

**IAEA MINISTERIAL CONFERENCE  
ON NUCLEAR SAFETY**

Vienna, 20–24 June 2011

**CHAIRPERSONS' SUMMARIES**



**IAEA**

International Atomic Energy Agency

*Atoms for Peace*

The attached texts are the Chairpersons' summaries of the main proposals that emerged from the Working Sessions and the issues that were discussed. Where appropriate, points raised at the Plenary Sessions are also reflected in the texts.

# **1. Preliminary Assessment of the Accident at TEPCO's Fukushima Daiichi Nuclear Power Stations and Actions for Safety Improvements**

## **Strengthening the IAEA Safety Standards**

1. The IAEA was encouraged to review and strengthen, as appropriate, its Safety Standards in all areas related to: design requirements, with particular emphasis on defence in depth, low probability beyond design basis accidents, singly and in combination, and severe accident management for single-unit and, more especially, multi-unit sites, including extended loss of ultimate heat sink and essential supplies, hydrogen management, post-accident monitoring and safety of spent fuel storage. Further topics include, but are not limited to, the use of hardened emergency response centres on sites, and the availability and capability of site staff to work under severe accident conditions.
2. The IAEA was encouraged to play a leading role in collecting the results of all relevant analyses of lessons learned in the assessment, management and communication of all the consequences of the accident. This could serve as important input for the review and updating of IAEA Safety Standards. To this end, consideration could be given to IAEA missions to look in more detail at specific areas such as external hazard assessment, controlling public exposure and remediation of evacuated areas.
3. All Member States were encouraged to make a firm commitment to apply the IAEA Safety Standards in their national arrangements for ensuring nuclear safety in a transparent and open way. This could ensure that the highest and most robust levels of nuclear safety are in place in all Member States.
4. It is imperative for new countries embarking on nuclear programmes to fully implement IAEA Safety Standards, to integrate lessons learned from the Fukushima accident into the development of their programmes and to demonstrate complete preparedness to operate nuclear power plants (NPPs) before commissioning the first reactor.
5. Contracting parties to international conventions were encouraged to initiate an update of the conventions in the light of the Fukushima accident. For example, the Convention on Nuclear Safety (CNS) can be enhanced by taking into account areas such as transparency, the independence of regulatory bodies, emergency preparedness and the peer review process.

## **Safety Reviews**

6. It is important for all Member States to systematically review the safety of all NPPs, including the safety margins and design basis assumptions for both new and operating plants. It is important to take into account site specific characteristics and features, including low probability extreme events previously not included in original design and engineering considerations.
7. It was suggested that internationally harmonized review methodologies (e.g. stress tests) be implemented by all Member States. The IAEA could play a leading role in the development of these methodologies on a coordinated basis.
8. Member States were strongly encouraged to report the results of safety reviews and their responses to lessons learned at the Extraordinary Meeting of the Contracting Parties to the CNS in 2012.

9. It was suggested that the IAEA could assist in carrying out peer reviews of national safety reviews, using the services of international expert teams and make the results publicly available. This could enhance the openness and credibility of national safety reviews.

10. It was suggested that consideration be given to making the IAEA's plant specific safety review services (OSART, EPREV) and its Integrated Regulatory Review Service (IRRS) mandatory for all countries operating and constructing nuclear power plants and make the results publicly available. The IAEA was asked to include in its plant specific safety review services and IRRS missions the implications of the Fukushima accident and share the lessons learned and good practices drawn from Member States.

11. A mechanism could be developed to select the particular NPPs to be reviewed by the IAEA expert team and make the results publicly available. This may be a random process, but the initial focus should probably be put on older NPPs.

12. The IAEA was encouraged to establish a design peer review service based on commonly accepted methodologies and criteria.

### **Role of Organizations in Nuclear Safety**

13. While recognizing that the operator has prime responsibility for nuclear safety, all parties (governments, operating organizations, regulatory bodies, technical support organizations, research organizations, WANO, OECD/NEA, etc.) which have a role to play in nuclear safety should work together, respecting their different roles and responsibilities, to maximize the benefits of the lessons learned. The IAEA was encouraged to facilitate the dialogue and interaction between the various stakeholders.

