Provisional

Executive Summary of the Interim Report

Investigation Committee on the Accidents at Fukushima Nuclear Power Stations of Tokyo Electric Power Company

December 26, 2011

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1. **Introduction** [Chapters I.1, I.4, I.6*]

The Investigation Committee on the Accidents at the Fukushima Nuclear Power Stations (“the Investigation Committee”) of Tokyo Electric Power Company (TEPCO) was established by the Cabinet decision on May 24, 2011. Its objectives are: to conduct investigation and evaluation for finding out the causes of Accidents at the Fukushima Dai-ichi Nuclear Power Station (Fukushima Dai-ichi NPS) and Fukushima Dai-ni Nuclear Power Station (Fukushima Dai-ni NPS) of TEPCO as well as the causes of accident damage; and to make policy recommendations for limiting the expansion of damage and preventing reoccurrence of similar accident.

The Investigation Committee has conducted its investigation and evaluation since its first meeting on June 7, 2011. Its activities included: site visits to the Fukushima Dai-ichi and Dai-ni NPSs, as well as to other facilities; hearing of heads of local governments around the Fukushima Dai-ichi NPS; and hearing of people concerned through interviews mainly by the Secretariat. As of December 16, 2011, the number of interviewees reached 456.

The investigation and evaluation by the Investigation Committee are still ongoing and the Interim Report does not cover every item that the Committee aims at investigating and evaluating. Fact-finding of even some of those items discussed in the Interim Report are not yet completed.

The Investigation Committee continues to conduct its investigation and evaluation and will issue its Final Report in the summer of 2012.

This brief executive summary covers mainly considerations and evaluation of the issues in Chapter VII of the Interim Report, with brief reference to Chapters I to VI. The Investigation Committee recommendations are printed in bold.

[*] after the headings refers to corresponding chapters of the Interim Report

2. **Outline of the Accidents** [Chapters II, IV, V]

On March 11, 2011, the Fukushima Dai-ichi and Dai-ni NPS were hit by the Off the Pacific Coast of Tohoku Earthquake ("the Earthquake") and accompanying tsunami waves ("the Tsunami"). The Earthquake was of Magnitude 9.0 and the Tsunami waves height at the Fukushima Dai-ichi NPS exceeded 15 meters above O.P. (Reference sea level at Onahama Peil).

Six nuclear power units stood at the Fukushima Dai-ichi NPS: Units 1 to 3 were in operation, and Units 4 to 6 were in maintenance modes at the time of the Earthquake. Units 1 to 3 appeared to have automatically scrammed at the Earthquake, but external power supplies and almost all in-house AC power supplies were lost due to the Earthquake and the Tsunami. Reactors and spent fuel pools at the Fukushima Dai-ichi NPS lost their cooling capabilities. Explosions occurred on Units 1, 3 and 4, which were caused presumably by the hydrogen released from the possible core damage and filled in the reactor buildings. The reactor core of Unit 2 also seems to have been damaged, although the investigation is still incomplete.

A large amount of radioactive materials were released and spread from the Fukushima Dai-ichi NPS. The zone up to 20km from the site was designated as the Access Restricted Areas and no entry is allowed unless authorized. Some areas outside 20km from the site were also designated as the Deliberate Evacuation Areas. As many as more than 110,000 people have evacuated. Many people are still forced to live in evacuation, and radiation contaminations have caused serious impacts in extended areas.

3. **Issues relating to responses by government organizations to the Accidents** [Chapters III.2, VII.3 (2)]

(1) **Issues relating to the local nuclear emergency response headquarters** [Chapters III.5, VII.3 (1)]

a Loss of functionality at the Off-site Center

The Act on Special Measures Concerning Nuclear Emergency Preparedness (“Nuclear Emergency Preparedness Act”) and the Nuclear Emergency Response Manual (“NER Manual”) of the Government stipulate that once a nuclear accident occurs, a local nuclear emergency response headquarters (“ local NERHQ”) shall be established close to the accident site, as center of the emergency response coordination. A local NERHQ is to be located at a local standing facility for emergency responses and measures (“Off-site Center”).

The Off-site Center of the Fukushima Dai-ichi NPS was located about 5km from the Fukushima Dai-ichi site but it could not function as intended.

