

IAEA-IRS: New directions in a co-operative network for nuclear safety

Started in 1983, the Agency's incident reporting system is being strengthened

by Valeri D. Tolstykh

Rapid progress in science and technology brings not only benefits for mankind, as the accident at the Chernobyl nuclear power plant has reminded once again. Though the nuclear power industry has an excellent safety record, the Chernobyl accident gave evidence of the severity of unusual events that can occur. Efforts to assure the safe operation of nuclear facilities of all kinds continue to be a prerequisite for widespread utilization of nuclear energy, and it is always possible to make improvements. Safety experts worldwide, therefore, are focusing attention on mechanisms to better use the growing body of operational experience at nuclear power plants: The accumulated lifetime of power reactors already in operation is about 4000 reactor years.

Increasingly, it is recognized that feedback of operational experience provides a unique opportunity to improve nuclear safety. Every accident or abnormal event and situation must be screened. Where appropriate, it must be rigorously investigated to assess its implications for existing system design, equipment design and quality, operator training and simulators, computer models of the system, plant procedures, safety systems, emergency measures, management, and regulatory requirements. Implementation of lessons learned from operational experience improves not only plant safety, but equipment reliability and plant availability as well.

Many countries have set up systems to collect, analyse, and disseminate information on safety-related events and situations in nuclear power plants. The IAEA has recognized the advantages of joining in various national and international efforts to exchange operational experience worldwide. In 1983, it began operating an international Incident Reporting System (IAEA-IRS) to complement national systems.

To date, the IAEA-IRS has proved its importance to countries with large nuclear power programmes, as well as to those with one or two nuclear power plants.

Yet the reactor accident at Chernobyl, and other past accidents, have pointed out the evident need for greater international co-operation in nuclear safety and the expansion of IAEA safety activities. Now the time has

come to take measures for development of an international nuclear safety regime. The IAEA-IRS ranks among the important tools in this task.

The system's status

Currently, 15 of 26 Member States with operating nuclear power plants take part in the IAEA-IRS directly while seven others participate through the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (NEA/OECD), which operates a similar system. Additionally, two Member States participate in the IAEA-IRS through meetings, although they have not officially joined the system as of yet. (See accompanying table.)

Countries with nuclear power plants participating in IAEA-IRS (as of November 1986)

Country	Date of IAEA-IRS participation	Reports stored in IAEA-IRS
<i>Participants:</i>		
Argentina	May 1983	Yes
Brazil	November 1983	Yes
Bulgaria	February 1983	Yes
Czechoslovakia	January 1985	Yes
Finland	May 1983	Yes
German Democratic Republic	January 1984	Yes
Hungary	October 1984	Yes
India	June 1984	Yes
Korea, Republic of	February 1983	Yes
Netherlands	June 1983	Yes
Pakistan	August 1984	Yes
Spain	January 1983	Yes
United Kingdom	March 1986	Yes
USSR	September 1984	Yes
Yugoslavia	May 1986	Yes

Participants through the NEA/OECD:

Belgium	February 1983	Yes
France	June 1983	Yes
Germany, Federal Republic of	July 1983	Yes
Italy	March 1985	Yes
Sweden	October 1983	Yes
United States	August 1985	Yes
Canada	July 1986	Yes

Reporting and meeting participants:

Japan	Yes
Switzerland	Yes

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Currently, the system contains 247 incident reports, including 59 from non-OECD countries.

In 1986, the IAEA, together with some invited experts, prepared the first incident report review in the system's history. A substantial amount of engineering judgement was involved in the review. Moreover, the job entailed certain limitations — such as a limited database; a large variation in the quality of reporting; and great diversity in terms of reactor type, operational practices, regulatory climate, and the state of maturity in the nuclear technology of Member States. Overall, this restricted, to a large extent, the generalizations that could be drawn from the IAEA-IRS reports. Nevertheless, the review could be useful to Member States. (See an accompanying table for an example of information from the review, specifically a breakdown of the causes of IAEA-IRS incidents.)

System principles and features

Intended as a worldwide scheme to complement national systems, the IAEA-IRS was created to share information on safety-significant events and situations in nuclear power plants with all participating countries. The end goal to which it contributes is reduction of the frequency and severity of events at nuclear plants worldwide.

The IAEA-IRS has the following main characteristics:

- Countries commit themselves to send relevant information to the IAEA.
- The level of significance of the events or situations to be reported are determined by national authorities and are subject to change.
- Only participating countries receive the information sent to the IAEA. (All participants are asked to designate a co-ordinator responsible for sending, receiving, and distributing information directly to or from the IAEA.)

All Member States can participate in the IAEA-IRS if they have:

- Embarked on a nuclear programme*
- Established or intend to establish a regulatory body with the appropriate authority to regulate safety of nuclear power plants**
- Established or intend to establish a national system along the lines set out in the IAEA's *Guide on a national system for collecting, assessing, and disseminating information on safety-related events in nuclear power plants*

* A Member State with no nuclear power plants in operation, but which plans to participate in the IAEA-IRS, should contact the IAEA about a year before its first nuclear power plant enters service for advice on arrangements it should make to set up its own national reporting system, and on the way in which information should be sent to the IAEA.

** See *Governmental organization for the regulation of nuclear power plants*, IAEA Code of Practice, Safety Series No. 50-C-G (Vienna, 1982).

Causes of incidents reported to the IAEA-IRS

Major contributing cause	Percentage of incidents
Design deficiency or error	18.7
Operational error	17.5
Corrosion	10.7
Maintenance deficiency or error	10.3
Installation deficiency or error	8.0
Other fluid hydraulic effects	7.6
Ageing	7.2
Causes external to the plant	5.6
Fabrication deficiency or error	4.0
Procedural deficiency or error	4.0
Environmental influence	2.4
Violation of operating technical specifications	2.0
Loose parts	2.0

- Given an appropriate organization, usually the regulatory body, the responsibility for sending information on unusual events or situations to the IAEA.

