

Technical Cooperation Project RER/1/016:  
“Enhancing Utilization and Safety of Research Reactors”

**IAEA Annual Meeting of the  
Commonwealth of Independent States Research Reactor Coalition (CISRRC)**

Organised by:  
International Atomic Energy Agency (IAEA)  
Hosted by:  
Institute of Nuclear Physics of the Republic of Kazakhstan  
Almaty, 23-26 August 2016

**MEETING REPORT**

**BACKGROUND**

The International Atomic Energy Agency (IAEA) promotes networking, coalitions and regional collaboration to improve the safety, and efficient and sustainable utilization of research reactors (RRs). A number of RR coalitions and networks were developed with IAEA support as a new model to better utilise RRs and facilitate access for the Member States without such facilities. The coalition/network concept involves putting in place cooperative arrangements among RR operators, user entities and other stakeholders. Ideally, a strong partnership is formed leading to increased utilization of individual RRs through collective efforts, including improved self-sustainability and self-reliability.

In 2012, the IAEA invited all IAEA Member States that belong to the Commonwealth of Independent States (CIS) to take part in the initial planning meeting of the CIS Research Reactor Coalition (CISRRC) to facilitate education, training, research, and industrial applications of the region. The Coalition was established in December 2012 in Vienna and held its first Annual Meeting in June 2013 in Dimitrovgrad, Russian Federation, where the draft Memorandum of Understanding was signed, the areas of cooperation identified and the first work plan agreed upon. Since then, the CISRRC has been meeting regularly once a year to review and discuss the work plan and further areas of cooperation.

The CISRRC is implemented under IAEA TC regional project RER/1/016, which is built on the results achieved by the CISRRC within RER/1/007. It is aimed at the improved utilisation, best practices and support for the safe operation of research reactors (RRs) in the European Region Member States (MS) through compliance with the Code of Conduct on Safety of Research Reactors and the sustainability of related networks and coalitions.

The IAEA has invited all MS of the CIS to take part in the 2016 annual meeting of the CISRRC, hosted by the Institute of Nuclear Physics, Almaty, Kazakhstan.

## OBJECTIVE

The main objective of the meeting was to develop work plans for each focus area of cooperation: research reactor safety; education and training; and ageing management, and to review and discuss the work done during the previous year. Participants were expected to:

- develop a concrete 2016–2017 work plan with clearly defined roles, activities and timeline for coalition members and the IAEA;
- discuss other potential fields of activities where cooperative efforts of the Coalition might lead to enhanced regional coalitions/networks;
- identify and define future lines of activity where the IAEA’s facilitation would have high impact and significance.

The meeting was attended by 21 participants from 9 MS: Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Russian Federation, Tajikistan, Ukraine and Uzbekistan. The IAEA was represented by two Technical Officers (TOs) from the Research Reactor Section, Department of Nuclear Energy and the Research Reactor Safety Section, Department of Nuclear Safety. The list of meeting participants is included in Annex I. The meeting Agenda is included in Annex II.

## WORK DONE

The meeting was held in plenary and parallel breakout sessions, comprising of presentations from participants, technical discussions, breakout sessions to develop the work plan for 2016-2017 and preparation of the meeting report. The IAEA Technical Officers Mr David Sears (NSNI/RRSS) and Mr Maksim Voronov (NE/RRS) facilitated the meeting.

The meeting was opened by Mr Mukhtar Yerman, Member of Parliament, Member of the Committee on International Affairs, Defence and Security, who acknowledged the importance of interstate cooperation and assured the support for the Coalition’s activities.

Welcome remarks were provided by Mr Sayabek Sakhiyev, the Director of Institute of Nuclear Physics, Republic of Kazakhstan, and Mr David Sears, who summarized the goals and objectives of the meeting. The agenda was adopted and Mr Chakrov from Institute of Nuclear Physics, Republic of Kazakhstan, chaired the meeting.