The Off-site Center had to be evacuated because of the following reasons: difficulty in assembling its staff members due to damaged transportation and heavily congested traffic caused by the Earthquake; loss of telecommunication infrastructures, power cut, shortages of food, water and fuel; and elevated radiation levels in the building which was not equipped with air cleaning filters.

In other words, the Off-site Center lost its functions because:

i. It was not assumed that nuclear disasters may strike simultaneously with outbreak of earthquake; and
ii. Its building structure was not designed to withstand elevated radiation levels, although it was intended for use in nuclear emergencies.

The Ministry of Internal Affairs and Communications identified the latter point in its “Recommendations based on the administrative evaluation and inspection of nuclear disaster prevention programs (Second Issue) “ in February 2009. NISA of METI did not take concrete steps for installing air cleaning filters, etc.

The Government should take prompt actions to ensure the Off-site Center functionality, even under large-scale disasters.

b Issues concerning delegation of authority to the local NERHQ

The Nuclear Emergency Preparedness Act stipulates that the head of the **Nuclear Emergency Response Headquarters (“**NERHQ”) may delegate part of its authority to the head of the local NERHQ. However, on this occasion, necessary notification concerning delegation of authority was not issued. The head of the local NERHQ had to make decisions on many issues such as implementation of evacuation and carry out those decisions in order to execute necessary actions in timely manner, assuming the formal notifications had been provided and he had been given the authority. The Investigation Committee will continue to investigate why such situation happened.

(2) **Issues relating to the nuclear emergency response headquarters** [Chapters III.2, VII.3 (2)]

a Responses at the NERHQ at the Prime Minister’s Office

Once a nuclear disaster occurs, the NERHQ is to be established at the Prime Minister’s Office with the Prime Minister as its head and to execute the emergency responses. And officials of relevant ministries and agencies at the Director-General level are to assemble at the Crisis Management Center of the Government located on the underground floor of the Prime Minister’s Office, and to form an emergency gathering team. The team is expected to collect the information each Ministry has obtained, and coordinate their views with flexibility.

At the time of the Accidents, decisions on emergency responses were made primarily by the NERHQ (located on the 5th Floor of the Prime Minister’s Office). All relevant Ministers and the Chairman of the Nuclear Safety Commission (“NSC”) of Japan were convened there. Senior executives of

TEPCO were also present.

The emergency gathering team members (on the underground floor) could hardly get hold of the discussions taking place on the Fifth floor. When the integrated responses by the entire Government set-up are of critical importance, there was insufficient communication between the Fifth floor (NERHQ) and the emergency gathering team.

b Issues relating to information collection

The Nuclear Emergency Response Manual stipulates that, in an emergency, nuclear operators report relevant information to the ERC at METI, which forwards the information to the NERHQ at the Prime Minister's Office. At the Accidents, however, such arrangement of information flow did not work smoothly. NISA staff and others at the ERC were aware of their information collection and forwarding far from desired promptness, but they did not come to realize to install its own teleconference system similar to the one extensively used by TEPCO. Neither they did dispatch their members to TEPCO HQ for information collection. After all they did not act proactively for effective information collection.

Collection of accurate and most up-to-date information is a prerequisite for timely and appropriate decision-making. This issue, together with the need for providing information to the nation, is of a major concern.

(3) **Remaining issues** [Chapters III.4 (2), VII.3 (3)]

The Nuclear Emergency Preparedness Act and the NER Manuals have been formulated and in place for prompt and appropriate responses to nuclear disasters.

But the existing Manuals or designated emergency organizations set-up did not function properly. And the Integrated Response Office of the Government and TEPCO was established, which was not envisaged in the Manuals and others.

- Why procedures in the Manuals did not work as intended?
- Where problems exist in the crisis management operations by the Prime Minister's Office?
- The emergency response procedures assumed in the existing NER Manuals were realistic?

The Investigation Committee will conduct further interviews of people concerned and report on the outcome of the investigation of these issues in its Final Report.

