R9: November 18, 2010

Outline of Safety Evaluation During the Establishment Permit Process

Incorporated administration agency
Japan Nuclear Energy Safety Organization

JNES

The “basic design or basic design principles” of a nuclear reactor are reviewed in Japan at the stage of establishment permit according to Paragraph 1 of Article 23 of the Act for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (hereinafter referred to as the “Reactor Regulation Act”). Paragraph 1 of Article 23 of the Reactor Regulation Act stipulates that “a person who intends to establish a nuclear power reactor facility shall receive a permit from the Minister of Economy, Trade and Industry (establishment permit).” When establishing a reactor, an applicant submits an application for establishment permit to the Ministry. The establishment of the nuclear power reactor facility is permitted when the application is judged conforming to permit criteria (Paragraph 1 of Article 24 of the Reactor Regulation Act).

Permit criteria stipulated in Paragraph 1 of Article 24 of the “Act for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors:”
(1) The nuclear reactor shall not have any risk to be used for other than peaceful objectives.
(2) The license shall not impair planned implementation of nuclear development and utilization.
(3) The person who intends to establish a nuclear reactor shall have sufficient technical capability and financial basis required to install the nuclear reactor and have sufficient technical capability to appropriately operate the nuclear reactor.
(4) The location, structure and equipment of the nuclear reactor facility shall not impair prevention of disasters caused by the nuclear reactor, its nuclear fuel material (including spent fuel), or objects contaminated with the nuclear fuel material (including fission products).

The contents which should be described in the establishment permit application and its Appendix documents are stipulated by Acts, Cabinet and Ministry Orders. (Reference sheet 1)

When the establishment permit is applied, the Administrative Authority (the Ministry of Economy, Trade and Industry [METI] in the case of commercial power reactors) reviews the application and judges whether the application conforms to requirements stipulated in Paragraph 1, Article 24 of the Reactor Regulation Act (safety review.)

Judgment on the conformity to the requirements, "the location, structure or equipment of a nuclear reactor do not impair prevention of disasters caused by the nuclear fuel material or the nuclear reactor," stipulated in Paragraph 4 is made based on the Notice which specifies dose limits and various Guides such as the “Review Guide for Safety Design of Light Water Nuclear Power Reactor Facilities” (hereinafter referred to as the “Review Guide for Safety Design”) provided by the Nuclear Safety Commission of Japan (NSC).

Reviews on the application for establishment permit are performed by the Administrative Authority (METI for commercial power reactors) and by the NSC. The NSC is not placed in a Ministry or Agency responsible for nuclear regulation. It is placed in the Cabinet Office, consisting of full-time commissioners and a secretariat. These arrangements were taken pursuant to the recommendation made by the Consultation Meeting for Nuclear Administration. The recommendation of the Consultation Meeting is that “relevant administrative ministries and agencies consistently implement the safety regulation under their responsibilities. As the administrative agencies have also responsibility to promote nuclear development, their credibility of ensuring safety could be jeopardized. Safety regulation by the administrative agencies need to be

evaluated systematically. In order to cope with such issues, the NSC should check the regulation activities conducted by administrative agencies to ensure health and safety of the public (cross check)."

In order to satisfy the necessity of separating nuclear regulation from nuclear promotion as described in the recommendation, an administrative reform was implemented to establish an independent organization, the Nuclear and Industrial Safety Agency (NISA), in METI. NISA is an organization with missions to ensure safety of energy facilities and industrial activities for electric power, nuclear power, city gas, high pressure gas, and mining.

Figure-1 shows the process of safety regulation for nuclear power stations at various phases of site selection, pre-construction, construction, operation and decommissioning.

Figure 1 Regulatory Process of Nuclear Power Stations (1/3)