In the opening plenary session, the IAEA TOs delivered presentations on the following topics:

- Brief introduction and objectives of the Project RER/1/016 – David Sears, RRSS/IAEA;
- IAEA activities in the field of research reactors – Maksim Voronov, RRS/IAEA;
- SSR-3 Revised Safety Requirements for Research Reactors – David Sears, RRSS/IAEA.

The technical working groups leaders presented a summary of the implemented activities and achieved results for the previous 2015-2016 cycle, namely:

1. Activities and results achieved by the working group on safety of RRs – Mr Victor Fedulin, RIAR, Russian Federation.
2. Activities and results achieved by the working group on education and training – Mr Alexey Petelin, RIAR, Russian Federation.
3. Activities and results achieved by the working group on ageing management – Mr Alexander Albul, NRC “Kurchatov Institute”, Russian Federation. (presented on day 2)

Highlights of progress made includes the following:

1. Arrangements were made to jointly organize the International Conference on Research Reactor Safety 2017 and the Annual Meeting of the CISRRC in cooperation with the IAEA.
2. A cooperation agreement (Practical Agreement) was signed between the IAEA and RIAR, with the support of the members of the CISRRC, to cooperate in organizing the International Conference on Research Reactor Safety 2017, to be held in Dimitrovgrad in 2017.
3. A book entitled "Research Reactors of the CIS member-states" has been published. This will provide useful information to a wide range of potential users, including CIS countries that do not have RRs. This is considered as a significant achievement of the Coalition.
4. Two "Information Bulletins on the safety significant incidents at RRs in the CISRRC" for 2014 and 2015 were developed and published on the CISRRC Information Portal.
5. The training curricula in the area of RR utilization and safety (radiation, nuclear safety, reactor physics, etc.) were developed and are ready to be offered to stakeholders and members of the coalition, including countries that do not have an operating RR.
6. Plans to organize a seminar for RRs safety professionals to analyse the most significant incidents in CISRRC RRs were considered and are being developed.
7. The CISRRC Information Portal on Operating Experience of the RRs in the CIS has been developed and launched in a test-mode with limited access.
8. The process of collection of the information on operating experience of the equipment important to safety has been initiated. The initial analysis of the collected information revealed the necessity of adjustment of the existing approach to this activity, including the activity on obtaining necessary permissions for publishing the obtained information.
9. The existing experience of partners of the CISRRC was successfully applied in the works on modernization of the WWR-K reactor systems.

The more detailed information on the work done and achievements is included in Annex III.

Following the reports from the working group leaders, Countries Presentations were made by the representatives of each of the CISRRC participants.

On the second day of the meeting, the technical visit to the Institute of nuclear Physics was conducted. Participants visited research reactor WWR-K, critical assembly, isotope production facilities and new accelerator building. The reactor was shut down during the visit with the top plug removed, allowing the participants to observe the new control rod drives that were recently installed as part of the LEU conversion and upgrade of the I&C systems.

## WORK PLAN FOR 2016-2017

During the meeting, participants worked in groups to review the 2015-2016 work plan and discussed activities that should be carried out during the 2016-2017. A work plan for 2016-2017 has been drafted accordingly for each focus areas: research reactor safety, education and training and ageing management. The detailed output from each working group is included in Annex IV.

## CONCLUSION AND RECOMMENDATIONS

Good progress was made during 2015–2016 in achieving the work plan activities identified at the last meeting.

Participants agreed that the coalition is an effective tool to enhance safety, ageing management and education and training in RRs of the CIS, and unanimously agreed to continue the coalition activities.

The participants agreed to continue to work on accomplishing the work plan activities for 2016-2017 identified in the attached work plan, in particular to:

1. Make an inquiry to the IAEA with request of possibility to support publishing the book “Research Reactors of the CIS” in the CISRRC Information Portal on Operating Experience of the RRs in the CIS has been developed and launched in a test-mode with limited access. English language.
2. E&T: Continue to provide training in the area of RR safety, utilization, and ageing management (safety incidents, radiation protection, nuclear physics, burnup, etc.) including to countries that do not have access to operational research reactors.
3. E&T: commend EERRI for the sharing of experience on implementation of the training programmes. Partly, the training programme for the CISRRC was based on the EERRI group fellowship training programme (MEPhI – RIAR).
4. Ageing Management: consider ways of joint work and information sharing between the IAEA RRADB and the Information System of the CISRRC on ageing management.
5. CISRRC members to review achievements of the previous four year cycle and prepare a presentation on the goals and objectives for the next four years, with a view to enhancing sustainability of the coalition, to be presented at the International Conference on Safety of RR.
6. To promote networking and sharing of information on research reactor issues, consider the possibility of holding the next meeting of the CISRRC in Dimitrovgrad, 22-27 May 2017.
7. Create and present the activities and achievements on enhancing safe operation and utilization of RRs that have been implemented during the past 4 years of the CISRRC work under the RER/1/007 project. Acknowledging the benefits of the long-term planning for the Coalition and the objective of sustainability the participants have proposed to develop the list of ultimate goals within the 4-year cycle of the RER/1/016 Project. Present this at the next meeting of the coalition.

**RER1016/9002/01**  
**Annual Meeting of the Commonwealth of Independent States Research Reactor Coalition**  
**(CISRRC)**  
**Kazakhstan, Almaty**  
**2016-08-23 - 2016-08-26**

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**Agenda**

<b>Tuesday, 23 August</b>	
9:30 – 10:00	Arrival/Registration
10:00 – 10:45	Meeting opening: <ul style="list-style-type: none"> <li>- Welcome remarks from INP - (Sayabek Sakhiyev, INP – Gen. Director)</li> <li>- Opening remarks: objectives, expectations of the CISRRC meeting, approval or amendment of the Agenda - (David Sears, RRSS/IAEA, Maksim Voronov, RRS/IAEA)</li> <li>- Group introduction</li> </ul>
10:45 – 11:15	The IAEA Research Reactor Section Activities - (Maksim Voronov, RRS/IAEA)
11:15 – 11:45	<i>Coffee break</i>
11:45 – 12:30	SSR-3 Revised Safety Requirements for Research Reactors - (David Sears, RRSS/IAEA)
12:30 – 14:00	<i>Lunch break</i>
14:00 – 14:30	Report of the CISRRC working group on Safety of Research Reactors - (Victor Fedulin, RIAR)
14:30 – 15:00	Report of the CISRRC working group on Education and Training - (Alexey Petelin, RIAR)
15:00 – 15:30	Report of the CISRRC working group on Ageing Management of Research Reactors - (Alexander Albul, NRC “Kurchatov Institute”)
15:30 – 16:00	<i>Coffee break</i>
16:00 – 18:00	Country presentations – brief update on nuclear research activities and status of research reactors: <ul style="list-style-type: none"> <li>• Armenia</li> <li>• Azerbaijan</li> <li>• Belarus</li> <li>• Kazakhstan</li> <li>• Kyrgyzstan</li> <li>• Russian Federation</li> <li>• Tajikistan</li> <li>• Ukraine</li> <li>• Uzbekistan</li> </ul>
18:00	Adjourn
18:30	<i>Reception</i>
<b>Wednesday, 24 August</b>	
10:00 – 10:30	WWR-K research reactor upgrades related to HEU/LEU conversion – (Darkhan Nakipov, INP – Kazakhstan)
10:30 – 11:00	Safety of nuclear reactors and fuel cycle facilities at RIAR in 2015 - (Alexey Petelin, RIAR)
11:00 – 11:30	<i>Coffee break</i>
11:30 – 12:00	Incidents at Russian nuclear research installations in 2011-2015 - (Victor Fedulin, RIAR)
12:00 – 12:30	Experience in operation of the equipment of research reactor systems important to safety in CIS - (Alexander Albul, NRC “Kurchatov Institute”)
12:30 – 14:00	<i>Lunch break</i>
14:00 – 15:00	Presentation of pilot version of information system on operation experience of the CIS Member States’ RRs - (Petr Chakrov, INP – Kazakhstan)
15:00 – 15:30	<i>Coffee break</i>
15:30 – 18:00	Break into Working Groups to draw up activities and draft work plan for each area of focus: <ul style="list-style-type: none"> <li>- Safety of Research Reactors</li> </ul>

