excluding the situation in which multiple reactors are damaged simultaneously, like the Fukushima Dai-ichi reactors.

b. Precautionary Action Zone (PAZ) described in the IAEA documents

(a) Approach by the IAEA

The IAEA published the Safety Requirement GS-R-2 "Preparedness and Response for Nuclear or Radiological Emergency" (hereinafter, "GS-R-2") in 2002 and the Safety Guide GS-G-2.1, and the "Arrangement for Preparedness for a Nuclear or Radiological Emergency" (hereinafter, "GS-G-2.1") in 2007. These documents proposed to designate Precautionary Action Zone (PAZ) and Urgent Protective action planning Zone (UPZ) to lower the risk of severe deterministic effect by implementing emergency measures within these two areas before or immediately after the release of radioactive materials based on the conditions of a nuclear facility. PAZ is an area in which provision must be made for the implementation of the precautionary emergency protective actions, while UPZ is an area in which provision must be made for the implementation of the emergency protective actions.

As for the protective measures implemented inside the PAZ, it is stated that sheltering and evacuation of the residents living inside the PAZ should be carried out for the purpose of preventing or reducing the deterministic effects on the residents before or immediately after the release of radioactive materials. The idea behind this IAEA's approach is: first of all, the reactor suffers core damage; then the C/V loses containment function; and only after that, the accident situation gives rise to exposure possible to cause serious deterministic effects. It is stated that, in order to prevent residents from being exposed to such high radiation level, the best solution is to take precautionary measures including immediate evacuation of the residents living inside the PAZ immediately after a fact or a symptom of core damage are identified. Also, when it comes to the implementation of the protective actions before or immediately after the release, it is hard to predict radioactive release from the containment vessel, in case of the damage done to the containment vessel by physical phenomena such as hydrogen explosion and steam explosion. In comparison, whether the core has been damaged or is likely to be damaged can be determined from various parameters by the operators in a relatively early accident stage. It means that precautionary measures including an evacuation could be taken in an early accident stage.

Whilst it is desired to take such precautionary measures prior to the release, it is stated that such measures could be taken immediately after the release in consideration of the possibility of a rapid progress of the phenomenon in the form of an explosion.

On the other hand, the UPZ is a concept that the environmental radiation monitoring in emergencies is conducted first after the occurrence of an accident, in order to grasp the concentration and the path of the radioactive plume and, if any, identify the areas where the residents living outside the PAZ should be evacuated. The idea behind this concept is that the UPZ gives a little more time to spare than the PAZ in terms of the implementation of protective measures. In addition, the protective measures in the UPZ aim not only to avoid the deterministic effect but also to reduce the stochastic effects as low as reasonably achievable. The GS-G-2.1 proposes that the range of the PAZ and the UPZ be 3-5km (5km is recommended) and 5-30km respectively for a commercial reactor with thermal power equal to or more than one million kW.

(b) Domestic discussion based on the approach by the IAEA

Following the approval of the DS105, a draft for the safety guide GS-G-2.1, at the CSS meeting in 2005, the NSC held the first meeting of the Working Group for Reviewing the Regulatory Guide for Emergency Preparedness for Nuclear Facilities (the Chair: Toshio Fujishiro, who was Special Advisor to Research Organization for Information Science and Technology) on March 29, 2006 to review the Regulatory Guide for "Emergency Preparedness for Nuclear Facilities" (T-EP-II.01) based on the international discussion about nuclear disaster prevention.

The Working Group for Reviewing the Regulatory Guide for Emergency Preparedness for Nuclear Facilities led the discussion, initially aiming to introduce the concept of the PAZ into Japan. However, the group met with a strong opposition from NISA which pointed out that: in Japan it was extremely unlikely that a serious accident leading to a release of large amount of radioactive materials would occur; even if such an accident occurred, it was unlikely to continue for a long period of time, and thus, there was no need to immediately evacuate residents within a 5-km radius of a nuclear power station in line with the PAZ concept; if IAEA's approaches such as the concept of the PAZ are introduced into Japan, the local communities around a

nuclear power station and the local residents there would be forced to consider relocation of their residence, Offsite center and other facilities; this would cause significant social confusion and foster a perception that the existing disaster prevention measures based on the EPZ is insufficient, which may arouse the feeling of insecurity about nuclear safety among the people in Japan. The NSC did not recognize as rational the reason given by the NISA that the introduction of the PAZ would incite a feeling of fear among the local residents[69]. Nevertheless, the NSC also expressed that the concept of PAZ is originally based on the U.S. system, and the concept would not function in Japan only by setting up an area called the PAZ unless a system equivalent to the system of Emergency Action Levels (EALs), which in the U.S. is supposed to be specified by nuclear operators, is created for the classification of emergency situations[70]. Therefore, considering the fact that measures similar to the emergency protective measures in the PAZ had already been taken in our Nuclear Emergency Response Drill, it was decided that the PAZ should be introduced into Japan in the next step, after getting used to those measures similar to the measures taken in the PAZ and after the discussion on the EAL led by the IAEA reached a conclusion[71]. In these discussions, however, with regard to the domestic light water

[69] Member of the NSC Shizuyo Kusumi explained that during a working lunch between the NSC and NISA senior officials on May 25, 2006, Kenkichi Hirose, the then head of NISA, expressed opposition, saying, "Don't wake a sleeping child," "Now that the public is finally reassured that necessary countermeasures have been taken with regard to the JCO criticality accident, why dare to stir anxiety by starting this sort of discussion again?"

[70] In the Nuclear Energy Disaster Prevention Drill implemented from the fiscal year 2000 to 2006, an exercise for sheltering and evacuation before and after the release of radioactive materials had been already conducted, and the evacuation area was set for a ring-shaped area with a radius of 1-3km from an accident facility. However, at the hearing with the members of the Working Group for Reviewing the Regulatory Guide for Emergency Preparedness for Nuclear Facility conducted by the Investigation Committee, the reason why the measure similar to the urgent protective action taken in the PAZ was taken as part of the Nuclear Emergency Response Drill in Japan was simply because the scenario for evacuation before the release of radioactive materials was to convince local residents who would not agree the evacuation after radioactive release. Based on the statement at the hearing, it was revealed that, assuming that there would be no damage to the containment and little increase in radioactive release, the exercise had not aimed to avoid deterministic effects but had aimed to completely avoid exposure to radiation. In fact, at the meeting of the Special Committee on Nuclear Emergency Preparedness for Nuclear Facilities in April 2007, the Prefectural Government Association on Nuclear Power expressed, "In the Nuclear Emergency Response Drill, each local government currently evacuates local residents before or immediately after the release of radioactive materials, but it is not a precautionary measure to set evacuation area based on the idea of the PAZ. Thus, please amend relevant expressions in appendix to avoid misperception." At the same hearing, a person stated that since the possibility of evacuation outside the accident site as response measures would be almost none if containment integrity was confirmed, and therefore the person did not think that the containment integrity as a premise is nor reasonable in nuclear emergencies.

[71] The "Criteria for use in preparedness and response for a Nuclear or Radiological Emergency" (GSG-2), General Safety Guide, IAEA indicates examples of EAL as criteria for emergency classifications in general and facility-dependent criteria for determining the classification, but this safety guide was established and published only on March 17, 2011.

reactors, the scale of accident equivalent to the Fukushima Dai-ichi nuclear accident was not postulated, while the affected area was expected to be limited to the area within the range of the EPZ provided in the previous guide. As a result, the concept and the range of the PAZ were not directly mentioned in the revised Regulatory Guide for Emergency Preparedness for Nuclear Facilities, but instead the following sentence was included in the main text: "Depending on the local circumstances and the conditions of the emergency, it is also effective to implement precautionary measures such as sheltering or evacuations before or immediately after the release of radioactive materials." At the same time, the PAZ was mentioned in the Appendix and described as, "As an emergency response inside the EPZ, an emergency drill is being implemented including protective measures before or immediately after the release of radioactive materials based on the condition of each facility, in consideration of specific circumstances with each local government, on the basis of the existing Regulatory Guide for Emergency Preparedness."