4. Issues of responses to the Accidents at the Fukushima Dai-ichi NPS

(1) **Misjudgment of operational situation of IC at Unit 1** [Chapters IV.3 (1), VII.4 (1)]

故障安全

Unit 1 lost its all power supplies shortly after the arrival of the Tsunami. The isolation condensers (IC) seem to have lost its functionality when its isolation valves were fully or almost fully closed by the fail-safe circuits. But at the initial stage of the Accidents, appropriate corrective action was not taken nor instruction was given. This was because it was wrongly assumed that the IC was operating normally. After a while, the shift operators on duty started to doubt the normal operation of IC from the indicators that momentarily recovered on the control panel, and switched off the IC. This judgment is not necessarily incorrect, but the decision was not properly reported to, or consulted with, the NPS emergency response headquarters.

In the meantime, the NPS emergency response headquarters and the TEPCO head office in Tokyo had the opportunities from the reports from the shift operators on duty and other sources, which could have prompted them to notice the loss of functionality of the IC. But they failed to notice and maintained their view that the IC was operating normally. These incidents in sequence indicate that not only the shift operators on duty but also the NPS emergency response headquarters as well as

TEPCO head office in Tokyo did not fully understand the function of IC operation. Such situation is quite inappropriate for nuclear operators.

As soon as the IC lost its function, Unit 1 required alternative water injection for core cooling as quickly as possible, and it became necessary to depressurize the reactor vessel for allowing low-pressure water injection. In the view of the Investigation Committee, misjudgment of the operational situation of the IC caused delay in alternative water injection and primary containment vessel (PCV) venting. As a result, an earlier opportunity for core cooling was missed.

(2) **Poor handling of alternative water injection at Unit 3** [Chapters IV.4 (2), VII.4 (2)]

At Unit 3, the high pressure coolant injection (HPCI) was kept running below the preset revolution per minute (RPM) operating ranges of the turbine for long duration while the reactor pressure vessel (RPV) was in low pressures. The shift operators on duty became concerned about insufficient water injection by HPCI and switched off the HPCI manually at 2:42 a.m. on March 13, 2011. Then the means for alternative water injection were not yet set in place. But they underestimated the risk of battery depletion and resulted in failing depressurization for alternative water injection. These decisions were made only among shift operators and the limited number of staff of the power group of the NPS emergency response headquarters. They did not seek for instructions from the managers and the report from the power group to the station managers was also delayed. Such situation is problematic in light of crisis management. It is highly regrettable that this caused the delay of alternative water injection until 9:25 a.m. on March 13.

Furthermore, due attention should have been paid to the depletion of battery that is essential for HPCI operation under the station blackout (SBO) conditions. If it had been done, the NPS emergency response headquarters could have initiated much earlier alternative water injections by using fire engines. The NPS emergency headquarters was considering and preparing for mid or long-term measures of water

injection by using the standby liquid control system as soon as power supplies resume. However, nothing was done to deploy fire engines for urgent alternative water injections, until the operators on duty reported to the NPS emergency response headquarters about the trouble after the HPCI operation had been manually stopped. The delay was caused solely due to the lack of recognition at the NPS emergency response headquarters of the necessity and urgency of alternative water injections into Unit 3.

(3) **Relations with the explosions in the Units 1 and 3 reactor buildings** [Chapters IV.4 (1), (2), VII.4 (3)]

It is still too early to judge at this stage whether earlier depressurization and alternative water injection of Units 1 and 3 could have prevented the explosions of reactor buildings.

5. Issues relating to the measures for preventing the expansion of damage

(1) **Issues concerning the initial radiation monitoring** [Chapters V.1, VII.5 (2)]

Monitoring data of radiation levels in the environment are indispensable for preventing radiation exposure and planning evacuation of people.

However, as a result of many monitoring posts washed away by the Tsunami or became inoperative by power cut, monitoring system lost its sufficient capabilities, under the influence of preceding earthquakes and tsunami.

Furthermore, in the initial stage of responses to the Accidents, there were confusions over utilization of monitoring data. In particular, the government lacked an attitude of making the monitoring data promptly available to the public. Even when some data were made public, they were only partial disclosure.

The Investigation Committee calls on the relevant organizations concerned to take prompt action for improvement on the following points:

i. **The monitoring system should be designed to maintain its functionality in crucial moment against various incidents such as earthquake, tsunami. Measures should be taken to function even in the complex disasters. It is also necessary to prepare for measures to enable monitoring vehicles to move and patrol even in such situations as the roads being damaged by earthquakes.**

ii. **Training and other programs should be strengthened for the organizations concerned and their staff to deepen knowledge of the function and role of monitoring system.**

(2) **Issues relating to the utilization of SPEEDI** [Chapters V.2, VII.5 (3)]

The System for Prediction of Environmental Emergency Dose Information (SPEEDI) is also to play an important role in planning prevention of radiation exposure and evacuation of local population. However, the system was not utilized at the time of issuing instructions to evacuate.

