A formal international nuclear safety regime: The first steps

Collective global efforts can strengthen safety and build public trust

by Morris Rosen

In Vienna, during early September 1991, an international conference on nuclear safety declared in its final document the "need to consider an integrated approach to all aspects of nuclear safety...which would be adopted by all Governments...". Later that same month, a resolution of the International Atomic Energy Agency's General Conference invited the Director General to prepare an outline of the possible elements of a nuclear safety convention.*

For many years, reluctance and doubt plagued the idea of a more demanding and formal international agreement on nuclear safety, some believing it premature, others considering it unnecessary. But then, within less than a month, there was a major consensus for an international regime with a more precise and transparent overview process; a regime which would be codified and implemented through a binding convention.

The first steps

In an environment of political change, perhaps rapid shifts in attitude should be expected. Unquestionably it is an opportune time to achieve a more integrated and formal global approach to safety. Fortunately, we need not start from scratch, but only build and extend ongoing efforts with an added thrust to strengthen and broaden them.

The 1980s have already seen at the IAEA the growth of internationally recognized nuclear safety and radioactive waste standards. There was a concurrent development of widely used safety review services, particularly in the operations area, along with formalized incident reporting procedures. Legal instruments now are also available in the form of binding conventions for physical protection, liability, and for early notification and assistance in case of accidents.

We are in reality not so far away from an explicit safety regime. What remains is the need to provide some further coherence and a legal base, along with the required political will. Now is the time to acknowledge that in an international marketplace, design and construction of nuclear power facilities is a multinational undertaking which calls for harmonization of approaches and criteria. Operation is clearly of transboundary importance. It is no longer premature to have a more harmonized approach to nuclear safety. The IAEA Director General has been authorized by the Agency's Board of Governors to establish an open-ended working group of legal and technical experts to carry out the substantive preparations for a nuclear safety convention. The first meeting in Vienna was set with the optimistic goal of submitting a draft document to the IAEA General Conference in September 1992.

Issues and apprehensions

There are a number of relevant points which are currently being addressed. What are the central ingredients of a safety regime? Would a convention in actual practice improve the safety of existing as well as future plants? Would it encourage the development of rigorous safety regimes in those countries that need it without obstructing or diminishing the responsibility and effectiveness of strong and adequate national systems? Would it call for additional international and IAEA oversight which may not be necessary or desirable?

There is a further item which warrants some initial comments. Would a safety regime, for-

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* See the proceedings of the *International Conference on the Safety of Nuclear Power Strategy for the Future*, published by the IAEA, Vienna (1992), and IAEA document GC (XXXV)/RES/553 (September 1991).

malized through a convention, help build public confidence and simultaneously help sustain the nuclear option?

Building public confidence

In an environmentally conscious and increasingly transparent world, nuclear power's future depends not only on safe performance nationally, but on safe performance everywhere. Public confidence will depend on safety being assured in each and every country using nuclear power. Today, with some 430 operational nuclear plants in 30 countries, several being newly independent, there would certainly be a higher level of comfort worldwide if there were some established and consistent international level of safety.

To raise public confidence, it is necessary now to embrace a course of effective, and also visible, actions which present fresh and strengthened international mechanisms to ensure safety. There are valuable lessons from another field which greatly depends on public confidence: The aviation industry has succeeded in demonstrating to the public that, through national efforts and an array of international arrangements, air transport safety exists. The public readily accepts new aircraft designs and willingly flies from one country to another, perhaps with varying degrees of anxiety, but with an underlying belief that an internationally agreed level of safety exists.

Comparisons with aviation industry

Some of the reasons for the differing public perceptions of safety in the aircraft and nuclear industries can possibly be found in their mechanisms for international collaboration. It is interesting to compare the International Atomic Energy Agency with its aviation counterpart, the International Civil Aviation Organization (ICAO), both of which are specialized agencies of the United Nations.

In the founding ICAO convention, the Member States agree to "co-operate to secure the highest practicable degree of uniformity in regulations, standards and procedures". There is a sensible recognition that in some areas obligatory standards are not needed. For aircraft design, only guidelines exist which assist Member States in developing their own detailed national standards for safe design. ICAO has established technical requirements for aircraft crews which are accepted throughout the world.

