

Safety of Nuclear Installations

Objective

To enable Member States to ensure appropriate levels of safety during the design, construction and operations throughout their total life cycle of all types of nuclear installations through the availability of a 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 and assistance.

State of Nuclear Installation Safety around the World in 2008

Major themes observed in 2008 in nuclear installation safety worldwide include continuous improvements in strengthening safety through international cooperation, activities related to new entrant nuclear power programmes and the expansion of existing nuclear power programmes. There was a continuing focus on operating experience feedback, knowledge networking, self-assessment and peer review.

The international instruments associated with nuclear installation safety include the Convention on Nuclear Safety, which had 62 Contracting Parties at the end of 2008, and the voluntary Code of Conduct on the Safety of Research Reactors.

Enhancing Nuclear Safety Infrastructure for Member States Embarking on Nuclear Programmes

The establishment of a sustainable national safety infrastructure is an essential foundation for ensuring safe siting, design, construction, operation and decommissioning of nuclear power plants. This process involves the development of a strong governmental, legal and regulatory framework, as well as the necessary education and training, technical capacity and an integrated approach to safety. In 2008, the Agency assisted Member States in developing a safe and effective infrastructure by reviewing proposed nuclear legislation and laws,

and reviewing safety infrastructure and regulatory body development needs. In this regard, the International Nuclear Safety Group (INSAG) — a high level expert group that provides authoritative advice on nuclear safety issues to the international nuclear community and public through the offices of the Agency — issued two publications that address the importance of the various infrastructure issues which have a bearing on the obligation to ensure nuclear safety: *Nuclear Safety Infrastructure for a National Nuclear Power Programme Supported by the IAEA Fundamental Safety Principles* (INSAG-22) and *Improving the International System for Operating Experience Feedback* (INSAG-23).

In July 2008, the Agency organized a workshop with more than 100 participants from 45 countries to discuss the roles and responsibilities of ‘vendor countries’ and nuclear power newcomers. It was

clearly felt that there were moral responsibilities when transferring nuclear power technology. As a consequence, vendor companies should work more

closely with their governments to set up agreements that contribute to long term safety and security in countries seeking to buy their nuclear technology. The concept of ‘vendor countries’, rather than vendor companies, arose directly from these discussions, since the private sector’s focus on profits cannot replace national ownership and commitment to long term safety and security. Regarding a possible nuclear power plant export control regime focusing on long term safety, the participants emphasized the importance of international treaties and conventions as well as compliance with the Agency’s safety standards, systematic Agency safety review services applicable at different stages of a State’s nuclear power development, and Agency forums such as the review meetings for the Convention on Nuclear Safety.

Topical Issues in Nuclear Installation Safety

At an Agency conference on Topical Issues in Nuclear Installation Safety, held in Mumbai in November 2008, the participants agreed on a number of conclusions and recommendations:

- The prevention of accidents requires constant vigilance, a high level of technical competence, strong leadership with a commitment to continuous improvement, and a vision of sustained excellence.
- The participation of all Member States in international nuclear safety instruments, codes of conduct and conventions, including those on liability for nuclear damage, is considered essential for global safety.
- Countries embarking on nuclear power programmes assume crucial safety responsibilities that cannot be delegated. Therefore, the establishment of a sustainable national safety infrastructure is an essential foundation for ensuring safe design, construction, operation and decommissioning of nuclear power plants.
- Operating experience feedback (OEF) is an important element of the continuous safety improvement process for nuclear power plants.
- The synergies between safety and security need to be maximized by integrating the respective requirements.
- The quality of the supply chain is an important issue. Harmonization of safety requirements, design codes and quality standards within the supply chain was recognized as requiring further collaboration among Member States, international organizations and supplier companies.
- Despite high levels of safety at nuclear power plants, emergency preparedness and response is

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an important issue in the context of developing nuclear energy.

- There is a generation gap in nuclear related education and training that needs to be addressed. In addition, technical capacity needs to be improved.

Operational Safety of Nuclear Power Plants

The work of the Agency’s Operational Safety Review Team (OSART) service is well established. Missions in 2008 to Cruas, France; Balakovo, the Russian Federation; Forsmark, Sweden; Rovno, Ukraine; and Arkansas Nuclear One, USA, indicated that OSART is also useful for countries with a mature nuclear power programme (Fig. 1).

Seven OSART preparatory meetings and five follow-up missions were also conducted in 2008. The follow-up mission results showed that about 95% of the recommendations and suggestions raised during OSART reviews have been either resolved or their implementation is making

satisfactory progress.

After studying the results of the OSART reviews, the Agency in 2008 considered enlarging the scope of the review areas to better match the needs of each Member State. Among the improvements being studied are optional review areas that could be selected by States covering: commissioning; long term operation; transition from operations



FIG. 1. OSART members inspecting equipment at the Forsmark nuclear power plant in Sweden.

to decommissioning; applications of probabilistic safety assessments in decision making; and accident management. The Agency also offers a 'corporate' OSART service to review those centralized functions of the corporate organization of a nuclear utility which affect the operational safety of the nuclear power plants of the utility.

Another Agency service, Peer Review of Operational Safety Performance Experience (PROSPER), provides critical information to nuclear power plant operators in terms of their capability to identify and assess operating experience and implement appropriate corrective actions. In 2008, the Agency conducted a PROSPER mission to a Magnox South plant in the United Kingdom, and a PROSPER follow-up mission to Santa Maria de Garona in Spain.