14. The IAEA was encouraged to give enhanced support to operating organizations, which have the prime responsibility for nuclear safety. This could include improving communication between the IAEA and the representatives of the operators and establishing a forum for enhanced communication between the various parties.

15. In spite of all recent efforts there is still room for improvement in understanding the concept of safety culture and implementing it effectively worldwide in the management of all NPPs.

16. Mechanisms for responding to and managing a nuclear accident need to be enhanced, both within and between countries. The mechanisms could include the sharing of information, resources and emergency equipment, if necessary.

17. The existence of credible, competent and independent regulators is an essential element of nuclear safety. All countries were encouraged to reinforce their regulatory bodies and ensure that they are genuinely independent, with clarity of role and appropriate authority, in all circumstances, and staffed by well trained, experienced personnel.

18. Full scientific knowledge of the technology, including the integrity and behaviour of systems, structures and components, including fuel elements, is key in responding to an emergency. All Member States were encouraged to utilize more effectively research and development in these areas and in those of nuclear safety, emergency preparedness and response.

19. In the event of a major nuclear accident, remediation measures may be needed in order to reduce exposures to acceptable levels. Member States are encouraged to utilize existing experience in the application of remediation techniques and make it available to Japan. This

could be coordinated by the IAEA. Such experience is available in a number of Member States, which would be ready to help identify the most effective situation-specific countermeasures.

### **Receiving and Disseminating Information**

20. Continuous improvement is a foundation stone of nuclear safety. Sharing operational experience feedback is a vital tool for guarding against complacency and for learning lessons from incidents and events. The IAEA should strengthen its role in the consolidation of operator and regulatory experience and foster interaction with industry and other international institutions that support the safety of operations.

21. In this regard, the IAEA and WANO were encouraged to establish a mechanism to improve their cooperation in sharing experience, and in particular to learn lessons from the Fukushima accident, while respecting each other's roles and limitations.

22. Review and improvement of the International Nuclear and Radiological Event Scale (INES) are needed to make the scale more effective from a communications point of view.

23. The IAEA was encouraged to institutionalize the practice of 'fact finding missions', in the case of nuclear incidents/accidents. The criteria for invoking such missions could be linked to INES.

24. All Member States and the IAEA, WANO, WNA and other national and international organizations were encouraged to improve public information on nuclear energy, radiation and other nuclear issues. This will help to avoid unnecessary misunderstanding, fear and resistance against the peaceful utilization of nuclear energy and help to build trust in the global nuclear community.

25. Japan was encouraged to continue sharing the results, in the open way they already have, of evaluations of the accident and lessons learned. This, together with the comprehensive report already provided by Japan<sup>1</sup> to the IAEA, and the results of the fact finding mission<sup>2</sup>, will enable a uniform understanding of the facts. It is also important that Japan keep the international community informed about the implementation of major actions, including progress in the actions defined in TEPCO's 'Road Map'.

26. It was suggested that in response to an emergency the IAEA should expand its role to include engineering analysis, simulation of technological processes and prediction of how systems, structures and components will behave. This could be achieved by increasing the IAEA's existing capacity or with the involvement of national and international engineering and research institutions. This information should be shared on a timely basis with all Member States.

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<sup>1</sup> Report of the Japanese Government:

[http://www.kantei.go.jp/foreign/kan/topics/201106/iaea\\_houkokusho\\_e.html](http://www.kantei.go.jp/foreign/kan/topics/201106/iaea_houkokusho_e.html)

<sup>2</sup> Fact Finding Mission Report:

[http://www-pub.iaea.org/MTCD/Meetings/PDFplus/2011/cn200/documentation/cn200\\_Final-Fukushima-Mission\\_Report.pdf](http://www-pub.iaea.org/MTCD/Meetings/PDFplus/2011/cn200/documentation/cn200_Final-Fukushima-Mission_Report.pdf)

