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Research Reactor Safety – IAEA Activities on Knowledge Networks and International Sharing of Knowledge and Operating Experience for Research Reactors

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RRSS/NSNI



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RRSS participation in Networks associated with Research Reactors

- Establishment of regional advisory safety committees with a clear purpose, objectives, functions, membership and annual meetings
- Operation of Incident Reporting System for Research Reactors
- Participation in other Networks such as ANNuR, FNRBA, AFRA, RER

Regional Advisory Safety Committees for Research Reactors

The IAEA has established the following regional advisory safety committees:

- Europe Advisory Safety Committee for Research Reactors (EURASC) with members from the European region – Established 2010
- Regional Advisory Safety Committee for Research Reactors in Africa (RASCA) – Established 2010
- Regional Advisory Safety Committee for Research Reactors in Asia and Pacific (RASCAP) – Established 2013 with ANSN support

Charter of the Regional Advisory Safety Committee



- Preamble
 - Recognizing that
 - identified common safety issues for research reactors in the region and the need for coherent safety approaches to deal with them;
 - the need to further improve the application of the IAEA Code of Conduct on the Safety of Research Reactors, and the IAEA Safety Standards;
 - the necessity to enhance networking and the mutual interest in continuing cooperation and exchange of information on good safety practices;
 - research reactors are a useful tool for developing the technical and safety infrastructures necessary to embarking on a nuclear power programme;
 - the desire to foster cooperation of the safety committees of the operating organizations in the region for enhancing the safety of the research reactors;

Charter of the Regional Advisory Safety Committee

- Article 1 - Establishment and Name
- Article 2 – Purpose
- Article 3 - Objectives
- Article 4 - Membership
- Article 5 – Functions
- Article 6 - Meetings
- Article 7 - Effective Date

Charter of the Regional Advisory Safety Committee



- Membership is open to all the IAEA Member States in the region. Member States from other region may also be invited to participate in the activities.
- Participants in the regional advisory safety committees are usually Chairpersons of the national reactor safety committees
- Each regional committee has a Chairperson appointed by the members for a fixed term.
- The regional safety committees act as advisory group on important safety issues in the region and help improve the effectiveness of the operating organizations' safety committees.
- All regional safety committees meet annually.
- Main objectives of the regional committees are
 - Provide a forum for fostering networking and regional cooperation, and for facilitating use of competencies in the region to cover specific safety issues;
 - Share knowledge and operating experience feedback including good practices on the application of the IAEA Code of Conduct on the Safety of Research Reactors and the IAEA Safety Standards;
 - Promote networking with other regional research reactor safety committees.

Charter of the Regional Advisory Safety Committee



- The principal functions of the regional safety committee are to:
 - Discuss the safety of the research reactors of the region, identify common safety issues and trends, and recommend possible actions to address them;
 - Peer review the safety of a research reactor at the request of its operating organization. This peer review is based on the IAEA Safety Standards;
 - Provide expertise on specific safety issues, and review significant incidents and associated corrective actions at the request of participating Member States.

- 2013 Meeting Istanbul, Turkey 3-7 June 2013
- Topics discussed were
 - Use of a graded approach on application of the safety requirements for research reactors
 - Safety reassessment for research reactors following the feedback from the Fukushima-Daiichi accident
 - Safety considerations of resuming a research reactor operation after a long period of shutdown and their application to the Turkey research reactor TRR-1
- 2014 Meeting Kiev, Ukraine, 23-27 June 2014
- Topics discussed were
 - provisions for protection against internal and external hazards, including seismic,
 - neutronic and thermal-hydraulic safety criteria of the research reactors.
 - results of the walkthrough of the Kiev research reactor

- 2015 Meeting Budapest, Hungary, 8 - 12 June 2015
 - Core management including spent fuel management
 - Safety analysis for internal and external events
 - Review of the walkthrough results of Budapest research reactor
- 2016 Meeting Halden, Norway, 15 - 19 August 2016
 - Consideration of human factors in different stages of research reactor lifetime
 - Leadership and Management for safety and Safety culture
 - Walkthrough of Halden and Kjeller research reactor and discussion on the results

