

# International Conference on **Research Reactors: Safe Management and Effective Utilization**

**16–20 November 2015  
Vienna, Austria**



## **PROGRAMME**

Organized by the



**IAEA**

International Atomic Energy Agency

## Programme Committee:

H. Abou-Yehia, IRSN, France  
P. Bode, TU Delft, Netherlands  
A. Borio di Tigliole, NEFW, IAEA  
K. Brooks, NSNS, IAEA  
B. Carle, SCK-CEN, Belgium  
C. Jimenez De Bergant, TCPC, IAEA  
J. Lolic, Instituto Banseiro, Argentina  
F. Marshall, NEFW, IAEA  
N. Ramamoorthy, BARC, India  
D. Ridikas, NAPC, IAEA  
A. Shokr, NSNI, IAEA  
B. Steynberg, NECSA, South Africa

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## IAEA Secretariat:

Scientific Secretaries: A. Borio di Tigliole (lead scientific secretary)  
D. Ridikas  
A. Shokr

Conference Organizer: M. Neuhold

Conference Support: T. Desai  
A. Zhukova

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## Location of the Conference:

International Atomic Energy Agency  
Vienna International Centre (VIC)  
**M Building, Board Room A**

Wagramer Strasse 5  
1400 Vienna, Austria  
Tel.: (+43) 1 2600 0  
E-mail: [official.mail@iaea.org](mailto:official.mail@iaea.org)

**Working Language:** English

**Resolutions:** No resolutions may be submitted for consideration on any subject; no votes will be taken.

## TIMETABLE

### Monday, 16 November 2015

08:00	Registration	Gate 1
10:00–10:30	Opening Session	
10:30–12:00	Session A	Utilization & Applications
12:00–14:00	<i>Lunch Break</i>	
14:00–15:30	Session A (cont'd)	Utilization & Applications
15:30–16:30	Poster Session &	<i>Coffee/Tea Break</i>
16:30–18:10	Session B	Common Management Considerations
18:10–20:00	<i>Group Photo and Reception</i>	M-Building, Ground Floor

### Tuesday, 17 November 2015

09:00–10:40	Session C	Safety of Research Reactors
10:40–11:10	Poster Session &	<i>Coffee/Tea Break</i>
11:10–12:50	Session C (cont'd)	Safety of Research Reactors
12:50–13:50	<i>Lunch Break</i>	
13:50–15:30	Session D	Operation & Maintenance
15:30–16:00	Poster Session &	<i>Coffee/Tea Break</i>
16:00–17:50	Session D (cont'd)	Operation & Maintenance
18:00–19:00	Side Events	

### Wednesday, 18 November 2015

09:00–10:30	Session E	Spent Fuel Management & Decommissioning
10:30–11:00	Poster Session &	<i>Coffee/Tea Break</i>
11:00–12:30	Session F	New Research Reactor Projects
12:30–13:30	<i>Lunch Break</i>	
13:30–15:20	Session F (cont'd)	New Research Reactor Projects
15:20–16:00	Poster Session &	<i>Coffee/Tea Break</i>
16:00–17:50	Session G	Security of Research Reactors
19:30–22:00	<i>Conference Dinner</i>	<i>Zwölf Apostelkeller Stadtheuriger</i>

### Thursday, 19 November 2015

09:00–10:30	Session C (cont'd)	Safety of Research Reactors
10:30–11:00	Poster Session &	<i>Coffee/Tea Break</i>
11:00–12:30	Session C (cont'd)	Safety of Research Reactors
12:30–13:30	<i>Lunch Break</i>	
13:30–15:00	Session A (cont'd)	Utilization & Applications
15:00–16:00	Poster Session &	<i>Coffee/Tea Break</i>
16:00–18:00	Session D (cont'd)	Operation & Maintenance

### Friday, 20 November 2015

09:00–10:30	Session A (cont'd)	Utilization & Applications
10:30–11:00	Poster Session &	<i>Coffee/Tea Break</i>
11:00–12:30	Session B (cont'd)	Common Management Considerations
12:30–13:30	Panel Session	Summary Discussion, Conclusions & Recommendations
13:30–14:00	Closing Session	
15:00–17:00	Technical Tour	