## **2. Emergency Preparedness and Response**

### **International Emergency Preparedness and Response Framework**

1. Legal instruments for the international emergency preparedness and response framework were adopted 25 years ago and inevitably reflect the prevailing concerns at that time. Possible ways to strengthen these instruments should be considered.
2. The IAEA's role in response to a radiation emergency should be broadened to enable it to conduct analysis of emergency conditions, progression, possible scenarios for emergency development, consequences, associated radiological impact and response actions, and to share this analysis with Member States. To fulfill this function effectively, a broader scope of information (data, analysis and other information) should be provided to the IAEA. The responsibility of States to promptly and continuously provide information needs to be emphasized.
3. A preliminary examination of the IAEA Safety Standards on preparedness and response related to severe reactor emergencies such as occurred at the Fukushima Daiichi nuclear power plant indicates that the relevant standards address the issues adequately. However, these standards need to be carefully reviewed and enhanced, as appropriate, as understanding of the Fukushima accident develops. Additional guidance on taking protective and other actions based on environmental data analysis and assessment following a release to ensure public safety should be developed.
4. To better cope with serious emergencies, international assistance arrangements and capabilities should be strengthened by enhancing the IAEA's Response and Assistance Network (RANET) and by implementing its improved guidelines to ensure assistance compatibility and effectiveness. States may wish to extend national capabilities registered under RANET to cover special technical capabilities (e.g. remotely controlled equipment, robots) and expertise in different areas (crisis management, nuclear power plant designs, etc.), thus establishing an international pool of experts. Regional RANET coverage needs to be extended. Registered RANET capabilities and arrangements should be appraised through regular review missions and through regional and international emergency exercises.
5. There is scope for reinforcement of emergency notification, reporting and information sharing arrangements and capabilities. In addition, the newly developed protected web site of the IAEA's Unified System for Information Exchange in Incidents and Emergencies, which replaces the Early Notification and Assistance Convention web site, needs to be fully implemented to ensure efficient and effective information sharing and to enable effective activation of international assistance.
6. Strengthening of the international emergency preparedness and response framework should take into account recommendations given in the International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies.
7. Member States should consider making use of systematic and regular Emergency Preparedness Review (EPREV) and follow-up missions to appraise national emergency preparedness and response arrangements and capabilities to ensure their continuous improvement.

8. Real time on-line radiation monitoring systems are operational or planned in States worldwide. While the purposes of such systems may vary, the data from them could be useful in emergency situations related to atmospheric radioactive releases. An integrated, worldwide monitoring and display system using available national and international early warning systems as the global radiation monitoring platform for displaying real time data on radioactive releases would benefit all States and relevant international organizations.

### **National and Regional Emergency Preparedness and Response**

9. Universal implementation of the IAEA Safety Standards on emergency preparedness and response at the national level would improve preparedness and response, facilitate communication in an emergency and contribute to harmonization of national criteria for protective and other actions. It was also noted that cooperation among national authorities, utilities and technical support organizations could be strengthened. The capabilities and arrangements of national authorities to communicate risk to the public should be strengthened. States may wish to consider establishing national rapid response teams that could also be available internationally.

10. It would be helpful for standardized and reliable methodologies to be put in place in all IAEA Member States to estimate the source term<sup>1</sup>, to analyse and evaluate radiological monitoring data, and to assess radiological impacts to the population in affected areas via all exposure pathways.

11. Timely estimates of exposure of the general public from accidental releases are important for both the planning and implementation of protective and other actions in local and regional areas, and for the dissemination of information on the radiological impact of the accident at greater distances, including the impact on neighbouring countries.

12. It would be helpful for knowledge and experience gained concerning the effectiveness of protective and other actions, as well as the interaction of national and local authorities with the public, to be shared by an 'Accident State' with the IAEA and neighbouring countries.

13. Joint international studies to assess the possible long term implications and full consequences of a nuclear accident and associated radioactive releases to the environment at the local, regional and global levels are important. Such studies should include an assessment of the impacts on health, land use, agriculture, fishery, tourism, the environment and industry.

14. Training and emergency response exercises are a key component of a good emergency preparedness programme and provide a powerful tool for verifying and improving the quality of emergency arrangements and capabilities. All Member States are encouraged to enhance training programmes and to participate in the international Convention Exercises (ConvEx).

### **Inter-agency Emergency Preparedness and Response**

15. Experience from the Fukushima accident has shown the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE) to be an effective and useful mechanism. However, it should now be carefully reviewed and enhanced, and relevant organizations that are not yet members of IACRNE should be encouraged to become members.

