Safety of Nuclear Installations

Objective

To increase the capability of Member States to achieve and maintain a high level of safety and security in nuclear installations under design, construction or in operation.

National Regulatory Infrastructure for Nuclear Installation Safety

The Agency's International Regulatory Review Team (IRRT) service provides advice and assistance to Member States to strengthen and enhance the effectiveness of their nuclear safety regulatory body. In 2004, full scope follow-up IRRT missions were carried out in Armenia and China.

The IAEA–OECD/NEA Incident Reporting System (IRS) was set up to exchange information on unusual events at nuclear power plants, and to increase awareness of actual and potential safety problems. Currently, the IRS system contains about 3200 reports. In 2004, there were 74 new reports, slightly more than in 2003. The trend towards a reduced reporting delay continued in 2004, with the majority of full reports now being sent within one year of the event date. A similar network, the Incident Reporting System for Research Reactors (IRSRR), recorded an increase in the number of participating States — from 38 to 42, covering more than 90% of currently operating research reactors.

Information and Communication Networks and Global Infrastructure for Nuclear Installation Safety

The Agency continues to support a global nuclear safety regime based on strong national safety infrastructures and widespread subscription to international legal instruments to maintain high levels of safety worldwide. Central to the Agency's role are the establishment of international safety standards and the provision for applying these standards, and the provision of support for the sharing of information. The Agency's involvement in the Asian Nuclear Safety Network (ANSN) is a case in point. This is a regional safety network set up to analyse and share existing and new knowledge and practical experience to further improve the safety of nuclear installations in Asia. The ANSN Steering Committee met in early 2004 and established topical groups on safety analysis, safety culture, education and training, and operational safety. The network entered into regular operation in 2004 with hubs in China, Germany, Japan and the Republic of Korea. A network hub at the Agency hosts the master index database. National centres are under development in Indonesia, Malaysia and Vietnam.

As part of its Strategy for Education and Training in Nuclear Installation Safety, the Agency continued to develop standard training packages in 2004. In addition, a module on self-assessment of nuclear power plants was completed. Distance learning tools for self-study were also developed. In this connection, a module on the operational safety of nuclear power plants was completed, and a special multimedia series on the nuclear safety standards was established.

Use of Advanced Tools for Safety Assessment

The Agency delivered and installed an Integrated Training and Accident Analysis System (ITAAS) for the Kursk nuclear power plant in the Russian Federation. An integrated software and hardware

The Agency's Safety Standards: A Status Report

The following standards dealing with the safety of nuclear installations were published in 2004:

- Format and content of the safety analysis report for nuclear power plants (GS-G-4.1);
- Protection against internal fires and explosions in the design of nuclear power plants (NS-G-1.7);
- Design of emergency power systems for nuclear power plants (NS-G-1.8);
- Design of the reactor coolant system and associated systems in nuclear power plants (NS-G-1.9);
- Design of reactor containment systems for nuclear power plants (NS-G-1.10);
- Protection against internal hazards other than fires and explosions in the design of nuclear power plants (NS-G-1.11).

system that includes deterministic analysis, training, reference and probabilistic analysis modules, ITAAS can be expanded to include other analysis tools. It provides plant personnel, technical support organizations and regulators with a comprehensive accident, safety and potential risk analysis capability. ITAAS can be configured for other nuclear power plants or nuclear installations and is flexible and modular to accommodate changes, modifications and additions that reflect technological and computational advances or new applications.

The development of probabilistic safety assessment (PSA) has become a regular requirement for every nuclear power plant in most countries. The Agency's International Probabilistic Safety Assessment Review Team (IPSART) service provides a peer review service to strengthen PSAs for safety related decision making during plant design and operation. Two IPSART missions were conducted in 2004 to verify the adequacy of modelling data and important methodology issues stemming from the development of the PSAs for the Tianwan plant in China and the Sizewell B plant in the United Kingdom.

Engineering Safety of Existing Nuclear Installations

Re-evaluation of the seismic safety of existing nuclear power plants in countries operating WWER type reactors was completed, along with substantial upgrading of facilities. The most important upgrades and technical fixes were carried out using deterministic approaches as developed mainly in the USA but adapted to the specific conditions of WWERs. The nuclear power plants that were re-evaluated were Kozloduy (Bulgaria), Paks (Hungary), and Mochovce and Bohunice (Slovakia). The Armenia nuclear power plant was also reviewed, focusing on the actions required for a full and comprehensive assessment programme.

The use of probabilistic methods is under way at a number of sites and plants to complement the assessment and upgrades performed using deterministic approaches. In 2004, probabilistic seismic hazard assessments for the Cernavoda nuclear power plant in Romania and the Armenia plant were reviewed as part of the Engineering Safety Review Service provided by the Agency.

