International Conference on
Global Emergency Preparedness and Response

19–23 October 2015, Vienna, Austria

CONFERENCE REPORT

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International Atomic Energy Agency

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In co-operation with

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Location of the Conference:

International Atomic Energy Agency
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A-1400 Vienna, Austria

REPORT ON
INTERNATIONAL CONFERENCE ON
GLOBAL EMERGENCY PREPAREDNESS
AND RESPONSE

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, 2015

EDITORIAL NOTES

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FOREWORD

By J. C. Lentijo
Deputy Director General
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While the responsibility for developing, maintaining and strengthening nuclear and radiological emergency preparedness and response (EPR) arrangements lies at the national level, the International Atomic Energy Agency (IAEA) has continuously been supporting the work of its Member States in EPR, in particular since the accident at the Chernobyl nuclear power plant (NPP) in 1986. In 2005, the IAEA announced the establishment of the Incident and Emergency Centre to serve as a global focal point for preparedness and response to any nuclear or radiological emergency, independent of whether it was to arise from an accident, natural disaster, negligence, nuclear security event or any other cause. The IAEA carries out its work in this area based on its statute and under the Convention on Early Notification of a Nuclear Accident (Early Notification Convention) and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention).

The IAEA develops safety standards and guidelines, and works to define and promote common approaches so that response does not differ among countries, as this could result in confusion and mistrust on the part of the public, interfere with recovery operations and possibly even lead to unplanned socio-economic consequences. In recent years, there has been also a heightened awareness of the need to strengthen response to emergencies caused by nuclear security events, as well as of the need to wisely plan for the recovery phase.

The experience gained in responding to nuclear and radiological emergencies in the past underscored the importance of emergency preparedness in all activities involving nuclear and other radioactive material. For example, the 2011 accident at the Fukushima Daiichi NPP emphasized again the need to strengthen EPR at the national as well as at the international levels.

This report summarizes the discussions held at the conference. I hope that it will serve as a useful information tool and that it will contribute to the further strengthening of EPR worldwide.

CONTENTS

INTRODUCTION

The 2015 International Conference on Global Emergency Preparedness and Response was organized by the IAEA in cooperation with the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), the European Commission (EC), the European Police Office (Europol), the Food and Agriculture Organization of the United Nations (FAO), the International Civil Aviation Organization (ICAO), the International Labour Organization (ILO), the International Maritime Organization (IMO), INTERPOL, the Nuclear Energy Agency of the Organisation for Economic Cooperation and Development (OECD NEA), the Pan American Health Organization (PAHO), the United Nations Environment Programme (UNEP) the World Health Organization (WHO) and the World Meteorological Organization (WMO). Its purpose was to provide an opportunity to exchange information and share experiences in emergency preparedness and response (EPR), discuss challenges and identify key priorities in further improving readiness for responding to nuclear and radiological emergencies.

The conference took place at IAEA Headquarters in Vienna from 19 to 23 October 2015. The Conference President was Mr Ramzi Jammal, Executive Vice-President and Chief Regulatory Operations Officer, Canadian Nuclear Safety Commission.

The conference provided a forum for networking and exchange of information and experiences, and promoted effective preparedness as a key to efficient response. In particular, it brought together officials responsible EPR, experts in nuclear safety and nuclear security, emergency responders as well as relevant stakeholders.

It also provided opportunities to refresh and update knowledge in specific areas of EPR, deliberate on challenges and priorities in EPR in round table discussions and visit the IAEA's Incident and Emergency Centre (IEC).

The conference was attended by over 420 participants from 82 Member States and 18 international organizations. In addition six international organizations, 13 companies and two Member States registered in RANET[1] prepared displays, exhibits and demonstrations of instruments, publications, educational tools and assessment methods and tools.

Scientific Programme

Presentations

The following areas, while not exhaustively covering all aspects of EPR, formed the backbone of the conference: international cooperation (Session 1), communications in an emergency (Session 2) emergency management (Session 3), past emergencies (Session 4), protection strategy (Session 5), education and training (Session 6) and public health and medical response (Session 7). The International Conference Programme Committee reviewed 144 contributions and assigned 52 contributions for oral presentation and 81 for poster presentation[2]. In addition, seven senior experts were invited as keynote speakers and 12 as invited speakers, adding up to 152 presentations in total. An overview of the conference contributions is presented in the Table 1.

[1] The IAEA Response and Assistance Network.
[2] Four contributions were rejected; seven contributions were later withdrawn.

Table 1: Overview of the conference contributions

Topic	Keynote	Invited	Oral	Posters
International Cooperation		1	8	5
Communications in an Emergency	1	1	3	5
Emergency Management	2	2	14	30
Past Emergencies	1	2	2	8
Protection Strategy	2	2	13	19
Education and Training		1	6	5
Public Health and Medical Response	1	3	6	9
Total: 152	7	12	52	81

Lists of session chairs and keynote and invited speakers are shown in Table 2, Table 3 and Table 4 respectively.

Table 2: Session topics and session chairs

Session	Topic	Session Chair
1	International Cooperation	S. Magnusson (Iceland)
2	Communications in an Emergency	L. Hubbard (Sweden)
3A	Emergency Management	A. Cortes (Mexico)
3B		O. Isnard (France)
3C		A. Erastov (Russia)
4	Past Emergencies	H. Aaltonen (Finland)
5A	Protection Strategy	M. Nizamska (Bulgaria)
5B		C. Blackburn (FAO)
5C		T. Homma (Japan)
6A	Education and Training	M. Ong (Singapore)
6B		J. Salas (Chile)
7A	Public Health and Medical Response	Z. Carr (WHO)
7B		N. Valverde (Brazil)

Table 3: Topics of keynote presentations and keynote speakers

Keynote	Topic	Keynote Speaker
2	Public communication in an emergency	E. Brenner (USA)
3A	Emergency ~~M~~management	M. Neate (UK)
3B	Nuclear security/safety interface and integration in an emergency	S. Aoki (USA)
4	Lessons from emergencies	A. J. González (Argentina)
5A	Protective strategy in an emergency	F. Gering (Germany)
5B	Assessment and prognosis in an emergency	L. Sigouin (Canada)
7	Public health and psycho-social aspects in an emergency	Rethy K. Chhem (Cambodia)

Table 4: Topics of invited presentations and invited speakers

Session	Topic	Invited Speaker
1	International Cooperation	J-L. Lachaume (France)
2	Communications in an Emergency	P. Rickwood (Austria)
3	Emergency Management	H. Yue (China) M. De Cort (EC)
4	Past Emergencies	V. Kutkov (Russia) T. Homma (Japan)
5	Protection Strategy	A. Mozas (Spain) E. Naadland Holo (Norway)
6	Education and Training	P. Wieland (Brasil)
7	Public Health and Medical Response	E. Bey (France) Z. Carr (WHO) M. Akashi (Japan)

The structure of the conference programme is shown in the following figure.

	Sunday		Monday		Tuesday	Wednesday	Thursday	Friday
	18-Oct		19-Oct		20-Oct	21-Oct	22-Oct	23-Oct
Time		Time		Time				
		$8^{00} - 10^{00}$	Registration	$8^{00} - 9^{00}$	Workshop A	Worksop B	Workshop C	Workshop D
		$9^{30} - 10^{30}$	**Opening**	$9^{00} - 10^{30}$	Session 3B	Session 5A	Session P	Session 7A
		$10^{30} - 11^{00}$	Coffee/Tea Break					
		$11^{00} - 11^{30}$	Session 1	$11^{00} - 11^{30}$	Keynote 3A	Keynote 5A	Keynote 5B	Keynote 7
		$11^{30} - 13^{00}$		$11^{30} - 13^{00}$	Session 3C	Session 5B	Session 6A	Session 7B
		$13^{00} - 14^{00}$	Lunch Break					**Closing**
		$14^{00} - 14^{30}$	Keynote 3B	$14^{00} - 14^{30}$	Keynote 2	Session 5C	Keynote 4	
		$14^{30} - 15^{30}$	Session 2	$14^{30} - 15^{30}$	Session 4		Session 6B	
$15^{30} - 18^{00}$	Registration	$15^{30} - 16^{00}$	Coffee/Tea Break					
$17^{00} - 18^{00}$	ICPC Meeting	$16^{00} - 18^{00}$	Session 3A	$16^{00} - 18^{00}$	Round table A	Round table B	Round table C	
		$18^{00} - 20^{00}$	**Reception**					

Round Table Discussions

Three round table discussions were organized to explore the current key issues in specific EPR areas. The two-hour discussions opened with brief introductory statements by the moderators and by each of the panellists and were followed by the moderators' questions and open dialogues between the panel members and the audience. Tables 5 and 6 list the round table topics, moderators and panellists.

Table 5: Topics and moderators of round table discussions

Round Table	Topic	Moderator
A	Nuclear security/safety integration in an emergency	P. Jamet (France)
B	Risk communication and what is "safe"	A. Gonzales (Argentina)
C	EPR — the way forward and priorities	A. Heinrich (USA)

Table 6: Panellists of round table discussions

	Round Table A	Round Table B	Round Table C
1	M. Khaliq (IAEA)	P. Meschenmoser (IAEA)	T. Homma (ICRP)
2	V. McClelland (USA)	J. Brent (WHO)	D. Drabova (Czech Republic)
3	D. Bokov (Russia)	C. Blackburn (FAO)	P. Majerus (Luxembourg)
4	B. Yao (China)	J. Joseph (India)	S. Haywood (UK)
5	M. Neate (UK)	E. Brenner (USA)	A. Gioia (IAEA)
6	R. dos Santos (Brazil)	W. Weiss (Germany)	M. Hirano (Japan)
7	J. Jerome (France)	G. Williams (Australia)	R. Lewis (USA)
8		Y. Zhao (China)	E. Buglova (IAEA)

Refresher Workshops

The refresher workshops provided participants with the opportunity to refresh and update their knowledge in four areas of EPR, as shown in Table 7. The workshops were held in the morning prior to the conference sessions. On average, 70 participants attended each refresher workshop.

Table 7: Topics of refresher workshops and lecturers

Workshop	Topic	Lecturer
A	Protection strategy for a nuclear or radiological emergency	S. Nestoroska Madjunarova (IAEA)
B	Communication in an emergency	G. Winkler (IAEA)
C	Public communication	P. Meschenmoser (IAEA)
D	Medical management in a nuclear/radiological emergency	N. Valverde (Brazil)

Technical Visits

Six visits to the Incident and Emergency Centre were organized during the lunch times. Close to 120 participants visited the centre, where they had an opportunity to listen to the presentations from the IEC staff and discuss with them the role of emergency response centres.

The Scientific and Technical Secretaries for the conference were Ms Elena Buglova and Mr Rafael Martincic from the Incident and Emergency Centre, Department of Nuclear Safety and Security.

CONFERENCE OPENING

Ms E. Buglova, Scientific Secretary, introduced the conference president, Mr R. Jammal, and invited him and the IAEA Director General, Mr Y. Amano, to open the conference. Mr Jammal, as chair of the Opening Session, welcomed the participants (see Annex 1), invited the IAEA Director General to give his opening address and then declared the conference opened.

Mr Jammal introduced each speaker and invited them to give their opening statements in the following order: Mr J. C. Lentijo, IAEA Deputy Director General; Mr P.Gernard, Special Assistant to the CTBTO Executive Secretary for Programme & Technical Coordination; Mr Q. Liang, Director, Joint IAEA/FAO Division; Mr S. Niu, Senior Specialist, Labour Administration, Labour Inspection and Occupational Safety and Health Branch, ILO; Mr D. Pughiuc, Senior Deputy Director, Marine Environment, IMO; Mr C. Ugarte, Director, Emergency Preparedness and Disaster Relief, PAHO; Mr K. Shimomura, Acting Deputy Director-General and Chief Nuclear Officer, OECD NEA; Ms E. Van Deventer, Team Leader, Radiation Programme, Department of Public Health, Environmental and Social Determinants of Health, WHO; and Mr X. Tang, Director, Weather and Disaster Risk Reduction Services Department, WMO (see Annex 1 for opening statements).

At the end of the session, Mr Jammal asked Ms Buglova to briefly explain the logistical and administrative arrangements of the conference.

SESSION 1: INTERNATIONAL COOPERATION

Session 1 covered different aspects of the international cooperation in EPR. The session included nine presentations from four Member States[3] and five international organizations[4]. The presentations highlighted the fact that international cooperation is fundamental in achieving harmonized EPR arrangements and in building capacity in Member States.

The presentations on behalf of the Arab Atomic Energy Agency (AAEA), European Commission (EC) and South Africa (Forum of Nuclear Regulatory Bodies in Africa) described the cooperation being undertaken on a regional basis within EPR. The main focus of all three presentations was the harmonization of EPR related arrangements, on a regional basis. One of the examples provided for regional harmonization was the approach adopted by the Heads of the European Radiological Protection Competent Authorities Association (HERCA) and the Western European Nuclear Regulators Association (WENRA).

