

The Fukushima Ministerial Conference on Nuclear Safety

Fukushima Prefecture, Japan, 15–17 December 2012

CHAIRPERSON SUMMARIES



IAEA

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

Working Session 1

Lessons Learned from the Accident at TEPCO's Fukushima Nuclear Power Stations

1. Since the accident at TEPCO's Fukushima Daiichi Nuclear Power Station (hereinafter referred to as the 'Fukushima Daiichi accident'), Member States and the IAEA have been working ceaselessly to learn lessons, and to take actions to review the safety of nuclear installations and to ensure that nuclear safety improvements, where needed, are made in a timely manner.
2. It is a credit to the whole nuclear community that its response to the Fukushima Daiichi accident has led to a wide ranging examination of many safety matters aimed at improving nuclear safety in general. The actions of the IAEA in pursuing the Action Plan on Nuclear Safety (hereinafter referred to as the 'Action Plan') and, in fact, this very conference attest to the seriousness of the world nuclear community in seeking to maximize learning from the Fukushima Daiichi accident. This provides a basis for earning the trust and confidence of stakeholders.
3. It is particularly important and reassuring that the process initiated by Member States immediately after the Fukushima Daiichi accident to review site hazards and to complete complementary safety assessments (through national reviews or 'stress tests') has now been largely completed. The results of these assessments, undertaken to ensure plant robustness to extreme events, have been reported to national authorities and international organizations, and where Member States have identified the need for improvements, these have been prioritized and resourced. Such prioritization has reflected the need to maintain continued attention to the critical features of the previous safety basis for plant operation. It is reassuring to note that, despite the use of different terminology and emphases, the efforts have largely converged on the same conclusions. In addition, the similarities in actions provide confidence that significant issues have not been overlooked. The prior use of periodic safety reviews has been shown to be particularly advantageous.
4. The Fukushima Daiichi accident reminds us of the imperative of establishing an effective nuclear safety regulatory framework, including an independent (in law, practice and culture) effective expert regulator that is credible, trusted, competent and adequately resourced. To achieve this objective, it is vital to recognize the importance of scientific and technical knowledge and expertise in taking effective, optimized regulatory decisions. The importance of Member State participation in the International Conference on Effective Nuclear Regulatory Systems, to be held in Ottawa, Canada, in 2013, was highlighted.
5. In this regard, it is important to note the efforts to create the new Japanese Nuclear Regulatory Authority as an independent commission body, separated from the functions of nuclear promotion, bringing together in one body safety, security and safeguards regulation. It was highlighted that there was a commitment to ensure that regulatory lessons learned from the Fukushima accident will be incorporated into the new organization, including taking full advantage of international best practice and, especially, having openness and transparency as a core value.
6. Since March 2011, many lessons have been learned from the Fukushima Daiichi accident. Such lessons cover not only technical and regulatory aspects but also philosophical and cultural issues. As mandated by the Action Plan, the IAEA has facilitated the sharing of this information at a number of different events, including the successful International Experts Meetings held during 2012 on reactor and spent fuel safety, communication in the

event of a nuclear or radiological emergency, and protection against extreme earthquakes and tsunamis, as well as the Second Extraordinary Meeting of the Contracting Parties to the Convention on Nuclear Safety.

7. It is reassuring to see that significant progress has been made on all 12 actions established in the Action Plan. However, a large amount of work will need to be carried out by the IAEA, its Member States and others in the coming years to improve nuclear safety worldwide. This is in line with an important aspect of a sustained safety culture — continuously striving for improvements to nuclear safety.

8. The Fukushima Daiichi accident has reminded us of the importance of paying careful attention to external events such as floods, earthquakes and tsunamis. It has served as the stimulus for a re-examination of the design basis to ensure that such external events are adequately taken into account and for the introduction of an additional layer of protection to prevent or mitigate a beyond design basis accident, regardless of the initiating event. However, it was noted that more work needs to be undertaken to explore what constitutes a consistent design basis and how much safety margin is reasonable for establishing adequate beyond design basis robustness. Probabilistic assessments can add value in this respect.

9. It is now time to consider further information, as reported at this conference, relating both to the lessons learned about the prevention of severe accidents and to the ways in which Member States have made progress in developing severe accident management strategies, including, inter alia, pre-positioning additional equipment, both on- and/or off-site, and the provision of procedures to use this equipment.

