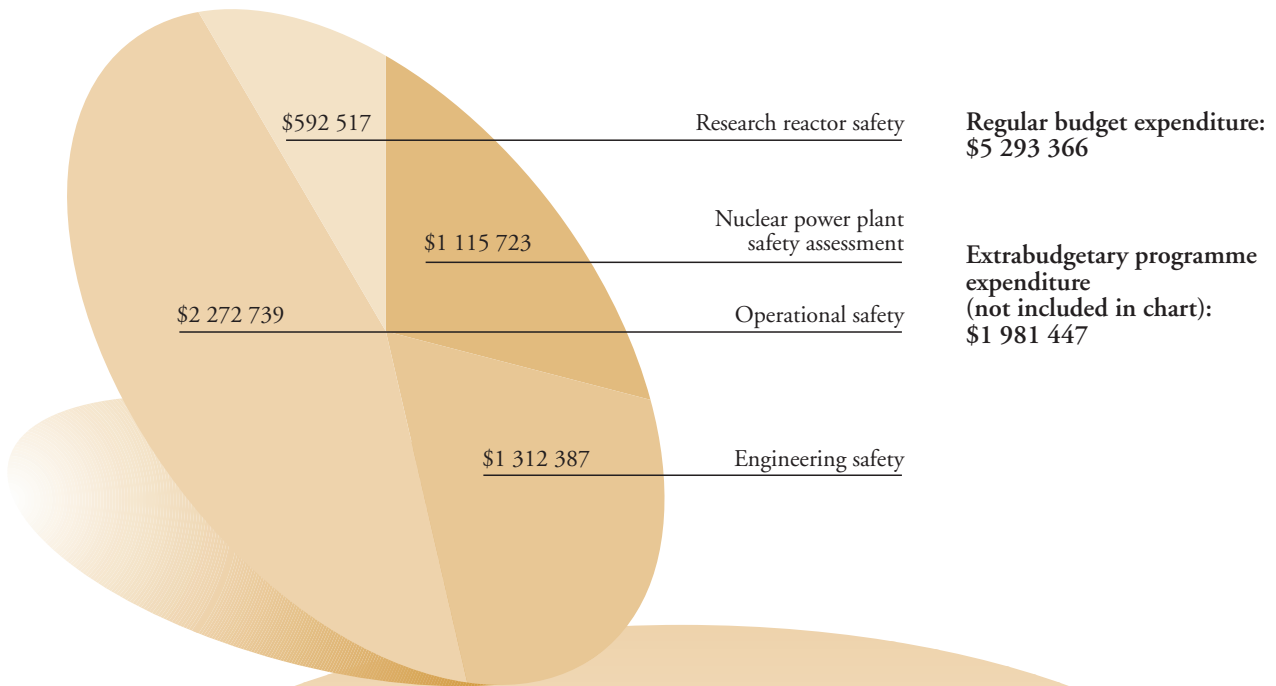


# NUCLEAR SAFETY



To promote the achievement and maintenance of required levels of safety performance in nuclear power plants, research reactors and other nuclear installations through: the development of safety documents; assistance in performing safety assessments; the collection and dissemination of information on safe operational practices; and the provision of peer review safety services.

## Programme objective

Activities concentrated on supporting intergovernmental efforts to strengthen nuclear safety around the world. The focus was on developing common safety standards, providing a variety of expert services, fostering the exchange of information on safety issues and supporting co-ordinated research in Member States. The development of the Nuclear Safety Standards (NUSS) focused on their review, revision and elaboration in the areas of siting, design and operation of nuclear power plants, and research reactors. Additionally, the standards on governmental

organization were revised to make them suitable for the general safety area.

## Nuclear power plant safety assessment

Reports were published discussing safety issues for advanced nuclear power plant protection, control and

human-machine interface systems, and proposing a common basis for judgements on the safety of nuclear power plants built to earlier standards. Draft safety performance indicators were developed and are being tested in pilot applications at several nuclear power plants.

A CRP on the collection and classification of human reliability data for use in probabilistic safety assessments (PSAs) was completed. The major results, published as a technical document, included the development and application of methods for data analysis to support the modelling of errors in decision making where so called 'cognitive' errors have been identified as major elements in severe accidents.

With the finalization of the identification and ranking of safety issues for WWER-1000 and early RBMK plants, the Extrabudgetary Programme on the Safety of WWER and RBMK nuclear power plants, launched in 1990, was completed. The Agency database on the findings and recommendations for the various types of reactors (RBMK, WWER-1000, WWER 440/V-213 and WWER 440/V-230) is available on CD-ROM.

A database of generic safety issues for nuclear power plants with LWRs, and the measures taken to resolve them, was created, and also issued as a technical document. This database will enable Member States to learn from the safety decisions made by other countries.

## Engineering safety

Expert missions were conducted to advise on protection measures against seismic and other external events at nuclear power plants, other reactors and proposed reactor sites. This included a seismic review of the Mochovce nuclear power plant in Slovakia.

In a General Conference resolution (GC(42)/RES/11), the Agency was requested to act as a clearinghouse and central point of contact for Member States to exchange information on diagnostic and remedial actions being taken at nuclear power plants, fuel cycle and/or medical facilities which use radioactive materials, the aim being to make these facilities Year 2000 compliant. A special project was initiated, and pages were set up on the Agency's Web site (<http://www.iaea.org/ns/nusafety2000/y2k.htm>) to collect data from Member States (through

an electronic questionnaire) and as a medium for disseminating information.

The draft of a technical document entitled *Achieving Year 2000 Readiness: Basic Processes* was made available on the Internet. This document provides guidance on Y2K programme management, initial assessment (classification and inventory), detailed assessment and contingency planning.