**Poster sessions will take place in the M-building, Ground floor.**

**Commercial exhibits will be displayed in the M-Building, 2nd floor, outside Board Room A.**

## MONDAY, 16 NOVEMBER 2015

**08:00**            **Registration and distribution of  
conference material**

**10:00–10:30**    **OPENING SESSION**

**M. Chudakov**  
Deputy Director General, Department of  
Nuclear Energy

Welcome addresses and opening remarks by the IAEA

**J.C. Lentijo**  
Deputy Director General, Department of  
Nuclear Safety and Security

**A. Malavasi**  
Deputy Director General, Department of  
Nuclear Sciences and Applications

**D. Yang**  
Deputy Director General, Department of  
Technical Cooperation

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**10:30–12:00**    **SESSION A:  
Utilization and Applications**

**Chair:**            **H. Böck, Austria**  
**Co-Chair:**      **D. Ridikas, IAEA**

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<i>No. of Paper IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Paper</i>
A.01. (keynote)	<b>D. Ridikas</b>	IAEA	IAEA activities in support of enhanced research reactor utilization and sustainability
A.02.	<b>F. Foulon</b> J. Safieh	France	The impact of the education and training on research reactors for the building of the knowledge, competencies and skills
A.03.	<b>S. Malkawi</b>	Jordan	A comparative analysis of the use of internet reactor laboratory and a subcritical assembly for nuclear engineering education
A.04.	<b>L. Sklenka</b> F. Foulon	Czech Republic	Education and training at research reactors: sharing the experiences from Europe with Asia and Africa

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**12:00–14:00**    *Lunch Break*

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## MONDAY, 16 NOVEMBER 2015

**14:00–15:30**      **SESSION A (cont'd):**  
**Utilization and Applications**

**Chair:**            **P. Bode, Netherlands**  
**Co-Chair:**      **I. Swainson, IAEA**

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<i>No. of Paper IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Paper</i>
A.05. (invited)	<b>N. Kardjilov</b> J. Banhart A. Hilger I. Manke	Germany	Neutron imaging in science and technology
A.06.	<b>P. Mikula</b> P. Strunz	Czech Republic	The use of thermal neutron beams at medium power reactor LWR-15 in REŽ for competitive neutron scattering experiments
A.07.	<b>A. Izhutov</b> S. Ilienکو V. Kalygin	Russian Federation	Modern methods to test materials and fuel in research reactors of RIAR
A.08.	<b>T. Ivanova</b> J. Gulliford A. White	OECD-NEA	Overview of the NEA activities related to experimental needs

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**15:30–16:30**      *Coffee/Tea Break*  
**Poster Session  
in all topics**

**(A) Utilization and Applications**  
**(B) Common Management Considerations**  
**(C) Safety of Research Reactors**  
**(D) Operation and Maintenance**  
**(E) Spent Fuel Management and Decommissioning**  
**(F) New Research Reactor Projects**  
**(G) Security of Research Reactors**

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**16:30–18:10**      **SESSION B:**  
**Common Management Considerations**

**Chair:**            **N. Ramamoorthy, India**  
**Co-Chair:**      **Y. Barnea, Israel**

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B.01. (invited)	<b>G. Storr</b> D. Vittorio	Australia	Interface between safety and security of research reactors
B.02. (invited)	<b>J. Du Bruyn</b> B. Steynberg	South Africa	Integrated management system, configuration and document control for research reactors
B.03.	<b>H. Böck</b> D. Ridikas	Austria	World of TRIGA research reactors: present and future
B.04.	<b>A. Mahjoub</b> D. Mosbah	AAEA	Challenges of research reactors optimal utilization in Arab countries

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**18:10–20:00**      *Group Photo/Reception – Ground Floor*

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## TUESDAY, 17 NOVEMBER 2015

09:00–10:40

**SESSION C:  
Safety of Research Reactors**

**Chair:** J. Lolich, Argentina

**Co-Chair:** A. Shokr, IAEA

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<i>No. of Paper IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Paper</i>
C.01. (keynote)	<b>A. Shokr</b>	IAEA	IAEA sub-programme on safety enhancement of research reactors
C.02. (invited)	<b>H. Abou Yehia</b>	France	Highlights of safety enhancements of research reactors based on safety reassessments following the Fukushima-Daiichi accident
C.03.	<b>T. Kato</b> M. Arai Y. Murayama S. Wada	Japan	Status of JRR-3 after great east Japan earthquake
C.04.	<b>C. Karhadkar</b>	India	Safety assessment and up-grades executed and proposed at Dhruva reactor following the accident at Fukushima Daiichi nuclear power plant
<b>10:40–11:10</b>	<i>Coffee/Tea Break</i> <b>Poster Session in all topics</b>		<b>(A) Utilization and Applications</b> <b>(B) Common Management Considerations</b> <b>(C) Safety of Research Reactors</b> <b>(D) Operation and Maintenance</b> <b>(E) Spent Fuel Management and Decommissioning</b> <b>(F) New Research Reactor Projects</b> <b>(G) Security of Research Reactors</b>