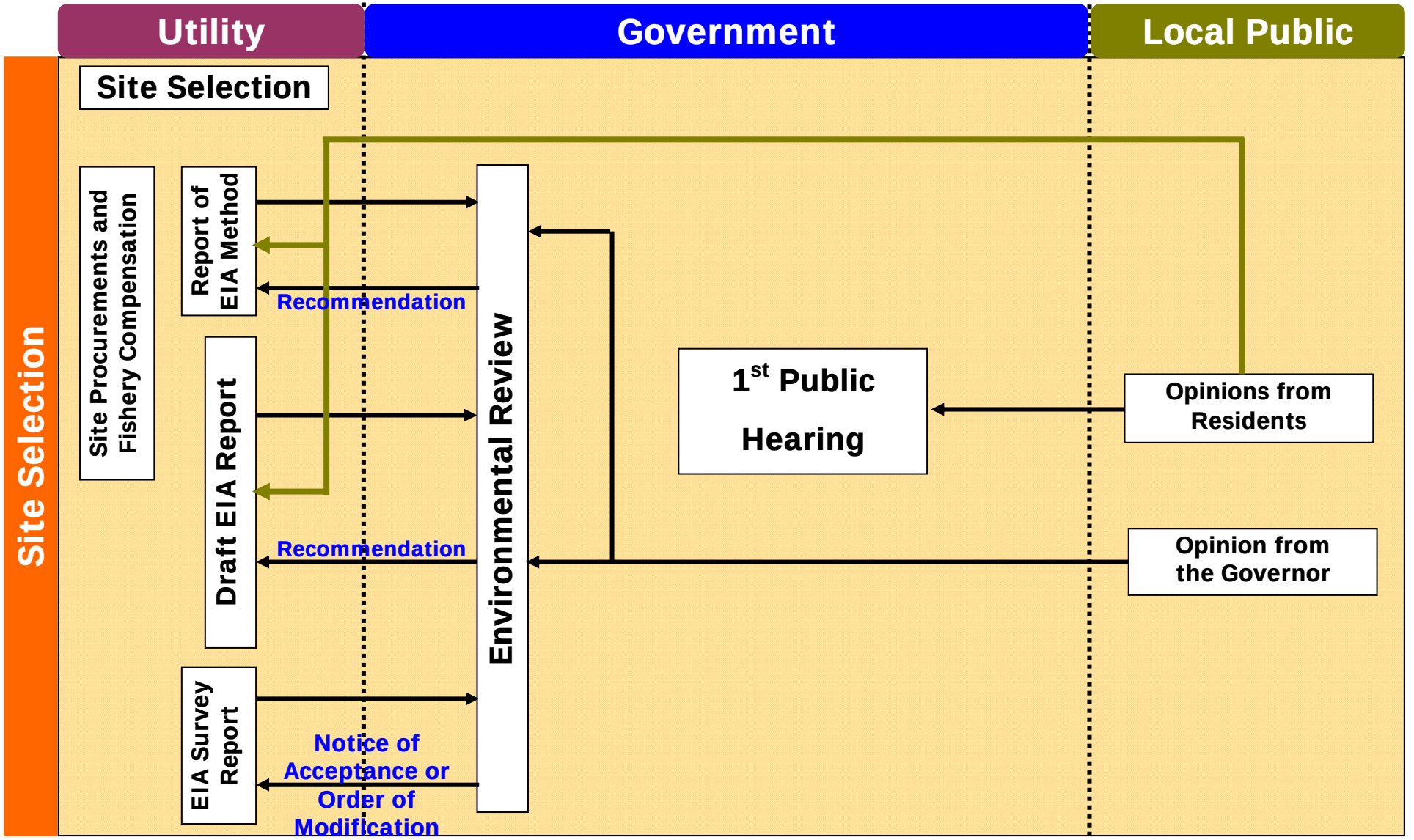
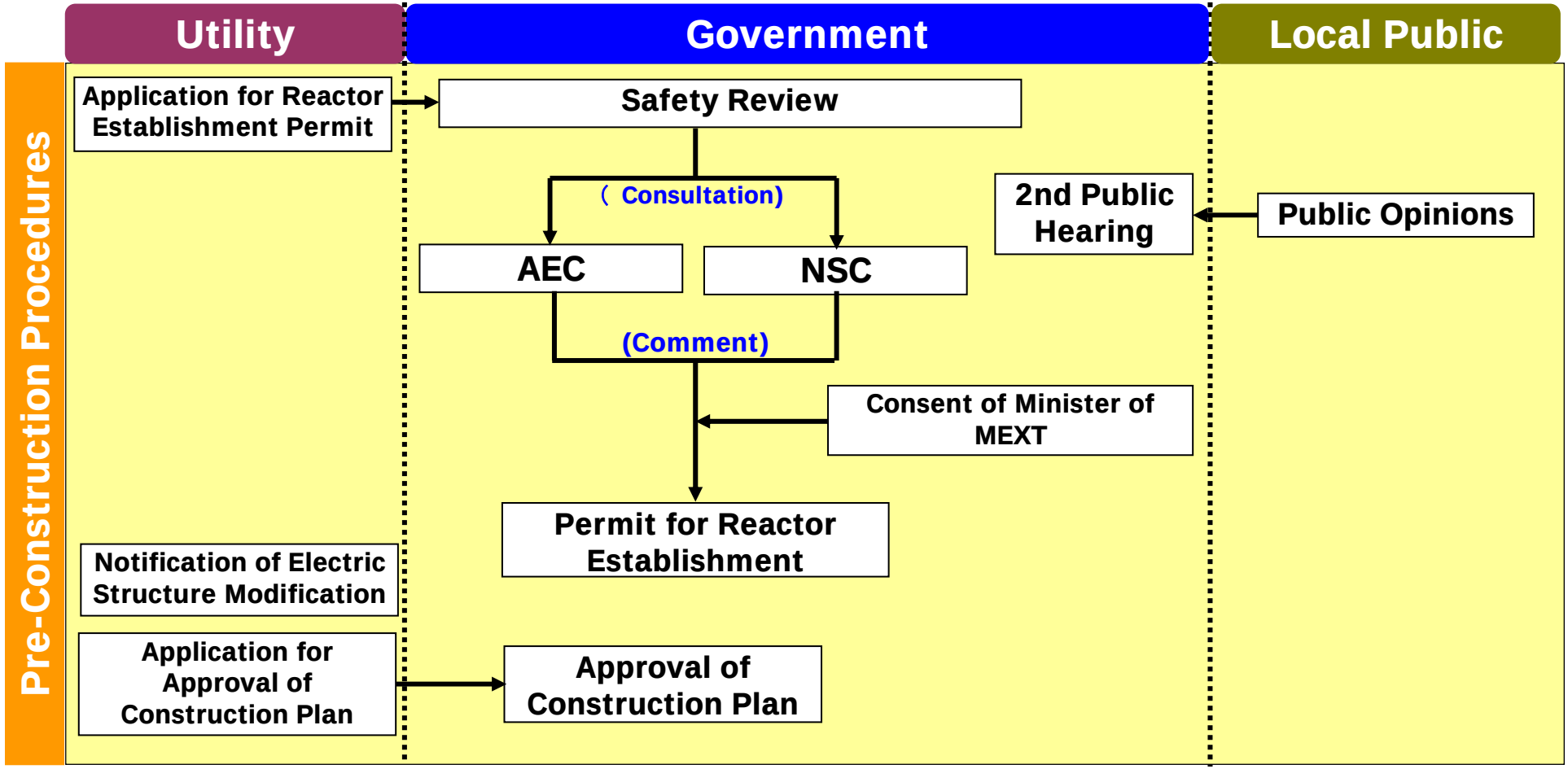
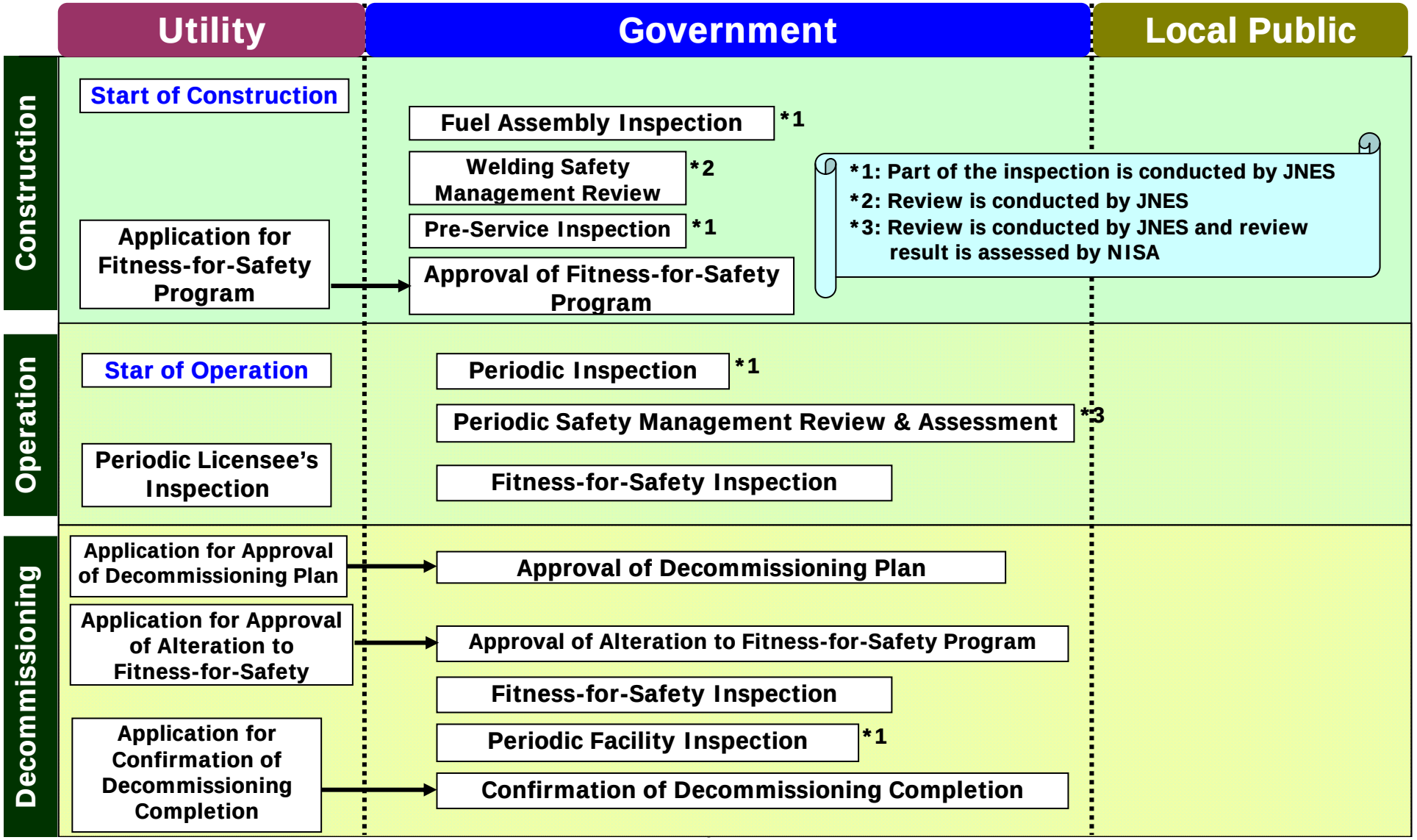