The presentations from China, France and the United States of America, each having large nuclear programmes, recognized the importance of international cooperation in helping to further strengthen the national, regional and international EPR arrangements. This is achieved through a range of activities under bilateral and multilateral relations with other countries and international organizations. One of the primary benefits of these arrangements is in the area of capacity building that helps both to enhance the EPR capabilities and to harmonize operational response arrangements.

[3] China, France, South Africa and USA.
[4] Arab Atomic Energy Agency (AAEA), CTBTO, EC, IAEA and WMO.

Each of these three States, as Parties to the Assistance Convention, have registered their National Assistance Capabilities in RANET so that they may be available to provide assistance in case of a nuclear or radiological emergency.

The IAEA provides the secretariat for the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE), whose purpose is to coordinate the arrangements of the relevant international organizations concerning the preparation for and response to nuclear or radiological emergencies. Members of IACRNE develop, maintain and co-sponsor the Joint Radiation Emergency Management Plan of the International Organizations (Joint Plan), which describes a common understanding of how each organization acts during a response and in making preparedness arrangements.

There has been a long standing cooperation between the IAEA and the WMO. During an emergency, the WMO applies specialized atmospheric transport and dispersion modelling (ATDM) techniques and reports on the spread and deposition of airborne radioactive substances.

As one of the latest members of IACRNE, the CTBTO is able to provide real-time radionuclide monitoring data from its International Monitoring System (IMS), including confirmation of non-detection during a nuclear or radiological emergency. Advice may be given on atmospheric transport and dispersion predictions as appropriate. In the post-emergency phase, the CTBTO provides relevant IMS results on radionuclide air concentrations and related expertise.

Key points:

(1) The session highlighted the efforts that are being taken on a regional basis to achieve harmonization of EPR arrangements. The challenge remains to ensure harmonization on a global scale, which is where the IAEA plays a central role by developing safety standards and conducting peer review missions, such as the Emergency Preparedness Review (EPREV).

(2) Member States with developed EPR arrangements, together with the IAEA, play a significant role in capacity building. Efforts in this regard are important in further enhancing the response capabilities of developing and embarking nations and also in achieving harmonization of EPR arrangements.

(3) States Parties to the Assistance Convention, especially those with developed response systems, need to review their National Assistance Capabilities and, where applicable, register them in RANET, thus fulfilling one of their obligations under the convention.

(4) The inter-agency cooperation coordinated through IACRNE has proven to be a robust system. Members of IACRNE have the capabilities and authorities to significantly contribute to the international response in a nuclear or radiological emergency.

SESSION 2: COMMUNICATIONS IN AN EMERGENCY

Session 2 consisted of a keynote contribution and three presentations[5] from three Member States[6] and one international organization[7].

[5] One presentation was cancelled due to the absence of the authors.
[6] Austria, Japan and USA.
[7] The IAEA.

The keynote contribution emphasized that communication in the age of social media needs to occur early, happen often and be accurate. The experience of the United States Nuclear Regulatory Commission during the response to the Fukushima Daiichi accident and in subsequent exercises has shown that it is possible to prepare relevant material in advance of an emergency that saves significant time during the actual event. Social media postings concerning, for example, the activation of an emergency centre or instructing the public to listen to local emergency channels are important messages that can be prepared beforehand and be released early through social media channels. The importance of releasing public information without delay in order was emphasized. Accurate information, however brief, is effective when released as soon as it is available, with more detailed reports to follow.

Communicating during nuclear or radiological emergencies has always been challenging due to disproportional risk perceptions, little public knowledge about nuclear matters and many contradicting analyses during emergency situations. It was emphasized how these difficulties have been compounded by the onset of social media. The current rate of information sharing on social media is more than 3.5 million posts every 60 seconds. The issue was developed further by discussing the differences between classical journalism and social media, and how the onset of social media has changed the very nature of journalism. For example, the issue of "timely release" of information has assumed an entirely new meaning, increasing the demands on the traditional principles of good crisis communication of providing timely, concise, factually correct and easily understandable information to the public. In the times of social media and citizen journalism, coverage is often instantaneous and eyewitnesses at the scene are frequently those that are breaking the news. Therefore, professional communicators handling an emergency often need to keep their messages brief and to the point, and limited to 140 characters, the maximum length of a Tweet.

The role of journalists at the scene while covering a nuclear or radiological emergency was described in the presentation by the founder of a group called Atomic Reporters. The need to integrate journalists into response organizations was recognized, and it was emphasized that national authorities need to consider the role of journalists in their EPR arrangements. In addition, the journalists reporting from the scene need to be trained on how they can protect themselves.

The third presentation addressed risk communication through the description of the results of a survey conducted in Kawauchi Village in Fukushima Prefecture, where, due to the NPP accident, the average internal dose was reported to be less than 1 mSv and the average external dose 0.8 mSv. The village was part of the evacuated area after the accident. The survey among 285 adult residents, using a questionnaire, concentrated on differences in perception of risks of health effects due to exposure to radiation. The results clearly showed a marked bipolarization in their perception of risks. It is therefore essential to evaluate the residents' risk perception of the health effects resulting from radiation, and then to implement a comprehensive risk communication strategy based on the evaluation. A risk communication strategy needs to acknowledge and take into account the perception of risks and misunderstandings, while, at the same time, presenting scientific evidence in an understandable and factually correct manner.

Key points:

(1) Communication in a nuclear or radiological emergency needs to happen early, happen often and be clear.

(2) The rapid growth of the use of social media has forced a sharpening of the traditional principles of good crisis communication: producing timely, concise, factual and easily understandable information.

(3) Although response authorities will most probably not win the race for the first Tweet, they should strive to win the competition on credibility.

(4) Journalists need to be incorporated into the EPR arrangements, including involvement in exercises. They should be provided with personal protective equipment, as any other emergency responder. In addition to increasing their ability to protect themselves on the scene, this will also reduce the probability that their own personal fear gets transferred into their reporting.

(5) It is vital for experts to pursue a risk communication strategy that takes into account misperceptions of possible health effects from radiation exposure.

(6) Professional communicators handling a nuclear or radiological emergency will not be able to avoid being confronted by members of the public with the question: "Am I safe?" They need to be prepared to answer this question in a clear and unambiguous way.

(7) The ability to communicate complex issues in a clear and unambiguous way needs to be improved. The EPR community needs to develop clear and timely messages for the public. Many of these messages can be anticipated and should be prepared in advance of an emergency.

SESSION 3: EMERGENCY MANAGEMENT

Session 3 covered a number of technical and operational topics related to emergency management for nuclear and radiological emergencies. In total, the session included 15 presentations and two keynote contributions from ten Member States[8] and four international organizations[9].

The keynote contribution on the interface of nuclear safety and nuclear security highlighted lessons learned from United States responses and exercises. Barriers to communication between the responders dealing with nuclear safety and nuclear security matters and officials must be addressed and reduced by establishing, among other things, a common understanding and a common terminology. The keynote contribution on the evolution of Unified Command during emergency response highlighted experiences from the United Kingdom that had led to a progression from separate response plans to a single Unified Command. Bringing together different responders in a Unified Command increased the common understanding of the situation, improved communication and enhanced coordination.

Presentations from Pakistan, China and France highlighted recent improvements to national arrangements for managing nuclear and radiological emergencies, which included an emphasis on testing and validating these arrangements, increasing the specificity of the criteria for regulatory judgements, removing ambiguities or overlaps in the roles and responsibilities of response organizations and integrating nuclear and radiological emergencies into the broader response mechanism in place for response to all emergencies. The contribution from Belgium presented

[8] Australia, Belgium, Canada, China, France, India, Pakistan, Singapore, UK and USA.
[9] EC, International Federation of Red Cross and Red Crescent Societies (IFRC), IAEA and World Institute for Nuclear Security (WINS).

improvements in the definition of geographic areas to be used as part of the protection strategy that had been developed in cooperation with national and local decision makers.

Speakers from Canada, Australia and the United States presented specific operational applications of emergency management systems, including those for visits of nuclear powered vessel and for decommissioning ofNPPs. These presentations highlighted the origins of the specific emergency management arrangements and lessons learned over time, most notably the need to continually update the EPR arrangements based on the up-to-date hazard assessments.

Additionally, technical tools and systems that can be used as part of an emergency management system were also highlighted. These included online emergency response systems in India, atmospheric dispersion modelling systems in the United States, and a new automated, mobile high purity germanium (HPGe) detector system for cargo container alarm adjudication in Singapore. It was emphasized that any useful technical tool or system needs to rapidly and accurately deliver data and information to the decision makers who are managing the emergency.

Finally, a number of international organizations presented updates on their emergency management arrangements and systems for nuclear and radiological emergencies.

Key points:

(1) Emergency management systems for nuclear and radiological emergencies at the national level need to be integrated into an all-hazards approach. The EPR arrangements must be tested and validated through training and exercise programmes.

(2) To increase the overall effectiveness of emergency management systems, national and international EPR arrangements need to harmonize the relevant nuclear safety and nuclear security terminology and concepts.

(3) An integrated command and control system operating under a Unified Command can increase the effectiveness and efficiency of emergency management in response to a nuclear or radiological emergency (irrespective of its cause).

(4) Emergency management of nuclear or radiological emergencies relies on technical tools and systems to provide information, assessment and prognosis. The outputs of these systems should be put in perspective and communicated clearly to emergency managers during a response in order to avoid inappropriate decisions or actions.

SESSION 4: PAST EMERGENCIES

Session 4 focused on past nuclear and radiological emergencies. The session included four presentations from four Member States[10].

Two presentations shared interesting experiences gained during the Chernobyl accident. The first one discussed the protection of emergency workers that worked under extreme radiation conditions. In the study, the emergency workers — about 110 000 — were divided into six cohorts: witnesses of the accident, early civil emergency workers, military emergency workers, staff of the NPP, supporters to

[10] Belarus, Japan, Russia and USA.

the NPP staff and staff building the shelter covering Unit 4. Personal dose monitoring was either not performed or performed incompletely, in particular in the early phase of the accident. However, it was estimated that the dose of about 500 workers exceeded the level of 1 Sv. For emergency workers building the shelter, the doses were on average below 300 mSv due to strict radiation controls and optimized planning of the work.

The second presentation described a method for more accurate estimation of annual internal doses in the population living on territories contaminated by the radioactive release from the Chernobyl accident. The method is based on the whole body monitoring carried out in the early years after the accident and supplemented by direct and indirect factors concerning the local circumstances. These factors include soil contamination, activities of main dose-forming products and consumption rates. Indirect factors such as social and ecological aspects are also considered.

A chronology of the Fukushima Daiichi accident and some of its consequences were also presented. It was shown, for example, that the most severe health effects were connected to people's mental and social wellbeing. Examples of the consequences of the evacuation of patients from hospitals were also presented (e.g. 51 elderly patients died as a result of evacuations). The Fukushima Daiichi accident demonstrated the importance of adequate planning for all phases of emergencies: urgent, early, recovery and transition to the existing exposure situation. It was noted that a review and revision of EPR arrangements in Japan was taking place so that urgent precautionary protective actions will be taken on the basis of conditions at the facility, as required by the IAEA Safety Standards (e.g. GS-R-2 and GSR Part 7).

Key points:

(1) Emergency preparedness needs to cover all phases of the emergency, including termination of the emergency, recovery and transition to existing exposure situation. It is important to establish clear and consistent decision making processes with a common understanding of the emergency management arrangements.

(2) Longer term needs and the adjustability of protection strategies are to be taken into account in the development of EPR arrangements. Each phase requires a transparent pre-determined response and necessitates actions that take into consideration the needs and roles of the concerned parties in the society, since they may be impacted at every phase of the emergency.

(3) Emergency planning for different phases should take into consideration all potentially affected groups: the public (to include patients), emergency workers and helpers and concerned parties in the society.

SESSION 5: PROTECTION STRATEGY

In Session 5, two keynote contributions and thirteen presentations were given by participants from 12 Member States[11]. They covered various aspects of the protection strategy, such as current efforts at national levels to enhance emergency arrangements in light of past experiences and ongoing attempts at the regional level to harmonize the approaches for transboundary emergencies. The contributors

[11] Belgium, Canada, Finland, France, Germany, Ireland, Japan, Republic of Korea, Norway, Spain, Switzerland and USA.

from the USA and the Republic of Korea presented research studies to support the effective implementation of the protection strategy in a nuclear or radiological emergency.

The first keynote contribution discussed the concept of protection strategy and provided some examples of national strategies currently available. The presentation emphasized the dichotomy that had been shown by past experiences: While many efforts had been made at national levels to develop strategies for the urgent phase of an emergency; taking into account protective actions aimed at dealing with its radiological consequences, less attention had been given to actions addressing non-radiological consequences and to recovery in the aftermath of an emergency. The contribution also highlighted some of the important factors that should be considered when authorities develop a protection strategy at the preparedness stage, and provided an overview of different elements of a comprehensive protection strategy.