The communication links were disrupted and inoperative due to the earthquakes, and the SPEEDI could not receive the basic source term information of discharged radioactivity. It was therefore not possible for the SPEEDI to estimate atmospheric dispersion of radioactive materials on the basis of the basic source term information.

However, it is possible for the SPEEDI to estimate the course of dispersion of radioactive materials, making assumption of the unit amount of discharge (1 Bq/h). And actually those estimates were then calculated by the system. Such calculation only predicts the direction of dispersion and relative distribution of radioactivity. But, if the information were provided timely, it could have helped local governments and population to choose more appropriate route and direction of evacuation.

Since the local NERHQ lost its functionality, the Government NERHQ or NISA

should have taken the role of providing the SPEEDI results to the public. But none of them had the idea of making use of this information. MEXT, the competent ministry for SPEEDI, did not come to realize to providing the SPEEDI information to the public by themselves or through the Government NERHQ. Furthermore, since March 16, the clear division of responsibility was kept undefined between MEXT and NSC on the utilization of the SPEEDI. This was one of the reasons for the delay of making the SPEEDI results public.

The operational procedures of the SPEEDI should be improved for providing timely the useful information to the public and preventing the expansion of damage. The hardware of the SPEEDI system should be also upgraded so that its functionality could be maintained in complex situations such as earthquakes.

(3) **Issues relating to the decision-making of evacuation of residents and confusion at localities** [Chapters V.3 VII.5 (4)]

The government issued instructions for evacuation over several times. The decisions were made at the Government NERHQ only on the basis of the information and views of the senior members of relevant ministries and TEPCO at present. There is no evidence that any official representing MEXT as the competent ministry of SPEEDI was present at the Government NERHQ. No knowledge of SPEEDI was utilized in the decision-making process. Since the SPEEDI had not been functional in a full form, the conclusions of evacuation zoning might have been the same as the government decisions. But it should be pointed out as problematic that the point of view of utilizing the SPEEDI was totally missing in planning the evacuation strategy.

The government instructions for evacuation did not reach promptly all the relevant local governments subject to Evacuation Areas. Moreover, the instructions were not specific nor in detail. The local governments had to, with insufficient information, make decisions to evacuate, locate evacuation

destination, and evacuation procedures. One major reason for such confusion is considered to be that the government and electric power companies had not tackled fully the issue of evacuation once a nuclear disaster occurs.

The Investigation Committee notes the following points in order to prepare for possible recurrence of such an accident.

i. **Public educational programs should be formulated and implemented for the general public to have basic knowledge in daily life on how radioactive materials be released, dispersed, and deposited on the ground once a nuclear accident occurs at a nuclear power station, and the possible health effects of radiation exposure.**

ii. **Local governments should prepare for the evacuation operation system, considering the unique characteristics of nuclear accident, and should implement regular training exercises in a realistic manner with earnest participation of the population.**

iii. **The evacuation may involve a large number of populations from the order of thousands to tens of thousands. With this in mind, the local governments should prepare in normal times for establishing concrete plans to ensure transportation, traffic control, evacuation location in remote place, food and drinking water at the destinations, etc. In particular, special measures are needed for the evacuation of the socially vulnerable people: those in medical facilities, nursing homes for senior citizens, and welfare institutions, and severely affected patients at home, severely disabled people and others.**

iv. **Nuclear disasters affect broad areas. Above-mentioned measures should not be left alone to local governments. The prefectural and**

national government should proactively involve themselves with the local governments (cities, towns, villages) in formulating above-mentioned measures for evacuation planning, disaster prevention planning and their operation.

(4) **Issues relating to providing information to the nation and international society** [Chapters V.8, VII.5 (5)]

In the wake of the Accidents, quite a few cases were observed where the manner of providing information by the government gave rise questions and doubt on the part of the populations in the surrounding areas who were forced to evacuate and people in the whole nation that the government was not providing truth promptly and accurately. Such examples included, among others, the status of the reactor cores (core meltdowns, in particular), the critical conditions of Unit 3, and explanations on radiation effects on health such as “No immediate impacts on human health”, which was difficult to understand.

