International Experts Meeting on Human and Organizational Factors in Nuclear Safety in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant

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Opening Remarks by: A. Bychkov, Deputy Director General
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(Chair Slovak Nuclear Regulatory Authority Mrs Ziakova, Director General Canadian Nuclear Safety Commission Mrs Heppell-Masys, Director FANR Mr Ian Grant, and Deputy Director General Mr. Denis Flory, Distinguished Guests, Ladies and Gentlemen.)

Good morning!

On behalf of the International Atomic Energy Agency, I would also like to welcome you to this 5th International Experts Meeting that is being held as part of the IAEA Nuclear Safety Action Plan in response to the accident at the Fukushima Daiichi Nuclear Power Plant. I would also like to express my sincere appreciation to the government of Japan for their strong support and assistance.

Ladies and Gentlemen

The topic of this International Experts' Meeting, Human and Organizational Factors in Nuclear Safety in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant, as my colleague Mr Flory has already expressed, is a critical element for the nuclear community to consider, discuss, and understand as we move forward after this catastrophic event. While many have referenced the importance of human and organizational factors in the Fukushima event, this is the first international forum on this topic for experts to discuss their research, their thinking, and the various actions that have been or are being taken in this area since the accident. The high response to and participation in this meeting are clear indications of the importance of this area as recognized by our community.

Dear Colleagues

Here at the IAEA we are proud of the way that we collaborate as a team with our colleagues from all departments but especially with cooperation between the Departments of Nuclear Energy and Nuclear Safety. Mr Flory has already indicated some of the work his department has been leading and you will shortly from Mr Caruso about some of the specific projects that we are working on

together. I would also like to inform you about some of the activities that we are responsible for in the area of human and organizational factors but before doing that, I would like to reflect on the specifics of the Accident at the Fukushima Daiichi Nuclear Power Plant.

While the are many similarities between this accident and those which ocurred at Chernobyl and Three Mile Island, and hence lessons learned from those accidents which are relevant to this one, there is one critical element which makes this one unique among these nuclear accidents and which, we belive, had a significant impact on subsequent human and organisational performance. It is not so much the fact that this accident was triggered by an extreme event of nature which makes it unique, but the fact that the earthquake and subsequent tsunami had so many wider consequences in that area of Japan which placed severe stess on the people trying to manage the accident and created many conflicting priorites for those in decision making positions.

In the first hours after the triggering events, the government and emergency services had many demands on their resources. Homes, hospitals, schools, whole towns had been destroyed and there was severe disruption of the infrastructure, making it difficult, if not impossible, to get resources where they needed them to be. It is easy for us, with the benefit of hindsight, to reflect on the decisions made and how the quality of those decisions might have been better, but it is difficult to image the enormity and diversity of decisions the Japanese government and its various organisations had to make when one considers the bigger picture, and not just the Fukushima event.

However, while recognising the challenges the accident presented in this context, this also serves to reinforce the importance of ensuring that the model for decision making is appropriate. It must ensure that decisions are made at the level which has the necessary information to make an informed decision and, above all, ensure that not only ultimate responsibility, but also authority, for nuclear safety remains with the operator at the site.

It is also important to remember that Japan lost 20,000 or more of its citizens in the earthquake and tsunami, but **not one** as a direct consequence of the accident at Fukushima and indeed, only last week, the OECD-NEA produced a report confirming that the prompt evacuation of the potentially affected zones close to the NPP avoided significant potential doses to the local population. We also know that the bravery and dedication of many NPP staff who stayed at the site, and displayed great innovation with limited resources, did much to mitigate the radiation release and longer term consequences of the accident. The fact that these people stayed at their posts and worked, in many cases, literally until they collapsed, while at the same time not knowing whether their parents, spouses and children were alive or dead, safe or injured, is testament to their courage and professionalism. Here

surely is one aspect of Japanese culture which deserves much credit. In this respect there is much to be learned from this accident about the behaviour of individuals and organisations in such extreme situations and much work needs to be done.

Notwithstanding this, the staff at the Fukushima Daini plant, in generally similar circumstances, appeared to cope better with the consequences of the earthquake and subsequent tsunami than their colleagues at Fukushima Daiichi. There were technical and design reasons for this but we need to explore whether there were also human or organisational factors involved also.

As Mr Flory mentioned previously, the Department of Nuclear Safety is responsible for developing the standards and framework for safety that are agreed upon by all Member States and that each Member State must be accountable to meet in their own nuclear programme. In the Department of Nuclear Energy we do everything to assist Member States to meet these standards whether they are just thinking about a nuclear power programme, starting a nuclear power programme, expanding a nuclear programme, or maintaining their existing programme. The work that we do in our two departments should help Member States to understand not only what needs to be achieved in this area but ideas of how to achieve it.

Much work has already been done to try to understand the technical aspects of the Accident at the Fukushima Nuclear Power Plant and several International Experts Meetings have been held already to look at Reactor and Spent Fuel Safety, Protection against Extreme Earthquakes and Tsunamis and Decommissioning and Remediation after a Nuclear Accident. Subsequent to the accident, many Member States have conducted so-called 'Stress Tests' to confirm the engineering and design integrity of their operating NPPs. However these tests, in common with the IEMs I have already mentioned, focused mainly on the design and engineering safety of nuclear facilities and not on the impact of human and organisational aspects of nuclear safety and much more work needs to be done in this area.

