactor establisher who has discontinued all the operation of the reactor, or in the case of dissolution or death of reactor establisher the liquidator or trustee in bankruptcy, or the person who is to take charge of the inheritance in the place of the inheritor of dead establisher in the case of the absence of succession pursuant to the provision of Paragraph 1, Article 31 or of Paragraph 1, Article 32 of the Law, shall assign the nuclear fuel material, eliminate contamination, dispose the nuclear fuel material pursuant to the provisions of Paragraph 1, Article 66 of the Law, and shall deliver the radiation management record as specified under Paragraph 1, Article 7 to the organization specified by the Minister of Economy, Trade and Industry pursuant to Paragraph 4 of the said Article.

2. The measures specified under the preceding paragraph shall be executed within 30 days from the day of the cancellation of the permission, the day of discontinuing all operation, or the day of dissolution or death.

(Collection of Reports)

**Article 24.** The reactor installer shall prepare a report in Form 2 for each plant or business place, covering the period as from April 1st of every year to March 31st of the subsequent year, in the case of the report on the dose equivalent on the radiation workers during one year, and the period as from April 1st of each year to September 30th, and as from October 1st to March 31st of the subsequent year, in the case of other reports, and shall submit them to the Minister of Economy, Trade and Industry, within one month after the lapse of the applicable period.

2. The reactor installer shall, in the case of coming under any of the following items, report the case immediately, and report the situation and measures taken within 10 days, to the Minister of Economy, Trade and Industry.

- (i) Wherein the nuclear fuel material has been stolen or is missing.
- (ii) Wherein operation of the reactor has stopped or such stoppage has become necessary during the operation of the reactor, due to failure in the reactor facility.
- (iii) Wherein, during the operation suspension of the reactor, failure in the reactor facility deemed potentially harmful to the operation of the reactor has occurred.
- (iv) In the case of the discharge of gaseous radioactive waste through the exhaust facility, wherein the concentration of the said radioactive material in the atmosphere outside the environmental monitoring area exceeds the concentration limit under Item (iv), Article 15.
- (v) Wherein gaseous nuclear fuel material or material contaminated by nuclear fuel material has leaked outside the control zone.
- (vi) In the case of discharging liquid radioactive waste through the discharge facility, wherein the concentration of the radioactive material in water at the outer boundary of the environmental monitoring area exceeds the concentration limit under Item (vii), Article 15.
- (vii) Wherein the liquid nuclear fuel material or material contaminated by nuclear fuel material has leaked outside the control zone.
- (viii) In the case of the leakage of the nuclear fuel material or material contaminated by the nuclear fuel material within the control zone, when new measures such as personal entry restriction into the leakage-related location and key control have been taken, or when the leaked material has spread outside the control zone.
- (ix) Wherein a radiation worker has become subject to exposure in excess or possible excess of the dose equivalent limit specified in Item (i), Paragraph 1, Article 9.
- (x) In addition to the preceding items, wherein a personal hazard (non-radiation hazard, excluding minor hazard) has occurred or its potential is present.

3. The number of copies of the report under Paragraph 1 to be submitted shall be one original.

#### **(4) Regulations Regarding Procedures etc. to Appoint Entities which Authorize the Person Responsible for Operation (Excerpt) (Ordinance No. 622 of the MITI, December 25th, 1980)**

(Application for Appointment)

**Article 1.** Persons or entities (hereinafter referred to as "applicants") desiring to apply for the application of the Rules for the Installation and Operation, etc. of Commercial Nuclear Power Reactors, Article 12, Item (iii) (hereinafter referred to as "the Rules") shall submit the following documents to the Minister of Economy, Trade and Industry together with an application form which shall provide the name of the said entity, and the name and address of its representative.

- (i) Articles of incorporation or act of endowment (hereinafter referred to as "Articles of Incorporation etc.") and copy of registration books.
- (ii) Inventory sheet and balance sheet as of the end of the business year immediately preceding the business year in which the date of application belongs.
- (iii) Business plan and revenue & expense budget for the business year to which the date of application belongs, together with those for the following year.
- (iv) Names and personal resumes of the directors of the board, and documents providing the names of the entities or personnel in the case of a corporate juridical person.
- (v) Documents containing the names of the constituent members of the organization and their job descriptions.
- (vi) Documents containing items concerning the execution of the work (hereinafter referred to as "Authorization Work") for the authorization (hereinafter, referred, to as "Authorization") of the person responsible for operation as stipulated in the Rules, Article 12, Item (iii).

2. Wherein the applicants are to do work other than the authorization work, the entry of items that are in conjunction with the authorization work shall be made to distinguish it from those items related with other matters in the documents.
3. The documents stipulated in Paragraph 1, Item (vi), shall contain the following.
- (i) Matters pertaining to their educational background, their qualifications, and their practical experience etc. in nuclear or thermal power plants which are prescribed in Paragraph 1, Article 8.
  - (ii) The method of execution of those test of operation skills in, course, oral test stipulated in Paragraph 1, Article 8 and course stipulated in Paragraph 5 of the same Article (hereinafter referred to as "Test of Operation Skills etc." (to include the qualification and numbers of the personnel involved in the test of operation skills, etc. and facilities thereof.)
  - (iii) Matters pertaining to the determination of the propriety of the authorization.
- (Criteria of Appointment)

**Article 2.** Wherein the application stipulated in Paragraph 1 of the preceding article is deemed to conform to each of the following items, the Minister of Economy, Trade and Industry shall make an appointment in accordance with the provisions of the Rules, Article 12, Item (iii).

- (i) To be a juridical person established in accordance with the provisions of the Civil Law Act (Law No. 89, 1896), Article 34; and the composition of the directors or personnel thereof shall be unlikely to interfere with the fair execution of the said Authorization.
- (ii) The related accounting foundation and technical foundation is sufficient to assure the fair and reliable execution of the Authorization.
- (iii) Matters pertaining to the execution of the authorization work such as the personnel, facilities, and test of operation skills etc. shall be sufficient to assure the fair and reliable execution of Authorization.
- (iv) When the said entity is involved in work other than the Authorization Work, it shall be deemed unlikely that the execution of the said work shall make the execution of the authorization work unfair.
- (v) Making the said appointment shall not interfere with the adequate and smooth execution of the Authorization concerned with the application.

(Suspension or Abolition of the Authorization Work)

**Article 5.** Appointed entities shall not suspend or abolish a part or all of the Authorization Work without permission by the Minister of Economy, Trade and Industry .

(Notification of the Appointment, Etc.)

**Article 7.** Notification in an official gazette shall be made by the Minister of Economy, Trade and Industry at each following occasion about each item.

- (i) When the appointment is made pursuant to Item 3, Article 12 of the Rules.
  - (ii) When the approval is made pursuant to Article 5.
  - (iii) When the appointment is revoked or the Authorization Work is banned pursuant to the preceding article.
- (Authorization Methods, Etc.)

**Article 8.** Authorization shall be made by the test on operation skills for each type of nuclear reactor, course and oral test of the candidates who have enough educational background, qualification and operational experience at nuclear or thermal power stations to satisfy the quality defined by the appointed entities.

- (i) Test on operation skill aims to judge the presence of special skills needed such as the ability to perform the emergency measures as a person responsible for operation.
- (ii) Course aims to progress the knowledge and skills of reactor operation.
- (iii) Oral test aims to judge the candidate has or has not enough practical knowledge to perform works of person responsible for operation.

**(5) Order to Designate the Designated Inspection Organization Based on the Provision of Article 61-24of the Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors (Excerpt) (Ministerial order No.124 March 30, 2001)**

(Organization that certifies the responsible person for operation of reactor)

Article 4 Organization designated by the Minister of METI based on item 3 of Article 12 of the Rule for the Installation, Operation, etc. of Commercial Nuclear Power Reactors (Ordinance of the Ministry of International Trade and Industry, No.77, Dec. 28, 1978) are as follows;

Name of the Organization	Place of the Main Business
Thermal and Nuclear Power Engineering Society	1-23-11,Toranomon, Minato-ku, Tokyo

**(6) Notification for Radiation Dose Rate Limits, etc. Based on the Provisions of the Rules for Installation, Operation, etc. of Commercial Power Reactors (Excerpt) (Notification No. 187 issued by the METI, March 21, 2001)**

(Dose as Specified Item 4 of Paragraph 2 of Article 1of Rules for Installation, Operation, etc. of Commercial Power Reactors)

**Article 2.** The dose , concentration, and density to be determined by the Minister of Economy, Trade and Industry , pursuant to Article 1, Paragraph 2, Item 4 of the Rules for Installation, Operation, etc. of Commercial Nuclear Power

Reactors (hereafter referred as "the Rules"), shall be as follows.

- (i) For dose, 1.3 milli-Sieverts per 3 months.
- (ii) For concentration, the average concentration in 3 months is one-tenth of the concentration limit determined in Paragraph 1 through Paragraph 4, Article 7.
- (iii) For density, one-tenth of the surface density limit determined in Article 5.

2. For the limit stipulated in the preceding paragraph, when both external radiation and radioactive materials must be considered, the limit is given by converting the 3-month average dose and concentration to their fractions to the values provided in items 1 and 2 respectively. In this case, the dose and concentration shall be such that the sum of their fractions is less or equal to 1.

(Dose Limit provided in Item 6, Paragraph 2, Article 1 of the Rules )

**Article 3.** The dose limit to be determined by the Minister of Economy, Trade and Industry , pursuant to Item 6, Paragraph 2, Article 1 of the Rules, shall be as follows.

- (i) For effective dose equivalent, 1 milli-Sievert per year (one year start from April 1st ).
- (ii) For skin and eye lens tissue dose equivalent, 50 milli-Sieverts each per year.
- (iii) For eye lens tissue dose, 15 milli-Sieverts each per year

2. In spite of provision of the item 1 of the preceding Paragraph, effective dose limit may be determined as 5 milli-Sieverts when the Minister of METI has so approved.

(Surface Density Limit)

**Article 5.** The surface density limits to be determined by the Minister of Economy, Trade and Industry , pursuant to Item C, Paragraph 1, Article 8 of the Rules, shall be as indicated in annexed Table 1.

(Dose Limit for Personnel Engaged in Radiation Works)

**Article 6.** For the dose limits to be determined by the Minister of Economy, Trade and Industry , pursuant to Item 1, Paragraph 1, Article 9 of the Rules, the effective dose shall be as follows.

- (i) Five years determined in Paragraph 3 of Article 4, 500 milli-Sieverts.
- (ii) 50 milli-Sieverts per year.
- (iii) For female ( except for those who diagnosed as sterility and those who notified will for no pregnancy to the reactor establisher with document and those who are specified in next Paragraph), 5 milli-Sieverts per three-month starting April 1, July 1, October 1 and January 1, except for determined in 2 preceding items
- (iv) For the pregnant female, 1 milli-Sieverts for internal exposure during the time of the reactor establisher noticed the pregnancy by the notification of the worker herself to the delivery, in addition to the provision of items 1 and 2.

2. For the dose limits to be determined by the Minister of Economy, Trade and Industry , pursuant to Item 1, Paragraph 1, Article 9 of the Rules, the effective dose equivalent shall be as follows.

- (i) For eye lens, 150 milli-Sieverts per year.
- (ii) For skins, 500 milli-Sieverts per year.
- (iii) For abdominal region of pregnant female worker specified in item 4 of the preceding Paragraph, 2 milli-Sieverts during the time in the preceding Paragraph.

(Concentration Limit for Personnel Engaged in Radiation Works)

**Article 7.** For the concentration limits to be determined by the Minister of Economy, Trade and Industry , pursuant to Item (ii), Paragraph 1, Article 9 of the Rules, the average concentration for three-month shall be as follows.

- (i) When the type of radioactive materials (Shown in annex Table 2. The same applies in next and the third Paragraphs) is known, and that is only one type, the concentration given in the fourth column of annexed Table 2, for the type of radioactive materials listed in the first column of that table.
- (ii) When the type of radioactive materials is known, and there are more than two types, the concentration whose sum of the ratios of the concentration of each radioactive material to the concentration of radioactive material given in the preceding paragraph become unity is the concentration of each radioactive material.
- (iii) When . the type of radioactive material is not known, the least concentration given in the fourth column of annexed Table 2 (except those type of radioactive materials whose non existence in air is clear.).
- (iv) When the type of radioactive material is known, and the type of the radioactive material is not included in annexed Table 2, the concentration of the second column in accordance with the division shown in the first column of the annexed Table 3.
- (v) When there are risks of both external radiation exposure and inhalation of airborne radioactivity, the concentration of radioactive materials shall be such that the sum of its fraction of the effective dose equivalent for a year by exposure from external radiation (hereinafter referred to as "external exposure") to 50 milli-Sv, and the fraction of airborne radioactive materials concentration to that provided in the preceding paragraphs, is less or equal to 1.

(Dose Equivalent Limit in Emergency Work)

**Article 8.** Dose limits to be determined by the Minister of Economy, Trade and Industry , pursuant to Paragraph 2, Article 9 of the Rules, is 100 milli-Sieverts in effective dose equivalent.

(Concentration Limit at Outside of Environmental Monitoring Area)

**Article 9.** The concentration limit to be determined by the Minister of Economy, Trade and Industry , pursuant to Paragraphs 4 and 7, Article 15 of the Rules, shall be as follows in average of three-month.

- (i) When the type of radioactive materials (that given in annexed Table 2, the same applying in the following paragraphs and the third paragraphs and next Item paragraph 1 to 3) is known and that is only one type, concentration in air given in the column 5 of annexed Table 2, and that in water given in the column 6, for respective type of radioactivity.

- (ii) When the types of radioactive materials are known and there are more than 2 different types of radioactive materials in water or in air, the concentrations of radioactive materials shall be such that the sum of their fractions to the respective concentrations provided in the preceding paragraphs, is less or equal to 1..
- (iii) When the type of radioactive materials is unknown, the minimum concentration given in the column 5 of annexed Table 2 (except those type of radioactive materials whose non existence in air is clear.)for air and in the column 6 for water, respectively.
- (iv) When the type of radioactive material is known, and the type of the radioactive material is not included in annexed Table 2, the concentration of the third column for in air and the fourth column for in water, in accordance with the division shown in the first column of the annexed Table 3.
- (v) When radioactive materials exist in water and in air and there are risks of both inhalation and oral intake, concentrations of radioactive materials in water and in air shall be such that the sum of their fractions to the respective concentrations provided in the 1<sup>st</sup>, 3<sup>rd</sup> and precedent paragraphs, is less or equal to 1.
- (vi) When there are risks of both external radiation exposure and inhalation of radioactive materials in air or in water, the concentration of radioactive materials shall be such that the sum of its fraction of the effective dose equivalent for a year by external exposure to 1 mSv, and the fraction of concentration for radioactive materials in air or in water to that provided in the preceding paragraphs, is less or equal to 1.

Annexed Table 1 (in relation to Article 5)

Division	Limit on Density(Bq/cm2)
Radioactive material that emits alpha particles	4
Radioactive material that does not emit alpha particles	40

### 3.5 Law for Technical Standards of Radiation Hazards Prevention(Excerpt)

(Law No.162, May 21, 1958)

Latest Revision: Law No.160, December 22, 1999

(Objectives)

**Article 1.** The objectives of this law are to clarify the basic policy of enacting technical standards for radiation hazards prevention and to arrange technical standards of radiation hazards prevention in an orderly manner through the establishment of the Radiation Review Council within MEXT.

(Basic Policy)

**Article 3.** In enacting technical standards of radiation hazards prevention, the basic policy shall be to keep the radiation dose of personnel engaged in radiation management work to handle materials which generate radiation, etc. and of general public, at the radiation dose equal or less than what causes no danger of hazards.

(Establishment of Radiation Review Council)

**Article 4.** The Radiation Review Council (hereinafter referred to as the "Council") shall be established within MEXT.

(Assigned Duties of the Council)

**Article 5.** The Council shall investigate and review the matters prescribed in this law.

2. Concerning the matters of the preceding paragraph, the Council may state its opinions to the heads of related governmental organizations as necessary.

(Consults to the Council)

**Article 6.** When heads of related governmental organizations intend to establish technical standards of radiation hazards prevention, they shall consult with the Council.

### 3.6 Law on Compensation for Nuclear Damage (Excerpt)

(Law No.147, June 17, 1961)

Latest Revision: Law No.160, December 22, 1999

(Objectives)

**Article 1.** It is the objectives of this Law to protect persons suffered from nuclear damage and also to contribute to the sound development of nuclear industry by means of establishing the basic system concerning the compensation in the case of occurrence of nuclear damage through operation of reactors, etc.

(Liability without Fault, Channeling of Liability, Etc.)

**Article 3.** When a nuclear damage is occurred owing to the operation of the reactor, etc. during the operation of the reactor, etc. a nuclear business operator who is engaged in the operation of the reactor on the occasion, shall be liable for the damage, except for the case that the damage is caused by a extraordinary great natural disaster or by a serious social disturbance.

(Duty of Providing Financial Security)

**Article 6** A nuclear business operator is prohibited from the operation of the reactor, etc. unless the financial security for compensation of the nuclear damage (hereinafter referred to as " financial security") has been provided.

(Contract of Liability Insurance for Nuclear Damage)

**Article 8.** The contract of liability insurance for the nuclear damage (hereinafter referred to as "liability insurance contract") shall be the contract under which an insurer (a liability insurance company as provided for in Article 2, Paragraph 4 of the Insurance Business Law (Law No.105, 1995) or a foreign liability insurance company, etc. as provided for in Article 2, Paragraph 9 of the same Law, that undertakes liability insurance; hereinafter an insurer is limited to this meaning) undertakes to indemnify a nuclear business operator for his loss arising from compensation for the nuclear damage of certain causes in case the nuclear business operator becomes liable for the compensation of a nuclear damage and under which the insurer undertakes to pay a premium to the insured.

(Indemnity Agreement for Compensation of Nuclear Damage)

**Article 10.** The indemnity agreement for compensation of the nuclear damage (hereinafter referred to as "indemnity agreement") shall be the contract under which the National Government undertakes to indemnify a nuclear business operator for his loss arising from compensating for the nuclear damage not covered by the liability insurance contract and other financial security for compensation for the nuclear damage in case the nuclear business operator becomes liable for the compensation of a nuclear damage and under which the nuclear business operator undertakes to pay the indemnity fee to the National Government.

(Measures Taken by the National Government)

**Article 16.** In case the nuclear damage occurs, the National Government shall give to a nuclear business operator undertaker (except nuclear business operator related to foreign nuclear ship) such aids as required for him to compensate the nuclear damage, when the amount which he should compensate for the nuclear damage in accordance with Article 3 exceeds the financial security amount concerned and when the National Government deems necessary in order to fulfill the objectives of this Law.

### **3.7 Industrial Safety and Health Law**

#### **(1) Industrial Safety and Health Law(Excerpt)**

**(Law No.57, June 8, 1972)**

**Latest Revision: Law No.87, June 29, 2001**

(Objectives)

**Article 1.** The objectives of this Law is to secure, in conjunction with the Labor Standards Law (Law No. 49, 1947), the safety and health of workers in workplaces as well as to facilitate the establishment of comfortable working environment by promoting comprehensive, and systematic countermeasures concerning the prevention of industrial accidents, such as taking measures for the establishment of standards for the prevention of danger and injury, the classification of responsibility, and the promotion of voluntary activities with a view to preventing industrial accidents.

**Article 22.** Employers shall take necessary measures for preventing health impairment as follows:

(ii) Health impairment due to radiation, high temperature, low temperature, ultrasonic waves, noises, vibration, or abnormal atmospheric pressure and others.

(Safety and Health Education)

**Article 59.** Employers shall, when they have employed new workers, give the said workers' education for the safety and/or health concerning works in which they are engaged, as provided for in the ordinance of the Ministry of health and Labor.

(Medical Checks)

**Article 66.** Employers shall, as provided for in the ordinance of the Ministry of Health and Labor, execute medical checks of workers conducted by physicians.

#### **(2) Rules for Prevention of Damage from Ionizing Radiation(Excerpt)**

**(Ordinance No. 41of the Ministry of Labor, September 30, 1972)**

**Latest Revision: Ordinance No. 171 of the Ministry of Health and Labor, July 16, 2001**

(Basic Principle of Prevention of Radiation Hazards)

**Article 1.** Employers shall endeavor to minimize the exposure of workers to the ionizing radiation as far as possible.

(Illustration of a Control Zones, etc.)

**Article 3.** Employers performing radiation management work shall express clearly by marks the area defined as follows (hereinafter referred to as "control zones").

(i) area where three months total of the effective dose from the external radiation and the effective dose from the radioactive materials in the air may exceed 1.3 milli Sieverts

(ii) area where surface contamination may exceed the limits defined by the attached table.

**2.** The effective dose from the external radiation in (i) of the preceding paragraph shall be measured as to the 1 cm dose equivalent.

**3.** The effective dose from the radioactive materials in air in (i) of Paragraph 1 shall be determined by multiplying 1.3 milli Sieverts by the ratio of a tenth of the limit of the three months average concentration of the weekly average of radioactive materials in air during the working hours in a week (where the working hours in a week exceeds 48 hours or less than 48 hours, use instead the figure obtained by multiplying the average concentration of the radioactive materials in air during the working hours in a week by the result of dividing the working hours by 48 hours; in Article 25 this is referred



to as the "weekly average concentration".) provided for by the Minister of Health and Labor.

**4.** Employers shall not allow anyone other than the necessary persons to enter control zones.

**5.** Employers shall post, in a location easily seen by workers in the control zones, notices for attention related to the attachment of measuring devices of exposure dose provided for in Paragraph 3 of Article 8, notices for attention concerning the handling of radioactive materials and other necessary notices for prevention of damages to health of workers due to radiation, such as emergency measures in case of an accident.

(Limits of Exposure for Personnel Engaged in Radiation Management Works)

**Article 4.** Employers shall ensure that the effective dose of personnel engaged in radiation management works in control zones (hereinafter referred to as "personnel engaged in radiation management works") does not exceed 50 milli Sieverts annually, and 100 milli Sieverts in 5 years.

**2.** Regardless of the provision of the preceding paragraph, employers shall ensure that the effective dose of female personnel engaged in radiation management works (excluding those who are infertile and those provided for in Article 6) does not exceed 5 milli Sieverts in 3 months.

**Article 5.** Employers shall ensure that the equivalent dose of personnel engaged in radiation management works does not exceed 150 milli Sieverts annually for the eye lens, and 500 milli Sieverts annually for skin.

**Article 6.** Employers shall ensure that the effective dose from internal radiation, and equivalent dose in the abdominal region of female personnel engaged in radiation management works who have been diagnosed as pregnant does not exceed 1, and 2 milli Sieverts, respectively, from the time that pregnancy is diagnosed until birth.

(Limits of Exposure During Emergency Work)

**Article 7.** In the case of the accident which falls under any one of the items in Paragraph 1 of Article 42, and in which a zone provided for in that paragraph has occurred, when the employer performs emergency work to prevent damages to health of workers due to radiation (hereinafter referred to as "emergency work"), regardless of the provisions of Article 4 paragraph 1 and Article 5, male and infertile female personnel engaged in radiation management works who perform such emergency work may be exposed the dose in excess of the limits provided for in that article.

**2.** In the preceding paragraph, the effective dose, the equivalent dose for eye lens and the equivalent dose for skin, which they expose during such emergency work shall not exceed 100, 300 and 1000 milli Sieverts, respectively.

**3.** The preceding paragraph shall also apply when emergency work is performed by a male or infertile female workers other than personnel engaged in radiation management works.