In the discussion at the meetings of the Working Group for Reviewing the Regulatory Guide for Emergency Preparedness for Nuclear Facilities, the focus was placed on the introduction of the PAZ into Japan, and the UPZ rarely came up for discussion from the beginning. The UPZ was viewed as an emergency zoning proposed with almost the same purpose as that of the EPZ. On the grounds that the facility types and the radius of the EPZ indicated in the Regulatory Guide for Emergency Preparedness satisfied the requirements proposed in the IAEA document and that there was no significant difference in the size between Japan and foreign countries, a review of the EPZ size was not specifically performed.

(3) Response to a complex disaster of massive natural disaster and nuclear emergency combined

As described in Chapter VI 6. (1) of the Interim Report, a fire was caused by the Niigata-Chuetsu-oki Earthquake at the Kashiwazaki-kariwa Nuclear Power Station (hereinafter, "Kahiwazaki-kariwa NPS") operated by TEPCO in 2007 and the fire motivated the NISA to produce the draft report "Points of concern for the creation of a nuclear emergency preparedness manual dedicated to a complex disaster of massive natural disaster and nuclear emergency combined (draft)." This draft faced criticism from relevant national agencies and

local governments. In October 2010, NISA decided to apply the existing disaster prevention scheme to the complex disaster countermeasures. At the same time, the NISA consulted about the need for preparation against a complicated disaster where different kinds of disasters including a nuclear emergency occur at about the same time and about what disaster management system, as a whole, should be established to prepare against such complex disasters, with the Cabinet Office (hereafter in this section referring to a division under the Director General for Disaster Management)[72]. As a result, it was decided that NISA would plan to coordinate relevant matters with a prospect of consultation with the Central Disaster Management Council and that, after the determination of the direction for a further move, it would begin working on tasks required for expanding the nuclear emergency system while coordinating with relevant organizations.

Based on the above-mentioned plan, NISA requested to the Cabinet Office on March 8, 2011 that they would discuss complex disasters at the Central Disaster Management Council. Regarding the Cabinet Office's response to this request, the Cabinet Office says that the meeting was closed shortly due to Cabinet Office's time constraint and that it only suggested consulting each other as needed when more details about complex disasters became available. On the contrary, NISA says that the request was rejected by the Cabinet Office for the reason that the topic was irrelevant to the Central Disaster Management Council. Accordingly, the Investigation Committee was not able to identify the details of the talks between them.

Despite that, the Disaster Countermeasures Basic Act which falls within the jurisdiction of the Cabinet Office gives a definition of a disaster, and Article 1 of the order for enforcement of this law states that a disaster includes damages caused by "the release of considerable amount of radioactive materials." At the Investigation Committee hearing, the Cabinet Office gave the following statements: "In the past, disaster prevention was generally dealt with by the former National Land Agency from the beginning. After the JCO Criticality Accident, the Act on Special Measures Concerning Nuclear Emergency Preparedness was enacted, and specific matters, in particular practical and highly technical matters were purposely separated from NLA's," "It might have been judged that we should recognize what was being discussed but

[72] The Director General for Disaster Management served as the secretariat for the Central Disaster Management Council.

should not be involved in practical and highly technical matters until relevant discussion matured to some extent, because we were not a specialist in nuclear power," "In general the Central Disaster Management Council deals with the issue as a whole, but we expect them (the NISA) to take the initiative to formulate nuclear-related matters and to combine their results with non-nuclear matters." The Cabinet Office also said that, once a nuclear emergency occurs, the Minister of Economy, Trade and Industry should make a practical judgment on the details as to whether that nuclear emergency falls under the provision of nuclear emergency situation and, immediately after this judgment, the Cabinet Office would deal with office procedure for issuing the Declaration of a Nuclear Emergency and establishing the Nuclear Emergency Response Headquarters. That is to say, this is a statement that the Cabinet Office presides over emergency response in the manner similar to the Cabinet Affairs Office, which handles the general affairs of the Cabinet, suggesting their stance that the Cabinet Office will not be involved in the substance of nuclear emergency response.

In addition, the Cabinet Office states that prior to the Tohoku Region Pacific Coast Earthquake there had not been much discussion about disaster prevention against different types of disasters combined, including a nuclear disaster. Regarding the background of this statement, the Cabinet Office mentioned that it had given priority to the disaster prevention of an individual disaster and that it wavered in deciding what scenario should be postulated in terms of complex disasters. The Cabinet Office also said that it was difficult to deal with the disaster prevention against complex disasters due to the shortage of human resources.

5. Relationship with International Convention and International Standards

(1) Approach to a harmonization of the international and national standards

a. Domestic discussion about the IAEA fundamental safety principles

In 2006, the IAEA established the "Fundamental Safety Principles" by integrating various existing safety principles documents[73] and determined 10 safety principles that are consistent and do not contradict each other on the basis of fundamental safety objectives to protect people

[73] As there is no name of Japanese government officials listed as collaborators for drafting the principles or reviewing them, it cannot be confirmed that Japan actively contributed to the formulation of the "Fundamental Safety Principles."

and the environment from the harmful effects of ionizing radiation. Among these principles, those related the safety of nuclear power facilities are as follows:

Principle 1: Responsibility for safety: The prime responsibility for safety must rest with the person or organization responsible for facilities and activities that give rise to radiation risks.

Principle 2: Role of government: An effective legal and governmental framework for safety, including an independent regulatory body, must be established and sustained.

Principle 3: Leadership and management for safety: Effective leadership and management for safety must be established and sustained in organizations concerned with, and facilities and activities that give rise to, radiation risks[74].

Principle 8: Prevention of accidents: All practical efforts must be made to prevent and mitigate nuclear or radiation accidents[75].

Principle 9: Emergency preparedness and response: Arrangements must be made for nuclear emergency preparedness and response for nuclear or radiation incidents

However, at that time the NISA had given an instruction to nuclear operators regarding the back-check of seismic safety associated with the revision of the Seismic Design Guide (LS-D-I.02), and had put priority on its own review of the seismic safety assessment reports submitted by the nuclear operators, including its participation in the discussion at the secondary review conducted by the NSC. For this reason, when the IAEA established the Fundamental Safety Principles, both the NISA and the NSC could not afford to conduct a systematic review of the Regulatory Guides and other guidelines in Japan.

In order to examine the necessity for revising the structure of the Regulatory Guides, the Subcommittee for Reorganization of Regulatory Guides was established under the NSC, and the Subcommittee started discussion in July 2009, referring to the approaches in safety regulations abroad such as the adoption of IAEA Fundamental Safety Principles. In parallel, several special committees were working on the topic. However, the area of discussion was

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[74] Specifically, it is stated, "Leadership in safety matters has to be demonstrated at the highest levels in an organization. Safety has to be achieved and maintained by means of an effective management system. ...The management system also has to ensure the promotion of a safety culture, the regular assessment of safety performance and the application of lessons learned from experience."

[75] As a specific content it is stated, "The main measure for the prevention and mitigation of accidents is "defense-in-depth." Defense-in-depth is mainly realized by the combination of many sequential as well as independent protection levels, which may cause harmful effects on humans and the environment only when it failed to function.

narrowed down due to the difficulty in maintaining human resources necessary for the operation of these committees. The activity of the Subcommittee was aborted after the fourth meeting and the Subcommittee itself also ceased to exist in June 2011.

