

# 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.*

## Convention on Nuclear Safety

In April 2005, Contracting Parties to the Convention on Nuclear Safety (CNS) met in Vienna for the Third Review Meeting. Their national reports had been prepared taking into account a Secretariat report presenting generic information on the significant issues, developments and trends in enhancing nuclear safety. For the first time, the national reports could be submitted through a secure web site.

The findings and conclusions of the meeting referred to the need for openness and transparency in the nuclear industry, the necessity for both regulators and operators to show leadership in nuclear safety, the importance of knowledge management as experienced staff retire and facilities move into extended operation, and the requirement to avoid complacency resulting from good safety performance in the recent past. The Contracting Parties made reference to the relevant Agency safety standards as a tool to assist in the review process and recognized the value of the Agency's safety services, such as operational safety and regulatory reviews. The Contracting Parties also recognized the need for a continuous process, with enhanced communication, between review meetings.

## Nuclear Safety Standards

The Nuclear Safety Standards Committee (NUSSC)<sup>1</sup> was reconstituted for the 2005–2007 period with modified terms of reference placing

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<sup>1</sup> The preparation and review of safety standards involves the Secretariat and four safety standards committees in the areas of nuclear safety (NUSSC), radiation safety (RASSC), the safety of radioactive waste (WASSC) and the safe transport of radioactive material (TRANSSC), as well as a Commission on Safety Standards (CSS), which oversees the entire safety standards programme.

more emphasis on the use of standards and sharing of the experience from their use. A review of the new overall safety standards structure identified the need for a number of new Safety Guides. As a result, in 2005 NUSSC endorsed proposals for 11 new Guides.

In the near term, NUSSC will continue to work on the completion of the Safety Guides for research reactors as well as the Safety Requirements and Guides for fuel cycle facilities. Another important task for NUSSC will be the development of Safety Requirements and Guides in the thematic area of assessment and verification, including the methodology and application of probabilistic safety assessments.

## Nuclear Power Plant Operational Safety

Nuclear power plant operational safety performance remained high throughout the world in 2005. Using the worldwide unit capability factor<sup>2</sup>, Fig. 1 shows that this performance has been on a plateau for a number of years.

The Operational Safety Review Team (OSART) service continued to be in great demand in 2005. Missions were conducted to China, France, the Netherlands, Romania, the Russian Federation and the USA (Fig. 2). In addition, four preparatory and six follow-up missions were conducted. The OSART teams continue to find issues related to fire risk, management objectives, staffing, human performance, surveillance testing, temporary modifications, low level events and near misses, and computer applications. However, OSART follow-up mission results have shown that a significant number of these issues have been resolved in accordance with the Agency's safety standards. The OSART teams also noted several good practices, including the importance of blame-free environments, communication actions, teamwork, self-assessment, corrective action programmes and risk assessment.

Another Agency service — Peer Review of Operational Safety Performance Experience (PROSPER) — provides critical information to nuclear power plant operators. In 2005, the Agency

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<sup>2</sup> From the Agency's PRIS database.

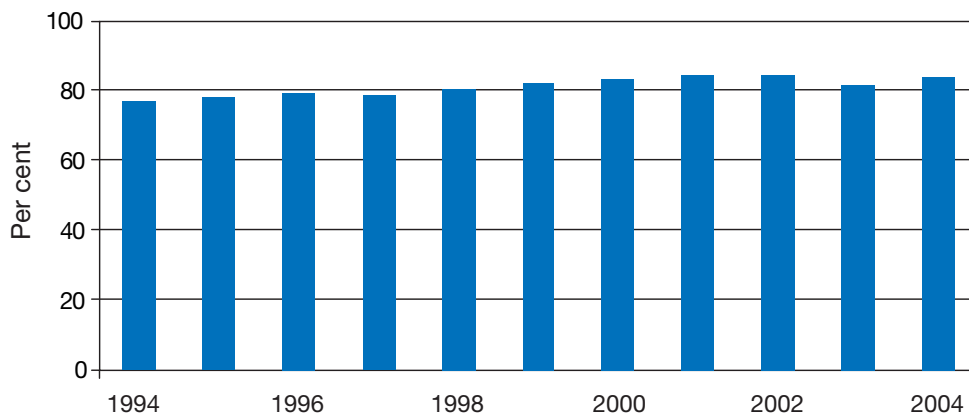


FIG. 1. Worldwide unit capability factor (in per cent) as an indicator of nuclear power plant safety performance.



FIG. 2. OSART members observe new fuel inspection activities at the Penly nuclear power plant in France.

conducted one PROSPER mission to Spain and a follow-up mission to Armenia.

In November, the Agency hosted an international conference on operational safety performance in nuclear installations to share experience and thus strive to improve operational safety performance. Participants made recommendations on how best to achieve and ensure the safety of extended operations and ensure that operating experience is reflected in the design, construction, commissioning and

operation of new nuclear power plants. In particular, the participants noted that both operators and regulators must avoid isolation and instead freely share safety information and show leadership in nuclear safety. The results of the conference will be merged with the issues and trends identified from the Agency's safety services for input to the Fourth Review Meeting of the CNS in 2008.