### **3.8 Electricity Utilities Industry Law**

#### **(1) Electricity Utilities Industry Law(Excerpt)**

**(Law No. 170, July 11, 1964)**

**Latest Revision: Law No.75, June 27, 2001**

(Objectives)

**Article 1.** The objectives of this Law are to protect the benefits of consumers of electricity and to contrive to promote the sound development of electric utilities industry, by ensuring the proper and reasonable operation of electric utilities industry and to secure public safety and protect environment by regulating construction, maintenance and operation of electric structures.

(Business Licensing)

**Article 3.** Any person (excluding specified-scale electric utilities) who intends to carry on an electric utility shall obtain license from the Minister of METI.

**2.** The License in the preceding paragraph shall be granted according to the category of a general electric utility, a wholesale electric utility, and a specific electric utility.

(License Application)

**Article 4.** Any person who intends to obtain the license referred to in the Paragraph 1 of the preceding article shall submit an application containing the information listed below to the Minister of METI.

(i) Name and address, or name and address of representative in the case of a corporation,

(ii) Service area, a general electric utility to which electricity will be supplied, or supply location.

(iii) Following information on electric structures to be used for the applied electric utility

(a) Location of installations, type of motive power, frequency and output for electric power generation business

(b) Location of installations, frequency and output for electric power transformation business,

(c) Location of installations, electricity mode, method of establishment, number of lines, frequency and voltage for electric power transmission business,

(d) Electricity mode, frequency and voltage for electric power distribution business.

**2.** The application in the preceding paragraph must contain the business plan, statement of estimated business income and expenditures, and other documents required by the ordinance of METI.

(Criteria for the Licensing)

**Article 5.** The license referred to in Paragraph 1 of Article 3 shall not be granted unless the Minister of METI recognizes that the application for the license meets the following conditions.

(i) The commencement of the applied electric utility meets properly general electricity demand, demand of general electric utilities industry or demand at the service location.

(ii) There exists a sufficient financial basis and sufficient technical ability for the proper operation of the applied electric

utility.

- (iii) The plan of the applied electric utility is sound.
- (iv) The capacity of the electric structures to be used for the applied electric utility corresponds to the electricity demand in the service area or the service location in case that the applied electric utility is a general electric utility or a specific electric utility.
- (v) The commencement of the applied electric utility is not supposed to cause remarkable excess in electric structures for the used of general electric utilities industry in all or part of the service area in case that the applied electric utility is a general electric utility.
- (vi) The commencement of the applied electric utility is not supposed to be in danger of obstructing the interests of users of electricity within the service area of a general electric utilities industry in case that an application is for a specific electric utility with a service location where is within the service area of that general electric utilities industry.
- (vii) In addition to the conditions listed above, in case that an application is for a general electric utility or wholesale electric utility, the commencement of the applied electric utility is necessary and appropriate for the promotion of comprehensive and reasonable development of electric utilities industry and for the public interest, and in case that an application is for a specific electric utility, the commencement of the applied electric utility is appropriate in the light of the public interest.

(License)

**Article 6.**

2. The license shall contain the following information.

- (i) Date and number of the permission.
- (ii) Name and address.
- (iii) Supply area, general electric utilities to which electricity will be supplied, or supply location.
- (iv) Following information on electric structures to be used for electric utility.
  - (a) Location of installations, type of motive power, frequency and output for electric power generation business.

(Obligations at Beginning the Business)

**Article 7.** An electric utility (excluding specified-scale electric utility) shall begin the licensed business within the time, not more than ten years from the date when the permission is granted, designated by the Minister of METI.

3. The Minister of METI may, if deemed that there exist due reasons, extend the time designated in Paragraph 1 in case that such extension is applied from an electric utility.

4. An electric utility shall notify the Minister of METI without delay when it begins the business (or if designation of the time period referred to in Paragraph 1 was divided by supply areas, general electric utilities which are to receive electricity, or supply locations based on the provisions of Paragraph 2, the business related to those divisions).

(Alterations in Electric Structures, etc.)

**Article 9.** When an electric utility intends to alter the items referred to in Paragraph 2(iv) of Article 6, this shall be notified to the Minister of METI, unless the alteration is so minor as specified in the ordinance of METI.

(Revocation of Licensing, etc.)

**Article 15.** The Minister of METI may revoke the license issued by Paragraph 1 of Article 3, when an electric utility does not begin the licensed business within the time specified in Paragraph 1 of Article 7 (or within the extended period specified in Paragraph 3 of that article).

2. Except as provided in preceding paragraph, the Minister of METI may revoke the license issued by Paragraph 1 of Article 3, when an electric utility has violated the provisions of this Law or an order based on this Law and the violation is deemed to threaten the public interest.

(Responsibility on Electricity Supply, etc.)

**Article 18.** A general electric utility shall not refuse to supply electricity to correspond general electric demand within its supply area (excluding demand at the supply locations where a specific electric utility has begun its business based on the license in accordance with Paragraph 1 of Article 3 and specified-scale electric demand).

(Supply Stipulations, etc. by a General Electric Utility)

**Article 19.** A general electric utility shall set supply stipulations concerning power rates or other conditions for supply of electricity to correspond general electric demand (excluding specified-scale demand), and shall obtain the approval of the Minister of METI in accordance with the ordinance of METI.

The same is applied to modifications of the stipulations.

2. The Minister of METI shall approve the supply stipulations referred to in the preceding paragraph when it recognizes that the application for the approval meets the following conditions.

- (i) The rates correspond to an appropriate rate of profit added to an appropriate cost under efficient management.
- (ii) The rates are set clearly as a fixed rate or fixed amount according to the type of supply.
- (iii) Appropriate and clear determination has been made of matters related to the responsibilities of the general electric utility and the users of electricity, and of methods for allocating expenses related to electrical instruments, other equipment, wiring work, and other construction work.
- (iv) There exists no unjust, discriminatory treatment of specific parties.

3. Notwithstanding latter part of paragraph 1 of this article, a general electric utility may changes the power rates or other conditions for supply of electricity defined in the supply stipulations approved in accordance with paragraph 1 of this article, if the change meets the case described in the ordinance of METI; such that the change is reduction of the power rates or the change is not deemed to threaten the public interest.

4. A general electric utility shall notify the modified supply stipulations to the Minister of METI, as provided for in the ordinance of METI, when it changes the power rates and other conditions in accordance with the preceding paragraph

5. In the case that the Minister of METI deems that the modified supply stipulations submitted in accordance with the preceding paragraph do not meet any of the following items, he may order the general electric utility to reconsider the supply stipulations indicating a suitable deadline:

- (i) The rates are set clearly as a fixed rate or fixed amount according to the type of supply.
- (ii) Appropriate and clear determination has been made of matters related to the responsibilities of the general electric utility and the users of electricity, and of methods for allocating expenses related to electrical instruments, other equipment, wiring work, and other construction work.
- (iii) There exists no unjust, discriminatory treatment of specific parties.  
(Depreciation, etc.)

**Article 35.** The Minister of METI may order a electric utility to establish and implement a method or fixed amount on suitable depreciation for fixed assets used for its electric utility business or to build up reserve funds or allocations in a specified method or amount, when deemed particularly necessary for the proper management of an electric utility,  
(Maintenance of Electric Structure for Business Use)

**Article 39.** A person who established electric structure for business use shall maintain it so that it is to be in conformity with the technical standards specified in the ordinance of METI.

2. The ordinance of the Minister of METI referred to in the preceding paragraph shall be based on the following;

- (i) To prevent electric structure for business use from causing harm to persons or to objects,
- (ii) To prevent the structure from causing electrical or magnetic interference on the function of other electric equipment or other objects,
- (iii) To prevent damage of the structure from causing remarkable interference to the supply of electricity by an electric utility, and
- (iv) To prevent damage of the structure from causing remarkable interference to the supply of electricity by an electric utility, in case that these structures are used for a general electric utility.

(Orders for Conformity with Technical Standards)

**Article 40.** The Minister of METI may order the person who established electric structure for business use to repair, alter, or move the structure so that it conforms with the technical standards specified in the ordinance of the Minister of METI described in paragraph 1 of the preceding article, or to halt temporarily its use, or place restrictions on the use of it, when deemed that the electrical structure for business use is not in conformity with the technical standards.  
(Electrical Safety Preservation Rules)

**Article 42.** A person who established an electric structure for business use shall establish an electrical safety preservation rules for each responsible organization on the electric structure for business use, needed to be preserved as a unitarily, required by the ordinance of METI to ensure safety preservation of the construction, maintenance and operation of the electric structure for business use, and shall notify it to the Minister of METI prior to beginning usage (or construction work if it is accompanied with self inspection specified in paragraph 1 of Article 50.2 or Paragraph 1 of Article 52) of the electric structure for business use by the concerned organization.

2. A person who established an electric structure for business use shall notify the Minister of METI without delay when he has altered his electrical safety preservation rules.

3. The Minister of METI may order a person who established the electric structure for business use to make changes its electrical safety preservation rules, when deemed necessary to ensure safety preservation of construction, maintenance, and operation of a concerned electric structure for business use.

4. A person who established an electric structure for business use and his employee shall comply with the electrical safety preservation rules.

(Chief Engineers)

**Article 43.** A person who established an electric structure for business use shall assign a person who had received license of chief engineer as a chief engineer in order to supervise ensuring safety preservation of construction, maintenance and operation of electric structure for business use, as specified in the ordinance of the Minister of METI.

2. Notwithstanding the provisions of preceding paragraph, a person who established an electric structure for in-house use may assign a person who had not received license of chief engineer as a chief engineer after obtaining the permission of the Minister of METI.

3. A person who established an electric structure for business use shall notify a fact to the Minister of METI without delay when he assigned a chief engineer (excluding the appointment with the permission referred to in the preceding paragraph). The same is applied when the chief engineer is dismissed.

4. The chief engineer shall perform faithfully his duty on supervision of ensuring safety preservation concerning construction, maintenance and operation of electric structure for business use.

5. A person who engaged in construction, maintenance and operation of an electric structure for business use shall follow the chief engineer's instructions for safety preservation.

(Chief Engineer's License)

**Article 44.** Types of chief engineer's license for are as follows.

- (i) Class I Chief Electrical Engineer's License
- (ii) Class II Chief Electrical Engineer's License
- (iii) Class III Chief Electrical Engineer's License

- (iv) Class I Chief Dam and Watercourse Engineer's License
  - (v) Class II Chief Dam and Watercourse Engineer's License
  - (vi) Class I Chief Boiler and Turbine Engineer's License
  - (vii) Class II Chief Boiler and Turbine Engineer's License
2. License of Chief Engineer is granted by the Minister of METI to those persons who meet any of the followings;
    - (i) Persons with an academic career or qualifications who have practical experience provided for in the ordinance of the Minister of METI for each type of chief engineer's licenses.
    - (ii) Persons who have passed the qualification test for chief electrical engineer in case of a chief engineer's license of a type (i)-(iii) of the preceding paragraph,.
  3. The Minister of METI may refrain from issuing a chief engineer's license to a person to whom any of the following applies.
    - (i) A person who was ordered to return his chief engineer's license, according to the following paragraph, within one year after issuing the order.
    - (ii) A person who was ordered to pay a fine or undergo more severe punishment due to the violation of the provisions of this Law or orders based on this Law, within two years after the punishment was completed or ended.
  4. The Minister of METI may order the return of the chief engineer's license if a person who has received a chief engineer's license has violated the provisions of this Law or orders based on this Law,.
  5. The scope of construction, maintenance and operation of electric structure for business use which a person who has received a chief engineer's license may supervise on safety preservation and procedural matters related to the issuance of chief engineer's licenses shall be provided in the ordinance of the Minister of METI.

(Qualification test for Chief Electrical Engineers)

**Article 45.** The qualification test for chief electrical engineers shall be conducted by the Minister of METI for each type of chief engineer's licenses, concerning knowledge and skills necessary to preserve construction, maintenance and operation of an electric structure for business use.

2. The Minister of METI may entrust a designated party (hereinafter referred to as "designated organization for qualification test") to conduct the duties on execution of the qualification test for chief electrical engineers.

3. Details of the execution of qualification test for chief electrical engineers, including test subjects and test-taking procedures, shall be provided in the ordinance of the Minister of METI.

(Environmental Impact Assessment concerning the Electric Structure for Business Use)

**Article 46-2** Environmental impact assessment and its procedures specified in paragraph 1 of Article 2 of the Environmental Impact Assessment Law (Law No. 81 of 1997), with respect to construction work to establish or alter electric structure for business use of the Class-1 Project specified in paragraph 2 of Article 2 or the Class-2 Project specified in paragraph 3 of Article 2 of that Law, are provided for in that Law and the concerned stipulations in this Law.

(Environmental Impact Assessment by Simplified Method)

**Article 46-3** Any person who intends to perform construction work to establish or alter electric structure for business use of the Class-2 Project specified in paragraph 3 of Article 2 of the Environmental Impact Assessment Law shall describe the result of the environmental impact assessment for the construction work that has been performed by simplified method pursuant to the ordinance of METI, on a written report specified in the first half of paragraph 1 of Article 4 of that Law, as well as the items specified in the same paragraph of that Law.

(Preparation of a Scoping Document)

**Article 46-4** Any person (hereinafter referred to as a "specific business operator") who intends to perform construction work which establishes or alters electric structure for business use and conforms to the project (hereinafter referred to as a "specific project") specified in paragraph 4 of Article 2 of the Environmental Impact Assessment Law shall describe items to be considered in an environmental impact assessment of the specific project and the methods of survey, prediction and assessment, irrespective of the provision of Item 4 of the same paragraph, in a scoping document on environmental impact assessment (hereinafter referred to as a "scoping document") specified in paragraph 1 of Article 5 of that Law.

(Submittal of the Scoping Document)

**Article 46-5** A specific business operator shall submit the scoping document to the Minister of METI at the same time when it is submitted pursuant to paragraph 1 of Article 6 of the Environmental Impact Assessment Law.

(Submittal of an Outline of Comments Regarding the Scoping Document)

**Article 46-6** A specific business operator shall describe his view for the comments, presented pursuant to paragraph 1 of Article 8 of the Environmental Impact Assessment Law, in the document specified in Article 9 of that Law, in addition to the items specified in the same Article.

2. A specific business operator shall submit the document pursuant to Article 9 of the Environmental Impact Assessment Law to the Minister of METI at the same time when he submits the document pursuant to the same article.

(Comments of the Prefectural Governor regarding Scoping Document)

**Article 46-7** Comments of the prefectural governor(s) pursuant to Paragraph 1 of Article 10 of the Environmental Impact Assessment Law on the specific project shall be presented to the Minister of METI as a substitute for the business operator, irrespective of the provision of the same paragraph.

2. In making the comments on specific project, pursuant to Paragraph 1 of Article 10 of the Environmental Impact Assessment Law, the prefectural governor(s) shall take into consideration the view of the business operator described in the documents, specified in Article 9 of that Law, pursuant to Paragraph 1 of the preceding article as well as the provision of

Paragraph 3 of Article 10 of that Law.

(Recommendation on Scoping Document)

**Article 46-8** In case that scoping document is submitted pursuant to Article 46-5, the Minister of METI reviews scoping document, considering the comments of the prefectural governor(s) made pursuant to Paragraph 1 of Article 10 of the Environmental Impact Assessment Law and paying due consideration to an outline of the comments made pursuant to Paragraph 1 of Article 8 of that Law and the view of the business operator on the outline of comments, submitted pursuant to Paragraph 2 of Article 46-6. The Minister may issue necessary recommendation to the specific business operator on the items to be considered in an environmental impact assessment of the specific project and the methods of survey, prediction and assessment, within a time to be established by the ordinance of METI from the date when the document was submitted pursuant to Article 46-5, when deemed it to be the necessary to assure proper measures to protect the environment.

2. The Minister of METI shall notify the purport to the specific business operator without delay when he admits it unnecessary to issue the recommendation pursuant to the provisions of the preceding paragraph.

3. The Minister of METI shall provide a copy of the written report submitted pursuant to paragraph 1 of Article 10 of the Environmental Impact Assessment Law to the specific business operator at the same time when he issues recommendation pursuant to paragraph 1 or notifies pursuant to paragraph 2 of this Article.

(Selection of Items to be considered in the Environmental Impact Assessment)

**Article 46-9** A specific business operator, upon receiving the recommendation pursuant to paragraph 1 of the preceding article, shall conduct further study, based on the recommendation, considering the comments made pursuant to Paragraph 1 of Article 10 of the Environmental Impact Assessment Law and paying due consideration to the comments made pursuant to Paragraph 1 of Article 8 of that Law, in the review pursuant to paragraph 1 of Article 11 of that Law.

(Preparation of draft Environmental Assessment Statement)

**Article 46-10** A specific business operator shall describe contents of the recommendation issued pursuant to paragraph 1 of Article 46-8, as well as the items specified in each paragraph of to paragraph 1 of Article 14 of the Environmental Impact Assessment Law, in the draft of Environmental Assessment Statement (hereinafter referred to as a “draft EIS”) defined in the same paragraph of that Law.

(Submittal of a draft EIS)

**Article 46-11** A specific business operator, when submitting a draft EIS and its summary pursuant to the provisions of Article 15 of the Environmental Impact Assessment Law, shall submit them to the Minister of METI at the same time.

(Submittal of an Outline of Comments Regarding the draft EIS)

**Article 46-12** A specific business operator, when submitting the document pursuant to Article 19 of the Environmental Impact Assessment Law, shall submit it to the Minister of METI at the same time.

(Opinions of the Related Governor(s) regarding the draft EIS)

**Article 46-13** Opinions of the related prefectural governors pursuant to Paragraph 1 of Article 20 of the Environmental Impact Assessment Law on the specific project shall be presented to the Minister of METI as a substitute for the business operator, irrespective of the provision of the same paragraph.

(Recommendation on the draft EIS)

**Article 46-14** In case that draft EIS is submitted pursuant to Article 46-11, the Minister of METI reviews draft EIS, considering the comments of the related prefectural governors made pursuant to Paragraph 1 of Article 20 of the Environmental Impact Assessment Law and paying due consideration to an outline of the comments made pursuant to Paragraph 1 of Article 18 of that Law and the view of a business operator on the outline of comments, submitted pursuant to Article 46-12. The Minister may issue necessary recommendation to the specific business operator on the environmental impact assessment of the specific project, within a time to be established by the ordinance of METI from the date when the document was submitted pursuant to Article 46-12, when deemed it to be the necessary to assure proper measures to protect the environment.

2. The Minister of METI shall obtain an opinion from a viewpoint of protecting an environment from The Minister of Environment at the review conducted pursuant to preceding paragraph.

3. The Minister of METI shall notify the purport to a specific business operator without delay when he admits it unnecessary to issue the recommendation pursuant to paragraph 1 of this Article.

4. The Minister of METI shall provide a copy of the submittal pursuant to paragraph 1 of Article 20 of the Environmental Impact Assessment Law to a specific business operator at the same time when he issues recommendation pursuant to paragraph 1 or notifies pursuant to paragraph 2 of this Article.

(Preparation of an Environmental Impact Statement)

**Article 46-15** A specific business operator, upon receiving the recommendation pursuant to paragraph 1 of preceding article, shall conduct further study, based on the recommendation, considering the comments made pursuant to Paragraph 1 of Article 20 of the Environmental Impact Assessment Law and paying due consideration to the comments made pursuant to Paragraph 1 of Article 18 of that Law, in the review pursuant to paragraph 1 of Article 21 of that Law.

2. A specific business operator shall describe contents of the recommendation issued pursuant to paragraph 1 of Article 46-8 and paragraph 1 of preceding Article, as well as the items specified in each paragraph of to paragraph 1 of Article 21 of the Environmental Impact Assessment Law, in the Environmental Assessment Statement (hereinafter referred to as a “EIS”) defined in the same paragraph of that Law.

(Submittal of EIS)

**Article 46-16** A specific business operator, after preparing the EIS pursuant to paragraph 2 of Article 21 of the Environmental Impact Assessment Law, shall submit it to the Minister of METI. The same shall be done when a specific

business operator alters the EIS in response to the order issued pursuant to paragraph 1 of the following article.

(Order of Alteration)

**Article 46-17** Regarding a specific project on which the EIS was submitted pursuant to preceding article, the Minister of METI, may order the specific business operator to alter the EIS with setting the appropriate deadline but within a time to be established by the ordinance of METI from the day received the EIS pursuant to the same article, when deemed it to be especially necessary and appropriate to assure proper measurement to protect the environment.

2. The Minister of METI shall notify the purport to the specific business operator without delay when he admits it unnecessary to order pursuant to preceding paragraph.

(Submittal of the EIS)

**Article 46-18** The Minister of METI, when issuing the notification pursuant to paragraph 2 of the preceding article, shall submit the copy of the concerned EIS to the Minister of the Environment issued.

2. A specific business operator, upon receiving the notification pursuant to paragraph 2 of the preceding article, shall promptly submit the concerned EIS, its summary and the document describing the content of the order pursuant to paragraph 1 of the preceding article to the related prefectural governors and related mayors of cities, towns and villages, specified in Article 15 of the Environmental Impact Assessment Law.

(Announcement and Exhibition to the Public)

**Article 46-19** Concerning the application of Article 27 of the Environmental Impact Assessment Law to a specific business operator, "making a submission or notice pursuant to the provisions of Article 25, Paragraph 3" in that article shall be construed to "receiving the notice pursuant to the provisions of Article 46-17, Paragraph 2 of Electricity Utilities Industry Law", "EIS" shall be construed to "concerned EIS", and "EIS, the summary, and the papers specified in Article 24" shall be construed to "the concerned EIS, its summary and the document describing the content of the order pursuant to paragraph 1 of the same article".

(Consideration for Protection of the Environment)

**Article 46-20** A specific business operator shall implement the specific project paying proper consideration in protecting the environment pursuant to paragraph 1 of Article 38 of the Environmental Impact Assessment Law, and maintain and operate the electric structure for business use concerning the specific project paying proper consideration in protecting the environment pursuant to the contents of the EIS concerning the notification issued pursuant to paragraph 2 of Article 46-17.

(Technical Reinterpretation for Application of the Environmental Impact Assessment Law)

**Article 46-21** Technical reinterpretation for application of the provisions of the Environmental Impact Assessment Law over the specific business operator and items required for application of the provisions of that Law to the specific business operator other than those specified in this stipulation, shall be provided for in the government ordinance.

(Exemptions for Application of the Environmental Impact Assessment Law)

**Article 46-22** Provisions from Articles 22 to 26, and from Articles 33 to 37 of the Environmental Impact Assessment Law shall not be applied to the specific project of the specific business operator.

(Construction Plans)

**Article 47.** Any person who intend to conduct construction work to establish or alter an electric structure for business use, defined as extremely important to assure public safety in the ordinance of METI, shall obtain an approval of the construction plans from the Minister of METI, unless the work is unavoidably temporary one in case of an emergency such as destruction or damage of an electric structure for business use, or a disaster.

2. A person who has received the approval pursuant to the preceding paragraph shall obtain the approval of the Minister of METI if he intends to alter the construction plan for which the approval was granted, unless the alteration is minor one specified in the ordinance of the Minister of METI.

3. The Minister of METI shall grant the approval of each of two preceding paragraphs when the construction plan applying for approval pursuant to each of two preceding paragraphs meets all of the requirements set forth below.

(i) The electric structure for business use conforms to the technical standards specified in the ordinance of METI referred to in paragraph 1 of Article 39.

(ii) The electric structure for business use shall be technically appropriate one in ensuring smooth supply of electricity when in case that an electric structures for business use is devoted to a general electric utility.

(iii) Regarding a specific project, it shall conform to the EIS concerning the notification issued pursuant to paragraph 2 of Article 46-17.

4. A person who establishes an electric structure for business use, in case of latter part of paragraph 1, shall notify the fact to METI without delay after beginning concerned work.

5. A person who received the approval pursuant to paragraph 1, in case of latter part of paragraph 2, shall notify the altered construction plan to METI without delay after altering it, unless the case is specified in the ordinance of METI.

