

New directions in nuclear safety

An overview of the Agency's expanding programme

by Morris Rosen

The direction of the IAEA's commitment to nuclear safety has been continually evolving since the inception of its Nuclear Safety Division in 1957. Originally, the domain of nuclear safety rested almost exclusively within national programmes and the role and resources of the Agency were limited. Early work by the Agency centred around the establishment of standards in areas where the matter was clearly of an international character. In the 1960s, for example, the well-known regulations on the transport of radioactive materials across international boundaries were developed. Of course, certain "ad hoc" programmes and assistance were carried out to meet the special requests of Member States.

In the early 1970s, as the number of orders for new nuclear power plants increased, work on a comprehensive body of safety standards for nuclear plants began. Eventually, 60 documents of the Nuclear Safety Standards programme (NUSS) were developed by the Agency for the purpose of establishing an internationally agreed frame of reference for the safety of nuclear power plants. These documents concern recommendations for nuclear power plant safety in siting, design, operation, and quality assurance.

In 1983, for example, an international Incident Reporting System (IRS) was established at the Agency to share operational safety experience among Member States.

In the early 1980s, the numbers of new nuclear power plant orders began to level off. This factor, coupled with the aftermath of the accident at Three Mile Island, led the Agency to reconsider its programmes and to shift its focus away from siting, design, and construction safety towards operational safety. Several new programmes were established.

Also in 1983, the Operational Safety Review Team (OSART) programme was created as a mechanism to provide useful advice to nuclear power plant operators on how to enhance the safety of their plant. The teams are composed of 10 to 15 experienced individuals, often operators from other nuclear power plants, who travel to

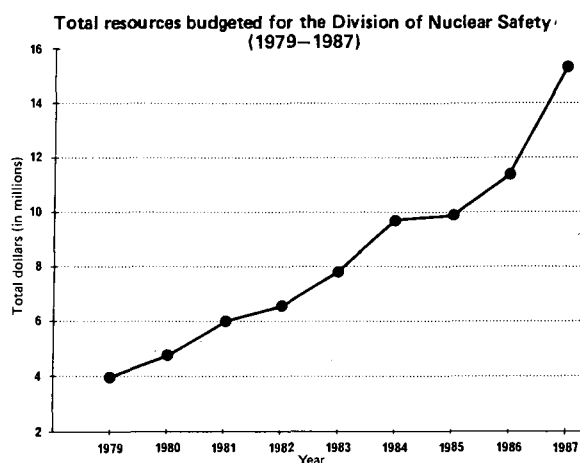
the plant site and perform a 2-to-3 week in-depth review of the local operating practices. They cover such areas as maintenance, operations, technical support, radiation protection, training, emergency planning, and others. The review is not aimed at checking compliance with national regulatory requirements but rather to objectively assess the plant's safety practices against other successful international practices and to exchange ideas on safety improvement at the working level. In the long run it is hoped that an internationally agreed level of operational safety may be achieved, not through direct administrative actions, but instead, by the spontaneous acceptance of successful, cost-effective safety practices.

As the number of operating plants increased in the 1980s, the importance of radiation protection for workers likewise increased. This led the Agency to revise its Basic Safety Standards in 1982, to incorporate the new ICRP principle of dose optimization.* Additional technical guidance covering occupational and public radiation protection needs, and emergency planning and preparedness, were created during this same time frame.

As each of these programmes matured, and the number of interactions between the IAEA and the national safety programmes increased, the Agency soon began to establish itself not only as a co-ordinator between national safety programmes but as a useful element within the national programmes themselves. At first, acceptance by Member States of the new Agency role came slowly, but steadily gained momentum as the benefits were realized. As the growth of the Nuclear Safety Division budget over the last 10 years indicates, governments have given the Agency's activities in this field emphasis.

Early in 1985, the Agency took another step to enhance its responsiveness to evolving nuclear safety needs by establishing an International Nuclear Safety Advisory Group (INSAG). This group, composed of

* ICRP is the International Commission for Radiological Protection.



