

Chapter 2

Nuclear Safety and Emergency Planning Schemes in Member Countries

Study on Nuclear Safety Management in East Asian Countries Working Group

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CHAPTER 2

Nuclear Safety and Emergency Planning Schemes in Member Countries

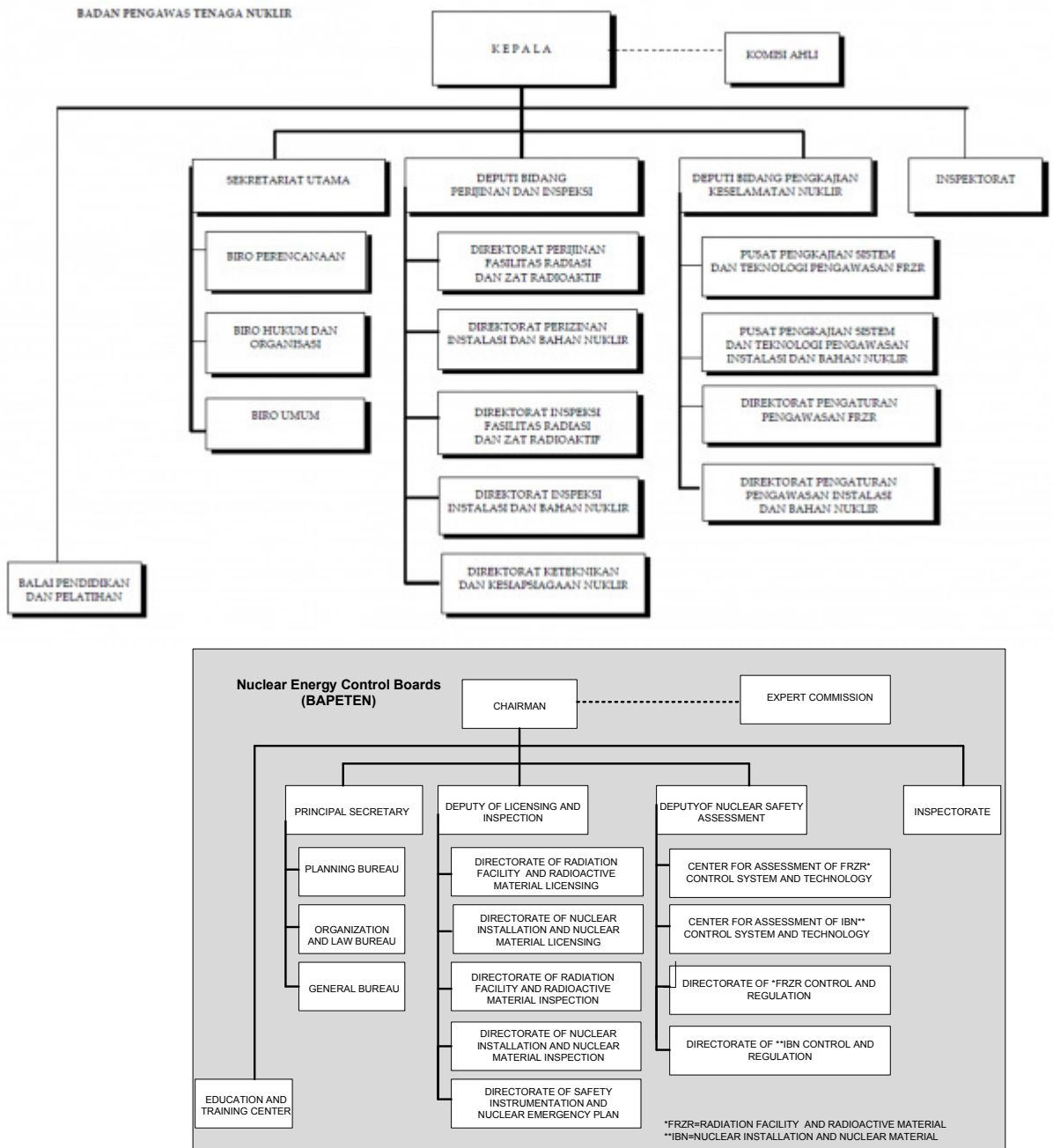
1. Indonesia

1.1. Safety Regulatory Authority

BAPETEN is the national nuclear regulatory authority of Indonesia. It was established in 1997 and has been in charge of safety assessment, licensing of nuclear facilities, safeguards, radiation protection, emergency planning, nuclear security, and physical protection. Act No. 10/1997 on Nuclear Energy, Article 14, designates BAPETEN as the sole and independent authority to control any nuclear energy utilization through regulation, licensing, and inspection. BAPETEN performs its functions through the implementation of licensing and inspection of the construction and operation of nuclear reactors, nuclear installations, nuclear material facilities, radiation sources, and the development of nuclear emergency preparedness. BAPETEN also takes the lead as the National Coordinating Authority (NCA) in establishing the National Emergency Preparedness and Response System in Indonesia.

As of 2013, there are some 41 experts working for safety assessment and the reviewing of nuclear facilities; 25 working for radiation protection; 20 for security and physical protection; and 15 for emergency planning. Figure 1 shows the organizational structure of BAPETEN.

Figure 1: Organization Structure of BAPETEN



1.2. Legislation

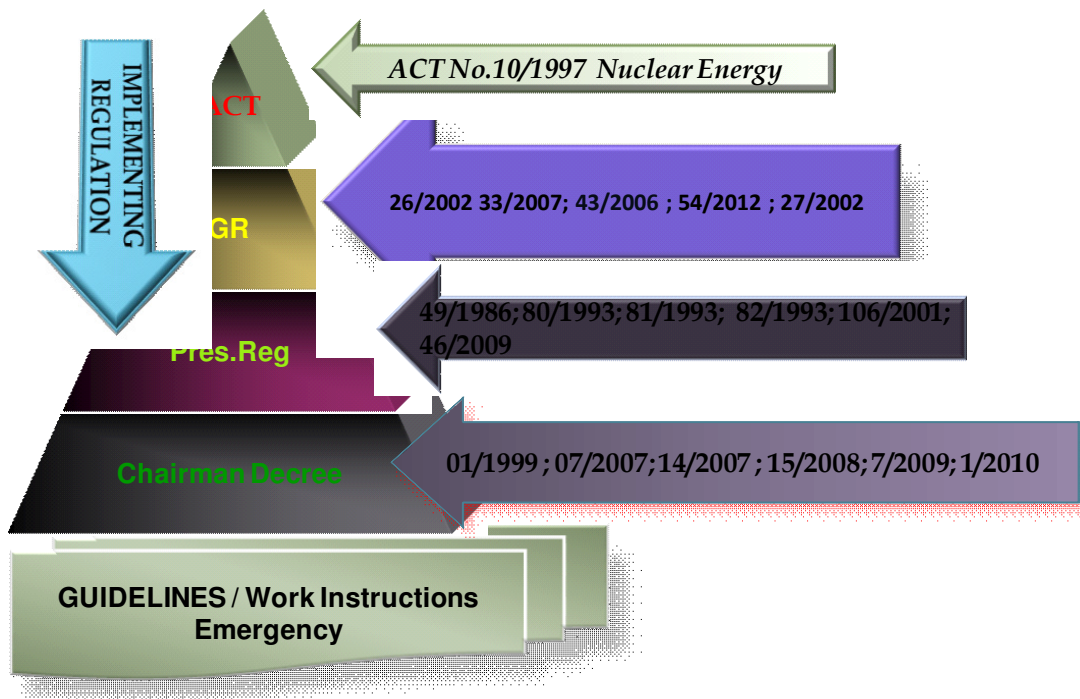
There are several layers of legislation concerning nuclear safety, security, and emergency planning. Act No. 24/2007 on National Disaster Countermeasures designates the National Disaster Management Agency (BNPB) as the responsible body in case of emergency, including radioactive releasing accidents. GR No.