The development of a protection strategy was considered an important step toward the development of the overall emergency preparedness that was dealing with the consequences of a range of postulated nuclear or radiological emergencies. A comprehensive hazard assessment was recognized as a key element to provide a basis for the development of the protection strategy. In this context, a paper presented by Japan provided an example of how Probabilistic Safety Assessment (PSA) Level 3 was used at the preparedness stage to support the hazard assessment in identifying where, and what kinds of, protective actions may be feasible and adequate for the urgent phase of a nuclear emergency that involved large and prolonged radioactive release and a controlled release. On the other hand, the monitoring strategy developed for use during an emergency to assess the radiological situation and the potential consequences provides feedback in the decision-making process for the implementation of the respective protection strategy. It was noted that a good practice in optimizing the monitoring strategy was to set priorities for specific phases of the emergency and allocate the available and usually limited resources to address these priorities based on the prevailing conditions at the time. France introduced a new system developed at the national level for the purpose of diagnosing the status of safety functions and safety systems at the NPP in order to assess the plant status and to evaluate how the situation might further develop. As such, this system and its processes were expected to provide a basis for determining the course of response actions warranted by the operator and to shape the strategy to protect the public.

Several papers emphasized the impact of the Fukushima Daiichi accident on the further development of national EPR frameworks. Spain and Japan presented their ongoing efforts to revise either the protection strategy or the emergency arrangements in light of the lessons learned. Japan introduced the new protection strategy for emergency preparedness and response based on lessons learned. After the Fukushima Daiichi accident, Japan brought its protection strategy in closer compliance with the IAEA safety standards in emergency preparedness and response. This has been the case particularly in terms of the application of plant conditions, i.e. emergency action levels, and operational intervention levels as a basis for triggering precautionary and urgent protective actions and other response actions early in the emergency. This resulted in abandoning the previously used approach that took account of the results obtained from modelling tools in the decision making for this phase of the emergency. The models tend to result in conservative dose assessment with significant uncertainties, not matching the actual measured doses. Key lessons related to the protective actions were: sheltering in the urgent protective action planning zone (UPZ) may sometimes be a better option than evacuation, and the vulnerability of patients in hospitals needs to be taken into consideration when deciding on possible evacuation of a hospital.

The speaker from Spain presented various improvements implemented at the national level to strengthen on-site and off-site EPR arrangements at the existing sites. One of the improvements i carried out during this process relates to the reinforcement of the essential on-site and off-site emergency response facilities.

Stakeholder engagement at the preparedness stage was recognized as essential for ensuring that various aspects of the protection strategy are acceptable, feasible and practicable, irrespective of the fact that this might, to a great extent, be a complex and time-consuming task. Moreover, engagement of relevant stakeholders in developing/enhancing EPR arrangements helps building trust in the authorities as well as in the EPR arrangements. Speakers from Ireland and Belgium presented two successful examples: in food and agriculture management options (Ireland) and in harmonizing the measures to protect emergency workers (Belgium). In both cases, additional work to turn the agreed solutions into operational arrangements has been foreseen to continue in the coming years.

In the second keynote contribution, the operational aspects of the assessment and prognosis process and the experience and approach of the Canadian regulator were explained.

It was generally acknowledged that IAEA safety standards in EPR continue to provide a basis for the harmonization of protection strategies and the criteria that underpin the strategy at the regional and international levels. It was also recognized that broader harmonization particularly at the regional level would also require political commitments at the national levels. Two examples of good regional cooperation in EPR were given: the first among the NORDIC countries and the second at the level of the European Union. Through regional cooperation, trust is being built and mutual understanding is increased.

Key points

(1) The development of an adequate protection strategy for a nuclear or radiological emergency has proved to be challenging tasks. Continuous capacity building activities in this area are essential to assist States to better understand the overall concept and the approach to develop a justified and optimized protection strategy for postulated emergencies. The need for further international guidance in this area is essential.

(2) Building emergency preparedness is a continuous process. It calls for a questioning attitude among all parties involved, with the goal of identifying what can be improved. It also requires regular reviews and updates to take account of new developments and lessons identified from past experience. The Fukushima Daiichi accident reminded the EPR community of the importance of EPR and the role of a proactive evaluation of the need for further improvements in the continuous enhancement of EPR. While many efforts have already be made to address the lessons learned from the Fukushima Daiichi accident, a large amount of work still remains for the EPR community in its effort to get better prepared to respond to future emergencies. The IAEA's report on the Fukushima Daiichi Accident, consisting of the Report of the Director General and various technical volumes, provides a wide range of lessons to be learned in the EPR area as well as in nuclear safety, radiation protection and recovery.

(3) Effective EPR for nuclear and radiological emergencies cannot be achieved in isolation; consequences of an emergency may in many circumstances be transboundary and multi-dimensional — extending to public health, food production and supply, the environment, trade, industry and affecting various governmental and local jurisdictions. Meaningful stakeholder engagement is

important to establish and refine an adequate protective strategy and associated EPR arrangements and to build up trust.

(4) In communicating with the public during an emergency, technical information, such as the results of assessment and prognosis processes, also needs to be shared. Therefore, arrangements how to present complex technical information in plain and understandable messages for the public are essential.

(5) Cross-boundary cooperation in EPR is important, and relevant international organizations, such as IAEA, should consider all means to encourage this cooperation and promote the safety standards in the EPR area.

SESSION 6: EDUCATION AND TRAINING

Session 6 focused on EPR education and training. The session consisted of seven presentations from four Member States[12] and one international organization[13].

Challenges and novel proposals for training decision makers and senior managers were discussed in the invited presentation. During emergencies, prompt assessment coupled with the experience to make effective decisions are required. Senior managers need to be equipped with technical knowledge as well as skills in communicating with the media. Therefore, early engagement to prepare decision makers is essential for responding efficiently in an emergency. This will contribute to achieving credible and sound decisions, and will keep the morale of emergency workers and volunteers high. The intensified stress and emotional reactions during an emergency may run counter to the established EPR arrangements, increasing the need for strong leadership.

The first Canadian contribution focus ed on the work that Canada has carried out in national nuclear emergency preparedness in order to align it with a new all-hazards approach and to strengthen inter-jurisdictional emergency response arrangements. The presentation also centred on the exercise programme as an essential element of an adequate level of readiness. The second Canadian contribution summarized Health Canada's efforts to enhance the Canadian medical community's state of readiness to face a radiological or nuclear emergency through the Medical Emergency Treatment for Exposure to Radiation (METER) training programme. Canadian authorities have funded a multi-year project to expand the METER training package and better fit the needs of the Canadian medical community. E-learning and online content of the METER package are helpful and particular useful in areas with high staff turnover. However, these tools are not intended to replace a hands-on approach, exercises, or active classroom learning, which remain vital elements for training.

Two contributions from the USA described training programmes available for interested States. The International Radiological Assistance Program Training for Emergency Response (I-RAPTER) is intended to enhance the readiness to respond to radiological emergencies. The training can be tailored to meet the specific requirements of a country. The second contribution described in brief the International Aerial Monitoring System (I-AMS) training programme.

The contribution from Chile presented experience and lessons learned from table top exercises based on radiological emergencies triggered by malevolent event(s) and designed to simulate extreme

[12] Brazil, Canada, Chile, and USA.
[13] IFRC.

conditions in order to enable testing of all organizations in the national EPR system, including criminal prosecution.

The presentation from IFRC described the CBRN International Summer School 'ItRC,' which implements activities that IFRC carries out for protecting volunteers. The contribution also presented the first edition of a radiological Nuclear Emergency Preparedness Basic Course with the key objective of building EPR capacities in national IFRC societies.

Key points:

(1) Education and training are essential factors in the design, implementation, operation and sustainability of any EPR system. They are invaluable in changing attitudes, enhancing skills and sharing knowledge needed for an effective and efficient emergency response. In this context, international cooperation is a very important element of efficient capacity building.

(2) The importance of practical testing in exercises cannot be overemphasized. Emergencies or large scale exercises result in invaluable lessons that need to be learned.

(3) Education, training and exercises are iterative processes that require time, resources, planning and coordination to have any significant impact.

(4) Active participation of senior management, technical as well as non-technical staff members and even volunteers in training and exercises is essential for efficient emergency response in a nuclear or radiological emergency. Training and exercising of senior management and decision makers — even of those from outside established 'normal' nuclear or radiological organizations — must not be overlooked. Properly trained senior managers can ensure credibility and consistency in decisions, which in turn can lead to greater public confidence.

SESSION 7: PUBLIC HEALTH AND MEDICAL RESPONSE

Session 7 focused on public health and medical aspects of emergency preparedness and response. The session consisted of eight presentations and one keynote[14] contribution from seven Member States[15] and two international organizations[16].

The keynote contribution from Cambodia highlighted the ways in which non-radiological health impacts during a nuclear or radiological emergency may be severe enough to prevail even over those impacts directly caused by radiation. The presentation further highlighted the role of the medical community in communicating with the public. It pointed out ways of engaging the public during and after an emergency in order to allow people to talk about their emotions and the fear for their own health and the health of their loved ones, with the goal of decreasing the stress they are experiencing. The address concluded by noting that radiation experts may not always be the best spokespersons for crisis communication due to their tendency to employ technical language, and that further training in this regard seems necessary.

[14] Cambodia.
[15] Canada, Cuba, Finland, France, Japan, Russian Federation and USA.
[16] IFRC and WHO.

The contributions from France and Cuba highlighted the importance of cooperation among States and international organizations as one of the essential elements of an effective public health and medical response. The past actions and the growing role of the Latin American Biological Dosimetry Network and the close cooperation between France and the IAEA in the medical management and treatment of individuals involved in radiological accidents are good examples of recent regional and international cooperation. Two issues were mentioned in particular: (1) the need for harmonized strategies in the medical follow-up of these cases; and (2) the need for continuous support and further integration of other capabilities for medical response. A better coordination between the health sector and the nuclear safety sector is needed at both national and international levels as a way forward to strengthen the medical response.

The contribution from Finland highlighted the need for the international exchange of experience and lessons learned in the development and update of international guidance and recommendations.

The presentation from the USA emphasized the need to develop clear criteria for enabling decision making in the medical response to a nuclear or radiological emergency, such as "clinical decision guidelines".

The Japanese contribution emphasized the relevance of the transfer of basic knowledge about radiation related matters to the public, as well as the need for specific training and exercises in medical preparedness and response (at national and international levels). This should be aimed at medical specialists, general practitioners and target groups such as teachers and others who are in close contact with members of the public.

The contribution from the Russian Federation focussed on the relevance of maintaining specialized medical teams and medical centres in the management of radiation emergencies, considering the assistance and support that they can provide to the preparedness and response at national, regional and international level.

The Canadian presentation proposed that the modelling of hypothetical severe nuclear accidents could facilitate the evaluation and analysis of needs for the response and, at the same time, support the justification of specific countermeasures.

The contribution from WHO indicated that the existing EPR system, which is based on radiological protection principles and values, does not explicitly take into account ethical and psycho-social issues, cultural values, social determinants of health and community resilience and engagement. There is a need to develop a framework that would address non-radiological issues to support decision making in response to a nuclear or radiological emergency.

The IFRC raised the topic of the need for an advanced systematic approach to integrate into the preparedness and response effort such entities as humanitarian relief organizations, regional specialized centres, medical professionals and multidisciplinary teams that play an important role in an emergency, as shown by the experience from the Fukushima Daiichi accident.

Key points:

(1) There is a need to support and strengthen further development of international networks and cooperation arrangements for building national and regional capacities for medical response to nuclear or radiological emergencies.

(2) It is important to develop and maintain up-to-date international guidance on the medical response to nuclear or radiological emergencies based on lessons learned.

(3) A key component for the medical preparedness to nuclear or radiological emergencies is to strengthen and continuously update training and exercises for all medical groups. The training needs to take into account the importance of the medical community's role in communicating with the public.

(4) Continuous public education on the biological effects of ionizing radiation is an important means to avoid or reduce exacerbated risk perception during and after an emergency.

(5) Implementation of protective actions (evacuation, sheltering, administration of potassium iodide, etc.) needs to be justified, i.e. it must do more good than harm. This particularly applies to evacuation of subsets of the population such as the elderly, in-hospital patients with severe diseases, etc. It is important to develop practical and operational criteria for the medical response following a radiation emergency.

(6) Strengthening the preparedness and further integration of supporting capabilities that contribute to the medical response is relevant for an effective medical response to nuclear and radiological emergencies.

ROUND TABLE A: NUCLEAR SECURITY/SAFETY INTEGRATION IN AN EMERGENCY

The round table discussion on nuclear security/safety integration in an emergency was moderated by Mr Philippe Jamet from France. The panellists came from six Member States and one international organization (see Table 6).

The moderator opened the discussion with a statement to the effect that nuclear security and nuclear safety have the same goal — to protect people and the environment — and that the challenges are in the implementation. The key objective of the discussion was, therefore, to explore these challenges and present possible solutions to achieve harmonization and coordination of nuclear security and nuclear safety in EPR.

Each panellist had an opportunity to express his/her view in a short introductory statement. All panellists reiterated the importance of the integration of these two aspects in EPR.

Mr Khaliq (IAEA) explained that response to an emergency should be the same in all cases, but that there are differences in definitions and concepts that need to be bridged. An effective emergency response requires the coordination of nuclear security and nuclear safety personnel, while recognizing the importance of maintaining physical protection.

