

IMPROVEMENT OF NUCLEAR SAFETY AND RADIATION PROTECTION INITIATED BY THE CHERNOBYL ACCIDENT

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Good Morning Ladies and Gentlemen:

It is a great pleasure for me to be here today to represent the IAEA at the very beginning of the substantive plenary session of this important International Conference. On behalf of the IAEA, I would like to congratulate the Ukrainian Government as the main host for the wonderful organization and successful starting of the Conference in the National Opera House yesterday. I was particularly impressed by the President Victor Yushchenko's statement regarding his personal sympathy toward the victims of the accident, particularly children, and his vision for the future.

I would also express special thanks for the generous hospitality of our host including excellent concert of classical music with attractive Ukrainian flavor last night.

In the words of the IAEA's Director General Mohamed ElBaradei, "Chernobyl was a tragic but important turning point ... It prompted us to focus unprecedented energies and resources to help the affected people and ensure that such a serious accident would never happen again."

On the 20th anniversary of the accident at the Chernobyl Unit 4 nuclear power plant, it is now appropriate for all of us to take a look at ourselves and the entire nuclear safety regime, and examine how the lessons that we learned are being applied to ensure nuclear safety today and for future generations.

Yes, it is true that the Chernobyl accident acted as a catalyst for improvements 20 years ago, but it is also true that in recent years we are still experiencing some reoccurring significant events in many parts of the world. So, what we have really learned--- is that a significant event can happen anywhere and at anytime if we do not have a strong vigilance of maintaining safety as our highest priority.

However, I am pleased to say that after 20 years many improvements have been made in nuclear installations and in human protection. The state of nuclear and radiation safety has been very much enhanced in the last two decades by improvements to technology, processes and international standards.

On behalf of the IAEA I would like to commend the Government of Ukraine for their support and participation in these improvements.

Ladies and Gentlemen,

Awareness of the need for nuclear technology improvements began after the event at Three Mile Island Nuclear Power Plant in 1979 and more fully evolved as a result of the Chernobyl accident.

Following Chernobyl, improvements were made to a wide range of systems and components as well as to the fuel characteristics of RBMK reactors. I will not discuss in detail all of these improvements, but would like to highlight just a few significant contributions.

- changes were made to eliminate the positive power coefficient that was a contributing factor to the Chernobyl event along with improving the shutdown systems to eliminate initial local positive reactivity addition
- assistance measures and guidance were developed to help operators in maintaining appropriate safety margins and increasing the Design Basis Accident criteria for overpressure protection and pipe breaks, and ,
- the International community, under the IAEA's Programme on the Safety of WWER and RBMK Nuclear Power Plants, was instrumental in improving the safety of RBMK and WWER plants including addressing and enhancing, where necessary, reactor pressure vessels and piping integrity as well as in-service inspection methods.

Although the investigations into the technical causes of the Chernobyl event resulted in improvements to nuclear power plants operating worldwide, many more improvements were realized in the area of operational safety. For example; instrumentation and control systems were modernized to improve the human aspects of man/machine interface and provide operators with more readily understood information and the use of probabilistic risk analyses was increased, a tool which was not widely used at the time of the Chernobyl event.

The Government of Ukraine has made significant technical contributions for all of these improvements.

Ladies and Gentlemen:

I would now like to discuss some of the more influential factors that the Chernobyl event has had on the development of nuclear safety processes around the world.

Because we are engineers and scientists, the improvements needed to the nuclear technology, following the Chernobyl accident, were well understood and rapidly addressed. However, the greater challenge was to improve the overall operational safety at nuclear installations worldwide.

To meet this challenge, new international instruments were created, IAEA initiatives were strengthened, guidance on safety culture and safety management was developed, and emergency planning and preparedness programs were improved. These process improvements have enhanced nuclear safety by setting in place prevention systems to discover weaknesses before they become events.

I am pleased to say that in line with these process improvements were also the creation of new internationally accepted instruments and procedures, which marked the beginning of a global nuclear safety regime and the sharing of common visions and objectives for the future of nuclear safety.