The following tendency was observed: transmission and public announcement of information on urgent matter was delayed, press releases were withheld, and explanations were kept ambiguous. Whatever the reasons behind, such tendency was hardly appropriate, in view of communication in an emergency.

The Investigation Committee will continue its investigation and evaluation on this issue, and will make necessary recommendations in its Final Report.

As regards providing information to the international society, contaminated water was discharged to the ocean immediately after the decision was made without prior explanation to the neighboring countries. It may not violate legal obligations under the relevant international conventions, but the case may have caused their mistrust in Japan’s nuclear disaster responses. An important lesson should be drawn from this case for the future.

(5) **Review of other measures for preventing the expansion of damage** [Chapters

V.4 (5) (6), 5 (2), VII.5 (6)]

The Investigation Committee is still in the process of investigating and evaluating the issues relating to the elevation of screening levels, the standards for the use of contaminated school grounds, and the medical institutions for emergency radiation.

6. Inappropriate precautionary measures against tsunami and severe accident

(1) Inappropriate measures against tsunami and severe accident [Chapters VI.3, 4, VII.6 (1)]

a Issues on tsunami assumptions

(a) Regulatory bodies concerned

The Nuclear Safety Commission (NSC) of Japan started its revision process of the seismic design regulatory guide in July 2001 through its Sub-committee on the seismic design regulatory guide. But no tsunami specialist was included among the Sub-committee members. It indicates the NSC's insufficient awareness of the significance of tsunami in nuclear safety. The revision of the seismic design regulatory guide (NSCRG L-DS-I.02) took five years of work and it was finally concluded in September 2006. It is commendable that a clause on the countermeasures against tsunami was mentioned in the final version of the regulatory guide, but it did not lead to concrete design measures against tsunami.

It is the role of the regulators to set up the methodology for tsunami evaluation and the criteria for evaluating the effectiveness of design measures against tsunami. The Investigation Committee is unable to find, however, evidence of such efforts made by the regulatory organizations concerned. NISA received from TEPCO in 2002 its safety evaluation report based on the "Tsunami Assessment Method for Nuclear Power Plants in Japan" (Ref. 1). But NISA did not make specific points or instructions for action. NISA received reports from

TEPCO in August/September 2009 and in March 2011, respectively on the results of its test calculations of tsunami and other relevant matters. But NISA did not make any specific responses or request for their concrete work.

(Ref. 1) *Tsunami Assessment Method for Nuclear Power Plants in Japan, the Tsunami Evaluation Subcommittee, the Nuclear Civil Engineering Committee, Japan Society of Civil Engineers, 2002*

(b) TEPCO and others

The licenses for the Fukushima Dai-ichi NPS were awarded between 1966 and 1972 with the design base of 3.1 meters as the tsunami wave height above the sea level. This height was set based on the maximum wave height observed at the Onahama Port (about 40km south of the Fukushima Dai-ichi NPS) at the time of the Chile Earthquake in 1960.

In February 2002, the Tsunami Evaluation Subcommittee, the Nuclear Civil Engineering Committee, of Japan Society of Civil Engineers compiled the tsunami evaluation methodology for estimating the maximum wave height due to tsunami (Ref. 1). The methodology defines a possible tsunami wave height, based on the historic records of tsunamis that left fairly reliable written records of wave heights. Prehistoric tsunamis, even if they might have occurred, were not considered in the methodology, so long as there is no record. And its limit of application or points to consider in application was not mentioned in the compiled version.

In 2008, TEPCO reevaluated the tsunami risks at the Fukushima Dai-ichi NPS and got the wave heights exceeding 15 meters. TEPCO got another estimated wave heights of exceeding 9 meters on the basis of the wave source model of the Jogan Tsunami in 869 A.D. (the Satake Theory, Ref. 2). However, it did not lead TEPCO to take concrete measures against tsunami at the Fukushima Dai-ichi NPS. The reasons for this attitude was that in their view, the former value (>15

meters) was a virtually derived value obtained by applying the source wave model of the Off-Sanriku (about 200km north of the site) to the Off-Fukushima coasts. They also thought that the latter value (>9 meters) was obtained from not sufficiently credible knowledge, because the source model had not yet been finalized in the Satake Theory.

