

Safety of Nuclear Installations

Objective

To enhance the global nuclear safety regime and to ensure appropriate levels of safety throughout the total lifetime of all types of nuclear installations in Member States by ensuring the availability of a consistent, needs-based and up to date set of safety standards, and assistance in their applications. To enable Member States seeking to embark on nuclear power production programmes to develop appropriate safety infrastructures through the availability of Agency guidance, assistance and networking. To enable Member States to build improved competence frameworks for the safety of nuclear installations and to enhance their capabilities for capacity building as the foundation for strong safety infrastructure.

Nuclear Safety Infrastructure

The Agency continued to focus on promoting and supporting the strengthening of global nuclear safety, primarily by assisting in the enhancement of governmental and regulatory frameworks and other safety infrastructure elements in Member States. Its Integrated Regulatory Review Service (IRRS) was widely used by Member States for an objective evaluation of their nuclear and radiation safety regulatory activities in line with the Agency's safety standards. In 2011, five IRRS missions were conducted in the Republic of Korea, Romania, Slovenia, Switzerland and the United Arab Emirates.



FIG. 1. IRRS mission to the Republic of Korea.

In addition, four follow-up IRRS missions were conducted in Australia, Canada, Germany and Spain. As a result of the accident at TEPCO's Fukushima Daiichi nuclear power plant (hereinafter referred to as the Fukushima Daiichi accident), a special IRRS module addressing early lessons learned from the accident was developed for all subsequent IRRS missions (Fig. 1).

IRRS recommendations and suggestions related to regulatory practices, policy and technical issues faced by nuclear regulatory bodies, as well as lessons learned, were collected, analysed and shared with the international community. Related to this work, a report entitled *Highlights of the Lessons Learned from the IAEA Integrated Regulatory Review Service in 2006–2010* was prepared by the Agency and presented at the Third Workshop on Lessons Learned from IRRS Missions, hosted by the Nuclear Regulatory Commission in Washington, D.C., in October. The

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report addresses areas needing improvement such as the governmental, legal and regulatory framework, certain areas of the core regulatory practices, and the efficiency and effectiveness of the missions themselves.

A new Safety Guide on *Establishing the Safety Infrastructure for a Nuclear Power Programme* (IAEA Safety Standards Series No. SSG-16) was used to assist countries embarking on nuclear power in developing the necessary safety infrastructure using a phased approach. This Guide contributes to the building of leadership and management for safety and of a safety culture by all organizations involved. Several workshops were organized on the application of the Guide. Related to these activities, Member State access to Agency training material was improved, and a dedicated web site on safety infrastructure for nuclear power was developed (<http://www-ns.iaea.org/tech-areas/safety-infrastructure/default.asp?s=0&l=94>).

Convention on Nuclear Safety

The Agency facilitated the Fifth Review Meeting of the Contracting Parties to the Convention on Nuclear Safety, convened in Vienna in April. The meeting was the first major international nuclear safety meeting

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following the Fukushima Daiichi accident. It was agreed to make a specific statement by Contracting Parties in response to the accident. The statement

to, the Fukushima Daiichi accident, and to review the effectiveness and, if necessary, the continued suitability of the provisions of the Convention.

Safety Management and Capacity Building

The Agency continued to promote an integrated approach to nuclear safety focusing on management systems, effective leadership and safety culture (Fig. 2). Training for the application of management systems in the regulatory framework was offered at both the national and the regional level. For example, a regional workshop for the European region was conducted specifically on management systems. In addition, several training courses were held on leadership and management for the introduction of nuclear power and on the establishment of safety infrastructure.