**Article 48.** Any person who intends to conduct construction work to establish or alter an electric structure for business use (excluding the work defined in the ordinance of METI, described in paragraph 1 of the preceding article), shall notify the Minister of METI of the construction plan. The same shall be applied to alterations of concerned construction plan (excluding minor alterations specified in the ordinance of METI).

2. A person who has made the notification pursuant to the preceding paragraph may not begin the construction work concerning the notification within thirty days from the day on which the notification was accepted.

3. The Minister of METI may reduce the time required by the preceding paragraph when the construction plan notified pursuant to paragraph 1 of this article meets all of the requirements set forth below;

- (i) The requirements specified in each item of paragraph 3 of the preceding article.
- (ii) Regarding a power generating electric structures for business use which use hydraulic power as motive force, the electric structure for business use is technically appropriate to ensure the effective utilization of hydraulic power generation..

4. The Minister of METI may order the person who notified pursuant to paragraph 1 of this article to alter or abolish the notified construction plan within thirty days (or extended period in case that the period defined in paragraph 2 of this article is extended pursuant to the following paragraph) from the accepted date of the notification, unless the construction plan notified pursuant to paragraph 1 of this article is deemed to conform to any of the requirements in paragraph 3 of the preceding article.

5. The Minister of METI may appropriately extend the period specified in paragraph 2 of this article, when the review on assurance of conformability of the construction plan notified pursuant to paragraph 1 of this article to each requirements specified in Paragraph 3 of this article requires considerable period, and there exists reasonable reason for the concerned review not to be completed within the period specified in paragraph 2 of this article. In this case, the Minister of METI, without delay, shall notify the extended period and the reason for the extension to the person who notified.

(Pre-service Inspection)

**Article 49.** Regarding an electric structure for business use, defined as extremely important to assure public safety in the ordinance of METI, which is constructed or altered with the approval pursuant to paragraph 1 or paragraph 2 of Article 47, or which is constructed or altered with the notification pursuant to paragraph 1 of the preceding article (excluding structure for which no notification has been made pursuant to paragraph 1 of Article 47, in case that an order was issued concerning the construction plan referred to in Paragraph 4 of that article), the structure shall be subject to inspection on its work conducted by of the Minister of METI or an person designated by the Minister of METI, in accordance with the ordinance of METI, and shall not be used before the structure has passed such inspection, except a case provided in the ordinance of METI.

2. The electric structure for business use shall pass the inspection specified in preceding paragraph if it meets all of the following requirements.

(i) The construction work was performed in accordance with the construction plan approved pursuant to paragraph 1 or paragraph 2 of Article 47 (including minor alterations, defined in the ordinance of METI, pursuant to latter part of paragraph 2 of Article 47), or the construction plan notified pursuant to paragraph 1 of the preceding article (including minor alterations, defined in the ordinance of METI, pursuant to the latter part of that paragraph).

(ii) It conforms to the technical standards specified in the ordinance of METI referred to in paragraph 1 of Article 39

(Inspection on Fuel Assembly)

**Article 51.** Nuclear fuel material to be used as fuel for nuclear power reactors (hereinafter referred to as "fuel material") shall be subject to inspection by the Minister of METI at each of the fabrication processes, specified in the ordinance of METI, and shall not be used before it has passed the inspection, except a case specified in paragraph 3 and cases specified in the ordinance of METI.

2. Fuel material shall pass the inspection specified in the preceding paragraph if it meets both of the following requirements.

(i) Its fabrication is performed in accordance with the design approved by the Minister of METI in advance.

(ii) It conforms to the technical standards specified in the ordinance of METI.

3. Imported fuel material shall not be used unless it has passed the inspection of the Minister of METI.

4. Imported fuel material shall pass the inspection described in the preceding paragraph if it conforms to the technical standards specified in the ordinance of METI described in paragraph 2 (ii) of this article.

(Inspection on Welding Safety Management)

**Article 52.** Any person who intends to establish electric structures specified below shall perform self- inspection on weld of them and shall record the result of inspection before use pursuant to the ordinance of the METI, except the case defined in the ordinance of METI; those structures (hereinafter referred to as "boilers, etc.") for power generation, which are boiler, turbine, or other mechanics or instrument specified in the ordinance of METI, whose pressurized parts (hereinafter referred to as "pressurized part") with at least the pressure specified in the ordinance of METI are welded; those structures (hereinafter referred to as "containment, etc.") for nuclear power reactor, which are containment vessel, or other mechanics and instruments specified in the ordinance of METI, which are welded; or those imported structures which are boilers, etc. whose pressurized parts are welded, or containment, etc. which is welded.

2. In the inspection of the preceding paragraph (hereinafter referred to as "welding self-inspection"), it shall be confirmed that the welding conforms to the technical standards specified in the ordinance of METI, referred to in Paragraph 1 of Article 39,.

3. A person who establishes the electric structures with performing the welding self-inspection shall undergo the investigation on the organization for implementation of the welding self-inspection by the Minister of METI or the party designated by the Minister of METI, at the time specified in the ordinance of METI.

4. The examination of the preceding paragraph, as a purport of safety management of electric structures, shall be conducted about the organization for implementation of the welding self-inspection, the inspection method, schedule control, and other items specified in the ordinance of METI.

(Periodic Inspection)

**Article 54.** Any Person who establishes boiler, turbine or other electric structure for power generation, which is defined in the ordinance of METI as a extremely important items for ensuring public safety and includes the parts

pressurized with more than the specified pressure in the ordinance of METI, or nuclear power reactor or related components specified in the ordinance of METI, shall undergo inspection by the Minister of METI or the party designated by the Minister of METI at the interval specified in the ordinance of METI except the case defined in the ordinance of METI.

(Designated Organizations for Inspections)

**Article 67.** The designation specified in of Paragraph 1 of Article 49 or Article 54 shall be conducted, pursuant to the ordinance of METI, through the application of a party who intends to perform the inspection specified in Paragraph 1 of Article 49 or Article 54, for each division defined in the ordinance of METI.

(Ineligibility)

**Article 68.** Person who meets any of the following shall be ineligible to receive the designation defined in Paragraph 1 of Article 49 or Article 54.

(i) Person who did not pass two years after completion of the punishment or the payment of a fine, which was ordered because of violation of the provisions of this, law or orders based on this law,

(ii) Person who did not pass two years after revocation of designation by the provisions of Article 79, or

(iii) Juridical person who includes any persons specified in (i) or (ii) above as management officer.

(Standards for Designation)

**Article 69.** The Minister of METI shall not designate the applicant for unless deemed that the application for designation defined in Paragraph 1 of Article 49 or Article 54 meet all of the following conditions.,

(i) Inspection is performed by persons with knowledge and experience which meets the conditions specified in the ordinance of the ordinance of METI, and the number of such persons exceeds the number required by ordinance of the ordinance of METI.

(ii) There exists a sufficient financial basis and sufficient technical ability for proper execution of the inspection works.

(iii) For juridical person, there is no threat in executing fair inspection owing to the composition of its management officers, or members specified for each category of juridical person in the ordinance of METI.

(iv) The application meets the standard, specified in the ordinance of METI, on the unfair execution of inspections other than the preceding paragraph

(v) Smooth and proper execution of inspections may not be obstructed by designation.

(Business Rules)

**Article 72.** A designated organization for inspections shall establish rules on the inspection business (hereinafter referred to in this part as "business rules") and obtain the approval of the Minister of METI, and shall obtain the approval of the Minister of METI as well when the business rules are changed.

2. The contents of the business rule shall be specified in the ordinance of METI

3. The Minister of METI may order the designated organization for inspections to change its business rules, when deemed that the business rules, approved pursuant to paragraph 1 of this article, have become unsuitable for the fair execution of inspections,

(Temporary Halt or Abolition of Business)

**Article 73.** A designated organization for inspections shall notify the Minister of METI in advance, when it halt temporarily or abolish all or a part of its inspection business, pursuant to the ordinance of METI.

(Dismissal Orders)

**Article 76.** The Minister of METI may order designated organization for inspections to dismiss inspector when the inspector has violated the provisions of this law or the provisions of orders based on this law, or the business rule.

(Orders for Conformity)

**Article 78.** The Minister of METI may order, when deemed that a designated organization for inspections has turned not to conform to any of (i) through (iv) of Article 69, designated organization for inspections to take necessary measures to comply with these provisions

(Revocation of Designation)

**Article 79.** The Minister of METI may revoke the designation of Paragraph 1 of Article 49, or order to halt all or a part of the inspection business for a specified period of time, when a designated organization for inspections meet any of the followings;

(i) a designated organization for inspections has violated the provisions of the part of this law.

(ii) a designated organization for inspections meets (i) or (iii) of Article 68.

(iii) a designated organization for inspections has executed inspection in a manner not in accordance with the business rules which was approved pursuant to Paragraph 1 of Article 72.

(iv) a designated organization for inspections has violated an order based on the provisions of Paragraph 3 of Article 72, Article 76 or the preceding article.

(v) a designated organization for inspections has obtained the designation of in Paragraph 1 of Article 49 or Article 54 through unjust means.

(Ledgers)

**Article 80.** A designated organization for inspections shall prepare ledgers and record the matters on the inspection business specified in the ordinance of METI.

2. The ledgers referred to in the preceding paragraph shall be stored in accordance with the ordinance of METI.

(Collection of Reports)

(Designated Organizations for Audit on Safety Management)



**Article 81.** The designation specified in of Paragraph 3 of Article 52 shall be conducted, pursuant to the ordinance of METI, through the application of a party who intends to perform the audit specified in Paragraph 3 of Article 52, for each division defined in the ordinance of METI.

(Duties of Audit on Safety Management)

**Article 81-2.** A designated organizations for audit on safety management shall perform the audit on safety management without delay at any time when the audit on safety management is demanded, unless there exist due reason to refuse.

(Application with Modification)

**Article 81-3.** The following articles shall be applied to designated organizations for audit on safety management with appropriate modification; Article 68, Article 69, Article 72, Article 73, and Article 76 through Article 80.

**Article 106.** The Minister of METI may require electric utility to report on its business or financial situations to the extent necessary for the enforcement of this law in accordance with the ordinance of METI

**3.** The Minister of METI may require designated organization for inspection, designated organizations for audit on safety management or designated organization for qualification test to report on its business or financial situations to the extent necessary for the enforcement of this law in accordance with the ordinance of METI.

(Entry and Inspection)

**Article 107.** The Minister of METI may have staff of METI enter the premises of the business places, offices or other places of business of an electric utility and inspect its business or financial situations, or its electric structures, ledgers, documents and other objects to the extent necessary for the enforcement of this law.

**2.** The Minister of METI may have staff of METI enter the premises of the factories, business places, offices or other places of business of those who establish electric structures for private use, fabricate fuel assemblies, or weld boilers, etc. or containment, etc. and inspect their electric structures, ledgers, documents and other objects to the extent necessary for the enforcement of this law.

**5.** The Minister of METI may have staff of METI enter the offices or the places of business of a designated organization for inspection or a designated organizations for audit on safety management, or the offices of a designated organization for qualification test and inspect its business situations or its ledgers, documents, and other objects to the extent necessary for the enforcement of this law.

(Penalties)

**Article 115.** A person who has obstructed generation, transformation, transmission or distribution of electric power through damaging electric structures for use of an electric utility or otherwise hindering function of electric structures for use of an electric utility shall be sentenced to a term of penal servitude of 5 years or less, or fined 1 million yen or less.

**2.** A person who has obstructed the generation, transformation, transmission, or distribution of electric power through the violative operation of electric structures for use of an electric utility shall be sentenced to a term of penal servitude of 2 years or less, or fined 500,000 yen or less.

**3.** A person engaged in an electric utility who has obstructed generation, transformation, transmission, or distribution of electric power through neglecting to maintain or operate without due reasons shall be sentenced to the same punishment as the preceding paragraph

**4.** Attempted crimes of Paragraphs 1 and 2 shall be punished.

**Article 116.** A person who has carried on an electric utility in violation of the provisions of Paragraph 1 of Article 3 shall be sentenced to a term of penal servitude of 3 years or less, or fined 3 million yen or less., or both of these punishments.

**Article 117.** A person who falls under any of the following shall be sentenced to a term of penal servitude of 2 years or less, or fined 3 million yen or less., or both of these punishments.

(ii) A person who has refused to supply electricity in violation of the provisions of Paragraphs I through 3 of Article 18.

**Article 117-2.** A management officer or staff of a designated organization for inspection, a designated organizations for audit on safety management or a designated organization for qualification test who has violated an order to halt inspection business or qualification test business specified in Article 79 shall be sentenced to a term of penal servitude of 1 year or less, or fined 1 million yen or less..

**Article 118.** A person who falls under any of the following shall be fined 3 million yen or less.

(ii) A person who has violated an order issued pursuant to the provisions of Paragraph 5 of Article 19.

(vii) A person who has violated an order or a direction issued pursuant to the provisions of Article 40.

(viii) A person who has not assigned a chief engineer in violation of the provisions of Paragraph 1 of Article 43.

(ix) A person who has performed construction work to establish or alter an electric structure in violation of the provisions of Paragraph 1 of Article 47.

**Article 119.** A person who falls under any of the following shall be fined 1 million yen or less.

(iii) A person who has performed construction work to establish or alter an electric structure in violation of the provisions of Paragraph 4 of Article 48.

(iv) A person who has used an electric structure in violation of the provisions of Paragraph 1 of Article 49, Paragraph 1 or 3 of Article 51.

**Article 119-2.** A management officer or staff of a designated organization for inspection or a designated organizations for audit on safety management or a designated organization for qualification test who falls under any of the following shall be fined 300,000 yen or less.

(i) Abolition of inspection business without notification or with false notification in violation of the provision of Article 73.

(ii) Failure of record or false record in ledgers in violation of the provisions of Paragraph 1 of Article 80 or Article 81-3.

- (iii) Failure to store ledgers in violation of the provisions of Paragraph 2 of Article 80 or Article 81-3.
- (iv) Failure of reporting or false report in violation of the provisions of Paragraph 3 of Article 106.
- (v) Refusal, obstruction or evasion of an inspection in violation of the provisions of Paragraph 5 of Article 107.

**Article 120.** A person who falls under any of the following shall be fined 300,000 yen or less.

- (i) A person who has failed to notify or has falsely notified in violation of the provisions of Paragraph 4 of Article 7, Paragraph 1 of Article 9, Paragraph 1 or 2 of Article 42, Paragraph 3 of Article 43, Paragraph 4 or 5 of Article 47.
- (vi) A person who has violated an order issued pursuant to the provisions of Paragraph 3 of Article 42.
- (vii) A person who has performed construction work to establish or alter an electric structure in violation of the provisions of Paragraph 1 or 2 of Article 48.
- (viii) A person who has refused, obstructed or evaded an inspection in violation of the provisions of Paragraph 1 of Article 54 or Paragraph 1 through 4 of Article 107.
- (xii) A person who has failed to report or has falsely reported in violation of the provisions of Paragraph 1 of Article 106.

**Article 121.** When representatives of juridical person or the agents, employees or such other workers of a juridical person or natural person have committed an act in violation of Article 116, Article 117, Article 118, Article 119, or the preceding article in relation to the business of such juridical person or natural person, in addition to penalizing the party who committed such act, the penalties of each of the said Articles shall be imposed on that juridical person or that natural person.

**Article 123.** A person who falls under any of the following shall be fined a correctional, non-penal fine of 100,000 yen.

- (ii) A person who has not returned chief engineer's license without due reason in violation of an order issued pursuant to Paragraph 4 of Article 44.

**(2) Ordinance for the Enforcement of the Electricity Utilities Industry Law(Excerpt)**  
**(Government Ordinance No. 206, June 15, 1965)**  
**Latest Revision: Ordinance No.311, June 7, 2000**

(Trust of Competence)

**Article 9.** The competencies of the Minister of METI indicated in the left row of the following table shall be entrusted to the director of the Economy, Trade and Industry Bureau indicated respectively in the right row of that table.

<p>(xii) The competencies based on the provisions of Article 54 of the Law, to be indicated below.</p> <p>(b) Competencies concerning electric structures belonging to power producing equipment with the output of less than 900,000kw of a nuclear power station (limited to whose power reactor uses light water as the moderator and the coolant, or uses graphite as the moderator and carbon dioxide as the coolant respectively), and the attached facilities of the power reactor of that power producing equipment.</p>	<p>The Director-General of the Economy Trade and Industry bureau having jurisdiction over the location where the electric structures are established.</p>
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**(3) Rules for the Enforcement of the Electricity Utilities Industry Law(Excerpt)**  
**(Ordinance of MITI No. 77, October 18, 1995)**  
**Latest Revision: Ordinance No.178 of METI, June 29, 2001**

(Approval, Etc. of Construction Plans)

**Article 62.** The construction work to establish or alter an electric structure for business use provided for in the ordinance of METI referred to in Paragraph 1 of Article 47 of the Law, (hereinafter referred to as "restricted construction work"), shall be as indicated in the middle row of annexed Table 2 according to the types of construction work indicated in the upper row of that table; or other work, constituting actions indicated in Article 7, Paragraph 1 of the Law on Prevention of Damage from Collapse of Steeply Inclined Land (1969, Law No. 57) which are performed within steeply inclined land collapse risk areas referred to in Article 3, Paragraph 1 of that law (hereinafter referred to as "steeply inclined land collapse risk areas"), excluding the case that the work had already begun at the time of designation of that steeply inclined land collapse risk area and the cases of Article 2, Nos.1 to 8 of the Enforcement Ordinance of the Law on Prevention of Damage from Collapse of Steeply Inclined Land (1966, Government Ordinance No. 206).

**2.** The minor alterations provided for in the proviso of Paragraph 2 of Article 47 of the Law shall be those alteration that do not involve the work indicated in the middle or bottom row of annexed Table 2 or the bottom row of annexed Table 4 or restricted construction work performed in steeply inclined land collapse risk areas.

**3.** The cases provided for in the proviso of Paragraph 5 of Article 47 of the Law shall be cases which do not involve alters in the matters indicated in the construction plan referred to in Paragraph 1(i) of the following article.

**Article 63.** Any person who intends to obtain the approval of Paragraph 1 or 2 of Article 47 of the Law shall submit an application for approval for a construction plan (or alteration), using Form 47with the following documents attached. However, if the application concerns construction work for alterations, it shall not be necessary to include the documents (ii) in the case of replacement or repair work, and it shall not be necessary to include the documents (ii) and (iii) in the case of abolishment work.

(i) The construction plan.

(ii) The documents, indicated in the lower row of annexed Table 3 according to the category indicated in the upper row of that column to which the concerned electric structure for business use belongs.

- (iii) The construction process table.
  - (iv) In the case of construction work for alterations or alterations in the construction plan, a statement of the reasons making the alterations necessary.
2. The construction plan of (i) of the preceding paragraph shall include the matters indicated in the middle column of annexed Table 3 (or the repair methods in the case that the application is for repair work) corresponding to the type of an electric structure for business use for which the application was submitted. In this case, if the application is for construction work for alteration (excluding work for replacement, repair, and abolition) or alterations in the construction plan, these matters must be presented in a manner that facilitates comparison between the situation before the alterations and the situation after the alterations.
3. In the case of divided application for approval, referred to in Paragraph 1 of Article 47 of the Law, on the construction plan indicated in the middle row of annexed Table 2, in addition to the documents of each items in Paragraph 1, a statement must be attached to the application, giving an overview of the construction plan of other portion than the portion concerned in the application.

(Pre-service Inspection)

**Article 69.** The inspection referred to in Paragraph 1 of Article 49 shall be undergone in the process of the construction work indicated below.

- (i) Construction work of nuclear power stations.
  - (a) Regarding reactor, reactor cooling system, Instrumentation and control system equipment, fuel handling equipment, radiation management equipment, disposal equipment, and reactor containment facilities, at the time when these have reached a state allowing testing of their structure, strength, or leak.
  - (b) At the time when lower half of a steam turbine wheel room has completed be installed and main body of an auxiliary boiler has completed be assembled.
  - (c) At the time when reactor has reached a state allowing insertion of fuel.
  - (d) At the time when reactor has reached criticality.
  - (e) At the time when all construction work related to the construction plan has been completed.
- (ii) Construction work other than that indicated above: At the time when all construction work related to the construction plan has been completed.

**Article 70.** The cases provided for Paragraph 1 of Article 49 of the Law shall be as follows.

- (i) The case that a nuclear reactor is to be used in a testing, and the approval of the Minister of METI has been obtained concerning the time period and method of usage, and the reactor or line is used during the time period and by the method for which that approval was obtained.
- (ii) The case that electric structures for business use other than the electric structures for business use referred to in the preceding number are connected with power grids and used for testing within a time period notified in advance to the Minister of METI.
- (iii) The case that electric structures for business use other than those referred to in the No. 1 are used for testing within a time period notified in advance to the Minister of METI without being connected with power grids.
- (iv) The case that a portion of an electric structure for business use has been completed, and there are special circumstances such that the completed portion must be used at a time other than their use for testing, and the approval of the Minister of METI has been obtained concerning the time period and method of usage, and the concerned portion is used during the time period and by the method for which that approval was obtained.
- (v) The case that the Minister of METI has indicated that an electric structure for business use may be used without inspection, having deemed that there is no obstacle to such use based on the situation of its location or the content of construction.

**Article 77.** Any person who intends to obtain the approval of Paragraph 2 (i) of Article 51 of the Law shall submit an application for design approval of fuel assemblies using Form 54, with the following documents attached.

- (i) Description on heat resistance, radiation resistance, corrosion resistance and other performance of the fuel assembly
- (ii) Calculation of mechanical strength of a fuel assembly (or a fuel element for fuel assembly composed of fuel elements)
- (iii) Structural drawings of the fuel assembly
- (iv) Flow sheet of fabrication
- (v) Description on Quality Assurance

**Article 78.** Any person who intends to receive the inspection provided for in Paragraph 3 of Article 51 of the Law shall submit an application for inspection for imported fuel assemblies using Form 55, with the following documents attached, unless the Minister of METI indicates that it is not necessary to attach the documents judged from type and design, etc. of fuel assembly concerning the application.

- (i) Description on heat resistance, radiation resistance, corrosion resistance and other performance of the fuel assembly
- (ii) Calculation of mechanical strength of the fuel assembly (or a fuel element for fuel assembly composed of fuel elements)
- (iii) Structural drawings of the fuel assembly
- (iv) Flow sheet of fabrication
- (v) Data of the test result, including composition, structure and strength, etc. of the fuel material, the fuel cladding and other parts
- (vi) Description on Quality Assurance

**Article 80.** The pressures provided for in paragraph 1 of Article 52 of the Law shall be as follows.

- (i) Regarding vessel and pipe for water whose maximum working temperature is less than 100 degrees, a maximum working pressure of 1,960 kilopascals.
- (ii) Regarding vessel and pipe for liquefied gas, a maximum working pressure of 98 kilopascals.
- (iii) Regarding vessel other than the containers referred to (i) and (ii) above, a maximum working pressure of 98 kilopascals.
- (iv) Regarding pipe other than the pipe referred to in (i) and (ii) above, a maximum working pressure of 980 kilopascals (or 490 kilopascals in the case of longitudinal seam portion of pipe which do not belong to fuel cell facilities).

(Periodic Inspections)

**Article 89.** The specific pressure structures provided for in Article 54 of the Law shall be steam turbine belonging to nuclear power stations.

**Article 90.** The nuclear power reactor and attached equipment provided for in Paragraph 1 of Article 54 of the Law shall be reactor, the reactor cooling system, instrumentation and control system, fuel equipment, radiation management equipment, disposal equipment, reactor containment facility, and auxiliary boiler, and emergency power generation devices.