The scope and title of the extrabudgetary programme on the safety aspects of the long term operation of PWRs — established in 2003 — were changed to include all water moderated reactors. The programme's activities are guided by a steering committee, which met once in 2004, and are being implemented through four working groups, which also met during the year. A quality assurance manual was developed and a 'standard review process' was finalized as part of this programme.

Operational Safety

The Agency's Operational Safety Review Team (OSART) service recorded some notable achievements in 2004. Out of the six OSART missions conducted (plus one Pre-Commissioning OSART mission and three follow-up visits), four were to Member States with developed nuclear programmes. Of particular note were the invitations received by the Agency to conduct OSART missions in the Russian Federation and the USA on a three year schedule to coincide with the Convention on Nuclear Safety review process.

OSART mission results have shown overall improvements in the material condition of structures, systems and components, as well as improvements in management goals and staff training programmes. Most OSART recommendations focus on areas of procedure and policy implementation, adherence to and enforcement of industrial safety work practices, management oversight and enforcement of nuclear safety work practices, and implementation of operating experience programmes for low level events and near misses.

Another Agency service, the Peer Review of the Effectiveness of Operational Safety Performance and Experience Review process (PROSPER), serves as a basis for an enhanced review of operating experience as part of OSART missions. In 2004, a PROSPER workshop was held in China, and preparatory meetings and seminars were held in Pakistan and Spain.

Evolutionary and Innovative Reactors

A methodology based on the integration of risk informed concepts for defence in depth was developed to assess the safety of evolutionary and innovative reactors. This methodology has been used to develop a set of safety requirements applicable to any type of reactor. In addition, a technical document was prepared and will be published in 2005. (The Agency's work in the area of innovative nuclear reactors is discussed in greater detail in the Nuclear Power chapter of this report.)

Research Reactor and Fuel Cycle Facility Safety

The Code of Conduct on the Safety of Research Reactors — a non-binding international legal instrument — provides guidance to States on the development and harmonization of policies, laws and regulations, and recommendations on best practices in the management of research reactor safety. It was adopted by the Agency's Board of Governors in March, and endorsed by the General Conference at its regular session in September.

The Agency continued to receive responses to a survey of research reactor safety initiated in 2002. Overall, the responses indicated that operational safety and regulatory supervision were being handled in a reliable and effective manner, and that attention should be focused on quality assurance, radioactive waste management and emergency preparedness. All of the reactors that were reported to be operational or shut down also had some form of independent supervision, mostly from a formal regulatory body. Most of the responses indicated that the shutdown reactors were planned for restart or decommissioning.

The Agency, through its Integrated Safety Assessment of Research Reactors (INSARR) service, conducted a pre-INSARR mission to the Netherlands to define the scope and prepare for a future mission. One full mission was conducted in the Democratic Republic of the Congo and four follow-up missions were conducted to Bangladesh, Chile, Greece and Romania to evaluate progress in the implementation of recommendations from previous missions. In addition, seven safety missions were conducted to address specific topics. Of these 13 missions, six involved research reactors under Agency project and supply agreements. The Agency also assists Member States in the safe operation of their research reactor facilities (Fig. 1).

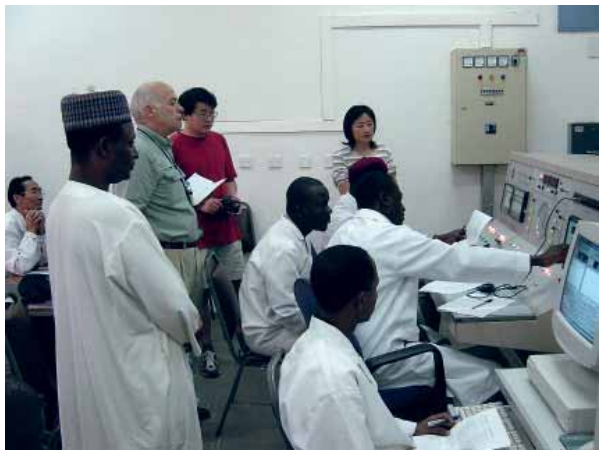

FIG. 1. Commissioning of the Zaria research reactor in Nigeria.

The safety of fuel cycle facilities is a relatively new area of activity for the Agency. Guidelines to assist Member States in promoting continuous improvement of the operational safety of their fuel cycle facilities through the use of good practices were developed and validated at a Technical Committee meeting in December. And the Agency, in cooperation with the OECD/NEA, is developing a 'Fuel Incident Notification and Analysis System' (FINAS) for sharing information on significant events, analyses and lessons learned. In December 2004, the first Technical Committee meeting of FINAS national coordinators endorsed the FINAS guidelines, as well as development of an Internet based system. ■