The Convention on Nuclear Safety was developed and has subsequently been ratified by all countries with operating nuclear power plants. The Convention has been successful in providing a forum to enhance nuclear safety through a structured peer review process.

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management and the Code of Conduct on the Safety of Research Reactors provide similar functions at other nuclear installations.

Once again, I am pleased to note that the Government of Ukraine has been a strong supporter to all of these international instruments.

The series of IAEA Safety Standards were developed by Member States and promulgated throughout the nuclear industry. These Standards have become accepted by the international community and are the basis for assessing nuclear safety in the entire life cycle, at all types of nuclear installations. The concept of Safety Culture was raised internationally and has since evolved into a broader and more globally accepted structure called safety management.

In 1989, the International Nuclear Event Scale (INES) was developed by a group of experts from the IAEA and the Nuclear Energy Agency (NEA). The scale serves as a means for promptly communicating to the public, in consistent terms, the safety significance of events reported at nuclear installations.

The IAEA/NEA Incident Reporting System (IRS) has also been developed to collect, analyze, and provide feedback on information from around the world on unusual events at nuclear power plants.

Ladies and Gentlemen:

As a result of the Chernobyl accident, the need for an independent, statutorily authorized national regulator responsible for assuring safety in all nuclear applications was re-emphasized.

While the responsibility for maintaining nuclear safety remains at the national level, the IAEA continues its work to facilitate high standards of safety at an international level. To accomplish this, the IAEA established the Department of Nuclear Safety and Security specifically designated as the responsible organization within the IAEA for all safety related matters.

The IAEA's Safety Review Services, like the OSART, IRRRT and RASIAS service, are good examples of the assistance that the Department of Nuclear Safety and Security provides. For over 20 years international review teams have been providing guidance on how to best apply IAEA Safety Standards, comply with Conventions, and put into practice international best practices in order to meet the goal of enhancing nuclear safety.

Now, let me speak about the human protection improvements that have been made in the last 20 years.

The importance of having effective communication capabilities, both domestically and multi-laterally, as well as the need in international assistance in case of nuclear or radiological emergency was strongly recognized. The latter recognition led to the establishment of the first two international documents brought about by the Chernobyl event; "The Convention on Early Notification of a Nuclear Accident" and "The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency".

These conventions were prepared by the IAEA in 1986, shortly after the Chernobyl accident, and entered into force at the start of 1987. Their objective was very much focused on human protection through Member State cooperation in the event of a serious nuclear or radiological accident, especially with the possibility of the trans-border transfer of released radioactive material. I am pleased to say that about 100 IAEA Member States are party to these important conventions.

Influenced by Chernobyl lessons, assistance of experts from countries with substantial radiological experience, including treatment of radiation injuries, has become common international practice in case of emergencies that happen from time to time in some regions of the world. As for emergency preparedness and response, the preventive protective actions for the public in case of developing nuclear emergency suggested by the IAEA are now accepted in many countries.

Since 1986, the IAEA has operated an emergency centre which is an international unit for collecting data on events that have occurred worldwide, and a body for organizing help according to a Member State's needs. Currently, the Incident and Emergency Centre (IEC) serves as the focal point for providing information and assistance in the case of nuclear and radiological emergencies. In its work to ensure that such emergency plans are well-developed, it has carried out activities such as the CONNEX Exercise in 2005, a drill which involved sixty-one member states and seven international organizations. The IAEA is ready to provide further support to member states in the area of emergency response, but in order to do so,

must be able to provide more resources for the further enhancement of the IEC. Your continued support for such an important function would be very much appreciated.

The huge experience of responding to the Chernobyl accident and particularly of protecting the population from radionuclides in the environment, radically influenced the development of radiation protection on both international and national scales. New protection principles, international safety standards and practical countermeasures were developed and widely implemented.