(Ref. 2) *Kenji Satake, Yuchi Namegawa, Shigeru Yamaki,, Numerical simulation of the A.D. 869 Jogan tsunami in Ishinomaki and Sendai plain,*

The Investigation Committee is of the view that specific measures against tsunami should have been in place including measures against severe accidents for the purpose of preventing nuclear disasters. In its view, natural phenomena entail by nature major uncertainties; especially tsunami has only limited historic records. Once a tsunami far exceeding the design basis hits nuclear power plants, a wide range of safety functions of nuclear facilities could be lost simultaneously by common mode failures. The sequence of prior consideration of the matter should be the lesson to be learned individually by all those concerned with nuclear power in the government and the industry.

b Severe accident management measures

As stated, if a tsunami far exceeding the design basis hits nuclear power plants, it is very likely that a broad range of safety functions could be lost simultaneously by common mode failures, which will lead immediately to the severe accident. But in the past, risks of tsunamis were not fully considered in the context of severe accident that deals with incidents exceeding design standards.

The Ministry of International Trade and Industry (MITI) at that time issued the “Roadmap of Accident Management (“AM”) in July 2002, and initiated considerations on the Accident Management as measures against severe accidents. However, the scope of incidents was limited only to internal incidents such as mechanical failures, human errors. External incidents such as earthquakes,

tsunamis were not included in the scope of consideration. Moreover, AM was to be implemented as voluntary initiatives by nuclear operator, not as part of regulatory requirements.

Measures against severe accident should not be left with the operator's voluntary activities. The nuclear safety regulatory bodies should consider and determine legal requirements when they deem necessary. This is a lesson learned from the experience with the Accidents.

(2) **Issues relating to measures by TEPCO against natural disasters** [Chapters VI.4 (6), (7), VII.6 (2)]

TEPCO did not implement measures against tsunami as part of its AM strategy. Its preparedness for such accident as severe damage at the core of reactor as a result of natural disasters was quite insufficient. Listed below are some of the specific issues that were revealed through the Accidents.

i. Inadequate measures against Station Blackout (SBO)

The risk of tsunami exceeding design basis had not been considered. Therefore, no preparation was made for the eventuality such as "simultaneous and multiple losses of power" and the "Station Blackout including DC power supplies". No operational manuals were in place for recovering instrumentation equipment and power supplies, PCV venting, etc. in such conditions. Staff education was not organized for such eventuality and equipments and materials for such recovering operations were not ready for use on stock.

ii. No previous plan for water injection and seawater injection by fire engines

Fire engines were brought in for water injection and seawater injection for responding the Accidents. These steps were not placed as part of the AM. Therefore, specific procedures were not planned in advance and extra time was

needed for their operation.

iii. Breaking down of emergency telecommunication lines

The in-house telecommunication lines in an emergency were not sufficiently in place. As a result of the SBO, all personal handy phone system (PHS) became inoperative and information sharing among the people concerned was seriously disrupted.

iv. Securing of materials and operators in an emergency

There were no specific procedures decided in advance for handling materials in an emergency or in an extraordinary situation, causing delay in securing operators of fire engines or heavy machinery.

7. Why were the measures against tsunami and severe accident insufficient? [Chapter VII.7]

i. Limitation of voluntary safety measures

TEPCO did not incorporate measures against tsunamis exceeding the design basis. This indicates the limit of voluntary safety measures.

ii. Insufficient organizational capabilities of regulatory bodies

Relevant research and knowledge continue to advance quickly and on daily basis. The regulatory bodies should focus their efforts on formulating and updating the guidelines and standards, taking into account the latest knowledge to be applicable. To this end, it is essential to ensure sufficient organizational capabilities of regulatory bodies. Scholarly discussion with inconclusive nature could be left to the work by academic society.

iii. Negative effects of specialization and division of labor

Excessive fragmentation by specialization may have negative effects for designing measures against tsunami, which requires knowledge and technology of diverse disciplines. Coordinated efforts by diversified knowledge and expertise coming from various cultural backgrounds are important. Organizational system of breaking barriers of specialization should be devised.

iv. Difficulty in presenting risk information

It is a paradox that effort to improve and search for higher safety is met with negative reactions by others, because such effort may be interpreted as disallowing past practices.