## Operational safety

Efforts were made to improve the integration and co-ordination of the various safety services offered by the Agency as a means of enhancing their quality. This was accomplished, in part, by combining services during a mission and further optimizing the selection of staff for assignments which involved Operational Safety Review Team (OSART), Assessment of Safety Significant Events Team (ASSET) and International Regulatory Review Team (IRRT) missions. While many of the missions were supported by resources from the Technical Co-operation Fund, priority was also given to improving co-ordination and communication with international organizations that provide operational safety services. Additionally, activities were supported that recognize the importance of communicating with the public on matters relating to the operational safety of nuclear power plants. An example was the participation of the Agency in a national seminar on public information on the peaceful uses of nuclear energy, which was held in Romania.

Initiatives were taken to evaluate utility peer review processes and other self-assessment activities to gauge their effectiveness in improving operational safety performance, and on how these activities should be incorporated into operational safety services. In this connection, a Technical Committee meeting was held in Vienna in December on national practices for nuclear power plant self-assessment and their effectiveness in enhancing safety performance.

Four OSART missions were carried out, along with three preparatory visits for 1999 missions and five follow-up visits. In order to provide greater assistance to those Member States receiving OSART visits, seminars and technical assistance missions were conducted before and after each visit. For example, seminars on the OSART methodology to support nuclear power

plants in the self-assessment of operational safety performance were carried out in Bulgaria, China, Kazakhstan, Lithuania and Pakistan. Technical assistance missions, both before and after OSART visits, were organized at the request of authorities in Argentina, China and Mexico. The ASSET service included four missions for the review of plant self-assessments of operational events and six seminars covering the evaluation of the consequences and analysis of the causes of operational events.

An ASSET peer review at the Aktau nuclear power plant in Kazakhstan was notable because it immediately preceded an OSART mission to the plant. The conclusions of the plant self-assessment, together with the comments and recommendations of the ASSET peer review, were utilized by the OSART team to study safety performance issues identified earlier at the plant. This was the first time the two services have been coordinated in such a way and the results of the combined mission will be studied to determine the future benefits of this approach. The plant self-assessments and ASSET peer review identified the need for lower internal reporting thresholds and broader reporting criteria; the requirement to continue to develop internal operational experience feedback programmes; and the need to enhance organizational safety culture, especially in the commitment to correcting known safety problems. Equipment reliability, procedure adequacy and personnel proficiency were areas of concern highlighted by the self-assessments.

The Joint IAEA–OECD/NEA Incident Reporting System (IRS) Guidelines were issued in May, establishing a unified method of reporting incidents. In 1998, the IRS system received 127 reports from participating countries. Ten of these reports were classified as being of high safety importance, with important lessons to be learned. One group of events, caused by equipment failures, includes problems of erosion–corrosion, stress corrosion cracking, fuel and control rod problems, water hammer phenomenon, faults in electrical systems, design deficiencies and ageing. A large proportion of the events was connected with the management of safety, including human error during operation, problems of compliance with procedures, and control of maintenance work and modifications.

During 1998 the Assessment of Safety Culture in Organizations Team (ASCOT) services were changed to ‘Safety Culture Seminars’ with a focus on how to develop and improve safety management and safety

culture; assess the developmental stages of an organization; and increase awareness of the importance of learning processes and a learning culture to support these developments. These services were provided for a utility in Lithuania and for the regulator, utilities and support organizations in China. A preparatory meeting was held for utility personnel in Brazil in order to set up a programme for Agency assistance in performing a self-assessment of the utility organization’s safety culture, as well as a peer review of the assessment.

A Technical Committee meeting was held on safety culture self-assessment highlights and good practices. In addition to highlighting the fact that self-assessments of safety culture have now been performed in several countries, the meeting also identified early warning signs of a weakening safety culture. In addition, an evaluation was made of the relative merits of different methods of extracting important safety culture attributes. At the request of the Canadian Government, a working group was convened in Vienna in June to review Ontario Hydro’s recent performance degradation in comparison with similar situations elsewhere. The experience and the lessons learned regarding the symptoms, causes and correction of the degradation in safety culture and safety management were presented at the international conference on ‘Topical Issues in Nuclear, Radiation and Radioactive Waste Safety’, held in Vienna in August.

## Research reactor safety

Five more States joined the Incident Reporting System for Research Reactors (IRSRR), raising the total number of participating Member States to 20.

An Integrated Safety Assessment of Research Reactors (INSARR) mission, funded by the Extrabudgetary Project for East Asia and the Pacific, visited the 30 MW research reactor in Serpong, Indonesia, to review operational safety issues. Another mission reviewed the Preliminary Safety Analysis Report for the research reactor to be constructed in Ongkaharak District, Thailand. There were technical co-operation missions to a research reactor in Tajura, Libyan Arab Jamahiriya, to advise on reactor modification issues, and a mission, partially funded by Italy, to the Vinča research reactor in Yugoslavia to advise on the management of the spent fuel storage pool, for which a remedial action plan has been initiated.

The final Research Co-ordination meeting for a CRP on the applications of non-destructive testing and in-service inspection to research reactors was held in Prague. The major outcome was the development of special techniques to examine and monitor the condition of reactor structures, systems and components for their assessment in relation to the safe operation and management of the reactor.

Four Safety Guides on operational limits and conditions, commissioning, maintenance and periodic testing, and design, assessment and operation of spent fuel storage pools were completed. These publications provide guidance on the implementation of requirements for the design and operation, including utilization and modifications, of research reactors.