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<sup>1</sup> The amount and isotopic composition of radioactive material released (or postulated to be released) from a facility during an accident.

16. The Joint Radiation Emergency Management Plan of the International Organizations (JPLAN) also demonstrated its usefulness. However, additional operational procedures and bilateral protocols to support its implementation and reduce the response times should be developed.

17. The existing ConvEx exercise regime should be regularly used to test the level of preparedness of relevant international organizations and to help ensure efficient and coordinated interagency responses.

### **3. The Global Nuclear Safety Framework**

1. In the light of the Fukushima accident, the strengthening of the global nuclear safety framework is necessary to ensure the highest level of nuclear safety in every State that uses nuclear energy. The prime responsibility for safety rests with the operators, subject to scrutiny by national regulators. Various international bodies, operating within an international nuclear safety framework, monitor and reinforce their efforts.

2. The international framework for safety encompasses a variety of organizations, including intergovernmental organizations, multinational networks among regulators, multinational networks among operators, an increasingly international nuclear industry, non-governmental organizations, standard setting organizations, scientific and engineering societies, and others. All must take responsibility for enhancing safety. These entities are linked with each other by a cluster of conventions and other arrangements to achieve common safety objectives.

#### **Role of the IAEA**

3. The IAEA plays a central role and is the appropriate international focal point for strengthening the global nuclear safety framework.

4. Improvements to the global nuclear safety framework will require a significant enhancement of the IAEA's budget dedicated to safety in order to respond to the Fukushima accident and to help prevent future accidents.

#### **IAEA Safety Standards**

5. The IAEA Safety Standards represent the common reference for nuclear safety. However, not all Member States apply them, and those States that do apply them may not always implement them fully. All Member States were encouraged to commit to making national safety standards consistent with those of the IAEA.

6. The details of the Fukushima accident will become clearer over time. The IAEA should review and update its Safety Standards, as necessary, to incorporate the lessons learned from the Fukushima accident. Special attention needs to be paid to those standards pertaining to multiple severe hazards, such as tsunamis and earthquakes, and their impact on single-unit and multi-unit sites. Standards that deal with preparedness for prolonged power blackouts and with cooling of both reactors and spent fuel storage facilities under severe accident conditions should also be reviewed.

#### **Convention on Nuclear Safety**

7. In order to ensure that all safety issues are fully considered, it was suggested that there be a review of the effectiveness of the Convention on Nuclear Safety and its associated review mechanisms, both of which form an important part of the global nuclear safety framework. A proposal to amend the Convention has already been submitted to the IAEA by a Member State for circulation to Contracting Parties. If an amendment to the Convention is undertaken, it might appropriately incorporate, among other matters, stronger requirements related to the concept of effective regulatory independence. However, the response to the Fukushima accident should not await the amendment of the Convention.

## **International Peer Reviews**

8. The important role of independent international peer reviews of national regulatory frameworks and nuclear installations should be reinforced as part of the process of ensuring that there is continuous improvement of safety and proper regulation of nuclear installations. These peer reviews provide recommendations to improve safety and serve to exert peer pressure to ensure that every State with nuclear installations recognizes its safety responsibility and is able and committed to meet the IAEA Safety Standards. The IAEA should include consideration of the implications of the Fukushima accident in its peer reviews of regulatory frameworks and nuclear installations, and should seek to ensure that the lessons learned from the accident and resulting good practices developed by the Member States are widely shared.

9. In addition, the IAEA's safety review services are currently being carried out in Member States on a purely voluntary basis. While safety review services are requested by some Member States, they have not been sought by all. Moreover, there are instances where reviews have been carried out without follow-up to monitor implementation of previous recommendations. Member States should take advantage of the review services and respond promptly to the results.

10. It was felt that the IAEA peer review services needed to be accorded a greater profile to enhance public confidence in the national and international arrangements for safety. It was suggested that the schedule of planned peer review missions should be published along with the respective mission results and, if applicable, the associated follow-up results. Those Member States with a nuclear power programme that have participated in the IAEA peer review process could be identified, along with those that have yet to participate.