Contrary to the ICAO, the IAEA has no obligatory standards in any area. It has developed guidelines for operating personnel, but only in the form of recommendations so that there are notable variations in national operator requirements. While ICAO maintains an obligatory incident reporting system and is also involved in accident investigations, the IAEA operates an Incident Reporting System (IRS) in which participation is general but not obligatory. Accident investigations, like operational safety services, are only undertaken upon request.

What can be seen in these comparisons between the intergovernmental organization dealing with air transport and the intergovernmental agency dealing with nuclear energy are similar objectives, but significant differences in the formality and authority of measures to achieve them.

Ingredients of a safety regime

When searching for the essential components of a nuclear safety regime, it is axiomatic that an effective regime must be based on enhanced international interaction and co-operation. But above all, in any regime, individual countries would retain national responsibility and authority for safety. Assistance would be readily available with no shift of accountability to an international body.

A regime would harmonize approaches to safety and would incorporate and be based on an accepted set of fundamental principles or objectives. It would promote safety through strengthened national safety infrastructures and regulatory bodies. It would promote the timely exchange of operational safety experience. Inescapably, there would be some modest and visible peer assessment system to assure global commitment and use.

At the IAEA, the elements of a safety regime would be implemented through programmes which increase international interaction in safety matters. This would include:

Strengthening national safety infrastructures. The primary enforcement of safety at national levels would be encouraged by supporting the establishment of adequate national infrastructures that include legislation, regulatory mechanisms for enforcement, and long-term programmes for human resource development through education and training.

Reviews of regulatory organizations. The achievement of competent national regulatory oversight would be promoted through peer-reviews. It would encourage greater consistency in national approaches, consistency not being uniformity. It would encourage the use of recog-

nized good regulatory practices within the context of often diverse legal, industrial, and social structures.

Reviews of facilities and their operations. A more vigorous programme of nuclear power plant reviews would be directed at promoting high safety performance during construction and operation, and at helping to identify and foster improvements at installations which do not meet acceptable safety performance levels. IAEA safety services, particularly in the operations area, would be strengthened through noncompulsory but markedly increased regular and periodic use.

Promoting incident reporting and investigation. Mechanisms would be enhanced for improving the quality and timely exchange of findings from analyses of operating experience and investigations of serious accidents. The Agency would encourage a commitment to the IRS for technical use, and to the International Nuclear Event Scale (INES) for improved public communication.

Development of a technical consensus on nuclear waste. A consensus on methods for managing nuclear waste and assistance to help establish or strengthen national waste management systems would be pursued.

Harmonizing safety requirements for future reactors. The development of safety goals and criteria for advanced reactors would be promoted.

Promoting relevant international commitments. A harmonized international approach to nuclear safety would be sought by advancing a nuclear safety convention with relevant protocols. This would entail the development of an appropriate set of fundamental safety principles, along with safety standards and agreements.

Would a regime containing enhanced international interaction to foster effective safety infrastructures, plant reviews, and operational experience feedback actually improve global safety?

Observation of the current experience in eastern Europe is possibly sufficient to answer the question. A concerted and intensive cooperative international effort is under way to assist countries in the region in meeting the basic requirements of a safety regime. In the future, hopefully an effective safety regime would prevent such extreme situations.

The degree of IAEA oversight responsibility in carrying out the elements of a regime need not be an issue. The Agency Statute does not give it regulatory authority. Its authority derives from the pressure of international opinion which will call for increased oversight of weaker nuclear power programmes. Such increased oversight is well demonstrated by the augmented IAEA activities in countries with first-generation Soviet-designed nuclear power plants where a co-ordinated and active international approach was an absolute necessity.

While strengthening weaker national programmes, a safety regime need not in any way undermine strong and effective national regulatory bodies. Such bodies would not only lend their strength to problem resolution, but also on occasion, they themselves would gain through regularly scheduled exchanges and peer reviews.

A framework convention

A comprehensive convention would formalize a safety regime by containing commitments to basic principles and other agreements, along with some review system. Although a single unified document with all required annexes or protocols has been endorsed by some, the most discussed approach involves a "framework convention", a technique now common to many contemporary environmental agreements.

