

Safety of Nuclear Installations

Objective

To continuously improve the safety of nuclear installations during site evaluation, design, construction and operation through the availability of set safety standards and their application. To support Member States in developing appropriate safety infrastructure. To assist adherence to and implementation of the Convention on Nuclear Safety and the Code of Conduct on the Safety of Research Reactors and to strengthen international cooperation.

Nuclear Safety Infrastructure

The Agency continued to assist Member States in their efforts to strengthen the governmental, legal and regulatory framework for safety through Integrated Regulatory Review Service (IRRS) missions. In 2013, the Agency conducted four IRRS missions — to Belgium, Bulgaria, the Czech Republic and Poland — and two IRRS follow-up missions — to the Russian Federation and the United Kingdom. To enhance the effectiveness and efficiency of the IRRS programme and missions, a number of improvements were made in 2013. For example, the revised *Integrated Regulatory Review Service (IRRS) Guidelines for the Preparation and Conduct of IRRS Missions*, a manual to assist IRRS reviewers, was published and a training course was held for potential IRRS reviewers, to ensure review consistency and quality.

“The Agency conducted over 40 workshops and training courses on regulatory topics for countries with nuclear power programmes and countries at different stages of programme development...”

The Agency organized the International Conference on Effective Nuclear Regulatory Systems: Transforming Experience into Regulatory Improvements, held in April in Ottawa, Canada. The purpose of the conference was to assess regulatory improvement efforts since the previous conference, held in Cape Town in 2009, and since the accident at the Fukushima Daiichi nuclear power plant in 2011. Senior regulators identified several areas for improvement — including ways that regulatory experience is collected, analysed and shared — and called for increased use of IRRS and IRRS follow-up missions by Member States.

The Agency’s *Strategic Approach to Education and Training in Nuclear Safety for the Period 2013–2020* was

developed in consultation with the Steering Committee on Competence of Human Resources for Regulatory Bodies. The approach supports capacity building and provides a framework for integrating education and training efforts, effectively strengthening the implementation of national and regional training strategies for nuclear safety.

The Agency continued to support Member States in assessing their capacity needs through the deployment of self-assessment tools such as the Guidelines for Systematic Assessment of Regulatory Competence Needs (SARCoN) and the Integrated Review of Infrastructure for Safety (IRIS), which was finalized and made available on-line in 2013.¹ The Agency conducted over 40 workshops and training courses on regulatory topics for countries with nuclear power programmes and countries at different stages of programme development — including Armenia, Bulgaria, Indonesia, the Islamic Republic of Iran, Jordan, Lithuania, Malaysia, the Netherlands, Nigeria, the Philippines, Poland, Thailand, Turkey and Viet Nam — as well as for Africa, the Asia–Pacific region and Europe.

Using the Agency’s safety standards as a basis, the Regulatory Cooperation Forum (RCF) helps Member States to develop effectively independent and robust regulators of nuclear power, and promotes international cooperation and collaboration. The forum is open to all Agency Member States and to certain organizations such as the European Commission and the OECD/NEA. In 2013, the RCF expanded its membership to include Bangladesh and Kenya. During the year, it continued to support activities for building regulatory infrastructure and capacity building to develop competent regulatory bodies in Jordan and Viet Nam.

Convention on Nuclear Safety

The Convention on Nuclear Safety (CNS) is a legally binding international instrument whose objective is to achieve and maintain a high level of nuclear safety worldwide through the sharing of information related to nuclear installations. Its Contracting Parties commit to submitting national reports on the measures they have taken to implement each of the obligations of the CNS for peer review at periodic meetings during country group sessions. Oman became a Contracting Party to the CNS in 2013, increasing the membership to 76 Contracting Parties.

The Contracting Parties to the CNS, during their 2nd Extraordinary Meeting in August 2012, established a Working Group on Effectiveness and Transparency with the task of reporting to the 6th Review Meeting of the Contracting Parties to the CNS, to be held in Vienna from 24 March to 4 April 2014, on a list of actions to strengthen the CNS and on proposals to amend, where

¹ Available at: <http://www-ns.iaea.org/tech-areas/regulatory-infrastructure/iris-tool.asp>.

necessary, the Convention. Four meetings of the Working Group were held in 2013. Fourteen areas to improve the effectiveness and transparency of the CNS were identified and corresponding working papers were developed for each area. During the last meeting of the Working Group, in November, a final report was adopted, which included, inter alia, a list of actions to strengthen the convention.

Safety Assessment of Nuclear Installations

The Design and Safety Assessment Review Service (DSARS) is a modular service based on the Agency's safety standards whose objective is to review plant design safety. In 2013, the Agency reviewed improvements made by the Netherlands to their national nuclear power reactor safety requirements in the light of the Fukushima Daiichi accident in 2011. During the year, the IPSART (International Probabilistic Safety Assessment Review Team) module of DSARS was conducted in Bulgaria and the Netherlands, and the RAMP (Review of Accident Management Programmes) module was conducted in Mexico.

In addition, the IPSART module was expanded to include accidents caused by extreme natural events. The fault sequence analysis method, including the Fault Sequence Tool for Extreme Events (FAST-EE), was added to help Member States evaluate the robustness of their plants in the face of such an event. The Agency also completed two DSARS Generic Reactor Safety Review (GRSR) modules, one for the Russian Federation's AES 2006 design and one for China's ACPR1000+ conceptual design. The GRSR provides design reviews of new nuclear power reactors based on the Agency's safety standards.