**Article 91.** The time periods provided for in Article 54 of the Law shall be as follows.

- (i) For steam turbine belonging to nuclear power station, the time not earlier than one year but within 13 month after the date when operation began or the date when the Periodic Inspection (defined in Article 54 of the Law) was completed.
- (ii) For items specified in the preceding article, the time not earlier than one year but within 13 month after the date when operation began or the date when the Periodic Inspection was completed.

**Article 92.** The cases provided for in the proviso of Article 54 of the Law shall be as follows.

- (i) The case that the Minister of METI (or in the case of an electric structure for business use related to the authority of No. 12 of the table in Article 8 of the ordinance, the director of the International Trade and Industry bureau exercising such authority; the same applies in the next item) deems it unnecessary, based on the usage situation, to perform an inspection at the time referred to in the preceding article, and has given approval, instructing the time when the inspection should be performed.
- (ii) In the case that the Minister of METI deems that, due to a disaster or other emergency, it would be significantly difficult to perform an inspection at the time referred to in the preceding article, and has given approval, instructing the time when the inspection should be performed.

**Article 93.** A person who intends to undergo the inspection referred to in Paragraph 1 of Article 54 of the Law shall submit an application for the Periodic Inspection, using Form 61.

**2.** A person who undergoes the inspection referred to in Paragraph 1 of Article 54 of the Law performed by a designated organization for inspection shall submit an application for the Periodic Inspection to the designated organization for inspection as required by that organization.

#### **(4) Ordinance of Establishing Technical Standards for Nuclear Power Generation Equipment (Excerpt)**

**(Ordinance No. 62 of MITI, June 15, 1965)**

**Latest Revision: Ordinance No. 24, March 21, 2001**

(Definitions)

**Article 2.** Terminology used in this Ministerial Order is defined in the following respectively.

- (vii) "Control zones" means the areas within a nuclear power station where there is a hazard that the dose may exceed the limit specified separately by the ministerial notification, and that the concentration of radioactive material in the air may exceed the level specified separately by the ministerial notification or that the density of radioactive material on the surface of objects contaminated by radioactive material may exceed the level specified separately by the ministerial notification.
- (viii) "Environmental monitoring area" means those areas surrounding control zones, the outside of which there is no possibility of the dose exceeding the limit of the dose specified separately by the ministerial notification..

(Instrumentation Devices)

**Article 20.** Nuclear power station shall be equipped with the devices directly to measure the followings;

- (vii) The concentration of radioactive materials in ventilation gases at the outlets of ventilation tubes or at locations near those outlets.
- (viii) The concentration of radioactive materials in discharge at the outlets of draining points or at locations near those outlets.
- (x) The dose equivalent rates in control zones and zones adjacent to monitoring areas.

(Alarm Devices, Etc.)

**Article 21.** Nuclear power station shall be equipped with automatic alarming devices through reliably detecting those following events; a danger of remarkable obstacles in operation of reactor caused by loss of function of its components or mis-operation, a remarkable increase in the concentration of radioactive materials referred to in No. 7 of the preceding article or in the dose rate referred to in No. 10 of that article, a danger of remarkable leak of radioactive liquid waste form facilities for processing or storing radioactive waste in liquid form.

(Biological Shields)

**Article 27.** Biological shields shall be installed at places inside nuclear power station where it is necessary to prevent radiation hazards due to external radiation.

(Ventilation Facilities)

**Article 28.** Ventilation facilities shall be installed at places inside a nuclear power station where it is necessary to prevent radiation hazards due to air polluted with radioactive materials.

(Prevention of Contamination by Radioactive Materials)

**Article 29.** In buildings of nuclear power stations that are frequently accessed by people, the surfaces of walls, floors, and other portions which could become contaminated with radioactive materials, and the portions which could be touched by people, shall be such as to allow easy removal of contamination by radioactive materials.

(Waste Processing Equipment, Etc.)

**Article 30.** In nuclear power stations, equipment must be installed for the processing of radioactive waste.

### **(5) Technical Standards on Dose Equivalent, etc. due to Radiation Relating to Nuclear Power Generation Equipment (Excerpt) (Notification No. 188 Issued by METI, March 21, 2001)**

(Dose, Etc. Related to Control Zones)

**Article 1.** Article 1 and 11 of the Notification, issued by METI No.187, 2001, shall apply to dose from external radiation, concentrations of radioactive materials in air, or concentrations of radioactive materials on the surfaces of objects contaminated with radioactive materials specified in the provisions of Article 2, No. 7 of the Ordinance of Establishing Technical Standards for Nuclear Power Generation Equipment (hereinafter referred to as the "Ministerial Order").

(Dose Limits Related to Monitoring Areas)

**Article 2.** The provisions of Articles 2 and 11 of the Notification shall also apply to dose limits specified in the provisions of Article 2 (viii) of the Ministerial Order.

(Concentrations of Radioactive Materials Outside Monitoring Areas)

**Article 3.** The provisions of Article 9 of the Notification shall also apply to the concentrations of radioactive materials in the air outside monitoring areas and in the water at the boundaries with monitoring areas, specified in the provisions of Paragraph 1(i) of Article 30 of the Ministerial Order.

## **3.9 Basic Law on Emergency Preparedness**

### **(1) Basic Law on Emergency Preparedness (Excerpt)**

**(Law No. 223, November 15, 1961)**

**Latest Revision: Law No.99, May 31, 2000**

(Objectives)

**Article 1.** This law is a provision for the establishment of necessary disaster countermeasures systems through the national government, local governments and other public agencies to protect the national land, and the lives, health, and assets of the citizens from disaster, and clarifies the parties responsible for the same. It also specifies the principles regarding preparation of disaster countermeasures plans, disaster prevention, disaster emergency countermeasures, financial measures for disaster recovery and disaster countermeasures, and fundamentals of other necessary disaster countermeasures, thereby contributing to the development and promotion of comprehensive and systematic disaster countermeasures administration to maintain social order and ensure public welfare.

(Definition)

**Article 2.** The terminology used in this law is defined in the following respectively.

(i). Disaster Disaster means damage due to wind storm, heavy rainfall, heavy snowfall, flood, high tide, earthquake, tsunami, volcanic eruption and other abnormal natural phenomena, or large fire and/or explosion, and other causes specified in government ordinances according to the disaster level.

(Responsibility of the National Government)

**Article 3.** The National Government shall be responsible for taking all possible steps with respect to disaster countermeasures by mobilizing all of its organizations and functions, in view of its mission to protect the national land, and lives, health, and assets of citizens from disaster.

**2.** In order to perform the responsibility referred to in the preceding paragraph, the National Government is to prepare a plan that should be the bases of disaster prevention, disaster emergency countermeasures, and disaster recovery, execute the said plan in accordance with the legislation, make promotion and overall coordination of the affairs or activities handled by the local governments, designated public agencies, and designated local public agencies etc., and rationalize the bearing of expenses in connection with disasters.

**3.** In performing the assigned duties, the designated administrative agencies and designated local administrative agencies have to cooperate each other to ensure the full performance of the responsibility of the National Government referred to in the Paragraph 1.

**4.** The chiefs of the designated administrative agencies and designated local administrative agencies shall recommend, instruct, advise, and take other adequate measures for the relevant prefectures or municipalities with regard to their duties so that the preparation and execution of the local disaster countermeasures plans in accordance with the provisions of this Law should be performed smoothly by the relevant prefectures and municipalities.

(Responsibility of Prefectures)

**Article 4.** In order to protect the region of the prefectures, and the lives, health, and assets of the residents of the relevant prefectures from disaster, the prefectural governments shall have a responsibility, by the cooperation of the related

agencies and other local governments, to prepare disaster countermeasures plans with regard to the regions of the relevant prefectures, execute the same in accordance with the regulations, assist the municipalities and designated local public agencies within the region in the performance of their duties and activities for disaster countermeasures, and make an overall coordination.

2. Prefectural agencies shall cooperate each other in the performance of their assigned duties so that the responsibility of the prefectural governments referred to in the preceding paragraph should be fully accomplished.  
(Responsibility of Municipalities)

**Article 5.** Being bases of local governments, the municipal governments shall, prepare plans for disaster countermeasures in regard to the regions of the relevant municipalities with cooperation of the related agencies and other local governments, and shall execute the same in accordance with the legislation on their own responsibility, in order to protect the regions of the relevant municipalities, and the lives, health, and assets of the residents of the relevant municipalities from disaster.

2. The mayors of municipalities shall make efforts to develop such organizations as fire fighting agencies and flood control squadrons, and enrich the organizations established in public organizations aiming for disaster countermeasures within the administrative territory of the relevant municipalities and voluntary organizations of residents for disaster countermeasures established by the spirit of neighbors cooperation (referred to as "voluntary disaster countermeasures organizations" in Article 8, Paragraph 2), and make full use of the functions of municipalities, in order to accomplish the responsibility referred to in the preceding paragraph.

3. In performing the assigned duties, municipal agencies such as fire fighting agencies and flood control squadrons shall cooperate each other so that the responsibility of municipalities provided for in the paragraph 1 should be fully accomplished.

(Responsibility of Designated Public Agencies and Designated Local Public Agencies)

**Article 6.** The designated public agencies and designated local public agencies shall prepare plans for disaster countermeasures with regard to their respective duties, execute the same in accordance with the legislation, and shall be responsible for cooperating the relevant prefectures and municipalities in relation to their duties, so that the preparation and execution of disaster countermeasures plans in accordance with the provisions of this Law should be conducted smoothly by the National Government as well as prefectural and municipal governments.

2. In view of the public nature of their duties or the public interest, the designated public agencies and designated local public agencies have to contribute to disaster countermeasures through their respective duties.

(Establishment of Central Disaster Prevention Council and Assigned Duties)

**Article 11.** The Central Disaster Prevention Council shall be established in the Cabinet's Office.

2. The Central Disaster Council shall be responsible for the following items.

(i) To prepare the basic plan of disaster countermeasures and promote the execution of the same.

(ii) To prepare plans regarding emergency measures and promote the execution of the same on the occasion of emergency disasters.

(iii) To deliberate important issues regarding disaster countermeasures in response to an inquiry from the Prime Minister.

(vii) The affairs placed under its authority in accordance with the provisions of the legislation, aside from the above items.

4. The Prime Minister shall submit the following items to the Central Disaster Prevention Council for deliberation.

(i) Basic policies on disaster countermeasures

(ii) Important items regarding overall coordination of disaster countermeasures.

(iii) General principles on emergency measures needed temporarily on the occasion of emergency disasters.

(iv) Proclamation of emergency situation of disaster.

(v) Other important matters relating to disaster countermeasures to be deemed necessary by the Prime Minister.

(Organization of the Central Disaster Prevention Council)

**Article 12.** The Central Disaster Prevention Council shall consist of a chairman and council members.

2. The chairman shall be the Prime Minister.

(Disaster Countermeasure Headquarters)

**Article 23.** Prefectural governors or municipal mayors may establish a disaster countermeasure headquarters in accordance with the prefectural or municipal disaster countermeasures plans when the above is deemed necessary to enhance disaster countermeasures when a disaster has occurred or is likely to occur in the jurisdiction of the said prefectures or municipalities.

2. The head of the disaster countermeasures headquarters shall be the general manager of the disaster countermeasures headquarters, who shall be the prefectural governor or a municipal mayor.

(Establishment of Emergency Disaster Countermeasures Headquarters)

**Article 24.** When an emergency disaster occurs, in view of the scale and other circumstances whereof a special necessity is recognized in order to enhance disaster emergency countermeasures, the Prime Minister may establish the Emergency and Disaster Countermeasures Headquarters in the Prime Minister's Office on a temporary basis regardless of the provisions of National Government Organization Law, Article 40, Item 2.

(Organization of Emergency and Disaster Countermeasures Headquarters)

**Article 25.** The head of the Emergency and Disaster Countermeasures Headquarters shall be the General Manager of the Headquarters and shall be a state minister.

(Establishment of Urgency and Disaster Countermeasures Headquarter)

**Article 28-2.** When an extraordinary and intense emergency disaster occurs, and a special necessity is recognized in

order to enhance temporary damage restoration measures, the Prime Minister may, subject to the approval of the Cabinet Council, establish the Urgency and Disaster Countermeasures Headquarters in the Prime Minister's Office on a temporary basis regardless of the provisions of National Government Organization Law, Article 8, Item 3.

(Organization of Urgency and Disaster Countermeasures Headquarters)

**Article 28-3.** The head of the Urgency and Disaster Countermeasures Headquarter shall be the General Manager of the Headquarters and shall be the Prime Minister. (or the state minister designated by it in advance in the case that there are unavoidable circumstances under which the Prime Minister can not assume the position.)

(Preparation and Official Announcement of the Basic Plan of Disaster Countermeasures)

**Article 34.** The Central Disaster Prevention Council shall prepare the Basic Plan of Disaster Countermeasures; examine the same, taking the result of scientific research on disaster and disaster prevention and the situations of previous disaster as well as the effect of the disaster emergency countermeasures applied thereto into consideration on an annual basis; and shall revise the same when it is deemed necessary to do so.

**Article 35.** The Basic Plan of Disaster Countermeasures shall cover the following;

- (i) Comprehensive, long-term planning regarding disaster countermeasures.
- (ii) Matters requiring stress in the plan of disaster countermeasures and the local disaster countermeasures plan.
- (iii) Matters that shall be the standards for the preparation of the plan of disaster countermeasures and local disaster countermeasures and shall be recognized as necessary by the Central Disaster Prevention Council, aside from those referred to in the preceding items.

(Plan of Disaster Countermeasures of the Designated Administrative Agencies)

**Article 36.** The chiefs of the designated administrative agencies shall prepare the plan of disaster countermeasures in conjunction with the assigned duties in accordance with the Basic Plan of Disaster Countermeasures, shall examine the same on an annual basis, and shall revise the same when it is deemed necessary to do so.

(Prefectural Local Disaster Countermeasures Plans)

**Article 40.** Prefectural disaster countermeasures councils shall prepare prefectural local disaster countermeasures plans in conjunction with the jurisdiction of the relevant prefectures in accordance with the Basic Plan of Disaster Countermeasures, shall examine the same on an annual basis, and shall revise the same when deemed necessary. In this instance, the relevant prefectural local disaster countermeasures plans shall not be contrary to the plan of disaster countermeasures.

(Municipal Local Disaster Countermeasures)

**Article 42.** Municipal disaster countermeasures councils (or municipal mayors of the relevant municipalities where a municipal disaster countermeasures council is not established; the same would apply hereunder in this article) shall prepare municipal local disaster countermeasures plans in conjunction with the jurisdiction of the said municipalities in accordance with the Basic Plan of Disaster Countermeasures, examine the same on an annual basis, and shall revise the same when deemed necessary. In this case, the relevant municipal local disaster countermeasures plans shall not be contrary to the plan of disaster countermeasures or prefectural local disaster countermeasures plans of the prefectures containing the relevant municipalities within their jurisdiction.

## **(2) Ordinance for the Enforcement of the Basic Law on Emergency Preparedness (Excerpt)**

**(Government Ordinance No. 288, July 9, 1962)**

**Latest Revision: Ordinance No.553, December 27, 2000**

(Causes Specified by the Government Ordinance)

**Article 1.** The causes specified under Item 1, Article 2 of the Basic Law on Disaster Countermeasures (hereinafter referred to as "the Law") shall be those large-scale accidents involving the release of a large amount of radioactive materials, the sinking of a vessel resulting in heavy casualties, and the like.

## **(3) Basic Plan for Emergency Preparedness (Summary)**

### **Volume 10. "Nuclear Emergency Response"**

**(Central Emergency Prevention Council: May, 2000)**

#### **1. Preface**

- Each body decides that countermeasures are taken so that it can respond to all the situations assumed, and establishes systems, which can cope with them even when an unexpected situation occurs.
- The emergency preparedness guideline "Emergency Preparedness of Nuclear Installations", defined by the Nuclear Safety Commission in special and technical items should be respected.

#### **2. Emergency Prevention**

##### **(1) Collection of information • Establishment of communication systems**

- The national government, local governments, nuclear business operators, etc. collect information even in nights and holidays in order to expect perfectness in nuclear emergency prevention and establish communication systems.
- The national government and local governments establish and maintain a leased communication line network.

##### **(2) Establishment of emergency response systems**

- The national government (Cabinet Office) establishes and maintains the operation center equipped with required machinery and materials.

- Regulatory ministries and offices establish and maintain the operation center equipped with required machinery and materials such as an emergency speedy radioactivity influence prediction system (hereinafter referred to as "SPEEDI network system"), an emergency response support system (hereinafter referred to as "ERSS").
  - The national government, local governments, nuclear business operators, etc. establish emergency personnel gathering systems.
  - The national government establishes the Nuclear Emergency Response Headquarter and the Local Nuclear Emergency Response Headquarter immediately after the declaration of a nuclear emergency situation. Moreover, the national government specifies a countermeasure facility beforehand where related staff of the national government, local governments, and nuclear business operators, etc. meet, share information and carry out emergency situation countermeasures.
  - The Nuclear Safety Commission establishes emergency gathering systems such as an emergency technical advice system, etc.
  - The national government, public institutions, nuclear business operators, etc. establish an emergency monitoring system.
  - The national government establishes a specialist dispatch system.
  - The national government defines beforehand the transfer measures of necessary personnel to the Local Nuclear Emergency Response Headquarters, etc.
  - The local governments make a plan concerning evacuation and guidance beforehand, and make known widely to residents in everyday life about evacuation places, the evacuation methods, etc.
  - The national government and local governments establish the emergency medical dispatch system for emergency medical activities.
- (3) Emergency preparedness drills, training and spread of knowledge of emergency preparedness
- The national government, local governments, nuclear business operators, etc. carry out practical training.
  - The national government, local governments and nuclear licensees complete and reinforce trainings of emergency prevention personnel.
  - The national government and local governments make efforts in the spread and education of knowledge of emergency preparedness to residents.
- (4) Promotion of the research about emergency prevention, etc.
- The national government makes efforts in promotion of the technology and research of nuclear emergency prevention.
- ### 3. Emergency Response
- (1) Notifications of specific event occurrence information
- A nuclear business operator notifies the Official Residence (Cabinet Office), the Ministry of Economy, Trade and Industry, the local government and the Senior Specialist for Nuclear Emergency etc. within 15 minutes after a specific event discovery or receipt of a report of discovery.
  - A local government notifies the Senior Specialist for Nuclear Emergency, when the numerical detection value, which should be notified as a specific event occurrence, is discovered in a monitoring post. The Senior Specialist for Nuclear Emergency directs to check the situation of the installation to the nuclear business operator and reports the result to the Ministry of Economy, Trade and Industry and the local government.
- (2) Reports of the emergency operator activity information, damage information, etc. after a specific event occurrence
- A nuclear business operator reports periodically situation of the installation, situation of emergency response activities of the nuclear business operator and the situation of the Emergency Response Headquarters, situation of damage, etc. to the Official Residence (Cabinet Office), the Ministry of Economy, Trade and Industry, the local government, the Senior Specialist for Nuclear Emergency, etc.
  - The national government holds related ministries and government offices emergency response connection meeting and a local emergency response connection meeting consisting of related bodies.
  - The Ministry of Economy, Trade and Industry directs to the Senior Specialist for Nuclear Emergency to collect information at the spot and to perform connection, adjustment, etc. among the nuclear business operator, the local government, the local emergency response connection meeting, etc.
- (3) Connection of the emergency response activity information and emergency information after a declaration of nuclear emergency situation.
- Local Nuclear Emergency Response Headquarter, specific public institutions, local governments of the emergency response enforcement zone, specific district public institutions, the nuclear business operator and other related organizations share continuously required information. Moreover, each organization performs adjustment required about the emergency response.
- (4) Activity for the early grasp of radioactivity influence
- A local government strengthens monitoring at ordinary times, when a report of specific event occurrence is received from a nuclear business operator.
  - While the national government predicts the state of nuclear reactor installation etc. by ERSS, it carries out radioactivity influence prediction by SPEEDI network system, and connects information required for enforcement of emergency response to the local government, etc.
- (5) Response after the declaration of nuclear emergency situation
- The Prime Minister establishes the Nuclear Emergency Response Headquarter, which makes himself the director general. (The deputy director-general is the Minister Specializing in Safety Regulation.)
  - The Nuclear Emergency Response Headquarter Director establishes the Local Nuclear Emergency Response



Headquarter.

- The Local Nuclear Emergency Response Headquarter succeeds quickly office works of the local emergency response connection meeting.
  - The director of the Local Nuclear Emergency Response Headquarter is the vice minister of the ministries and government offices specializing in safety regulation.
  - The Local Nuclear Emergency Response Headquarter organizes a Joint Council for Nuclear Emergency Response in local emergency response facility with the emergency response headquarters (or local response headquarter) of prefectures and municipal governments which have jurisdiction of enforcement zone of emergency response. The director of the Local Nuclear Emergency Response Headquarter, each emergency response headquarters of prefectures and municipal governments, specification public institutions and the nuclear business operator, etc. constitute this Council.
  - Roles and assignments of the Joint Council for Nuclear Emergency Response are discussed and fixed by related organizations beforehand. In the Joint Council for Nuclear Emergency Response, the work group of a small number of people is selected beforehand, which defines the response policies in the spot in an emergency.
  - The Nuclear Safety Commission calls an emergency technical advice organization immediately, sends a member of the Nuclear Safety Commission and a member of the emergency response investigation committee specified beforehand to the spot when a report of specific event occurrence is received from ministries and government offices for safety regulation.
  - The Nuclear Safety Commission performs technical advice about emergency response to the Nuclear Emergency Response Headquarter director.
- (6) Emergency response activity
- The Self-Defense Forces dispatches a corps for emergency.
  - The local governments carry out response activities of evacuation guidance of residents etc., shipment regulation of contaminated food, ingestion restriction of food and drink, stable iodine-tablet recipe directions, etc. if needed.
  - The local governments, the Self-Defense Forces, etc. carry out rescue and first aid activities. The National Police Agency and the Fire Protection Agency carry out measures for wide area aids, such as sending of a wide area rescue team and an emergency fire protection rescue team respectively, if needed.
  - The emergency exposure medical treatment team consisting of the medical personnel of the National Institute of Radiological Sciences, National Hospitals, and attached hospitals of National Universities etc. carries out medical activities at the spot.
  - The Nuclear Emergency Response Headquarter, the Local Nuclear Emergency Response Headquarter, specific governmental agencies, specific public institutions, local governments, and nuclear business operators offer exact and fine information.
4. Emergency Restoration
- When recognizing that it becomes unnecessary to carry out emergency response, the Prime Minister hears opinions of the Nuclear Safety Commission, and declares release of a nuclear emergency situation.
  - Local governments cancel various restriction measures based on investigation of the area by environmental monitoring etc. and judgments of specialists sent by the national government and emergency response investigation committee of the Nuclear Safety Commission, etc.

### **3.10 Special Law of Emergency Preparedness for Nuclear Disaster**

#### **(1) Special Law of Emergency Preparedness for Nuclear Disaster (Excerpt)** **(Law No. 156, December 17, 1999)**

(Purpose)

**Article 1.** In view of the particularity of nuclear disaster this Law stipulates the responsibilities of nuclear business operators for nuclear disaster prevention and special measures such as the issue of the Notification of Activating Nuclear Emergency Organization, the establishment of a Nuclear Disaster Countermeasures Headquarters, the implementation of immediate emergency countermeasures, and other issues related to nuclear disasters; and tightens countermeasures against nuclear disasters in conjunction with the Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors (Law 57-166, hereinafter referred to as "LRNR"), the Basic Law on Disaster Countermeasures (Law 61-223), and other laws on the prevention of nuclear disasters, with the ultimate goal of protecting the life, body and property of national from hazard in the event of nuclear disasters.

