

NUCLEAR SAFETY NUCLEAR SAFETY

PROGRAMME OBJECTIVE

To assist in achieving and maintaining a high level of safety of nuclear installations operating worldwide through international harmonization of safety standards and norms and the provision of advice and services.

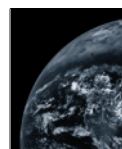
OVERVIEW

Activities in this area 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 nuclear safety standards focused on their review, revision and elaboration in the areas of legal and governmental infrastructure, and siting, design and operation of nuclear power plants and research reactors. The development of operational safety review services placed greater emphasis on the management of safety, safety culture and self-assessment.

NUCLEAR POWER PLANT SAFETY ASSESSMENT

Two Safety Reports were completed, one on implementation of accident management programmes and the other on accident analysis of nuclear power plants. The former focuses on the contribution of accident management to defence in depth. The report on accident analysis presents examples of good practices for performing deterministic safety analyses of nuclear power plants and discusses the requirements for maintaining an adequate level of quality of the safety analyses.

Recent work on safety indicators has focused on the development of a framework for the establishment of operational safety performance indicator programmes at nuclear power plants. This began with a definition of the concept of operational safety performance and the identification of 'operational safety attributes'. A hierarchical structure of 'overall', 'strategic' and



'specific' indicators was developed. Pilot plant studies conducted over a 15 month period have indicated that the proposed framework provides a good basis for the development of a plant specific tool for self-assessment. These results provided the basis for a new CRP on safety indicators.

The Agency's work in the area of probabilistic safety analysis (PSA) concentrated on establishing priorities for its application, and improving the quality and consistency of PSAs

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to support such applications. Two technical documents, on quality assurance for PSAs and on 'living' PSAs, were published. In co-operation with the OECD/NEA, guidance was developed to encourage more thorough regulatory review of PSAs. In addition to this developmental work, peer review and expert advice services were provided. International Peer Review Service (IPERS) missions reviewed the shutdown and low power PSAs for the Paks nuclear power plant in Hungary and the Bohunice V2 plant in Slovakia. Expert reviews were performed for the KANUPP PSA in Pakistan, and the Kozloduy nuclear power plant PSA, which were limited to internal events and fire and seismic analyses.

**DESIGN AND
ENGINEERING SAFETY**

The updating of the safety standards for nuclear power plant siting and design currently represents a substantial part of work in this area. Publications were issued on: root cause analysis for fire events; implementation and review of ageing management; assessment and management of major nuclear

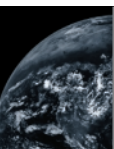
power plants components important to safety; and a simplified approach to estimating reference source term for LWR design. In addition, guidelines for the Agency's Design Safety Review Services and for Ageing Management Assessment Teams were issued.

Engineering Safety Review Services in the form of technical co-operation missions and workshops were organized in 20 Member States (see Annex, Table A5). Design Safety Review Service missions (including safety aspects of configuration management and of ageing management) visited the Islamic Republic of Iran, Pakistan, Romania and Ukraine.

Seismic evaluations of existing nuclear power plants account for the majority of missions on internal/external events. These missions aim to provide plants with feedback of experience from other countries and thereby harmonize international practices and optimize the use of resources. Fire safety is also a key issue in operational safety to which increasing attention is being paid in periodic safety reviews. Accordingly, two fire safety missions were conducted, one to Pakistan and the other to China, and recommendations were made to improve compliance with the Agency's safety standards. A number of technical co-operation missions were made to the Islamic Republic of Iran relating to the WWER-1000 reactor being constructed at Bushehr. These included reviews of the seismic hazard, foundation safety, the primary circuit and the provision of guidance to improve the preliminary safety analysis report.

A new extrabudgetary programme was established in 1999 to co-ordinate and assist with actions relating to intergranular stress corrosion cracking in stainless steel piping at RBMK reactors. The programme will focus on: improving in-service inspection and qualification; comprehensive assessments; qualification of repair techniques; and decontamination methods.

