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INTERNATIONAL CONFERENCE ON RESEARCH REACTORS

SAFE MANAGEMENT AND EFFECTIVE UTILIZATION

***16-20 NOVEMBER 2015, VIENNA, AUSTRIA
(IAEA-CN-231)***

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Background

- The International Conference on Research Reactors (ICRR): Safe Management and Effective Utilization was the fifth in a series of quadrennial conferences
- Previous Conferences were held in: Lisbon, Portugal (1999); Santiago, Chile (2003); Sydney, Australia (2007); and Rabat, Morocco (2011)
- The main objectives of this ICRR were to **foster the exchange of information** on operating and planned research reactors and **to provide a forum** at which reactor operators, managers, users, regulators, designers and suppliers could share experience and lessons learned, as well as address common issues, challenges, and strategies
- In addition, **three side events** were organized: (1) IAEA support to education and training based on research reactors; (2) IAEA assistance to new research reactor projects; and (3) IAEA assistance in addressing research reactor-based radioisotope production issues.

Background

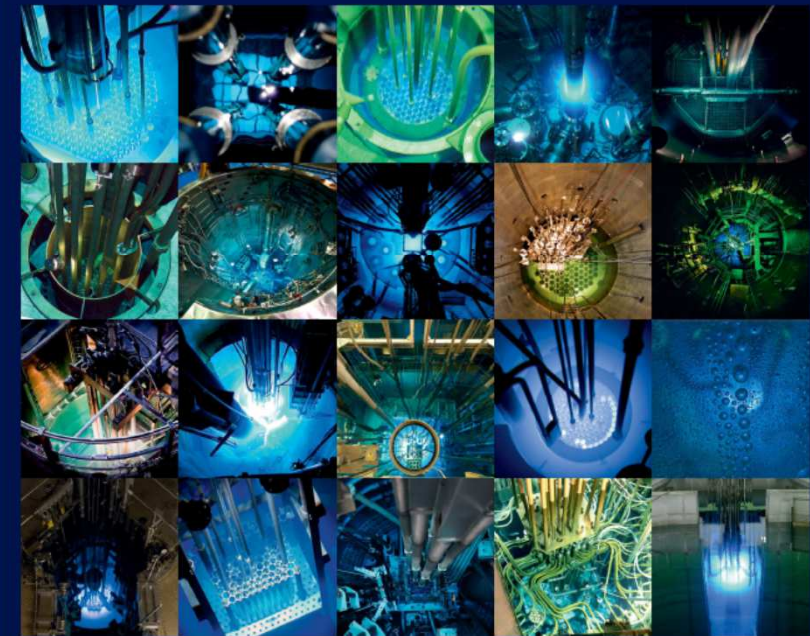
- Today, research reactor organizations need to address challenges such as
 - management of ageing of facilities and staff
 - more effective and efficient utilization of the facilities to justify operation and maintenance costs
 - need to enhance regulatory effectiveness and address the relevant lessons learned from the accident at the Fukushima Daiichi nuclear power plant
 - security of fuel supply and the management of spent fuel
 - need for increased vigilance to prevent malicious acts
 - strain of shrinking resources, both financial and human, while fulfilling an expanding role in support of nuclear science and technology development
 - development of the national infrastructure and human resources to ensure a successful implementation of new research reactor projects

ICRR Statistics

- 313 delegates and observers
- 56 Member States
- 2 international organisations (OECD/NEA, Arab Atomic Energy Agency)
- 17 Topical Sessions and 1 Panel Session, 3 side events
- 74 papers presented orally and 74 papers presented as posters
- IAEA Scientific Secretaries
 - A. Borio di Tigliole, Division of Nuclear Fuel Cycle and Waste Technology,
 - A. Shokr, Division of Nuclear Installation Safety
 - D. Ridikas, Division of Physical and Chemical Sciences.

