



International Atomic Energy Agency

Enhancing Research Reactor Safety- the IAEA's Approach

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Topics

- **The Code of Conduct on the Safety of Research Reactors.**
- **Research Reactor Safety Standards.**
- **Safety Review Services.**
- **The Approach for the Future.**
- **Summary**

History of the Code of Conduct

- **In 1998 and 2000, INSAG expressed concern over safety of research reactors:**
 - **Ageing of facilities and staff;**
 - **Research reactors neither operating nor decommissioned (extended shutdown);**
 - **Lack of appropriate regulatory supervision.**
- **GC(44)/RES/14 (2000): “...continue work on exploring options to strengthen international nuclear safety arrangements for civil research reactors.”**
- **An expert working group met to examine options.**

History of the Code of Conduct

- **GC(45)/RES/10.A (2001) endorsed a Board request that the Secretariat develop and implement, in conjunction with Member States, an International Research Reactor Safety Enhancement Plan.**
- **This plan includes preparation of a Code of Conduct on the Safety of Research Reactors with a view to establishing the desirable attributes for management of research reactor safety.**
- **The Code was drafted at two Open-ended Meetings in 2002. It was sent to all Member States for comment, and revised on the basis of the comments received.**

The Code of Conduct on the Safety of Research Reactors

- **The Code of Conduct was adopted by the Board in March 2004 and endorsed by the General Conference in September 2004.**
- **The Code is a non-binding international legal instrument. A State may make a legally non-binding political commitment to apply its guidance.**
- **The Code provides guidance to the State, the regulatory body, and the operating organization on management of research reactor safety.**

Application of the Guidance in the Code

States should:

- **Apply the guidance in the Code through national safety regulations and make appropriate use of IAEA Safety Standards;**
- **Use a graded approach commensurate with the hazard potential;**
- **Communicate any difficulties faced and assistance needed to the IAEA.**

Guidance in the Code

The State should:

- **Establish a legislative and regulatory framework, including an effectively independent regulator;**
- **Place the prime responsibility for safety on the operating organization;**
- **Ensure that the safety of existing research reactors is reviewed and upgraded as necessary;**
- **Provide information, if requested, to States in the vicinity for emergency planning and response.**

Guidance in the Code

The Regulatory Body should:

- **Establish regulations, guidance and a process for issuing authorizations;**
- **Inspect and ensure corrective action for deficiencies;**
- **Take enforcement actions in the event of violations;**
- **Review and assess safety.**

Guidance in the Code

Separate guidance is provided for the Regulatory Body and for the Operating Organization based on the principal requirements of the IAEA Safety Standards. This guidance addresses:

- **Safety Culture**
- **Assessment and Verification of Safety**
- **Financial and Human Resources**
- **Quality Assurance**
- **Human Factors**
- **Radiation Protection**
- **Emergency Preparedness**
- **Siting**
- **Design, Construction, and Commissioning**
- **Operation, Maintenance, Modification, and Utilization**
- **Extended Shutdown**
- **Decommissioning**

Guidance in the Code

The IAEA Secretariat should:

- **Disseminate the Code of Conduct and assist Member States in its application;**
- **Collect and disseminate information on RR safety, provide review services, develop and establish safety standards, and assist in their application;**
- **Advise and assist on all aspects of safe management of research reactors.**

Effective Application of the Code

- **Having taken into consideration the positive impact of the incentive nature and the benefits of the review process of the Convention on Nuclear Safety, the Contracting Parties requested that the Director General convene meetings to which all Member States would be invited to discuss how best to assure effective application of the Code of Conduct.**
- **This request reflects their strong interest in enhancing research reactor safety through applying the Code of Conduct.**

Effective Application of the Code

- **An Open-ended Meeting on Effective Application of the Code of Conduct on the Safety of Research Reactors will be held 14-16 December 2005 at IAEA Headquarters in Vienna.**
- **Proposed topics for discussion include:**
 - **Developing a common understanding of the Code and the associated IAEA documents;**
 - **Mechanisms for making a commitment to apply the Code;**
 - **Identifying ways in which Member States might report progress and exchange ideas and experience; and**
 - **Investigating alternatives for practical applications of the Code and for Agency assistance.**

Research Reactor Safety Standards

- **The Code of Conduct provides guidance for management of research reactor safety, but it does not provide detailed technical guidance. Technical guidance is provided in the Safety Standards and other technical documents.**
- **A new Safety Requirements document, NS-R-4, *Safety of Research Reactors*, has been published. It sets forth the requirements that must be met to assure safety in research reactor design and operations.**