Figure 1 Regulatory Process of Nuclear Power Stations (2/3)



AEC: Atomic Energy Commission
NSC: Nuclear Safety Commission
MEXT: Ministry of Education, Culture, Sports, Science and Technology

Figure 1 Regulatory Process of Nuclear Power Stations (3/3)



Review Criteria for an Establishment Permit

The concrete criteria to judge the conformity to the requirements* of Paragraph 4 of the Permit Criteria in Paragraph 1, Article 24 of the Reactor Regulation Act" are mainly various types of standards and guides specified by the Nuclear Safety Commission of Japan. "Review Guide for Nuclear Reactor Siting and Reference Criteria Concerning its Application" and "Review Guide for Safety Design of Light Water Nuclear Power Reactor Facilities" (hereinafter called as the Review Guide for Safety Design) are the examples of major guides for the establishment permit.

*The location, structure and equipment of the nuclear reactor facility shall not impair the prevention of disasters due to nuclear fuel materials (including spent fuel), objects contaminated with nuclear fuel materials (including fission products), or nuclear reactors.

Table 1 Major Safety Review Guides for Nuclear Power Stations

Siting	Review Guide for Nuclear Reactor Siting	
Design	Review Guide for Safety Design of Light Water Nuclear Power Reactor Facilities	
	SG	Review Guide for Classification of Importance of Safety Functions for Light Water Nuclear Power Reactor Facilities
		Review Guide for Seismic Design of Light Water Nuclear Power Reactor Facilities
		Review Guide for Fire Protection of Light Water Nuclear Power Reactor Facilities
		Review Guide for Radiation Measurement During Accident at Light Water Nuclear Power Reactor Facilities
		Review Guide for Liquid Waste Processing Facilities
Safety Evalua-tion	Review Guide for Safety Evaluation of Light Water Nuclear Power Reactor Facilities	
	SG	Evaluation Guide for Core Thermal Design of Pressurized Water Cooled NPRs
		Evaluation Guide for ECCS Performance of Light Water Nuclear Power Reactors
		Evaluation Guide for Reactivity Insertion Events of Light Water Nuclear Power Reactor Facilities
		Evaluation Guide for Dynamic Load Added to the MARK I Containment Pressure Suppression System
		Evaluation Guide for Dynamic Load Added to the MARK II Containment Pressure Suppression System
		Meteorological Guide for Safety Analysis of Nuclear Power Reactor Facilities
Dose Objective	Guide for Dose Objective Around Light Water Nuclear Power Reactor Facilities	
	SG	Evaluation Guide for Dose Objective Around Light Water Nuclear Power Reactor Facilities
		Measurement Guide for Released Radioactive Materials from Light Water Power Reactor Facilities

SG: Supplemental Guide

At the planning phase of a nuclear power plant construction, the applicant for establishment (hereinafter referred to as an "electric utility") develops application documents for establishment, which include location, structures, and specifications, etc. of the nuclear power plant facilities planned to be constructed, and apply for the permit of its establishment to the National Government. The National Government is required to reviews that the safety design of the nuclear reactor facilities meets requirements provided in the Review Guide for Safety Design during the safety review.