Mr McCleland (USA) stated the importance of the integration of nuclear safety and nuclear security in emergency response and explained that, in the United States, for the most part, integration has been achieved.

Mr Bokov (Russia) proposed that integrating both aspects requires the application of an integrated approach, right from the development of regulations to their verification through inspection. Regulations for nuclear security and nuclear safety aspects in EPR should be submitted to a joint

regulatory committee; nuclear safety and nuclear security regulations should respect the boundaries of the two areas but should also contain provisions to ensure that one does not impair the other. Mr Bokov also suggested that inspections should proactively look for potential conflicts in the implementation of nuclear safety and nuclear security regulations for response during an emergency.

Mr Yao (China) noted that, while nuclear security and nuclear safety aspects in EPR are interconnected, they are different. EPR therefore requires an approach that takes into account the differences.

Mr Neate (UK) observed that nuclear security was in general seen as the responsibility of the State, whereas nuclear safety was always the responsibility of the operating organization, and that the definition of 'emergency' may have been an obstacle to integration. He underscored the importance of integration at several levels, including within nuclear facilities and between the facility and the State.

Mr Dos Santos (Brazil) pointed out the importance of preparedness activities in the integration process. He also explained that, in Brazil, an important initiative toward integration was combining the responsibilities for EPR related issues in nuclear security and nuclear safety at major public events into a single position.

Mr Joly (France) suggested that nuclear safety and nuclear security are two sides of the same coin; they must be integrated in the response. For this to happen, the methodology used to develop arrangements should be similar and consistent. When a major event affecting nuclear safety or nuclear security functions occurs, both plans need to be implemented. It is the operator that is responsible for coordinating both aspects.

All panellists agreed that the separation between nuclear safety and nuclear security in an emergency is in part historical, and that there is a need to get the two communities to work together to break down the barrier. Integration is possible but requires senior leadership.

The panellists also highlighted the importance of cyber security threats and their potential impacts on the nuclear safety aspects of EPR arrangements.

Participants raised the issue that, in the nuclear security area, the need for confidentiality may create a potential conflict with the need for openness and transparency in public communication. However, the information that was needed to support the emergency response — and in particular the implementation of protective actions for the public and the environment — is not generally classified. Hence, there is no need to divulge information of a confidential nature for the emergency response to remain effective. Therefore, it was suggested that there is no conflict, provided that the instruction and guidance to communicators are clear.

The panellists expressed the importance of a unified command as an essential factor in the integration of nuclear security, nuclear safety and public communication in an emergency.

Considerable discussion took place on the need for joint exercises. Participants and panellists agreed that exercises combining nuclear safety and nuclear security response to emergencies are essential for further integration. However, confidentiality considerations regarding the details of the scenario and the sharing of lessons learned remain an issue that limits participation of teams responsible for the nuclear safety aspects of the emergency response.

Finally, it was suggested that working together is the best way to improve the effectiveness of the response. The panellists strongly suggested that nuclear security and nuclear safety personnel should

cooperate as closely as possible during exercises to develop a better understanding of each other's priorities and to develop trust between the two communities.

Key points:

(1) When it comes to an emergency, the objectives of the response are to protect human life, health and the environment. These objectives are what nuclear safety and nuclear security measures and protective actions have in common, hence the need for continuous discussion about their integration during an emergency.

(2) Utilizing an integrated approach to EPR arrangements is a continuous process of including the development of regulations and reviews. Authorities should jointly, in a coordinated manner, consider EPR arrangements for both the nuclear security and nuclear safety aspects of response. Reviews should proactively look for potential conflicts in the implementation of EPR arrangements in nuclear security and nuclear safety.

(3) Integration of nuclear security and nuclear safety aspects of EPR should be implemented at the facility, local and national levels. The operating organization must recognize that it has full responsibility and authority for integrating the two aspects at the facility level.

(4) Emergency exercises combining both nuclear security and nuclear safety aspects should be conducted on a regular basis. Issues regarding the confidentiality of the scenario and evaluation report should be carefully considered, but they should not stop the conduct of such joint exercises.

(5) The concept of a unified command should be implemented to enhance the coordination of nuclear security, nuclear safety and public communication aspects. During exercises (and in real events), nuclear security and nuclear safety responders should work together, which will enhance their understanding of each other's priorities and further strengthen the integration.

ROUND TABLE B: RISK COMMUNICATION AND 'WHAT IS SAFE'

The round table discussion on risk communication and 'what is safe' was moderated by Mr Abel J. González from Argentina. The panellists came from five Member States and three international organizations (see Table 6).

The two-hour discussion opened with brief introductory statements by the moderator and each of the panellists, followed by the moderator's questions and open dialogue between the panel and the audience.

Mr Meschenmoser (IAEA) and Ms Brent (WHO) talked about experience in communicating with the public, Mr Blackburn (FAO) discussed food safety and the experience of FAO, while the panellists Mr Joseph (India), Mr Brenner (USA), Mr Weiss (Germany), Mr Williams (Australia) and Mr Zhao (China) presented their own diverse experiences and what they saw as major issues in risk communication.

After the short opening statements, the moderator proposed to concentrate on fundamental, simple and straightforward questions usually asked by members of the public during a nuclear or radiological emergency. These include the following: Is it safe to live in the affected area? Or, is it harmful? Is it

safe to drink the water, eat the food or use consumer products from the affected area? What is the meaning of expressions like 'the risk is as low as 10^{-5}'? The moderator invited the participants to explore whether the radiation safety community is ready to answer these questions unambiguously. He also expressed his personal doubt: Are the experts, through the 'stakeholder involvement', transferring their responsibilities to protect people to the very people whom they are supposed to protect?

After a lively discussion, the moderator concluded that thorough analyses had been made of the issues of risk communication in an emergency and of the solution to the conundrum of 'what is safe?'. However, he also noted that an urgent synthesis is needed.

Round table observations included the following:

— The way in which the Codex Alimentarius Commission has been handling the communication on the issue of controlling the safety of food in general could be a good example of how to handle the communication on issues of food safety in the case of a nuclear or radiological emergency.
— Comparisons of radiation risk with other risks are not necessarily helpful. The affected people may accept other risks because they may perceive a benefit from the situation in question, while they do not perceive any benefit from the risk of radiation exposure due to a nuclear or radiological emergency.
— Reassuring people of low risks is not always a solution. If people are genuinely concerned about the risk, it is better not to downplay their concern as this may, inter alia, aggravate emotions.
— Circumstances surrounding a risk situation may change over time. If it was communicated that the situation was safe, and this assessment later has to be revised or retracted, trust will be lost.
— Trust is perhaps the more relevant issue for ensuring proper communication. Public trust in regulatory authorities is essential; people should feel that regulatory authorities are on their side. In the nuclear field, however, not all regulatory authorities are in a strong position compared with those that have to be regulated. This can cause problems of mistrust. It was suggested that medical doctors belonged to a profession that was inspiring trust, and that they could be good communicators in the name of the authorities; however, medical professionals are often lacking scientific knowledge of radiation safety.
— The stigmatization of the people subjected to a nuclear or radiological emergency is a serious problem and contributes to jeopardize open communication.
— Unambiguous communication is considered very important. The caveats that radiation protection experts usually introduce lead to confusion ('This is safe, however,…').
— Emotional connection with the local population is a serious issue, particularly when the communicator is perceived as emotionally detached from recipients of the communications.

There was a wide consensus that misunderstandings and disagreements among experts jeopardize communication with members of the public. Problems noted include the following:

— There is no agreement on what is safe as far as radiation exposure is concerned.
— Many experts use the concept of probability associated to risk incorrectly. They use it as a number that expresses the frequency of occurrence, when, in reality, it constitutes only a subjective probability — that is, a belief among the experts that is not supported by quantitative experience.
— The system of quantities and units are cumbersome and occasionally misapplied, causing great confusion (e.g., effective dose vis-à-vis equivalent dose in the case of thyroid exposure).

— Experts convey the idea that 1 mSv/y is a limit, but then they agree that between 20 mSv and 100 mSv may be incurred after an accident, that workers may incur up to 20 mSv/y over many years, that a rescuer may incur 100 mSv or more and that radon in houses represents no danger if it leads to doses below 10 mSv. This is absolutely confusing to the public.

Key points:

(1) The foundation on which consistent radiological risk and safety communications are based needs to be in an easily defendable form. Specifically, a widely accepted international standard with dose thresholds borne of scientific rigor would provide a basis to answer the questions posed by the public regarding their basic needs (health, shelter, food and water) in the event of a nuclear or radiological emergency.

(2) Once an international standard is in place, it needs to be converted into plain language for information of the public. Various communication techniques, like those discussed by the panel, are to be implemented to aid in the understanding and acceptance of the protective actions strategy and actions identified by the appropriate authorities. However, the end goal must be the communication of an answer to the question 'what is safe?'.

(3) A scientifically based, easily understood and sound risk and safety communication strategy must be developed by a trusted source. Political, financial, geographical and cultural impediments are just some of the obstacles that the various response organizations must address when providing public risk and safety communications. The successful communicator possesses the requisite knowledge and skills to connect on a cognitive and psychological level with the public.

ROUND TABLE C: EPR — THE WAY FORWARD AND PRIORITIES

The discussion on the priorities and the way forward in EPR was moderated by Ms Ann Heinrich from the USA. The panellists came from five Member States and two international organizations (see Table 6).

The two hour discussion opened with brief introductory statements by the moderator and each of the panellists, followed by the moderator's questions and open dialogue between the panel and the audience.

In her opening remarks, the moderator presented a perspective on the significant international EPR related activities in the past decade, including work accomplished under the 2004–2009 International Action Plan for the Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies. The EPR community regularly identifies issues and plans the path forward through the ConvEx exercises, meetings of the Competent Authorities identified under the Early Notification Convention and Assistance Convention, and through the safety related resolutions adopted by the IAEA General Conference. Recognizing the crosscutting nature of EPR, the Emergency Preparedness and Response Standards Committee (EPReSC) has been recently established.

In their introductory statements, the panellists touched on the following subjects: EPR — the view of the International Commission on Radiological Protection (ICRP) (Mr Homma); the importance of

safety standards in the EPR area (Ms Drabova); international cooperation in EPR (Mr Majerus); the importance of EPR harmonization (Ms Haywood); the new nuclear industry and implications for EPR (Mr Lewis); application of EPR standards in Japan (Mr Hirano); legal aspects of EPR (Mr Gioia); and the IAEA perspective on EPR priorities (Ms Buglova).

In the discussion part, the moderator invited the panellists to answer the following questions: What can we learn from the management of other types of emergencies (such as natural disasters, chemical accidents, airplane crashes, terrorist attacks)? What does international EPR cooperation and harmonization mean to your organization? What are the top three global issues or challenges in EPR? What is your insight on the implementation of changes in EPR systems and how we can achieve a better integration of the various governmental sectors involved in EPR?

The audience actively participated in the discussion. The following points were raised:

— Addressing mental health effects needs to be considered in preparing for response to a nuclear or radiological emergency.
— Harmonization of international messaging in an emergency is a challenge, especially considering the time pressures.
— International safety standards do not need to be revised significantly based on the experience of the accident at the Fukushima Daiichi NPP; however, improvements need to be made in their implementation.
— Harmonization needs to be achieved also within the national response structures, between the EPR advisers (such as nuclear regulatory bodies) and the decision makers (such as civil protection authorities).
— Unilateral decisions in implementing protective actions and other response actions can have adverse consequences.
— The importance of social media and advances in technology in shaping the EPR arrangements and operations need to be taken into account.
— The ICRP will need to address the concept of ‘safe’ within the framework of the ‘tolerability of risk’.
— The ICRP and the IAEA should be involved in developing guidance for decision aiding in support of decision making.
— The importance of the regional projects in extending the national EPR capabilities needs to be considered.

The moderator concluded that, keeping up the momentum that has been generated by the intensive work in EPR in recent years, the work of preparing to achieve consistent and harmonized EPR arrangements and enhanced response capabilities is already underway. The key in achieving such consistent and harmonized arrangements is the implementation of the international safety standards in the EPR area, which were developed on a sound scientific basis and on the basis of lessons learned from past emergencies.

Key points:

(1) There is a need to strengthen consistently harmonized EPR arrangements and capabilities.

(2) Harmonization of international messages on protective actions and other response actions in response to a nuclear or radiological emergency is required.

(3) Active engagement of Member States in EPR activities to include meetings of Competent Authorities identified under the Early Notification Convention and the Assistance Convention and EPReSC is an important factor.

(4) The need for guidance on the termination of the emergency phase should be addressed[17]; the IAEA safety guide on the termination of an emergency (DS 474) needs to be finalized.

(5) There is a need to integrate preparedness for all hazards.

(6) There is a need to develop a safety guide on public communication in EPR.

(7) There is a need to continue addressing various aspects of EPR in the national, regional, and international activities.