Nevertheless, in December 2010, the NSC formulated "The Basic Policies of the Near Term Initiative of the Nuclear Safety Commission," in which the NSC showed the principle that: "Whilst each of the Regulatory Guides established by the NSC so far is based on implicitly-agreed fundamental principles regarding nuclear safety, the fundamental principles have not been made explicit. The NSC recognizes the importance of this fact and is determined to formulate a document that clearly indicates the most fundamental principles." In February 2011, the NSC approved the "Approach towards the Promotion of the Basic Policies of the Near Term Initiatives," in which, opinion exchanges with external experts should be actively conducted regarding the fundamental principles for safety. On February 9, 2011, the first meeting was held and it offered an opportunity for an opinion exchange. The subsequent meetings have been reopened several months after the earthquake in 2011 in order to further develop the discussion.

At the first meeting, the NSC Chair Haruki Madarame explained the method of exchanging opinions – Instead of adopting the IAEA Fundamental Safety Principles as they were, the NSC aimed to reach a consensus among all the stakeholders by applying the basic concept of nuclear safety to SA measures for a re-examination of the concept and formulate a Fundamental Safety Principles document, involving regulators, licensees, and the entire the other Japanese citizens[76].

b. IAEA Safety Guide SSG-9 "Seismic Hazards in Site Evaluation for Nuclear Installations"

Based on the implementation of seismic PSA worldwide and the experience of the impact of

[76] In the "Harmonization to International Standards" described in the USNRC Management Directive 6.6 for Internal Management of the development and revision of regulatory guides, NRC states that the Safety Guide such as the standards published by IAEA should also be examined for the application to Regulatory Guides. Also in June 2009 when the European Council adopted the EU Directive to establish a common framework for nuclear safety at nuclear facilities, they placed priority on the opinions of the European Parliament, saying "The Member States, if appropriate, shall review relevant IAEA Fundamental Safety Principles that established the framework of actual practices, which the Member States must respect when implementing the EU Directive." In this way, both the U.S. and the EU respect the international nuclear safety standards such as IAEA Safety Standards, whilst at the same time attempting to harmonize it with national standards. In terms of the inclusion of the international nuclear safety standards into national standards, they were taking the lead in the response in comparison with Japan.

a large earthquake on nuclear power plants in Japan, the IAEA set to work on the revision of the existing Safety Guide NS-G-3.3 “Evaluation of Seismic Hazards for Nuclear Power Plants” since 2008. As the second experts meeting was held for the revision of NS-G-3.3 in Tokyo in 2009, Japan made a presentation on an assessment of ground motion using fault model. Ultimately, the revised document was published as the Safety Guide SSG-9 “Seismic Hazards in Site Evaluation for Nuclear Installations” in 2010 through the approval procedure within the IAEA.

One the features of the new Safety Guide is the first inclusion of an evaluation method by utilizing fault model (seismic source simulation) that has been widely used in Japan, because its effectiveness as an evaluation method of the ground motion had been demonstrated through the experience at the Kashiwazaki-kariwa NPS operated by TEPCO at the Niigata-Chuetsu-oki Earthquake in 2007. This is one of the examples of Japanese contributions to the formulation of international standards.

c. IAEA Safety Guide SSG-18 “Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations”

Based on the flooding accident at the Madras Atomic Power Station Unit 2 (Kalepakkam Atomic Power Station, Unit 2) following the Major Earthquake off the Coast of Sumatra in 2004, the IAEA held a workshop in Kalepakkam, India, in 2005. The Japanese delegates initially consisted of the Director of Seismic Safety Office at NISA, JNES (Japan Nuclear Energy Safety Organization), Dr. Kenji Satake (currently professor of the Earthquake Research Institute, University of Tokyo, hereinafter, “Prof. Satake”) who was then a member of the National Institute of Advanced Industrial Science and Technology (AIST), and a few representatives from electric power companies, while the NISA had to be absent at the meeting due to follow-up works related to the Earthquake off the coast of Miyagi Prefecture, which had affected the Onagawa Nuclear Power Station (hereinafter, “Onagawa NPS”) operated by the Tohoku Electric Power Co., Inc. (hereafter referred to as “Tohoku Electric Power”). At the workshop, Prof, Satake talked with Mr. Antonio R. Godoy, who was a staff member of the IAEA, about the tsunami assessment method developed by the Japan Society of Civil Engineers. As Mr. Godoy requested a report on the tsunami assessment method in an English version, its

English translation was submitted at a conference in Italy in 2006.

Since the previously mentioned workshop, the IAEA worked on the development of the Safety Guide SSG-18 “Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations.” A draft of the Safety Guide DS417 was produced in 2010 and was finalized as SSG-18 and published in December 2011. Japan joined forces with the IAEA to establish SSG-18, and Japanese experts played a leading role in the development of SSG-18. Those who played an active role in the development included staff members of the JNES, Prof. Satake from the Earthquake Research Institute at the University of Tokyo and Prof. Fumihiko Imamura at the Tohoku University, both of whom were requested to participate in this task by the JNES. As the SSG-18 describes general principles as performance criteria, the IAEA is currently working on specification criteria that would contain detailed information about what should be implemented in applying the criteria to an actual assessment. This program is being implemented as the EBP (Extra Budgetary Program) funded by the JNES.

SSG-18 was developed for the following purposes to: revise the existing Safety Guides NS-G-3.4 “Meteorological Events in Site Evaluation for Nuclear Power Plants” and NS-G-3.5 “Flood Hazard for Nuclear Power Plants on Coastal and River Sites”; introduce the latest knowledge about floods; combine these two Safety Guides as part of the plan to restructure various IAEA Safety Standards. Particularly emphasized in terms of the contents was to flesh out the description of the tsunami hazard assessment. A unique component in the SSG-18 was that it includes a parameter study, which was proposed in the tsunami assessment method by the Japan Society of Civil Engineers and was used widely in Japan, without receiving an endorsement from NISA. It is rare that a concept or a method developed in Japan is adopted in the IAEA Safety Standards. Apart from this tsunami hazard assessment, there is only one other example, which is the fault model previously mentioned in section b.

Nevertheless, the Investigation Committee failed to find evidence and statements that proved the NISA’s will to be the reason why the JNES had begun to contribute to the development of IAEA Safety Standards.

In addition, the development of the measures to protect facilities was not the central theme of the development of SSG-18. The draft of SSG-18, that is DS417, described various ideas, which could have been used as the countermeasures against the accident in Fukushima. In the

Chapter on protection measures, without going into specifics, it is pointed out that: design criteria for barriers like embankment would be different and more conservative in comparison with those for power stations; protection measures should be reinforced by adopting a water-proof system as diverse measures; reference to debris and water pressure. However, at the Investigation Committee hearing, a staff member of the JNES said that there was no particular discussion about above-mentioned descriptions in the revision of the DS417 at the IAEA, while the persons in charge at the JNES and that the NISA also did not pay any attention to those descriptions.

(2) Review of regulatory bodies and nuclear operators by the IAEA and other organizations

a. Integrated Regulatory Review Service by IAEA (IRRS)

The IAEA establishes the Safety Standards and provides safety review services, based on the request from its Member States in order to ensure safety in using nuclear energy in the Member States. The Integrated Regulatory Review Service (IRRS), which is one of the review services, aims to perform a comprehensive review of the legislative system related to nuclear safety regulation and the organizations involved in nuclear safety regulation in a nation. The IRRS is implemented through peer reviews by a review team that consists of experts from different countries.

The IRRS is an advanced review service that has been created by integrating the International Regulatory Review Team (IRRT) and the Radiation Safety and Security Infrastructure Appraisal (RaSSIA), intending to perform comprehensive reviews on the legislative system and organizations in a nation involved in nuclear safety regulation. The IRRS made its debut when Romania invited IRRS mission as the IRRT follow-up mission in January 2006, which was followed by an invitation from the U.K., France, Australia, and Mexico. At the 50th IAEA General Conference in September 2006, Japan announced that it would invite the IRRS mission during 2007. After a preparatory meeting in February 2007, the IRRS was carried out between June 25 and June 30 in 2007. Main IRRS implementation is listed in Table V-2.

