Establishment of an international nuclear safety body

by M. Rosen*

During the past year there has been increasing interest in the establishment of new international mechanisms for developing a more uniform approach to nuclear safety. In September 1982, in his statement to the IAEA General Conference in Vienna, the Director General raised the question of the desirability of considering the formulation of international agreements on universally applicable nuclear safety standards. Shortly afterwards, in a paper presented at the Second International Conference on Nuclear Technology Transfer in November 1982 at Buenos Aires, the President of the American Nuclear Society referred to this idea and suggested that an "International Institute of Nuclear Safety" be organized for the purpose of developing a uniform nuclear safety philosophy and set of safety principles.**

International co-operation has contributed, through standards development and information exchange, to a high safety level in the design and operation of nuclear installations world-wide. Thus, the idea of also developing an internationally agreed-upon, overall concept for nuclear safety merits consideration. National approaches to nuclear safety developed over the years have resulted not only in differences in regulations, but also in variations in technical requirements from one country to another. This has been a burden for the international nuclear market, and it has possibly had an effect on the level of public confidence. The development of a clear and universally acceptable approach to safety guided by an international body composed of prominent experts might well alleviate national and international safety concerns, and might also positively influence public opinion.

If such a group were founded, a number of organizational and administrative questions would arise. The International Nuclear Societies Group (INSG) has established a special committee to study the idea of an International Institute on Nuclear Safety or some comparable initiative and to provide an answer to these questions by the latter part of 1983.

To contribute to the ongoing discussions, it may be useful to consider matters such as the tasks, organizational nature and affiliation, composition and structure, and financial support of an international nuclear safety body.

Background

The need for protection against the effects of ionizing radiation was recognized early in the century. At the time nuclear power was under development in the 1950s, a philosophy of radiation protection to deal with the widespread use of radiation sources was already well established by the International Commission on Radiological Protection (ICRP), which had been set up as international non-governmental organization in 1928. Through the years the ICRP has developed a consensus on the basic principles governing exposure to radiation, and its recommendations are widely respected and used by national and international organizations. This philosophy is now embodied in a dose-limitation system which requires that all practices involving exposure to ionizing radiation be justified, that individual exposure be controlled through specified limits, and additionally that radiation exposure be made as low as reasonably achievable, social and economic factors considered.

With the introduction of nuclear power, an additional consideration outside the existing radiation protection framework appeared: the need to determine not only *an acceptable level of radiation exposure*, but also *an acceptable level of risk* of radiation exposure, taking into account accidents which could release large inventories of radioactivity. A new scientific and engineering discipline – "nuclear safety" – emerged, but no overall safety approach to address the new risk factor introduced by nuclear power was developed.

What initially merged as the basic safety approach was the use of a so-called "design basis accident" (DBA), which was considered to be credible although unlikely. This concept was generally adopted to serve as a guide for evaluating the radiological consequences, and thus the acceptability, of reactor sites and safety system designs. This methodology, which did not deal explicitly with the probability of occurrence, allowed for differing definitions of design basis accidents and varying methods

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of implementation which depended on the technical judgement of those nationally responsible for designing and regulating nuclear power plants. Currently, in order to deal more specifically with the question of risk (especially for low-probability events) and to provide a comprehensive and systematic approach to it, methods of probabilistic risk analysis (PRA) are being developed.

Tasks

The tasks of the proposed international nuclear safety body would be to develop a coherent framework within which nuclear safety could be considered, and to formulate broad safety principles which could be universally applied. The basic issue it would deal with would be how low the risk of radiation exposure from nuclear power plant accidents should be to be considered acceptable. Consideration would be given to elaborating the methodology for quantifying the probability and consequences of accidents. This would cover the complete accident sequence, starting from the source term and including emergency response, and would use probabilistic risk analysis techniques where appropriate. It would also evaluate the role of cost-benefit trade-offs in assessing the point to which risk could be reduced before any further reduction would not justify the effort necessary. The objective would be to eventually translate the developed philosphy into a licensing approach; but, as is true of the ICRP, the new body would not encroach upon the responsibility of the various national regulatory bodies by attempting to formulate specific advice concerning regulations.

Specific, universally applicable, technical recommendations could also be issued in areas such as: the use of probabilistic risk analysis methods, including consideration of the uncertainties related to them; the assessment of acceptable population distribution around nuclear facilities, including the possibility of compensating for unfavourable distribution by enhanced safety features; the establishment of criteria for planning emergency measures; the possible reduction in values used for calculation of the radioactive release in case of severe accidents (the source term); and the use of advanced forms of containments to mitigate against a degraded-core accident. Additionally, unresolved safety issues could be identified, and research and development encouraged where desirable.

The development of uniform safety principles could take several years, while specific technical recommendations would be the work of special committees whose work would proceed in parallel on a number of topics.

Administrative matters

In considering the creation of an international body, a number of organizational and administrative questions arise. Should it be a governmentally or non-governmentally appointed body? Should it be organizationally independent or organizationally related to an existing international nuclear organization? Should it have a permanent staff or a temporary staff with secretariat and working groups? How should the costs be managed?

Organizational nature and affiliation – The non-governmental option may have the advantage of potentially greater freedom from political and commercial pressure. However, the alternative option with its likely advantages of governmental commitment and support does not preclude working independence. An organizationally independent body would have to generate its own financial, technical, and logistical support, whereas organizational affiliation would alleviate some of these problems. The ICRP is an example of a non-governmental body not organizationally related to an international organization. The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) is an example of a governmentally appointed body directly responsible to an international organization. A third possibility, affiliation of the new body with a regional organization, has obvious limitations. The OECD/NEA, for example, does not include the developing countries or those with centrally planned economies.