In what follows, this text discusses the outline of the safety evaluation performed by the National Government to judge "whether the design of nuclear power reactor facilities is adequate from the standpoint of ensuring safety." Refer to the following texts for more detailed information:

- Dose Evaluation for an Application for Reactor Establishment Permit
- Safety Design for an Application for Reactor Establishment Permit
- Safety Analysis for an Application for Reactor Establishment Permit
- Seismic Design for an Application for Reactor Establishment Permit

Dose Evaluation

The Safety Review includes the reviews of "siting conditions" and the safety design of the nuclear power plant, and the reviews of radiological dose evaluation during normal operation and transient conditions, and "dose evaluation against major and hypothetical accidents."

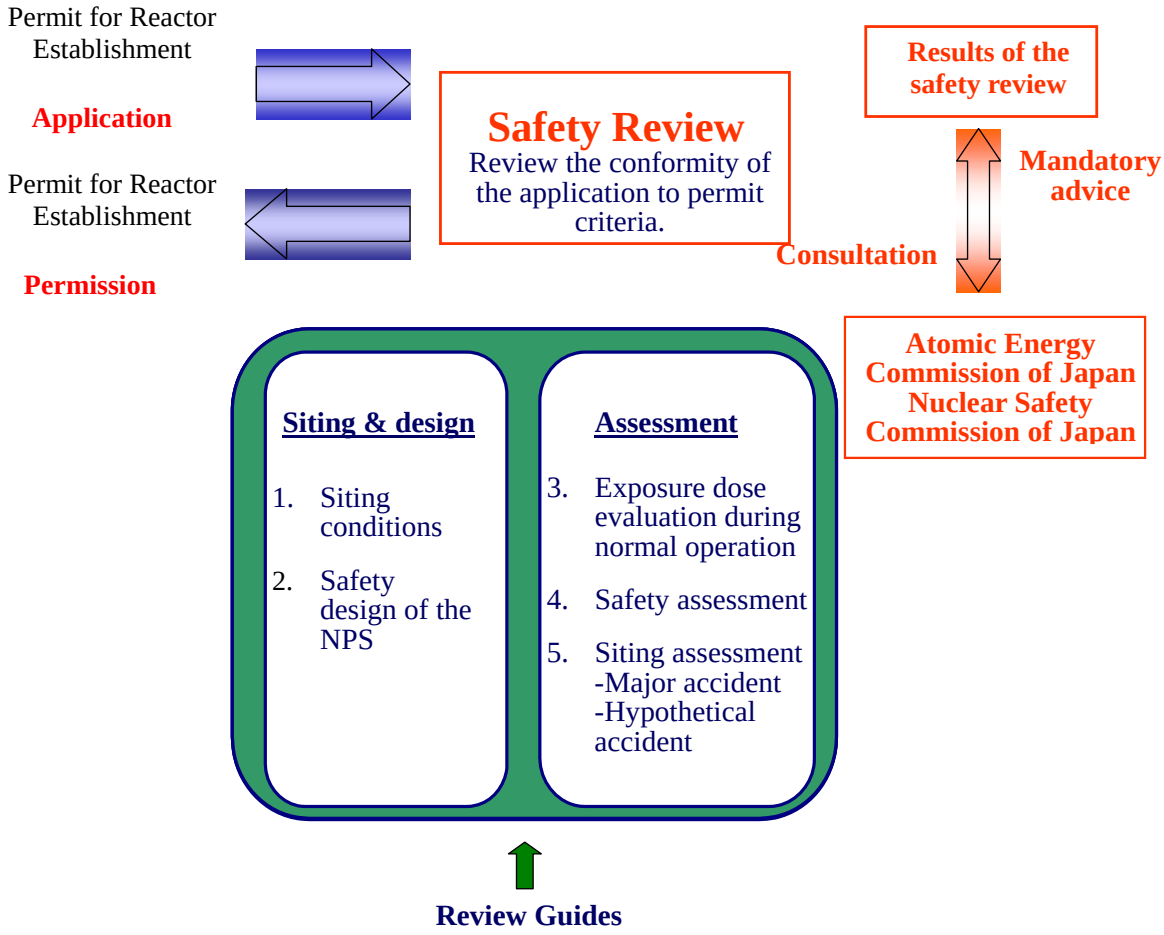


Figure-2 Overall Picture of the Safety Review

In the Safety Review, the “Review Guide for Safety Evaluation” is applied to the review of siting conditions, and the “Review Guide for Nuclear Reactor Siting” is applied to the review criteria.

The following siting conditions are specified as fundamental principles of the Review Guide for Nuclear Reactor Siting.

It is natural that a nuclear reactor shall be designed, constructed, operated, and maintained so as not to cause an accident wherever it is installed, and the following siting conditions are necessary in principle in preparation for a possible accident to ensure safety of the public.

1. There was no event which induced a large accident in the past and such an event is unlikely to happen even in the future. In addition events that escalate into a disaster are also rare.
2. The reactor must be sufficiently away from the public in relation to the safety protective facility.
3. The reactor site, including the surrounding area, should be such that appropriate measures can be taken for the public as necessary.

Specifically speaking, nuclear sites shall be the following locations;

- Where a major accident would not occur due to an earthquake, wind, tsunami, landslide, etc.
- Where proper distance between the nuclear power plant and the residential area is secured

The Safety Review confirms that the site has no risk to cause an accident in relation with the design of a nuclear power plant based on the siting fundamental principles.

The evaluation of exposure dose during normal operation is performed to confirm that the nuclear power plant is so designed to be able to attain the dose objectives provided in the "Guide for Dose Objective Around Light Water Nuclear Power Reactor Facilities" based on the principles that radiation exposure should be as low as reasonably achievable, as well as not to exceed the acceptable dose limits to the general public outside of the site boundary of the nuclear power plant specified in the legislation and regulations.