10. Consideration needs to be given to the potential performance of a plant in response to beyond design basis accidents; that is, the effectiveness of the measures and safety features provided for design basis accidents needs to be evaluated to see whether these measures and safety features can be enhanced to provide protection against events that had not previously been considered in the design. These enhancements might be introduced either through the provision of additional equipment or by providing protection against the effects of extreme events.

11. Mitigation capabilities need to be correspondingly enhanced; alternatively, systems not normally relied upon for mitigation may need to be re-classified (e.g. installed fire systems may take on part of the reactor/spent fuel pool cooling safety function), to adequately complement the accident prevention features. This should include updating and strengthening the severe accident management guidelines and the associated training, drills and exercise programmes to improve the overall response capability.

12. It should be emphasized that any proposed additional measures to mitigate the impact of severe accidents should not be carried out at the expense of the attention given to prevention of accidents; both these aspects need to be properly supported. The constant and full compliance of nuclear power plants with their licensing basis should continue to provide assurance at all times that safety margins are guaranteed to allow the necessary time to respond to an initiating event and to adequately mitigate and properly manage accident progression, when necessary.

13. Although the various safety measures identified in response to the Fukushima Daiichi accident will serve to improve safety, the key will always be constant vigilance, as there is no room for complacency or anything less than a total commitment to improving safety. The establishment of a robust and enduring safety culture is crucial. Licensees and regulators need to be constantly alert to any early sign of a possible degradation of safety that could directly or indirectly affect the public. Other aspects of promoting a vibrant safety culture were noted,

in particular recognizing the significant efforts that are needed to embed the attributes of a strong safety culture, such as open reporting and learning, in a prevailing, more established culture. Additionally, it was noted that the transparency of the results of peer review missions is essential, as is ensuring that regulatory bodies operate in an open and transparent manner, thereby enhancing confidence and trust.

14. While the concepts set out in the strategy for defense in depth remain sound, the application of defense in depth requires further enhancement. The areas for enhancement include: to focus safety measures on both the prevention of accidents and the mitigation of accident consequences; to strengthen the mitigation measures to ensure containment integrity; periodically re-examining site specific external hazards to ensure the adequacy of safety margins and protective measures; and to ensure the availability and operability of resources to cope with events such as a prolonged station blackout or loss of ultimate heat sink. In addition, it is necessary to assess the effects of a combination of extreme natural hazards; to explore the uncertainties associated with extreme natural hazards using the latest technical approaches; and to account for accident propagation between units on multi-unit nuclear power plant sites as well as the impact on emergency preparedness and the severe accident management programme. The IAEA and its Member States should put additional effort into work in these areas and the dissemination of results so that the implementation of defense in depth can be improved. The IAEA is planning a conference to address this need.

15. A major lesson from the Fukushima Daiichi accident is the need for effective and independent barriers in the national nuclear safety system at the operator, regulator and stakeholder levels. This is why there has been considerable focus on enhancing the international peer review mechanisms for nuclear operators and regulators worldwide, as well as on promoting openness and transparency to ensure that stakeholders—in particular, the public—can hold industry and regulators properly to account, thereby enhancing trust and confidence. This will demand a commitment to being open to challenge, learning from others and holding each other to account, requiring working internationally through an attitude of cooperation, collaboration and mutual trust. Additionally, greater consideration will be required on organizational factors within each barrier of national and international systems.

16. The Fukushima Daiichi accident reinforces the importance of preventing accidents, even in the absence of significant direct radiation-related health impacts from certain event sequences that nevertheless led to significant social disruption. It argues for recognizing that the scope of regulatory assessments needs to include more emphasis on broader environmental and societal impacts.

17. Additional lessons learned will need to be taken forward in key areas such as regulatory effectiveness, human and organizational factors, periodic safety reviews, severe accidents and source term determination for radiation protection.

18. The adoption by the Board of Governors of the IAEA Action Plan on Nuclear Safety and its unanimous endorsement by Member States at the 2011 IAEA General Conference has provided a significant driving force for the identification of lessons learned and the implementation of safety improvements.

19. While significant progress has been made, considerable work remains to be done under the Action Plan. It is important for all those involved—whether nuclear regulators, plant operators, governments or international organizations—to maintain the momentum gained in the 15 months since the adoption of the Action Plan in the collective drive to improve nuclear safety around the world.