Association with the IAEA would allow for some technical, logistical, and financial support, and would provide affiliation with the international organization whose sole function and expertise is concerned with nuclear energy. The IAEA draws its membership from the entire nuclear community and works in co-operation with the regional organizations such as the Commission of the European Communities (CEC), the Council for Mutual Economic Assistance (CMEA), and the Nuclear Energy Agency (NEA) of the OECD.

Other reasons exist for positive consideration of affiliation of the proposed body with the IAEA. While the implementation of the ICRP recommendations, through regulations or codes of practice, has been made by appropriate national authorities, the newest ICRP recommendations are being promoted on an international level through the Agency's Basic Safety Standards for Radiation Protection. The recommendations of the proposed safety body will undoubtedly call for a rigorous programme of co-ordinated international implementation.

The Agency is the only organization with sufficiently broad governmental representation to serve as a mechanism for developing the international agreements for implementation. It has already fostered agreements in many areas, including those in physical protection and emergency assistance. Moreover, safety is a problem that transcends national borders and regional groupings. An agency that already represents both the nuclear and non-nuclear power nations, and whose membership spans the globe, is best equipped to deal with this universal problem.

The Agency is also a recognized promulgator of international nuclear standards. In addition to its work in radiation protection, it embarked on a major standards activity in 1975 with the establishment of the Nuclear

Safety Standards (NUSS) programme to develop a set of internationally agreed-upon standards for nuclear power plants. The published NUSS Codes and Guides represent consensus on the actual practices in Member States. There are also the well-known and widely used Agency Regulations for the Safe Transport of Radioactive Materials.

Composition and structure – The ICRP provides a useful model for determining how a non-governmental body might be organized. It was established in 1928 by the International Congress of Radiology, a professional society of radiologists, to consider the fundamental basis underlying radiation protection. The members are selected every four years by the Commission from its own nominations and those submitted to it by national delegations to the International Congress. For historical reasons, these selections are subject to formal approval by the executive committee of the Congress. Terms of service overlap and it is required that approximately one-third of the membership be changed at each periodic Congress.

The 13 members are selected on the basis of their recognized knowledge, and there is a balance based on expertise rather than on nationality. The Commission has established four expert committees, each composed of about 15 persons and chaired by a member of the Commission. Much of the work of ICRP is performed by small, ad-hoc task groups which are normally directed by one or more members of a committee or of the Commission. Additional experts are invited to participate. Altogether some 40 individuals take part in task-group work, bringing the total participation in ICRP to more than 100 experts from over 20 countries. The Secretariat of the International Commission, one professional employee aided by clerical staff, is located in the United Kingdom.

UNSCEAR provides an example of a governmental committee organizationally related to the United Nations. It was established in 1955 by the General Assembly of the United Nations, after there had been extensive testing of nuclear devices, to evaluate the observed levels of ionizing radiation from all sources and their possible effects. UNSCEAR is an organ of the General Assembly, and its evaluations are presented in detailed reports to this body.

If the affiliation of the international nuclear safety body is to be with the IAEA, its first members could be chosen by the Director General from a panel of nominees submitted by a selection committee. The nominees could be recommended by governments, by the nuclear engineering societies of the recently formed International Nuclear Society Group (INSG), by other international organizations or by a combination of sources. The aim must be to choose specialists known for their qualifications and their integrity, and of sufficient prestige so that their recommendations would, like those of the ICRP, receive international acceptance. They should be independent of political and commercial influences. However, consideration must also be given to an adequate geographic distribution so as to ensure the integration of regional approaches and experiences. There could be about 15 members, and they would decide on the number and the composition of supporting working groups.

Financial support – The funding of the proposed international body would be largely dependent upon the extent of its tasks and affiliation. The funds necessary to cover the expenses of meetings, travel, and salaries or allowances would, of course, be a function of the size of the main body itself, its committees, and the number of consultants. Other significant expenses would result from interpretation, translation, and publication costs.

Estimated expenditures for the ICRP will amount to approximately US $160 000 in 1983. These are financed principally by six international organizations and six individual countries. Meetings of the Commission itself are held yearly, and with its four committees every two years. In addition, committees and task groups meet on their own to discuss and prepare their reports. The ICRP supports the travel costs of some individuals to attend these meetings. During recent years up to two-thirds of the total travel costs were borne by the institutions of the ICRP members. The budget includes staff costs of only its small secretariat. The Commission conducts all its work in English, and publication costs are covered by royalties.

The budget of UNSCEAR is approximately US $500 000 per year. The higher sum results from its practice of paying all travel costs of its 20 members and 15 consultants as well as the cost of interpretation into five official languages, and translation and publication costs. In addition to the salary of its small secretariat, consultant costs run about US $30 000 annually.

These amounts can be compared to the US $5 000 000 budget of the IAEA Division of Nuclear Safety, about half of which goes for the costs of 30 professional and 20 general services staff. The cost of the Division's work on nuclear safety standards, in 1983, amounts to about US $800 000, and the costs of safety advisory services for nuclear facilities amount to US $330 000.

Although the exact size of the proposed international body must await detailed consideration, it should be organizationally sound and should be established on a firm financial basis.

Conclusion

The issue of whether nuclear plants are safe – or safe enough – is in the limelight in this era when environmental protection is increasingly becoming a political issue. Perhaps the time has come when the creation of an international body of acknowledged experts in the area of nuclear safety could make an important contribution to resolving some of the questions involved. The IAEA stands ready to co-operate in this venture.