54/2012 on Safety and Security of Nuclear Installation (Article 66-93, Paragraph on Emergency Preparedness System) establishes the National Nuclear Emergency Preparedness Organization (OTDNN) as a responsible body.

A licensee obliged to establish an Emergency Response Plan is subject to the following guidelines:

- GR No.54/2012 on Safety and Security of Nuclear Installation
- GR No.33/2007 on Safety of Ionizing Radiation Utilization and Security of Radioactive Sources
- GR No.43/2006 on Licensing of Nuclear Reactor
- GR No.26/2002 on The Safe Transportation of Radioactive Materials
- GR No.27/2002 on Radioactive Waste Management
- CD No. 01/2010 on Nuclear Emergency Preparedness and Response
- CD No. 8/2012 on Preparation of Safety Assessment Report of Non-Power Reactor

Figure 2: Legislation Structure for Nuclear Emergency Preparedness



2. Malaysia

2.1. Safety Regulatory Authority

The Atomic Energy Licensing Board (AELB) is the regulatory body responsible for all aspects of radiation protection and nuclear safety in Malaysia. The AELB was established under Section 3 of Act 304 and placed under the jurisdiction of the Prime Minister's Department on February 1, 1985, before jurisdiction was transferred to the Ministry of Science, Technology and Innovation (MOSTI) on October 27, 1990. The Board of the AELB consists of five members (a chairman and four others), all appointed by MOSTI; the Director General of the AELB serves as Executive Secretary.

The AELB's main objective is to regulate and control all nuclear activities, such as the use, transport, and import/export of radioactive and nuclear material, and the siting, construction, operation, and decommissioning of nuclear facilities. This is to ensure that such activities are carried out safely and do not endanger workers, members of the public, properties, and the environment with radiation hazards. To achieve these objectives, the AELB is responsible for the following issues:

- Authorizing the activities related to radioactive materials, nuclear materials, and radiation-producing devices after appropriate review and evaluation of proposed activity
- Conducting inspection (surveillance) and taking enforcement actions to ensure radiation safety requirements are being implemented
- Establishing standards and regulations for radiation protection and safe operation pertaining to atomic energy

The functions of AELB as stated in Act 304 are as follows:

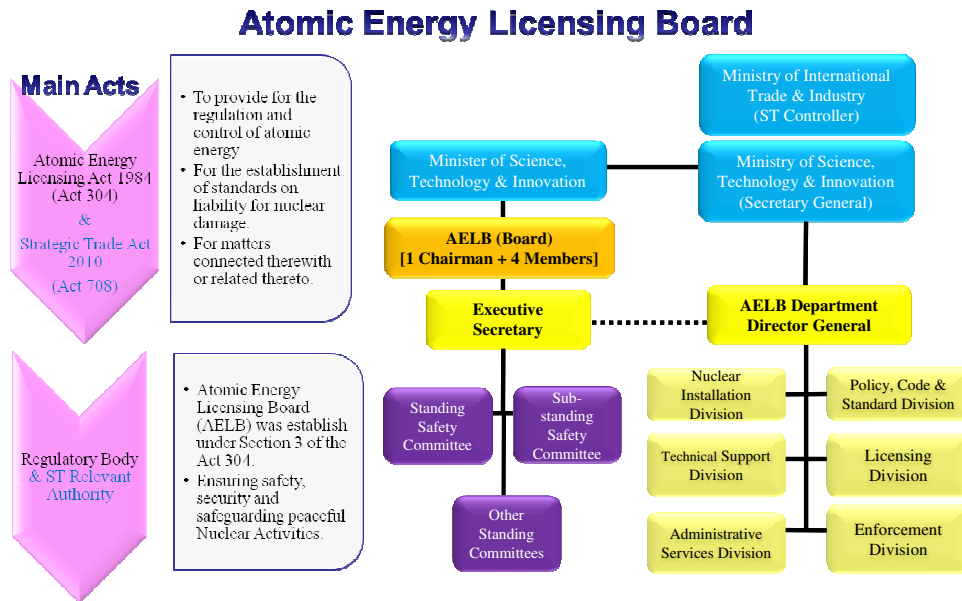
- To advise the Minister of Science, Technology and Innovation and the government of Malaysia on matters relating to the Atomic Energy Licensing Act 1984 and developments pertaining thereto, with particular reference to the implications of such developments for Malaysia
- To exercise supervision over the production, application, and use of atomic energy and matters incidental thereto
- To establish, maintain, and develop scientific and technical co-operation with

such other bodies, institutions, or organizations in relation to nuclear matters or atomic energy as the Board thinks fit for the purposes of the Atomic Energy Licensing Act 1984

- Where so directed by the government of Malaysia, to perform or provide for the performance of the obligations arising from agreements, conventions, or treaties relating to nuclear matters or atomic energy to which Malaysia is a party, where such agreements, conventions, or treaties relate to the purposes of the Atomic Energy Licensing Act 1984
- To do such other things arising out of or consequential to the functions of the Board under the Atomic Energy Licensing Act 1984 which are not inconsistent with the purposes of this Act, whether or not directed by the Minister

Besides regulating Act 304, the AELB is also responsible for regulating the Strategic Trade Act 2010 (Act 708), which was gazetted on October 1, 2010. This Act provides for control over the export, transshipment, transit, and brokering of strategic items, including arms and related material, and other activities that will or may facilitate the design, development, and production of weapons of mass destruction and their delivery systems, as well as other matters connected therewith. This Act is administered by the Ministry of International Trade and Industry (MITI) and the Controller is responsible for regulating the Act. Under this Act, AELB has been designated as a relevant authority and responsible for issuing permits for nuclear material and nuclear-related items. The organizational structure of AELB is shown in Figure 3.

Figure 3: Atomic Energy Licensing Board



2.2. Legislation

The safe use of atomic energy in Malaysia is governed by the Atomic Energy Licensing Act 1984 (Act 304). This Act provides for the regulation and control of atomic energy, for the establishment of standards on liability for nuclear damage, and for matters connected therewith or related thereto. Under this Act, any person who wants to carry out any activity – including the use, transport, or import/export of radioactive material, nuclear material, and irradiating apparatus; and the siting, construction, operation, and decommissioning of nuclear installations – requires a license from the Board of the AELB. The Board has the power to cancel or suspend any license issued under this Act if the licensee has committed an offence under this Act or committed a breach of any of the conditions of the license. To dispose, accumulate, and transport any radioactive waste is prohibited under this Act without prior authorization in writing from the Board. This Act also provides power to any senior public officer to enter, inspect, and take samples at all times at any premises, site, nuclear installation, or conveyance if he has reasonable ground to believe that there is activity being conducted which requires a license under this Act, and if any person contravenes any provisions of this Act there is a provision of penalty to those who commit an offence under this Act.