The Incident Reporting System (IRS) is an international system jointly operated by the Agency and the OECD/NEA. It is used by 31 countries to exchange experience on improving the safety of nuclear power plants by submitting event reports on unusual events considered important for safety. By the end of 2008, the IRS database reached the threshold of 3500 reports; 90 new reports were submitted to the IRS in 2008. The IRS content is improving: the quality of entries has improved, the reports have a better level of detail, and event causes are better substantiated and explained.

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Convention on Nuclear Safety

In April 2008, Contracting Parties to the Convention on Nuclear Safety (CNS) met in Vienna for the 4th Review Meeting. Their national reports took into account a Secretariat report presenting generic information on the significant issues, developments and trends in enhancing nuclear safety.

The Contracting Parties reported the increased application of Agency Safety Standards in their national regulations. They also recognized the value of the Agency's safety services (e.g. OSART and IRRS) and encouraged all Contracting Parties to request such services if they had not already done so.

In addition, the Contracting Parties highlighted nine common issues that should be addressed in the next national reports:

- Legislative and regulatory framework;
- Independence of the regulatory body;
- Safety management and safety culture;
- Staffing and competence;
- Probabilistic safety assessment;
- Periodic safety review;
- Ageing management and life extension;
- Emergency management;
- New nuclear power plants.

The Contracting Parties also recognized the need for a continuous process, with enhanced communication between review meetings. To address that, a new schedule of the review process and the continuity of officers for a three year term was approved.

With regard to more transparency of the review process, the Contracting Parties decided to invite journalists to attend the opening plenary session of the review meeting. In addition, a press event is to be organized at the end of each review meeting.

Finally, the Contracting Parties agreed on outreach measures to promote the CNS by convincing other countries of the benefits of the peer review process. To encourage participation, a recommendation was made that Contracting Parties and the Agency engage with those Parties not taking part. Signatory States that have not yet ratified the CNS should be encouraged to do so, and countries not yet members of the CNS who want to launch a nuclear programme should also be encouraged to ratify it.

Application of the Code of Conduct on the Safety of Research Reactors

A meeting on the application of the Code of Conduct on the Safety of Research Reactors was held by the Agency in October 2008. In addition to exchanging information on the safety status of research reactors and on good practices with respect to the application of the Code, the participants reviewed self-assessments on the application of the Code to identify common safety trends and issues. The participants agreed on a number of recommendations to further enhance the application of the Code, including the organization of periodic regional and international meetings. These recommendations covered:

- Networking between regulatory bodies and operating organizations for improved regulation and safety management;
- Ways to improve ageing management;
- Infrastructure needs for new research reactors;
- Practical application of a graded approach to safety requirements;
- Implementation of activities addressing common safety issues identified from self-assessments.

Based on feedback from earlier meetings on the application of the Code, the Agency held four regional meetings in 2008 on research reactor safety: in South East Asia, the Pacific and the Far East; in Eastern Europe; in Africa; and in Latin America. The participants, drawn from regulatory bodies and research reactor operating organizations, including senior members of safety committees, exchanged information on safety issues and trends; developed action plans for the update, review and assessment of safety documents; and addressed the implementation of periodic safety reviews at research reactors.

The International Seismic Safety Centre and Related Activities

The seismic safety of nuclear installations is a subject that has received substantial attention at the Agency as part of its statutory functions for establishing safety standards. The Agency has been providing services relating to their application to Member States. In recent years, renewed attention has been paid worldwide to seismic safety owing to the occurrence of extremely severe earthquakes that have affected some nuclear power plants beyond their original design levels.

To enhance information and experience sharing among Member States, the Agency in 2008 established the International Seismic Safety Centre (ISSC). The objectives and tasks of this centre include:

- Establishing a focal point for sharing lessons learned from scientific developments and the occurrence of seismic events;
- Providing feedback to improve the Agency's seismic safety standards;
- Supporting Member States through advisory and review services and training courses;

- Enhancing seismic safety by providing advice from top level scientists and experts.

The Agency's seismic safety review services, which are based on the safety standards, started in the 1980s. Since then, more than 110 missions involving interdisciplinary teams of experts have been undertaken in many Member States during the site selection and evaluation phases, and for new and existing nuclear installations. In 2008, the Agency

dispatched missions to Armenia and Jordan, and fact finding missions to the Kashiwazaki-Kariwa nuclear power plant in Japan to follow up on the earthquake that occurred in

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July 2007 (Fig. 2).

A Scientific Committee was established in 2008 to advise the ISSC in its activities. In addition, the ISSC is responsible for developing and maintaining an international roster of experts and a network of associated institutions. Since its formation in October 2008, the following activities have been carried out by the ISSC:

- Reassessment of the seismic hazard;
- Re-evaluation of the seismic safety of existing nuclear power plants;
- Post-earthquake actions and response to emergencies in coordination with the Agency's Incident and Emergency Centre;
- Development of a database on earthquake experience;
- Feedback of experience from extreme events.



FIG. 2. Removal, cleaning and replacement of oil contaminated soil below the pile foundation of a non-safety related structure at the Kashiwazaki-Kariwa nuclear power plant.