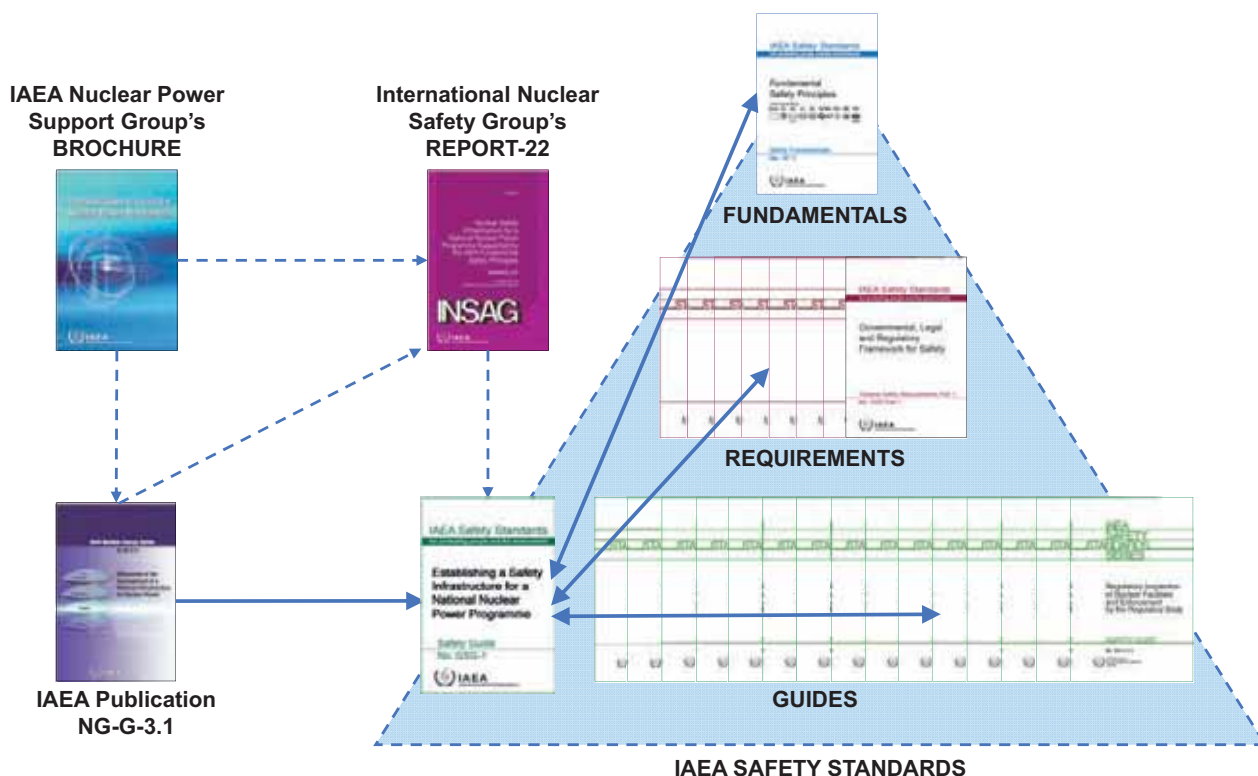


FIG. 2. Developing safety infrastructure for nuclear power using the Agency's documentation.

reaffirmed the objectives of the Convention; included a commitment to identify and act on the lessons learned; supported the Agency's continuing role in the area of nuclear safety, specifically noting the Ministerial Conference held in June at Agency Headquarters; and included a commitment to hold an Extraordinary Meeting in August 2012 to share lessons learned from, and actions taken in response

In a letter report¹ to the IAEA Director General, the International Nuclear Safety Group (INSAG) noted that “there are many countries without experience with nuclear power that have launched programs to

¹ Communication dated 26 July 2011 from the Chairman of the International Nuclear Safety Group (INSAG), issued as GOVINF/2011/11.

construct a plant or are advancing in that direction.” In this context, INSAG recommended that “the IAEA should reach out to these countries to provide both the education about the necessary infrastructure that must be established and the services to monitor and assist their progress in complying with international standards.”

Safety Assessment of Sites and Installations

The renewed interest of some Member States in building nuclear power plants and research reactors significantly increased the demand for assessments of siting and associated external hazards. After the Fukushima Daiichi accident, Member State demand for site safety services and related capacity building increased significantly, with nine siting missions being conducted by the Agency. In related work, IAEA Safety Standards Series No. SSG-18, on *Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations*, was published. The Agency’s External Events Notification System, used in response to the Fukushima Daiichi accident, was continuously improved using extrabudgetary resources (Fig. 3).

The Agency developed a comprehensive plan as part of an extrabudgetary project to address issues identified in implementing IAEA safety standards in Member States, including lessons learned after the Fukushima Daiichi accident. These activities have been incorporated into the IAEA Action Plan on Nuclear Safety.