20. All of this is based on a fundamental approach to nuclear safety, namely, that of continuous improvement—no matter how high the standards, the quest for improvement must never cease.

Working Session 2

Strengthening Nuclear Safety, Including Emergency Preparedness and Response, in the Light of the Accident at TEPCO's Fukushima Nuclear Power Stations

1. The IAEA Action Plan on Nuclear Safety was adopted by the Board of Governors and endorsed by all Member States at the 55th regular session of the General Conference in September 2011. The ultimate goal of the Action Plan is to strengthen nuclear safety, emergency preparedness and radiation protection of people and the environment worldwide.
2. More than a year since its adoption, significant progress has been made on all 12 actions established in the Action Plan. Important activities have been and continue to be carried out in several key areas, such as assessing safety vulnerabilities of nuclear power plants; strengthening the IAEA's peer review services; reviewing and strengthening the IAEA safety standards; improving emergency preparedness and response capabilities; strengthening and maintaining capacity building; and enhancing and widening the scope of communication and information sharing with Member States, international organizations and the public. These activities have contributed to the enhancement of the global nuclear safety framework.
3. Several Member States are now actively preparing their own national nuclear safety action plan in order to implement the IAEA Action Plan. All Member States were encouraged to develop a national action plan, taking into account their national arrangements. The IAEA offers support to Member States for developing such plans based on the IAEA Action Plan.
4. Demand for IAEA peer review services remains high. These services have been strengthened since the Fukushima Daiichi accident, and the IAEA is continuously working with Member States to make further improvements. Numerous missions have been conducted in all areas of nuclear safety, including Operational Safety Review Team (OSART), Emergency Preparedness Review (EPREV), Integrated Regulatory Review Service (IRRS) and Design Safety Review Service (DSRS) missions. Transparency of the results of the peer review services is essential for enhancement of safety.
5. Significant progress on strengthening nuclear safety has been made by those Member States with nuclear power plants through 'stress tests' and the implementation of appropriate measures based on the findings of these tests. Virtually all Member States with nuclear power plants have conducted such stress tests.
6. A thorough review of the IAEA safety standards has been conducted, in particular of safety requirements applicable to nuclear power plants and the storage of spent fuel. While no deficiencies were identified in the safety requirements, consideration is being given to strengthening safety requirements in areas such as dealing with prolonged loss of power, properly identifying potential external hazards and ensuring safety under severe accident conditions.
7. One of the most effective actions to strengthen nuclear safety worldwide is for Member States to utilize the IAEA safety standards as broadly and effectively as possible in a consistent manner. The IAEA provides support and assistance in the implementation of IAEA safety standards through its peer review services in all safety areas.
8. The memorandum of understanding between the World Association of Nuclear Operators (WANO) and the IAEA calls for cooperation in several important areas, including coordinating the scheduling of IAEA OSART and WANO peer review missions, enhancing

the exchange of information, and collaborating in a serious event in a nuclear power plant or fuel cycle facility. It was reiterated that the responsibility for nuclear safety lies with each Member State and operating organization.

9. Sound preparedness for and effective response to any nuclear or radiological emergency is essential in order to avoid or minimize the impacts of such an event if one were to occur. The Fukushima Daiichi accident reinforced the importance of emergency preparedness and response at all levels—local, national and international.

10. The IAEA's role in response to a nuclear or radiological emergency was broadened to enable it to conduct analysis of emergency conditions, potential consequences and prognosis of possible scenarios, and to share this analysis with Member States. Further efforts are needed to implement this role with the support of Member States and utilizing the IAEA's Response and Assistance Network (RANET). To fulfill this function effectively, a broader scope of information should be provided to the IAEA in an emergency through pre-agreed information exchange procedures.

11. To further strengthen international assistance arrangements, RANET was enhanced with the preparation of new guidance on the roles and responsibilities of, and actions for, members of the network in preparing for, requesting and receiving assistance. A new functional area was proposed for providing assessments as well as advice to competent authorities on the on-site mitigation activities in an emergency at a nuclear facility. Member States were encouraged to register available national capabilities within RANET to further strengthen the network.

12. The EPREV peer review service was further strengthened by incorporating the lessons learned to date; as a result, more effective support and assistance is being provided to Member States. In 2012, the IAEA carried out eight EPREV missions, the largest number in a single year since this programme began. Member States, especially those with nuclear power plants, are encouraged to utilize this IAEA service, which allows for a complete appraisal of the national emergency preparedness and response arrangements and capabilities.