## Research Reactor Safety

In December 2005, the Agency held a meeting to discuss how best to ensure effective application of the Code of Conduct on the Safety of Research Reactors. Representatives from 31 Member States agreed that national commitment is best displayed through participation in meetings for exchanging information and experience on the application of the Code of Conduct. Participants also called for periodic review meetings to discuss topics related to the application of the Code of Conduct, and also to exchange experience and lessons learned, identify good practices, discuss future plans, and discuss difficulties encountered and assistance required to reach full compliance. At the request of the meeting

### The Agency's Safety Standards

Four Safety Standards were published in the nuclear safety area in 2005:

- *Safety of Research Reactors* (NS-R-4);
- *Design of the Reactor Core for Nuclear Power Plants* (NS-G-1.12);
- *Radiation Protection Aspects of Design for Nuclear Power Plants* (NS-G-1.13);
- *Geotechnical Aspects of Nuclear Power Plant Site Evaluation and Foundations* (NS-G-3.6).

In addition, six draft safety standards were approved by NUSSC for submission to the CSS.



FIG. 3. Members of the INSARR mission to Indonesia at the Siwabessy Research Reactor.

participants, the Agency will establish a web site to facilitate the exchange of information.

The Agency, through its Integrated Safety Assessment of Research Reactors (INSARR) service, conducted pre-INSARR missions to Morocco and the Syrian Arab Republic to define the scope and to prepare for future missions. Full missions were conducted in Indonesia and the Netherlands (Fig. 3) and one follow-up mission was conducted to the Czech Republic to evaluate progress from a previous mission. In addition, ten safety missions were conducted to address specific topics. These missions, as well as other Agency activities related to the safety of research reactors, found that there was a need to: apply the Agency's safety standards in the implementation of modifications; reinforce the role of safety committees; and review training and qualification programmes.

Following up on recommendations made by Agency safety review missions, the Democratic Republic of the Congo implemented a range of improvements at its CREN-K Research Reactor with Agency assistance. The improvements included the: establishment of effective regulatory supervision; setting up of a quality assurance programme; design of a preliminary reactor decommissioning plan; implementation of a safety related erosion monitoring plan; and completion of all safety related documents.

## Regulatory Infrastructure

Regional and national technical cooperation projects focused on 11 States in Europe and the Middle East operating or decommissioning nuclear

power plants. Agency support was aimed primarily at strengthening national regulatory capabilities, enhancing safety assessment capabilities, enhancing nuclear power plant operational safety and improving design basis documentation and configuration management at nuclear power plants.

In the Russian Federation, a national safety standard project supported by the Agency's technical cooperation programme resulted in the preparation of regulations and guidelines on nuclear power plant lifetime extension. These regulations were applied during the licence renewal process at several nuclear power plants in the country.

At their meeting in April, the Contracting Parties to the CNS highlighted the value of the Agency's services for enhancing regulatory infrastructures and called upon all Member States with nuclear installations to avail themselves of these services. Progress was made in improving the methodology for conducting this service, most notably in developing a self-assessment process by which the recipient organizations would identify areas of strength and weakness and develop self-improvement plans and strategies. Several countries with mature national regulatory programmes have indicated their intention to request a regulatory review in the next two to three years.

## Ageing Management and Long Term Operation

The number of Member States giving high priority to continuing the operation of nuclear power plants beyond the timeframe originally anticipated is increasing. Participants at an Agency conference on operational safety performance in nuclear installations observed that 80% of the power reactors operating worldwide could be eligible for long term operation. Figure 4,<sup>3</sup> shows the age of current operating reactors as of the end of 2005. In this regard, the Agency added publications on the ageing management of BWR reactor pressure vessels and their internals to its guidance documents on the safety aspects of ageing. In addition, the Agency produced a draft Safety Guide which will provide key recommendations for effective ageing management.

<sup>3</sup> From the Agency's PRIS database.