After review areas are confirmed, the IRRS is conducted through peer reviews by a review team, which consists of experts from different countries, based on: 1. “Self-assessment report” prepared by member states; 2. “IAEA questionnaire.”

Table V-2 Main IRRS implementation list

Year	Country	Review scope	Safety requirements employed as review standards (※1)
2006	Romania	※IRRT follow-up mission	
2006	U.K.	Nuclear Power Reactor only	GS-R-1, GS-R-3
2006	France	Nuclear Power Reactor, etc.	GS-R-1, GS-R-3
2007	Australia	Research Reactor, etc. (※2)	GS-R-1, GS-R-3, GS-R-2, etc.
2007	Japan	Nuclear Power Reactor only	GS-R-1, GS-R-3
2008	Spain	Nuclear Power Reactor, etc.	GS-R-1, GS-R-3, GS-R-2, etc.
2008	Germany	Nuclear Power Reactor only	GS-R-1, GS-R-3, GS-R-2, etc.
2009	France	Nuclear Power Reactor, etc.	GS-R-1, GS-R-3, GS-R-2, etc.
2009	Canada	Nuclear Power Reactor, etc.	GS-R-1, GS-R-3, GS-R-2, etc.
2009	U.K.	Nuclear Power Reactor, etc.	GS-R-1, GS-R-3, GS-R-2, etc.
2009	Russia	Nuclear Power Reactor, etc.	GS-R-1, GS-R-3, GS-R-2, etc.
2010	U.S.	Nuclear Power Reactor only	GSR Part 1, GS-R-3, GS-R-2, etc.
2011 (※3)	Spain	Nuclear Power Reactor, etc.	GS-R-1, GS-R-3, GS-R-2, etc.

※1 Reference Safety Requirements : "Legal and Governmental. Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety" (GS-R-1), Safety Requirements (2000); "Governmental, Legal and Regulatory Framework for Safety" (GSR Part.1), General Safety Requirements (2010); "The Management System for Facilities and Activities" (GSR-3), Safety Requirements (2006); "Preparedness and Response for Nuclear or Radiological Emergency" (GS-R-2), Safety Requirements (2002) (see Table V-1).

※2 There is no nuclear power reactor in Australia.

※3 The IRRS follow-up mission in Spain was scheduled to take place from 24th January to 1st February 2011.

(a) Results of IRRS in Japan

For Japan, the IRRS was implemented in June 2007 and the Mission Report was published in December in 2007[77].

The following three points are emphasized as good practices in the report:

1. Japan has a comprehensive national legal and governmental framework for nuclear safety in place; the current regulatory framework was recently amended and is continuing to evolve.

2. NISA as the regulatory body plays a major role for directing and coordinating the

[77] For the IRRS Report and its draft translation, refer to the following links:
- http://www.nisa.meti.go.jp/genshiryoku/files/report.pdf
- http://www.nisa.meti.go.jp/genshiryoku/files/report2.pdf

evolution of the regulatory framework.

3. Challenges have already been addressed to improve the relations among NISA, the nuclear industry and stakeholders in order to come with a better understanding and cooperation. Further work is also in progress.

In addition, the points below are mentioned in the report as recommendations and suggestions.

R1 The role of NISA as the regulatory body and that of NSC, especially in producing safety guides, should be clarified[78].

S1 NISA is effectively independent from ANRE, in correspondence with the GS-R-1. This situation could be reflected in the legislation more clearly in future[79].

S4 NISA should consider different staff/job rotation frequencies and patterns (particularly for its senior management) to further enhance its knowledge management and effectiveness of nuclear safety regulation of strategic and operational issues[80].

S6 Before approval of operational safety program and start of routine operation, NISA should add an additional hold point for an integrated review of all factors essential for safety.

(b) Japanese effort towards IRRS

As shown in Table V-2, U.K, France, Australia, Spain, Germany, Canada, Russia and the U.S. used the Safety Requirements GS-R-2 as a reference, but Japan did not. The Safety Requirements GS-R-2 was published on November 6, 2002, with the aim to minimize harmful effects to humans, resources and environment in any nuclear or radiological emergencies, and

[78] According to the IAEA review, the relation between NSC Regulatory Guides and the ministerial ordinance by the Ministry of Economy, Trade and Industry (METI), "Ministerial Ordinance for Establishing Technical Standards for Nuclear Power Generating Facilities" as well as the interpretations and structures of these guides and ordinance is unclear.

[79] According to IAEA review, in case of conflict between safety and promotion, the Minister of Economy, Trade and Industry is set to put priority on safety, as required by law, and therefore NISA is effectively independent from ANRE. The law referred to was the Article 2 of the Atomic Basic Law, which states that the research, development and utilization of nuclear energy shall be limited to peaceful purposes, on the basis of the highest priority of ensuring safety, and performed on an independent basis under the democratic operation. Its outcome shall be made public and be used to actively contribute to international cooperation. The legislative independence of NISA should be stipulated in the Atomic Basic Law, Act for Establishment of the Japan Atomic Energy Commission and the NSC, and in the Nuclear Reactor Regulation.

[80] The IAEA mission report says that a job rotation with short intervals of such as two to three years is not likely to provide the officials with enough time to gain a step-by-step improvement of regulatory and technical abilities required to exercise the regulatory function such as regulatory reviews continuously.

established the requirements for preparedness and response at a sufficient level for such emergencies.

Spain invited the IRRS mission in 2008, a year later than Japan did in 2007. Nevertheless, as of March 11, 2011, Spain had invited a follow-up mission, whilst Japan did not.

The IRRS Guideline, which is a bylaw of the IAEA, states that IRRS follow-up mission should be conducted approximately two years after the main mission. The process of preparation for the follow-up mission begins when a host country of the review sends off an invitation letter to the IAEA. On August 7, 2009, the NISA posted a letter to the IAEA to invite a follow-up mission to be conducted in February 2010, and a preparatory meeting was held from September 3 to 4 in the same year.

On November 25, 2009, however, NISA sent a letter to the IAEA requesting it to put off the follow-up mission, and with the agreement from the IAEA it was postponed. NISA asserted that it would take time to devise a plan for dealing with the issues and to be well-prepared for the follow-up mission, citing the following reasons:

1. On April 3, 2009, a discussion on cross-sectional regulatory issues regarding ensuring safety started at the Basic Safety Policy Subcommittee of Nuclear and Industrial Safety Subcommittee, with the aim to devise a plan for the future as regulatory authority and appropriate future tasks related to safety regulation, taking into account the performance of NISA's past policies and the rapidly changing social environment in recent years. In December 2009, based on the discussion, a draft report "Summary of Tasks Concerning Nuclear Safety Regulations (draft)" was published[81]. Since the IRRS pointed out in its draft report that it identified the issues and suggestions/recommendations for further improvement in terms of the existing system, NISA began tackling these issues. However, the relevant tasks in progress would not have been completed until the follow-up mission scheduled for February.

2. Since 2010, the work load relating to seismic back-check and the restart of the Kashiwazaki-kariwa NPS would increase more than expected.

With regard to this topic, at the Investigation Committee hearing, the then Director of

[81] Later, this draft report was finalized after having been amended based on the public comments and the discussion at the Fundamental Policies Subcommittee of the Nuclear and Industrial Safety Subcommittee, and published in February 2010 as "Summary of tasks concerning nuclear safety regulations."