(Duties of nuclear business operators)

**Article 3.** In accordance with the provisions of this Law and related laws, nuclear business operators are obliged to take the safest measures to prevent the occurrence of nuclear disasters (including the probability of a nuclear disaster), measures to prevent the propagation of nuclear disasters and measures for restoration therefrom.

(Duties of the national government)

**Article 4.** In accordance with the provisions of this Law and related laws, the national government shall take measures necessary for the implementation of immediate emergency countermeasures including the establishment of a Nuclear Disaster Countermeasures Headquarters, provision of necessary instructions to local authorities, and for the implementation of nuclear disaster prevention countermeasures and ex-post-facto countermeasures of nuclear disasters, in order to fulfil its obligations as prescribed in Article 3 Paragraph 1 of the Basic Law on Disaster Countermeasures.

2. The chiefs of designated administrative agencies (or the designated administrative agency itself, if a committee or council system agency; also applies to the succeeding provisions; the same shall apply hereinafter except for Article 17 Paragraph 6 Clause 3 and Article 20 Paragraph 3) and of designated local administrative agencies shall provide recommendations and advice to local authorities and take appropriate measures with respect to assigned duties in their charge, in order to allow smooth execution of nuclear disaster prevention countermeasures, immediate emergency countermeasures, and ex-post-facto countermeasures of nuclear disasters by local authorities, as stipulated in this Law.

3. The competent Minister shall properly exert competencies stipulated in this Law, instruct and advise nuclear business operators, and take appropriate measures, in order to allow smooth implementation of nuclear disaster prevention countermeasures, immediate emergency countermeasures, and ex-post-facto countermeasures of nuclear disasters by nuclear undertakes in accordance with the provisions in this Law.

(Duties of local authorities)

**Article 5.** In accordance with the provisions of this Law and related laws, local authorities shall fulfil their duties concerning nuclear disasters as prescribed in Article 4 Paragraph 1 and Article 5 Paragraph 1 of the Basic Law on Disaster Countermeasures, by taking measures necessary for the implementation of nuclear disaster prevention countermeasures, immediate emergency countermeasures, and ex-post-facto countermeasures of nuclear disasters.

(Disaster prevention work plan of nuclear business operators)

**Article 7.** In accordance with the provisions of the order of the competent Ministry, at each establishment of nuclear enterprise, nuclear business operators shall prepare a disaster prevention work plan of nuclear business operators with respect to nuclear disaster prevention countermeasures, immediate emergency countermeasures, ex-post-facto countermeasures of nuclear disasters, and other measures necessary to prevent the occurrence and propagation of nuclear disasters and to restore therefrom. Once prepared, these plans shall be reviewed annually and revised as necessary, and shall not infringe upon the regional disaster prevention plan as prescribed in Article 2 Clause 10 of the Basic Law on Disaster Countermeasures and the petroleum-industry-complex disaster prevention plan as prescribed in Article 31 Paragraph 1 of the Law on Disaster Prevention Plans at Petroleum Industry Complexes. (Both disaster prevention plans are referred to together as "the regional and other disaster prevention plans" in the succeeding Paragraph.)

3. When a nuclear business operator has prepared or modified a disaster prevention work plan in accordance with the provisions of Paragraph 1, it shall immediately report this fact to the competent Minister and release essential details of the preparation or the modification to the public.

4. When a nuclear business operator is deemed to be in violation of the provisions of Paragraph 1, or its disaster prevention work plan of nuclear business operators is not deemed sufficient to prevent the occurrence or propagation of nuclear disasters involving the establishment of nuclear enterprise, the competent Minister may order the nuclear business operator to modify the plan or prepare the alternative to it.

(Nuclear disaster prevention organization)

**Article 8.** Nuclear business operators shall organize a nuclear disaster prevention organization at each of their establishments.

(Management personnel for nuclear disaster prevention)

**Article 9.** Nuclear business operators shall appoint management personnel for nuclear disaster prevention at each of their establishments to manage the nuclear disaster prevention organization.

(Notification duty of management personnel for nuclear disaster prevention)

**Article 10.** When the management personnel for nuclear disaster prevention detect or are notified of the detection, by means of the methods designated by government ordinance, of radiation doses exceeding the level designated by government ordinance, or of other events designated by government ordinance near the boundary of the area of the establishment of nuclear enterprise, they shall immediately report the finding to the competent Minister, competent prefectural governor, competent mayor of the municipality, and governors of the related neighboring local governments (or if the event occurs during transportation outside an establishment, to the competent Minister and to the prefectural governor and mayor of the municipality who have jurisdiction over the area in which the event occurred, as stipulated by the order of the competent Ministry and the disaster prevention plan of nuclear business operators. Upon being so notified, the competent prefectural governor and governors of the related neighboring local governments shall report the event to the mayors of the related surrounding municipalities.

2. The prefectural governor or the mayor of the municipality, who has been notified in accordance with the prescription in the former part of the preceding Paragraph, may request the competent Minister to dispatch personnel who have special knowledge to assess the situation in accordance with the provision of the government ordinance, at which time the competent Minister shall dispatch personnel who are deemed appropriate.

(Designation of the Off-site Centers)

**Article 12.** For each establishment of nuclear enterprise, the competent Minister shall designate facilities as bases for immediate emergency countermeasures taken by the persons as prescribed in Article 26 Paragraph 2. These facilities (hereinafter referred to as the "Off-site Center") shall be located in an area of the prefecture where the relevant establishment is located, and meet other requirements as prescribed by the order of the competent Ministry.

(Disaster prevention exercise plan by the national government)

**Article 13.** A disaster prevention exercise prescribed in Article 48 Paragraph 1 of the Basic Law on Disaster Countermeasures, as applicable after amended as per the provisions of Article 28 Paragraph 1, (excluding those executed by responsible personnel for disaster prevention as designated in the relevant Paragraph in accordance with the provisions of a disaster prevention plan or a disaster prevention work plan of nuclear business operators), shall be executed according

to plan prepared by the competent Minister in accordance with the order of the competent Ministry.

(Notification of Activating Nuclear Emergency Organization)

**Article 15.** When a nuclear emergency situation as prescribed in the succeeding Paragraphs is deemed to have occurred, the competent Minister shall immediately submit to the Prime Minister both drafts of notification as prescribed in the succeeding Paragraph and instructions as per the provisions of Paragraph 3, in addition to provide necessary information on the situation.

(i) The radiation dose reported to the competent Minister in accordance with the former part of the provisions of Article 10 Paragraph 1 or the radiation dose detected by the methods and radiation-measuring devices designated in the government ordinance exceeds the threshold for radiation doses in abnormal level designated in the government ordinance.

(ii) An event designated in the government ordinance as indicating the occurrence of a nuclear emergency situation, in addition to the events prescribed in the preceding Clause.

**2.** Upon receipt of the report and drafts prescribed in the preceding Paragraph, the Prime Minister shall immediately issue an official announcement (hereinafter referred to as "Notification of Activating Nuclear Emergency Organization") concerning a notification of a nuclear emergency situation and the items outlined in the succeeding Clauses.

(i) Areas where immediate emergency countermeasures should be taken

(ii) Summary of the nuclear emergency situation.

(iii) Issues exhaustively notified to residents, visitors, and public and private groups in the areas designated in Clause (a) (hereinafter referred to as "residents"), in addition to the information in the preceding Clauses (1) and (2).

**3.** Upon receipt of the information and drafts prescribed in Paragraph 1, the Prime Minister shall immediately provide instructions and/or recommendations of refuge by evacuation or sheltering to the mayors of municipalities and prefectural governors who have jurisdiction over the areas designated in Clause (1) of the preceding Paragraph, in accordance with the provisions of Article 60 Paragraphs 1 and 5 of the Basic Law on Disaster Countermeasures, as applicable after being amended as per the provisions of Article 28 Paragraph 2, and provide instructions of other measures related to immediate emergency countermeasures.

**4.** Once immediate countermeasures to prevent the propagation of a nuclear disaster are deemed no longer necessary, the Prime Minister shall immediately consult the Nuclear Safety Commission and issue an official announcement to cancel the nuclear emergency situation (hereinafter referred to as "a Notification of Deactivating Nuclear Emergency Organization").

(Establishment of Nuclear Disaster Countermeasures Headquarters)

**Article 16.** After issuing Notification of Active Nuclear Emergency Organization, the Prime Minister shall establish Nuclear Disaster Countermeasures Headquarters temporarily at the Prime Minister's Office after holding a Cabinet council, for executing immediate emergency countermeasures concerning relevant nuclear emergency situation, irrespective of the provisions of Article 83 of the National Government Organization Law (Law 48-120).

(Organization of the Nuclear Disaster Countermeasures Headquarters)

**Article 17.** The Prime Minister (or a Minister of State appointed in advance should the Prime Minister be deemed under unavoidable circumstances) shall act as the Superintendent General of the Nuclear Disaster Countermeasures Headquarters, a chief of the Headquarters.

(Competency of the Superintendent General of the Nuclear Disaster Countermeasures Headquarters)

**Article 20. 4** When deemed necessary to request support from the Defense Agency for swift and efficient implementation of the immediate emergency countermeasures in its implementation zone notified by the relevant Nuclear Disaster Countermeasures Headquarters, the Superintendent General of the Nuclear Disaster Countermeasures Headquarters may direct the Director-General of the Defense Agency to dispatch the troops in accordance with the provisions of Article 8 of the Self-Defense Forces Law (Law54-165).

(Joint Council of Nuclear Disaster Countermeasures)

**Article 23.** Once a Notification of Activating Nuclear Emergency Organization has been issued, the On-Site Nuclear Disaster Countermeasures Headquarters and the Disaster Countermeasure Headquarters of the prefecture and municipalities which have jurisdiction over the implementation zone of the immediate emergency countermeasures, in which the Notification has been issued, shall establish a Joint Council of Nuclear Disaster Countermeasures in order to exchange the information on the relevant nuclear disaster and to aid cooperation in implementing their immediate emergency countermeasures.

(Technical Experts for Nuclear Disaster Prevention)

**Article 30.** Technical Experts for Nuclear Disaster Prevention shall be appointed in the Ministry of Education, Culture, Sports and Technology and the Ministry of Economy, Trade and Industry.

**2.** Technical Experts for Nuclear Disaster Prevention shall provide guidance and advice to the establishments of nuclear enterprise designated, by the Director-General of the Minister of Education, Culture, Sports and Technology or the Minister of Economy, Trade and Industry, as those for which they are responsible. Relevant guidance and advice shall be given to the preparation of nuclear disaster prevention work plans of nuclear business operators in accordance with the provisions of Article 7 Paragraph 1, the establishment of nuclear disaster prevention organizations in accordance with Article 8 Paragraph 1, and the nuclear disaster prevention countermeasures implemented by nuclear business operators. Technical Experts shall further collect necessary information to recognize the situation upon receipt of reports in accordance with the provisions of the former part of Article 10 Paragraph 1, provide advice for the collection of information and emergency measures implemented by local public agencies, and handle any additional affairs necessary to smoothly prevent the occurrence and propagation of nuclear disasters.

**(2) Ordinance for the Enforcement of the Special Law of Emergency Preparedness for Nuclear Disaster (Excerpt) (Government Ordinance No.195, April 5, 2000)**

(Events to be reported)

**Article 4.** The reference value specified in the government ordinance in Article 10 Paragraph 1 of the Law is a radiation dose of 5 micro Sv per hour.

**2.** The detection of radiation dose in accordance with the government ordinance of Article 10 Paragraph 1 of the Law shall be performed by measuring the gamma ray radiation dose per unit of time (which shall be two minutes or less) by one or more of the radiation-measuring devices installed in accordance with the provisions of Article 11 Paragraph 1 of the Law, converting it into a value per hour, and determining whether this value is higher than the radiation dose specified in the preceding Paragraph. No radiation dose shall be deemed to be detected if the measured value falls within the purview of one of the succeeding Clauses.

(i) The radiation dose is detected at only one point (with the restriction that the detection time is less than 10 minutes).

(ii) The radiation dose is detected during a thunderstorm

**3.** When the radiation doses, detected as per the provisions of the preceding Paragraph, at all radiation-measuring devices installed in accordance with the provisions of Article 11 Paragraph 1 of the Law are less than that in Paragraph 1, and the value measured by one or more of the relevant radiation-measuring devices is 1 micro Sv or more per hour, the detection of radiation dose in accordance with the provisions of Article 10 Paragraph 1 of the Law shall be performed by totaling the radiation dose detected by the relevant radiation-measuring devices in accordance with the relevant Paragraph and the neutron radiation dose measured in accordance with the provisions of the order of the competent Ministry in the vicinity of the facilities for the operation of reactors, irrespective of the provisions of the preceding Paragraph.

**4.** The event to be specified by the government ordinance in Article 10 Paragraph 1 of the Law is one of those specified in the succeeding Clauses.

(i) A radiation dose over the reference value specified in Paragraph 1 is detected in accordance with the provisions of Paragraph 2 or the preceding Paragraph.

(ii) Radioactive materials whose radiation level is higher than the reference value specified as equivalent to the radiation dose as specified in Paragraph 1 by the order of the competent Ministry at the boundary of the relevant establishment of nuclear enterprise, are detected at the ventilation tubes, wastewater draining points, or similar points in the facility for the operation of reactors of the relevant establishment.

(iii) The radiation dose or radioactive materials specified in the succeeding items are detected at locations (excluding those specified in the preceding Clause) other than in specified control zones (i.e., the zone specified by the order of the competent Ministry where radiation exposure dose for personnel shall be controlled) inside the facility for the operation of reactors within the site of the relevant establishment.

(a) Radiation dose of 50 micro Sv or more per hour.

(b) Radioactive materials which exceed the reference quantity specified in the order of the competent Ministry as equivalent to a dose of 5 micro Sv per hour at the relevant locations.

(iv) A radiation dose of 100 micro Sv or more is detected in accordance with the provisions of the competent Ministry at a point 1m distant from a vessel used for transportation outside an establishment.

(v) Inability to shut down a reactor as specified in Article 23 Paragraph 1 Clause 1 of the Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material, and Reactors (Law 57-166) by inserting normal neutron absorbers, where a reactor being referred to as "an operational power reactor" in Article 6 Paragraph 4 Clause 4 of the relevant Law, and other events specified, for each characteristic of the facility for the operation of reactors and of the vessels used for the transport outside an establishment, by the order of the competent Ministry as potentially leading to a nuclear emergency, in addition to those specified in the preceding Clauses.

(Nuclear emergency situation)

**Article 6.** The radiation-measuring devices specified in the government ordinance in Article 15 Paragraph 1 Clause 1 of the Law shall be installed in the prefecture of the competent prefectural governor or governors of the related neighboring local governments and have performance equivalent to that of the radiation-measuring devices specified in Article 11 paragraph 1 of the Law.

**2.** The measuring method specified in the government ordinance in Article 15 Paragraph 1 Clause 1 of the Law shall be performed by repeating measurement of gamma ray radiation doses per unit of time (which shall be 10 minutes or less) and converting them into values per hour, wherein the relevant value is deemed as not detected if detection occurs during a thunderstorm.

**3.** The reference values specified in the government ordinance in Article 15 Paragraph 1 Clause 1 of the Law shall be those in the succeeding Clauses for the detected radiation doses specified therein.

(i) 500 micro Sv per hour: for the detected radiation doses as specified in Article 4 Paragraph 4 Clause 1 (i.e., the doses obtained by totaling the neutron radiation dose specified in Paragraph 4 Clause 3 and the doses measured by the relevant radiation-measuring devices when the values measured by one or more of the radiation-measuring devices installed in accordance with the provisions of Article 11 Paragraph 1 of the Law, are 5 micro Sv or more), or the radiation dose detected by the method in the preceding Paragraph and by using the radiation-measuring devices in Paragraph 1.

(ii) 5mSv per hour: for the detected radiation doses specified in the item (a) in Article 4 Paragraph 4 Clause 3.

(iii) 10mSv per hour: for the detected radiation doses specified in Article 4 Paragraph 4 Clause 4.

4. The event specified as indicating the occurrence of a nuclear emergency situation in Article 15 Paragraph 1 Clause 2 of the Law is one of those specified in the succeeding Clauses.
- (i) Radioactive materials whose radiation levels at the boundary of the relevant establishment are equivalent to or exceed the reference value specified by the competent Ministry as equivalent to the dose specified in Clause 1 of the preceding Paragraph are detected at the locations specified in Article 4 Paragraph 4 Clause 2 in accordance with the provisions of the competent Ministry.
  - (ii) Radioactive materials whose radiation levels at the locations specified in Article 4 Paragraph 4 Clause 3 are equivalent to or exceed the reference value specified by the competent Ministry as equivalent to 500 micro Sv per hour are detected at relevant locations in accordance with the provisions of the competent Ministry.
  - (iii) Nuclear fuel materials are at a stage of criticality (i.e., a state where a fission chain reaction is continuing) within the facilities for the operation of reactors (excluding the interior of reactor main bodies).
  - (iv) Inability to shut down an operational power reactor by inserting emergency neutron absorbers, and other events specified, for each characteristic of the facility for the operation of reactors and the vessels used for the transportation outside an establishment, by order of the competent Ministry as indicating the occurrence of a nuclear emergency, in addition to those specified in the preceding three Clauses.

**3.11 Environmental Impact Assessment Law(Excerpt)**  
**(Law No. 81, June 13, 1997)**  
**Latest Revision: Law No.73, May 19, 2000**

(Purpose)

**Article 1.** Because it is extremely important, in terms of protecting the environment, for a corporation that is undertaking a project that changes the shape of the terrain or that involves the construction of a new structure, or that is engaging in other similar activities, to conduct an environmental impact assessment in advance of such a project, the purposes of this law are to ensure that proper consideration is given to environmental protection issues relating to such a project and, ultimately, to ensure that present and future generations of this nations people enjoy healthy and culturally rewarding lives. In order to achieve these purposes, this law sets forth procedures and contains other provisions designed to clearly define the responsibilities of the government regarding environmental impact assessments and to ensure that such assessments are conducted properly and smoothly with respect to large-scale projects that could have a serious impact on the environment, and prescribes measures to reflect the results of such environmental impact assessments in implementing such projects and in determining the content of such projects.

(Definitions)

**Article 2.** In this law, "Class-1 Project" shall mean a large-scale project (in this and the following paragraph, scale shall mean the measurable aspects of a project, such as the land area to be altered and the size of any structure(s) to be built) that is designated by government ordinance as likely to have a serious impact on the environment and that is one of the following:

- (i) A project in any of the following categories:
  - (e) A project to construct or modify a power generating structure to supply electricity to corporate entities, as prescribed in Article 38 of the Electricity Utilities Industry Law (Law No. 170 of 1964)

(Responsibilities of the National Government and Other Parties)

**Article 3.** Fully recognizing that it is important for an environmental impact assessment to be conducted before a project is implemented, the national government, local governments, proponents, and citizens shall endeavor from their respective positions to ensure that such an environmental impact assessment is conducted properly and smoothly, and that other procedures stipulated in this law are properly and smoothly followed, in order to avoid or to reduce as much as possible the environmental burdens resulting from the project, and in order to assist in giving proper consideration to the protection of the environment in regard to the implementation of the project.

(Preparation of a Scoping Document)

**Article 5.** The proponent shall prepare a scoping document concerning the environmental impact assessment (hereinafter referred to as a "scoping document"). Said scoping document shall present information concerning the items listed below regarding the scope of the environmental impact assessment (limited to those items relating to survey, prediction, and assessment activities) relating to the relevant project, pursuant to ministerial regulations regarding the various types of projects referred to in Article 2, Paragraph 2, Items (i) (a) through (m);

- (i) The name and address of the;
- (ii) The purpose and content of the relevant project;
- (iii) The general conditions of the area in which the relevant project will be implemented (hereinafter referred to as the "relevant project implementation area") and its vicinity; and
- (iv) The items to be considered in an environmental impact assessment of the relevant project, and the survey, prediction, and assessment methods to be utilized (if such methods have not yet been determined, then the items to be considered in the environmental impact assessment of the relevant project).

(Submission of Scoping Document; Other Procedures relating to a Scoping Document)

**Article 6** After preparing a scoping document, the proponent, pursuant to the ministerial regulations applicable to the various types of projects referred to in Article 2, Paragraph 2, Items (i) (a) through (m), shall submit the scoping document

to the prefectural governor(s) and to the mayors of the cities, towns, and villages having jurisdiction over the area deemed likely to be environmentally impacted by the relevant project.

**2.** In order to ensure that the area referred to in the preceding paragraph is appropriate in scope for seeking opinions, from the standpoint of protecting the environment, regarding the environmental impact assessment of the relevant project, the competent cabinet minister shall consult with the Minister of the Environment and shall prepare ministerial regulations setting forth standards to ensure that such scope is appropriate.

(Making a Scoping Document Public and Available for Public Inspection)

**Article 7.** For the purpose of inviting comments, from the standpoint of protecting the environment, regarding both the items to be considered in an environmental impact assessment and the survey, prediction, and assessment methods to be utilized, the proponent, upon preparing the scoping document, shall make public, pursuant to a regulation to be adopted by the Ministry of Environment, the fact that a scoping document has been prepared, and shall make the scoping document available for public review in the area referred to in Paragraph 1 of the preceding Article 7 for one month from the date on which the scoping document is made known to the public.

(Submission of Comments regarding a Scoping Document)

**Article 8** A person who has comments, from the standpoint of protecting the environment, regarding a scoping document may submit such comments to the proponent during a period that shall commence on the date that the document becomes known to the public and that shall end two weeks after the day following the termination of the period during which the statement is to be available for public review.

(Submission of an Outline of Comments regarding a Scoping Document)

**Article 9** After termination of the period referred to in the preceding Article 8, the proponent shall submit to the prefectural governor(s) having jurisdiction over the area stipulated in Article 6, Paragraph 1 and to the mayors of the cities, towns and villages having jurisdiction over said area, a document outlining the comments submitted pursuant to the provisions of the preceding Article 8.

(Comments of Prefectural Governors and Other Officials with regard to a Scoping Document)

**Article 10.** Upon receiving the document referred to in the preceding Article 9, the prefectural governor(s) referred to in that same Article shall send to the proponent written comments, from the standpoint of protecting the environment, regarding the scoping document, within a time period to be established by government ordinance.

**2.** While abiding by the provisions of the preceding Paragraph 1, the prefectural governor(s) shall seek comments, from the standpoint of protecting the environment, from the mayors of the cities, towns, and villages referred to in the preceding Article 9, regarding the scoping document and shall set a deadline by which time such comments must be received by the prefectural governor(s).

**3.** While abiding by the provisions of Paragraph 1, the prefectural governor(s) shall take into consideration the comments submitted by the aforementioned mayors of the cities, towns, and villages pursuant to the preceding Paragraph 2, as well as the comments outlined in the documents referred to in the preceding Article 9.

(Selection of Items to be Considered in an Environmental Impact Assessment)

**Article 11.** The proponent shall give due consideration to comments expressed pursuant to Paragraph 1 of the preceding Article 10, shall take into consideration comments expressed pursuant to Article 8, Paragraph 1 in reviewing matters listed in Article 5, Paragraph 1, Item (4), and shall select both the items to be considered in an environmental impact assessment relating to the relevant project and the survey, prediction, and assessment methods to be utilized, pursuant to ministerial regulations applicable to the various types of projects referred to in Article 2, Paragraph 2, Items (i) (a) through (m).

**2.** When deemed necessary for making selections pursuant to the provisions of the preceding Paragraph 1, the proponent may submit a document to the competent cabinet minister expressing the proponent's desire to receive documents that provide technical advice.

**3.** With a view to ensuring the matters set forth in the Items under Article 14 of the Environment Basic Law, the ministerial regulations referred to in Paragraph 1 shall be adopted by the competent cabinet minister in consultation with the Minister of the Environment, in order to establish guidelines for selecting, on the basis of already acquired scientific knowledge, both the items that are regarded as necessary to be considered in an environmental impact assessment in order to properly conduct an environmental impact assessment relating to the relevant project, and the methods for reasonably conducting survey, prediction, and assessment activities.