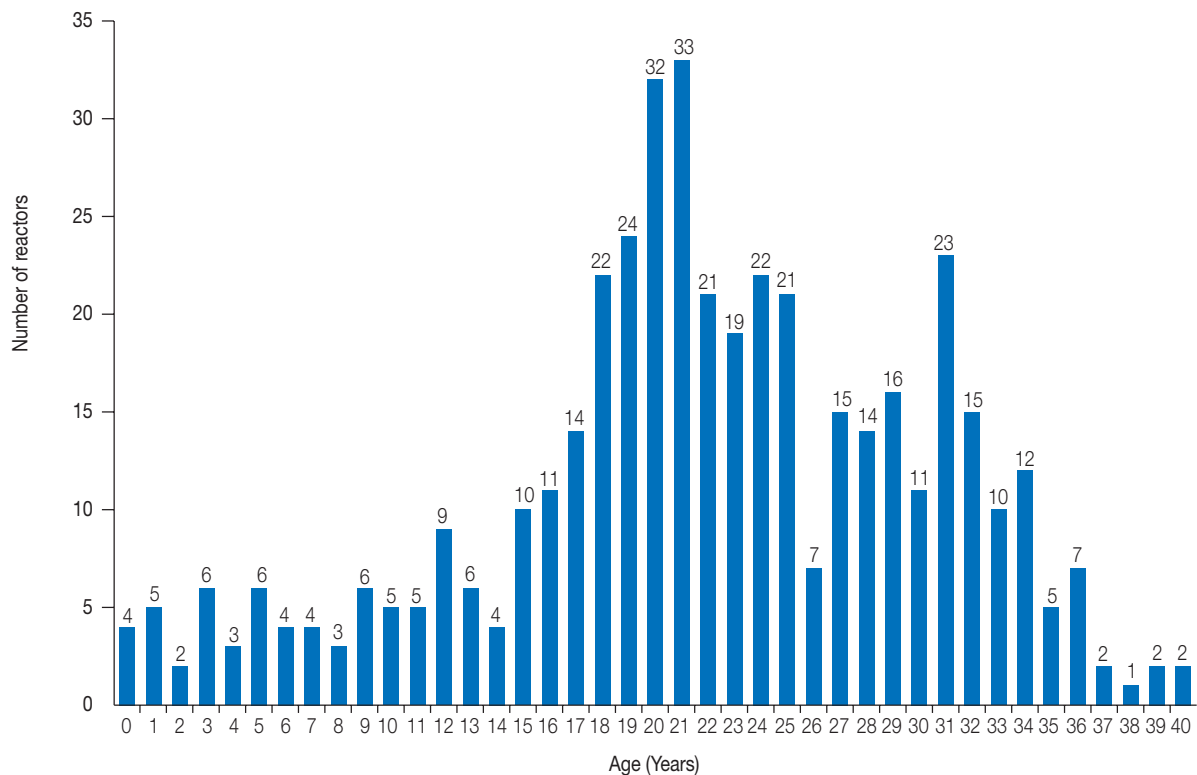


FIG. 4. Number of reactors by age, as of 31 December 2005.

## Safety of Fuel Cycle Facilities

Guidelines for the evaluation of the operational safety of fuel cycle facilities were prepared by the Agency. The guidelines describe self-assessment by a Member State of its fuel cycle facilities, as well as the implementation of a new safety peer review service – Safety Evaluation During Operation of Fuel Cycle Facilities.

In a joint effort with the OECD/NEA, the Agency is fostering the exchange of information on fuel cycle facility safety issues. At a technical meeting in 2005, participating Member States endorsed the guidelines for the Fuel Incident Notification and Analysis System, and the Secretariat is currently developing a common web platform which will cover the incident reporting systems dedicated to nuclear power plants, research reactors and fuel cycle facilities.

## Incident Reporting System

The Incident Reporting System (IRS), jointly operated by the Agency and the OECD/NEA, is an essential element for providing information regarding nuclear power plant operating experience worldwide. The 2005 joint meeting discussed lessons learned from 40 recent events in countries

participating in the IRS. Several events had latent failures (i.e. a failure caused by an undetected degradation in an element of a safety layer, a continuing concern in recent years). Emerging phenomena (i.e. failure mechanisms that had not previously been identified as problems) suggest that problems could be more widespread than previously thought. Quality control on the part of contractors remains a problem and needs greater attention by both operating organizations and regulatory bodies.

## Regional Nuclear Safety Networks

With the assistance of the Agency, Asian Nuclear Safety Network (ANSN) hubs and national centres in China, Malaysia, the Philippines, Thailand and Vietnam were made operational. In addition to the documents currently available in the ANSN relating to education and training, other types of documents – for instance on operational safety – are now being added. A bi-weekly *ANSN Newsletter* has also been published since March 2005 by the Agency. Promotional meetings (for example to Indonesia and Vietnam) were also organized to introduce ANSN to a larger audience, including key decision makers.

At the end of 2005, four topical groups had been established and were operating within the

framework of ANSN in the areas of education and training, operational safety, safety analysis and information technology. A substantial expansion of ANSN was agreed by participating countries in December 2005. Work in 2006 will cover new areas such as emergency preparedness and response, research reactor decommissioning and radioactive waste management.

Within the framework of an extrabudgetary programme, the Agency continued to cooperate with

the Forum of Ibero-American Nuclear Regulators. The focus is on strengthening knowledge sharing and expertise on nuclear safety standards, regulatory practices, control of radioactive sources, protection of patients and education and training. With the participation of Argentina, Brazil, Cuba, Mexico and Spain, the prototype of an Ibero-American Radiation Safety Network was completed in 2005. The network should enter into operation in 2006. ■