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## TUESDAY, 17 NOVEMBER 2015

11:10–12:50

**SESSION C (cont'd):**

**Safety of Research Reactors**

**Chair:**

**H. Abou Yehia, France**

**Co-Chair**

**C. Grant, Jamaica**

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C.05.	<b>E. Grolleau</b> M. Mderotte	France	French post-Fukushima complementary assessments – general approach and resulting safety improvements for the high flux reactor located in Grenoble
C.06.	<b>Y. Barnea</b> N. Hazensprung T. Makmal	Israel	Implementation of regulatory guidelines based on IAEA SRS-80 to reassess and enhance the safety of SNRC IRR-1, 5MW pool type MTR
C.07.	<b>S. Malaka</b>	South Africa	SAFARI-1 safety reassessment outcome and modifications in light of the Fukushima Daichi accident
C.08.	<b>Y. Boulaich</b>	Morocco	Thermal hydraulic and safety analysis for the Moroccan TRIGA MARK II research reactor
C.09.	<b>K. Krezhov</b>	Bulgaria	Management of the research reactor IRT-Sofia in extended shutdown

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12:50–13:50

*Lunch Break*

13:50–15:30

**SESSION D:**

**Operation and Maintenance**

**Chair:**

**J. Du Bruyn, South Africa**

**Co-Chair:**

**J. Estrade, France**

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<i>No. of Paper IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Paper</i>
D.01. (keynote)	<b>F. Marshall</b>	IAEA	IAEA activities in support of research reactor operation and maintenance
D.02. (invited)	<b>D. Elliott</b> A. Frikken	Australia	Reliability improvement at OPAL
D.03.	<b>M. Shaat</b>	Egypt	Management of ageing and modifications for research reactors
D.04.	<b>A. Pichlmaier</b> H. Gerstenberg A. Kastenmüller	Germany	FRM II: Extension of core component lifetime by application of fracture mechanics

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## TUESDAY, 17 NOVEMBER 2015

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<b>15:30–16:00</b>	<i>Coffee/Tea Break</i> <b>Poster Session in all topics</b>		<b>(A) Utilization and Applications</b> <b>(B) Common Management Considerations</b> <b>(C) Safety of Research Reactors</b> <b>(D) Operation and Maintenance</b> <b>(E) Spent Fuel Management and Decommissioning</b> <b>(F) New Research Reactor Projects</b> <b>(G) Security of Research Reactors</b>
<b>16:00–17:50</b>	<b>SESSION D (cont'd): Operation and Maintenance</b>		
<b>Chair:</b>	<b>A. Pichlmaier, Germany</b>		
<b>Co-Chair:</b>	<b>R. Sharma, India</b>		
D.05. (invited)	<b>E. Koonen</b>	Belgium	The development of high density, low enriched fuel for the conversion of research reactors
D.06.	<b>J. Stevens</b> B. Waud	USA	Continuing progress toward research and test reactors conversion to low enriched uranium fuel
D.07.	<b>P. Chakrov</b> D. Nakipov	Kazakhstan	WWR-K reactor upgrades related to HEU/LEU conversion
D.08.	<b>K. Kamajaya</b> E. Umar P. I. Yazid	Indonesia	The study and analyse the operation of the Bandung TRIGA research reactor using plate type fuel elements
D.09.	<b>Y. Mahlers</b> V. Makarovsky	Ukraine	Calculations and measurements for the full-core conversion of the WWR-M research reactor in Ukraine

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## TUESDAY, 17 NOVEMBER 2015

### SIDE EVENT 1:

**18:00-19:00**      **IAEA support to education and training based on research reactors**

(Conference Room M4)

