Annex I of Technical Volume 2
HISTORICAL DEVELOPMENT OF THE GOVERNMENTAL, LEGAL AND REGULATORY FRAMEWORK FOR NUCLEAR SAFETY IN JAPAN

The governmental and public organizations responsible for policy and safety regulation in Japan have evolved significantly during the period in which the Japanese nuclear power industry has operated. The IAEA's Integrated Regulatory Review Service (IRRS) mission to Japan in 2007 commended Japan's updating of its legislative and governmental framework to strengthen arrangements for nuclear safety in light of the incidents which had occurred [I–1]. A view of these past developments is helpful to understand the origins of the regulatory framework in place at the time of the accident at the Fukushima Daiichi nuclear power plant (NPP), and to assess the prospects for the further institutional reforms that Japan has implemented following this accident.

Shiroyama has identified three periods in the evolution of the governmental and regulatory organizations prior to the accident at the Fukushima Daiichi NPP [I–2].

I–1. THE FIRST PERIOD: 1957–1978

The Fukushima Daiichi NPP was one of the oldest nuclear facilities in Japan and was licensed, constructed and put into operation during this first period in the development of the governmental and regulatory framework. Construction of the first unit started in 1967, while the sixth and last unit commenced operation in 1978 [I–3].

Following the enactment of the Atomic Energy Basic Law of December 1955 (the Basic Law) [I–4], the Japan Atomic Energy Commission (JAEC) was established as an independent body under the Prime Minister's Office to direct national policy on research, development and utilization of nuclear energy. The Director-General of the Science and Technology Agency (STA) was appointed as Chair of the JAEC, while the STA served as the commission's secretariat.

The Law for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors enacted in 1957 (Reactor Regulation Law) gave the Prime Minister authority to approve licenses for nuclear businesses. The former Ministry of International Trade and Industry (MITI) was responsible for the development of nuclear power as an energy source.

The issuance of a construction permit for commercial nuclear power reactors required the consent of the Minister of MITI. However, although the consent of the relevant Ministers was required, the JAEC and STA exercised considerable influence over nuclear decisions [I–2].

I–2. THE SECOND PERIOD: 1978–1999

The second period in the development of the regulatory framework commenced with a review by the committee on Atomic Energy Administration chaired by Hiromi Arisawa, Emeritus Professor of the University of Tokyo. The Arisawa review was commissioned by the Japanese Government in the light of public concern about the adequacy of the nuclear safety regime following a radiation incident aboard the nuclear-powered ship Mutsu [I–2].

Based on the report of the Arisawa committee, the Japanese Diet in 1978 amended several laws, including the Basic Law, the Law on the Establishment of the Atomic Energy Commission (the Establishment Law), and the Reactor Regulation Law. The main amendments related to the creation of a new Nuclear Safety Commission (NSC) and modification of the licensing procedures for nuclear reactors [I–5].

The NSC was created as an advisory body on nuclear safety separate from the JAEC. The STA supported the NSC in addition to its ongoing role as secretariat for the JAEC [I–2]. The new NSC comprised five commissioners appointed by the Prime Minister. The relevant ministers were required to listen to the opinions of the NSC on safety-related issues when designating activities and issuing permissions.

The licensing of commercial nuclear power reactors was re-assigned in this period through legal amendments to the Minister of MITI. Commercial marine reactors were regulated by the Minister of Transport. Research and Test Reactors, reactors in the stage of research and development, and other aspects of the nuclear fuel cycle continued to be regulated by the Prime Minister, i.e. in effect by the STA.

Safety assurance measures were enhanced in 1980 in order to reflect the lessons learned from the Three Mile Island accident in 1979 and again after the Chernobyl accident in 1986. An appraisal in 1986 defined long-range electric power requirements and a programme for enhancement of safety called 'Safety 21', aimed at reinforcing safety assurance measures [I–3].