It is not easy to admit an absolute safety never exists and to learn to live with risks. But it is necessary to make effort toward realizing a society where risk information is shared and people are allowed to make reasonable choices.

8. Recommendations on the new nuclear safety regulatory body [Chapter VI.7, VII.8]

The Government made a cabinet decision on August 15, 2011 to reorganize the nuclear safety regulatory bodies into an agency of the Ministry of Environment, by separating NISA from METI and integrating the functions of the NSC. The Investigation Committee requests the Government to take the following points into account in establishing the new regulatory body.

i. Independence and transparency

The new regulatory body is required to ensure its independence and transparency. It should be provided with necessary authority, resources and staff with expertise to enable to perform its function independently. It should bear accountability on nuclear safety to the nation.

ii. Organizational competence in responding to an emergency

The new regulatory body is required to formulate disaster prevention programs and implement disaster prevention training so that it can carry out activities promptly at the time of disaster. It is necessary to develop professional competence to provide appropriate advice and leadership to the responsible personnel and relevant organizations that are in charge of emergency response. Their management capabilities need to be promoted to make best use of available resources effectively and efficiently.

It is also important to have strong sense of responsibilities for managing an emergency. It must prepare for organizational system in advance to enable itself to respond to a large-scale disaster. The new regulatory body also needs to prepare, in collaboration with relevant government agencies and local governments, for the system by which the entire organizations concerned work together for managing an emergency as a team. In this set-up, the role of the new regulatory body is to be clarified.

iii. The role of providing information

The new regulatory body should realize deep sense of the importance of providing relevant information. It should put the system in place routinely and be prepared for providing timely and appropriate information to the nation and the international community in an emergency.

iv. Securing of competent human resources and staff education for upgrading

Management of human resources and personnel planning are necessary to enable its staff to formulate consistent career path. Specific steps to this end should include: improved conditions to securing competent staff with high professional expertise; enlarged opportunities for its staff to experience long-term training and practical study; personnel exchanges with other administrative authorities or research institutions including those for nuclear and radiation activities.

v. Collection and accumulation of scientific knowledge

It should continue to acquire knowledge relevant for regulatory needs by

monitoring relevant academic societies and specialized scientific journals including those overseas, as well as the activities of other regulatory bodies in the international community. It should try to appreciate the significance of such information, and share, utilize, preserve and transfer systematically within the new regulatory body.

9. Preliminary conclusions [Chapter VII.9]

The Investigation Committee is of the view, from its investigation and evaluation up to now, that the following three factors had major influence over many problems relating to the Accidents and the responses after the Accidents.

i. Lack of severe accident measures against tsunami

TEPCO did not take precautionary measures in anticipation that a severe accident could be caused by tsunami such as the one hit at this time. Neither did the regulatory authorities.

Even for an accident of low probabilities so long as extremely large scale damages are anticipated once it occurs such as the tsunami of this time, due consideration should be given to the risks involved and precautionary measures should be taken.

ii. Lack of viewpoint of complex disaster

It was a major shortcoming for the safety of both nuclear power plants and surrounding communities that nuclear accident had not been assumed to occur as complex disaster. Disaster prevention program should be formulated by assuming complex disaster, which will be the major point in reviewing nuclear power plant safety for the future.

iii. Lack of viewpoint of looking at the whole picture of accident

It cannot be denied that viewpoint of looking at a whole picture of an accident was not adequately reflected in nuclear disaster prevention program in the past. The nuclear disaster prevention program had serious shortfalls. It cannot be excused that the nuclear accidents could not be managed because of an extraordinary situation that the tsunamis exceeded the assumption.

The Investigation Committee is convinced of the need of paradigm shift in the basic principles of disaster prevention programs for such a huge system, which may result in serious damage once it has an accident.

10. Closing [Chapter VII.10]

Whatever to plan, design and execute, nothing can be done without setting assumptions. At the same time, however, it must be recognized that things beyond assumptions may take place. The Accidents this time present us crucial lessons on how we should be prepared for such incidents beyond assumptions.

The Investigation Committee will continue its investigation and evaluation, bearing in mind that many people are still obliged to spend restricted life in evacuation for a long period of time, suffering from radiation contamination or fears of health due to exposure, contaminated air, soils, water and food.