**Chairs:**      **W. Kennedy, IAEA**  
**J. Vyshniauskas, IAEA**

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18:00–18:20	<b>W. Kennedy</b>	IAEA	IAEA activities supporting education and training on research reactors
	<b>J. Vyshniauskas</b>	IAEA	
18:20–18:30	<b>R. Altamimi</b>	Jordan	Eastern European Research Reactor Initiative: experience and feedback
18:30–18:40	<b>F. Foulon</b>	France	Internet reactor laboratory: capabilities and opportunities
18:40–18:50	<b>W. Kennedy</b>	IAEA	Training on research reactor safety
	<b>A. D’Arcy</b>	IAEA	
18:50–18:55	<b>All participants</b>		Round table discussion and Q&A session
18:55–19:00	<b>A. Shokr</b>	IAEA	Summary and closing

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### SIDE EVENT 2:

**18:00-19:00**      **IAEA assistance to new research reactor projects**

(Conference Room M5)

**Chairs:**      **D. Sears, IAEA**  
**A. Zhukova, IAEA**

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18:00–18:15	<b>A. Zhukova</b>	IAEA	The IAEA milestone approach on the establishment of a new research reactor: specific considerations
18:15–18:30	<b>D. Sears</b>	IAEA	Specific safety considerations in different phases of a research reactor project
18:30–18:55	<b>All participants</b>		Round table discussion and Q&A session
18:55–19:00	<b>A. Borio di Tigliole</b>	IAEA	Summary and closing

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## TUESDAY, 17 NOVEMBER 2015

### SIDE EVENT 3:

**18:00-19:00**      **IAEA assistance to addressing  
research reactor-based radioisotope  
production issues**

(Conference Room M6)

**Chairs:**      **D. Ridikas, IAEA  
J. Osso Junior, IAEA**

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18:00–18:05	<b>D. Ridikas</b>	IAEA	Introduction
18:05–18:15	<b>J. Osso Junior</b>	IAEA	IAEA assistance in RI production and supply
18:15–18:25	<b>N. Ramamorthy</b>	BARC, India	Perspectives from Member State expert
18:25–18:35	<b>V. Z. De Villiers</b>	WCI & IAEA	Perspectives from World Council on Isotopes (WCI)
18:35–18:55	<b>All participants</b>		Round table discussion and Q&A session
18:55–19:00	<b>M. Venkatesh</b>	IAEA	Summary and closing

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## WEDNESDAY, 18 NOVEMBER 2015

09:00–10:30

### SESSION E:

#### Spent Fuel Management and Decommissioning

Chair:

Y. Zhou, PR China

Co-Chair:

V. Michal, IAEA

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<i>No. of Paper IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Paper</i>
E.01. (invited)	<b>R. Sharma</b>	India	Management of transition between shut down and decommissioning of research reactor CIRUS
E.02.	<b>S. Kanamori</b> T. Adatte C. Bigou N. Florian E. Grolleau A. Jouve C. Kassiotis	France	Safety assessment of the Osiris research reactor and regulatory process for final shutdown
E.03.	<b>G. Nabkhtiani</b> S. Abramidze Z. Rostomashvili	Georgia	Decommissioning of Georgian nuclear research reactor
E.04.	<b>L. Ramanathan</b> O. Correa S. Fernandes	Brazil	Coatings for safe long term wet storage of spent Al-clad research reactor fuels
<b>10:30–11:00</b>	<i>Coffee/Tea Break</i> <b>Poster Session in all topics</b>		<b>(A) Utilization and Applications</b> <b>(B) Common Management Considerations</b> <b>(C) Safety of Research Reactors</b> <b>(D) Operation and Maintenance</b> <b>(E) Spent Fuel Management and Decommissioning</b> <b>(F) New Research Reactor Projects</b> <b>(G) Security of Research Reactors</b>

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## WEDNESDAY, 18 NOVEMBER 2015

11:00–12:30

### SESSION F:

#### New Research Reactor Projects

Chair:

G. Bignan, France

Co-Chair:

I-C. Lim, Rep. of Korea

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F.01. (keynote)	<b>A. Borio di Tigliole</b> D. Ridikas A. Shokr A. Zhukova	IAEA	Overview and IAEA assistance in the development of new research reactor projects
F.02. (invited)	<b>H. Blaumann</b>	Argentina	Key technical and safety requirements for a new research reactor: the RA-10 reactor experience
F.03.	<b>J. Perrotta</b>	Brazil	The RMB project - development status and lessons learned
F.04.	<b>A. Tuzov</b>	Russian Federation	MBIR International research center; current status and prospects