I–3. THE THIRD PERIOD: 1999–2011

The accident that occurred on 30 September 1999 at a small fuel fabrication facility at Tokaimura, operated by JCO, led to further changes to the Japanese governmental and regulatory framework for nuclear safety. The accident was at the time Japan's worst nuclear accident, which the authorities classified at Level 4 on the International Nuclear and Radiological Event Scale (INES) [I–6]. Two workers died as a result of their exposure to radiation. Hundreds of other workers and members of the public received elevated radiation doses. Although the direct causes of the accident were linked to unsafe acts and faulty procedures on the part of JCO, contributing factors included the failure of the STA to adequately assess the hazards during initial licensing of the facility, and its subsequent failure to effectively inspect the operation and detect non-compliances with the conditions of its license [I–7, I–8].

The NSC set up an investigative committee on the JCO criticality accident at Tokaimura which recommended actions to strengthen the regulatory framework [I–8]. Several legislative and organizational changes were implemented as chronicled in the Nuclear Law Bulletin [I–9] and IAEA reports [I–7, I–8]. The principal measures are summarized in the paragraphs below.

(a) Strengthening the Nuclear Safety Commission

The NSC was transferred from the Nuclear Safety Bureau of the Science and Technology Agency to the Prime Minister's Office on 1 April 2000. The NSC staff was increased from 20 to 92 members and the NSC's involvement in regulatory oversight was subsequently institutionalized in the double-check system of 'Subsequent Regulation Reviews'.

(b) Amendment to the Reactor Regulation Act

The Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (Reactor Regulation Act) was amended to strengthen the nuclear safety requirements for the management, operation and inspection of nuclear processing plants and nuclear energy facilities [I–10].

(c) Enactment of the Act on Special Measures Concerning Nuclear Emergency Preparedness

The Act on Special Measures Concerning Nuclear Emergency Preparedness (Nuclear Emergency Act) was adopted in December 1999 [I–11]. This legislation complemented the provisions for response to natural disasters established in the Disaster Countermeasures Basic Act [I–12]. The Nuclear Emergency Law set out roles and responsibilities of the national government, local governments, and license holders in case of emergencies at nuclear facilities.

(d) Amendments of Ordinances for the Compensation Law and the Law on the Indemnity Agreement for Compensation of Nuclear Damage

The implementing ordinances for the Compensation Law and the Law on the Indemnity Agreement for Compensation of Nuclear Damage were amended by Cabinet Order in 1999 to establish the amounts for which nuclear operators are liable, and to include within their scope nuclear damage resulting from transport, storage or disposal incidental to the storage of nuclear spent fuel.

(e) Revision of the Regulatory Guide: Emergency Preparedness for Nuclear Facilities

The guidelines describing technical aspects of nuclear disaster prevention measures were revised by the NSC in May 2000 [I–13].

(f) Reorganization of governmental bodies with responsibilities for nuclear safety

A reorganization of the Japanese central government took effect on 6 January 2001. The reorganization had been planned for several years, according to the Basic Act on Central Government Reform (No. 103 of 12 June 1998) and other laws related to administrative reform. It was aimed broadly at reducing costs and improving the efficiency of government [I–14]. However, a number of specific measures were implemented with the intention of strengthening the governmental organizations responsible for nuclear safety.

The organizational arrangements are described in the following section after a description of the national legal framework.

I–4. LEGAL FRAMEWORK AND GOVERNMENTAL ORGANIZATIONS FOR NUCLEAR SAFETY AT THE TIME OF THE ACCIDENT AT THE FUKUSHIMA DAIICHI NUCLEAR POWER PLANT

This section describes the legal framework for nuclear safety and the allocation of responsibilities to government bodies at the time of the accident at Fukushima Daiichi. The principal sources of information are the National Reports of the Government of Japan on the Convention on Nuclear Safety, a review published in the Nuclear Law Bulletin [I–15], and the briefing materials provided by the Government of Japan to the IRRS mission [I–16].