13. In line with the strategy recommended in the final report of the International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies, the Emergency Preparedness and Response Expert Group (EPREG) was established to advise the IAEA Secretariat on strategies to strengthen and sustain sound international preparedness for nuclear and radiological emergencies.

14. Continued support in the form of training events and exercises has been provided by the IAEA to Member States, to help them to strengthen their national emergency preparedness and response capacities. There is a need to continue such capacity building efforts at the national, regional and international levels. Member States were encouraged to conduct table top and field exercises using realistic scenarios.

15. The IAEA Secretariat and Member States have made progress on improving public information and enhancing transparency and communication during emergency situations. There is a need to ensure more effective communication to the public and all other stakeholders in order to regain public trust.

16. While significant progress has been made, a considerable amount of work remains to be done under the Action Plan to improve safety worldwide. Full and effective implementation of the Action Plan requires joint efforts and full commitment from the IAEA Secretariat, Member States and other stakeholders. Strengthening nuclear safety should always be considered a work in progress.

17. The IAEA will continue to play a central role in strengthening the global nuclear safety framework, including the preparation of a comprehensive report on the Fukushima Daiichi accident, to be finalized in 2014.

Working Session 3

Protection of People and the Environment from Ionizing Radiation

1. Significant progress has been made in the implementation of the Action Plan in the area of protection of people and the environment from ionizing radiation. This conference is an important opportunity to take stock of the lessons learned and the improvements made to date.
2. The radiological consequences of a nuclear or radiological emergency do not respect national boundaries; therefore, effective international cooperation is vital to ensure the protection of people from unplanned exposures to ionizing radiation.
3. In applying the concepts and principles of radiation protection during remediation and decommissioning after a nuclear or radiological emergency, realistic dose assessments, harmonized practical approaches, monitoring and characterization of the levels of radioactivity in the environment, and national and local guidance for affected citizens should be considered in the decision making process.
4. Radiation risk coefficients of potential health effects and limitations of epidemiological studies for attributing radiation effects following exposure to low doses of radiation need to be properly interpreted. An explanation of these limitations is essential for making clear the reasons why collective effective doses aggregated from small notional individual doses should not be used to attribute health effects to radiation exposure situations either retrospectively or prospectively.
5. The ultimate objective of remediation after a nuclear or radiological emergency is to reduce radiation exposure to the population from existing exposure situations and to improve the environment contaminated by radioactive substances, in order to realize the return of residents to their homes and livelihoods. To this end, Member States should have established policies and strategies for remediation of contaminated areas in place at an early stage of their nuclear programme, including for remediation of urban and rural areas for a wide range of environmental conditions. An effective remediation programme should address legal, socioeconomic and technological issues in line with IAEA safety standards and national requirements and guidelines.
6. For an effective transition from an emergency exposure situation to an existing exposure situation, and for remediation of affected areas, clear guidance should to be developed at the national level with the involvement of all stakeholders.
7. Many remediation actions will generate waste, which will impact the strategy chosen for implementation; in addition, this waste should be properly managed.
8. It is important both to gather experiences and lessons learned worldwide in the remediation and decommissioning of nuclear facilities in the aftermath of nuclear or radiological emergencies and to disseminate this information through the IAEA and through cooperation with the international community. The lessons learned from these activities are expected to contribute to enhancing the safety and effectiveness of future remediation and decommissioning activities worldwide.
9. It is important to seek more efficient and effective technologies for optimizing remediation from the perspectives of safety, cost and time through R&D and demonstration projects.

10. It is important to increase Member States' competence in the selection and use of technologies for characterization and remediation of areas affected by a nuclear or radiological emergency. Member States were encouraged to share information on existing monitoring networks and programmes as well as past practices and experience with management of contaminated land from previous nuclear or radiological emergencies.

11. Strong coordination among all involved organizations—such as competent authorities and professionals in the areas of health, food safety, civil defence, radiation protection, environment, transport, commerce and customs—is required for effective implementation of remediation strategies after a nuclear or radiological emergency.

12. The efforts undertaken by Japan and the progress made in off-site remediation and waste management were acknowledged. Japan was encouraged to continue to share information on the results and status of the decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station, off-site remediation and waste management. It was noted that, at the request of the Government of Japan, the IAEA Secretariat organized a mission to support the remediation of radioactively contaminated areas off the site of TEPCO's Fukushima Daiichi Nuclear Power Station.