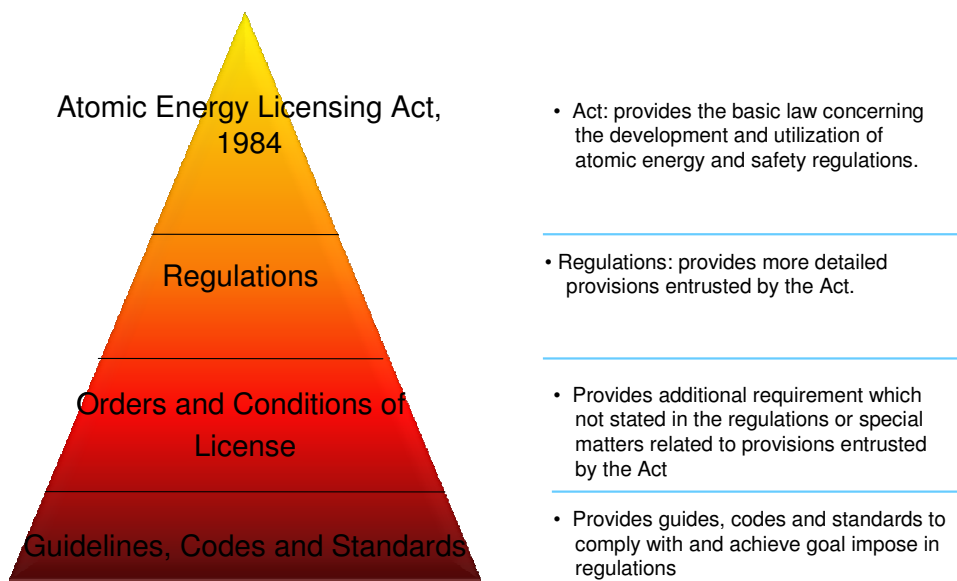
The Minister may, for the purpose of carrying out the provisions of this Act,

make any regulations and orders. Since the Act came into force, the government of Malaysia, with the recommendation of the Board, has gazetted several regulations, such as:

- Radiation Protection (Licensing) Regulations 1986
- Radiation Protection (Transport) Regulations 1989
- Atomic Energy Licensing (Appeal) Regulations, 1990
- Atomic Energy Licensing (Radioactive Waste Management) Regulations 2011
- Atomic Energy Licensing (Basic Safety Radiation Protection) Regulations 2010

The regulations are then supported by a code of practices, standards, and advisory materials. The legal framework is shown in Figure 4.

Figure 4: Malaysian Legal Framework



3. Philippines

3.1. Safety Regulatory Authority

Regulations for nuclear facilities and radiation safety programs in the Philippines are inherent in the mandate of two executive offices in the Philippines: the Philippine Nuclear Energy Institute, under the DOST; and the Bureau of Health Devices and Technology, under the Department of Health. Currently, however, PNRI also serves as both the nuclear regulatory and promotional arm of the government.

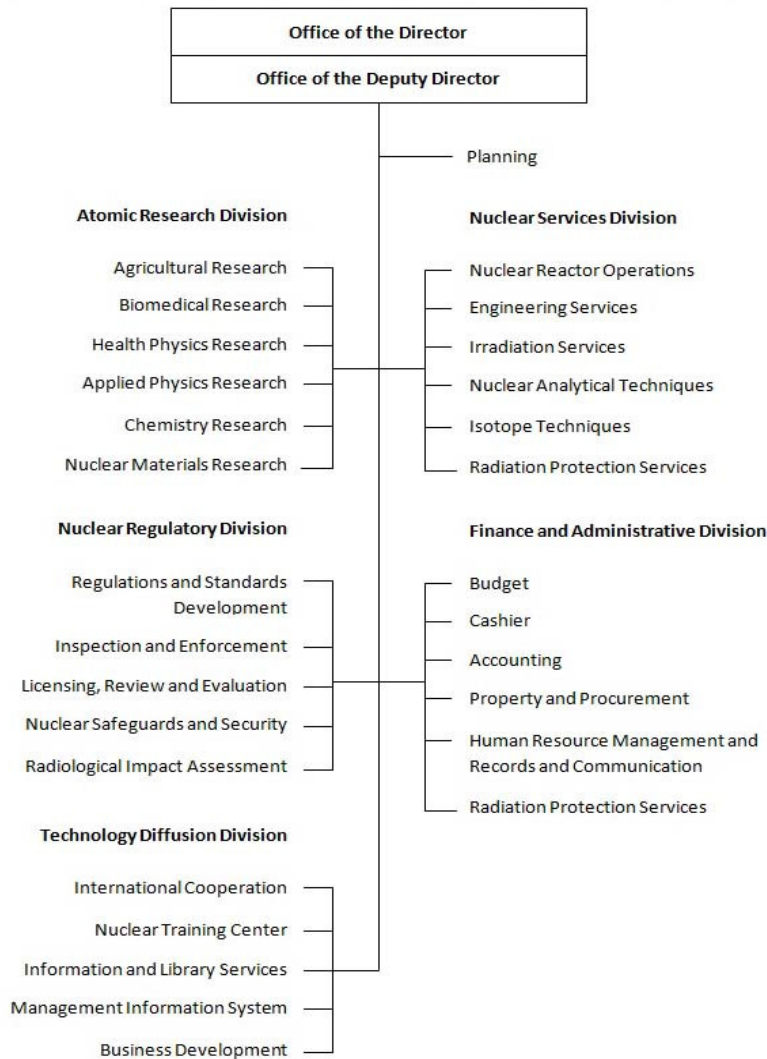
The PNRI, formerly the Philippine Atomic Energy Commission (PAEC), is the sole agency of the government mandated to advance and regulate the safe and peaceful applications of nuclear science and technology in the Philippines. It is one of the research institutes under the DOST. Under Executive Order 128, the PNRI is mandated to perform the following functions:

- Conduct research and development on the application of radiation and nuclear techniques, materials and processes
- Undertake the transfer of research results to end-users, including technical extension and training services
- Operate and maintain nuclear research reactors and other radiation facilities
- License and regulate activities relevant to production, transfer and utilization of nuclear radioactive substances

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The PNRI is headed by a Director, assisted by a Deputy Director. It is presently composed of 4 Technical Divisions and the Administrative/Finance Division. The organizational chart of PNRI appears in Figure 5.

Figure 5: Organizational Structure of the PNRI



(As per Rationalization Plan approved on 29 March 2010)

Office of the Director (OD)

The Office of the Director (OD) formulates policies, overall thrusts, and strategic plans and provides executive direction in the implementation of nuclear research and development, technical services, technology diffusion, operations, and regulations for the peaceful uses of atomic energy in the country. It represents the Institute in international, regional, and national activities, and establishes collaborative programs and projects with local and international bodies.

Office of the Deputy Director (ODD)

The Office of the Deputy Director (ODD) assists the Director in the formulation of policies, overall thrusts, and strategic plans, and in providing executive direction in the implementation of nuclear research and development, technical services, technology diffusion, operations, and regulation of the peaceful uses of atomic energy in the country. It also represents the Institute in international, regional, and national activities, and assists in establishing collaborative programs and projects with local and international bodies.

Atomic Research Division (ARD)

The Atomic Research Division (ARD) focuses on research and development programs on the safe and peaceful uses of radioactive and nuclear materials, and atomic and nuclear techniques and processes, in order to contribute to government efforts to increase agricultural and industrial productivity, ensure health security, and safeguard the environment.

Nuclear Regulatory Division (NRD)

The Nuclear Regulatory Division (NRD) performs the regulatory functions of PNRI in licensing and regulating the possession and use of nuclear and radioactive materials and facilities, as mandated by Republic Acts 2067 and 5207 (both as amended) and Executive Order 128. The NRD also implements the PNRI Policy on Internal Nuclear Regulatory Control Program, and the coordination of nuclear and radiological emergency preparedness and response activities. In addition, the NRD undertakes activities in support of international commitments on nuclear safety, safeguards, and security of nuclear and radioactive materials and facilities.

Nuclear Services Division (NSD)

The Nuclear Services Division (NSD) is the service-oriented arm of the Institute, engaging clients from industry, business, government, the medical and academic sectors, and the research staff of the Institute, in order to provide specialized nuclear services that enhance product quality, improve processes, and generate information derived from the use of nuclear techniques. The Division offers, among others,

services such as irradiation of materials and commodities, dispensing of radiopharmaceuticals for the diagnosis and treatment of diseases, radiotracer technologies, calibration of radiation detection equipment, dosimetry, and engineering works and analytical testing that harness the unique, value-added role of nuclear techniques.

Technology Diffusion Division (TDD)

The Technology Diffusion Division (TDD) increases the awareness and understanding of stakeholders and the public on the various aspects of nuclear science and technology, and takes charge in the transfer and commercialization of technology and business development.