18:00	<ul style="list-style-type: none"> <li>- Education and Training</li> <li>- Ageing Management</li> </ul> <p><i>Adjourn</i></p>
<b>Thursday , 25 August</b>	
10:00 – 11:30	<p>Working Groups presentations of the 2016-2017 activities and workplan for each area of focus:</p> <ul style="list-style-type: none"> <li>- Safety of Research Reactors</li> <li>- Education and Training</li> <li>- Ageing Management</li> </ul>
11:30 – 12:00	<i>Coffee break</i>
12:00 – 13:00	<p>(cont.) Working Groups presentations of the 2016-2017 activities and work plan for each area of focus:</p> <ul style="list-style-type: none"> <li>- Safety of Research Reactors</li> <li>- Education and Training</li> <li>- Ageing Management</li> </ul>
13:00 – 14:00	<i>Lunch break</i>
14:00 – 18:00	Technical tour to WWR-K research reactor and isotope production facilities at INP
19:00	<i>Dinner</i>
<b>Friday, 26 August</b>	
10:00 – 11:00	Drafting of the 2016-2017 work plan for the CISRRC
11:00 – 11:30	<i>Coffee break</i>
11:30 – 12:30	(cont.) Drafting of the 2016-2017 work plan for the CISRRC
12:30 – 13:00	Final comments and recommendations
13:00	<i>Meeting adjourn</i>
13:00 – 14:00	<i>Lunch</i>
14:00 – 18:00	Almaty city tour

**Reports of the CISRRC working groups leaders on the work done and achievements for the years 2015-2016**

**Working group on Research Reactors Safety, presented by Mr V. Fedulin (RIAR/Russia).**

1. Terms of reference for the establishment of the Information System on Operating Experience of RRs in the CIS and its Database are developed. The technical documentation is being developed (explanatory note, Administrator and User Manuals). The process of collection of information in accordance with the methodological recommendations, including information on incidents, has been initiated.
2. An electronic version of the annual Information Bulletin “Incidents at RRs of the CIS Member States” has been developed. Two Information Bulletins – for 2014 and 2015 – were published.
3. Information for the book “Research Reactors in the Member States of the CIS” has been collected. An electronic version of the book has been developed. The book was published by the publishing house “Gelios ARV” with the IAEA financial support. It was tentatively agreed with the IAEA to translate the book into English and publish it.
4. The information is being collected to develop recommendations for self-assessment of safety at RRs of the CIS based on the IAEA standards and requirements and existing national regulations in the field of nuclear energy.

**Working group on E&T, presented by Mr A. Petelin (RIAR/Russia).**

**Task 1: Development and implementation of Education and Training Programmes for RR staff:**

1. As a result of the joint cooperation with MEPHI (base institution in charge of E&T activities in the CIS Commission on Cooperation in the Field of Nuclear Energy), an E&T programme was developed based on suggestions from Coalition Members. This is a three-weeks training course with practical exercises at experimental facilities of MEPHI in Moscow and RIAR in Dimitrovgrad. The program was reviewed at the meeting of the working group and meets the demands of the CISRRC Member States in E&T. It is beneficial to include MEPHI as a member of the Coalition.
2. The website of the Coalition contains the information on available E&T courses.
3. Information on the training demands in the CIS is being clarified and will be presented by the end of 2016 in order to develop further training programmes.

**Task 2: CIS RR Staff training with the use of RIAR’s infrastructure:**

1. The design of the training programme “Cycle Chemistry of Nuclear Facilities” is developed. The programme was reviewed by the Coalition Members and acknowledged to be relevant for further training and internships among RRs of the CIS. Based on the design of RIAR’s training programme, the development of the Training Guide on relevant topics to be used by all the Coalition Members at their RRs was suggested.
2. Proposals for the establishment of functional analytical simulator for WWR-type reactors were discussed. It was noted that RIAR’s experience in creating functional and analytical simulators is of interest for the Coalition Members, and can be used for training. However, the

implementation of the projects on simulators development of other types of reactors (WWR-SM, WWR-K, and WWR-M) is only possible with considerable financial support from the IAEA or from the countries concerned.