The calculation procedure of exposure dose at a nuclear power plant during normal operation can be expressed like the one in Figure-3.

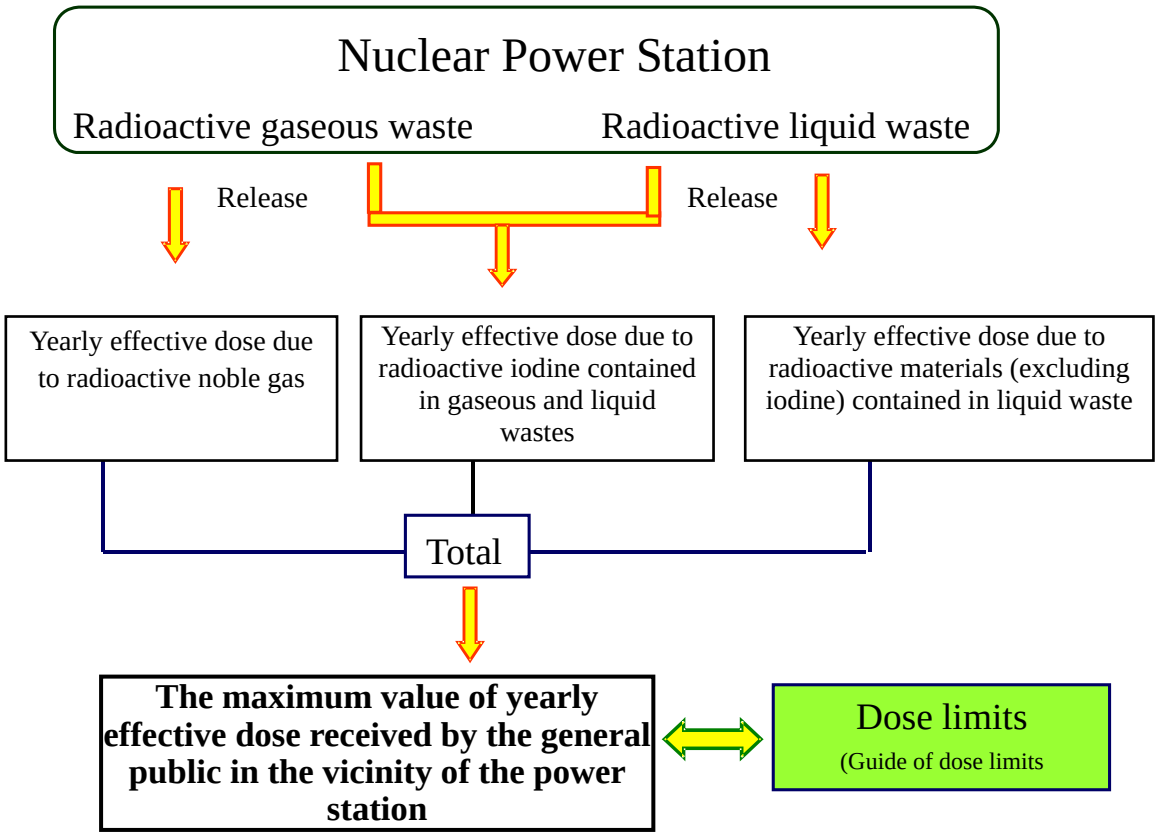


Figure-3 Calculation procedure of exposure dose during normal operation at a nuclear power plant

The siting evaluation is to evaluate whether the results of the analyses conducted assuming accidents in accordance with the Review Guide for Nuclear Reactor Siting conform to the Review Guide for Safety Evaluation, and to judge whether the calculated exposure dose from the assumed accidents to the general public is below the values specified in the legislation and regulations (reference doses) and an adequate distance from the public residence area in the vicinity is secured.

Accidents to be assumed are the ones considered to be technically likely to occur in the worst case (major accidents) and the ones technically inconceivable to occur exceeding major accidents (hypothetical accidents).

Three reference values for criteria provided in Figure-4 are specified for each area.

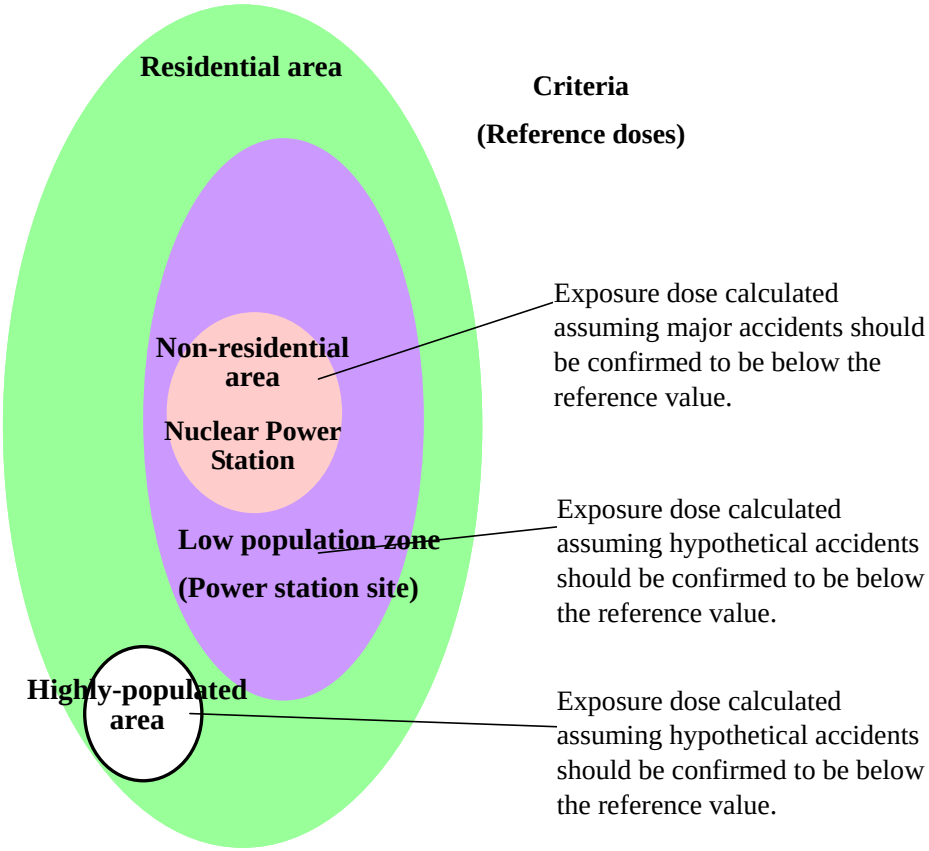


Figure-4 Criteria for siting evaluation

Safety Design Review

The requirements for the safety design of nuclear reactor facility are categorized into the following items:

- General Requirements for Nuclear Reactor Facilities
- Reactor and the Reactor Shutdown System
- Reactor Cooling System
- Reactor Containment
- Safety Protection System
- Control Room and Emergency Provisions
- Instrumentation and Control Systems and Electrical Systems
- Fuel Handling Systems
- Radioactive Waste Processing Facilities
- Radiation Control

The design philosophy of the facilities above shall satisfy the following basic principles.

Defense in depth

Multiple protective measures, not a single protective measure, shall be provided.

The first protective measure is to prevent anomaly from occurring. Facilities and components shall be appropriately designed and manufactured with a sufficient safety margin, and inspected strictly for their conformance to their design. After commissioning, measures for preventing performance degradation through monitoring, inspections and maintenance shall be taken to prevent a failure of the nuclear reactor or associated components.

The second protective measure is to provide preventive measures against escalation of any anomaly. Even when a failure or erroneous operation occurs during operation, measures shall be provided to detect the abnormal condition and to restore it at an early stage, or to prevent its escalation.

The third protective measure is to provide accident mitigation measures. Necessary measures shall be taken to ensure safety of the residents in the vicinity by preventing escalation of the accident and mitigating the consequences, even when an accident occurs in spite of the above measures.

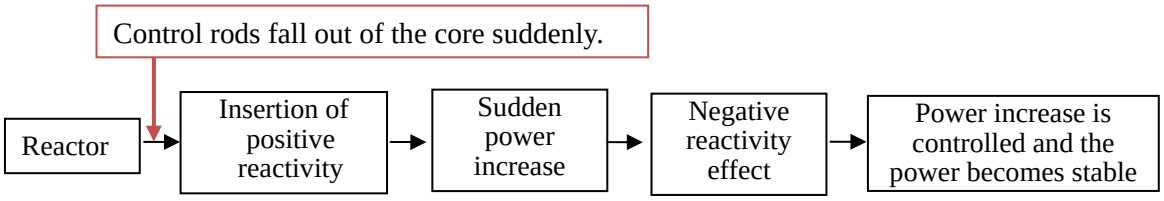
Confinement of radioactive materials

Multiple barriers shall be provided to ensure that radioactive materials (fission products) are not released in the areas surrounding the power station. Light water reactors are provided

with the following specific barriers. First, fuel pellets themselves have an ability to retain fission products. Second, the fuel cladding has a function to confine fission products released from fuel pellets. Third, the reactor pressure vessel and reactor cooling system form a reactor coolant pressure boundary, and serve as a barrier to confine fission products released from fuel rods into the reactor coolant. Fourth, even if a loss of reactor coolant accident occurs and fission products are released outside of fuel, the reactor pressure vessel and the reactor coolant boundary are housed in the containment serving as a barrier. Fifth, the reactor building housing the containment serves as a measure to prevent fission products release outside of the site.

Self-regulating characteristics of a nuclear reactor

A nuclear reactor shall have inherent self-regulating characteristics due to negative reactivity feedback against power escalation. As shown in the following figure, self-regulating characteristics due to negative reactivity feedback mean a characteristic, which limits a power increase by itself even in case of a rapid reactivity insertion caused by a sudden control rod drop out of the core etc.



Safety Analysis Review

Part of the criteria concerning the entire reactor facility provided in the Review Guide for Safety Design are as follows. Guiding Principles described here concern the objectives of safety analysis.

G2. 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 the most appropriate design ground motion.

2 Structures, systems and components with safety functions shall be so designed that the safety of the nuclear reactor facilities will not be impaired by other postulated natural phenomena other than earthquake. Structures, systems and components with safety functions 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-induced loads.

G9. 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 redundancy or diversity and independency considering their physical make-up, 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 unavailability of off-site power in addition to an assumption of a single failure of any of the components that comprise the systems.

The “safety” in this text means “not to cause excessive radiation exposure to the public or site personnel.” “Safety functions” refer to the functions of structures, systems and components necessary to ensure the safety of nuclear reactor facilities, which are categorized as follows:

(1) Functions, when lost, that could cause abnormal conditions in nuclear reactor facilities and could result in excessive radiation exposure of the public or site personnel.

(2) Functions that would prevent, in the case of abnormal conditions in nuclear reactor facilities, the escalation of such conditions or immediately terminate them, thereby

preventing or mitigating potential excessive radiation exposure of the public or site personnel.

The above criteria concerning the entire reactor facility are followed by each acceptance criterion of “nuclear reactor and reactor shutdown system,” “reactor cooling system,” “reactor containment,” “safety protection system,” “control room and emergency facility,” “instrumentation and control system and electrical system,” “fuel handling system,” “radioactive waste processing facility,” “radiation management.”

Design and Safety Evaluation During Establishment Permit

The design of the structures, systems and components of a nuclear reactor facility in the establishment permit process, is reviewed whether the design of structures, systems and components are provided with adequate measures for ensuring safety. This text discusses safety analyses to quantitatively verify the adequacy of the measures taken to achieve the safety functions. The safety analyses are to be performed by electric utilities, and their adequacy is reviewed during the establishment permit process. Objectives of the safety analysis are to demonstrate that what kind of failures and accidents are postulated and the safety functions required to deal with the postulated failures and accidents are attainable by measures taken.