13. The IAEA Secretariat was encouraged to provide further assistance and support to Japan in the remediation of the large areas of land contaminated as a result of the Fukushima Daiichi accident. It was also deemed important to support Member States in developing their competence in the characterization and remediation of areas affected by nuclear or radiological emergencies.

14. The importance of international cooperation for assessing the human impact of radioactive releases by a nuclear accident was emphasized. In this regard, the work of the World Health Organization (WHO) for issuing reports on the preliminary dose estimation and on the preliminary health risk assessment from the Fukushima Daiichi accident was noted with appreciation. Appreciation was also expressed for the ongoing work by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) on an assessment of the levels of individual exposure and radiation risks attributable to the accident. In this regard the presentation given by UNSCEAR was appreciated.

15. It is important to globally strengthen methods for monitoring food, including agricultural and fishery products, at every stage of production and distribution, to secure conformity with the reference values related to radioactive substances in food in affected regions.

16. The work of the IAEA Secretariat on a review of the generic criteria for radioactive material in food, animal feed and drinking water in cooperation with WHO and the Food and Agriculture Organization of the United Nations (FAO), including the Codex Alimentarius Commission, as well as other relevant international organizations, was noted with appreciation. The review will identify ways to clarify, harmonize and update, if appropriate, the existing guidance documents on contamination levels in food, animal feed and drinking water after nuclear or radiological incidents. The results of this review are expected to become available by the end of 2013.

17. Support was expressed for this work, which will identify ways to clarify, harmonize and update, if appropriate, the existing guidance documents on contamination reference levels in these items after a nuclear or radiological emergency. In this regard, presentations given by WHO and FAO were appreciated.

18. The IAEA was encouraged continue to review and to update the current strategies for monitoring people, with a special focus on children, as well as the environment and food, in

cooperation with WHO and other relevant organizations, in order to facilitate dose assessment and decision making on countermeasures and remediation, as well as to produce a technical report to be made available to Member States.

19. Communication to the public is an important tool for promoting effective actions to protect human health and the environment and, more broadly, to improve living conditions in areas affected by significant releases. In communication with the public, health, environmental, economic, social, psychological, cultural, ethical and political considerations should be taken into account, many of which may influence the actions taken. Effective communication will help in handling the effects of social and economic pressure, including post-traumatic stress disorder, depression and fear.

20. When communicating radiation protection issues to the public, it must be recognized that the language used by experts in the field is completely foreign to a general audience. It is very important to have early, routine communication and to have 'one voice' based on 'good science'. Extreme views based on 'poor science' can create unwarranted alarm and can result in real harm.

21. There is a need for guidelines that allow for accurate and timely information management, for the benefit of not only the people living near a nuclear power plant, but all people who may be affected if there were a nuclear or radiological emergency. Communication should be completely open and honest and should be in plain language; the advice provided is to be clear, concise and practical; reassurance should be given, when appropriate; and necessary knowledge is to be shared with people.

22. Implementation of IAEA safety standards and closer cooperation among the relevant networks of regulatory authorities, nuclear operators, technical support organizations and the IAEA in the field of remediation and decommissioning were strongly encouraged.

23. Member States with nuclear programmes including the use of radioactive material were strongly encouraged to voluntarily host relevant IAEA peer reviews, including follow-up reviews, on a regular basis, in the area of remediation and decommissioning, as well as to make the relevant parts of the review results publicly available in a timely manner.

24. The IAEA International Experts Meeting to be held in January 2013 on remediation and decommissioning after a nuclear or radiological emergency will be an important milestone reflecting improved understanding of the technical, social, environmental and economic issues to be considered for remediation and decommissioning activities after a nuclear or radiological emergency.

25. Interest was expressed in Japan's statement of its intention to host an IAEA international expert mission on the decommissioning of the Fukushima Daiichi Nuclear Power Station next year. Interest was also expressed in Japan's request to the IAEA that it considers establishing an international advisory group on decommissioning.

26. While significant progress has been made, considerable work remains to be done under the Action Plan. It is important for all those involved—whether nuclear regulators, plant operators, governments or international organizations—to maintain the momentum gained in the 15 months since the adoption of the Action Plan in the collective drive to improve nuclear safety in the area of protection of people and the environment around the world.