Finance and Administrative Division (FAD)

The Finance and Administrative Division (FAD) provides advice and assistance in policy formulation relevant to fiscal and administrative matters. FAD also provides administrative (Human Resource Management and Records/Communications, Medical Services), financial (Budget, Accounting, Property and Procurement, Cashiering), and auxiliary services (Plant Services, Motor Pool) for the successful implementation of the Institute's programs.

3.2. Legislation

The DOE and DOST should advocate for the refiling and passage of the Comprehensive Nuclear Energy Law (House Bill Nos. 3155 and 3254), which aims to create a Nuclear Energy Regulatory Commission. The proposed Commission would consolidate the regulation of the nuclear industry into one independent and strong regulatory body that directly reports to the President. Nuclear safety should necessarily be integrated into this enabling law.

Major national laws and regulations in nuclear power are as follows:

- Republic Act 2067 (Science Act of 1958) created the Philippine Atomic Energy Commission (PAEC).
- Republic Act 3859 (Amending RA2067) vested PAEC with a dual mandate to promote peaceful applications of atomic energy and to license and regulate the

use of radioactive materials.

- Republic Act 5207 (Atomic Energy Regulatory and Liability Act of 1968) authorized PAEC to issue licenses for the construction, possession and operation of any atomic energy facility, including nuclear power plants (NPPs).
- Republic Act 6395 (1971) authorized the National Power Corporation (NPC) to establish and operate NPPs.
- Presidential Decree No. 606 constituted PAEC as an independent and autonomous body and effected its transfer from the National Science Development Board (NSDB) to the Office of the President (OP).
- Presidential Decree No. 1206 (1977) created the Ministry of Energy (MOE), subsuming PAEC from OP.
- Executive Order 613 (1980) transferred PAEC from MOE back to OP.
- Promulgation of the Code of PAEC Regulations in 1981 included national standards and regulatory requirements, to wit:
 - CPR Part 3: Standards for Protection Against Radiation
 - CPR Part 4: Rules and Regulations on the Safe Transport of Radioactive Material
 - CPR Part 7: Licensing of Atomic Energy Facilities (based mainly on US NRC documents and IAEA standards, codes and guidelines)
- Executive Order 708 (1981) attached PAEC to the Office of the Prime Minister.
- Executive Order 784 (1984) reorganized NSDB to National Science and Technology and placed PAEC under its supervision.
- Executive Order 980 (1984) converted PAEC into a multi-headed agency known as the Board of Commissioners and reaffirmed its role as the nuclear regulatory board.
- Executive Order 128 (1987) reorganized NSTA into the Department of Science and Technology (DOST) and PAEC became the Philippine Nuclear Research Institute.

Legislation proposed but pending in congress includes:

- House Bill No. 6300: An Act Mandating the Immediate Rehabilitation, Commissioning and Commercial Operation of the Bataan Nuclear Power Plant, Appropriating Funds therefore, and for Other Purposes (2009)

- House Bill Nos. 3155 and 3254: An Act to Regulate the Nuclear Security and Safety Aspects in the Peaceful Utilization of Radiation Sources through the Creation of the Philippine Nuclear Regulatory Commission, Appropriating Funds therefore, and for Other Purposes (2009)
- House Bill No. 1291: An Act Mandating an Immediate Validation Process which Satisfies Internationally Accepted Nuclear Power Industry Norms to Determine the Bataan Nuclear Power Plant's Operability, Culminating in either the Immediate Rehabilitation, Certification and Commercial Operation Or, the Immediate Permanent Closure and Salvage Value Recovery of the Bataan Nuclear Power Plant, Appropriating Funds therefore, and for Other Purposes (2010)

4. Singapore

4.1. Safety Regulatory Authority

There are currently no nuclear regulatory bodies or legislation related specifically to the use of nuclear energy, as Singapore does not have a nuclear power program. The Centre for Radiation Protection and Nuclear Science of the National Environment Agency regulates nuclear materials in the industrial and medical fields.

5. Thailand

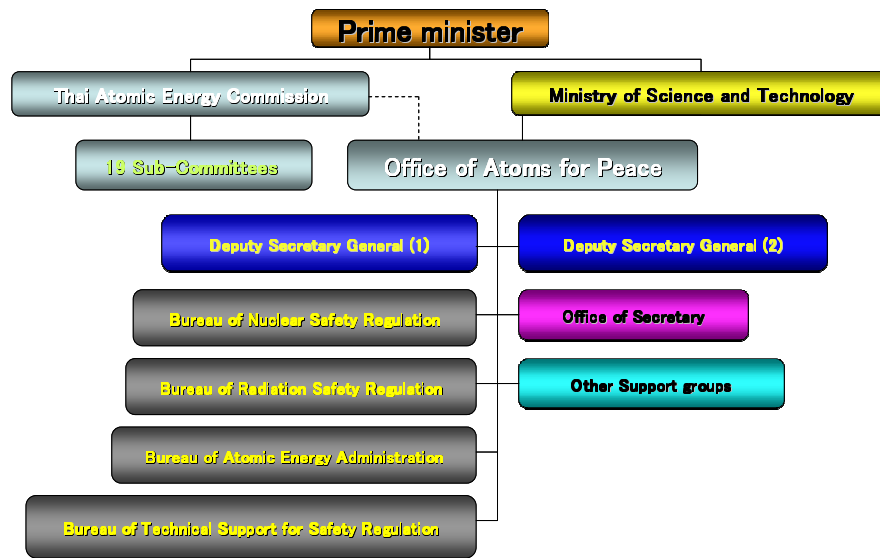
5.1. Safety Regulatory Authority

There is no nuclear regulator in Thailand, but the Office of Atoms for Peace (OAP), which is under the supervision of the Atomic Energy Commission and the Ministry of Science and Technology, will likely be a nuclear regulatory body in the future. OAP is currently responsible for drafting Atomic Energy for Peace Act, strengthening staff capabilities, and promoting public awareness of nuclear energy.

OAP has four missions:

- To formulate policies and strategic plans on the development and utilization of atomic energy, as well as to coordinate the plans and hence move towards realistic practice
- To perform R&D to promote the safe and extensive utilization of nuclear energy; to transfer nuclear technology and provide capacity for the useful utilization of nuclear technology for national development in medicine, agriculture and industry
- To regulate and ensure safe utilization of nuclear energy
- To be a center for technical cooperation and other activities associated with the peaceful application of nuclear energy, in collaboration with local and international organizations.

Figure 6: Office of Atoms for Peace Organization¹



5.2. Legislation

The use of atomic energy in Thailand is legislated by the Atomic Energy for Peace Act, which was enforced in 1961. This act aims to protect life, health, and property from the hazards of nuclear energy and from the harmful effects of ionizing radiation. The act provides compensation for damage caused by nuclear energy or ionizing radiation, and aims to prevent danger to internal or external security from the use or release of nuclear energy and to meet obligations in the field of nuclear energy and protection against radiation.

¹ Office of Atoms for Peace (OAP), Chalathip Kueakob

6. Vietnam

The Law on Atomic Energy (Law No. 18/2008/QH12) defines radiation and nuclear safety. These definitions reflect the fundamental safety objective of the IAEA Fundamental Safety Principles, which is to “protect people and the environment from the harmful effects of ionizing radiation.” Many staff members from multiple organizations in Vietnam, including EVN and VARANS, have been trained in basic nuclear power principles, nuclear safety principles and IAEA Safety Requirements and Guides. Much of this training has been conducted/coordinated via IAEA programs, or via bilateral agreements with other states (most notably, the Russian Federation, Japan, and the United States). Various government officials have met with representatives of the Regulatory Cooperation Forum regarding the importance of a competent and independent regulatory body.

VARANS has also been assisted by the US NRC in developing informal guidance related to the resources needed to review a safety analysis report. Although all organizations recognize the importance of a strong safety culture, programs are not yet planned for the development of safety culture in the relevant organizations (EVN, VINATOM, VARANS). VARANS is preparing new regulations regarding natural hazards analysis and severe accident management.