The Extrabudgetary Programme on the Safety of Nuclear Installations in South East Asia, Pacific and Far East Countries continued to provide assistance to Member States in the



region, placing particular emphasis on enhancing the technical capabilities of regulatory bodies and technical support organizations. Activities in 1999 included: a regional training course on research reactor safety; a review of the Malaysian regulatory organization, pre-IRRT (International Regulatory Review Team) missions to Indonesia and Viet Nam and a workshop on the regulatory function in Thailand; four design safety missions, a safety review of an experimental fast reactor and two PSA workshops in China; and an expert mission to Indonesia on emergency preparedness.

OPERATIONAL SAFETY

Four Operational Safety Review Team (OSART) missions were conducted during 1999, along with four preparatory visits for missions in 2000 and four follow-up visits (see Annex, Table A7). The missions identified opportunities for the improvement of operational safety in a number of areas, including safety management (establishing and communicating management expectations for safety performance), surveillance and preventive maintenance, facility condition and housekeeping, human performance, radiological protection, plant procedures and quality assurance. The OSMIR database of OSART mission results, which contains the results from all missions and follow-ups since 1991, was made available to utilities in Member States on CD-ROM.

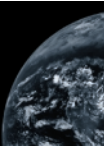
The provision of technical assistance and advice is being increasingly linked to OSART reviews. As part of post-OSART assistance to encourage the self-assessment of operational safety, three seminars on OSART methodology were conducted in France. Technical assistance missions after the pre-OSART visit to CHASNUPP were organized at the request of the authorities in Pakistan to help the staff of the operating organization and the regulatory body to focus on operational safety matters as the plant shifts from construction to commissioning and startup.

A new operational safety service — Peer Review of Operational Safety Performance

Experience (PROSPER) — was launched. The PROSPER service expands the scope of the Assessment of Safety Significant Events Team (ASSET) services to include the capability of a plant to make effective use of all operational performance data to enhance its safety performance. The review of significant event analysis information will continue to be a cornerstone of the service, but the use of information on operational data, such as low level events and near misses, and of external operational experience, to reduce failures will also be reviewed, and additional emphasis will be placed on the appropriateness, timeliness and effectiveness of corrective actions.

The Agency's operational safety services are being enhanced to better meet current challenges — increased competition, social and political changes and economic transition — and future needs identified by the Member States which use the services. An Advisory Group meeting in December endorsed the Agency's initiatives in this respect, and made a number of recommendations. In the management of safety culture, services should include an enhanced capability for the review of and assistance with management effectiveness in developing and maintaining a strong safety culture in the face of organizational and economic pressures. More emphasis should be placed in all services on the measures necessary to compensate for an ageing and shrinking nuclear work force and the loss of institutional memory. In the area of safety improvements and modernization, more guidance and services are required to assist Member States in decisions involving: modernization and improvement of safety related hardware and software; procedures; application of new safety standards; use of risk based decision making process; and new and more sophisticated safety performance indicators. Efforts in this area must also take into account possible overlap of activities with other organizations.

One element of this enhancement has been to improve the integration and co-ordination of the OSART, ASSET and the Safety Culture Enhancement services by conducting missions and training activities with mixed teams (e.g. an ASSET team leader leading an OSART



mission). This approach has now been extended to include other safety review services such as IRRT and the Integrated Safety Assessment of Research Reactors (INSARR) services. Co-ordination and communication has also been improved with other international organizations providing operational safety services to nuclear power plants.

The Agency's operational safety review services are increasingly focusing on helping utilities improve their management of safety and safety culture, and promoting self-assessment

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as a way of sustaining good safety performance. A series of technical co-operation missions was carried out to assist Electronuclear, the operators of the Angra nuclear power plant in Brazil, to train staff in the self-assessment of safety culture. Assistance will be continued as Electronuclear implements the recommended improvements, and it is intended that the whole process will also serve as a model for offering a comprehensive and integrated programme of assistance to other Member States.