(Conducting an Environmental Impact Assessment)

**Article 12.** On the basis of the items and methods selected pursuant to the provisions of Paragraph 1 of the preceding Article 11, the proponent shall conduct an environmental impact assessment relating to the relevant project in accordance with the ministerial regulations applicable to the various types of projects referred to in Article 2, Paragraph 2, Items (i) (a) through (m).

**2.** The provisions of Paragraph 3 of the preceding Article 11 shall apply *mutatis mutandis* to the ministerial regulations referred to in the preceding Paragraph 1. In such a case, the wording "guidelines for selecting, on the basis of already acquired scientific knowledge, both the items that are regarded as necessary to be considered in an environmental impact assessment in order to properly conduct an environmental impact assessment relating to the relevant project, and the methods for reasonably conducting survey, prediction, and assessment activities shall be construed to mean "guidelines concerning measures to protect the environment."

(Publication of Basic Guidelines)

**Article 13.** In consultation with the heads of relevant administrative organizations, the Minister of the Environment shall adopt and publish basic guidelines relating to the guidelines that are to be established by the competent cabinet minister

pursuant to the provisions of Article 11, Paragraph 3.

(Preparation of a Draft Environmental Impact Statement)

**Article 14.** After conducting an environmental impact assessment relating to the relevant project pursuant to the provisions of Article 12 Paragraph 1, the proponent, in preparation for hearing comments, from the standpoint of protecting the environment, regarding the results of the environmental impact assessment, shall prepare a draft environmental impact statement (hereinafter referred to as a "draft EIS") that shall deal with the following matters, in accordance with the ministerial regulations applicable to the various types of projects referred to in Article 2, Paragraph 2, Items (i) (a) through (m):

- (i) Matters listed in Article 5, Paragraph 1, Items (1) through (3);
- (ii) An outline of the comments referred to in Article 8, Paragraph 1;
- (iii) Comments of the prefectural governor(s), as referred to in Article 10, Paragraph 1;
- (iv) Views of the proponent regarding the comments referred to in the preceding two items (2) and (3);
- (v) Items to be considered in an environmental impact assessment and the survey, prediction, and assessment methods to be utilized;
- (vi) Contents of the technical advice received, if any, referred to in Article 11 Paragraph 2;
- (vii) The following results of the environmental impact assessment:
  - (a) An outline of the results of surveys, predictions, and assessments as classified according to the items to be included in the environmental impact assessment (including those items regarding which the nature and extent of the environmental impact did not become clear even though an environmental impact assessment was conducted);
  - (b) Measures for protecting the environment (including details regarding how such measures were developed);
  - (c) Measures for determining the current conditions of the environment, if the measures referred to in (b) are meant to cope with environmental conditions that become known in the future;
  - (d) An overall assessment of the likely environmental impact of the relevant project; and
- (viii) If the environmental impact assessment has been consigned in whole or in part to another person, the name and address of that person.

**2.** The provisions of Article 5, Paragraph 2 shall apply mutatis mutandis to the preparation of the draft EIS.

(Submission of a Draft EIS)

**Article 15.** After preparing a draft EIS, the proponent shall submit the draft EIS and a document summarizing it (referred to as "summary in the following Articles 16 and 17) to: (1) the prefectural governor(s) having jurisdiction over the area recognized as likely to be environmentally impacted by the relevant project, as determined by the ministerial regulations referred to in Article 6, Paragraph 1 (such prefectural governor(s) hereinafter referred to as "related governor(s)"; such area, hereinafter referred to as "related area," includes such area as is recognized to be added to the area on the basis of comments submitted pursuant to Article 8, Paragraph 1 and Article 10, Paragraph 1, and also on the basis of the results of the environmental impact assessment conducted pursuant to Article 12, Paragraph 1); and to (2) the mayors of the cities, towns, and villages having jurisdiction over the related area (hereinafter referred to as "related mayors").

(Making a Draft EIS Public and Available for Public Inspection)

**Article 16.** After submitting the materials pursuant to the preceding Article 16, the proponent, for the purpose of acquiring comments, from the standpoint of protecting the environment, regarding the results of the environmental impact assessment relating to the draft EIS in accordance with the provisions of a regulation to be adopted by the Ministry of Environment, shall publicly announce that the draft EIS and other items have been prepared in accordance with said regulation of the Ministry of Environment, and shall make the draft EIS and the summary available for public review in the related area for one month from the date of the aforementioned public announcement.

(Explanatory Meetings, etc.)

**Article 17.** In accordance with the provisions of a regulation to be adopted by the Ministry of Environment, the proponent shall hold explanatory meetings to make the public aware of the contents of the draft EIS (hereinafter referred to as "explanatory meetings") in the related area during the period of public review. If within the related area there is no appropriate place at which to hold such explanatory meetings, the meetings may be held outside the related area.

**2.** The proponent shall determine the date, time, and place of the explanatory meetings and shall publicly announce them at least one week before the date on which a meeting is scheduled to be held, in accordance with the provisions of a regulation to be adopted by the Ministry of Environment.

**3.** In determining the date, time, and place of an explanatory meeting, the proponent may seek the opinion(s) of the related governor(s).

**4.** If the proponent cannot hold an explanatory meeting that has been publicly announced pursuant to Paragraph 2, for reasons that are not attributable to the proponent and are provided for in a regulation to be adopted by the Ministry of Environment, the proponent shall not be obligated to hold that explanatory meeting. In such a case, however, the proponent, pursuant to provisions of a regulation to be adopted by the Ministry of Environment, shall endeavor to make the public aware of the contents of the draft EIS, through such means as publicly presenting a summary during the period of public review.

**5.** The content of and procedures to be followed in holding an explanatory meeting, other than those stipulated in the preceding Paragraphs, shall be determined by a regulation to be adopted by the Ministry of Environment.

(Submission of Comments regarding a Draft EIS)

**Article 18.** Anyone who has comments, from the standpoint of protecting the environment, regarding a draft EIS may express such comments by submitting a document to the proponent during a period that shall commence on the date of the

public announcement referred to in Article 16 and that shall end two weeks after the day following the expiration of the period of public review referred to in that same Article 16.

**2.** The content of and procedures to be followed in submitting comments as referred to in the preceding Paragraph shall be determined by a regulation to be adopted by the Ministry of Environment.  
(Submission of an Outline of Comments, etc. regarding a Draft EIS)

**Article 19.** After the end of the period referred to in Paragraph 1 of the preceding Article 18, the proponent shall submit to the related governor(s) and related mayors a document containing both an outline of the comments received pursuant to the same Paragraph 1 and the proponent's views regarding such comments.

(Opinions of Related Governor(s) and Others regarding a Draft EIS)

**Article 20.** After receiving a document referred to in the preceding Article 19, the related governor(s) shall express in writing their opinions, from the standpoint of protecting the environment, regarding the draft EIS within a period to be determined by government ordinance.

**2.** The provisions of Article 10, Paragraphs 2 and 3 shall apply mutatis mutandis to the expression of opinions by the related governor(s) regarding the draft EIS. In such a case, the wording "the mayors of the cities, towns and villages referred to in the preceding Article 9" in Paragraph 2 of the same Article 10 shall be construed to mean "the related mayors"; the wording "the preceding Paragraph" in Paragraph 3 shall be construed to mean "the preceding Paragraph as applied mutatis mutandis to Article 10, Paragraph 2"; and the wording "documents referred to in the preceding Article 9" in Paragraph 3 shall be construed to mean "both the comments presented in the document referred to in Article 19 and the proponents views regarding such comments."

(Preparation of an Environmental Impact Statement)

**Article 21.** In reviewing the items dealt with in a draft EIS, the proponent shall consider any opinions that are expressed pursuant to Paragraph 1 of the preceding Article 20, and shall pay attention to comments referred to in Article 18, Paragraph 1. If the proponent considers it necessary to amend the aforementioned items (only insofar as the project after such amendment will be classified as a relevant project), the proponent shall take measures to amend each of the items in accordance with the classifications listed below:

- (i) Amending matters referred to in Article 5 Paragraph 1, Item (ii) (except amendments stipulated by government ordinance, including reduction of the scale of the project, minor amendments as defined by government ordinance, and other amendments as defined by government ordinance): To conduct an environmental impact assessment and to follow other procedures as provided for in Articles 5 through 27.
- (ii) Amending matters referred to in Article 5, Paragraph 1 Item (i), or in Article 14, Paragraph 1 Items (ii) through (iv) and Item (6), or in Article 8 (except those covered by the preceding Item): To conduct the environmental impact assessment and to follow other procedures as provided for in the following Paragraph 2 and in Articles 22 through 27.
- (iii) Other than those specified in the two preceding Items (i) and (ii): To conduct an environmental impact assessment with regard the aforementioned amended portions of the relevant project, pursuant to the provisions of ministerial regulations referred to in Article 11, Paragraph 1 and in Article 12, Paragraph 1.

**2.** Except in a case covered by Item (i) of the preceding Paragraph 1, the proponent shall prepare the environmental impact statement (hereinafter referred to as "EIS") in accordance with the ministerial regulations applicable to the various types of projects referred to in Article 2, Paragraph 2, Items (i) (a) through (m); the EIS shall incorporate following matters relating to: (a) if an environmental impact assessment was conducted pursuant to the provisions of Item (3) of the same Paragraph 2, the results thereof and the results of environmental impact assessment conducted for preparing the draft EIS; or (b) if an environmental impact assessment was not conducted pursuant to the provisions of the same Item, the results of environmental impact assessment conducted for preparing the draft EIS.

(i) Matters referred to in Items (1) through (8) in Article 14 Paragraph 1.

(ii) An outline of comments referred to in Article 18, Paragraph 1.

(iii) Opinions of the related governor(s), as referred to in Article 20, Paragraph 1.

(iv) The proponent's views regarding the comments and opinions referred to in the two preceding Items (2) and (3).

(Making the EIS Public and Available for Public Review)

**Article 27.** When making a submission or notice pursuant to the provisions of Article 25, Paragraph 3, the proponent, pursuant to a regulation to be adopted by the Ministry of Environment, shall make public the fact that an EIS and other items stipulated in the regulation to be adopted by the Ministry of Environment have been prepared, and, for a period of one month from the date of such publication, shall make available for public review in the related area the EIS, the summary, and the papers specified in Article 24.

(Restrictions on the Implementation of a Relevant Project)

**Article 31.** A proponent may not implement a relevant project (if amended pursuant to the provisions of Article 21 Paragraph 1, and if the project is a relevant project after said amendment, then the project after said amendment) prior to a public announcement as required by Article 27.

**2.** If a proponent seeks to amend information referred to in Article 5, Paragraph 1, Item (ii) after a public announcement has been made as required by Article 27, the proponent need not conduct an environmental impact assessment or follow other procedures pursuant to the provisions of this Law if: (a) the purpose of said amendment is to reduce the scale of the project; or (b) the amendment is minor, as defined by government ordinance; or (c) the amendment is of another type specified by government ordinance.

(Additional Environmental Impact Assessment and Other Procedures after Public Announcement of an EIS)

**Article 32.** If, after a public announcement has been made as required by Article 27, the proponent decides that, due to



special factors such as changes in the environmental conditions in and around the relevant project implementation area, it is necessary to amend matters referred to in Article 14, Paragraph 1, Item (v) or (vii) in order to give proper consideration to the protection of the environment in implementing the relevant project, the proponent may conduct an additional environmental impact assessment and may implement other procedures relating to the relevant project pursuant to the provisions of Articles 5 through 27 or Articles 11 through 27.

2. If a proponent seeks to conduct an environmental impact assessment or to implement other procedures pursuant to the preceding Paragraph 1, the proponent shall without delay make that known to the public in accordance with the provisions of a regulation to be adopted by the Ministry of Environment.

(Proponents Consideration for Protection of the Environment)

**Article 38.** In implementing a relevant project, the proponent thereof shall give proper consideration to the protection of the environment pursuant to the contents of the EIS relating to the project.

(Communication with Local Governments)

**Article 49.** The proponent and others shall maintain close communication with, and may seek cooperation from, related local governments concerning public announcements, public reviews, and the holding of explanatory meetings as provided for in this Law.

(Technological Development)

**Article 51.** In order to improve technologies necessary for conducting environmental impact assessments, the national government shall endeavor to promote research and development of such technologies and to disseminate the results thereof.

(Exemptions, etc.)

**Article 52.** The provisions of this Law shall not apply to air pollution, water pollution (including deterioration of water conditions other than water quality and soil at the bottom), or soil pollution caused by radioactive substances.

(Competent Cabinet Minister)

**Article 58.** A competent cabinet minister in this Law shall be as indicated by the following Items according to the type of project referred to in each Item:

(v) A project of the type referred to in Article 2, Paragraph 2, Item (ii) (e) of this Law: the minister responsible for clerical work relating to implementation of the project and the minister responsible for clerical work relating to any license, special permit, permission, authorization, approval or report relating to a project of the type referred to in (e) of that same Item (ii).

(Relation to other Laws)

**Article 60.** An environmental impact assessment and other procedures relating to a Class-1 or Class-2 Project of the type of project referred to in Article 2, Paragraph 2, Item (i) (e) shall be subject to this Law and the Electricity Utilities Industrial Law.

### 3.12 Guides

#### (1) Examination Guide for Nuclear Reactor Siting Evaluation and Application Criteria (Decision of the Atomic Energy Commission, May 27, 1964, Partially Revised by the NSC, March 27, 1989)

In April 1958, the Atomic Energy Commission established the Specialty Subcommittee on Reactor Safety Standards to enact scientific and technical standards for the safety of reactor facilities. On November 2, 1963, the Committee submitted a report regarding the Examination Guide for Nuclear Reactor Siting Evaluation and Application Criteria as a preliminary stage before establishing the standards for nuclear reactors to be placed on land.

The Atomic Energy Commission studied the Report and specified the Examination Guide for Nuclear Reactor Siting Evaluation and Application Criteria, as in the Separate Sheet 1. The Commission also specified tentative criteria regarding the radiation dosage, etc., as in the Separate Sheet 2, which are required in application of this Guideline.

#### [Separate Sheet 1]

#### Examination Guide for Nuclear Reactor Siting Evaluation and Application Criteria

A safety review is conducted prior to the establishment of a nuclear reactor to be placed on land. This Guide is used in this safety review by the Council on Reactor safety Examination to examine the adequacy of the nuclear reactor siting conditions in relation to accident.

#### 1. Basic Concept

##### 1.1 Fundamental Siting Conditions

Regardless of the establishment location, nuclear reactors are required to be designed, constructed, operated and maintained to prevent accidents. The following siting conditions are, however, required in principle to ensure public safety in case of accident.

(1) There have as yet been no event liable to induce large accident and no such event is expected to occur in the future.

There have also been very few events deemed liable to expand disaster.

(2) In relation to their safety guarding facilities, nuclear reactors shall be located at a sufficient distance from the public.

(3) The environment of the nuclear reactor site including its immediate proximity shall be such that appropriate measures for the public can be implemented as required.

##### 1.2 Basic Goal

Based on a policy of ensuring public safety even in case of accident and promoting an sound nuclear development, this Guideline provides the following three basic goals;

- a.) Not to incur radiation damage to the neighboring public, even when assuming a serious accident that is deemed to have a possibility of occurrence under the worst scenario from technical point of view, by considering the events in the site vicinity, the characteristics of the nuclear reactor and related safety guarding facilities (hereinafter termed major accident).
- b.) To prevent any significant radiation hazard to the neighboring public when an accident, which exceeds the major accident level and which is not expected to occur from technical point of view, is hypothesized (hereinafter termed hypothetical accident), for example, by hypothesizing that safety guarding facilities which are assumed to be effective in postulating a major accident do not function, and corresponding release of radioactive materials occurs.
- c.) Effect on the collective dose of a hypothetical accident shall be sufficiently small.

## **2. Guideline for Siting Review**

When examining the adequacy of the siting conditions, it is necessary to ensure that the following three conditions are satisfied at least in order to achieve the previously described basic goals.

### **2.1 Regarding the area surrounding a nuclear reactor, an area of a specified distance from the nuclear reactor shall be the non-residential area.**

Here, the specified distance means a distance where person may be exposed to radiation damage if they remain within that distance under a major accident. non-residential area means the area where the public does not reside in principle.

### **2.2 The area within the specified distance from the nuclear reactor and outside the non-residential area shall be the low population zone.**

Here, the specified distance means the range wherein the public may be exposed to significant radiation hazard due to a hypothetical accident unless certain countermeasures are provided.

The low population zone means, for instance, a low population density zone where appropriate countermeasures can be provided to prevent significant radiation hazard.

### **2.3 The nuclear reactor site shall be located at the specified distance from the dense population zone.**

Here, the specified distance means the distance where the cumulative value of whole-body dose in case of a hypothetical accident shall be small enough to be deemed acceptable based on the viewpoint of collective dose.

## **3. Application**

This Guideline shall be applied for the siting review of nuclear reactors having 10,000KW or larger thermal output. In case of nuclear reactors under 10,000KW thermal output, this Guideline shall be used as a reference in their siting review.

### **[Separate Sheet 2]**

Tentative Criteria to apply Examination Guide for Nuclear Reactor Siting Evaluation and Application Criteria  
The criteria shall be used when the Guideline on the Separate Sheet 1 is applied by the Council on Reactor Safety Examination to review the safety of nuclear reactors to be placed on land.

1. The following dosage values shall be applied as the criteria for the specified distance in Guideline 2.1.
  - Thyroid (child): 1.5Sv
  - Whole body: 0.25Sv
2. The following dosage values shall be considered as the tentative criteria for the specified distance in Guideline 2.2.
  - Thyroid (adult): 3Sv
  - Whole body: 0.25Sv
3. The tentative criteria for the specified distance in Guideline 2.3 shall be referred to overseas examples, for instance, Sv for 20,000 population.

### **Supplement:**

- (i) The tentative criteria above are provided from the administrative aspect and are based on the currently available information regarding the radiation effect and comparison studies with overseas examples regarding the type and content of the diffusion of radioactive materials from nuclear reactors due to accidents. Since the biological effect of radiation and collective dose remains somewhat unclear at this time, research in this field shall be promoted further in Japan. Considering international trend as well, these criteria shall be reviewed accordingly.
- (ii) The tentative criteria above are provided based on a concept different from that for the emergency criteria in response to an actual nuclear reactor accident (dose in relation to food & drink intake and evacuation, etc.)
- (iii) The tentative criteria above are used for the safety review prior to nuclear reactor establishment to examine the adequacy of the siting conditions in relation to an accident. The criteria to prevent public radiation damage due to normal reactor operation are specified in the Law for the Regulation of Nuclear Source Materials, Nuclear Fuel Material and Nuclear Reactors (No. 166, 1957), and the Prime Ministers Ordinance and the Notification of the Science and Technology based on the previously mentioned law.
- (iv) Tentative Criteria 1 and 2 above are provided for nuclear reactors which use ordinary uranium fuel. It is necessary to consider separate criteria when the criteria in addition to those for thyroid and whole body are considered important from the damage aspect.

## **(2) Examination Guide for Seismic Design of Nuclear Power Reactor Facilities (Excerpt) (Decision of the Nuclear Safety Commission, July 20, 1981)**

## 1. Introduction

This guide was provided in September 1978 by the Atomic Energy Commission of those days, based on the engineering knowledge of seismological, geological and other studies with experiences of the safety examinations, in order to evaluate the adequacy of the design policy in the safety examination process of the seismic design of nuclear power reactor facilities.

The revision of this guide performed this time is on determination methods of static seismic force, etc. because it is considered as appropriate to utilize the new findings.

Incidentally, this guide shall be revised reflecting the newly accumulated findings and experiences, when necessary.

## 2. Scope of Application

This guide shall be applied for the land-based nuclear power reactor facilities.

(Partially Omitted)

## 3. Basic Policy

Nuclear power reactor facility shall maintain its structural integrity against any postulated seismic force likely to occur at the site so that no earthquake leads to a major accident. Moreover, buildings and structures shall be, in principle, of rigid construction and the important buildings and structures shall be supported on bedrock.

## 4. Classification of Importance in Seismic Design

Each nuclear power reactor facility shall be classified into the following categories corresponding to importance in seismic design from the standpoint of the impact on environment by the possible radiation resulted from earthquake.

### (1) Classification by Function

Class A --- Facilities containing radioactive material or related directly to equipment containing radioactive material and whose loss of function might lead to the release of radioactive material to atmosphere, facilities required to prevent the occurrence of such accidents, and facilities required to mitigate the consequences resulting from the spread of radioactive material in the event of an accident and whose influence and effect in mitigating such consequences is significant.

Class B --- Facilities of the same categories as the above Class A, but whose influences and effects are small.

Class C --- Facilities except for class A and B, and ones only required to maintain the same safety as required for general industrial facilities.

### (2) Facilities by Classes

(a) Class A facilities are as follows:

- (i) Equipment/piping systems composing of the reactor coolant pressure boundary
- (ii) Spent fuel storage pool
- (iii) Facilities to add the negative reactivity rapidly to shutdown the reactor and to maintain the shutdown mode of the reactor
- (iv) Facilities to remove the decay heat from the reactor core after reactor shutdown
- (v) Facilities necessary to remove the decay heat from the reactor core after the failure of reactor coolant pressure boundary
- (vi) Facilities to prevent the propagation of radioactive material directly as a pressure barrier at the failure of reactor coolant pressure boundary
- (vii) Facilities except those in the category vi) above, and ones to mitigate the release of radioactive material to the atmosphere at the accident which involves the release of radioactive material

In addition, Class A facilities belonging to i), ii), iii), iv), and v) are especially designated as Class As.

(Omitted)

## 5. Evaluation Method for Seismic Design

### (1) Policy

The nuclear power reactor facilities shall be designed in accordance with the following basic policies of the seismic design for each category of classification.

- (a) The integrity of each facility of Class A shall be maintained against the larger seismic force either the seismic force due to the maximum design earthquake or the static seismic force shown below.  
In addition, safety function of each facility of Class As shall be preserved against the seismic force by the extreme design earthquake shown below.
- (b) The integrity of each facility of Class B shall be maintained against the static seismic force shown below. And, as for the facility that is probable to resonate with earthquake, the influences shall be evaluated.
- (c) The integrity of each facility of Class C shall be maintained against the static seismic force shown below.
- (d) In each items shown above, the integrity of the upper class facility shall not be impaired corresponding to the damage of the lower class facility.

### (2) Determination Method of Seismic Force

The seismic forces due to the maximum design earthquake and the extreme design earthquake and the static seismic force, mentioned in Section 5. (1), shall be determined by the following methods.

- (a) Seismic forces due to the maximum design earthquake and the extreme design earthquake

The horizontal seismic forces due to the maximum design earthquake and the extreme design earthquake shall be determined by the basic earthquake ground motions, specified in Section 5. (3).

And, horizontal seismic forces shall be combined with the vertical seismic force concurrently and in the most adverse fashion, which is determined by using the vertical seismic coefficient obtained by multiplying the

maximum acceleration amplitude of the basic earthquake ground motion by a half (1/2). However, the vertical seismic coefficient shall be assumed to be constant in the height direction.

(b) Static earthquake force

(i) Buildings and structures

Horizontal seismic forces shall be determined by multiplying the weight at the height and above by the following story shear coefficient corresponding to the importance of the facility.

Class A	story shear coefficient	$3.0C_1$
Class B	story shear coefficient	$1.5C_1$
Class C	story shear coefficient	$1.0C_1$

Here,  $C_1$  of the story shear coefficient shall be 0.2 in the standard case, and shall be fixed considering the vibration characteristics of buildings and structures, the category of the ground, and so on.