International Conference on Research Reactors: Safe Management and Effective Utilization

16–20 November 2015, Vienna, Austria



Organized by the



ICRR Topics

- **To meet MS expectations, topics addressed during the Conference were**
 - A. Utilization and applications of research reactors (4 Sessions): 35 papers** (1 keynote, 3 invited and 12 contributed oral presentation and 19 posters)
 - B. Common management considerations (2 Sessions): 10 papers** (1 keynote, 2 invited, 5 contributed oral presentations and 2 posters)
 - C. Safety of research reactors (4 Session): 38 papers** (1 keynote, 3 invited, 13 contributed oral presentations and 11 posters presentations)
 - D. Research reactors operations and maintenance (3 Sessions): 34 papers** (1 keynote, 2 invited, 12 contributed oral presentations and 19 posters)
 - E. Research reactors spent fuel management and decommissioning (1 Session): 7 papers** (1 invited, 3 contributed oral presentations and 3 posters)
 - F. New research reactor projects (2 Sessions): 13 papers** (1 keynote, 2 invited and 6 contributed oral presentations and 4 posters)
 - G. Security of research reactors (1 Session): 21 papers** (1 invited, 4 contributed oral papers and 16 posters)

ICRR Conclusions: Utilization and Application

- There are many research reactors that are effectively used for a variety of purposes, but also that there are many that have a low utilization factor and are not utilized to their full potential. **Proper strategic planning is essential to sustainable utilization of a research reactor.** Member States are urged to make use of the IAEA services available to support strategic planning and implementation.
- **Increased use of networking and participation in regional coalitions has been shown to be effective in improving transfer of knowledge and experience from one installation to another.** The IAEA offers assistance in creating and maintaining such coalitions, and Member States are urged to take advantage of this assistance.
- Several well-developed **facilities for neutron science and testing** can make their capacity available to scientists from other countries, in some cases at no cost. It is therefore recommended that the IAEA expand the Research Reactor Data Base (RRDB) to include a list of facilities offering confirmed access for various types of research reactor utilization, such as neutron imaging, and other neutron beam techniques, material testing and neutron activation analysis (NAA)

ICRR Conclusions (cont'd): Utilization and Application

- The Conference recognizes the important role of the **IAEA** in coordinating and providing **support to Member States in the production and supply of radioisotopes**. This support should continue, expanding on regional and international cooperation and joint actions to facilitate reliable availability of the widely used radioisotopes produced in research reactors. Furthermore, the Conference recommends that the IAEA provide enlarged assistance covering the entire radioisotope production and supply chain, from preparation and irradiation of the targets, through processing, waste management, quality control and assurance, and regulatory issues.
- The Conference recognises that **validity of neutron activation analysis** results is very important, especially if the materials being characterized are related to environmental problems, health-related studies, industrial products or forensic cases. The Conference recommends that the IAEA continues its efforts in supporting NAA laboratories in Member States to assess and further improve their performance and the analytical quality of their analyses.

ICRR Conclusions: Common Management Considerations



- The Conference notes the importance of **integrated management of all activities in the research reactor organization**. All research reactor operating organizations are encouraged to make use of the Agency's documentation and services to ensure that safety and security and their interface are properly integrated into their management system.
- There is increasing recognition in the Member States of the **need for effective coordination of the interface between safety and security** in all research reactor activities throughout the life cycle of the facility. It is essential that measures in security do not unduly impact measures in safety and vice versa. The Conference requests the Agency to continue its efforts in providing support to Member States in this area.

ICRR Conclusions (cont'd): Common Management Considerations



- Several **challenges for TRIGA reactors were noted**, including continued supply of new fuel in the long term, back-end options for spent fuel and high-level technical support from that original reactor manufacturer. TRIGA operators are urged to strengthen regional and global cooperation to address these issues, enhance effective utilization and improve relations with stakeholders. The Conference recommends that the IAEA uses its good offices to foster this cooperation
- The Conference **notes the effective coordination of the IAEA's cross-cutting activities for research reactors**, and encourages the Agency to continue to work toward integration, harmonization and synchronization of these activities to maximize the benefits to the Member States.