The International Conference on Topical Issues in Nuclear Installation Safety: Defence in Depth — Advances and Challenges for Nuclear Installation Safety, held in Vienna in October, focused on how lessons learned from operating experience and recent events have been used to enhance safety. The implementation of the defence in depth approach covers a number of elements related to the different states and life cycle phases of a nuclear installation. The meeting emphasized that improvement in its implementation at all life cycle phases is still needed.

As part of its support of countries embarking on a nuclear programme, the Agency updated its training materials on nuclear safety assessment. Additionally, more than 50 training sessions and workshops were conducted to build safety assessment competencies.

Site Safety and Design against Internal and External Hazards

In establishing a nuclear safety infrastructure, countries initiating a nuclear programme often face difficulties developing the necessary regulations for site safety. In this regard, the Agency conducted a workshop for the staff of Bangladesh's regulatory authority.

Support in assessing site and design safety capacity building needs was provided to countries with nuclear

power programmes — Romania and South Africa — and to countries at different stages of programme development — Jordan, Poland, Sri Lanka and Turkey — as well as for the Asia-Pacific region and Latin America.

Different modules of the Site and External Events Design (SEED) service are tailored to address capacity building needs but may also be used to carry out an integrated review of compliance with the Agency's safety standards and guidance. In 2013, two Preparatory-SEED missions were conducted, to Indonesia and Viet Nam, defining the scope of a future review. SEED missions were conducted to the Czech Republic in March and to Jordan in July, and for the proposed LEU bank in Kazakhstan in April.

Operational Safety and Experience Feedback

The Agency conducted its first Operational Safety Review Team (OSART) peer review mission in 1983 at the Kori nuclear power plant in the Republic of Korea. Since then, it has conducted more than 170 OSART missions in over 30 countries at more than 100 sites. In 2013, OSART returned to the Republic of Korea to hold a Technical Meeting to discuss improvements for preparing and conducting OSART missions, and to discuss safety culture tools for use by regulators and licensees.

In 2013, the Agency conducted an OSART mission to the Chooz nuclear power plant in France, where a number of good safety practices were identified. Additionally, seven OSART follow-up missions were conducted — to Armenia, China, the Czech Republic, France, the Russian Federation, South Africa and the United States of America (Fig. 1). Follow-up missions provide an independent assessment of progress made in the resolution of issues identified in initial OSART missions.

The first ever 'corporate' safety review was conducted at the ČEZ national electricity company in the Czech



FIG. 1. An Agency reviewer in an OSART follow-up mission assessing the functionality of an essential service water pump at the Gravelines nuclear power plant in France.

Republic. Corporate OSART missions cover aspects related to corporate management, independent oversight, human resources, communication, maintenance, technical support and procurement. At ČEZ, the OSART team identified good corporate practices and discussed improvements to the corporate processes and performance important to operational safety.

“Corporate OSART missions cover aspects related to corporate management, independent oversight, human resources, communication, maintenance, technical support and procurement.”

The International Experts Meeting on Human and Organizational Factors in Nuclear Safety in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant, held in May in Vienna, discussed a systemic approach to safety. Experts addressed safety culture and its relation to broader factors, and discussed regulatory oversight and the need to assess the safety culture of regulatory bodies themselves. These topics, among others, were discussed at a safety culture workshop for senior management of the Tokyo Electric Power Company, conducted by the Agency in Tokyo in October. Also in 2013, the Latin American Safety Culture Network (LASCN), a web based platform facilitating knowledge sharing among operators in the Latin American region and in Spain, was finalized.

The Agency conducted Safety Aspects of Long Term Operation of Water Moderated Reactors Peer Review Service (SALTO) missions to Armenia and Brazil, and one follow-up mission to Hungary. Additionally, the first phase of the International Generic Ageing Lessons Learned (IGALL) project was concluded. The efforts of Member States to collect knowledge and data on ageing management programmes for nuclear power plants continued during 2013 and will be reflected in two forthcoming publications.

Safety of Research Reactor and Fuel Cycle Facilities

Agency efforts to enhance research reactor safety included a regional meeting in Indonesia on the application of the Code of Conduct on the Safety of Research Reactors and three Technical Meetings on ageing management, safety performance indicators of research reactors under project and supply agreements, and operating experience feedback. Following feedback from lessons learned from the Fukushima Daiichi accident, the Agency conducted six workshops on safety reassessment, the management system, operational safety, radiation protection programmes, the interface between safety and security, and new research reactor projects. In total, more than 500 participants from 52 Member States currently operating or planning to build research reactors participated in these activities.

To improve knowledge and enhance networking, the Agency supported the establishment of a Regional Advisory Safety Committee for Research Reactors in Asia and the Pacific and held annual meetings of similar committees in Africa and Europe. Publications



FIG. 2. IRR-1 reactor operating staff in Israel briefing the INSARR team.

provided guidance on safety enhancements in the application of management systems for research reactor operating organizations, safety reassessments following feedback from the lessons learned from the Fukushima Daiichi accident and the bidding process for new research reactors.

In 2013, a Pre-INSARR (Integrated Safety Assessment of Research Reactors) mission was conducted to Poland; INSARR missions were conducted to Israel, Italy

and South Africa (Fig. 2); and an INSARR follow-up mission was conducted to Romania. Safety missions for research reactors were also conducted to Bangladesh, Congo, Egypt, Ghana, Indonesia, the Islamic Republic of Iran, Jordan, Morocco, Thailand and Uzbekistan. These missions provided guidance and recommendations for safety improvements concerning regulatory supervision, safety analysis, operating procedures, ageing, radiological safety and decommissioning planning.