For the facilities of Class A, the vertical seismic force shall also be considered, and both horizontal and vertical seismic forces shall be combined concurrently and in the most adverse fashion. The vertical seismic force shall be determined by using the vertical seismic coefficient, which shall be 0.3 in standard case and shall be fixed considering the vibration characteristics of buildings and structures, the category of the ground, and so on. However, the vertical seismic coefficient shall be assumed to be constant in the height direction.

(ii) Equipments and piping systems

The seismic forces of each class shall be determined in the similar manner as the above (i), using the value of 20% more than each corresponding value of horizontal and vertical seismic coefficient, where the horizontal seismic coefficient takes place of the story shear coefficient for building and structures.

Both horizontal and vertical seismic forces shall be combined concurrently and in the most adverse fashion. However, the vertical seismic coefficient shall be assumed to be constant in the height direction.

(3) Evaluation Methods for the Basic Earthquake Ground Motions

The design earthquake ground motions for seismic design of reactor facilities shall be derived from the earthquake motions at the free surface of the base stratum in the proposed site.

The design earthquake ground motions at the free surface of the base stratum (hereafter referred to as “the design basis earthquake ground motions”) at the proposed site shall be determined in accordance with the fundamental concepts indicated in the following items:

(a) The basic design earthquake ground motions are classified into  $S_1$  and  $S_2$  depending upon their intensities.

(i) For the earthquakes causing the above mentioned basic design earthquake ground motions  $S_1$  (hereafter referred to as “maximum design earthquakes”), reference is made to the earthquake among the recorded earthquakes that would have the greatest effect on the proposed site and surrounding region and which may occur again in the same fashion, or among those earthquakes that might be induced by highly active faults in the near future.

(ii) For earthquakes causing the above-mentioned basic design earthquake ground motions  $S_2$  (hereafter referred to as “extreme design earthquakes”), reference is made to the earthquake among those earthquakes exceeding the maximum design earthquake that would have the greatest effect on the proposed site based on engineering judge following a seismological review of past earthquakes, the nature of any active faults and the seismo-tectonic structure underlying the site and the surrounding region.

(b) For earthquakes generating the design basis earthquake ground motions  $S_1$  and  $S_2$ , both distant and nearfield epicentral distances shall be considered. In addition, the shallow focus earthquake shall be considered for the design basis earthquake ground motions  $S_2$ .

(c) In determining the design basis earthquake ground motions, full consideration shall be given to the following items:

(i) The magnitude, epicenter, hypocenter, aftershock area and maximum intensity of earthquake ground motion (or estimated value), and resultant damage (including destruction rate of structures, overturning of tombstones, etc.) in earthquakes that have affected the site and the surrounding region in the past.

(ii) The statistical expectation of the intensity of the past destructive earthquake ground motions.

(iii) The magnitude of the earthquake and the distance between the site and its center of energy release.

(iv) Past observation records for the general region as well as those for the site, including any results of bedrock property investigations.

(d) Pursuant to the above items, the design basis earthquake motions shall be such that each of the following parameters can be evaluated as appropriate:

(i) The maximum amplitude of the earthquake ground motion

(ii) The frequency characteristics of the earthquake ground motion

(iii) The duration of earthquake ground motion and the time dependent change of the amplitude envelope curves

6. Load Combinations and Allowable Limits (Omitted)

COMMENTARY

In relation to dynamic analysis, an explanation is given of “evaluation of the design basis earthquake ground motions”, “evaluation of active faults”, “static seismic force” and “combinations of seismic forces with other loads and allowable limits”.

I. Evaluation of the Design Basis Earthquake Ground Motions

1. The meaning and interpretation of the terminology concerning the design basis earthquake ground motions are given as follows:

- (1) The "free surface of the base stratum" is a nearly flat surface of the base stratum extending over a considerable area, and above which neither surface layers nor structures are assumed to be present. The base stratum is firm bedrock which was formed in general in the Tertiary or earlier era and which is not significantly weathered.
  - (2) An "active fault" is a fault which has moved during the Quaternary period (i.e. within the last 1.8 million years) and thus is capable of causing earthquakes in the future. Judge as to the activity of a fault shall be based on a topographical and geological investigation, and on instrumental observations taken during past earthquakes, etc.
  - (3) A "seismo-tectonic structure" is a region of the geologic structure, which extends over a given area, and which has a common earthquake occurrence pattern in terms of intensity, hypocentral depth, generating mechanism, frequency, etc.
2. It was decided to classify the design basis earthquake ground motions according to their intensities into the two categories,  $S_1$ , and  $S_2$ , which correspond to the importance of the buildings, structures, equipment and piping of the reactor facilities.
- (1) The earthquakes to be taken into account in determining the design basis earthquake ground motions  $S_1$  are those earthquakes which are considered likely to occur. Namely, it is deemed appropriate to consider that, according to the historical evidence, the earthquakes which affected the site and the surrounding region in the past are likely to occur again in the near future and can be expected to have the same effect on the site and the surrounding region. The occurrence of earthquakes in the near future at highly active faults which would affect the site must also be considered. From these earthquakes, the earthquake which is referred to as the design basis maximum earthquake ground motions would give the largest ground motion to the base stratum of the site. Further, it is assumed that such earthquakes would actually occur and it is for this reason that buildings, structures, the equipment and the piping are subject to the design basis earthquake ground motions  $S_1$ .
  - (2) The earthquakes to be taken into account in determining the design basis earthquake ground motions  $S_2$  are assumed to recur because, in some cases, it is not possible from a seismological standpoint to disregard the possibility of an earthquake whose intensity is higher than that of the maximum design earthquake. Therefore in those cases where there is some evidence indicating that the earthquakes stronger than the maximum design earthquake have occurred in relatively recent era, an engineering review should be done. However, from our knowledge of the seismo-tectonic structure and from the data of past earthquakes, it can be concluded that there will be an upper limit to the intensity of earthquakes in each region of earthquake occurrence. Therefore it is possible to estimate the intensity of the earthquakes and to define the region of earthquake occurrence, based on the nearby active faults and the seismo-tectonic structure underlying the site. From these earthquakes, the earthquake that would produce the largest ground motions in the base stratum of the site shall be referred to as the extreme design earthquake. Further it is assumed that such an earthquake would actually occur and it is for this reason that, the buildings, structures, the equipment and the piping are subject to the design basis earthquake ground motions  $S_2$ .  
In addition, it was decided that the earthquakes with both distant and nearfield epicentral distances will be considered in determining the maximum and extreme design earthquakes because some characteristics of earthquake ground motions at the free surface of the base stratum will be different depending on the epicentral distance.  
(Omitted)

**(3) Examination Guide for Safety Design of Light Water Nuclear Power Reactor Facilities (Excerpt) (Decision of the Nuclear Safety Commission August 30, 1990)**

**IV. General Requirements for Reactor Facilities**

**1. Applied Codes and Standards**

Design, selection of materials, fabrication and inspection of structures, systems and components with safety functions shall conform to those codes and standards which are recognized appropriate in the light of the importance of their safety functions.

**2. Design Considerations against Natural Phenomena**

- (1) Structures, systems and components with safety functions shall be assigned to appropriate seismic categories, with the importance of their safety functions and possible safety impacts of earthquake-induced functional loss taken into consideration, and be designed to sufficiently withstand appropriate design seismic forces.
- (2) Structures, systems and components with safety functions shall be so designed that the safety of the reactor facilities will not be impaired by other postulated natural phenomena than earthquake. Structures, systems and components with safety function of especially high importance shall be of the design that reflects appropriate safety considerations against the severest conditions of anticipated natural phenomena or appropriate combinations of natural forces and accident loads.

**3. Design Considerations against External Human-Initiated Events**

- (1) Structures, systems and components with safety functions shall be so designed that the safety of the reactor facilities will not be impaired by postulated external human-initiated events.
- (2) Reactor facilities shall be so designed that structure, systems and components with safety functions are protected by appropriate means against any unjustifiable access by third persons.

**4. Design Considerations against Internal Missiles**

Structures, systems and components with safety functions shall be so designed that the safety of the reactor facilities will not be impaired by postulated missiles that may take place within the reactor facilities.

## **5. Design Considerations against Fire**

Reactor facilities shall be so designed that their safety will be protected against fire by appropriate combination of three measures of fire prevention, fire detection and extinguishment and mitigation of fire effects.

## **6. Design Considerations against Environmental Conditions**

Structures, systems and components with safety functions shall be designed to withstand all environmental conditions under which their safety functions are expected.

## **7. Design Considerations for Share Use**

Structures, systems and components with safety functions shall be so designed that in case they are shared by two or more reactor facilities, the safety of the reactors will not be impaired by the shared use.

## **8. Design Considerations against Operator Actions**

Reactor facilities shall be designed to reflect appropriate preventive considerations against operators' mis-operation.

## **9. Design Considerations for Reliability**

(1) Structures, systems and components with safety functions shall be so designed that their adequately high reliability will be ensured and maintained as required according to the importance of their safety functions.

(2) Systems with safety functions of especially high importance shall be designed with multiplex or diversity and independence considering their physical makeup, working principles, assigned safety functions, etc.

(3) The systems referred to in item (2) above shall be designed to be capable of fulfilling their safety functions even in case of loss of external power supply in addition to an assumption of a single failure of any of the components that comprise the systems.

## **10. Design Considerations for Testability**

Structures systems and components with safety functions shall be designed to be capable of being tested or inspected to verify their integrity and capability by adequate methods consistent with the importance of their safety functions during reactor operation and shutdown.

## **V. Nuclear Reactor and Reactor Shutdown System**

### **11. Core Design**

(1) Core shall be designed to assure, with the aid of the functions of associated reactor cooling system, reactor shutdown system, instrumentation and control system, and safety protection system, that the acceptable fuel design limits are not exceeded during normal operation and abnormal transients.

(2) Components, other than fuel rods, that make up the core or are located in proximity to it within the reactor pressure vessel shall be designed to be capable of ensuring safe reactor shutdown and proper core cooling during normal operation and abnormal situation.

### **12. Fuel Design**

(1) Fuel assemblies shall be designed not to lose their integrity despite various unfavorable factors that may take place during their use in the nuclear reactor.

(2) Fuel assemblies shall be designed not to be excessively deformed during transport or handling.

### **13. Reactor Characteristics**

Core and associated systems shall be designed to have inherent characteristics to suppress the reactor power rise and to be well capable of controlling reactor power oscillation if it occurs.

### **14. Reactivity Control System**

(1) Reactivity control system shall be designed to be capable of regulating reactivity changes expected to occur during normal operation, thereby maintaining necessary situation of operations.

(2) The maximum reactivity worth of control rods and reactivity insertion rate shall be such that postulated reactivity-initiated events will not result in a damage of the reactor coolant pressure boundary nor destruction of the core, core support structures and reactor pressure vessel internals that may impair core cooling.

### **15. Independence and Testability of Reactor Shutdown System**

Reactor shutdown system shall be designed to have at least two independent systems capable of making the core subcritical from hot standby or hot operational conditions and maintaining the core subcritical under hot conditions. They shall also be designed to allow testing with respect to their functional capability.

### **16. Reactor Shutdown Margin by Control Rods**

Control rod-dependent system in the reactor shutdown systems shall be designed to be capable of making the core subcritical under hot and cold conditions even when one control rod with the maximum reactivity worth is withdrawn out of the core and cannot be inserted.

### **17. Shutdown Capability of Reactor Shutdown System**

(1) At least one independent system out of the reactor shutdown systems shall be designed to be capable of making the core subcritical under hot conditions during normal operation and abnormal transients without leading to the acceptable fuel design limits being exceeded and capable of maintaining the core subcritical under hot conditions.

(2) At least one independent system out of the reactor shutdown systems shall be designed to be capable of making the core subcritical under cold conditions and of maintaining the core subcritical under cold conditions.

### **18. Reactor Shutdown System Capability at the Accident**

At least one independent system included in the reactor shutdown systems shall be designed to be capable of making the core subcritical at the accident, and at least one independent system included in the reactor shutdown systems shall be designed to be capable of maintaining the core subcritical at the accident.

## **VI. Reactor Cooling System**

### **19. Integrity of Reactor Coolant Pressure Boundary**

- (1) Reactor coolant pressure boundary shall be so designed that its integrity will be ensured during normal operation and abnormal situation.
- (2) Pipelines connected to the reactor coolant system shall be in general fitted with isolation valves.

### **20. Prevention of Reactor Coolant Pressure Boundary Failure**

Reactor coolant pressure boundary shall be designed not to exhibit brittle behavior and develop any rapid propagative failure during normal operation, maintenance, testing and abnormal situation.

### **21. Detection of Reactor Coolant Pressure Boundary Leaks**

Means shall be provided for quick and proper detection of the leakage of the reactor coolant, if any, from the reactor coolant pressure boundary.

### **22. In-Service Test and Inspection of Reactor Coolant Pressure Boundary**

Reactor coolant pressure boundary shall be designed to be capable of being tested and inspected to verify its integrity throughout the service life of the nuclear reactor.

### **23. Reactor Coolant Make-up System**

Reactor coolant make-up system shall be designed to be capable of supplying as much coolant as required at a proper flow rate to restore the necessary inventory of the reactor coolant in case of a limited leakage.

### **24. Systems for Removing Residual Heat**

- (1) Systems for removing residual heat shall be designed to be capable of removing fission product decay heat and other residual heat from the core during reactor shutdown, thereby preventing the acceptable fuel design limits and design conditions for the reactor coolant pressure boundary from being exceeded.
- (2) Systems for removing residual heat shall be properly provided with multiplexity or diversity and independence so that they can fulfill their safety functions even in case of loss of external power supply in addition to the assumption of a single failure of any of the components that comprise the systems. They shall also be designed to allow testing with respect to their functional capability.

### **25. Emergency Core Cooling System**

- (1) Emergency core cooling system shall be designed to be capable of preventing serious damage of fuel and of limiting the reaction between fuel cladding metal and water to a sufficiently small amount in case of a postulated loss of reactor coolant resulting from a break in piping, etc.
- (2) Emergency core cooling system shall be designed with multiplex or diversity and independence so that the system can fulfill its safety functions even in case of loss of external power supply in addition to an assumption of a single failure of any of the components that comprise the system.
- (3) Emergency core cooling system shall be designed to be capable of being tested and inspected on a periodical basis. The emergency core cooling system shall also be designed to allow testing and inspection of each constituent system independently so that the integrity and redundancy of the emergency core cooling system can be verified.

### **26. System for Transporting Heat to Ultimate Heat Sink**

- (1) System for transporting heat to an ultimate heat sink shall be designed to be capable of transferring heat generated or accumulated in structures, system and components with safety functions of especially high importance to an ultimate heat sink.
- (2) Systems for transporting heat to an ultimate heat sink shall be properly provided with multiplex diversity and independence so that they can fulfill their safety functions even in case of loss of external power supply in addition to an assumption of a single failure of any of the components that comprise the systems. They shall also be designed to allow testing with respect to their functional capability.

### **27. Design Consideration against Loss of Power**

Reactor facilities shall be so designed that safe shutdown and proper cooling of the nuclear reactor after shutting down can be ensured in case of a short-term loss of total AC power.

## **VII. Reactor Containment**

### **28. Functions of Reactor Containment**

- (1) Reactor containment shall be designed to withstand the load (pressure, temperature, dynamic load) resulting from the postulated events for reactor containment design and an appropriate seismic load and prevent the specified leakage rate from being exceeded with the aid of properly operating isolation functions.
- (2) Reactor containment shall be so designed that the leakage rate of the entire containment can be measured under a specified pressure on a periodical basis.
- (3) Reactor containment shall be designed to allow leakage tests at such important portions as penetrations for electric cables, pipelines, etc. and access openings.

### **29. Prevention of Reactor Containment Boundary Failure**

Reactor containment boundary shall be designed not to exhibit brittle behavior and develop any quickly propagative failure during normal operation, maintenance, testing and abnormal situation.

### **30. Isolation Function of Reactor Containment**

- (1) The pipelines that penetrate the reactor containment walls shall in general be fitted with containment isolation valves.
- (2) The containment isolation valves to be fitted in principal pipeings shall in general be designed to be automatically and properly closed in case of an accident that necessitates the retention of isolation function.

### **31. Reactor Containment Isolation Valves**

- (1) Containment isolation valves shall be located as close to the reactor containment as practicable.

- (2) Installation of the containment isolation valves shall be subject to the following:
- (i) Of the pipeings that open inside the reactor containment or connect with the reactor coolant pressure boundary, those which are not closed outside the reactor containment shall in general be provided with one containment isolation valve inside the reactor containment and one outside.
  - (ii) Of other pipeings than (i) above, those which are closed inside or outside the reactor containment shall in general be provided with one containment isolation valve outside the reactor containment.
  - (iii) Containment isolation valves shall not lose their isolation function due to loss of driving power after they are closed.
  - (iv) The containment isolation valves shall allow performance tests to be conducted on a periodical basis, of which important ones shall be testable for leakage.

### **32. Reactor Containment Heat Removal System**

- (1) Reactor containment heat removal system shall be designed to sufficiently reduce the containment pressure and temperature resulting from the release of energy in case of the postulated events for reactor containment design.
- (2) Reactor containment heat removal system shall be designed with multiplex or diversity and independence so that the system can fulfill its safety functions even in case of loss of external power supply in addition to an assumption of a single failure of any of the components that comprise the system. The system shall also be designed to provide testability.

### **33. System for Controlling Containment Facility Atmosphere**

- (1) Containment facility atmosphere cleanup system shall be designed to be capable of reducing the concentration of radioactive materials release to the environment at the postulated events for reactor containment design.
- (2) Flammable gas concentration control system shall be designed to be capable of controlling the concentration of hydrogen or oxygen present in the reactor containment in case of the postulated events for reactor containment design, thereby maintaining the integrity of the containment facility.
- (3) The systems for controlling containment atmosphere shall be designed with multiplex or diversity and independence so that they can fulfill their safety functions even in case of loss of external power supply in addition to an assumption of a single failure of any of the components that comprise the systems. They shall also be designed to allow testing with respect to their function capability.

## **VIII. Safety Protection System**

### **34. Redundancy of Safety Protection System**

Safety protection system shall be designed with redundancy so that a single failure of any of the components or channels that comprise the system or removal from service of any component or channel does not result in loss of safety function of the system.

### **35. Independence of Safety Protection System**

Safety protection system shall be designed such that the channels comprising the system are separated from each other taking into account the independence between them as much as practicable, thereby preventing loss of its safety function during normal operation, maintenance, testing and abnormal situation.

### **36. Function of Safety Protection System during Transients**

Safety protection system shall be designed to detect the abnormal state during anticipated operational occurrences and initiate automatically the operation of appropriate systems including the reactor shutdown system in order to ensure that the acceptable fuel design limits are not exceeded.

### **37. Function of Safety Protection System at the accident**

Safety protection system shall be designed to detect the abnormal situation in an accident and initiate automatically the operation of the reactor shutdown system and necessary engineered safety features.

### **38. Function of Safety Protection System at time of failure**

Safety protection system shall be designed to allow the reactor facilities to be settled in a state of safety eventually in case of driving power loss, system cut-off or any other unfavorable situation.

### **39. Separation of Safety Protection System from Instrumentation and Control System**

Safety protection system shall be designed to be functionally separated from instrumentation and control systems so that the system does not lose its safety functions by the influence from instrumentation and control systems in case that the both systems share common elements.

### **40. Testability of Safety Protection System**

Safety protection system shall be designed to be capable of being tested in general during reactor operation on a periodical basis and allow testing of each constituent channel independently so that the integrity and multiplex of the system can be verified.

## **IX. Control Room and Emergency Facilities**

### **41. Control Room**

Control room shall be so designed that the situation of operations and principal parameters of reactor and principal related facilities can be monitored and that prompt manual control can be performed, whenever required, to maintain safety.

### **42. Reactor Shutdown Function from Outside of Control Room**

Reactor facilities shall be designed to have the following functions that allow reactor to be shut down from an appropriate location outside the control room.

- 1) Quick hot shutdown of the nuclear reactor together with necessary instrumentation and control in order to maintain the reactor facilities in a safe state.
- 2) Maintenance of cold shutdown state of the nuclear reactor with appropriate control procedure.

### **43. Design Considerations for Control Room Habitability**



Control room shall be designed to be protected against fire, properly shielded so as to allow personnel to have access to or stay in the control room for necessary operations at the accidents, and protection against toxic gases and gaseous radioactive materials likely to be released due to fire or accident by means of proper ventilation system.

#### **44. On-site Emergency Station**

Reactor facilities shall be designed to allow establishment, in the nuclear power station, of an on-site emergency station from which necessary instruction will be furnished at the accidents.

#### **45. Design Considerations for Communications Equipment**

Reactor facilities shall be provided with adequate alarm systems and communications equipment that allow necessary instructions and messages to be given properly to all the people present in the nuclear power plant at the accidents. The communications equipment between nuclear power plant and necessary outside places shall be provided with multiplex or diversity.

#### **46. Design Considerations for Evacuation Route**

Reactor facilities shall be provided with emergency lights that function even in case of ordinary light power loss and have safe evacuation routes provided with concise and permanent guide mark.

### **X. Instrumentation and Control System and Electrical System**

#### **47. Instrumentation and Control System**

(1) Instrumentation and control system shall be designed with adequate considerations for the following requirements during normal operations and abnormal transients.

(i) The parameters necessary to ensure the integrity of the core, reactor coolant pressure boundary, reactor containment vessel boundary and associated systems shall be controlled and maintained within appropriate predicted range.

(ii) Monitoring of the aforementioned parameters within predicted variation limits shall be possible so as to allow necessary countermeasures to be taken as required.

(2) Instrumentation and control system shall be designed to enable monitoring, and recording as required, of the parameters necessary to recognize the status of accident and take countermeasures by adequate method over sufficient range at the accidents. The system shall also be designed to enable monitoring or estimation of the status of reactor shutdown and core cooling in particular by use of two or more kinds of parameters.

#### **48. Electrical System**

(1) Electrical system shall be designed to allow the structures, systems and components with safety functions of especially high importance to be fed by either external power or emergency auxiliary power system when they need electric power to fulfill their safety functions.

(2) External power system shall be connected to the power grid with two or more power transmission lines.

(3) Emergency auxiliary power system shall incorporate multiplexity or diversity and independence and have enough capacity and capability to accomplish the following properly even with an assumption of a single failure of its components.

(i) Shutting down and cooling the nuclear reactor without the acceptable fuel design limits and design conditions for the reactor coolant pressure boundary being exceeded in case of abnormal transients.

(ii) Cooling the core and ensuring the integrity of the reactor containment and safety functions of other necessary systems and components at the accidents, such as loss of reactor coolant.

(4) The electrical system associated with safety functions of high importance shall be designed such that their important portions can be tested and inspected on appropriate and periodic basis.

### **XI. Fuel Handling Systems**

#### **49. Fuel Storage and Handling System**

(1) Storage and handling systems for fresh and spent fuels shall be designed so as to meet the following requirements.

(i) Appropriate periodical testing and inspection of structures, systems and components with safety functions shall be possible.

(ii) Storage system shall have appropriate containment and air purification system.

(iii) Storage system shall have appropriate storage capacity.

(iv) Handling system shall have capability to prevent the dropping of fuel assemblies during transfer.

(2) Storage and handling systems for spent fuels shall be designed so as to meet the following requirements, in addition to the aforementioned.

(i) Proper shielding for radiation protection shall be available.

(ii) Storage system shall have the system capable of fully removing decay heat and transporting it to an ultimate heat sink with associated purification system.

(iii) Prevention of excessive decrease of cooling water inventory in the storage systems and proper leakage detection shall be possible.

(iv) Storage systems shall not lose their safety functions even in case of postulated dropping of fuel assemblies during handling.