ICRR Conclusions: Safety of Research Reactors

- The Conference **appreciates the significant progress that has been achieved in IAEA activities on safety of research reactors**, including supporting application of the **Code of Conduct on the Safety of Research Reactors**, development of **Safety Standards**, supporting **their application** and conducting **safety reviews**. These activities should continue for the benefit of Member States. The Conference recommends that Member States take advantage of safety review services, especially the Integrated Safety Assessment of Research Reactors (INSARR) service. In addition, the Conference recommends that the Agency continue to support establishment of an adequate regulatory and safety infrastructure in Member States planning to acquire their first research reactor.
- Many research reactor organizations have performed **safety re-assessments in light of the lessons learned from the Fukushima-Daiichi accident**, with the objective of improving their ability to withstand extreme external events. The Conference encourages Member States that have not yet performed safety reassessments to do so.

ICRR Conclusions (cont'd): Safety of Research Reactors

- The Conference recommends that the IAEA continues its efforts to disseminate the relevant lessons learned from the Fukushima-Daiichi accident and to support Member States to address them through implementation of technical meetings, workshops, peer reviews and advisory missions. It also recommends that the lessons learned be considered in the design of new research reactors.
- Member States are continuing to address **ageing of research reactors** through implementation of a systematic ageing management programme based on the IAEA Safety Standards, **including refurbishment and modernization activities**. The Conference recognizes the IAEA Research Reactor Ageing Management Database (RR-AMDB) as an important information resource for Member States and encourages Member States to contribute information to the database to strengthen it for all. The Conference recommends that the Agency continue to support ageing management.

ICRR Conclusions (cont'd): Safety of Research Reactors



- Several Member States have initiated a process of **periodic safety review (PSR) for research reactors**, although there is no current Agency guidance. The Conference recommends that the Agency develops such guidance and support Member States in establishment of a PSR process on the basis of experience from similar processes for nuclear power plants.

ICRR Conclusions: Operations and Maintenance

- The Conference **appreciates the Agency's activities in support of research reactor operations and maintenance (O & M), including ageing management and establishment of an integrated management system.** The Conference recommends that Member States avail themselves of the opportunity to request an IAEA Operations and Maintenance Assessment of Research Reactors (OMARR) review service.
- The Conference **appreciates the progress that has been made in conversion of research reactor cores from HEU to LEU fuel, and the accompanying fuel development work. Continued work on development of fuels suitable for high-performance research reactors is needed.** The support of the Agency with coordination and expertise is appreciated, and the Conference recommends that it continues.

ICRR Conclusions: Spent Fuel Management and Decommissioning

- The Conference recognizes that **decommissioning planning is necessary** and that it **should start as soon as possible**, even in the design stage of a new research reactor. The Conference recommends that the Agency continues to assist Member States in developing decommissioning plans and providing the platform for related information exchange through a technical cooperation programme
- The Conference also recommends that that Member States having a research reactor in extended shutdown decide whether to restart or decommission without unnecessary delay.

ICRR Conclusions: New Research Reactor Projects



- The Conference recognizes that the **IAEA-developed Milestone Approach** and supporting technical documents and Safety Standards **provide valuable guidance to Member States planning and implementing new research reactor projects**. Such documents are well known and used by Member States. It is recommended that IAEA guidance on the preparation of a feasibility study for a new or first research reactor project be finalized as soon as possible. The Conference also recognizes the value of the newly established Integrated Research Reactor Infrastructure Assessment (IRRIA) review service and urges the IAEA to implement this service as soon as possible.
- The Conference recognizes that **building a new research reactor is a national decision and that the Agency is ready to assist Member States in all stages of such projects**. Newcomers to RR Member States are also encouraged to consider accessing existing well-utilized research reactor facilities to build their national nuclear capacity. Also, the recently IAEA-developed International Centres based on Research Reactors (ICERR) scheme can be a valuable tool to share competences among experienced and newcomer Member States for nuclear capacity building as well as research and development projects.

ICRR Conclusions: Security of Research Reactors

- The Conference notes that **nuclear security for research reactors now has a well-defined structure within the Agency**. However, there are areas which need to be further defined and explained from the implementation perspective. The Conference recommends that IAEA guidance be developed on: vital area identification; definition of unacceptable radiological consequences; the interfaces between nuclear safety and nuclear security design; evaluation analysis and contingency versus emergency response; cyber security threats and protective measures for research reactors; and determining trustworthiness of research reactor employees and visitors.



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Thank you!