Nuclear Emergency Preparedness Division at NISA and Director of International Affairs Office at NISA, who was in charge of the issue inside NISA, provided the following statements: “The IRRS mission report was published in June 2007 and I think the NISA harbored a thought of dealing with the issues pointed out in the report. However, the Niigata-Chuetsu-oki Earthquake occurred in July 2007, which was immediately after the report had been published. Although it was just a year later than I was appointed as the Director of the Nuclear Emergency Preparedness Division, it seemed that NISA as a whole had been occupied with responding to the Niigata Prefecture Chuetsu-oki Earthquake (and verifications of seismic safety based on the earthquake) throughout the year. After my arrival at the new post, I became fully occupied with the work related to the seismic back-check”; “As it is stated in the bylaw of the IAEA that the IRRS follow-up mission should be conducted after two years of the main mission, we sent off the invitation letter and also had a preparatory meeting. Things went on according to the plan up to that point. But at the preparatory meeting, we were obsessed with responding to the Niigata Prefecture Chuetsu-oki Earthquake. For this reason, we had not been well-prepared for the matters pointed out in the report, and no progress had been made on other matters;” “As it has been 13 years since the establishment of NISA in 2001, we had a number of complicated issues to deal with. We were instructed to reorganize the whole system and were going to discuss this matter in the subcommittee. In such a situation, there was an attempt to discuss the whole issue including those pointed out in the IRRS review, from scratch. However, the duration of half a year until the follow-up mission was not long enough for digging up the whole issues and dealing with them. Given that the follow-up mission was invited as planned, a large amount of logistics would be needed during the period in which we should tackle the whole issue. Realizing that it would not bring a fruitful outcome, we came to agree to the idea, among the NISA, the NSC and relevant foreign regulatory agencies, that we should invite the follow-up mission after we finished comprehensive discussions. These were the reasons behind the postponement.”

Until the earthquake on March 11, 2011, the invitation for the follow-up mission was not sent to the IAEA. The then Director of Nuclear Emergency Preparedness Division at NISA and Director of International Affairs Office at NISA, who were in charge of the issue inside the NISA, stated: “The follow-up mission had been postponed, because we would not be able to

respond fully to the matters pointed out in the IRRS. As a condition for inviting the mission, there was a general agreement that we should send an invitation only after we became confident in ourselves that we would be able to respond to the issues pointed out in the previous mission to some extent;" "We thought that we would be able to sort out most of the issues within 2-3 years."

b. IAEA's International Expert Mission on the accident at the Fukushima Dai-ichi NPS

Based on the agreement with the government of Japan, the IAEA conducted an investigation by sending an international expert mission to clarify the immediate lessons learned from the Fukushima Dai-ichi NPS accident and to share the information with the global nuclear community. The result of the investigation was reported and published at the IAEA Ministerial Conference in June 2011[82]. The main conclusion of this report is that, given the extreme circumstances of the accident, the management of the accident site was conducted in the best way possible and following the IAEA Fundamental Principle 3. However, it is pointed out that there were insufficient defense-in-depth provisions for tsunami. As lessons learned, the following points are indicated: for severe situations, such as total loss of offsite power or loss of all heat sinks or the engineering safety systems, simple alternative sources for these functions including any necessary equipment (such as mobile power, compressed air, and water supplies) should be provided for severe accident management; severe accident management guidelines and associated procedures should take account of potential unavailability of instruments, lighting, and power, and abnormal conditions, including plant state and high radiation fields.

In the 3, 4, 5 "Follow-up IRRS Mission," it is stated that the respective roles of the NSC and the NISA are formally defined; however, some clarification seems necessary in their actual fields of intervention and respective contribution. According to the IAEA, whilst the NSC directly provided advice to the Prime Minister, the NISA, the regulatory authority, neither formed part of the decision-making process by providing a situation assessment nor composed part of the disaster response, apart from conveying orders and instructions to the nuclear

[82] For the IAEA report and its provisional translation, please see the links below.
- http://www-pub.iaea.org/mtcd/meetings/pdfplus/2011/cn200/documentation/cn200_final-fukushima-mission_report.pdf
- http://www.nisa.meti.go.jp/oshirase/2011/08/230805-5-1.pdf (provisional translation)

operators. Thus, the IAEA felt that the regulatory authority should play a more distinctive role in disaster response, as stated in the IAEA Fundamental Safety Principles.

c. IAEA's response to the International Emergency Response Exercise (ConvEx-3)

IAEA's International Emergency Response Exercise (ConvEx-3) is implemented by the IAEA based on two conventions of nuclear accidents: Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency; Convention on Early Notification of a Nuclear Accident. The exercise aims at testing/evaluating exchange of information between the Incident and Emergency Centre (IEC) of the IAEA and Member States, and is conducted on the occasion of the Integrated Nuclear Emergency Response Drill in "Accident State." ConvEx, the IAEA's International Emergency Response Exercise, is composed of three types of exercises at different levels. Each exercise level is further divided into 2-4 levels of exercise modes. The ConvEx-3 is the exercise at the highest level and corresponds to so-called a comprehensive exercise.

The exercise has been conducted three times so far in 2001 (France), 2005 (Rumania) and 2008 (Mexico). At the ConvEx-3 in Mexico, 67 countries participated in the exercise, among which 41 countries including Japan were classified as level A participants (reception of messages/information only), whereas the remaining 26 countries were classified as level B participants (exchange notification/information and assistance). Level A participation starts when a participant receives early notification of the accident from the IEC and ends when the early notification is verified. Level B participation, in addition to the activities of Level A, includes exercises in receiving notification of emergency situation, organizing necessary activities in response to the notification and providing assistance if assistance is requested according to the above-mentioned international convention. Regarding Japan's participation as a Level A participant, a NISA official concerned said that, taking into consideration the location of the "Accident State" Mexico far away from Japan, it was difficult to suppose that the accident would affect Japan and that level A participation would be adequate. He also added that it did not seem logical to take part in level-B exercise, which would require a domestic response.

d. Review of nuclear operators

International and domestic organizations provide review services for nuclear operators: the Operational Safety Review Team (OSART) program by the IAEA; peer review run by the World Association of Nuclear Operators (WANO); peer review run by the Japan Nuclear Technology Institute (JANTI).

(a) Acceptance of the Operational Safety Review Team (OSART) by IAEA

The IAEA provides review services called OSART, which aims to review the operational safety of a nuclear power station for nuclear operators. The OSART employs the previously mentioned IAEA Safety Standards as the basis of assessment. According to the OSART Guideline, the OSART implements an assessment not only on the following nine fields but also on safety culture by analyzing the review results of each field: 1. Management, organization and administration; 2. Training and qualification; 3. Operations; 4. Maintenance; 5. Technical support; 6. Operational experience feedback; 7. Radiation protection; 8. Chemistry; 9. Emergency planning and preparedness. The procedure with the OSART is that nuclear operators send an invitation to the IAEA through the NISA, which is part of the government of Japan, and then the operators will be informed of the IAEA's decision on its acceptance through the NISA. The OSART Mission list in Japan is shown in Table V-3[83].

[83] Please refer to the IAEA "OSART Mission List" for details of situation in other countries (http://www-ns.iaea.org/downloads/ni/s-reviews/osart/osart%20mission%20list%20jan%202012.pdf)

Table V-3 OSART Mission List in Japan

Year	Nuclear facility
1988	Kansai Electric Power Co. Inc., (※) Takahama Nuclear Power Station, Unit 3 and Unit 4
1992	Tokyo Electric Power Company, Fukushima Dai-ni Nuclear Power Station, Unit 3 and Unit 4
1995	Chubu Electric Power Co. Inc., Hamaoka Nuclear Power Station, Unit 3 and Unit 4
2004	Tokyo Electric Power Company, Kashiwazaki-kariwa Nuclear Power Station, Unit 3 and Unit 6
2009	Kansai Electric Power Co, Inc., Mihanma Nuclear Power Station, Unit 3

(b) Peer reviews among nuclear operators

There are two peer review programs among nuclear operators, that is, the one implemented by the WANO and the other by the JANTI.