I–4.1. Legal framework for safety

The Japanese legal framework for safety is defined by a hierarchy of legal and regulatory documents. At the top of the hierarchy are national laws. These laws collectively defined Japan's policy for the utilization of atomic energy, established organizations for the regulation of nuclear reactors, delineated their responsibilities and set up licensing processes.

Subordinate to the national laws are ministerial orders and ordinances, which elaborate the national laws and implement them. These instruments have the effect of regulation and are legally binding. They were promulgated by the ministries of the Japanese Government, for example, the Ministry of Economy, Trade and Industry (METI), which, at the time of the accident, had the primary responsibility for regulation of nuclear power reactors.

As a report by the United States Nuclear Regulatory Commission issued in 2013 has noted [I–17], the national laws and ministerial orders and ordinances are administrative in nature and did not give specific safety criteria for nuclear power reactors. The status of guides and standards which set out technical criteria for reactor safety is discussed later.

The purpose and scope of the relevant national laws are described below.

I–4.1.1. Atomic Energy Basic Law (Act No.186 of 19 December 1955; last amendment: Act No. 47 of 27 June 2012)

The Basic Law [I–4] is the foundation of the Japanese legal framework for nuclear energy. Its objectives are the security of energy resources and the promotion of research, development and use of nuclear energy for peaceful purposes. The Basic Law establishes the framework for the regulation of nuclear activities. Its provisions deal in broad terms with the mining of nuclear source materials, control over nuclear fuel materials, control over nuclear reactors, protection from radiation hazards and compensation for damage caused by nuclear activities. These provisions, in effect, express the state's intention to exercise regulatory powers in these areas by means of subordinate legislation [I–15]. The most important of these subordinate laws are:

(a) Law on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (Law No. 166, 10 June 1957; last amendment: Act No. 82, 22 November 2013)

The Reactor Regulation Law [I–10] applies to the utilization of nuclear source material, nuclear fuel material and reactors, i.e. the refining, fabricating and enrichment, storage, reprocessing and disposal of nuclear material, and the installation and operation of nuclear reactors. The law requires these activities to be limited to peaceful purposes, to be carried out in a planned manner, and to ensure the safety of the public by preventing hazards and by providing physical protection of nuclear fuel material, in accordance with the Basic Law.

Chapter IV of the Reactor Regulation Law specifies procedures for licensing and safety regulation for the construction and operation of nuclear facilities, including requirements for an establishing license, approval of design and construction methods, pre-service inspection, facility periodic inspection, approval of operational safety program, operational safety inspection, and decommissioning. The Reactor Regulation Law also sets out offences and penalties including administrative measures, such as suspension or revocation of a license, and criminal punishment including imprisonment and fines.

The provisions of the Electricity Business Act [I–18], however, govern the approval of design and construction methods, pre-service inspection, welding methods and inspection for commercial nuclear power reactors. Commercial nuclear power reactors are exempted from the corresponding provisions of the Reactor Regulation Law [I–19].

The Reactor Regulation Law has been amended on several occasions following accidents and incidents that have occurred in Japan [I–1]. Following the JCO criticality accident at Tokaimura in September 1999, the Reactor Regulation Law was amended to require regular checks on the management and operational procedures of nuclear facilities to ensure compliance with the safety regulations. These amendments also provided for the appointment of nuclear energy safety inspectors under the authority of the former STA and MITI. Other provisions established the duty of nuclear operators to provide safety education to their employees and to protect from discriminatory treatment employees who report violations [I–9].

The Reactor Regulation Law was further amended in 2002 regarding Tokyo Electric Power Companies (TEPCO) falsification of safety related records. Along with various notices and regulatory procedural changes, the Reactor Regulation Law was amended to stipulate that quality assurance be included in licensees' operational safety programmes, and that compliance with the programme should be confirmed by inspection [I–17].