REFRESHER WORKSHOPS

Workshop A: Protection Strategy for a Nuclear or Radiological Emergency

The workshop focused on the concept of a protection strategy as introduced in the latest IAEA Safety Standards Series publications, primarily the Safety Requirement on Preparedness and Response for a Nuclear or Radiological Emergency, No. GSR Part 7. The workshop was attended by about 80 participants. The lecturer was Ms S. Nestoroska Madjunarova from the IAEA's Incident and Emergency Centre.

The objective of the workshop was to increase awareness and understanding among the participants on: 1) what a protection strategy is, why it is an important element of the overall EPR framework and what purpose it serves; 2) the role of different dosimetric concepts, i.e. reference levels and the generic and operational criteria and how they can support the effective implementation of the protection strategy; 3) what needs to be considered when developing, justifying and optimizing protection strategies at the preparedness stage; and 4) how the strategy is to be implemented during different phases of a nuclear or radiological emergency.

The lecturer introduced the protection strategy as a strategic document that describes in a comprehensive manner what needs to be achieved in the response to a nuclear or radiological emergency and how this can be achieved through implementation of a justified and optimized set of protective actions and other response actions. She highlighted the necessity for applying a holistic approach in the development of the strategy so that it can define an effective response from the onset of the emergency to the time the emergency is declared to have ended, notwithstanding the need that, for a large scale emergency, it might be necessary to extend the implementation of the strategy in the longer term within the framework of an existing exposure situation.

To remember:

(1) Development of a comprehensive protection strategy that covers the period from the emergency onset to the time the emergency can be terminated is essential for effective emergency response

[17] Many countries currently do not consider the termination of the emergency phase in their emergency arrangements.

throughout different phases of the emergency, taking into account the shift of priorities and the level of information available in each phase. This allows for giving adequate attention to the consideration of impacts of earlier actions on the overall recovery efforts and for preparing to deal with the challenges associated with the termination of the emergency and the resumption, as normal as possible, of social and economic activities.

(2) Guidance on how and when to make decisions on lifting protective actions imposed earlier in the response should constitute part of the protection strategy and the overall emergency preparedness at national levels. This helps to ensure that each protective action within the protection strategy is discontinued when no longer justified.

(3) The IAEA is preparing international guidance on transitioning from an emergency exposure situation to an existing exposure situation or to a planned exposure situation, including guidance for adapting/lifting protective actions.

(4) The protection strategy is among the first steps in the development of overall emergency preparedness capability. Its implementation during the emergency requires the establishment of a range of specific operational arrangements at national, regional and facility levels. This should not be underestimated, because it is through the implementation of these operational arrangements that the strategy will be safely and effectively implemented.

(5) The engagement and consultation all relevant interested parties, including affected populations, during the development of the protection strategy is essential. This will help build a resilient community that can quickly recover from the consequences of the emergency and will help identify protection and management options that are feasible and acceptable for implementation.

(6) The protection strategy and each option within the strategy should undergo a thorough process of justification and optimization to ensure that actions taken do more good than harm and are optimized. This is also valid for the selection of the values for the reference level and criteria to be used within the protection strategy to avoid inappropriately selected values.

(7) Reference levels alone cannot be used to develop a protective strategy and to provide for the protection of affected populations. A more comprehensive approach is warranted in considering the health effects of concern, timeframes for decision making and goals to be achieved.

(8) Processes for adaptation of the protection strategy as information becomes available throughout the response are important elements of the protection strategy. Agreeing at the preparedness stage on these processes helps the efforts to manage the emergency response effectively.

Workshop B: Communication in an Emergency

The workshop focused on the existing arrangements for the official communication in an emergency among Member States and the IAEA. The lecturer was Mr G. Winkler from the IAEA's Incident and Emergency Centre. The workshop was attended by about 60 participants.

At the start of workshop, the participants were reminded about the obligations and rights which States Parties have under the Early Notification Convention and the Assistance Convention. The Operations Manual for Incident and Emergency Communication (IEComm Manual) was presented as the operational manual which describes the practical arrangement concerning the obligations under the conventions as well as recommended practices for information exchange on/in nuclear and radiological emergencies.

The concept of Contact Points for emergency communication was explained in detail, presenting their roles and responsibilities. Proper designation of Contact Points in accordance with the IEComm Manual is a prerequisite for successful communication during an emergency.

The practical arrangements for communication with the IEC were demonstrated from two perspectives: the view of a country experiencing an emergency and the view of a (potentially) affected country. The templates for communicating by fax/email and via the password protected USIE[18] website were shown. Further features of the USIE website were explained, together with preparedness activities which could help improve the communication tasks during an emergency. The sequence of actions by the IEC for an event was explained, along with the channels which IEC would use in certain situations to keep Member States and relevant international organizations informed.

To remember:

(1) Member States need to have a clear policy for sharing information on emergencies in line with the international treaties and relevant IAEA safety standards, guidance and operational arrangements.

(2) Member States have to ensure that their designation of the Contact Points is in line with the arrangements in the IEComm Manual and that all relevant organizations within the country have the appropriate responsibility assigned.

(3) The IEC has made available a corresponding guidance document, Operations Manual for Incident and Emergency Communication (EPR-IEComm (2012))[19] and several tools to ease the process of information exchange during an emergency. Member States are encouraged to make full use of those materials.

Workshop C: Public Communication

The workshop covered principles of public communication during a nuclear or radiological emergency. The workshop was attended by about 60 participants. The lecturer was Mr P. Meschenmoser from the IAEA's Incident and Emergency Centre.

The lecturer pointed out that the objective of public communications is not only to keep the general public informed. It shall also support the implementation of protective actions and mitigate the risks related to the emergency.

In this context, it was shown that it is important to understand the way risk is perceived by the public and what parameters influence this perception. Examples of previous emergencies show how failure of addressing this issue properly can lead to unwarranted reactions by the public, possibly resulting in hampering protective actions. The ways in which experts and non-experts perceive the same risk are completely different. The non-expert audience tends to react considerably more emotional.

To be able to convey messages that will mitigate risk comprehensively, the public needs to have trust in the messages and the messenger. Trust is the key aspect of all communications during an emergency.

Communications needs to be seen as one part of the overarching EPR system. Therefore, it needs to be as thoroughly planned as all the other aspects within the EPR arrangements. Depending on the magnitude of an event, a public information officer (PIO) or a whole public information section needs

[18] Unified System for Information Exchange in Incidents and Emergencies.
[19] Available in several UN languages.

to be part of the Incident Command System (ICS). The PIO section needs to cover media relations, stakeholder relations, internal communications, monitoring classic and social media and the writing of press releases and statements.

It was pointed out that relevant audiences and communication channels need to be identified at the preparedness stage. A special focus needs to be placed on the new media and the online communication. Potential spokespersons need to be thoroughly trained.

To remember:

(1) The need to build trust in different audiences of the public is essential. This can only be achieved if the communication is honest, avoids confidentiality if possible, is not overly reassuring and does not tell people how they should feel. The messages need to be transparent, relevant, accurate, concise, factual and in plain language. The communication needs to be timely and, in the age of social media with news breaking instantly, provisions need to be taken to have preapproved holding statements in place.

(2) It is important that regulating bodies and similar authorities that tend to communicate in a very technical and objective way, are also aware of the need to include compassion in their messages and keep in mind that human beings are affected.

(3) The use of the International Nuclear and Radiological Event Scale (INES) as a communication tool during an emergency bears advantages and risks. For minor events (rated below the scale or at the lower end of the scale), the use of a rating in communications can be useful, as it puts the severity of the event in perspective. For large scale emergencies that show an unfolding development, a provisional rating can potentially harm the credibility of the emergency communications, especially when several provisional ratings are published frequently until a final rating is reached. Additionally, it is most important that multi-unit sites are rated as one site instead of rating each unit separately.

Workshop D: Medical Management in a Nuclear or Radiological Emergency

The workshop focused on different aspects of EPR for nuclear or radiological emergencies, taking into account medical assistance to persons exposed to ionizing radiation. Public health countermeasures and non-radiological health consequences were not considered. The lecturer was Mr N. Valverde from Brazil. The workshop was attended by about 60 participants.

It should be understood that potential victims (and then medical patients) of a nuclear or radiological emergency could be radiation workers, patients, individuals from the public and first responders.

Possible health consequences of radiation exposure could include:

— External exposure: may lead to the Acute Radiation Syndrome (ARS) and/or the Cutaneous Radiation Syndrome (CRS).
— Radioactive contamination: external (limited to clothes, shoes and the skin), and/or internal, when incorporation of radionuclides occurs. The concern about internal contamination is the possibility of late cancer development in special circumstances and if the situation is not diagnosed and properly addressed in time.
— Associated conditions: a combination of the above situations.
— Combined injury: when trauma coexists with radiation exposure.

At this point, it is important to highlight that priority must be given to life-threatening conditions whenever a combined injury is present (bleeding, respiratory distress, fractures, etc.). Radioactive contamination is a secondary issue under these scenarios. Triage of victims should also be initially based on the severity of medical conditions and not on radioactive contamination.

The existence of state-of-the art facilities and resources to treat radiation injuries is not enough to consider a country as fully prepared to assist individuals involved in a nuclear or radiological emergency. As clearly recommended by the IAEA, the medical response must be integrated into the overall response system. The medical response should include three assistance levels:

— Pre-hospital: responders are paramedics, civil defence personnel, policemen, etc.
— Designated hospital: normally a trauma hospital that is prepared to receive patients with radioactive contamination. A plan must exist that is triggered once the hospital is notified that patients with radioactive contaminations will be brought in.
— Specialized centre: for severe cases of ARS or CRS. Special resources for the evaluation and treatment of radiation injuries are mandatory, and the specialized centre must have agreements with other organizations for biological dosimetry, bio-assays, reconstructive dosimetry, etc.

In the event of a possible high-dose accidental local overexposure, it is essential to estimate doses incurred at different skin structure levels. This is equivalent to isodose curves in radiotherapy, and has been named ‘dosimetry map’.

The dosimetry map provides doses as a function of tissue depths and the transverse distance from the central axis of the radiation beam.

In the past, the surgical doctrine for the management of CRS was “to wait, to see, and to intervene”. This kind of approach has been disappointing in cases of severe CRS. While in the eventuality of superficial lesions a conservative approach is recommended, surgery will be certainly required in cases of deep ulcers and necrosis.

A significant problem in respect to surgery in cases of deep ulcers and profound and large radionecrosis is that the intervention stimulates new waves of inflammation. To overcome this drawback, a new surgical approach has been used since 2006 in cases of severe CRS, with good results and significantly less morbidity. It combines conventional surgery (usually a rotation flap or a full-thickness graft), cell therapy and high-quality dosimetry of the exposed area. This procedure has been called Dosimetry Guided Surgery (DGS).

DSG is recommended as an early procedure in cases of local radiation overexposure, when deep ulceration or necrosis is anticipated (for example, when erythema, blistering, and edema develop within a short period after irradiation). By means of the dosimetry map, surgeons are informed on areas of high doses and where necrosis is likely to happen. This ‘guides’ surgery in the sense that all areas of possible necrosis development will be preventively removed.

Mesenchymal stem cells (MSC) are characteristically multipotent cells obtainable from the bone-marrow, and alternatively from other non-marrow tissues, such as umbilical cord blood and adipose tissue. MSC can differentiate towards a variety of specialized cells like osteoblasts, myocytes, chondrocytes and adipocytes. In DGS, autologous expanded MSC are injected locally at different points of the surgical area and, thereafter, in a number of sessions. MSC works as a source of trophic factors (e.g. growth factors) to promote wound repair processes and tissue regeneration to reversing radiation induced tissue damage.

To remember:

(1) Preparedness is essential for effective medical response to a nuclear or radiological emergency. The medical response must be integrated into the overall response system.

(2) The so-called 'medical' response to a nuclear or radiological emergency may encompass three levels of assistance: prehospital, designated hospitals and advanced medical centres. These levels should be harmonized and integrated into one 'medical response system'.

(3) Medical personnel should be aware of the possible clinical manifestations of radiation injuries, not only for prompt and proper evaluation and treatment, but also because this may be of great value for the identification of malevolent exposure of the population, for instance to a radiation planted source.

CONFERENCE CLOSING

Mr Jammal, conference president, chaired the closing session. He summarized his observations and conclusions (see Annex 2: President's Summary) and invited Mr Lentijo to give his final remarks and close the conference.

ANNEX 1: OPENING STATEMENTS

R. Jammal,
Conference President

Good morning, Ladies and Gentlemen.

It is my pleasure to welcome you all to this IAEA ***International Conference on Global Emergency Preparedness and Response.*** It is an honour for me to serve as President of this important conference. I am pleased to see that it has attracted a very high level of interest and participation, which reflects the importance of emergency management for the international community which encompasses among other things preparedness, response and recovery to a nuclear or radiological emergency.

As president of this conference, I have read every abstract that was submitted and accepted by the IAEA. I am very impressed with the quality of the submissions. However, I am disappointed that WANO has no representation. During this week, you will have an opportunity to contribute to the discussion on the following conference's themes: emergency management and its pillars: protection strategies; communications; public health and medical response; international cooperation; education and training, taking into account past experiences and determining the way forward and priorities. I personally think an emphasis should be made, as an outcome of this conference, to indicate that recovery should be based on health effects and not epidemiological studies. In addition, this conference should provide direction to the IAEA to develop and publish a short information document that can be easily used by politicians to improve decision making while under pressure during a nuclear emergency. It is important to educate all stakeholders that the 1mSv public dose is not to be used as an indicator of safe or unsafe health limit.