1) Peer reviews by the WANO

With the Chernobyl Accident in 1986 as a turning point, the WANO was established in 1989 by nuclear operators including those in Japan and has been conducting various support activities for power stations to improve the safety and reliability of nuclear power stations to their best condition, such as review services for nuclear power stations in the world and exchange of information on failures and troubles.

WANO peer review uses the "WANO Performance Objectives and Criteria: PO&Cs" as criteria and is designed to find out items to be improved and extract good practices through opinion exchange with the staff at power stations while conducting site observations.

From September 22 to October 3, 2008, TEPCO received the CPR (Corporate Peer Review), which is a review to evaluate the organization and management system. The WANO team, which consisted of nuclear experts from six countries, reviewed the organization and management system of the Headquarters of TEPCO. CPR report was submitted to TEPCO in

October 2008.

TEPCO created a digest version of the CPR report in order to communicate its content in the office. In the report, it is stated that there are several items to be improved in five areas, which are "safety culture," "leadership to be taken by the headquarters regarding process improvement," "monitoring of life management," "use of OE (operating experience)," and "human resources and educational/training." For example, the following points are reported in relation to "safety culture": the headquarters do not have a policy document that clearly prescribes safety culture; the interview with employees revealed that understanding of safety culture was not consistent among the them; staff at the headquarters were not clear about the whole idea of safety culture and the concept was not permeated throughout the organization; with the aim to foster safety culture, transparency should be recognized and, in parallel, a broader approach should be taken beyond compliance with laws and regulations. In terms of "human resources and educational/training," the report stated that: avoidable human errors were made due to flaws in the process expected to systematically extract training needs from non-compliance practices; a standard procedures common to all the plants were not shared among TEPCO and contractors' workers; due to weak ownership (sense of ownership) towards educational/training in the line organization, TEPCO were missing opportunities to draw the maximum benefit from educational/training for improving performance.

TEPCO carried out a range of activities to make improvements responding to these suggestions and, in November 2009, decided to invite the CPR follow-up mission in October 2010. Specifically, in order to improve "safety culture" area, TEPCO clarified the whole aspect of safety culture by establishing "Seven basic principles of safety culture;" distributed a booklet about the principles to the headquarters and each site to share the principles throughout the organization; conducted educational activities such as a case study based on the principles. In addition, with regard to "human resources and educational training" area, the observation of training was carried out on regular basis and mainly by the operation management manager and the operation management officer, and unsatisfactory performance, if identified, was directly pointed out during the training or recorded on a training observation check sheet.

From October 4 to October 8, 2010, TEPCO invited the CPR follow-up mission that consisted of nuclear experts from three countries, and an evaluation report based on the review

by the follow-up mission was submitted to TEPCO. A digest in-house version of this follow-up evaluation report was created to communicate its content to the employees. The evaluation was carried out based on three level criteria: Condition A - Problems have been solved or are expected to be solved shortly; Condition B - Good progress is being made. Objectives will likely to be achieved within a reasonable time period; Condition C - Objectives are unlikely to be resolved quickly. Some of the important measures are not employed. Among the five areas that were reported to require improvement, the "safety culture" area received "A," while the other four areas received "B." As for the evaluation on the "safety culture" area, the report cited as good examples the following activities: the "Seven fundamental principles for the basic idea of safety culture" were prescribed and actually conveyed to the employees; safety culture fostering activities were integrated into daily work; employees were awarded for such activities. For the "human resources and educational training" area, the report referred as a good practice to the observation of educational training by the managers, while it pointed out a need to clarify their expectations for the training observation and grasp the status of the training observation by the manager. At the end of this follow-up mission, the representative of the review team commented that various efforts were being made and that this was more than anticipated. In addition, he added that they the review team had an impression that the progress of activities was slow and that it would be important to prioritize important activities between these activities. Replying to this comment, TEPCO President Shimizu commented that it was one of the tendencies in the company to carry out various efforts in parallel but they would try to promote these activities putting priority among them.

2) Peer reviews by the JANTI

Following the JCO Criticality Accident in September 1999, Nuclear Safety Network (NS Net) was established by 35 companies and research institutes within the nuclear industry in December 1999, aiming to enhance safety awareness and thereby share/enhance safety culture across the entire nuclear industry. In April 2005, Japan Nuclear Technology Institute (JANTI)[84] was established by nuclear operators, nuclear manufacturers and research institutes with the aim

[84] At the time of establishment, it was a limited liability intermediary corporation, while as of March 2011 it is a general incorporated association.

to further improve nuclear safety by reinforcing technological foundations and promoting self-motivated activities for safety.

The JANTI carries out peer reviews to contribute to the promotion of the self-motivated activities for safety. The review team employs as criteria the "Performance Objectives and Criteria: PO&Cs" developed by the WANO and uses the review method adopted by the WANO and the Institute of Nuclear Power Operation (INPO[85]). The review team implements a review by conducting activities, with emphasis on site observations, as well as exchanging opinions with employees at power stations, whilst finding out items to be improved and extracting good practices in the review.

Table V-4 shows completed and planned peer reviews of TEPCO by the WANO and JANTI. The plans were made before the Tohoku Region Pacific Coast Earthquake[86]. Reviews by the IAEA and the OSART described in the previous section (a) are also included in the Table V-4.

[85] This is an agency founded by nuclear operators in the U.S., following the TMI accident in 1979. Periodic reviews conducted on nuclear power stations all over the U.S. are one of the main activities of the INPO in which the major process involves field observations during a two weeks staying at a power station. In the summary of the results of the peer review on the Fukushima Dai-ni Nuclear Power Station carried out by the JANTI in 2008, it is stated that, "Among the nuclear stakeholders, it is recognized that the improvement in safety and reliability of the nuclear power stations in the U.S. since the 1990s owes a large part to the INPO."

[86] For the situations related to other nuclear operators in relation to the JANTI, please refer to "List of Peer Review" available at the link below: http://www.gengikyo.jp/db/fm/peerreview.php

Table V-4 Completed and planned reviews by the WANO and the JANTI on TEPCO (※1)

Year of implementation	Review target			
	Head Office	Fukushima Dai-ichi Nuclear Power Station	Fukushima Dai-ni Nuclear Power Station	Kashiwazaki-kariwa Nuclear Power Station
1992			IAEA-OSART Review	
1993			IAEA-OSART Follow-up	
1999				WANO Peer Review
2000		JANTI（NS Net） Review		
2003		WANO Peer Review	JANTI（NS Net） Review	
2004				IAEA-OSART Review
2005			WANO Peer Review	
2006		JANTI Review		IAEA-OSART Follow-up
2007		JANTI Follow-up		（※2）
2008	WANO-CPR		JANTI Review	
2009		WANO Peer Review		
2010	WANO-CPR Follow-up			WANO Peer Review
Future Plan（※1）		FY 2012 JANTI Review	FY 2011 WANO Peer Review	FY2013 JANTI Review

※1 "Future Plan" shows plans made prior to the Tohoku Region Pacific Coast Earthquake.

※2 WANO Peer Review was planned to take place in September 2007. However, it was postponed due to the Niigata-Chuetsu-oki Earthquake in July 2007.

6. Organizational Structure as Regulatory Bodies for Nuclear Safety

(1) NISA as a regulatory authority

a. Background of the foundation of the NISA

As a result of the reorganization of the central government in January 2001, the Ministry of Economy, Trade and Industry took charge of all safety regulations on nuclear power as an energy source. In this process, the NISA was established as a "special agency" inside the Agency for Natural Resources and Energy, an extra-ministerial bureau, to take charge of ensuring energy safety and industrial safety alone.

The NISA was made up of: the main agency; the Regional Mine Safety and Inspection Bureau, which was set up nationwide as a mine safety administration organization; the Nuclear Safety Inspector, which was established near nuclear power facilities throughout the country; and the Nuclear Safety Inspector Office where Senior Specialists in Nuclear Emergency reside.