RASCAP Meetings

- 2013 : Meeting held in Dalat, Vietnam, 25–29 November 2013,
- Topics discussed were
 - Obsolescence management of Instrumentation and control and software important to safety for research reactors
 - Safety assessment of modifications for research reactors
 - Safety reassessment for research reactors in the light of the accident at the Fukushima-Daiichi nuclear power plant
- 2014 Putrajaya, Malaysia 8–12 September 2014
- Topics discussed were
 - safety of utilizations
 - ageing management programme for research reactors
 - peer review of RTP reactor digital instrumentation and control system

RASCAP

- 2015 Meeting Serpong, Indonesia 31 August to 4 September 2015
- Topics discussed were
 - Periodic Safety Reviews
 - Training and Qualification of Personnel for Research Reactors
 - Peer review the the proposed scope and methodology for the PSR of RSG-GAS
- 2016 Meeting Argonne, USA 24 -28 August 2016
- Topics discussed were
 - Integrated Management System for Research Reactors
 - Preliminary decommissioning plan and updating it during lifetime of the reactor
 - Peer review the OPAL reactor control and monitoring system upgrade project

- 2012 Meeting Kinshasa, DR Congo 27 February – 2 March 2012
- Topics discussed were
 - peer review the safety of the CREN-K research reactor, which is in an extended shutdown state since 2004
 - the safety aspects and conditions for resuming the reactor operation including the needs for refurbishment and safe implementation of the reactor refurbishment plan
- 2013 Meeting Rabat, Morocco 2 - 6 December 2013
- Topics discussed were
 - Safety of experiment
 - Radiation protection and waste management programmes
 - Walkthrough the Morocco TRIGA reactor facility and report on the observations
- 2014 Meeting Cairo Egypt 7-11 December 2014
- Topics discussed were
 - design provisions for protection against internal and external events
 - interface between safety and security
 - walkthrough of the ETRR-2 research reactor

- 2015 Meeting Accra, Ghana 21-25 September 2015
- Topics discussed were
 - core management (including safety aspects of the research reactor core fuel conversion from high to low enriched uranium of MNSR reactors)
 - integrated management system
 - emergency planning
 - Peer review the core conversion project
- 2016 Meeting Abuja, Nigeria 22-26 August 2016
- Topics discussed were
 - development of an initial decommissioning plan and its, updating the plan during the lifetime of the research reactor
 - updating safety documents
 - walkthrough of the NIRRR-1 research reactor
 - Preparation of NIRRR-1 for core conversion

Incident Reporting System for Research Reactors (IRSRR)

Sharing of Knowledge and Operating Experience

- Established in 1997 as paper based system
- Converted to a web-based system and now in Nucleus
- 58 Member States that have research reactors and/or planning/constructing to have one are members of the IRSRR representing more than 95% of the research reactors world-wide
- IRSRR is a closed system and access is permitted only to the national or local coordinators
- Each Member has a National Coordinator usually from regulatory body - responsible for submission of the event (incident) reports to the IRSRR
- Each Member can have more than one local coordinators usually from operating organizations. Local coordinators have only viewing rights

Current Members

Algeria	DR of Congo	Italy	The Netherlands	Slovenia
Argentina	Egypt	Jamaica	Nigeria	South Africa
Australia	Finland	Japan	Norway	Sweden
Austria	France	Jordan	Pakistan	Syria
Bangladesh	Germany	Kazakhstan	Peru	Thailand
Belgium	Ghana	Korea	Philippines	Tunisia
Brazil	Greece	Latvia	Poland	Turkey
Bulgaria	Hungary	Libya	Portugal	Ukraine
Canada	Indonesia	Malaysia	Romania	United Kingdom
Chile	Iran	Mexico	Russian Federation	USA
China	Iraq	Morocco	Serbia	Uzbekistan
Czech Republic	Israel			Vietnam

IRSRR - Meetings

- Biennial meetings of national coordinators are held where:
 - events of safety significance presented by national coordinators are discussed
 - training on event investigation and root cause analysis by an international expert to the participants is given
 - selected events are peer reviewed
 - ways to improve the effectiveness of the IRSRR are discussed

IRSRR - Meetings

- 2009, Petten, the Netherlands, 16-20 November
- 2011, Pitesti, Romania, 10-14 October
- 2013, Vienna, Austria, 15-19 April
- 2015, Sofia, Bulgaria, 16-20 March
- 2017 (Scheduled in Vienna in August)
- One of the major recommendation was to analyse the events reported to the IRSRR and publish an agency document
 - IAEA TECDOC-1762 was published in 2015.