#### Task 3: Joint Research Projects:

1. Working group members acknowledged mutual usefulness and relevance of the internships (trainings) held during recent years and this activity should be continued. It is suggested to conduct internship (training) on knowledge and experience transfer on decommissioning of RIAR's research reactors RBT-6/1 and AST. RIAR confirmed availability to conduct a workshop for RR staff on methodologies for fuel burn calculations.
2. RIAR and Sosny are currently preparing a contract for joint R&D on material testing.
3. It was noted, that the software suite for transmutations calculations, which has been passed by RIAR, is being successfully utilized at the INP of the Academy of Sciences of Uzbekistan.
4. The Coalition Members are interested in conducting trainings on neutron dosimetry, based on the methodology developed and utilized by RIAR: providing neutron dosimetry support to the wide range of irradiation experiments at different conditions, ensuring the measurements accuracy that meets the modern requirements, both national and international. The methodology is based on the uniformity of measurements at RRs of different types. This includes:
  - a. Organization of the irradiations and measurements process;
  - b. Activities measurements and determining activity integrals;
  - c. Neutron energy spectra evaluation;
  - d. Integral neutronic parameters evaluation;
  - e. Neutronic calculations, including calculations of damaging doses and transmutations.
5. The Working Group considers useful involvement of all the available options to meet the challenges of E&T in the CIS Member States. In this regard, a proposal was made to raise this issue at the next meeting of the CIS Committee on Cooperation in the Field of Nuclear Energy in October 2016 in Yerevan, Armenia. This is considered as another task of the working group on E&T.

#### **Working group on Ageing Management, by Mr A.Albul (NRC "Kurchatov Institute"/Russia).**

During the annual meeting of the CISRRC in Tashkent in 2015, it was decided to collect and summarize information about equipment important to safety at RRs of the Coalition. Purpose is to help each other in choosing the right supplier for further maintenance and modernization programmes.

The process of collection of the information on operating experience of the equipment important to safety has been initiated. Currently, information on 9 facilities has been collected (SM-6, RBT-10, RBT-6, BOR-60, IR-8, OR, Argus, Gidra, WWR-M). The initial analysis of the collected information revealed the necessity of adjustment of the existing approach to this activity, including the activity on obtaining necessary permissions for publishing the obtained information.

## The detailed output – work plan for 2016-2017 – from breakout sessions of each working group

**Working group on E&T**, group leader Mr A. Petelin (RIAR/Russia).

№ of task	Description	Steps	Participants	Responsible	Deadlines
Task 1	Development and implementation of Education and Training Programmes for RR staff	1. Disseminate among the CISRRC members for final actualization a 3-weeks training programme, that has been developed by the RIAR and MEPhI and mutually agreed.	MEPhI, RIAR	A. Portnov A. Petelin Khachaturov	September, 2016
		2. Provide feedback with suggestions of final version of the training programme and agree on the final version	Coalition members	V. Fedulin	October, 2016
		3. Depending on the suggestions in steps 1 and 2, clarify the cost for the training programme. Direct an inquiry with the financial support justification to the IAEA.	MEPhI, RIAR	V. Fedulin Khachaturov	November, 2016
		4. Clarify the training demands at the RRs of the CIS. Organize RR staff training using existing training programmes.	Coalition members, MEPhI, RIAR	V. Fedulin A. Petelin	Within the agreed time frames
Task 2	Training of the RR staff of the CIS with the use of existing infrastructure of RIAR	1. Develop a draft of the Training Guide for Cycle Chemistry of Nuclear Facilities, based on already developed and approved training programme	RIAR	V. Fedulin A. Petelin	December, 2016
		2. Make an inquiry to the IAEA for financial support of publication.	RIAR	V. Fedulin A. Petelin	December, 2016
		3. Publish the Training Guide and disseminate among the CISRRC members for its practical application.	RIAR	A. Petelin V. Fedulin.	March, 2017
		4. Develop a draft of the Basics of Research Reactors Physics and discuss with Coalition members at the Annual CISRRC meeting.	RIAR	A. Petelin O. Diakov	May, 2017
		5. Develop a training programme and perform training at RIAR of specialists from WWR-SM, Tashkent, Uzbekistan, on decommissioning of RRs.		A. Petelin D. Yusupov	Within the agreed time frames
Task 3	Implementation of joint R&Ds	1. According to the CISRRC members' suggestion, develop a programme and hold a training workshop on Methods and Techniques on Fuel Burn-up Calculations.	Coalition members	A. Petelin	Within the agreed time frames