The initial number of the staff at the NISA was 625 (as of April 2001) among which the staff in charge of nuclear safety increased from about 140 to about 260 since the foundation of the agency. Of the latter, the number of Nuclear Safety Inspectors and Senior Specialists for Nuclear Emergency, who were resident inspectors, increased from about 50 to about 100. The most common career background of the staff members who were employed at that time through the mid-career hiring is said to have been in engineering at nuclear vendors and in the Self-Defense Force with knowledge about disaster prevention.

b. Progress in the administration during the first 10 years of the NISA's establishment

On January 11, 2001, which was immediately after the central government reorganization, the Minister of Economy, Trade and Industry made an inquiry to the Advisory Committee for Natural Resources and Energy[87] about the way of ensuring nuclear safety in the future based on recent changes in the environment[88], and its review was relegated to the Nuclear and Industrial Safety Subcommittee[87]. As a result of this review, in July 2001 the direction that nuclear safety regulations should aim at was indicated in the Nuclear and Industrial Safety Subcommittee report entitled, "Report on Ensuring Nuclear Safety Infrastructure". In addition, the report emphasized the necessity to reinforce nuclear safety infrastructure and became the guide to the NISA's nuclear safety regulations.

However, various accidents and other events relating to nuclear safety occurred, overwhelmed the NISA with work required in response to each accident/event. These

[87] The Nuclear and Industrial Safety Subcommittee was set up under the former Advisory Committee for Energy in December 2000 to discuss intensively about nuclear safety regulations due to the issues raised (on July 21, 2000) by the General Subcommittee of the former Advisory Committee for Energy inside the former Ministry of International Trade and Industry. Through the central government reorganization on January 6, 2001, as a succeeding advisory committee, the Advisory Committee for Natural Resources and Energy was established inside the Agency for Natural Resources and Energy, while the Nuclear and Industrial Safety Subcommittee was set up on January 10, 2001.

[88] January 11, 2001, Inquiry 2 "What should it be done to ensure nuclear safety and secure power in the future based on recent changes in the environment?"

accidents/events included a falsification of voluntary inspection reports at a nuclear power station run by the Tokyo Electric Power Company (TEPCO), which was made public in 2002, the secondary system pipe rupture at Unit 3 of the Mihama NPS operated by the Kansai Electric Power Co., Inc. (2004), the reactor trip at the Onagawa NPS following the Earthquake off the coast of Miyagi Prefecture (2005), seismic back check (2006), and the fire at the Kashiwazaki-kariwa NPS operated by the TEPCO caused by the Niigata-Chuetsu-oki Earthquake (2007). Every time an accident/event occurs, the NISA must instruct the operator concerned to conduct an investigation and produces a report to investigate the cause of the accident/event and has to evaluate the validity of the report. As required, the NISA reports its evaluation results to the NSC, if need be, whilst the NISA amends relevant laws if necessary and instruct nuclear operators to respond to the amended laws. Moreover, based on the evaluation results, NISA has to provide an explanation about the safety of the nuclear facility at the local areas where the facility is located. As having been occupied with responding to these accidents/events, the NISA was not able to assign enough organizational and human resources to address long-term tasks sufficiently. It was in 2010 that the Nuclear and Industrial Safety Subcommittee had discussion based on the changes in the environment surrounding the nuclear safety regulation, and produced the report entitled “Basic Policy Subcommittee Report: Report of the Issues on Nuclear Safety Regulation.”

c. Organizational Problems with the NISA and problems with the environment surrounding the NISA

(a) The NISA is not an agency dedicated to nuclear regulations

NISA is in charge of not only nuclear safety regulations but also industrial safety. Therefore, if such accidents occur as petrochemical complex accident or gas water heater accident in the field of industrial safety, NISA is forced to respond to the accident by investigating into the causes of the accidents and formulating measures to prevent them from happening again. Whether the division that handles the accident is in charge of nuclear safety regulations or industrial safety, NISA executive officials such as the Director-General and the Deputy Director-General of the NISA are forced to handle these accidents. This means that the NISA does not have an organizational structure, which allows the leaders of the organization to focus

on nuclear safety regulations.

(b) The NISA is not independent in terms of personnel management

Whilst the specialists with technical expertise are independently employed through mid-career recruitment by the NISA, other staff members such as administrative and engineering officials are employed as staff members for the entire Ministry of Economy, Trade and Industry. The personnel transfers for these staff members are implemented following the personnel rules applied to the whole Ministry and are arranged for the entire Ministry to give each official an opportunity to have work experience within various posts and units, with the aim to identify the aptitude of each official. Since personnel transfers with a normal interval, which is 2-3 years, are also applied to the posts and units that require expertise and experience of nuclear regulation such as the NISA, that makes it difficult to develop specialized technical ability. Although staff members who are identified to have an aptitude for the NISA through the personnel operation are given a higher position step-by-step in a systematic manner, the necessity to develop staff member's expert technical abilities still remains a problem.

Nevertheless, when reviewing the personnel operation of the NISA, it is necessary to take into account the statement mentioned in the Basic Policy of Employment and Promotion (approved by the Cabinet on March 3, 2009[89]), which is based on the Article 54 of the National Public Service Act. The statement says, "With regard to a personnel transfer, efforts must be made to give the staff a variety of job opportunities, whilst it shall be implemented in consideration of the following points: development of administrative processing system which is able to respond appropriately to various administrative issues and changing work load; prevention of negative effects resulting from the situation in which a specific staff member is assigned to the same official post for a long period of time."

(c) The NISA does not have an organizational and personnel arrangement that is capable of addressing mid- to long-term challenges

[89] Based on Article 54, Section 1 of the National Public Service Act, which was revised by the Law of Partial Revision on the National Public Service Act (Law No. 108, 2007), the basic policy of employment and promotion was formulated as a basic guideline to secure appropriate and effective operation concerning the employment, promotion, demotion and transfer of officials.

As described in previous paragraphs and in Chapter VI of the Interim Report, during approximately 10 years since its establishment in January 2001, NISA has been occupied with the handling of various accidents, which have occurred at nuclear facilities, and therefore NISA had no choice but to prioritize the handling of such short-term administrative issues. Depending on the type of accident, a certain section has to take charge of a response to the accident, but due to the priority placed on these pressing issues, it was not feasible to maintain a sufficient amount of human resources for mid- and long-term tasks within each section. Although NISA recognized the necessity of reviewing mid- and long-term issues, it had no room for dealing with those issues in terms of its organizational and personnel capacities.

For example, the Study Group on the Use of Risk Information under the Nuclear and Industrial Safety Subcommittee was discussing more comprehensive use of risk information to realize more effective and efficient regulations through further enhancement of scientific rationality in safety regulations. Whilst the Study Group began its discussion in 2005, it was forced to have an interruption for four years between November 2006 and September 2010 due to the comprehensive checks of the falsification of inspection records and other misconduct at nuclear power facilities (NISA instruction in November 2006[90]).

(d) The NISA cannot afford to have a sufficient personnel interaction with international agencies and foreign regulatory authorities

Whilst Japan is the second largest financial contributor[91] after the U.S. to the IAEA, which promotes the peaceful use of atomic energy and aims to prevent the use of atomic energy to be diverted from a peaceful purpose to a military purpose, the number of Japanese staff members account for only five percent of the entire IAEA senior staff. It is not the problem specific to the IAEA that Japanese personnel contribution is low in comparison with the share of Japanese financial contribution. The same can be said of most international agencies. Although

[90] On October 31, 2006, the falsification of data at the Matanogawa Power Station operated by the Chugoku Electric Power Co., Inc. was disclosed. Since other accidents and problems were uncovered one after another, the NISA instructed all the power companies to conduct comprehensive checks as to whether falsified records, lack of necessary procedures and other similar problems at hydroelectric, thermal and nuclear power generating facilities by the end of March 2007.