Participation in other established networks

- RRSS regularly participates in other established networks and coalitions on research reactor safety issues including:
 - ANNuR;
 - FNRBA;
 - AFRA;
 - ANSN;
 - RER-1016: Commonwealth of Independent States Research Reactor Coalition (CISRRC).
- An example of RRSS participation in ANNuR is provided.

- ANNuR established in 2010, supported by IAEA, KINS, US-NRC DE (LLNL)
- EU representatives attending all ANNuR meetings
- Cooperation with global and regional networks
- RRSS participates in several of the ANNuR activities that are related to research reactor safety
- Recent examples are
 - Workshop for ANNuR and FNRBA on Milestones and Infrastructure for New Research Reactor Projects hosted by Egypt Nuclear and Radiological Regulatory Authority (ENRRA) at Cairo, Egypt, 10- 14 May 2015
 - Meeting on the Safety and Licensing of Research Reactors hosted by Egypt Nuclear and Radiological Regulatory Authority (ENRRA) at Cairo, Egypt, 28 August – 1 September 2016

Current Status of RR in the ANNuR Member States

ANNuR MS with RR	Facility Name	Facility Type	Power (kW _{th})	Status	Vendor Country	Date commissioned
Algeria	NUR	Pool	1000	Operational – being upgraded to 3 MW	Argentina	1989
	Es-Salam	Heavy water	15000	Operational	China	1992
Egypt	ETRR-1	Tank WWR	2000	Operational	Russia	1961
	ETRR-2	Pool	22000	Operational	Argentina	1997
Iraq	IRT-5000	Pool, IRT	5000	Extended shut down	Russia	1968
	TAMMUZ-2	Pool	500	Extended shut down	France	1980
Jordan	JSA	Sub-critical	0	Operational	China	2014
	JRTR	Tank in pool	5000	Commissioning	Korea	Imminent (2016)
Kuwait	-	-	-	Planning	TBD	-
Lebanon	-	-	-	Considering	-	-
Libya	TNRC	Critical assembly	0.1	Operational	Russia	1981
	IRT-1	Pool, IRT	10000	Operational	Russia	1981
Morocco	MA-R1	Triga Mark II	2000	Operational	USA	2006
Saudi Arabia	RR-1	Pool	30	Under construction	Argentina	-
	-	-	TBD (high power)	Planning	TBD	-
Sudan	-	-	-	Considering	-	-
Syria	SRR-1	MNSR	30	Operational	China	1996
Tunisia	-	Sub-critical	0	Planning	TBD	-

9 operational, 2 under construction, 5 under consideration



ANNuR future plans for research reactors



- **Proposed Actions to Address the Needs over a three-year period (2016 to 2018), complementary to the activities already planned under other programmes (such as national or regional technical cooperation projects):**
- Conduct, at requests from recipient States, IAEA fact-finding and coaching missions on the basis of the IAEA self-assessment method for developing national infrastructure for a research reactor programme;
- Conduct of regional IAEA/ANNuR workshops on competence framework for regulatory bodies for research reactors, and assessment of training needs and development of national plans to address identified actions;
- Conduct annual IAEA/ANNuR meetings for discussions issues of common concern in relation to regulatory supervision, including peer-review of specific issue(s) as needed in a requesting Member State. These meetings will provide for utilization of expertise in the region and could be supported by the IAEA for provision of technical support concerning application of the IAEA safety standards ;
- Conduct regional IAEA/ANNuR workshop(s) on regulatory aspects of research reactors focusing on provision of practical information and training on IAEA safety standards and regulatory activities such as conduct of regulatory inspection at research reactor facilities, performance of safety assessment, and periodic safety review. These workshops are to be conducted at research reactor facilities in the region, which to be used as a practical training tool.



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Questions?

Thank you!

Safety enhancement is a
continuous journey