The IAEA-IRS is operated in co-operation with regional organizations, such as NEA/OECD, which has its own system (NEA-IRS). Co-operation with the NEA-IRS is based on reciprocity, which takes into account the ratio of reactors operating in OECD countries to those in the rest of the world (about 3:1).

To review information received for the IAEA-IRS and to review system operation, the Agency convenes a technical committee at least once a year. Composed of experts having access to IAEA-IRS information, it selects events from IAEA-IRS reports for analysis that it considers of particular interest to the international community. Joint meetings of the IAEA and NEA for the exchange of information on abnormal events also have been held annually since 1983.

New directions and roles

Based on the views of Member States after the Chernobyl accident, the IAEA-IRS should be upgraded and expanded to broaden the information base, and to more extensively analyse the information provided, with a view to learning lessons that can be made available to Member States. Wider and more active participation by Member States was encouraged.

Bearing in mind proposals previously developed by IAEA to improve the incident reporting system, an evolutionary approach should be encouraged for its future development.

Some changes already have been made and are incorporated in a new document — entitled *Guide on a system for collecting, assessing and disseminating information on safety-related events in nuclear power plants, Part I — National System; Part II — IAEA-IRS*. It was recommended for publication by the IRS technical committee after agreement with the NEA-IRS and review by national co-ordinators.

Other proposals are related to exploring possible IAEA activities with respect to: 1) safety assessment investigations; 2) production of a compendium of incident descriptions (lessons learned and corrective actions taken); 3) improvement of computerization of incident information; 4) development of guidelines on selected IRS issues; and 5) collection of feedback data on operational safety experience. The Agency's International Nuclear Safety Advisory Group (INSAG) played an important role in examining this set of proposals.

In November 1986, the IAEA convened an Expert Working Group on International Co-operation in Nuclear Safety and Radiation Protection, which was open to all Member States. The group considered various measures endorsed by the IAEA General Conference to strengthen the safety regime, including the IAEA-IRS. It recommended improvements in the IRS, particularly an increase in the number of incident

reports; an upgrading of their quality; and the faster submission of incident notifications and dissemination of incident reports.

Future prospects

Even before the Chernobyl accident, the IAEA understood the weak points of its incident reporting system, developing proposals to improve it. Nevertheless, present requirements call for further steps to strengthen the system.

It is premature to say what position the IAEA-IRS exactly will hold in the near future. This depends, to a large extent, on the conclusions and requirements of Member States and the practical possibilities within the IAEA. In any event, it must be stressed again that an evolutionary approach to strengthening the IAEA-IRS would be the most effective way of expanding it.

Evolution of the IAEA-IRS

- **December 1979:** An advisory group meets to guide the IAEA on steps to be taken for establishing a system of collection, analysis, and dissemination of safety-related events. The group included 10 participants from nine Member States. The move was influenced by the Three Mile Island accident and actions in the United States, specifically the use of Licensee Event Reports (LERS) by utilities in reporting to the Nuclear Regulatory Commission (NRC). Activities also were assisted by the NEA/OECD, which had launched its own incident reporting system in 1979.
- **November 1981:** An advisory group of 36 experts from 22 Member States recommends that IAEA organize a system on safety-significant events and develop a guide to assist Member States in setting up their own systems.
- **July 1982:** A technical review committee meets to review two IAEA documents: *Guide on a national system for collecting, assessing, and disseminating information on safety-related events in nuclear power plants*, and *IAEA incident reporting system (IAEA-IRS)*.
- **November 1982:** A technical committee/workshop is convened for the exchange of experience in the operation of national reporting systems and the review of safety-significant events in nuclear power plants.
- **April 1983:** Official letters are sent by the IAEA Director General to appropriate Member States inviting them to participate in the IAEA-IRS. Thereby, the system started operation.
- **September 1983:** A joint IAEA/NEA meeting is held on assessment of incidents at nuclear power plants.
- **December 1983:** The IAEA convenes a consultants meeting to prepare the scheme, structure, and arrangements of computer storage and retrieval of information in the framework of the IAEA-IRS.
- **May 1984:** The Agency convenes a technical committee/workshop on national systems for abnormal event reporting and their interconnections with the IAEA-IRS.
- **July 1984:** The IAEA and NEA hold a joint meeting for the exchange of information on incidents in nuclear power plants.
- **May 1985:** The IAEA holds a technical committee meeting on national incident reporting systems.
- **September 1985:** The IAEA convenes a technical committee meeting on the progress and improvement of the IAEA-IRS. Also held is a joint NEA/IAEA meeting on the exchange of information on incidents in nuclear power plants.
- **February 1986:** Consultants meet at IAEA to update the Agency's IRS guidelines and to examine the need for new ones.
- **March 1986:** Consultants meet at IAEA on the identification of IRS generic safety issues.
- **May 1986:** In response to the Chernobyl accident of 26 April and at the request of Member States, the Agency begins its continuing steps to further strengthen international co-operation in nuclear safety, including actions related to the incident reporting system. A technical committee meeting also is held on the event-oriented assessment of incidents in nuclear power plants.
- **September 1986:** The IAEA and NEA hold another joint meeting on the exchange of information on incidents in nuclear power plants.
- **September/October 1986:** Member States at the Special and Regular Sessions of the IAEA 30th General Conference endorse an expanded IAEA nuclear safety programme and underline the importance of the incident reporting system.
- **November 1986:** The IAEA convenes an expert working group on international co-operation in nuclear safety and radiation protection. Items under consideration include the IAEA-IRS.