A framework convention contains general principles and obligations. This would be followed by distinct agreements on particular issues, some to be adopted at later dates; such agreements taking the form of supplementary protocols to the framework convention. Some protocols would be included in the initial document and others could be adopted by a stipulated plurality of the IAEA General Conference. The protocols might come into force for each party to the convention unless it specifically stated reservations within a prescribed time period.

A set of fundamental principles

The general principles and obligations would comprise the main goals of the convention. They would be written at a non-detailed and non-prescriptive level. No single set of detailed binding standards could hope to encompass the differences in plant design, location, operating philosophy, and legal and regulatory institutions among countries. A practical set of succinct fundamental obligations would address the safety elements in general terms with necessary explanatory details provided.

As an example, a first principle could address regulation by governments, requiring that they establish a legal framework and independent regulatory organizations for ensuring protection and safety in nuclear power.

Explanatory details are illustrated below:

Governments shall bear the primary responsibility for adopting and continuing to use nuclear power and for controlling nuclear installations and the radiation exposure they may deliver. They shall establish a legal framework for protection and safety and provide the necessary infrastructure for the implementation of the legal requirements, including the allocation of sufficient resources. They shall also advocate the necessary research and development activities and foster the exchange and dissemination of relevant information. Governments shall institute the formal mechanisms for discharging such responsibilities by introducing legislation that establishes regulatory organizations and assigns the prime responsibility for protection and safety to the operators of nuclear installations. The regulatory organizations shall establish protection and safety norms, regulations, and rules and standards, including exclusions and exemptions, and provide for their enforcement. They shall institute formal systems for governmental registration and licensing, or other statutory means, and for surveillance, monitoring, review, verification and inspection of nuclear installations. They shall also take any enforcement actions as well as require feasible corrective actions by operators. The regulatory organizations shall act independently of the suppliers of nuclear installations and of their operators; the separation of the responsibilities of the regulatory organizations and those of other parties shall be clear, so that the regulators retain their independence as a protection and safety authority and are guarded from undue external influence.

An example of a complete set of principles, without the needed explanatory details, follows:

First principle: Regulation by governments. Governments shall establish a legal framework and independent regulatory organizations for ensuring protection and safety in nuclear power.

Second principle: Responsibility of operators. The operator of a nuclear installation shall bear the ultimate responsibility for protection and safety.

Third principle: Protection of individuals. The magnitude and the likelihood of individual exposure due to nuclear power shall be limited.

Fourth principle: Preservation of the environment. Precautions should be taken to control and limit negative impact on the environment.

Fifth principle: Optimization of protection and safety. Nuclear installations shall be subject to the best protection and safety measures reasonably achievable under the prevailing circumstances.

Sixth principle: Procedures of defense-in-depth. Procedures of defense-in-depth shall be implemented to compensate for potential failures in protection and safety.

Seventh principle: Application of sound technical criteria. Protection and safety shall be based on sound engineering and management, quality assurance, trained and qualified personnel, comprehensive assessments, and lessons from experience and research.

Eighth principle: Attaining a safety culture. An established protection and safety culture shall govern the actions and interactions of all persons and organizations engaged in nuclear power.

(See the following article, which presents a proposed comprehensive set of fundamental principles.)

Supplementary protocols

There would also be a commitment to work towards the adoption of distinct supplementary protocols. These protocols could include:

- basic safety standards for nuclear installations;
- basic safety standards for radiation protection;
- regulations for the safe transport of radioactive materials;
- transboundary movements of radioactive waste;
- incident and accident reporting for technical and public information purposes;
- peer audits of regulatory organizations; and
- peer audits of facilities and their operation.

A system involving peer reviews to assess implementation, for example at periodic conferences of the parties to the convention, would be a possible mechanism to provide confidence in compliance with the adopted principles and obligations.

Collective international commitment

The safety philosophy and practices involved with a formal international nuclear safety regime would foster a collective international involvement and commitment.

A formal regime would be a practical example to other potentially hazardous industries of our industrial world, including those involving alternative energy sources.❐