In response to the Fukushima Daiichi accident, *A Methodology to Assess the Safety Vulnerabilities of*

Nuclear Power Plants against Site Specific Extreme Natural Hazards was published in November as one of the activities under the Action Plan. The methodology was made available for Member States that may wish to use it in carrying out their national assessments of the safety vulnerabilities of nuclear power plants in the light of lessons learned to date from the accident.

The Global Safety Assessment Network (GSAN) (<http://san.iaea.org/>) links experts around the world

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and facilitates their cooperation and collaboration on safety assessments in support of international efforts to support nuclear safety. In 2011, the Agency upgraded GSAN by providing a discussion forum and a ‘frequently asked questions’ page related to safety assessment topics for countries embarking on nuclear power.

The Agency’s Safety Assessment Education and Training (SAET) project is a part of GSAN. Training modules for deterministic and probabilistic safety assessment were developed and piloted in Malaysia, Poland and Vietnam. SAET activities tailored for these countries were refined, and workshops and training courses were held. Two webinars were conducted to provide distance learning training

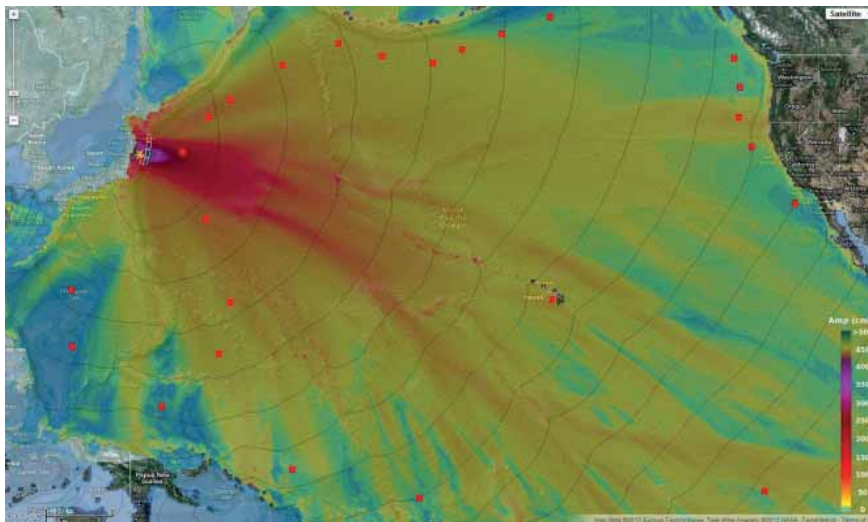


FIG. 3. Real time tsunami forecasting system under development at the Agency.

through the Asian Nuclear Safety Network and to link regional lecturers and students across the Asian region with Agency experts.

Operational Safety and Experience Feedback

The Agency's Operational Safety Review Team (OSART) service coordinates internationally based teams of experts who conduct reviews of operational safety performance at nuclear power plants. In 2011, the IAEA carried out seven OSART and four follow-up missions (Fig. 4). In the area of Safety

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Aspects of Long Term Operation of Water Moderated Reactors (SALTO), two peer review missions and one follow-up mission were performed, indicating an increased interest in these services on the part of Member States. Both OSART and SALTO attempt to identify gaps between practices of nuclear power plants and relevant IAEA safety standards. These gaps represent potential vulnerabilities that can be resolved through the implementation of appropriate corrective actions.

Through a technical meeting, the Agency reviewed the lessons learned from the Fukushima



FIG. 4. OSART reviewers accompanied by plant staff observing a local instrumentation and control panel at the Smolensk nuclear power plant in the Russian Federation.

Daiichi accident concerning the OSART service, the effectiveness of other operational safety review services and experience from OSART missions carried out between 2008 and 2011. The most important recommendation from this evaluation was that severe accident management be introduced as a separate review area within the standard scope of OSART missions. The meeting endorsed the integration of the different types of operational safety services (SALTO, Peer Review of Operational Safety Performance Experience (PROSPER) and Safety Culture Assessment Review Team (SCART)) under the umbrella of OSART to improve the use of available resources and harmonize the methodologies of these services.