6.1. Safety Regulatory Authority

Governmental Decree 28/2008/ND-CP established the Vietnam Agency for Radiation and Nuclear Safety (VARANS) as a regulatory body. VARANS is an agency under the MOST with the duty of assisting the Minister in the state’s management of radiation and nuclear safety. MOST Minister Decision 2248/QD-BKHCHN details its roles, responsibilities, and organizational structure. The organizational structure of VARANS includes: Department of Administration and Planning; Department of Licensing; Department of Nuclear Control; Department of Nuclear Safety; Department of Inspection; Department of International Cooperation; Department of Legislation and Information; Department of Training; Department of Technical Assistance for Radiation and Nuclear Safety.

VARANS reviewed and approved the Safety Analysis Report for Nuclear Power

Plants, in which it aims to organize and develop international cooperation activities in radiation and nuclear safety as assigned by the Ministry, and to participate in the execution of international treaties and other international agreements on radiation and nuclear safety.

The General Directorate of Energy (GDE) was also established under MOIT. The main role of the GDE is assisting MOIT in the development of energy programs, including nuclear, and in licensing NPP operation based on comments of the National Council for Nuclear Safety, implementing the Nuclear Power Plants Development Plan, cooperating with international partners, negotiating and signing agreements and treaties on NPP cooperation, organizing trainings on nuclear power plant management, and approving NPP design.

6.2. Legislation

Current legislation related to nuclear safety/security is as follows:

- Law on Atomic Energy 2008 (No. 18/2008-QH12): required to develop and promulgate secondary legal documents, including NPP standards
- Decree No. 70/2010/ND-CP: detailed implementation direction for several articles of the Nuclear Power Law on NPP
- Circular No. 19/2010/TT-BKHHCN: guidance on inspection of radiation and nuclear safety
- Circular No. 02/2011/TT-BKHHCN: guidance on control of nuclear materials and source materials
- Circular No. 28/2011/TT-BKHHCN: guidance on safety assessment, NPP site selection
- Circular No. 30/2012/TT-BKHHCN on the requirements for nuclear safety in NPP designs (based on IAEA document No. SSR-2)
- Circular No. 29/2012/TT-BKHHCN on the requirements for contents of Preliminary Safety Analysis Report (PSAR)
- Requirements for the establishment and approval of an emergency preparedness plan for nuclear and radiation
- Circular No. 23/2012/TT-BKHHCN on the safe transport of radioactive materials, including requirements regarding criticality safety

- Circular No. 19/2012/TT-BKHHCN on ensuring radiation protection for occupational exposure and public exposure

Detailed requirements (circulars) regarding the safety categorization of systems, structures, and components are planned for completion and approval in 2013 and the following years.

7. Korea

7.1. Safety Regulatory Authority

Fukushima accident played a role as trigger in creating an independent Nuclear Safety Commission under the control of the President, which would take over the mission, duties and responsibilities of the Ministry of Education, Science and Technology (MEST). The Nuclear Safety and Security Commission (NSSC) was launched on Oct. 26 of 2011, to ensure its independence and upgrade nuclear safety amid widespread public fears in the wake of the Fukushima accident. Previously, the nuclear safety authority in Korea was a department under the Minister of Education, Science and Technology (MEST), before October of 2011.

However, once again, new government decided to move the governmental position of NSSC under the control of Prime Minister, and an amendment of Government Organization Act including the act on establishing and operating NSSC was passed in March of 2013, which still guarantees sufficient independence from other government organizations. The amendment of the act on establishing and operating NSSC includes that the NSSC consists of 9 commissioners including a chairperson of the vice-minister level. Only chairperson and one commissioner are standing, and chairperson shall be appointed by the president at the recommendation of the Prime Minister. Half of eight commissioners shall be appointed by the President at the recommendation of the Chairperson and the other four commissioners shall be appointed by the president at the recommendation of the National Assembly.

Figure 7: Reform of Regulatory System in South Korea

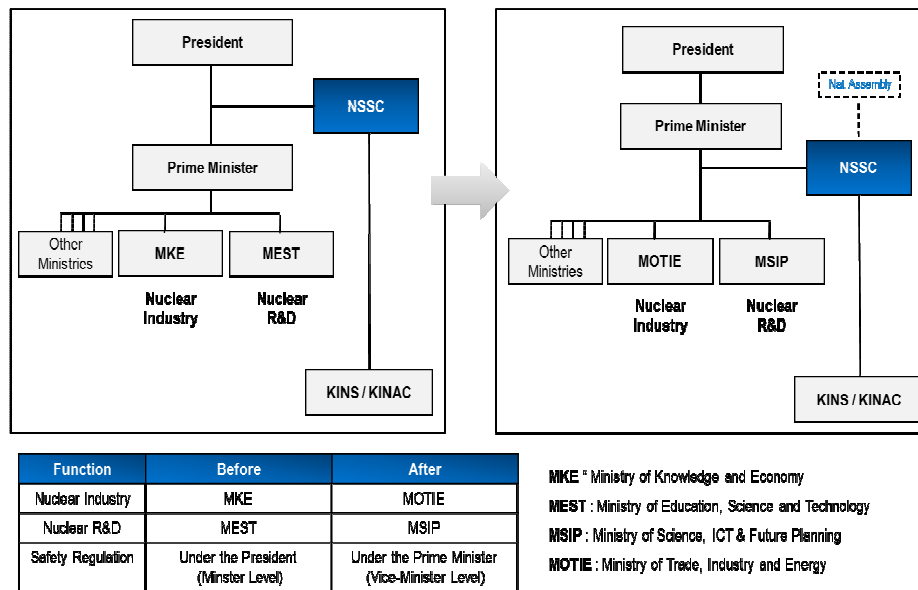
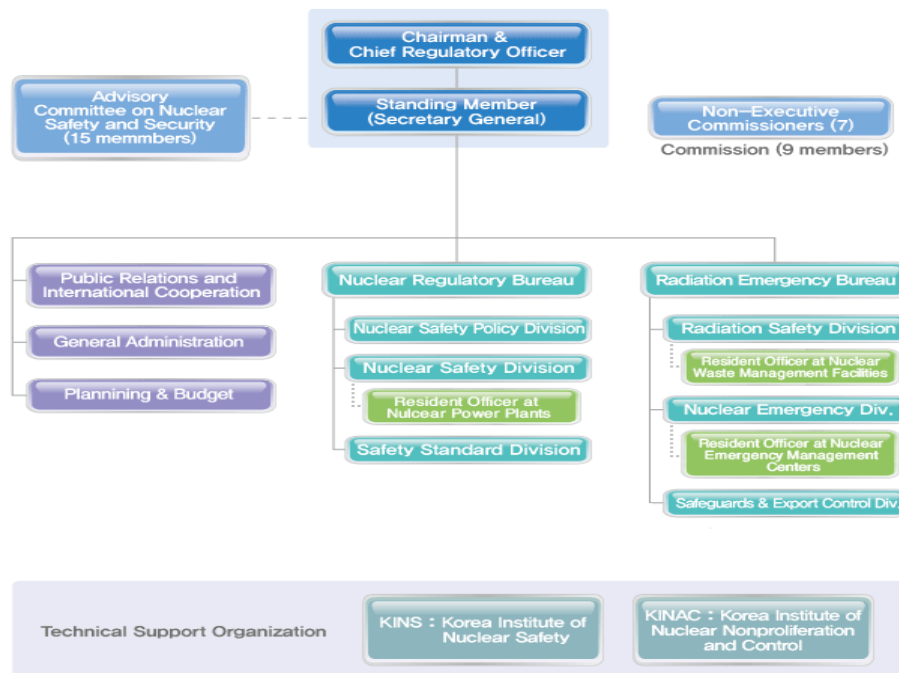