Note: Resources include regular budget funds, technical co-operation funds, extra-budgetary resources, and in 1986-87, the approved increases for strengthening safety activities.

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13 safety specialists, meets regularly to review the Agency's activities in nuclear safety and to provide advice on future directions. To ensure that reviews and advice are balanced and comprehensive, special care was taken in selecting the INSAG members from a range of countries and disciplines including research, industry, and regulation aspects.

Initiatives after Chernobyl

In April 1986, the experience at the Chernobyl reactor graphically demonstrated the international character of accidents. The role of the Agency both as an international safety co-ordinator and an essential element of the national programmes themselves was heightened even further. On 21 May, at a special meeting of the Board of Governors, its 35 Member States unanimously agreed on the necessity of strengthening the Agency's nuclear safety programme. In June 1986, at its regular meeting, the Board reaffirmed this position by increasing the regular budget resources for nuclear safety by one-third. In the short term, implementation by the Agency of these new co-ordination activities was agreed upon:

- Drafting of two new international agreements by a group of experts, in July 1986. One, on early notification of nuclear accidents and transfer of related information in the event of potential transboundary effects; the other, on co-ordination of emergency response and assistance in case of accident with transboundary radiological releases. (See *News in brief*.)
- Organization of a special post-accident review meeting to be held at the Agency from 25 to 29 August — to co-ordinate the flow of information received by then — during which the Chernobyl accident would be reviewed by a team of Soviet specialists in the light of available information. All delegations of Member States would be invited to attend this meeting, with the heaviest participation expected from those with national nuclear power programmes. (See *News in brief*.)
- Holding of a Special Session of the IAEA General Conference in September, immediately before its Regular Session, to review the report prepared of the post-accident meeting and to discuss the resulting INSAG recommendations. Other topics to be discussed are IAEA's expanded programme on nuclear safety and safety improvements, in co-operation with other international agencies and regional organizations such as the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development, the Commission of the European Communities, and the Council for Mutual Economic Assistance.
- Convening of an expert working group in November 1986 to formulate recommendations on how to improve international co-operation in the field of nuclear safety. This group will examine whether it is advisable and feasible to transform some standards in NUSS documents into minimum rules to which States might commit themselves.

OSART missions performed to date and planned for the immediate future

1983		
Korea, Rep. of	KO-RI, Unit-1	8-26 Aug.
1984		
Yugoslavia	Krško	6-24 Feb.
Philippines	PNPP	25 June-12 July
1985		
Pakistan	Kanupp	7-20 Jan.
Philippines	PNPP	4-15 Feb.
Brazil	Angra, Unit-1	12-30 Aug.
France	Tricastin, Unit-1	12-29 Oct.
1986		
Mexico	Laguna Verde, Unit-1	6-24 Jan.
Finland	Olkiluoto, TVO, Unit-1	3-21 March
Sweden	Barsebaeck, Unit-1	1-19 Sept.
Netherlands	Borssele	6-24 Oct.
Germany, Fed. Rep. of	Biblis, Unit-A	Late 1986
Korea, Rep. of	KO-RI, Unit-3	Late 1986
1987		
Netherlands	Dodewaard	Early 1987

Stronger safety support

In the longer term, the Agency's role within national safety programmes will be strengthened, particularly with respect to operational safety:

- During the first few months following the Chernobyl accident, several new requests for OSART missions to nuclear power plants have already been received from developing and industrialized countries. Thus, the OSART programme, which initially was intended to conduct 5 to 6 nuclear power plant reviews annually, is now expected to expand considerably by 1988 to an annual total of 15 to 18 missions per year. The guidelines for missions will also be modified to reflect recent developments in emergency operating procedures, operating experience feedback, accident management, and emergency response capability. A similar expansion is expected in the number of planned research reactor review missions to meet the increased demand both from developing and industrialized countries.
- New Assessment of Safety Significant Events Teams (ASSET) will be established to perform a local in-depth analysis of the operational experience of nuclear power plants in relation to their safety. In this service, the teams will review records to identify safety-related significant operational events, to assess accident precursors, and to assist in the development of effective preventive measures. Human factors are almost always a contributory element to the direct cause of an event, thus the ASSET investigation will be particularly

focused on the human implications. One request for such a mission has already been received by the Agency and it is foreseen that perhaps four similar missions per year will be performed.