The Agency continued to operate two event reporting systems for nuclear power reactors and for research reactors: the International Reporting System for Operating Experience (IRS) and the Incident Reporting System for Research Reactors (IRSRR). Eighty event reports were shared with the international nuclear community using the IRS, including reports from almost all 29 Member States with operating nuclear power reactors. In addition, updated guidelines related to the coding of the causes and associated attributes of nuclear safety related events were issued. In 2011, 53 Member States contributed to IRSRR incident reports. Additionally, a technical meeting for the IRSRR national coordinators was held in Romania to share research reactor related operating experience through the collection and analysis of information on events and the dissemination of lessons learned.

In the area of long term operation of nuclear power plants, three working groups, a clearing group and a steering committee focusing on ageing management began the development of the International Generic Ageing Lessons Learned (IGALL) database, a comprehensive source of information on ageing mechanisms and related ageing management techniques for nuclear safety related structures, systems and components. The database will help to identify effective ageing management programmes to maintain the reliability of nuclear safety related equipment.

Safety of Research Reactors and Fuel Cycle Facilities

Two significant Agency activities — one an international meeting on application of the Code of Conduct on the Safety of Research Reactors, held in Vienna in May, and the other an international

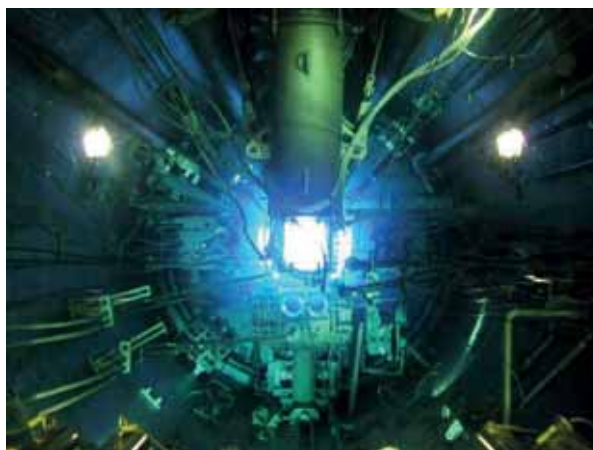


FIG. 5. Looking down into Egypt's ETRR-2 research reactor, the site of a safety review mission undertaken in 2011.

conference on the safe management and utilization of research reactors, held in Rabat, Morocco, in November — provided a forum for the exchange of experience and good practices. These activities also contributed to improving Member State self-assessment capabilities, establishing safety infrastructure for countries building their first research reactor and enhancing emergency preparedness and response.

Other meetings involved ageing management, periodic safety reviews and safety performance indicators for research reactors under Agency agreements. The Agency also conducted workshops on operational radiation safety, training and qualification, use of a graded approach in the application of safety requirements, and synergy between safety and security. Three Safety Guides were approved, on safety analysis, utilization and modification, and use of a graded approach, which provide additional guidance on application of the Code of Conduct.

A number of safety review missions were undertaken at research reactors in Egypt, Jordan and Morocco, and three INSARR missions were conducted in the Netherlands, Peru and Romania. These missions provided recommendations for further safety improvements at these facilities concerning mainly the operational organization, the quality of the safety analyses and reactor safety documents, fire protection and radiological safety (Fig. 5).

The Agency continued to enhance the operational safety of fuel cycle facilities. For example, six reports were prepared in 2011 through the Fuel Incident Notification and Analysis System (out of 144 total reports currently in the system database). Training courses were held on application of the safety standards for fuel cycle facilities involving

safety culture and criticality safety. And a Safety Evaluation During Operation of Fuel Cycle Facilities (SEDO) mission was conducted at a fuel fabrication facility in Romania.

Activities Funded by Extrabudgetary Contributions

Two significant extrabudgetary projects funded by Norway were completed in 2011. Carried out within the framework of another extrabudgetary project on 'Safe Nuclear Energy — Regional Excellence', the first project was initiated in 2009 with Romania, and the second project was initiated in 2010 with Bulgaria. One of the primary outcomes of these projects was that over 300 individuals from regulatory authorities and operating organizations were trained. The projects also supported an international emergency

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response exercise between the two countries, as well as IRRS and EPREV peer review missions to Romania. Operating and regulatory review procedures were developed through the development of safety and capacity building documents to support future assistance to Member States. In addition, a new methodology for assessing safety culture was developed and subsequently tested during OSART missions to Brazil and South Africa.