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12:30–13:30

*Lunch break*

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13:30–15:20

### SESSION F (cont'd):

#### New Research Reactor Projects

Chair:

A. Tuzov, Russian Federation

Co-Chair:

A. Borio di Tigliole, IAEA

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<i>No. of Paper IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Paper</i>
F.05. (invited)	<b>I-C. Lim</b> H-T. Chae	Rep. of Korea	Feasibility study for a new research reactor project
F.06.	<b>I. Rotaru</b>	Romania	The role of RRS in the development of the national infrastructure for nuclear science and technology programmes
F.07.	<b>M. S. Gurisha</b> S.L. Mdoe	United Republic of Tanzania	Basic settings for development of supporting infrastructure for research reactor project in United Republic of Tanzania
F.08.	<b>Y. Li</b> J. Hong J. Lu D. Peng X. Wu	PR. China	Design of miniature neutron source reactor with LEU core
F.09.	<b>G. Bignan</b> N. Waeckel	France	The key-role of material testing reactors in support to nuclear industry: example of JHR and of the ICERR scheme

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## WEDNESDAY, 18 NOVEMBER 2015

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15:20–16:00	<i>Coffee/Tea Break</i> <b>Poster Session</b> in all topics		<b>(A) Utilization and Applications</b> <b>(B) Common Management Considerations</b> <b>(C) Safety of Research Reactors</b> <b>(D) Operation and Maintenance</b> <b>(E) Spent Fuel Management and Decommissioning</b> <b>(F) New Research Reactor Projects</b> <b>(G) Security of Research Reactors</b>
16:00–17:50	<b>SESSION G:</b> <b>Security of Research Reactors</b>		
<b>Chair:</b>	<b>F. Mansoor, Pakistan</b>		
<b>Co-Chair:</b>	<b>K. Brooks, IAEA</b>		
G.01. (invited)	<b>D. Ek</b>	USA	Risk-based approach for security management
G.02.	<b>E. Ryan</b>	Australia	Security management of research reactors and associated facilities
G.03.	<b>J. Lolich</b> M. Clarke	Argentina	Safety considerations when implementing security at RRAFs
G.04.	<b>R. Leitch</b> R. Brigantic D. Stanford	USA	International policies and tools for protecting against radiological sabotage
G.05.	<b>G. Heo</b> J. Shin H. Son S.M. Suh	Rep. of Korea	Methodology on cyber security for digital I&C system in research reactors
19:30–22:00	<i>CONFERENCE DINNER</i> <i>Zwölf Apostelkeller Stadtheuriger</i>		

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## THURSDAY, 19 NOVEMBER 2015

09:00–10:30

SESSION C (cont'd):

Safety of Research Reactors

Chair:

N. Arkhangelskiy, Russian Federation

Co-Chair:

D.V.H. Rao, IAEA

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<i>No. of Paper IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Paper</i>
C.10. (invited)	<b>A. Sapozhnikov</b>	Russian Federation	Periodic safety reviews: basis and benefits of improving safety
C.11.	<b>A. Shepichak</b> B. Stoliarchuk	Ukraine	Lifetime extension of WWR-M based on results of periodic safety review
C.12.	<b>J. Sterba</b> R. Bergmann D. Hainz S. Hrbeny A. Musilek M. Villa	Austria	The first PSA of the TRIGA Mk II in Vienna, Austria
C.13.	<b>J. Adamczyk</b>	Poland	Polish regulatory authority experience from INSARR mission for the Maria research reactor
<b>10:30–11:00</b>	<i>Coffee/Tea Break</i> <b>Poster Session in all topics</b>		<b>(A) Utilization and Applications</b> <b>(B) Common Management Considerations</b> <b>(C) Safety of Research Reactors</b> <b>(D) Operation and Maintenance</b> <b>(E) Spent Fuel Management and Decommissioning</b> <b>(F) New Research Reactor Projects</b> <b>(G) Security of Research Reactors</b>
<b>11:00–12:30</b>	<b>SESSION C (cont'd):</b> <b>Safety of Research Reactors</b>		
	<b>Chair:</b>	<b>W. Zidan, Egypt</b>	
	<b>Co-Chair:</b>	<b>A. Adams Jr., USA</b>	
C.14. (invited)	<b>A. Adams Jr.</b>	USA	The application of a graded approach in the regulation of research and test reactors at the U.S. nuclear regulatory commission
C.15.	<b>F. Naseer</b>	Pakistan	PNRA role for ensuring safety of research reactors
C.16.	<b>H. Kim</b> D. S. Jo C. Park S. K. Park	Rep. of Korea	Analysis on thermal-hydraulic behaviour of a reflector system (from PRDBE to SRBDBE)
C.17.	<b>M. Abubakar</b> J. Ejembi	Nigeria	Safety of research reactors in Nigeria
12.30-13:30	<i>Lunch Break</i>		