- The Incident Reporting Systems (IRS) will now be expanded to include more significant events and a more effective mechanism for the analysis of the reported events. A database on the main safety features of operating plants is envisaged and, under the extended Agency programme, a prompt notification procedure for severe accidents will be instituted to allow for an earlier examination and interpretation of incidents.

- An enhancement of the Agency's emergency response mechanism is planned with the aim of meeting demands during major emergency situations. An Emergency Response Unit will be established to process and co-ordinate requests for assistance and to increase the national capabilities to deal with abnormal situations. Communication and data processing facilities, and a limited inventory of radiation protection equipment, will be established.

- The Radiation Protection Advisory Team (RAPAT) programme, developed by the Agency in the last few years, will also be expanded. The importance of the RAPAT missions lies in the fact that they help non-nuclear power Member States to establish a radiation protection capability. This may be of great assistance regarding activities involving the handling of their domestic radioactive material. It also may provide a useful basis for their involvement in the consequences of radioactive releases from accidents abroad. The RAPAT programme has met with very positive response from Member States. To date, 18 missions are planned until 1988, but it is obvious that their number will increase in the future. Training activities in the field of radiation protection will also be strengthened. New training is foreseen in radiation monitoring and dose assessment, emergency planning and preparedness, intervention actions, and in maintenance and calibration of radioactive measuring equipment.

Other co-ordinating activities of the Agency will be substantially increased as a consequence of the Chernobyl accident, some of them in co-operation with other agencies. In the assessment of long-term health effects of radioactive releases from Chernobyl undertaken by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the World Health Organization (WHO), the Agency will have the responsibility of collecting data from all affected countries. In 1986-87, the Agency will establish a comprehensive database which will also be used, in co-operation with the World Meteorological Organization (WMO), for the validation of environmental transport models.

In the field of nuclear standards, the Agency completed, in 1985, the 60 Codes of Practice and Safety Guides of the NUSS programme and established a continuing programme of implementation. The Chernobyl accident has stressed the need for re-

analysing accident sequences and for improved safety features to reduce radioactive releases. As soon as a more complete understanding of the accident becomes available, the adequacy of existing safety features of the different reactor types will be examined and recommendations for possibly updating and upgrading existing NUSS standards will be made. Both INSAG and the Advisory Group on Nuclear Safety Standards (NUSAG) will be involved in this long-term undertaking. This work will also include the preparation of manuals and of reports to integrate and supplement the guidance already given in the NUSS documents. Many such documents have already been prepared; among the documents in preparation, there is one on the Seismic Probabilistic Safety Assessment (PSA) and another on methodologies to prevent extensive groundwater contamination by very large releases.

In the area of new reactor types, an active ongoing discussion is foreseen on inherently safe reactor systems with simplified design and smaller unit size. Typical of these systems are the modular high-temperature gas-cooled reactor (HTGR) and the process-inherent ultimate safety (PIUS) reactor type. The first is being developed in the USA and in the Federal Republic of Germany, while the second is a Swedish concept. Interest in these designs has been stimulated by the increasing complexity of reactor systems in operation, which gives rise to construction, licensing, and operational problems. The Agency is planning a number of meetings on these new-reactor types and on potential international co-operation in this field.

Shortly after the Chernobyl accident, proposals were made to the IAEA Board of Governors for improved nuclear plant safety. Shown at one session are (from left) Leonard Konstantinov, Deputy Director General and head of the Department of Nuclear Energy and Safety; Dr Blix, Director General of the IAEA; Morris Rosen, Director of the Division of Nuclear Safety; Mrs Artati Sudirdjo, Chairman of the IAEA Board of Governors.