Mr Flory has described some of the work being led by his Department in this area, especially in the area of ITO and we in the Depatment of Nuclear Energy have been expanding our work also, albeit with limited resources and expertise. In 2006 we increased the scope of our Technical Working Group on Training and Qualification, recognising the need to take a more integrated approach to Human Resouce Management. We began developing a document on Leadership in Nuclear organizations and we are in the process of publishing reports on Managing Change and Managing Human Performance. Subsequent to the accident at Fukushima NPP we have drafted a document on Leadership, Human Performance and Internal Communication in Nuclear Accidents. Mr Flory referred to the Requirements for Leadership and Management for Safety as articulated in the IAEA Safety Fundamentals and I would like to echo this with a quote from our draft document:

When considering leadership opportunities within organizational structures all Member States should evaluate their commitment to incorporate nuclear safety culture into their national culture and integrate their cultural application to support nuclear safety culture aspects. Leaders should be chosen, developed and successfully promoted when they are identified to be committed to these values. In fact, a culture where the integration of the human behaviour aspects of nuclear safety culture is considered from a leadership perspective will be a culture that can solve many challenges and achieve high levels of performance in any environment. These cultures are able to adapt themselves to ever changing circumstances such as the emergency situation without significant loss of capability.

Working with our colleagues in Nuclear Safety we have developed guidance on Capacity Building in Member States and we are developing a module on Human Resources, Competence and Knowledge Management to be incorporated into the guidelines for the Safety Assessment of Long Term Operations (SALTO) for NPPs. However, these activities only 'scratch at the surface' of understanding the importance of the relationship between individuals, technology and the organisation.

In many Member States, NPP operating utilities have a long history of cooperating with their counterparts in the airline industry to exchange experience resource management training where aircraft crews and NPP control room staff have similar responsibilities and challenges. This work has been very beneficial to both parties and such cooperation between safety critical industries should be further developed. While the design and technology of NPPs may be specific, many of the human and organisational factors which affect performance are common to these industries.

From an organisational perspective, there is also much to be learned about how the development of organisational and staffing arrangements for safe and efficient performance during normal operations may impact on an organisation's ability to cope with extreme events. Related to this is the issue of 'Managing the Unexpected' as already mentioned by Mr Flory. All Member States operating NPPs have emergency arrangements, training and exercises, as confirmed during IAEA OSART and other missions. However, these are usually planned well in advance, with the knowledge of at least senior management, and are rarely based on major events which would affect all of the units on an operating site, or even multiple sites, which was the reality in Japan. We must work to create more challenging emergency scenarios to better test and develop our ability to handle such crisis situations as were experienced in Japan.

In our 2nd International Experts' Meeting last year we explored the issue of Enhancing Transparency and Communication Effectiveness in the Event of a

Nuclear or Radiological Emergency, which focused largely on communicating with external stakeholders, but we need to better understand the internal communication and command and control challenges, both within the affected site and with the offsite support organisations. We need to better understand from the people on the ground what it was like to carry on working in those extreme conditions; what were the factors the helped them to continue to put their lives at risk; what, from a human perspective would have made it easier; how were they able to communicate with each other; what were the biggest communication problems? What tools and techniques did they use to support their decision making? What was the most critical information that did not have? Perhaps, in reviewing the robustness of our post-accident instrumentation systems as we are, we need to also reconfirm what is the most important information for decision making.

As I indicated before, many of the human and organisational challenges faced by the staff of TEPCO and the other organisations and government ministries in Japan have similarities with those which have been faced by other countries when they have been hit by other disasters, whether natural or technological. I hope this meeting will be a first opportunity, on an international stage, to relate these lessons to the lessons we have already learned from the accident at Fukushima. However, looking to the future, there is much more we need to learn about the specific human and organisational factors which either contributed to, or mitigated, the consequences of the accident.

Therefore, in returning to the objectives of this meeting, I hope that all participants will contribute fully and frankly in the discussions and plenarly sessions, so that we may produce specific, meaningful recommendations on how to make the necessary improvements in this area. In order to achieve this, I believe we need to:

- Identify the necessary specialist resources who can work together to ensure we can learn, and implement, the key lessons in this important area,

- Work closely with the key Japanese stakeholders, including TEPCO, the Regulatory body and the government to establish the specific facts about the human and organisational impacts on the accident at the Fukushima NPP,

- Review the relevant human and organisational lessons, including the decision making process we have learned from the accidents at Three Mile Island, Chernobyl and now Fukushima, as well as those from major accidents in other industries and use these to futher improve our human and organisational resilience for the future,

- Further enhance the procedures and training for, and realism of, Emergency Management exercises involving all national, and perhaps even international, stakeholders,

- And, last but not least, identify and promulgate those key leadership attributes that are identified as being key to success in emergency management.

In closing, we have a unique opportunity with such a diverse body of expertise present to make concrete recommendations on how to better understand and improve how we systemically address the Individual, Technology and Organisation issue in the nuclear industry, and I hope we exploit this opportunity fully. I wish us a successful meeting and I look forward to hearing your conclusions and recommendations on Friday.