There is no doubt that an efficient response to an emergency requires effective emergency preparedness, including up-to-date robust arrangements and knowledgeable and trained responders.

During the past years, since the Fukushima Daiichi nuclear accident in Japan in March 2011, significant efforts have been invested in reviewing and further strengthening emergency preparedness and response. Many national and international activities have been carried out in conjunction with the IAEA Action Plan on Nuclear Safety. The recently published IAEA Report and the Director General Summary's report on the Fukushima Daiichi accident provided several observations and lessons for governments, regulators, and nuclear operators throughout the world in various areas, including emergency preparedness, response and recovery. There is a need to address the planning for severe emergencies to include those involving several units at a multi-unit plant in order to stop the progression of events that may be occurring at the same time.

This, among other things, means a compelling need for clarity on the roles and responsibilities of regulators and all levels of government.

In addition, the establishment of clear unambiguous criteria for decision making on protection of the public and emergency workers must be based on factual information as it relates to the risks of radiation exposure and the attribution of health effects to radiation. Communication with all stakeholders in an emergency is also identified as an important area requiring high attention. It plays a key role in protecting the public's health. It is therefore important for all of us that we build and maintain trust and credibility well before any emergency might occur. This conference provides an

opportunity to develop messages to be conveyed to the public and all relevant stakeholders about the current status of the emergency preparedness and response and the way forward.

Emergency preparedness, response and recovery are critically linked, hence, efficient implementation is a must in any emergency irrespective of its cause, whether it is natural disaster, human error, mechanical or other failure or a nuclear security event. When it comes to any emergency, the objectives of the response are to protect human life and health and the environment. These objectives are what safety and security measures have in common, hence the need for continuous discussion about their integration during an emergency.

All these topics are part of the conference program so you can see that we have a busy and interesting program ahead of us. I would like to encourage you to share your views and experience throughout the conference and to discuss the current status of emergency preparedness and response at the national and international levels and provide your assessment on where to go from here. We look forward to your contribution which will provide an input to the outcome of our conference.

Finally, I appreciate the opportunity to be part of this important event which, I am sure, will contribute to our efforts to further strengthen emergency preparedness, response and recovery worldwide. I look forward to a very interesting and productive week.

It is now my pleasure to invite the Director General of the IAEA, Mr. Amano, to deliver his opening remarks.

Y. Amano,
IAEA Director General

Good morning, Ladies and Gentlemen.

I am pleased to welcome you all to this IAEA International Conference on Global Emergency Preparedness and Response.

Responding to a nuclear or radiological emergency is the responsibility of the operating organization at the level of the facility concerned, and of the affected State.

However, the International Atomic Energy Agency, with its 165 Member States, plays the central role in the international emergency preparedness and response framework for nuclear and radiological emergencies.

We provide guidance to Member States that covers all areas of emergency preparedness and response. This includes support in understanding and mastering the latest IAEA concepts, principles and safety standards.

We assist in the design, conduct and evaluation of emergency exercises. We provide technical support to national and regional capacity-building projects.

I encourage all countries to use the many services provided by the IAEA, including our emergency preparedness review missions. These offer expert peer review of national emergency preparedness and response arrangements and capabilities.

I also encourage all countries to test their existing operational arrangements, including through international exercises such as ConvEx, to identify areas that may require further improvement.

Ladies and Gentlemen,

The Fukushima Daiichi accident four years ago was a painful reminder that a serious accident can happen anywhere, even in a developed industrial country.

My report on the accident, which was published last month, noted that weaknesses in emergency preparedness and response arrangements, and in planning for the management of a severe accident, were among the important factors in the complex chain of events that occurred.

A Technical Volume covers emergency preparedness and response and the lessons learned from the accident.

In the last few years, Japan and other users of nuclear power have taken important steps to address these and other nuclear safety issues.

In fact, I have seen major improvements in safety in every nuclear power plant that I have visited since the accident. I believe the key message – that complacency about safety must be avoided at all costs – is fully understood.

Ladies and Gentlemen,

This is the largest international gathering of experts in emergency preparedness and response which we have held to date, with more than 470 participants from 85 Member States and 19 international organizations.

I am very pleased to acknowledge the cooperation of partners from the Inter-Agency Committee on Radiological and Nuclear Emergencies in preparing this event.

Despite the best safety efforts, the possibility of radiation-related emergencies cannot be totally excluded. This makes an efficient emergency preparedness and response system essential.

Your presence here confirms that the world is serious about being ready to respond to any future nuclear or radiological emergency, should it occur.

I am confident that this IAEA conference will make an important contribution to strengthening emergency preparedness and response throughout the world. I wish you every success with your deliberations.

Thank you

J. C. Lentijo,
IAEA Deputy Director General

Good morning ladies and gentlemen

This conference on **Global Emergency Preparedness and Response** is organised to provide a forum for networking and exchange of information and experiences, and to promote effective preparedness as a key to efficient response. It will also provide opportunities to refresh and update knowledge,

challenges and priorities in specific areas of Emergency Preparedness and Response, and to visit the IAEA's Incident and Emergency Centre.

I would like to thank Mr Ramzi Jammal, Executive Vice-President and Chief Regulatory Operations Officer of the Canadian Nuclear Safety Commission for accepting the duties of the President of this Conference.

This conference brings together various groups of people involved in EPR such as: responsible officials, experts in nuclear safety and nuclear security, emergency planners and responders, as well as relevant stakeholders. This is very important, as effective response to emergencies requires the involvement of numerous professionals in different organisations which form various layers of response.

Despite best efforts, radiation-related incidents and emergencies that may affect the public, workers, patients, property or the environment could continue to occur. These events can range from very low probable severe accidents in nuclear power plants, with potential for serious consequences, to events with low radiological impact. Any of these events can trigger considerable media interest and public concern.

The responsibility for response to a nuclear or radiological incident or emergency rests with the operating organization at the level of the facility concerned, and with the affected State at the local, regional and national level. At the same time under the international framework, the Agency's central role in response to such events includes: prompt notification; exchange and provision of official information to Member States and international organizations; coordination of international assistance upon request; and provision of public information. After the accident at the Fukushima Daiichi NPP, the IAEA's role was expanded to include provision of assessment and prognosis, as it was defined in the Action Plan on Nuclear Safety.

The Agency discharges its response role through its operational focal point, the Incident and Emergency Centre (IEC). Today, the IEC provides around-the-clock assistance to Member States in dealing with nuclear or radiological incidents or emergencies. The IEC main functions at the preparedness stage include developing standards, guidelines and practical tools; rendering services and building human capacities.

Ladies and Gentlemen,

In the recent past, Member States, the IAEA and other relevant international organizations have devoted much effort to strengthening national and international arrangements to effectively respond to a nuclear or radiological emergency. I would like to list just some examples.

The IAEA recently reviewed and revised Safety Requirements in the area of emergency preparedness and response, which was established as an Agency safety standard GSR Part 7 in March this year. It is notable that these safety requirements are co-sponsored by 15 international organisations, the highest number ever for the Agency's safety standards.

The 9th International Experts Meeting on Assessment and Prognosis in Response to a Nuclear or Radiological Emergency, conducted in April, provided a forum for experts to discuss issues, challenges and solutions related to the assessment and prognosis process in response to a nuclear or radiological emergency.

A new Emergency Preparedness and Response Standards' Committee has been established under the Commission on Safety Standards.

A new web-based tool, Emergency Preparedness and Response Information Management System (EPRIMS) was launched during the 59th General Conference to enable Member States to make a self-assessment of their preparedness for nuclear and radiological emergencies and to share information on it.

Comprehensive Radiation Emergency Management Schools are being conducted this year for European and Latin American Regions in Trieste and in Rio de Janeiro correspondingly. We continue running workshops for the field teams and RANET countries in the IAEA RANET Capacity Building Centre designated in Fukushima Prefecture.

However, more work is still needed in development and in assisting on the implementation of the new arrangements and capabilities. In this regard, outcome of this conference will provide a substantive basis in the form of feedback on Member States needs and priorities.

Ladies and Gentlemen,

From the experience we all know that emergencies do not respect the borders, hence international efforts in building effective emergency preparedness and response is needed.

As was just mentioned by the Director General, the Fukushima Daiichi Accident Report by the Director General and Five Technical Volumes were presented at the General Conference one month ago. I would like to encourage all Member States to get the benefit from learning and implementing the observations and lessons highlighted in this Report for further strengthening emergency preparedness and response worldwide.

I also encourage you to use the opportunity this week to learn more about various aspects in EPR and how they are developed in different countries; and also to see how the Secretariat can assist you in various areas of the EPR.

I wish you an interesting and productive week during the conference on Global Emergency Preparedness and Response.

Thank you.

P. Grenard,
CTBTO

Mr President, Director General, Colleagues, Distinguished delegates, Ladies and Gentlemen,

"The CTBT verification regime is one of the great accomplishments of the modern world. The international monitoring system is nearly complete; it is robust, it is effective, and it has contributed critical scientific data on everything from tsunami warnings to tracking radioactivity and nuclear reactor accidents".

Coming from my lips, such a description of the CTBTO International Monitoring System (IMS) may sound a little self-assured, but these are in fact the words of US Secretary of State John Kerry at last year's CTBT Ministerial Meeting.

Secretary Kerry's words encapsulate very well three main points I wish to make in my short introduction today.

The first is the uniqueness of our IMS as a global network. The Treaty's 183 States Signatories have made this investment of well in excess of US$1 billion to ensure that no nuclear test will go ever undetected. The reliability and accuracy of the network has been proven time and time again. CTBT data has been used to confirm all three nuclear tests that took place since the turn of the century, but it has also proven to have had significant unforeseen applications.

The most important of these is the IMS role in disaster risk reduction. This is my second point. For a number of years now, tsunami warning centres in many countries have received data from our seismic and hydroacoustic stations, helping them to issue more precise and timely warnings. Following the Fukushima disaster in 2011, our network's radionuclide stations tracked the dispersion of radioactivity on a global scale, providing valuable information for public health and other agencies.

The CTBTO was not established to work on disaster warning. But we have a lot to offer in practical terms. After Fukushima, we joined the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE) to more formally put our system to the disposal of all. My colleague Martin Kalinowski will present later today in more detail on the CTBTO's role in IACRNE.

My third point is implicit in Secretary Kerry's admiration for the IMS as a shared global accomplishment. Fukushima was a classic example of multi-hazard, triple disaster, with a universal impact. Disasters like these need a global response. This in turn requires unified vision and unified commitment. The vision is already clear, in the form of the Sendai Framework, adopted at the Third UN World Conference on Disaster Risk Reduction in March of this year. Commitment means transforming this vision into action. Last Tuesday, on the International Day for Disaster Reduction, an updated Joint Plan of Action was put to the UN's High-level Committee on Programmes. The Plan is set to be confirmed at the next meeting of the UN Chief Executives Board. This is a good start.

It is my hope that the spirit of Sendai will inspire us all to look beyond labels such as nuclear security, nuclear safety, even non-nuclear, and to come together at international, regional, and country level as we prepare for, and respond to, major emergencies.

Thank you.

Q. Liang,
FAO

Dear Conference President, Ladies and Gentlemen, distinguished guests, Dear colleagues:

It gives me great pleasure to see that this meeting has been arranged in co-operation with the Food and Agriculture Organization (FAO) of the United Nations. On behalf of FAO, I would like to extend my warm welcome to all participants and hope that this is a successful and fruitful conference.

I would like also to thank the International Atomic Energy Agency for providing all of us with this opportunity and platform to discuss the strategic issues related to nuclear emergency preparedness and response at the global level. In fact, effective nuclear emergency preparedness and response cannot be achieved in isolation, it cannot be done by any individual organization or country alone, as the impact of a nuclear emergency or accident can be far reaching, it can be transboundary and multidimensional

– the effects could extend to food production and supply, the environment, trade, industry and governments. It is only possible to deal effectively with nuclear emergency preparedness and response if we all work together across boundaries and across working sectors.

Under the leadership of IAEA and through the partnership with IAEA, the FAO mandate related to nuclear emergencies is focused as follows:

- To prepare for and respond to nuclear and radiological events affecting food and agriculture
- To help Member States to develop and implement agricultural countermeasure to minimize the impact of nuclear emergencies on food security
- To help advise government on acceptable levels of radionuclides for agricultural products entering national and international trade

Last week the FAO celebrated its **70th anniversary** and both the FAO and IAEA have worked closely together for many of these 70 years. Indeed, it is exactly 51 years ago, since October 1964 when both organizations agreed a joint programme – the Joint FAO/IAEA Division. To this day, this Joint FAO/IAEA strategic partnership continues to mobilize the talents and resources of both organizations - Working together in cooperation to benefit Member States in the peaceful application of nuclear science and technology in a safe and effective manner.