Two ministerial ordinances issued under the Reactor Regulation Law [I–10] apply to commercial nuclear power reactors: the Ministerial Ordinance for Commercial Nuclear Power Reactors concerning the Installation, Operation, etc., which implements the provisions of the Reactor Regulation Act and provides rules which apply to major NPPs in Japan; and the Ministerial Public

Notice for Radiation Exposure Dose Limits, which specifies the radiation exposure limits of workers, radioactivity concentration limits, etc. [I–20].

(b) Electricity Business Act (Act No.170 of 11 July 1964; last amendment: Act No. 87 of 2005)

The objectives of the Electricity Business Act are "to protect the interests of electricity users and to achieve sound development of Electricity Business by realizing appropriate and reasonable management of Electricity Business and to assure public safety and to promote environmental preservation by regulating the construction, maintenance and operation of Electric Facilities" [I–18].

The Electricity Business Law regulates NPPs in Japan as one of several types of electricity business. The law applies also to other types of electricity generation facilities, including thermal and hydro power generation.

The ordinances related to the Electricity Business Act which apply to nuclear installations include:

— Ministerial Ordinance for the Enforcement of the Electricity Business Act, which sets out the powers of the Minister of METI to require an electrical utility to submit reports on matters related to safety in the construction, maintenance and operation of facilities used for an electricity business. The rules cover NPPs and also thermal, hydro-electric and other types of electricity generating plants.
— Ordinance of Establishing Technical Standards for Nuclear Power Generation Equipments, which sets out the rules and standards applied to the approval of construction plans, pre-service inspection and periodic inspection, based on the provisions of the Electricity Business Act for electricity generation facilities including, but again not limited to, NPPs.
— Ministerial Ordinance of Establishing Technical Standards on Nuclear Fuel Material for Power Generation Facilities, which sets technical standards that apply to the approval of nuclear fuel assembly design and fuel assembly inspection based on the provisions of the Electricity Business Act.
— Ministerial Public Notice for Technical Standards on Dose Equivalent, etc. due to Radiation Relating to Nuclear Power Generation Facilities, which specifies details of doses provided in the Ministerial Ordinance of Establishing Technical Standards on Nuclear Power Generation Facilities.

(c) Act on Special Measures Concerning Nuclear Emergency Preparedness

The Nuclear Emergency Act was enacted after the JCO criticality accident at Tokaimura [I–7]. The Nuclear Emergency Act complemented the provisions for response to natural disasters in the Disaster Countermeasures Basic Act (Law No. 223 of 15 November 1961).

The main provisions of the Nuclear Emergency Act include requirements for nuclear operators to prepare emergency plans, and to set up emergency management organizations; requirements for the competent ministers to designate off-site centres in each prefecture where nuclear installations are located; and participation in emergency drills by the government, local authorities and operators [I–15, I–16].

The Nuclear Emergency Act also provides that, in the event of a nuclear emergency, several organizations should be activated. Within the Cabinet Office, the Nuclear Emergency Response Headquarters led by the Prime Minister should be established in Tokyo; the Technical Advisory Organization composed of NSC commissioners and advisors for emergency response, should give technical advice to the Prime Minister; the Local Nuclear Emergency Response Headquarters should be set up at the off-site centre concerned; and a Joint Council for Nuclear Emergency Response should be established at the off-site centre in order to share information between the national

government and related organizations such as local governments, licensees, etc., and, if necessary, to coordinate emergency measures by the respective organizations.

I–4.2. Governmental and regulatory organizations

The governmental and regulatory organizations in place at the time of the accident at the Fukushima Daiichi NPP were the result of the measures taken in 2001 to restructure the Japanese nuclear regulatory framework and the measures taken to implement lessons learned from the JCO criticality accident at Tokaimura.

The former MITI was reformed as the Ministry of Economy, Trade and Industry (METI), with responsibilities for ensuring a stable and efficient energy supply, including the use of nuclear energy. METI was also put in charge of nuclear safety regulation and the licensing of nuclear installations.