#### **50. Prevention of Fuel Criticality**

Fuel storage and handling systems shall be so designed that criticality can be prevented in any postulated case by use of geometrical safety layout or other appropriate means.

#### **51. Monitoring of Fuel Handling Area**

Fuel handling area shall be so designed that the situation leading to the loss of decay heat removal capability and excessive radiation levels can be detected and that such situation can be properly communicated to the personnel or corrective measures can be automatically taken against such situation.

## **XII. Radioactive Waste Processing Facility**

### **52. Radioactive Gaseous Waste Processing Facility**

Processing facility for radioactive gaseous wastes generated through the nuclear reactor operation shall be so designed that the quantity and concentration of radioactive materials released to the environment can be reduced as low as reasonably achievable through proper filtration, retention, decay, management, etc.

### **53. Radioactive Liquid Waste Processing Facility**

(1) Processing facility for radioactive liquid wastes generated through the nuclear operation shall be so designed that the quantity and concentration of radioactive materials released to the environment can be reduced as low as reasonably achievable through proper filtration, evaporation process, ion exchange, retention, decay, management, etc.

(2) Radioactive liquid waste processing facility and associated facilities shall be designed to reflect preventive considerations against the leakage of liquid radioactive materials from the systems and uncontrolled release of those materials to out site.

### **54. Radioactive Solid Waste Processing Facility**

Processing facility for radioactive solid wastes generated from the reactor facilities shall be designed to reflect preventive considerations against the dispersion of radioactive materials in the process of crushing, compression, burning, solidification, etc. of the radioactive wastes.

### **55. Radioactive Solid Waste Storage Facility**

Radioactive solid waste storage facility shall have enough capacity to store radioactive solid wastes generated from the reactor facilities and be designed to reflect preventive considerations against the spread of contamination by the wastes.

## **XIII. Radiation Management**

### **56. Environmental Radiation Management**

Reactor facilities shall be so designed that the dose rate by direct and skyshine gamma rays generated during normal operation around the site can be reduced as low as reasonably achievable.

### **57. Radiation Protection for Personnel Engaged in Radiation Work**

(1) Reactor facilities shall be so designed as to reflect necessary considerations for radiation protection in order to reduce the dose equivalent rate in the areas accessible to radiation workers as low as reasonably achievable by means of shielding, component layout, remote handling, prevention of the leakage of radioactive materials, ventilation, etc., taking work efficiency of radiation workers into account.

(2) Reactor facilities shall incorporate radiation protection measures that will allow radiation workers to perform necessary operations during abnormal situation.

### **58. Radiation Management for Personnel Engaged in Radiation Work**

Reactor facilities shall be provided with radiation management facility that adequately monitor and control radiation exposure in order to protect workers from radiation. Radiation management facility shall be so designed that necessary information can be displayed in the control room or in other appropriate places.

### **59. Radiation Monitoring**

Reactor facilities shall be designed to enable proper radiation monitoring over at least reactor containment atmosphere, monitoring area surrounding the reactor facility and release paths of radioactive materials at the normal operation and abnormal situation and to allow necessary information to be displayed in the control room or in other appropriate places.

## **(4) The emergency preparedness guidelines “Emergency Preparedness of Nuclear Installations”**

(Excerpt)

(Decision of the Nuclear Safety Commission, June 1980)

Latest Revision: June, 2001

**Chapter 1** Preface

**Chapter 2** Emergency Preparedness-General

**Chapter 3** Zone to be Performed Substantial Emergency Preparedness

3-2 Selection of Zone

Standards of "Zone to be Performed Substantial Emergency Preparedness"( hereinafter referred to as EPZ (Emergency Planning Zone)) are defined with sufficient margin in a distance from a nuclear facility even assuming situations, which cannot dare happen technically in nuclear installations making sufficient safety countermeasures. (Abbreviation) The standards of EPZ are shown in Table 1 depending on types of nuclear installations.

Table 1 Standard of EPZ depending on types of nuclear installations

Types of installations	Distance (radius) of standard of EPZ
Nuclear power stations, nuclear reactors in a research and development stage, and nuclear reactors of more than 50MW in experimental research stage	About 8-10km

**Chapter 4** Emergency Environmental Radiation Monitoring

4-1 Objective, etc.

In a nuclear installation, when there is an unusual release of radioactive materials or radiations or its fear, an environmental monitoring planned particularly in order to obtain the information about radioactive materials or radiations

of circumference environment, is called "emergency monitoring" and it consists of the 1st phase monitoring performed quickly at the time of occurrence of a nuclear emergency situation and the 2nd phase monitoring carried out to assess the general influence to the circumference environment. (Followings are abbreviated)

## **Chapter 5** Guideline for Enforcement of Emergency Response

### 5-1 Notification Criteria and Emergency Situation Judgment Criterion in the Abnormal Situation Occurrence

In the Special Law for Nuclear Emergency, considering the characteristic of nuclear installations, relations with countermeasure activities, etc., criteria about preparation and start of nuclear emergency preparedness activities are defined so that it can apply to all nuclear installations.

#### (1) Notification criteria to related persons and response to applicable events

##### 1) Contents of notification criteria

- (a) At the vicinity of boundary of a nuclear installation, dose rate of space radiations at one point of 5microSv/h or more for more than 10min. or at more than two points simultaneously 5microSv/h or more (when gamma rays are 1microSv/h or more, the total doses of 5microSv/h or more by measuring neutrons, excluding case due to thunders.)
- (b) Release of the radioactive materials with which a radioactivity level after spreading corresponds 5microSv/h or more near the boundary of a nuclear installation at normal release portions, such as a stack, etc. (release which corresponds 50microSv or more by an event when it is managed by accumulated release).
- (c) A space radiation dose rate of 50microSv/h or more, or release of radioactive materials corresponding to 5microSv/h or more in the place outside a management zone etc. when a fire, explosion, etc. arises.
- (d) A space radiation dose rate of 100microSv/h or more, or radioactive materials etc. in the point 1m from a transportation container when an accident occurred during conveyance outside nuclear installations.
- (e) Occurrence of a criticality accident or a state of its fear.
- (f) Individual events based on the characteristic of nuclear installations in light water reactors and shut down of the nuclear reactor by insertion of control rods cannot be performed.

##### 2) Responses when an event applicable to notification criteria occurs

###### (a) Responses of nuclear operators

While a nuclear operator should notify to the national government, prefectural governors, and municipal governors quickly, he carries out emergency response required for the grasp of the information about the influence on residents in the vicinity, etc. and prevention of occurrence or expansion of a nuclear emergency and also needs to report the development of the incident to these organizations precisely.

###### (b) Responses of the national government

While the national government collects quickly the incident information, etc. in the nuclear installation through the Senior Specialist for Nuclear Emergency, it needs to send personnel and specialists of Japan Atomic Energy Research Institute etc. to the spot. Moreover, response to alert conditions such as attaining share of the information between the related persons and discussing countermeasures should be prepared according to the expansion situation of the incident by holding the emergency response connection meeting between related ministries and government offices, etc.

###### (c) Responses of local governments

Prefectural and municipal governments need to collect information, obtaining cooperation of the Senior Specialist for Nuclear Emergency and to prepare an alert condition according to the expansion situation of the incident. Moreover, from the viewpoint of the grasp of the influence to the circumference, while the monitoring at usual times is strengthened, preparation of emergency monitoring is started.

Besides, this stage is strictly a stage of preparation required for prevention of occurrence or expansion of a nuclear emergency and responding pertinently is important so as not to give unnecessary anxiety and confusion to residents in the related organizations. In addition, as response at the spot in an initial stage, the role of the Senior Specialist for Nuclear Emergency is important, and contents of performances, etc. need to be defined beforehand.

#### (2) A nuclear emergency situation and its response

##### 1) The contents of the judgment criteria of nuclear emergency situations

- (a) At vicinity of the boundary of a nuclear installation, dose rate of space radiation in a point of 500microSv/h or more for more than 10 minute or 500microSv/h or more at more than two points simultaneously. (Total dose of 500microSv/h or more by measuring dose of neutrons also, when dose of gamma rays is 5microSv/h or more, but excluding dose due to thunder.)
- (b) A release of the radioactive materials with which a radioactivity level after spreading corresponds 500microSv/h or more near the boundary of a nuclear installation at normal release portions, such as a stack, etc. (a release which corresponds 5mSv or more by an event when it is managed by accumulated release).
- (c) A space radiation dose rate of 5mSv/h or more, or a release of radioactive materials corresponding to 500microSv/h or more in the place outside a management zone etc. when a fire, explosion, etc. arises.
- (d) A space radiation dose rate of 10mSv/h or more, or radioactive materials etc. in the point 1m from the transportation container when an accident occurred during conveyance outside nuclear installations.
- (e) Occurrence of a criticality accident
- (f) A nuclear reactor cannot be shut down by operations such as pouring of borate in a light water reactor in individual events based on the characteristics of the nuclear installation.

##### 2) Response to nuclear emergency situations

(a) Responses of nuclear operators

Nuclear operators need to carry out emergency response for prevention of occurrence, or expansion of a nuclear emergency.

(b) Responses of the national government and local governments

The national government declares a nuclear emergency situation and at the same time it establishes the Nuclear Emergency Response Headquarter. Local governments establish Emergency Response Headquarters and carry out emergency response. The Joint Council for Nuclear Emergency Response which consists of the local response headquarter of the national government, response headquarters of prefectural and municipal governments, etc. is organized in the off site center, in order to share information, to perform cooperated emergency response and it is important to take proper measures to reduce influence of radiation and not to give unnecessary anxiety and confusion to residents in the vicinity.

5-2 (Omission)

5-3 Indices for protective measures

Indices for taking protective measures are expressed as the dose (prediction dose) expected to receive for individuals if certain measures are not taken, or measured values as concentration of radioactive materials in food and drink.

Although a predicted dose will be presumed from the mode of an abnormal situation, the release situation of radioactive materials or radiations, weather information, SPEEDI network system, etc., information from emergency monitoring etc. are not necessarily obtained at early times of presumption. Therefore, when the measured values by emergency monitoring are obtained, it is effective to correct the calculated values by SPEEDI network system etc. one by one based on these values.

(1) Indices of sheltering and evacuation, etc.

Based on "The Radiation Level of Emergency Response on the Extensive Release Incident of Radioactive Materials" (reply of Radiation Council 1967), the indices of sheltering, evacuation, etc. taking into account the efficiency of protective countermeasures are shown in Table 2.

Table 2 Indices about sheltering and evacuation etc.

Anticipated radiation dose (unit: mSv)		Contents of protective countermeasures
Effective dose by external exposure	<ul style="list-style-type: none"> <li>• Equivalent dose of the thyroid gland by radioactive iodine</li> <li>• Equivalent dose of the bone surface or the lung by uranium</li> <li>• Equivalent dose of the bone surface or the lung by plutonium</li> </ul>	
10~50	100~500	Residents need to do indoor sheltering in own houses, etc. In that case, air tightness should be attended by shutting windows, etc. In the case that the neutrons or gamma rays are directly released from nuclear installations, residents need to sheltering in concrete building or evacuation when the Local Nuclear Emergency Response Headquarter indicates it.
50 or more	500 or more	Residents need to take indoor sheltering to concrete building or to be evacuated according to directions.

We decided that a certain width is given to the index of sheltering, evacuations, etc. The reason is that a protective measures should not be determined by only the dose, but it should be determined in considering the possibility of realization of countermeasures, a risk of being generated by performing, the influencing population scale and the dose to be reduced, and for that flexibility is needed for enforcement of protective countermeasures. Moreover, advices or directions about actions of circumference residents, etc. performed by emergency response headquarters are expected to be given to unit of certain area and prediction doses change with places in the area. That is the reason why index has a width.

In addition, it is required to define a certain area and to carry out step by step after considering the scale of an unusual situation and weather conditions according to the above mentioned index, when a protective countermeasures of indoor sheltering or sheltering in concrete buildings or evacuation are actually applied.

(2) The indices about ingestion restrictions of food and drink

In addition to iodine, uranium and plutonium in radioactive plumes as radioactive elements related to ingestion restriction of food and drink, cesium was selected based on the experience of the Chernobyl accident of former USSR.

Indices about ingestion restrictions of food and drink are shown as measured concentration of the radioactive materials in Table 3 determined from the viewpoint that exposures of these nuclides for residents in the vicinity are reduced.

These Indices further show standard when emergency response headquarters etc. start considerations about the ingestion restriction measure of food and drink to be appropriate or not.

Table 3 Indices of ingestion restriction of food and drink

Objects	Radioactive iodine (representative nuclide of mixed nuclides: <sup>131</sup> I)
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Drink water	3x10 <sup>2</sup> Bq/kg or more
Milk and dairy products	
Vegetables (excluding rootcrop and potato)	

Objects	Radioactive cesium
Drink water	2x10 <sup>2</sup> Bq/kg or more
Milk and dairy products	
Vegetables	
Grain	
Meat, egg, fish, etc.	

Objects	Uranium
Drink water	20Bq/kg or more
Milk and dairy products	
Vegetables	1x10 <sup>2</sup> Bq/kg or more
Grain	
Meat, egg, fish, etc.	

Objects	Alpha nuclides of plutonium and transuranium (sum of radioactivity concentration of <sup>238</sup> Pu, <sup>239</sup> Pu, <sup>240</sup> Pu, <sup>242</sup> Pu, <sup>241</sup> Am, <sup>242</sup> Cm, <sup>243</sup> Cm, <sup>244</sup> Cm)
Drink water	1Bq/kg or more
Milk and dairy products	
Vegetables	10Bq/kg or more
Grain	
Meat, egg, fish, etc.	

## Chapter 6 Emergency Medical Treatment

### 6-3 Emergency medical treatment for radiation exposure

#### (1) Initial medical treatment system for radiation exposure

##### 1) Initial medical treatment for patients exposed to radiation at nuclear installation

The initial treatment includes first aid for patients, surveillance, screening and measurement of dosage, followed by decontamination or prevention of further spread of contamination, and transfer of patients to the medical institutions.

##### 2) Initial response for residents taking refuge in shelters etc.

The initial response includes surveillance, screening and measurement of dosage, and collection and filing of information on evacuation paths and duration of evacuation.

##### 3) Initial medical treatment at medical institutions

Medical institutions in the vicinity of nuclear installations treat patients transferred there from shelters or nuclear installations, and practice decontamination and emergency treatment.

It should be taken note of that, in emergency, many residents may visit medical institutions or shelters and seek unnecessary medical treatment out of mental uneasiness.

#### (2) Subsequent medical treatment system for radiation exposure

After initial medical treatment, patients with residual contamination or with considerable damage are to be transferred to medical institutions for subsequent medical treatment, which includes whole body decontamination by shower, medical treatment for contaminated wound, and measurement of contamination and dosage. It also includes treatment for partially or severely exposed patients.

#### (3) Special medical treatment system for radiation exposure

Following subsequent medical treatment, patients with severe exposure from external or internal radiation are to be transferred to medical institutions for special medical treatment. Medical institutions attached to national universities are recommendable for their special interdisciplinary expertise.

Local medical institutions for special medical treatment obtain cooperation from local radiation protection institutions in measuring dosage and providing radiation protection.

Local medical institutions for special medical treatment, in cooperation with the National Institute of Radiological Sciences, practice treatment of patients, long term medical check, etc. Local medical institutions for special medical treatment, together with institutions for initial and subsequent medical treatment, constitute effective local medical treatment system for radiation exposure, and are responsible for coordination of transfer of patients, technological cooperation, etc. among local institutions.

The National Institute of Radiological Science is the central institute of special medical treatment, practices highly professional decontamination and medical treatment in cooperation with other institutions with high expertise, and gives assistance and advice to other institutions. The National Institute of Radiological Science is one of the local medical institutions for special medical treatment, also.

### 3.13 Miscellaneous

#### (1) Fundamental Element in Arrangement of Accident Management

##### 1. Implementation system of Accident Management

The following items shall be fulfilled from the standpoint that efficient accident management system (hereinafter referred to as AM) is essential.

##### 1.1 Organization

- (1) To specify the Implementation organization of AM
- (2) Support organization for operators with technical evaluation, communication, dose evaluation, restoration, etc. (hereinafter referred to as support organization) as well as operators themselves shall be included in the organization.
- (3) Communication system for calling up the staff shall be specified

##### 1.2 Assignment of duty

- (1) The duty of each organization shall be defined and its responsible person is nominated.
- (2) Operation and support organization is reasonably divided in assignment to avoid over load of operators.

##### 1.3 Responsible person and decision making

- (1) Responsible person of decision making for the implementation of AM shall be assigned according to the situation of the accident.
- (2) The organization to support technical information necessary for the decision-making by responsible person shall be prepared.

##### 2. Facility and equipment

The following items shall be fulfilled to implement AM from the standpoint that the necessary area and equipment for implementing AM is secured.

##### 2.1 Facility and equipment for the support organization

- (1) Area for the support organization shall be secured and the following equipment shall be prepared in advance.
  - a. communication facility
  - b. procedures (phase-1 AM procedures, phase-2 AM procedures, etc)
  - c. technical documents such as piping and instrument drawing
  - d. safety parameter display system
  - e. radiation monitor in site
  - f. radiation monitor out of site
  - g. meteorological data acquisition equipment
- (2) When restoration is expected in AM, resources for the restoration shall be reasonably secured and means to obtain them is estimated.

##### 2.2 Other facilities and equipment in site

- (1) Protective suits and radiation monitor that are necessary for protective activity shall be prepared.

##### 2.3 Availability of instruments

- (1) Instruments necessary for reasonably grasping plant condition, existence of leakage of radioactive material, meteorology, area radiation dose shall be prepared and availability (measuring range, environmental applicability, etc.) at the time of accident is to be evaluated.
- (2) To grasp plant condition, support by computer shall be surveyed and shall make plan to use it in case it is useful. At the same time, the application limit, etc. of model in computer-aided system shall be understood by user.

##### 3. Preparation of knowledge base

The following items shall be fulfilled from the standpoint of that it is necessary to arrange and integrate the knowledge base to implement AM properly,.

##### 3.1 Grasp of plant condition

- (1) To grasp plant condition, type of information and means to obtain (instrument, etc.) it, as well as the criteria for judgement shall be provided in the procedures.
- (2) For a phenomenally uncertain event, the content of knowledge obtained and scope of its application shall be shown in procedures as a knowledge base.

##### 3.2 Judgment of Implementation of AM

- (1) Condition for carrying out AM (Implementation criteria of AM) shall be provided in the procedures as measurable parameters such as water level, pressure, temperature, etc.
- (2) Trend forecast of plant response and parameter change shall be arranged in the procedures as knowledge base.

##### 3.3 Procedures

- (1) Procedures which contain selection criteria of AM, technical data, a series of measures to be taken based on the plant conditions and consequence forecast, etc shall be given to the support organization.
- (2) The procedures used in the main control room shall be prepared so understandably in order to make quick judgment through adopting the format like flow charts, etc.
- (3) Composition of procedures and transfer criteria (transfer from phase-1 AM to phase-2 AM) between each procedure shall be clearly given.
- (4) Criteria on transfer between each procedure or operation judgment shall be indicated in the procedures to be

judged from the specific parameters.

- (5) Technical basis for the criteria of (4) shall be indicated.
- (6) Each procedure shall be distinguished, arranged and kept in custody.
- (7) When the restoration is expected as AM, the restoration guide for the important equipment shall be provided and resources for restoration and postulated time for the restoration shall be shown.
- (8) Renewal of knowledge base shall be done properly.

4. Information and communication

The following items shall be fulfilled from the standpoint that it is necessary to have a system to inform the plant status and implementation situation of AM to the organization out of site properly and receive information, guidance or advice in timely manner, and a system to disseminate those information widely.

- (1) The information to be provided to the organization out of site and the interface with its contact point shall be defined.
- (2) Unitary control shall be defined in collecting, transmitting and receiving information.
- (3) The organization for public relations to disseminate information shall be arranged.

5. Education etc.

The following items shall be fulfilled from the standpoint that it is necessary to educate the involved staff always to deepen the understanding of the knowledge base in order to implement AM properly.

- (1) Education shall be objected to the staff of the AM implementation organization.
- (2) Instructor shall be the person with considerable knowledge in principle, and selected properly in accordance with the recipient of education and content of education.
- (3) Content of the education shall be reasonably defined according to the role of the staff.
- (4) It is defined that education shall be implemented periodically at desk or through drill.
- (5) Frequency of education shall be reasonably planed within the safety securing activity of the station and be revised properly.
- (6) Drills shall be performed to confirm the effectiveness of the AM implementation organization at need.

## **Annex 4**

### **Reference 4.1 Education and Training of Nuclear Regulatory Staffs**

- 1) As the fundamental training, there is the course in which those who want to be a nuclear safety regulatory staff learn the legal system, etc. for nuclear safety regulation such as the Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors, the Electricity Utilities Industry Law, the Special Law for Nuclear Emergency, etc., the governmental philosophy of the business safety regulation, and the fundamentals of the disaster prevention systems by the national government, local governments and nuclear operators, in order for them to acquire fundamental knowledge, skills, etc. common to overall nuclear matters, indispensable in carrying out their duties.
- 2) As the step-up training, there is the course in which professional knowledge and skills profounder and higher than what was learned in the fundamental training are given to those who passed through practical work experiences for a certain period of time after the assignment to their post, and in which they acquire a broad view of things, sound and unerring judgment, etc.
- 3) In addition to the above trainings, there is the course for practical training in which the staffs receive guidance individually in carrying out their everyday works.
- 4) Senior Specialists for Nuclear Emergency and Nuclear Safety Inspectors are required of higher professional knowledge such as Nuclear Emergency Preparedness and safety preservation inspection etc. in pursuing their duties. Consequently, in addition to the step-up training after the fundamental training, they are obliged to receive the training for the qualification of the safety of a nuclear installation (the safety examination guidelines, aging, the overview and trends of latest incidents and events, etc.), the usage of radiation protectors, environmental data collection and measurement, exercises, etc., before starting for their new assignment.

### **Reference 4.2 Examples of the incident due to human error**

#### **a. Manual shutdown of Ohi Power Station Unit 2 due to drop of condenser vacuum**

On February 19, 2000, while Unit 2 was operating at 60 % of the rated power to investigate the leakage of condenser tube, operators started to decrease the power by misjudging the condenser vacuum to drop in the operation management display (hereinafter referred to as CRT) in the main control room. The operator misjudged further the vacuum drop and shut down the turbine manually.

The cause of the incident was that the operator mistook the reading of the generator output, which was arranged next to the condenser vacuum meter and was very near that of the condenser vacuum, for the condenser vacuum reading.

The analysis of the incident made clear that the incident was due to the erroneous conviction and recognition of the operators in the series of the process resulted to the shutdown of the turbine (misreading of the CRT by the turbine operator, erroneous recognition of the response character of the vacuum CRT display by the shift supervisor and erroneous recognition of the situation by the shift director) and that those multiple event deprived them of the chance of recovery.

As the countermeasures, it was decided to read out the value of the operating parameters with the unit and to revise the arrangement in the CRT display.

#### **b. Malfunction in the 3A inspection of the diesel generator at Ikata Power Station Unit 3**

On November 26, 1999, an emergency diesel generator stopped in the commissioning due to the functioning of the safety valve in the diesel engine crank room. Investigation of the crank room revealed that



there existed burning sticks at the bearing of the crank pin and also revealed the residuals of sponge in the piping which supplies lubricant to the bearing.

The cause of the trouble was estimated to be the reduction of lubricant due to the remaining of the sponge which was used for cleaning during the disassembly inspection and not found in the confirmation checking of foreign materials.

As the countermeasures, it was recommended to use hand mirror in the places where the visual confirmation was not available to secure the check, and the recommended method was clearly specified in the operating procedures. It was also planned to strengthen the thoroughness of the principle of the method and the education of it to check the number of materials which were brought inside.