Figure 8: Organizational Chart of the NSSC

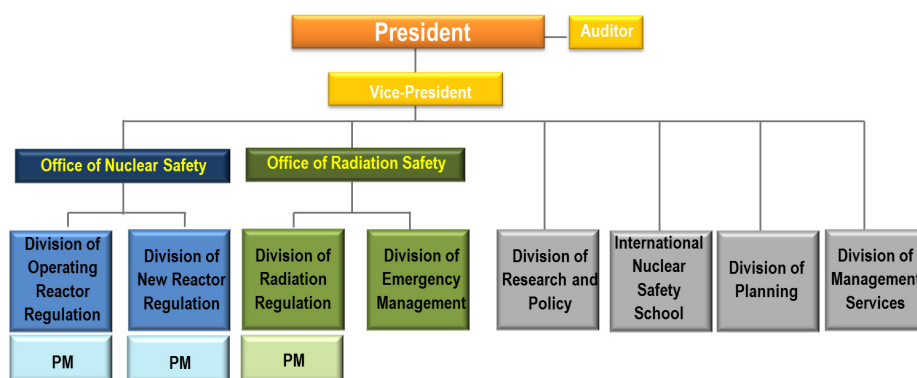


From a legislative point of view, the authority to regulate nuclear safety and establish nuclear safety policies is clearly entrusted to the NSSC through relevant laws, including the NSA. The Commission also maintains a close cooperative

system with other government agencies that are in charge of some activities relating to nuclear safety management in pursuance of their own functions, per the Government Organization Act. For example, under close cooperation with the Commission, the Ministry of Public Administration and Security (i.e., the National Emergency Management Administration under this Ministry) is responsible for national emergency preparedness at nuclear power facilities, and rescue efforts in case of an emergency like a fire.

The government established the Korea Institute of Nuclear Safety (KINS) in 1990 and the Korea Institute of Nonproliferation and Control (KINAC) in 2006, as regulatory expert organizations for supporting the Commission in strengthening technical capabilities related to nuclear safety regulation, as such regulation requires considerable knowledge of specialized technology. Under entrustment from the Commission, KINS is in charge particularly of technical aspects of nuclear safety regulation, including safety reviews, inspections, education, and safety research, based on technical knowledge and accumulated regulatory experience. KINAC carries out tasks entrusted by the Commission with respect to physical protection of nuclear power-related facilities and nuclear materials, related safety measures, and import and export control.

Figure 9: Organizational Structure of KINS

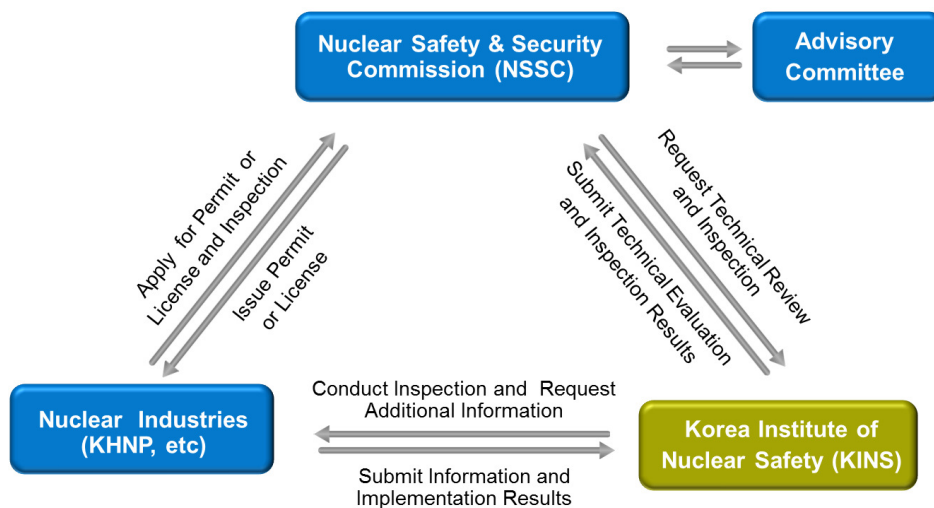


-Total Staff : 415 (Technical Staff of 88.4%)
(As of April 2012)

For closer regulatory support between the NSSC and its regulatory expert organizations, a few employees from KINS and KINAC are dispatched as liaison officers to NSSC headquarters. Furthermore, regulatory operations, such as the on-site inspection and supervision of the resident offices established in the nuclear facility sites, are jointly conducted by the NSSC and the resident inspectors dispatched by KINS and KINAC.

To fulfill its responsibilities in a better and more effective way, the Commission organizes and makes use of several consultant committees, including the Advisory Committee on Nuclear Safety and Security (ACNSS), to obtain valuable consultation and in-depth review on important technical issues under its jurisdiction. The Committee consists of up to 15 senior experts and is divided into 12 areas focusing on nuclear technological areas, including nuclear reactor physics, security and non-proliferation, and radioactive waste. The NSSC may also organize and operate the Special Ad-hoc Investigation Committee if nuclear and/or radiation accidents occur. Both Committees have been carrying out their responsibilities with technical support from KINS or KINAC.

Figure 10: Mechanism for nuclear safety in Korea



Last January, as part of a sweeping government reorganization plan, the presidential transition committee proposed a plan that would change the status of the NSSC. If the plan goes ahead, the current presidential body will be downgraded to a

body affiliated to a newly created super-ministry in charge of policies on science research, information and communications technology, and atomic energy development. In addition, the NSSC would be led at the vice-minister level. The government reorganization plan is currently under review at the National Assembly. Until now, most of the lawmakers involved in the issue have been opposed to the plan and have tentatively agreed to draw up an alternative option to move the Commission to the Prime Minister's Office.

The decision to separate the Commission from the newly created ministry is intended to guarantee and strengthen the independence of safety from the promotion of nuclear energy. This institutional arrangement might be of great help, but what is more important is how the Commission is actually operated by its members. The final decision on the fate of the Commission will be made soon.

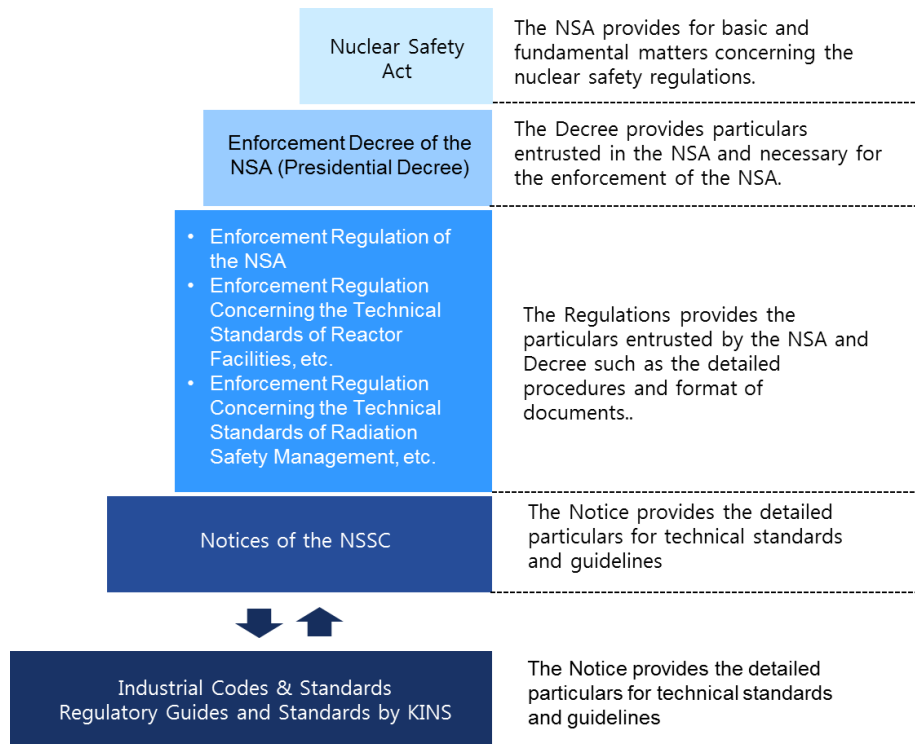
7.1. Legislation

There are several laws concerning nuclear safety and security:

- Nuclear Safety Act: To provide basic and fundamental matters regarding safety regulations
- Physical Protection and Radiological Emergency Act:
 - To establish a system for physical protection of nuclear materials and nuclear facilities
 - To provide legal and institutional bases for preventing radiological disaster and constructing countermeasures against radiological emergencies
- Act on Establishing and Operating the Nuclear Safety Commission
- Act on the Korea Institute of Nuclear Safety
-

The Nuclear Safety Act (NSA) is the most significant law for nuclear safety. The NSA provides for basic and fundamental matters concerning nuclear safety regulations. The legislative framework for nuclear safety is shown in Figure 11.