Ladies and Gentlemen

In the event of a major nuclear or radiological emergency both FAO and IAEA strive to mobilize commitments and concerted action towards meeting the necessary challenges.

The FAO is a full party to the two key international conventions – The **Early Notification Convention** and **The Assistance convention**. Activities are carried out under these conventions and in the context of the FAO cosponsored Joint Radiation Emergency Management Plan of the International Organizations (The JPLAN), which provides the management tools for coordinating international organization arrangements in preparing for, and responding to, nuclear or radiological emergencies.

The Joint FAO/IAEA Division, based in Vienna, is the bridge. It is the link between FAO headquarters in Rome and the IAEA Headquarters here in Vienna.

The FAO is no stranger to emergency response. The FAO responds to many different emergency situations. Food, fisheries and agricultural production are key to our well-being and essential for economic success.

Ladies and gentlemen, the joint arrangements between FAO and IAEA extend beyond emergency response – they also provide for a joint programme to meet the world's changing needs. Over its history the FAO and IAEA have together focused on expanding ongoing contributions to agricultural development and global food security, and embraced and added expertise to efforts to adapt to, and mitigate the effects of climate change, respond to globalization, conserve ecosystems and broaden biodiversity.

Ladies and Gentlemen, it is my privilege to be with you today.

Ladies and gentlemen, on behalf of the FAO may I wish you every success. Once more thank you

S. Niu,
ILO

Good morning ladies and gentlemen, Mr. Yukiya Amano, Director General, Mr. Juan Carlos Lentijo Deputy Director General of the IAEA and Mr. Ramzi Jammal, Conference President.

It gives me great pleasure to extend to you all a very warm welcome on behalf of the Director-General of the International Labour Organization, Mr Guy Ryder. The ILO is extremely pleased to join Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), European Commission (EC), European Police Office (Europol), Food and Agriculture Organization of the United Nations (FAO), International Civil Aviation Organization (ICAO), International Maritime Organization (IMO), INTERPOL, Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD NEA), Pan American Health Organization (PAHO), United Nations Environment Programme (UNEP), UN Office for Outer Space Affairs (UNOOSA), World Health Organization (WHO), World Meteorological Organization (WMO) to cooperate with the IAEA on this important international Conference. I also thank Ms Buglova and her team for the excellent preparation and organization of this conference.

Cooperation is a must because the emergency preparedness and response system requires concerted efforts from all the relevant sectors and partners. I thank the IAEA for its commitment to interagency cooperation. Challenges from the Fukushima Daiichi nuclear accident have highlighted the need for better coordination and cooperation among different sectors and partners in order to organize efficient responses. I am very happy that this Conference aims at the promotion of effective preparedness as a key to efficient response.

Among the topics to be elaborated at the conference, protection strategies for emergency workers are an important issue in emergency preparedness and response. The ILO Convention concerning the Protection of Workers against Ionizing Radiation (No. 115) and its accompanying Recommendation (No. 114) lay down basic principles and establish a fundamental framework for radiation protection of workers including emergency workers. They also contain provisions which concern the protective measures to be taken, the monitoring of radiation and the medical supervision of workers.

The ILO participates actively in collaborations for internationally harmonized standards. We believe that such collaborations not only facilitates the implementation of the ILO Convention No. 115 on radiation protection by our constituents but serve to increase, at the national level, the synergy impacts of the relevant international standards on radiation safety and protection formulated by other sister organizations. Our common goal is that our activities would not only be complementary but mutually supportive. In this connection, it is worth pointing out that the IAEA GSR part 3 - the International Basic Safety Standards for Radiation Protection and Safety of Radiation Sources (BSS) and GSR part 7 - Preparedness and Response for a Nuclear or Radiological Emergency which are cosponsored by the ILO and other organizations are two good examples of the efforts in harmonizing global standards on radiation safety and protection and on emergency preparedness and response.

The ILO also uses in a coordinated manner the various means of action available to it to provide support and services to governments, employers' and workers' organizations in drawing up and implementing programmes which will contribute to the safety and health at the workplace. Accidents occur not always because people don't know safety rules. In many cases, people do know the safety rules but choose not to ignore or do not follow them strictly.

The ILO has a Convention on the prevention of major industrial accidents. The Convention does not apply to nuclear and radiological accidents. Such an exclusion is purposely made to avoid duplication and overlapping with the work of IAEA, but the cross fertilization of the experiences and good practices in these two fields will be beneficial for the prevention and control of both industrial accidents and nuclear and radiological accidents

In conclusion, establishing a sound and effective system for emergency preparedness and response will be critical to control and mitigate the damage and impact of an emergency when it occurs and to prevent unnecessary disability and suffering including death to the public and workers. Hence, we shall continue in our endeavours for the safety of the people.

I wish you every success for fruitful deliberations. Thank you.

D. Pughiuc,
IMO

Conference President Jammal, Director General Amano, Deputy Director General Lentijo distinguished delegates, Ladies and Gentlemen,

I am deeply honoured to be given the opportunity to address the Conference in its opening session and I wish to express my sincere gratitude to the organizers for this privilege. As a member of the Inter-Agency Committee on Radiological and Nuclear Emergencies and a co-sponsor of the Joint Radiation Emergency Management Plan of the International Organizations, also known as the J-PLAN, IMO remains committed to cooperating in the area of Emergency Preparedness and Response to radiation incidents and other emergencies. Secretary-General Koji Sekimizu has confirmed the willingness of IMO to participate in the global effort to identify challenges and priorities in the Emergency Preparedness and Response areas and to share strategies and experiences in specific areas that include the use of ports by nuclear merchant ships and planning and preparing for response to transport events involving radioactive material.

As the global vehicle to transport 90 per cent or more of the world's exported goods, shipping has for centuries been a truly global industry and the most efficient and cost effective means to move manufactured goods, mineral and energy commodities across our planet. IMO was created in 1948 in recognition that actions to regulate maritime operations would be more effective if carried out at an international level rather than by countries acting unilaterally.

As the United Nations specialized agency responsible for safety and security of shipping and for the prevention of marine pollution by ships, IMO is prepared to continue the cooperative relations with IAEA and the other UN participating organizations and enhance its participation in the global effort towards further strengthening readiness to respond to radiological incidents or emergencies based on shared experiences and good practices. Ladies and gentlemen, I am fully aware that you have a busy schedule ahead of you for this week and I would like to conclude by assuring you that the outcome of this Conference will be reported back in London and the newly emerging EPR solutions and recommendations will be carefully considered in the future work of IMO. Mr Chairman, ladies and gentlemen, I wish you an interesting and highly successful Conference and I thank you for your attention!

C. Ugarte,
PAHO

Mr. Ramzi Jamal, President of the Conference, distinguished colleagues, Ladies and Gentleman,

Thank you for giving the opportunity to the Pan American Health Organization to address this important Conference. I am pleased to express the regards of Dr. Carissa Etienne, Director of the Pan American Health Organization (PAHO) and a national of the beautiful country of Dominica in the Caribbean. PAHO, founded in 1902, is the world's oldest international public health agency. PAHO is the specialized health agency of the Inter-American System and serves as the Regional Office for the Americas of the World Health Organization (WHO). Together with WHO, PAHO is a member of the United Nations system.

PAHO is proud to be one of the oldest IAEA partner. For over 40 years, IAEA and PAHO have collaborated in radiation safety and related areas of interest to their respective Member States. Both Agencies also have complementary networks in their Member States that can facilitate joint actions in areas of common interest. Both agencies shared the mission of strengthen its Member States develop capacities and capabilities in the safe use and management of nuclear and radiation technology used in medicine and to optimize preparedness and response to emergencies.

Regarding Emergency Preparedness and Response, many challenges remain and we are only as strong as the weakest country. The recent Ebola epidemic is an example of the actual challenge that is before us. The main goal to protect the health and wellbeing of the population from radio-nuclear emergencies is still far from certain. A week before this Conference, all health disaster coordinators from PAHO's 51 member states and territories met in Nicaragua to identify priorities for risk reduction, preparedness, response and recovery the next 6 years. Radio-nuclear emergencies were barely mentioned as one of the priorities. The health sector in general needs to be better prepared to deal with this type of emergencies and requires technical and financial resources to detect, respond and control radiological emergencies.

In this Conference, very few health delegates are participating. We must work together. Gandhi said: "Whatever you do for me but without me, you do against me". Countries, agencies, health and other sectors, national and subnational levels, need to jointly measure, test and improve their capacity to reduce the risk and respond to emergencies.

I gently request all the participants of this Conference, to approach their health colleagues in their respective countries and work together to jointly improve preparedness and response to radiological and nuclear emergencies. If we think that we are too small to make a difference, try sleeping in the same room with a mosquito. Together we will be able to move from theory to practice, from philosophy into action.

PAHO renews its commitment to continue, and to strengthen, its collaboration with IAEA and all partners on Emergency Preparedness and Response. We look forward for a fruitful and successful Conference. Thank you!

K. Shimomura,
OECD NEA

Ladies, Gentlemen, Colleagues and Friends,

On behalf of the OECD Nuclear Energy Agency, I would like to thank you all for your participation in this important conference. Particularly since the Chernobyl and Fukushima accidents, the NEA has been actively working with our member countries, and in collaboration with the IAEA, to identify international aspects of nuclear and radiological accidents, and to develop and share approaches to their management. This has been accomplished principally through our International Nuclear Emergency Exercises, the INEX programme. Since 1992 the NEA Working Party on Nuclear Emergency Matters has organised six international nuclear emergency exercises, both table-top and command-post, to explore how international aspects can best be addressed. Broadly, the principal area of focus of the first 3 INEX exercises was decision making in extremely uncertain circumstances, particularly with respect to the implementation of urgent countermeasures. This work helped to refocus national approaches towards more robust and flexible emergency planning arrangements, ready to adjust to whatever prevailing circumstances arise. The INEX series continued, with a focus more on consequence management, again in uncertain conditions. This work has helped to draw attention to the longer-term aspects of emergency situations, and the need to consider the long-term when making short-term decisions. For more information about our activities in this field, please refer to our web site, www.oecd-nea.org

Our most recent exercise, INEX 5, is currently under way. This table-top exercise is designed to explore formal and informal approaches to, and resource needs of, information collection and sharing during a large-scale accident. Approaches to the coordination of national decisions, and of knowledge used as input to decision makers, will also be addressed. The window for participants holding this exercise opened on 1 September, and it is hoped that all participants will complete their INEX 5 exercises by June next year. A summary workshop will be held in early 2017 to capture participant experiences.

Meetings such as this one are extremely important for the collection, sharing, and dissemination of national emergency management experience. I am certain that this will be accomplished this week, and that the efforts of you the experts will be discussed, refined and stored in our biological and numeric memories so that emergency planning and emergency response preparations will be very effectively ready to respond should another accident occur.

I thank you and the IAEA organisers of this meeting for this opportunity, and I wish you a successful week.

E. Van Deventer, WHO

Director General, Your Excellences, Ladies and Gentlemen

It gives me great pleasure to address the International Conference on Global Emergency Preparedness and Response on behalf of the World Health Organization.

WHO welcomes this forum to network and exchange information related to EPR in the context of nuclear accidents and radiological emergencies.

The topic of EPR is core to WHO's work on emergencies, which includes our support for strengthening the capacities of our 194 MS to manage all types of hazards, emergencies and disasters, including epidemics and pandemics.

The Ebola epidemic, which started last year and escalated with surprising speed, reminded the world of the need for preparedness in dealing with global emergencies. This infectious disease crisis also highlighted the importance of effective interaction between multiple agencies to provide support for communication, logistics, political awareness, and finance in West Africa and globally.

We have seen first-hand the immense challenges that countries and communities have faced in managing this particular emergency.

But on the other hand, we also see that countries that are well prepared for disasters can save many lives and reduce the immediate and long-term health consequences, putting communities on the road to recovery much faster. With strong health emergency risk management capacities, health outcomes can be improved through multi-sectoral action.

To date, 61 State Parties are fulfilling their obligations under the International Health Regulations - a global agreement for the prevention and control of epidemic diseases and other public health threats with the potential for international spread, including chemical and radiological events.

What is WHO doing about EPR related to radiation emergencies?

In the aftermath of the Chernobyl accident, we established the Radiation Emergency Medical Preparedness and Assistance Network (also known as REMPAN). REMPAN comprises some 40 member institutions who provide technical support to WHO.

WHO is a member of the Inter-Agency Committee for Radiological and Nuclear Emergencies (IACRNE), a partnership which was tested during the response to the Fukushima Daiichi Nuclear Power Plant accident. IACRNE's response came across as one UN-voice, and this was seen as essential for our Member States. It reflected the importance of working closely with other stakeholders.

Disaster Risk Reduction

On this, we can learn from the Disaster Risk Reduction community which has a wealth of experience who manage so many natural and man-made disasters and conflicts.

All emergencies have something in common in the way they disrupt the socio-economic tissue of affected regions, destroy families, employment, trade, and cause enormous mental distress for evacuees and refugees. Populations displaced for whatever reasons have similar basic needs for safe food, water, and access to health care.