		2. Develop and distribute among Coalition members a prospectus of the Training Workshop on Neutron Dosimetry. Request financial support from the IAEA. Develop a proposal to establish the IAEA TC Project on Neutron Dosimetry.	RIAR, Coalition members	A. Petelin V. Fedulin.	September, 2016
		3. Hold a Training Workshop on Neutron Dosimetry	RIAR	V. Fedulin A. Petelin	Within the agreed time frames
		4. Distribute among the CISRRC members the information on technical characteristics of the MBIR. Develop a proposal on participation of the Member States of the CISRRC in Research Centre based on MBIR.	RIAR, Coalition members	A. Petelin F. Grigoryev	December, 2016
Task 4	Involvement of socio-political organizations to meet the challenges of training of RR staff and specialists in the field of radiation and nuclear technology	Consider the E&T issues in the CIS Member States at the forthcoming meeting of the Committee of the CIS Member States on cooperation in the field of nuclear energy, Yerevan, Armenia, September 2016	CISRRC representatives	J. Salomov A. Garibov V. Fedulin	October, 2016
Task 5	Publication of the book “Research Reactors in the CIS” in English	1. Define financing source for translation services (inquire about financial support from the IAEA)	RIAR, Coalition members	N. Arkhangelsky, F. Grigoryev	September – October, 2016
		2. Define financing source for the book layout development and publication services (inquire about financial support from the IAEA)	RIAR, Coalition members	N. Arkhangelsky, F. Grigoryev	September – October, 2016

**Working group on Safety of Research Reactors, group leader Mr V. Fedulin (RIAR/Russia).**

<b>№ of task</b>	<b>Description</b>	<b>Steps</b>	<b>Participants</b>	<b>Responsible</b>	<b>Deadlines</b>
Task 1	Deployment of the Information System on the CIS RRs Operating Experience and further support to it	1. Finalization of the website of the Information System to provide online information on RRs operating experience and actual status, and further technical and information support.	RIAR	V. Fedulin	December, 2016
		2. Information and technical support to the Information System and database content management.	RIAR, Coalition members	V. Fedulin	On a regular basis
Task 2	Development and publication of the Information Bulletin on «Incidents at RRs	1. Information collection for the bulletin.	RIAR, Coalition	V. Fedulin	March, 2017

	of the CIS in 2016 »		members		
		2. Analysis of collected data.	RIAR	V. Fedulin	April, 2017
		3. Development of the electronic version of the bulletin.	RIAR	V. Fedulin	May, 2017
		4. Publish the Information Bulletin 2016. Consider possibility of translation of the Bulletin into English with the support of the IAEA.	RIAR, IAEA	V. Fedulin, M. Voronov	May, 2017
Task 3	Organize the Annual Meeting of the CISRRC alongside with the International Conference on RRs Safety in Dimitrovgrad, Russia	1. Coordination of activities on participation of the CISRRC Members with corresponding presentations on Safety at the Conference.	RIAR, IAEA	V. Fedulin, M. Voronov.B.	May, 2017
Task 4	Exchange of information on good practices in providing environmental safety of RRs activities	1. Prepare review presentations for the next Annual Meeting of the Coalition.	Coalition members	P. Chakrov A. Petelin	May, 2017
Task 5	Exchange of information on self-assessment of RR safety	1. Prepare review presentations for the next Annual Meeting of the Coalition.	Coalition members	P. Chakrov A. Petelin	May, 2017