Figure 11: Legislative Framework for Nuclear Safety



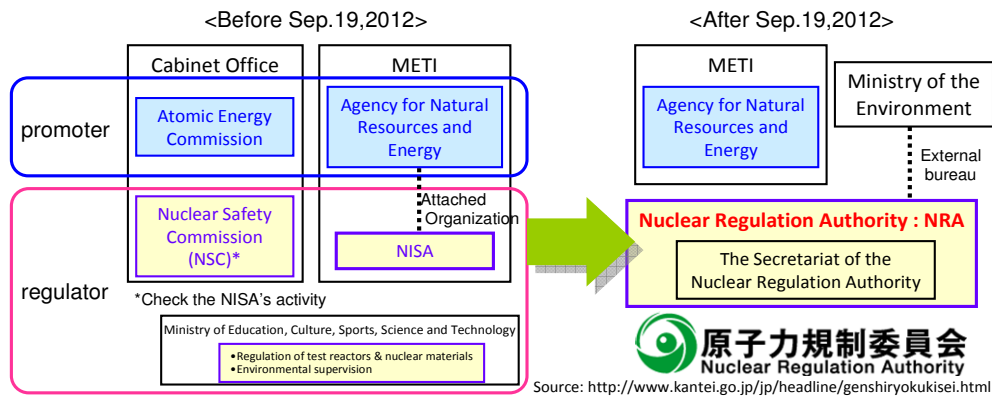
8. Japan

8.1. Safety Regulatory Authority

Before the Fukushima accident, nuclear facilities were regulated by the Nuclear and Industrial Safety Agency (NISA), which was under the Ministry of Economy, Trade and Industry (METI). The Agency for Natural Resources and Energy, which is a promoter of nuclear energy, was under the METI as well. The regulatory authority was not independent in Japan.

After the Fukushima accident, a new regulation authority, the Nuclear Regulation Authority (NRA), was established as an independent organization, on September 19, 2012. The NRA is under the umbrella of the Ministry of the Environment; however, the authority is independent both from the government and from the political parties.

Figure 12: Nuclear Regulatory Organization Structure in Japan

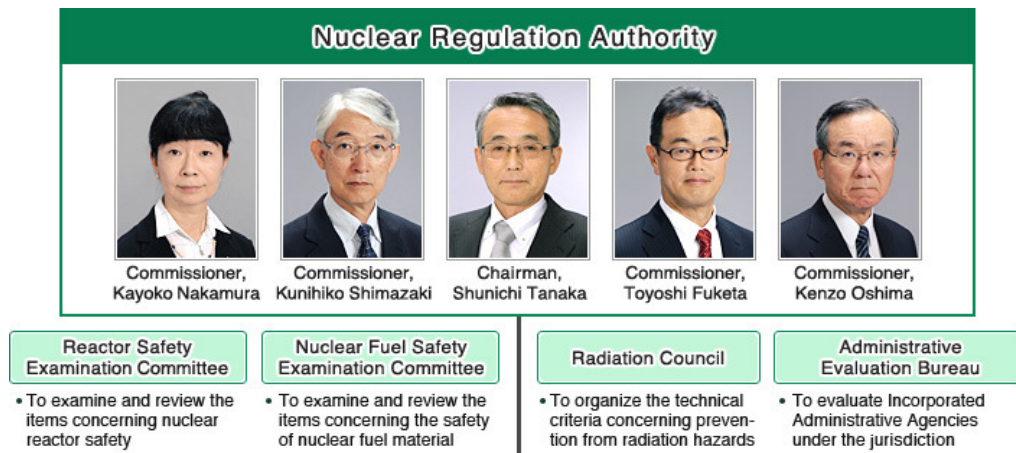


According to the core values of the NRA, it was established to absorb and learn the lessons of the Fukushima accident, and the nuclear safety system and management must be rebuilt on a solid basis, placing the highest priority on public safety and a genuine safety culture. Its guiding principles for activities are as follows:

- Independent Decision-Making
- Effective Actions
- Open and Transparent Organization
- Improvement and Commitment
- Emergency Response (preparedness)

One chairman and four commissioners were appointed by the government, and there are some committees and other divisions, as shown in Figure 13. The number of NRA staff is about 450, many of whom came from the old regulatory authority under METI, as well as some staff from the departments of police and defense.

Figure 13: NRA Commissioners and Committees (Source: NRA homepage)



A number of study teams, advisory committees and expert committees were established under the NRA. Eighteen committees are active as of May 2013, and they are discussing the new regulatory standards, specific site fracture zones (active faults), nuclear security, investigation of Fukushima accident, and so on.

8.2. Legislation

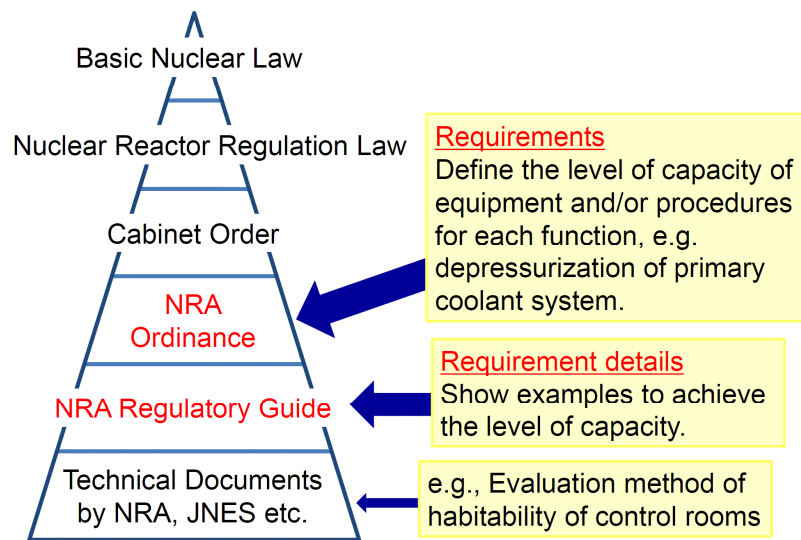
Amendments to the nuclear regulation act were promulgated in June 2012. Under this act, regulations have been enhanced in several areas:

- New regulation on severe accidents: Legally requested measures to prevent and to mitigate severe accidents
- Regulation based on state-of-the-art information: Develop new regulatory standards and apply to existing nuclear facilities (backfitting); introduce new systems (e.g., design certification)
- Forty-year operational limit for NPPs: Legally define the limit to 40 years; NRA can permit an extension of less-than-20-years
- Special regulation for disaster-experienced NPPs
-

The structure of NPP regulation legislation is shown in Figure 14. The draft New Safety Standards (NRA Ordinance and NRA Regulatory Guide in this figure) were released at the end of 2012; public comments were solicited from February 7 to February 28, 2013. The NRA and its study teams are discussing the new safety

standards in light of the public comments. The new safety standards are expected to be enforced in July 2013.