Within METI, specialized structures were set up. The Agency of Natural Resources and Energy (ANRE) within METI had responsibility for planning and overseeing the national energy supply. ANRE's Department of Electricity and Gas Industry managed nuclear energy policy and radioactive waste management [I–15].

The Nuclear and Industrial Safety Agency (NISA) was set up within ANRE to regulate the safety of nuclear and other energy sources as well as industrial safety. NISA's main functions comprised the following, as set out by the Law for Establishment of the Ministry of Economy, Trade and Industry (Law No. 99 of July 16, 1999) [I–1, I–15, I–16]:

— Regulating nuclear power refining, fabrication, storage, reprocessing and waste disposal businesses and nuclear power generation installations and matters relating to ensuring the safety of these businesses and installations;
— The safety of nuclear power relating to its utilization as an energy source;
— Control of explosives, safety of high-pressure gas, mine safety, and other safety matters under its jurisdiction (hereinafter referred to as 'industrial safety');
— International cooperation pertaining to affairs under its jurisdiction.

The new Ministry of Education, Culture, Sports, Science and Technology (MEXT) was created through a merger of the STA and the Ministry of Education. The former responsibilities of the STA for nuclear safety regulation were reallocated between METI and MEXT. Accordingly, the regulation of nuclear fuel cycle facilities, including uranium refining and fuel fabrication, spent fuel storage, reprocessing, nuclear waste management business, and related transportation of nuclear materials, were transferred from STA to NISA. About 90 employees were also transferred from STA to NISA, approximately 35% of NISA's initial complement of 260 people [I–21].

MEXT retained responsibility for the science and technology aspects of nuclear energy, including policy and the development of nuclear technologies; safety regulations governing research reactors, protection against radiation hazards, and the use and transportation of nuclear and radioactive materials; and safeguards. MEXT also supervised the National Institute of Radiological Sciences, the Japan Atomic Energy Research Institute and the Japan Nuclear Cycle Development Institute. The latter two organizations merged in 2005 to become the Japan Atomic Energy Agency (JAEA) [I–3, I-22].

The NSC and the JAEC were re-located from the Nuclear Safety Bureau of the STA to the Cabinet Office to continue their respective roles as senior advisory bodies on nuclear safety and nuclear policy. The NSC was empowered by law to require reports from NISA and performed double-check reviews of NISA's work.

The Ministry of Foreign Affairs (MOFA) was responsible for the international aspects of nuclear energy utilization, including the implementation of the related international treaties and conventions.

Later, in 2003, the Japan Nuclear Energy Safety Organization (JNES) was established in order to enhance regulatory safety activities together with NISA. The law establishing JNES was enacted by an extraordinary session of the Japanese Diet held in the autumn of 2002, following a crisis in public confidence precipitated by the discovery of TEPCO's falsification of safety records at its nuclear facilities [I–17]. JNES's main functions, as set out in its establishment law, consisted of conducting inspections at nuclear facilities, review of licensees' periodic inspections, safety analysis and evaluation, nuclear emergency preparedness support, research and testing for code/standard development, and collection, analysis and distribution of safety information. In practical terms, JNES was formed by merging parts of the former Nuclear Power Engineering Corporation (NUPEC), the Japan Power Engineering and Inspection Corp (JAPEIC), and the Nuclear Safety Technology Centre (NUSTEC) [I–16, I–19].

I–5. SAFETY-RELATED EVENTS FOLLOWING THE REORGANIZATION OF THE REGULATORY FRAMEWORK

In spite of the efforts of the Japanese Government to strengthen the regulatory framework following the JCO criticality accident at Tokaimura as described above safety significant events continued to occur. Notable events among others referenced in the Japanese national reports to the Convention on Nuclear Safety included the 2004 pipe rupture at Unit 3 of the Mihama plant (which killed five workers), the 2005 earthquake near the Onagawa NPP, and the Niigata-Chuetsu-Oki earthquake in 2007, which impacted the Kashiwazaki-Kariwa NPP.

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