[91] Simple international comparison is not feasible because financial contributions are made in various forms; however, in 2011, the shares of contribution by the U.S. and Japan for the regular budget of IAEA were 25.7% and 12.4% respectively.

government officials with work experience at the IAEA are useful to grasp the trends of the international safety standards as well as coordinate with the IAEA for various matters, the current staffing situation at the NISA does not allow an increase in the number of staff working for the IAEA. The same can be said of the personnel interaction with the NRC.

In addition, due to the time constraints coming from daily tasks, NISA officials did not often participate in IAEA meetings such as CSS and NUSSC. In these cases staff members from the JNES sometimes took part in the meetings on behalf of NISA staff. This is a good example to show that the direct opinion and information exchanges with officials from foreign regulatory authorities are not conducted sufficiently.

(e) NISA's organizational and personnel arrangements are suitable only for response to individual accidents

As reported previously and in Chapter VI of the Interim Report, NISA is an agency that conducts an investigation to identify accident causes and takes measures to prevent recurrence when an accident has occurred at a nuclear facility. However, NISA's review is limited to an individual accident caused by a specific event and does not include a comprehensive review such as an investigation into the possibility of an accident caused by related events combined and its preventative measures.

For example, in implementing the seismic back check, a priority was placed on checking the seismic safety of the safety-related buildings and structures at the nuclear facility, based on the experience at TEPCO's Kashiwazaki-kariwa NPS at the time of the Niigata-Chuetsu-oki Earthquake. As a result, the interim report of the seismic back check covered only the evaluation of design basis earthquake ground motion and seismic safety check of the safety-related buildings and structures. On the other hand, although the instruction of the seismic back check included the evaluation of the residual risk by the use of seismic PSA, the safety assessment of accompanying events such as tsunami had been postponed for the final report. And then, the Fukushima Nuclear Accident occurred.

Moreover, a comprehensive risk assessment on the nuclear facility has not been conducted, factoring in potential external events leading to a nuclear accident such as fire, volcano and landslide.

(f) Problem with the efficiency of administrative work in relation to the Nuclear Safety Commission (NSC)

The NISA was set up as a special agency within the Agency for Natural Resources and Energy, which takes a position to promote the use of nuclear energy. However, it can be said that its independence as a nuclear regulatory agency is practically ensured, as its regulatory activities are being checked by the NSC. On the other hand, NISA does not formulate regulatory guides separately from the NSC Regulatory Guides, which is NSC's bylaws, for fear of impairing efficiency in administrative work. Instead, NISA waits for the NSC to formulate and revise the NSC Regulatory Guides. Once the NSC Regulatory Guides have been established, the NISA takes actions.

(2) The NSC as an organization involved in regulation

a. Background of the foundation of the NSC

In 1978, with the aim to strengthen the system of securing nuclear safety, the NSC was established to take charge of safety regulations separated from among the functions associated with the former Japan Atomic Energy Commission. The Government regulation on the safe use of nuclear energy is implemented directly by the administrative bodies such as the Ministry of Economy, Trade and Industry and the Ministry of Education, Culture, Sports, Science and Technology[92], whereas the NSC plays a role in making decisions on the fundamental policies regarding the safety regulations used by the Government and in leading not only the administrative bodies but also nuclear operators from a neutral and independent position from the administrative bodies. For this reason, the NSC possesses a strong authority including recommendations to the relevant administrative bodies through the Prime Minister.

From the standpoint of neutrality, the NSC belongs to the Cabinet Office. The NSC consists of: five commissioners appointed by the Prime Minister with consent from the Diet; examination committee members that are composed of experts in various fields; special committee members; approximately 100 staff members of the Secretariat.

[92] These ministries were the former Science and Technology Agency and the Ministry of International Trade and Industry, etc. prior to the central government reorganization on January 6, 2001.

b. Organizational Problems with the NSC and the problems with environment surrounding the NSC

(a) Term of special committee members and open-ended work plan

In general, the term of the members of the NSC special committees had not been prescribed until recently, while that was determined on the occasion of reviewing the regulation related to the term and concurrent holding of positions, which was applied to all the council members in the government[93]. For this reason, it turned out that some special committee member served as the chairperson of a special committee for a long period and that some special committee member served as a commissioner at the Atomic Energy Commission or the NSC after having served as a special committee member.

For the formulation and revision of the guidance, a deadline is not particularly set. For example, it took more than five years to revise the Seismic Design Regulatory Guide from 2001 to 2006. As for the Regulatory Guide for Reviewing Nuclear Reactor Site Evaluation, the revision process began in 1979, immediately after the NSC was separated from the Japan Atomic Energy Commission and was established[94]. After the first and second reviews were conducted from 1979 to 1985 and from 1992 to 1997, respectively[95], the revision activity was ultimately discontinued.

The term of office for Special Committee members is not prescribed, and no end date is set for the formulation and revision of the Regulatory Guides, This means that the Regulatory Guides concerning nuclear safety were formulated and revised upon only after experts discussed the issue through and through to reach agreement. As the proceedings of the meeting have been made public, it can be said that the transparency of the discussion is ensured;

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[93] The Secretariat for the NSC established "Rules regarding the bylaw of the announcement of the examination committee members, expert members and special committee members" on April 1, 2005 and placed limitation on an assignment for a long period of time in relation to the special members. According to the NSC, there was no rule for reappointment and term of office period before the rule was established.

[94] In October 1978, for the purpose of establishing the system to ensure nuclear safety, the function related to safety (e.g. policy planning, review and decision on items concerning safety among those related to the development and utilization of nuclear energy) was separated from the other functions held by the Atomic Energy Commission. Following this, the NSC was established to have jurisdiction over the above-mentioned separated function, while at the same time it was also decided that the NSC would take a role to double check the safety inspection conducted by the competent authorities.

[95] The third review started in 2009; however, it was discontinued following the Tohoku Region Pacific Coast Earthquake in March 2011.

however, there is also a criticism that the formulation and revision of the Regulatory Guides are not carried out as quickly as required.

(b) The NSC has no organizational capacities to deal with mid- and long-term issues properly

As described previously and in Chapter VI of the Interim Report, whereas NISA was forced to respond to various accidents at nuclear facilities, the NSC was also forced to check the NISA's regulatory activities in such a situation. For example, the NSC was occupied with checking NISA's response to the falsification of the voluntary inspection report by operators at nuclear power stations and NISA's report on seismic back check assessment. Although the NSC recognized the necessity of reviewing mid- and long-term challenges, it did not have the organizational and personnel capacities to deal with those issues.

Hence, it was not until in December 2010 that the NSC clarified the mid- and long-term tasks, such as the documentation of the fundamental principles for nuclear safety and improvement of the SA measures, in "The basic policies of the near term initiative of the NSC". NSC's resources were preferentially allocated to the urgent task, which was the seismic back check assessment. Thus, until 2011, the NSC had not been able to tackle the most fundamental task, which was to lead nation-wide discussion about the fundamental principles of nuclear safety, in response to the establishment of the IAEA Fundamental Safety Principles in 2006 and to enshrine the principles in an appropriate document after deepening the discussion on the topic.

Also, as illustrated previously in 3.(2).b, in reviewing the AM implementation policy for the Tomari NPS Unit 3, external experts suggested the following points: a review of the AM concerning external event such as a large earthquake is necessary as a future issue; the implementation of the PSA for fires and floods, in addition to earthquakes, is the world trend; these PSAs should be implemented and, based on PSA results, it is encouraged to implement additional measures, if need be. The NSC was aware of the necessity to tackle such mid- and long-term issues, but it could not afford to start the review, being occupied with dealing with short-term issues.