As delivered

IAEA Activities in Nuclear Safety: Future Perspectives

Address by Mohamed ElBaradei
Director General
International Atomic Energy Agency

Spanish Nuclear Safety Council
Madrid, 28 May 1998

I am very pleased to be in Spain and to be invited to speak about nuclear safety which is one of the core functions of the IAEA. Spain was a founding member of the IAEA. Its substantial contribution to the work of the Agency has covered many priority areas. Last year, for example, the International Conference on Low Doses of Ionizing Radiation was held in Seville; Madrid was the venue for the World Congress on Desalination and Water Re-use; and the annual meeting of the Women in Nuclear Association took place in Valencia. Spain has a long established nuclear industry which currently accounts for nearly 30 percent of national electricity generation. This represents some 165 years cumulative experience in operating nuclear plants which places it tenth in the world in operational experience.

Nuclear safety justifiably is a high profile topic. To my mind, nuclear safety throughout all phases of the nuclear fuel cycle is a determining factor for the future use of nuclear energy. Let me briefly explain why.

Nuclear power currently constitutes some 17 percent of world electricity supply. Recent studies foresee an increase in electricity demand world-wide by a factor of two to three by the year 2030 and in Asia by a factor of seven and more, driven mostly by growing economies in the developing world. Nuclear power is already a mature and readily available technology for meeting this growing energy demand. Moreover, it is a proven technology for cost-effective mitigation of greenhouse gases emissions. It presently accounts for the avoidance of about eight percent of global carbon emissions. These factors would suggest that nuclear power, together with renewable sources, improved fossil fuel conversion and greater efficiency throughout the energy system, will continue to play a key role in national energy strategies.

However, as we approach the new millennium, the role of nuclear energy is under challenge and its future is at a cross-roads. Two decades ago, nuclear energy was hailed as the energy of the future. Today, its growth is stagnant in North America and Western Europe although it is expanding in East Asia, South Asia and Eastern Europe. The fact is that in many countries the use of nuclear power is severely challenged by public opinion particularly on the grounds of safety of operations and of disposal of radioactive waste. Other challenges are also present including apprehensions of nuclear weapons proliferation at the national and sub-national levels and, in an increasingly deregulated energy environment, the challenge of continuing to demonstrate the economic competitiveness of nuclear energy. But to my mind, the contribution of nuclear power to the future global energy mix will be influenced to a very great extent by public confidence in the safety of all nuclear applications including waste disposal.

The Role of the IAEA

The responsibility for nuclear safety lies primarily with national Governments. Since the advent of nuclear energy and for very sound considerations, including the potential cross-border effects of a nuclear accident, Governments have recognized the benefits of international co-operation in the safe utilization of this complex and sophisticated technology. The founding Member States of the IAEA gave it the mandate and the responsibility to recommend, advise and assist our Member States in achieving and maintaining a high level of nuclear, radiation and waste safety. But, except in relation to our own Agency operations, we do not have the power to enforce the Agency's safety standards and regulations.

Over the years, the Agency has implemented its mandate in the field of safety through three complementary activities: the development of legally binding international agreements and the servicing of their implementation; the establishment of a comprehensive corpus of non-binding safety standards; and the provision of assistance in the application of those standards through activities which include safety services, training, fostering scientific research, technical co-operation and information exchange.

For much of the first thirty years of the IAEA, these activities proceeded more or less in parallel until Chernobyl brought home to Governments that "an accident anywhere is an accident everywhere". There emerged a consensus that while the locus of legal responsibility

for safety must remain with national Governments, in many areas this responsibility should be subject to binding norms whose application would be facilitated by international peer review.

Binding Norms

Over the past few years the international community has taken major steps towards a comprehensive, legally binding nuclear safety regime. A number of important new international conventions have been adopted. Their broad purpose is to establish harmonized minimum standards in all countries and to ensure adequate compensation in the event of a nuclear accident. Two instruments of particular relevance are the Convention on Nuclear Safety, which entered into force on 24 October 1996, and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management which was adopted in September 1997.

The Safety Convention stipulates the obligations of States Parties with respect to safety of civil land-based nuclear power plants. Its implementation mechanism is peer review of National Reports at Review Meetings of the Contracting Parties. The first National Reports are due by September this year in preparation for the first Review Meeting in April 1999.

The Joint Convention provides for the obligations of the Parties with respect to the safety of spent fuel and radioactive waste resulting from civilian applications and materials managed within civilian programmes. Again, its implementation mechanism is through peer reviews of the measures taken. Twenty-nine States have signed and Norway and Canada have deposited the first ratifications. The Agency is actively involved in preparation for the early entry into force of the Joint Convention.

The priority now is to sustain the momentum for more States to ratify and implement these conventions. But we also need to be proactive in identifying areas in which the international community as a whole would benefit from binding norms. When it comes to nuclear safety , hindsight is not an adequate teacher. Research reactors, fuel cycle facilities, illicit use of nuclear and other radioactive materials, transport of nuclear material and radiation protection are areas which the IAEA Secretariat is examining with a view to determining the benefits of binding standards. In this context, a review of IAEA recommended physical protection guidelines is currently in progress. It may also be appropriate to revisit the Convention on the

Physical Protection of Nuclear Material to ensure coverage of all nuclear material in international and in domestic storage, use or transport.