Initiatives continued for the evaluation of utility self-assessment activities to gauge their effectiveness in improving operational safety performance, and on how these activities should be incorporated into operational safety services. Reflecting the strong interest by nuclear industry and governmental organizations, the Agency issued a guidance document on the self-assessment of operational safety for nuclear power plants to assist organizations in providing a stronger focus on operational safety.

In the area of safety management, Member States have requested the Agency to develop

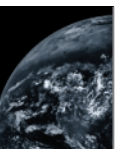
overview processes for corporate and nuclear installation management. These enhancements, including the development of guidelines, assessment services, workshops and self-assessment tools, will be integrated into the OSART-ASSET-Safety Culture services. To support this initiative, a Technical Committee meeting in Canada provided a broad exchange of corporate level and senior regulatory practices and experience in safety management and safety culture.

RESEARCH REACTOR SAFETY

INSARR missions to Finland and Belgium indicated increased interest in this service in western and northern Europe, and seven safety missions were carried out to research reactors in Belarus, Bulgaria, Poland, the Russian Federation and Ukraine, under European regional technical co-operation projects. Other safety missions visited Nigeria — where a mini neutron source reactor is being built under agreement with the Agency — the Democratic Republic of the Congo — to investigate erosion in the reactor site and the general safety condition of a research reactor in Kinshasa — and Thailand — to assist in the licensing of a new research reactor. Expert missions also visited Viet Nam (Dalat) and Indonesia (Serpong) to assist in improving safety analysis reports.

A mission also visited the Vinča research reactor near Belgrade, Yugoslavia, which was shut down about 15 years ago. In recent years there has been concern about the condition of spent fuel stored in a pond on the site; the primary aim of the mission was to assess the activities conducted to date to improve the condition of the fuel and the pond, and to investigate the current situation. The mission identified a number of safety issues, relating to this fuel and to the fuel still in the reactor, that are not being adequately addressed owing to a lack of funding.

A symposium on research reactor utilization, safety and management, was held in Lisbon in September. The safety issues referred to most frequently at the symposium were those affecting older research reactors, which now



constitute a majority of such reactors worldwide. Specific issues that were discussed included: the management of ageing; updating of safety analysis reports; documents and periodic safety reviews; management of spent fuel; and decommissioning.

REGULATORY ACTIVITIES RELATED TO NUCLEAR SAFETY

The IRRT service continues to attract new requests and the demand for missions during the next three years is high. During 1999, one full scope IRRT, two pre-IRRT missions and four preparatory visits for missions in 2000 were completed. The IRRT service was originally focused on the regulation of nuclear safety. However, many of the regulatory bodies requesting these missions also have responsibility for radiation, radioactive waste and transport safety, and an increasing number of missions are therefore being conducted by teams that include specialists in these fields.

The Incident Reporting System (IRS), which is operated jointly by the Agency and the OECD/NEA, received 112 event reports in 1999, increasing the total number of reports in the database to more than 2800. The information in the IRS database is for technical use, and has restricted distribution; for unrestricted use, a summary report on operating

experience covering 1996 to 1999 was prepared. Two studies of particular categories of events were performed, one on events which indicate a violation of operational limits and conditions, and the other on events connected with the interaction of procedures and human factors.

Y2K PREPARATIONS

A special project was established to assist Member States in addressing the Y2K computer problem in nuclear power plants (see Annex, Table A6). The Agency's role as a clearing house for information exchange included the setting up of a special Y2K web site to make information widely and easily available. A guidance document was published that outlined the necessary steps to manage the Y2K problem. And three workshops — on planning Y2K programmes, implementation, and contingency planning — were held, with the proceedings and conclusions made available through the Internet site. The Agency also conducted 20 missions to 9 Member States specifically to address Y2K preparations. Special arrangements were also made to ensure that the Agency's emergency response centre was staffed throughout the transition period from 1999 to 2000 so that Member States could have access to authenticated information on safety related Y2K problems at nuclear power plants.