Earlier this year, the 3rd World Conference on Disaster Risk Reduction was held in Sendai, Japan, north of Fukushima. Sendai, a city which saw first-hand the destructive powers of the earthquake and tsunami of 11 March 2011.

We are very pleased that the Sendai Framework for Disaster Risk Reduction puts people's health at the centre of emergency and disaster risk management.

Now, more than ever, there is a strong political will to improve the emergency response capability of the UN organizations and their associated partners, as seen through your participation in this event.

Let's work together to reduce global health risks from intentional or accidental radiation exposure.

We thank the IEC for a very fruitful collaboration over the past 10 years.

X. Tang,
WMO

Your Excellency **Dr Yukiya Amano**, Director-General of the International Atomic Energy Agency **(IAEA)**,

Mr Juan Carlos Lentijo, IAEA Deputy Director General, Head of Department of Nuclear Safety and Security,

Mr Ramzi Jammal, Conference President,

Mr Patrick Grenard, Special Assistant to the CTBTO Executive Secretary for Programme & Technical Coordination, Comprehensive Nuclear-Test-Ban Treaty Organization **(CTBTO)**

Mr Marc De Cort, Project Leader Radioactivity Environmental Monitoring, Joint Research Centre (JRC), Institute for Transuranium Elements – Nuclear Security Unit, European Commission **(EC)**

Mr Qu Liang, Director Joint IAEA/FAO Division, Food and Agriculture Organization **(FAO)**

Dr Shengli Niu, Senior Specialist, Labour Administration, Labour Inspection and Occupational Safety and Health Branch, International Labour Organization **(ILO)**

Mr Dandu Pughiuc, Senior Deputy Director, Marine Environment, International Maritime Organization **(IMO)**

Dr Ciro Ugarte, Director Emergency Preparedness and Disaster Relief Pan American Health Organization **(PAHO)**

Mr Kazuo Shimomura, Acting Deputy Director-General and Chief Nuclear Officer Nuclear Energy Agency of the Organization for Economic Cooperation and Development **(OECD NEA)**

Dr Emilie Van Deventer, Team Leader, Radiation Programme, Department of Public health, Environmental and Social Determinants of Health, World Health Organization **(WHO)**

Distinguished Participants, Dear Colleagues, Ladies and Gentlemen,

On behalf of the Secretary-General of WMO, Mr Michel Jarraud, and on my own behalf, I have the great pleasure of addressing the opening of the International Conference on Global Emergency Preparedness and Response. I would like to express my gratitude and appreciation to Dr Yukiya Amano, Director General of the International Atomic Energy Agency (IAEA), for organizing this Conference, and for inviting WMO to cooperate and participate in this important event.

Ladies and Gentlemen,

Disasters can strike in many ways. In addition to natural disasters that are associated with natural phenomena, there is also an important area of risk of disasters, sometimes referred to as technological disasters, which fall into the domain of "environmental emergencies". Frequently used examples are a nuclear power plant accident or a transportation accident that involves the release of harmful substances to the atmosphere. These potential disasters are induced by, or occur as a consequence of, human activities. Of course, natural hazards can also trigger technological disasters. Meteorology

could potentially play an important controlling factor in the behaviour of both the hazardous material suddenly released to the environment, into the air and into water bodies, while the effective protection of life and property often depends critically on reliable information on current and future environmental conditions. In managing the risk of environmental emergencies, therefore, meteorological data, information and forecasts are important in two main ways:

- Meteorological information such as weather forecasts support local and regional emergency response operations; and

- Specialized numerical modelling systems can assess and predict the movement and spread of air- and water-borne hazardous substances from the location of sudden release.

WMO's programme Emergency Response Activities (ERA) includes in general terms the broad area of the application of specialized atmospheric dispersion-modelling techniques to track and predict the spread of airborne hazardous substances in the event of an environmental emergency. This kind of specialized application depends directly on the operational infrastructure of the numerical weather prediction systems that are implemented and maintained at many global, regional and national meteorological centres operated within the WMO World Weather Watch system.

The ERA programme was established to assist National Meteorological and Hydrological Services (NMHSs), their respective national agencies and relevant international organizations to respond effectively to environmental emergencies involving large-scale dispersion of air-borne hazardous substances.

Following the Chernobyl nuclear power plant accident in 1986, the programme focused its operational arrangements and support on nuclear facility accidents. The programme is now expanding to emergency response for non-nuclear environmental emergencies such as the dispersion of smoke from large fires, ash and other emissions from volcanic eruptions, and chemical releases from industrial accidents.

For more than 25 years, WMO maintains operational international arrangements with the International Atomic Energy Agency (IAEA) to trigger specialized meteorological support to environmental emergency response related to nuclear accidents under the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. WMO plays an important role in this connection through its unique numerical weather prediction capability for simulating and predicting the movement and dispersal of radioactive materials in the atmosphere. WMO has implemented and maintains a system of ten specialized numerical modelling centres called Regional Specialized Meteorological Centres (RSMCs) which are providing 24x7x365 highly-specialized computer-based simulations of the atmosphere that predicts the long-range movement of airborne radioactivity. WMO centres also participate in numerous exercises that are designed to simulate an accident or failure at a nuclear power plant.

Dear Colleagues, Ladies and Gentlemen,

WMO works with UN system organizations such as the International Atomic Energy Agency, the International Civil Aviation Organization, the World Health Organization, the United Nations Environment Programme, the United Nations Office for the Coordination of Humanitarian Affairs, the United Nations International Strategy for Disaster Reduction and the Intergovernmental Oceanographic Commission of UNESCO. Each, in its respective domain, has responsibilities for promoting and coordinating emergency planning and related programmes, and implementing

emergency preparedness and response measures. Some also have round-the-clock operations to monitor emergency situations globally, and coordinate and facilitate emergency assistance as needed.

Meteorological data and information support both preventive and restorative measures, as well as emergency preparedness and response. International organizations have different leading interests or authority, depending on the hazard and disaster situation. Coordination and planning between WMO and other international organizations, including IAEA, ensure that the meteorological requirements during emergency situations are well understood and that the necessary products and services are ready and delivered efficiently and effectively by WMO's network of NMHSs and specialized meteorological centres. WMO is the leading and authoritative international organization on meteorological and hydrological hazards. Using data and products from authoritative sources ensures that the underlying situation assessments and response measures are based on accurate and reliable input according to the state of the art.

In addition, many other natural hazards or hazards which are the result of human activities are controlled in varying degrees by meteorological and hydrological factors, such as gases and ash from volcanic eruptions, floods, industrial spills or fires, or locust outbreaks. In addition, a meteorological hazard, such as a tropical cyclone, could trigger a secondary hazard, such as a fire at an industrial plant. Each potential hazard could require international consultations and coordination, for emergency response actions, deployment of supplies or assistance. Building meteorological aspects into the arrangements implemented and coordinated by other international organizations to enhance emergency preparedness and response is an effective approach to assuring specialized meteorological support and assistance to decision-makers having the ultimate responsibility to protect populations and the environment at risk.

Ladies and Gentlemen,

I note that this Conference is intended to serve as a forum for coordination of discussions among agencies involved in emergency preparedness and response. As a technical meeting among experts, I am sure it will succeed in its objectives to improve such coordination and enhance prospects for prompt and worldwide implementation of emergency preparedness and response activities.

I wish you a most productive and successful Conference.

Thank you.

ANNEX 2: PRESIDENT'S SUMMARY

PRESIDENT'S SUMMARY

Ramzi Jammal

President of the Conference
Executive Vice-President and Chief Regulatory Operations Officer
Canadian Nuclear Safety Commission

The International Conference on Global Emergency Preparedness and Response was organized by the International Atomic Energy Agency in cooperation with 13 international organizations. As President of the Conference, I consider that we were successful in achieving its objectives.

The Conference was attended by over 420 participants. Attendees comprised regulators, national emergency planners and responders from 82 Member States, 18 international organizations and other relevant stakeholders. The large number of participants is a testament to the commitment of the international community to global emergency preparedness and response (EPR).

On the assumption that nuclear and radiological events with a potential impact on the public and the environment might occur, the keynote speakers, presenters, chairs and participants contributed to productive discussions. The key technical areas important to strengthening national and international nuclear and radiological emergency preparedness and response were addressed through exchanges of the latest information and opinions on the pillars of emergency management being: protection strategies; communications; public health and medical response; international cooperation; and education and training. Lessons learned from past emergencies were taken into account in determining the way forward and the priorities to be established.

As a result of the discussions at this Conference, I will make six recommendations for further improvement. The implementation of these recommendations will require dedicated commitment at the national and international levels. I strongly encourage decision makers, relevant authorities and organizations to determine how these recommendations apply to them, decide how they will move forward with their implementation and commit to sharing the results once their implementation has been completed.

Recommendation 1: Defining '*What is safe?*'

During the conference, participants identified the need for relevant authorities and organizations to respond in clear, plain language to the question of '*What is safe?',* based on scientific evidence and reasoning.

Over recent decades, experts have produced highly detailed criteria which are codified in national and international radiation protection standards. However, their complexity seems to have impeded our ability to respond to simple questions from the public about radiation safety. Not being able to answer these questions would further reduce the credibility, not only of experts, but also of authorities and organizations responsible for protecting the public.

More specifically, participants noted that there is confusion arising from the misinterpretation and misuse of the 1 mSv/y dose limit. During the debate, experts expressed the need for a review of the reasoning behind and the validity of this dose limit.

I recommend that the IAEA develop, in consultation with international organizations, a framework to deal with the underlying question of '*What is safe?'*, including a review of the reasoning behind the dose limit established.

Recommendation 2: Communicating with the public

There was a consensus among Conference participants on the importance of risk communication and the need to develop methods for communicating risks to the public during the preparation phase as well as following a nuclear or radiological emergency.

I recommend that the IAEA develop, through the new Emergency Preparedness and Response Standards Committee (EPReSC), communication material to be used by decision makers, relevant authorities and organizations to provide scientifically based information to the public on issues relating to nuclear or radiological emergency. This information should be developed in conjunction and consultation with the public and written in simple and clear language so that it may be understood by the broadest audience. Using a single reference document will ensure that consistent and credible information is being communicated worldwide.

Recommendation 3: Implementing Observations and Lessons from the IAEA Report on the Fukushima Daiichi Accident

During the Conference, Observations and Lessons from the IAEA Report on the Fukushima Daiichi Accident arising from the assessment of emergency preparedness and the response to the accident were discussed. I encourage all Member States to commit to reviewing and taking the necessary actions to address these Observations and Lessons.

I recommend that Contracting Parties to the Convention on Nuclear Safety report on the implementation of these Observations and Lessons through their National Reports for the 7th Review Meeting. Moreover, I recommend that all Contracting Parties use the peer review process of the Convention to ensure continuous enhancement of EPR to a nuclear and radiological emergency.

Recommendation 4: Integrating nuclear safety and nuclear security in EPR

Nuclear safety and nuclear security have the common objective of protecting human life and health, hence there is a need to discuss their integration during an emergency. I recommend that the IAEA continue to implement activities to further promote integration of nuclear safety and nuclear security aspects in EPR.

Member States should also take proactive steps towards the effective integration of safety and security aspects in EPR. This should include considerations for harmonized emergency arrangements and regulatory reviews that seek to identify and resolve potential conflicts. The establishment of a unified command system — on-site and off-site — and the conduct of joint exercises would help to better coordinate safety and security aspects of the response.

Recommendation 5: Developing international guidance for the transition phase

During the Conference, it was recognized that there is a need for a holistic approach when implementing a protection strategy. Challenges and issues were raised regarding the lack of guidance for the termination of a nuclear or radiological emergency and the transitioning to recovery, including remediation.

I recommend that, to address this issue, the IAEA continue to develop guidance on the termination of a nuclear or radiological emergency and the transition to recovery, which should include guidance for adapting and lifting of protective actions.

Recommendation 6: Enhancing international cooperation and building capacity

International cooperation is fundamental in achieving harmonized EPR arrangements and in building capacity in Member States.

The need for harmonization of protection strategies and communication among countries, particularly neighbouring countries, and possible ways of achieving it, was a topic of active discussions. Broad compliance with the international safety standards in EPR was identified as a key step to achieving harmonization.

I recommend that arrangements for improving consultations and the sharing of information among Member States on protective actions be strengthened through the framework of the IAEA relating to EPR.

I also recommend that Members States educate and train their emergency planners and responders, utilizing material available in international safety standards, and perform exercises, including at the regional and international levels.

Main conclusions

Enhancing nuclear safety is an ongoing process. Nuclear safety has been strengthened since the Fukushima Daiichi accident. However, defining actions and deliverables from the Observations and Lessons on EPR provided by the IAEA Report on the Fukushima Daiichi Accident is a must. While many of these have already been transformed into regulatory improvements, much remains to be done.

This summary provides reasonable and achievable recommendations aimed at continuing improvements to emergency preparedness and response to a nuclear or radiological emergency.

It is incumbent on regulators, operators, national organizations and international organizations to implement these recommendations and to report on the progress made.

In view of the value of this Conference, I recommend that the IAEA organize another Conference on Emergency Preparedness and Response, which will allow Member States to report on their implementation of the recommendations.

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