Safety Standards

With respect to non-binding safety standards, a high priority for the Agency over the next biennium is to complete a major revision of the Agency's Safety Standards and Guides covering the four areas of nuclear, radiation, waste, and transport safety. In most cases this work involves updating existing standards but we are also focused on ensuring that the entire body of standards is comprehensive, coherent and consistent. This work is being coordinated by an Advisory Commission on Safety Standards comprising senior government officials which overviews the work of four specialist advisory bodies.

In this context, I place high priority on the work of the International Nuclear Safety Advisory Group which is currently preparing four reports: a high level document on the fundamental objectives and principles of nuclear, radiation and waste safety; an updated version of the INSAG-3 report on basic safety principles for nuclear power plants; and two new reports on safe management of the ageing of nuclear power plants and on safety management.

Services

It is equally important to ensure that norms and standards are not only adopted but that they are actually implemented. The Agency has an extensive range of services to assist Member States in the application of safety standards. Their purpose is to achieve a worldwide standard of excellence in nuclear safety through an integrated strategy that includes peer reviews and specific Agency services such as training. They include the Operational Safety Review Teams (OSART), the Assessment of Safety Significant Events Teams (ASSET) and the Assessment of Safety Culture in Organizations Teams (ASCOT).

It is worth explaining in some detail how these services work, for example, a typical OSART inspection. All teams are multinational. They are headed by two senior professional IAEA staff members and include nine additional experts. For training purposes, the team often includes two observers from countries which are developing nuclear power. The mission lasts three weeks. The team reviews eight major areas: management, training, operations, maintenance, technical support, radiation protection, chemistry, emergency planning and preparedness. The OSART

draft report is confidential - it is not released to the public; only to the plant operator, the national regulator and the Government of the Member State. If after 90 days there is no objection, the final report is de-restricted to promote technical exchange and transparency.

These are valuable services that Member States should utilize. They benefit the individual State and, indeed, the international community as a whole. They are the best practical way for safety culture to penetrate borders. I would particularly like to emphasize this point: an OSART inspection provides mutual benefits. The OSART team members identify good practices which are of global application.

I would like to see all countries accept our services, and particularly the OSARTs. I am therefore very glad to note that from 18 May to 4 June an Agency OSART team will be in Spain at the ASCO plant. I expect that this review will be of benefit to the operators by giving them an international perspective on their level of performance and of benefit to the OSART team by familiarizing them with practices developed during Spain's long nuclear experience.

In addition to these global services, the Agency also provides targeted assistance for addressing specific potential problem areas such as a particular reactor design, a gap in national legislation or infrastructure. For example, the Technical Co-operation Model Project on "Upgrading Radiation and Waste Safety Infrastructure" is based on a systematic approach of assessing existing safety infrastructure in 53 participating developing countries, comparing this to a reference model of an acceptable level of infrastructure, preparing a Country Safety Action Plan of necessary improvements and implementing the Action Plan. The "Integrated Strategy for Assisting Member States in Establishing and Strengthening their Nuclear Safety Infrastructure" which commenced last year is a comparable programme on nuclear installation safety.

In Eastern Europe and the former Soviet Union, since 1990 the Agency has conducted an extrabudgetary programme on the safety of particular types (WWER and RBMK) of nuclear power plants. In six countries in South East Asia, the Pacific and the Far East, a newly initiated extrabudgetary programme on the safety of nuclear installations aims to enhance the technical capabilities of regulatory authorities and technical organizations that support them, and improve nuclear safety infrastructures and personnel development.

Safety Strategy

However, to the public, nuclear safety is judged by its global record and, in my own view, I consider that the Agency has a moral responsibility to do everything within its mandate to maintain and enhance this global record. While the overall global nuclear safety trend is generally positive, there remain areas that require further and urgent attention. I quote from one key paragraph in the IAEA's Nuclear Safety Review for 1997:

> "A number of the main events related to nuclear safety in 1997 suggested a common theme of deficiencies in the management of operational safety, even in States with long established nuclear programmes. The specific problems and their direct causes differed from case to case, but the underlying causes seemed to be consistently linked to the absence of key elements of safety culture. Different possible reasons for this have been postulated: complacency bred by past successes, cost cutting in a competitive energy market and authoritarian management, among others but whatever the reasons there is significant room for improvement."

To address this, at the IAEA Board of Governors meeting last March, I advocated a review of our nuclear safety strategy to ensure comprehensive participation, an integrated approach and a truly global assessment of strengths and weaknesses.

This would have several elements. First, and already in hand, is the development of National Safety Profiles covering radiation protection, waste safety and the safety of nuclear installations. These Safety Profiles will be particularly helpful where we are providing technical assistance to Member States so that we have a clear and accurate picture of needs and can effectively target our activities.

Second, I believe it is the responsibility of the IAEA to raise identified or potential safety problems with relevant Member States. It is not the Agency's job to remedy shortcomings, but it is our duty to draw them to the attention of Member States who themselves have the responsibility to devote appropriate resources, with possible assistance from the Agency through its regular and extrabudgetary programmes.