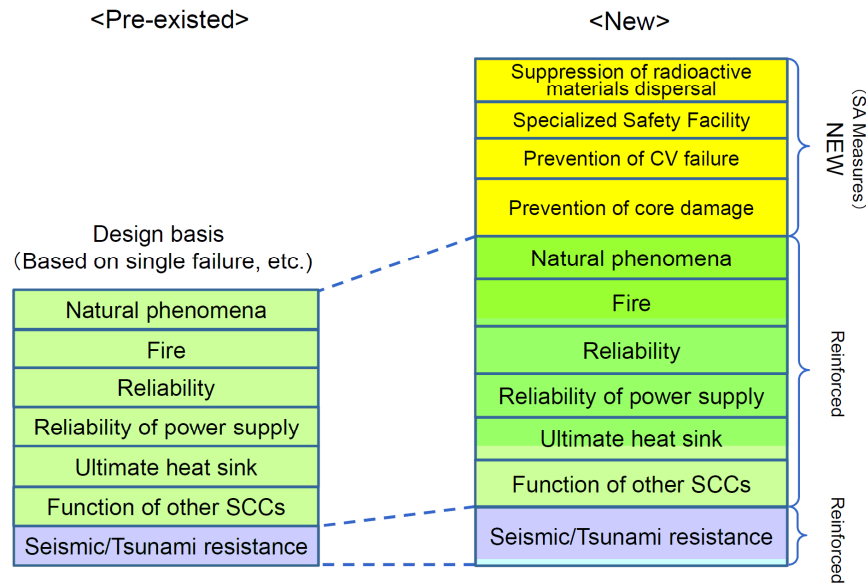
Figure 14: Structure of NPP Regulation Legislation



Source: NRA homepage.

The NRA has released some draft safety standards, whose requirements are reinforced and added as shown in Figure 15:

Figure 15: Structure of Proposed Requirements



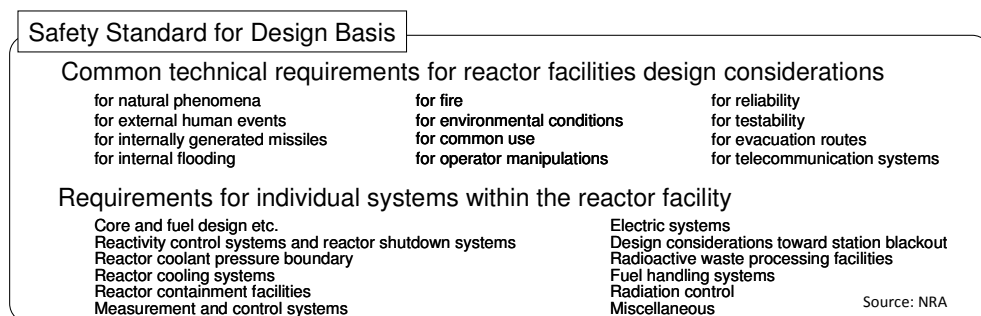
Source: NRA homepage.

Safety Standard for Design Basis

Before the Fukushima accident, there was a safety standard for design basis. The new safety standard for design basis is based on the old one but a few regulations have changed:

- Consideration of internal flood, airplane crash, terrorism (including cyber terrorism), etc.
- Consideration of fire protection (in a new guide which will be decided later)
- Preparation of fuel for emergency diesel generators for 7 days

Figure 16: Example of the Safety Standard for Design Basis

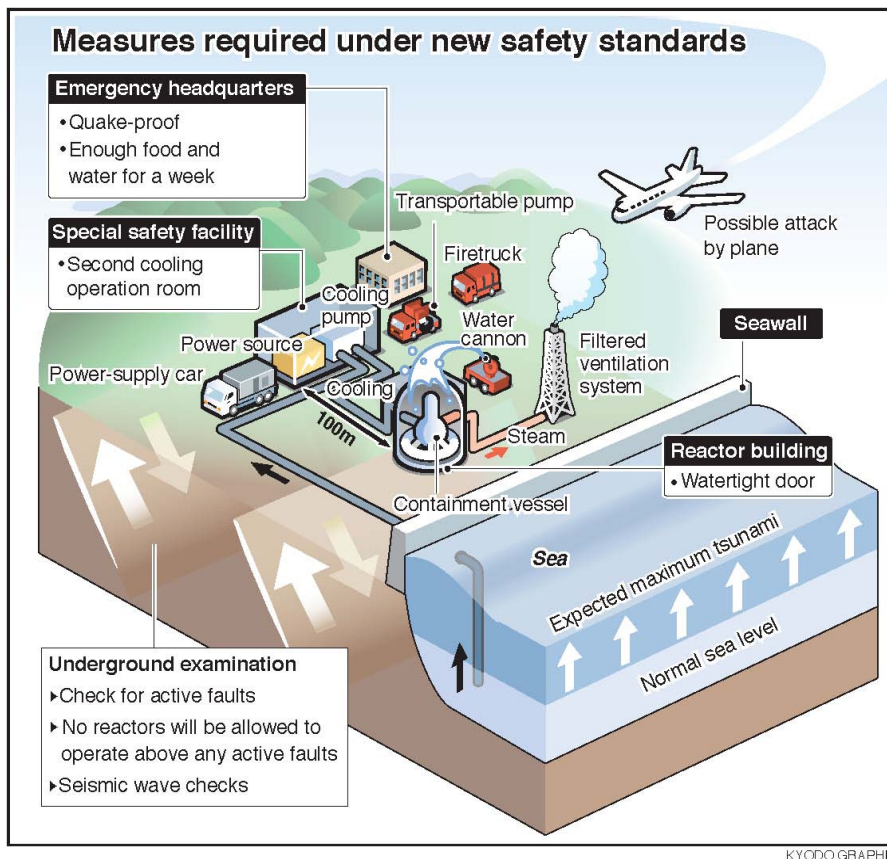


Safety Standard for Severe Accident

Under this standard, many measures are required to be put in place:

- Equipment to manage a severe accident (portable electricity power supply and water supply pumps, etc.)
- Emergency headquarters and specific safety facilities (to mitigate the release of radioactive material after core damage by natural hazard, airplane crash, etc.)
- Preparation of procedures, implementation of drills, and development of emergency response organization

Figure 17: Measures Required under New Safety Standards



Source: The Japan Times.

Safety Standard for Earthquakes and Tsunamis

Before the Fukushima accident, the “Regulatory Guide for Seismic Design” was the safety standard for earthquakes and tsunamis, but little was written about tsunamis in the old guide. In the new safety standards, requirements for the assessment of tsunamis (and earthquakes) are strengthened:

- Requirement to decide design based tsunami (the operator has to consider not only tsunamis caused by earthquake, but also by volcano, etc.)
- Important equipment has to be waterproof or installed higher than the design-based tsunami height
- Important equipment should not have to be installed on active faults (this was indirectly required before Fukushima)
- Active faults are defined as those that have moved in the last 400,000 years (before Fukushima, this was 120,000 – 130,000 years)

Opinions from the operators/experts

Operators and experts have some opinions against the draft safety standards, as follows:

- The new safety standards should be based on defense-in-depth; management should be evaluated under beyond-design conditions, discussed and determined based on scientific and technically reasonable evidence (plant life limit within 40 years, definition and assessment of active faults, etc).
- The current draft safety standards fail in that they are not performance-based regulation but only hardware regulation, and leave little room for alternative measures (diversified emergency power sources, containment venting systems, alternative control center, etc).
- They are also not best prepared for unexpected events.
- There is little consideration of the relative risk which is excessively severe among other countries in the world (beyond the international standards).

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Despite these severe criticisms, the draft safety standards will likely be fixed and endorsed in July 2013.