In order that the safety of a nuclear reactor facility would not be impaired by postulated natural phenomena, radioactive materials should be confined, and for that purpose, the nuclear fission reaction in a nuclear reactor must be discontinued and the core fuel must be cooled down. “Abnormal conditions” mean “anticipated operational occurrences” and “accidents” in which certain disturbances have occurred to the nuclear reactor facility, causing its operational deviations from predetermined operation limits during planned periods of startup, shutdown, power operation, hot standby, refueling etc.

“Anticipated operational occurrences” refer to those conditions resulting from a single failure or malfunction of components, or a single operator error expected to occur during the operating life of nuclear reactor facilities or disturbances expected with a similar frequency of occurrence to those. “Accidents” refer to those conditions beyond “anticipated operational occurrences”, which have a quite low frequency of occurrence and yet are postulated in the light of the safety design of nuclear reactor facilities, including from design basis accidents to severe accidents that exceed the design basis accidents.

Safety analysis of a light water reactor is to verify that “structures, systems and components with safety functions are so designed that the safety of the nuclear reactor facilities would not be impaired by natural phenomena other than earthquakes.” The events that affect operation of a nuclear reactor facility, as results of postulated natural phenomena, are classified into “anticipated operational occurrences” and “accidents.” The purpose of safety analysis is to verify that, even in the case of the “anticipated operational occurrences” or “accidents,” the nuclear reactor “can be shut down” and “can be cooled down,” and radioactive materials “can be confined” as shown in Figure 5. The adequacy of the safety analysis is reviewed during the safety review for establishment permit.

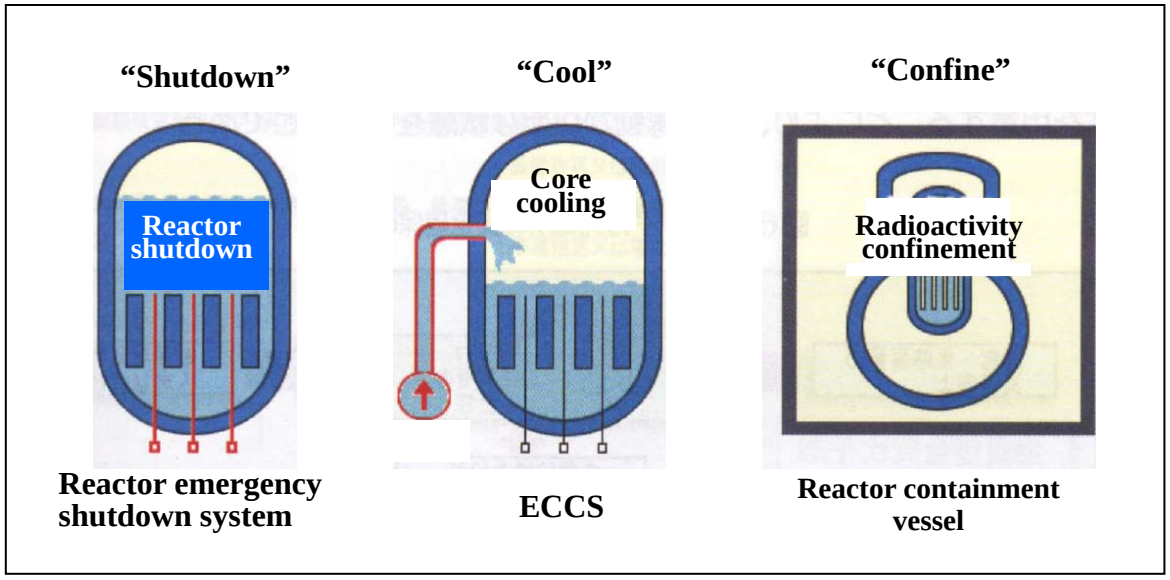


Figure 5 Safety Fundamentals

Light water reactors are so designed to confine radioactive materials with multilayer barriers, such as fuel rods, coolant pressure boundary, and containment boundary. The adequacy of measures for ensuring the functions to confine radioactive materials is verified using computer programs (analytical codes). The computer programs used for analyses adopt those programs developed based on knowledge obtained by various basic experiments and demonstration tests with full-mockup or scale-model experimental facilities. Furthermore, the computer programs should be improved in terms of simulation accuracy based on data obtained from operating experiences of light water reactors, and the programs as well as the parameters and constants used in the calculation models are required to be verified.

In order to confine radioactive materials, measures should be taken not to release radioactive materials from fuel rods. Excessive temperature rise of fuel pellets and fuel cladding of the fuel rods would cause their failures, leading to a loss of the first containment barrier function. The cladding temperature rises due to an increase in heat generation rate and/or a decrease in heat removal rate. The heat removal rate goes down with a change of boiling modes or a lowering of cooling water level in the core. The boiling modes vary with the coolant flow rate and/or a decrease in the coolant pressure, and the cooling water level goes down with a reduction in the coolant inventory. Thus, changes in conditions surrounding fuel rods in the core would progress in a direction to impair the first confinement barrier of radioactive-materials. The safety analysis takes into consideration such changes in conditions, and assuming various changes in heat generation rate, heat removal rate, boiling modes etc., it verifies that those changes do not bring the fuel-cladding temperature above the design limits. During the review for an establishment permit, the adequacy of analytical

processes and analysis results are evaluated.

A shift to abnormal conditions in a light water reactor would be caused by a single failure of structures, systems, or components consisting of the light water reactor or by a single erroneous operator action. Analyzing the progress of an event caused by a failure or erroneous operator action (sequences), selecting the sequence making it the quite difficult to maintain integrity of fuel rods and multi-barriers, and eliminating the same sequence and sequences considered to be extremely rare compared with operating experiences, the sequences to be evaluated are determined. The abnormal event sequences of light water reactors are classified into the following two categories for evaluation;

1. Anticipated operational occurrences
2. Accidents

As examples of “anticipated operational occurrences,” there are abnormal withdrawal of control rods and a loss of generator load, etc. These are events that would be caused by a failure or malfunction of one component, or an erroneous operator action during nuclear reactor operation. As examples of “accidents,” there are loss of a coolant and main-steam-line rupture, etc., which are events that could cause abnormal conditions exceeding the “anticipated operational occurrences.”