Third, we need to be more active in promoting our safety services in all countries. We will stand ready to provide, and we will be more active in promoting, the services required to assist them in

assessing their performance. The purpose of these services is not to criticize - their purpose is to assist Member States in reviewing the safety status in the country, identifying strengths and weaknesses, and remedying those weaknesses.

A fourth element is more effective use of the IAEA Annual Nuclear Safety Review. I would intend in future that it should report also on the safety measures that need to be taken together with an indication of the magnitude of resources needed, whenever this is possible.

The fifth element is a strengthening of our interaction with the nuclear safety community - regulators and operators - governmental and non-governmental. In this context, I would draw your attention to the special efforts being made to invite a wider range of groups with relevant interests to the International Conference on Topical Issues in Nuclear, Radiation and Radioactive Waste Safety which the Agency is organizing from 31 August to 4 September this year. This conference will discuss six topical issues with a view to consolidate international consensus on the present status of these issues and priorities for future work.

Safety, of course, depends not only on the institutional and management framework but also on technology and engineering. The Agency actively assists Member States to improve the safety and reliability of operating nuclear power plants through the application of advanced science, technology and modern engineering. The IAEA has established four International Working Groups for all reactor lines that are under development in Member states (Light Water Reactors, Fast Reactors, Gas Cooled Reactors, and Heavy Water Cooled Reactors) to review and discuss scientific and technological developments and safety features of current and future nuclear power plants. These include exchanges on national programmes, trends in safety and user requirements, the impact of safety objectives on plant design, and the coordination of research programmes on advanced reactor technology. Based on their advice, the Agency facilitates effective communication through the production of technical documents and conducts Coordinated Research Programmes which often involve experimental activities.

Future Perspectives

This brings me to the question of future perspectives. I will mention three areas: radioactive wastes, residues of past nuclear activities and the safety and security of radiological sources.

The issue of waste management is particularly high profile and urgent. Broad utilization of nuclear techniques has resulted in an accumulation of radioactive waste which has become a growing political problem for many Member States. Waste from medicine, agriculture and industry constitutes the largest volume of total radioactive waste generation. The forthcoming decommissioning of a number of power and research reactors will also result in substantial quantities of radioactive, including high level, waste requiring disposal. In this respect, the decommissioning of the Vandellos 1 reactor is of great interest to the Agency as a source of information and experience that could be applied elsewhere.

I believe we have come to the time when action is required to demonstrate the feasibility of permanent disposal of high level radioactive wastes. The nuclear community must not only say that high level radioactive wastes can be safely disposed, it must also demonstrate this by building final repositories.

A second area in which the Agency's expertise has been called on increasingly by Member States is to organize international radiological assessments on dealing with radioactive wastes and residues from past nuclear activities including nuclear weapons testing and waste disposal practices. The purpose of these assessments is, in the light of radiation protection standards and other criteria, to assess present and future conditions and possible hazards and, if the areas are to be inhabited or otherwise put to human use, to make recommendations on any remedial actions needed.

This year we will publish three reports comprising the results of the International Arctic Seas Assessment Project which investigated the potential health and environmental impacts of radioactive waste dumped in shallow waters of the Kara and Barents Seas; a radiological assessment of the former nuclear test site near the city of Semipalatinsk; and the report of the International Advisory Committee on Radiological Conditions at the Atolls of Mururoa and Fangataufa. A conference to review the Mururoa Study is to be held in Vienna in late June. I expect that our work will grow in this area of radiological assessment and advice on clean-up requirements, techniques and strategy. It will be important to maintain a clear and effective communication strategy to present the facts transparently and objectively particularly to populations living near affected areas.

A third area of international concern is the possibility of the theft and trafficking of nuclear materials and acts of nuclear terrorism. While public attention is largely focused on the proliferation aspects of such activities, there are also serious potential risks for human health from exposure to radioactive sources which are not under the full and effective control of the appropriate national authorities. The Agency has a programme which bridges these two concerns. We have also been actively supporting the work of the Ad Hoc Committee established by the United Nations to elaborate an international convention for the suppression of acts of nuclear terrorism to supplement related international instruments, with a view to ensuring synergy, not duplication, with the Physical Protection Convention. This is a welcome effort to strengthen the international regime for preventing the illicit trafficking of nuclear materials.

Conclusion

Developments in the area of safety of nuclear applications are making progress. Over the past five years we have been largely "catching-up". We still have a way to go to ensure that every State making use of nuclear energy has a sound regulatory infrastructure, that every nuclear operator is implementing "best-practice" safety culture, that all present safety standards have been updated, that binding standards are adopted where these are still required, and that there is agreement and action on the construction of safe and final repositories for high level waste.

Success in rising to these challenges will play a determining role in the future of nuclear energy. The fact is that the full potential of nuclear energy - both for electricity generation and non-power applications - is yet to be achieved. A strong and effective global safety culture is a building block: for public confidence, for operational efficiency and economy, and for the future. The IAEA is committed to assisting its Member States to meet this challenge. It is a task worthy of your continued support.