Research Reactor Safety Standards

- **Nine new or revised Safety Guides are expected to be available in the next 1 to 2 years. These include:**
 - **Commissioning;**
 - **Maintenance, periodic testing and inspection;**
 - **Operational limits and conditions and operating procedures;**
 - **The operating organization and recruitment, training and qualification of personnel;**
 - **Core management and fuel handling;**
 - **Radiation protection and radioactive waste management;**
 - **Application of the graded approach;**
 - **Safety assessment and preparation of the SAR; and**
 - **Safety in utilization and modification of research reactors.**

Safety Review Services

- **The Agency assists Member States by reviewing and assessing the legal and governmental infrastructure of the State, the regulatory structure and functions, and the safety of nuclear installations.**
- **The Integrated Safety Assessment of Research Reactors (INSARR) is the Agency's comprehensive review service. It includes a pre-INSARR to plan the review, the INSARR mission itself and a follow-up INSARR to assess progress on the recommendations.**
- **The Research Reactor Safety Section averages about 12 INSARR and other safety missions per year.**

The Approach for the Future

- **Three principal elements:**
 - **Establish IAEA safety documents as the foundation for a global safety regime;**
 - **Encourage and assist Member States in effective application of these safety documents;**
 - **Foster global and regional cooperation in research reactor safety.**
- **Implementation:**
 - **Complete the corpus of Safety Standards and associated documents;**
 - **Define ways to assure effective application of the Code of Conduct;**
 - **Provide for education and training;**
 - **Foster and encourage sharing of experience and regional cooperation.**

Sharing of Experience

- **Sharing of experience must become an accepted practice for the research reactor community to become a 'learning community' and raise its own standards.**
 - **Reporting incidents and operational events;**
 - **Follow-up with analysis of events;**
 - **Dissemination of lessons learned.**
- **Mechanisms for sharing:**
 - **Regional and international meetings;**
 - **Networks, such as the Asian Nuclear Safety Network;**
 - **Incident reporting systems, such as the Incident Reporting System for Research Reactors (47 current participants);**
 - **Databases, such as the INSARR database.**

Regional Cooperation

- **Regional meetings to exchange information on safe operation, discuss solutions to safety issues and disseminate operational experience can be an effective way to develop cooperation to enhance safety.**
- **The recent Latin America and Caribbean Regional Workshop on Research Reactors provided a test of the concept. Its objectives included:**
 - **Exchange of information on safe utilization;**
 - **Facilitating solutions of safety issues, including regulatory aspects;**
 - **Promoting cooperation on research reactor activities;**
 - **Application of the Code of Conduct.**

Regional Cooperation

- **Participants submitted facility reports, covering:**
 - **Management and verification of safety;**
 - **Utilization planning;**
 - **Management of aging;**
 - **Radiation protection;**
 - **Emergency planning;**
 - **Training and qualification;**
 - **Quality Assurance**
 - **Safety culture;**
 - **Planning for decommissioning;**
 - **Fresh and spent fuel management.**
- **All 17 reactors (from 7 countries) submitted reports.**
- **Presentations at the meeting led to fruitful discussions.**

Regional Cooperation

- **Implementation of the Code of Conduct was considered by the participants. A number of areas for improvement in regulation, management of safety, training, emergency preparedness and waste management were identified from this exercise.**
- **Creation of a regional group on research reactors was of great interest, starting with a network for information exchange and supporting future regional cooperation.**
- **This Workshop was very successful. The approach should be a model for future regional meetings.**

Regional Cooperation

- **Building a sustainable system for regional cooperation is an important goal.**
- **TRTR and IGORR could serve as models for sustainable organizations.**
- **Modern Web-based networks and electronic communications can aid greatly in sharing of information.**

Summary

- **Substantial progress has been made since the Research Reactor Safety Enhancement Plan was approved in 2001.**
 - **The Code of Conduct on the Safety of Research Reactors and the Safety Requirements NS-R-4, *Safety of Research Reactors*, provide a strong foundation.**
 - **Completion of the corpus of Safety Standards over the next two years will strengthen this foundation.**
- **An Open-ended Meeting will provide an opportunity for Member States to discuss how best to assure effective application of the Code of Conduct. The outcome of this meeting will be key to defining the path forward.**

Summary

- **Global and regional cooperation is a key part of the approach to enhanced safety.**
- **Sharing of experience is essential.**
- **Regional meetings are an effective means to build regional cooperation.**
- **Global and regional networks using electronic media are proving to be effective.**
- **Existing organizations, such as TRTR and IGORR can fill a valuable role in cooperation.**