Seismic Design

In order to ensure seismic safety of reactor facilities, the National Government established matters for the first time that should be considered in the basic design of the facilities and in the review of the basic design’s adequacy in 1978 as the "Review Guide for Seismic Design of Nuclear Power Rector Facilities[1)]" (hereinafter referred to as "Seismic Guide"). The National Government confirms that nuclear facilities are designed so that their safety functions are not impaired by earthquake ground motions which could occur eve if extremely rare during their operating lifetimes, based on the "Seismic Guide" at the safety review to license the establishment of nuclear power reactor facilities. The "Seismic Guide" is the most important and fundamental guides to ensure seismic safety of nuclear facilities.

In Japan, several earthquakes exceeding magnitude 7 have been experienced up to today, and investigations and studies on these earthquakes have been conducted. For this reason, new knowledge of seismology and earthquake engineering has been accumulated and remarkable improvements and progress in design and engineering for seismic safety have been made. Especially since the Hyogo-ken Nambu Earthquake which occurred in January 1995, investigations and studies on earthquake have been

conducted, and as a result, various knowledge concerning fault activity, earthquake ground motion, and earthquake resistance of structures, etc. have been acquired. The National Government, in order to appropriately use this precious latest knowledge for the improvement of the Seismic Guide, had conducted required investigations and deliberations, and revised the Seismic Guide in 2006.

The National Government reviews seismic safety pursuant to the new Seismic Guide for the existing nuclear facilities in operation (this is called the "back-check") as well as the nuclear facilities to be newly built.

note

1) The "Review Guide for Seismic Design of Nuclear Power Rector Facilities" is sometimes translated as the "Regulatory Guide for Reviewing Seismic Design of Nuclear Power Reactor Facilities" by the different organizations. In the JNES e-learning site, it is unified as the "Review Guide for Seismic Design of Nuclear Power Rector Facilities."

Reference sheet 1

Contents to be described in an application of establishment permit

The contents to be described in an application of establishment permit for a commercial power reactor is provided by the Act, the Implementation Order of the Act, and the rules.

I. The Act for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (Act No. 166 1957) (hereinafter referred to as the "Act")

Paragraph 2 of Article 23 of the Act provides that "the person who intends to establish a reactor (commercial power reactor) has to obtain a permit by the Minister of Economy, Trade and Industry" and "any person who wishes to obtain the permit shall present to the competent minister (Minister of Economy, Trade and Industry) an application containing the following items:

(i) The name and the address and, in the 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 address 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."

As for the specific description items in the application of the reactor establishment permit, Article 2 of the "Rules for the Establishment, Operation, etc. of Commercial Nuclear Power Reactors" (1978 Order of the Ministry of International Trade and Industry No. 717) provides as follows:

- For the "thermal power of a nuclear reactor", the continuous maximum thermal power shall be described
- For the "location, structure and equipment of a nuclear reactor facility", the description shall be made under the following divisions.

A. Nuclear reactor facility locations

(a) Site area and geometry

(b) Locations of main nuclear reactor facilities within the site

B. Nuclear reactor facility general structure

(a) The seismic structure

(b) Other main structures

C. Reactor structure and equipment

(a) Reactor core

(1) Structure

(2) Maximum number of fuel assemblies to be loaded into the core

(3) Major nuclear limits

(4) Major thermal limits

(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 major 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 coolant equipment

(1) Coolant type

(2) Number and structure of major components and piping

(3) Coolant temperature and pressure

(b) Secondary cooling equipment

(1) Coolant type

(2) Number and structure of major components

(c) Emergency cooling equipment

(1) Coolant type

(2) Number and equipment of major components and piping

(d) Other major items

F. Instrumentation and control system facility structure and equipment

(a) Instrumentation

(1) Type of nuclear instrumentation

(2) Type of other major instrumentation

(b) Safety protection circuits

(1) Reactor shutdown circuit type

(2) Type of other major safety protection circuits

(c) Control equipment

(1) Number and structure of control materials

(2) Number and structure of control material drive equipment

(3) Reactivity control capability

(d) Emergency control equipment

(1) Number and structure of control material

(2) Number and structure of major components

(3) Reactivity control capability

(e) Other major 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 facility

(1) Structure

(2) Waste disposal capacity

(3) Discharge port location

(c) Solid waste disposal facility

(1) Structure

(2) Waste disposal capacity

H. Radiation management facility structure and equipment

(a) Type of major equipment for indoor management

(b) Type of major equipment for outdoor management

I. Reactor containment facility structure and equipment

(a) Structure

(b) Design pressure, temperature and leakage rate

(c) Other major items

J. Structure and equipment of other facilities attached to the reactor

(a) Structure of emergency power supply

(b) Other major items

- For the “construction plan of the nuclear reactor facility,” the construction sequence and schedule shall be entered.
- 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,” their yearly projected loading amount and burn-up shall be entered for the respective material types.
- For the “spent fuel disposal method,” the parties to whom it is to be sold, loaned or returned, and the method thereof, or its disposal method shall be entered.

II. Implementation Order of the Act for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (1957 Cabinet Order No. 324) (hereinafter referred to as the "Cabinet Order")

Paragraph 2, Article 11 of the Cabinet Order provides that "the person who is going to obtain an permit shall apply attaching the procurement plan of fund required for establishment of reactors and other documents defined by an order of the competent ministry."

"The procurement plan of fund required for establishment of reactors and other documents defined by an order of the competent ministry" that should be attached to the application are concretely provided in Article 2 of the "Rules for the Establishment, Operation, etc. of Commercial Nuclear Power Reactors" (1978 Order No. 77 of the MITI) as follows:

(i) Document to describe the purpose of use of the reactor.

(ii) Document to describe the thermal power of the reactor.

(iii) Document to describe the fund amount required for and the procuring plan for the construction.

(iv) Document to describe the procurement plan for the nuclear fuel material required for the operation of the reactor.

(v) Document describe the technical capability for the etablishment and operation of the reactor facility.

(vi) Document 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 a 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) Documents to describe the safety design of the reactor facility.

(ix) Documents to describe 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) Document to describe 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.