I am pleased to report that an important step in developing the philosophy of radiation protection was the elaboration by the ICRP of protection principles in the event of a radiation accident, namely principles for the justification and optimization of intervention (ICRP-60, 1991). These general principles were soon converted into specific radiological criteria for intervention, at both the early and recovery stages of an accident (ICRP-63, 1993). Later still, partially in response to long-term Chernobyl problems, the ICRP developed recommendations on the protection of the population in conditions of prolonged exposure (ICRP-82, 1999).

To enhance the work in this area, the IAEA, in cooperation with other international organizations, converted the ICRP recommendations into international radiation safety standards, at first in the form of basic safety requirements and then as special requirements on preparedness and response for a nuclear or radiological emergency and on remediation of areas contaminated by radionuclides as a result of past accidents.

By way of introducing these and other safety standards, the IAEA organized cooperation among a number of international organizations, on developing possibilities for adequate response to radiation accidents. Through its technical cooperation system, the IAEA leads ongoing regional and national projects to improve the preparedness of its Member States for such situations.

Before the Chernobyl accident there were no international standards for permissible levels of radionuclides in food products. However, in response to the threat of internal exposure of the inhabitants of many European countries, by May 1986 in the USSR and the European Union, such standards had been developed and had entered into force.

The Chernobyl accident revealed a need for the development of preventive technology which can be applied to different ecosystems, above all, urban and agricultural. Many such technologies were discovered in the USSR from the experience of the Kyshtym accident, in 1990, and others were developed and applied *ad hoc*. Later, international and regional guidelines were developed for radiation protection in the event of serious accidents involving the release of radioactive substances into the environment (e.g., EC projects RECLAIM, STRATEGY).

After the Chernobyl accident, a number of countries developed and put in operation automatic early warning systems for detection of elevated levels of air-borne radioactivity as well as

assessment tools for evaluation of possible radiological consequences and decision support regarding protection actions. These were significant improvements to protect the public.

In order to prevent occasional exposure of the public, substantial efforts have been undertaken by the governments with IAEA's technical assistance aiming at search and recovery of potentially dangerous orphan radiation sources. Owing to this important activity, many dangerous sources have been recently returned under regulatory control.

This very short list of innovations shows that it is difficult to overestimate the influence of the Chernobyl experience on the continuing development of the international system for radiation protection.

Ladies and Gentlemen:

Let me conclude by saying that the Chernobyl accident and its lessons learned initiated the global nuclear and radiation safety regime. Today, many of the principle elements of a global safety regime are in place: namely, the international instruments, the body of international safety standards, strong governmental and legal infrastructures, implementation of safety management and the strong interest in and sharing through growing nuclear safety networks.

The concrete measures taken in the aftermath of the Chernobyl accident have had a radical influence on the development of international nuclear and radiation safety. Improvements made to operating RBMK nuclear power plants have strengthened the design weaknesses that existed at the Chernobyl plant. Processes have been set in place to strengthen nuclear safety worldwide and allow designers, operators and users to help each other by sharing best practices and lessons learned.

Conventions and other legal instruments have been firmly established to facilitate international cooperation and to be able to quickly respond to any future event. Generally, since the Chernobyl accident our world has become more cautious with regard of industrial use of nuclear energy and radiation sources and, therefore, is much safer.

However, nuclear safety worldwide still faces important challenges. External Governmental and business factors can erode both technical and human performance infrastructures if not closely monitored. High standards of radiological and operational safety as well as strong safety management are of utmost importance to prevent an accident such as Chernobyl from occurring again.

Vigilance is needed to fight complacency as the world continues long-term operation of nuclear power plants. The global regime of operating experiences must be embellished into the designs and construction of the next generation of nuclear plants. And, as the Chernobyl Forum pointed out, there is a continued need for well-focused monitoring of the health, environmental and socio-economic impacts of the Chernobyl event.

With these points in mind, we all need to be diligent, to ensure that nuclear safety remains as our highest priority and that the lessons learned from the Chernobyl event are never forgotten.

Thank You for Your Attention.