11. It was proposed that Member States with nuclear power programmes consider giving prior consent to the IAEA to perform systematic, regular international peer reviews of regulatory effectiveness, operational safety and emergency preparedness. There should also be follow-up to review the implementation of previous recommendations.

12. The Fukushima accident has highlighted the need for thorough and transparent national safety assessments (or 'stress tests') of nuclear power plants. Many licensees and national regulators are undertaking these assessments. The Extraordinary Meeting of the Contracting Parties to the Convention on Nuclear Safety in August 2012 provides an opportunity for the international sharing of the lessons from these activities. There was a suggestion that the IAEA develop a service that focuses on (a) safety margins against extreme natural hazards, such as earthquakes, tsunamis and floods, and (b) the regulatory implications of the Fukushima accident. Such assessments could be carried out within the next 12–18 months. The lessons learned, including an assessment of the regulatory responses to the Fukushima accident, should also be incorporated into existing services.

13. It was proposed that Member States with nuclear power programmes receive a peer review of regulatory effectiveness (e.g. the IAEA's Integrated Regulatory Review Service) every 10 years. It was also suggested that, with some reinforcement of its present capabilities, the IAEA could conduct an international safety review of one nuclear power plant in 10 over a period of three years, since reviewing all 440 operating nuclear reactors around the world in a short period of time is not realistic. The results of these assessments, which would include operational safety peer reviews of nuclear power plants (e.g. OSART missions and site/design reviews), could then be disseminated to Member States.

## **International Cooperation**

14. Member States were encouraged to recognize the importance of international cooperation and collaboration in enhancing safety and regulation. Member State expert participation was considered vital for the IAEA's peer review services and for the further development of the IAEA Safety Standards.

## **Regulatory Independence**

15. There is a need to strengthen national regulatory systems so that they have the necessary competence and power to ensure that there is a proper response to any safety concerns, and to ensure their effective independence. Regulatory systems need to operate in an environment without political influence and undue financial constraints, and regulators should be empowered to make timely safety decisions. It was recognized that effective regulatory independence is one of the main pillars for strengthening nuclear safety.

## **Newcomer Countries**

16. Countries embarking on nuclear power programmes need to participate fully in the global nuclear safety framework. They should become contracting parties to the relevant international legal instruments, apply the IAEA Safety Standards, and make use of the associated IAEA review services. These activities will contribute to building the necessary national infrastructure that is essential for safety. The newcomer countries need to demonstrate that an emergency preparedness and response programme is in place and that they have the capability to manage severe accidents before startup of the first nuclear installation.

## **Research**

17. The Fukushima accident will provide the opportunity for safety research on fuel performance and accident progression, among other matters. This research should be undertaken and the results should be widely shared so that the necessary adjustments to safety requirements can be made by all.

## **Operating Experience**

18. There is now about 14 000 reactor-years of experience with nuclear power plants around the globe. This wealth of operational experience should be made available in a user friendly form so that all participants in the nuclear enterprise can benefit. The efforts undertaken by the World Association of Nuclear Operators (WANO) in this regard are important for operators, and there should be parallel and substantive efforts by regulators to enhance the knowledge basis from operating experience.

## **Remediation**

19. Japan confronts a major challenge in the remediation of contaminated land areas. It should obtain the benefit of knowledge from international experts and, in turn, the lessons from experience should be made available to the international community.

## **Transparency**

20. The Fukushima accident has understandably shaken public confidence in the safety of nuclear activities. These concerns should be publicly acknowledged and confronted honestly. Transparency in dealing with safety related issues is an important component in building public confidence.

## Abbreviations and Acronyms

ConvEx	Convention Exercises
CNS	Convention on Nuclear Safety
EPREV	Emergency Preparedness Review
IACRNE	Inter-Agency Committee on Radiological and Nuclear Emergencies
INES	International Nuclear and Radiological Event Scale
IRRS	Integrated Regulatory Review Service
JPLAN	Joint Radiation Emergency Management Plan of the International Organizations
NPP	nuclear power plant
OECD/NEA	OECD Nuclear Energy Agency
OSART	Operational Safety Review Team
RANET	Response and Assistance Network
TEPCO	Tokyo Electric Power Company
WANO	World Association of Nuclear Operators
WNA	World Nuclear Association