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## THURSDAY, 19 NOVEMBER 2015

**13:30–15:00**      **SESSION A (cont'd)**  
**Utilization and Applications**

**Chair:**            **J. Razvi, USA**  
**Co-Chair:**       **L. Sklenka, Czech Republic**

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<i>No. of Paper IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Paper</i>
A.09. (invited)	<b>C. Grant</b>	Jamaica	Lessons learned on strategic planning for enhanced utilization of low power research reactors
A.10.	<b>P. Bode</b> D. Ridikas	Netherlands	Improved performance of neutron activation analysis laboratories by feedback meetings following inter laboratory comparison rounds
A.11.	<b>L. Hamidatou</b> S. Begaa M. Messaoudi H. Slamene B. Zouranen	Algeria	Overview of NAA method applied at Es-Salam research reactor
A.12.	<b>L. Snoj</b> A. Jazbec B. Smodiš	Slovenia	Advances in utilisation of the JSI TRIGA Mark II reactor
<b>15:00–16:00</b>	<i>Coffee/Tea Break</i> <b>Poster Session in all topics</b>		<b>(A) Utilization and Applications</b> <b>(B) Common Management Considerations</b> <b>(C) Safety of Research Reactors</b> <b>(D) Operation and Maintenance</b> <b>(E) Spent Fuel Management and Decommissioning</b> <b>(F) New Research Reactor Projects</b> <b>(G) Security of Research Reactors</b>

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## THURSDAY, 19 NOVEMBER 2015

16:00–18:00

**SESSION D (cont'd):  
Operation and Maintenance**

**Chair:** J. Arnold, Canada  
**Co-Chair:** F. Marshall, IAEA

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D.10.	<b>J. Sandoval</b> J. Gómez M. Guzmán A. Hernández E. López J. Orozco	Colombia	Thermal power calibration and neutron flux measurement of the nuclear research reactor IAN-R1 2015
D.11.	<b>K. Konoplev</b> V. Aksenov Y. Dragunov A. Lopatkin M. Kovalchuk S. Smolsky I. Tretyakov	Russian Federation	Reactor PIK: the upgraded core
D.12.	<b>M. Reichenberger</b> R. Fronk T. George J. Geuther T. Ito D. Nichols J. Roberts H. Vo-Le S. Stevenson P. Ugorowski	USA	Advances in the development and testing of micro-pocket fission detectors
D.13.	<b>H. Obeng</b>	Ghana	Operational approach on ageing management at the Ghana research reactor -1 facility
D.14.	<b>N. Arkhangelskiy</b>	Russian Federation	The "Rosatom" activity in the field of research reactors
D.15.	<b>B. Munkhbat</b> T. Obara	Mongolia	Dedicated facility for mass-producing of doped silicon

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## FRIDAY, 20 NOVEMBER 2015

09:00–10:30

**SESSION A (cont'd):**

**Utilization and Applications**

**Chair:**

**J. Perrotta, Brazil**

**Co-Chair:**

**J. Osso Junior, IAEA**

<i>No. of Paper IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Paper</i>
A.13. (invited)	<b>B. Ponsard</b>	Belgium	Issues and challenges in research reactors based radioisotope production
A.14.	<b>V. Gremiachkin</b> O. Kochnov V. Pozdeev	Russian Federation	Production of radionuclides for medical use at WWR-c reactor, radiopharmaceutical production under GMP standards
A.15	<b>B. Luong</b> N. D. Nguyen	Viet Nam	Current status of operation and utilization of Dalat nuclear research reactor and strategic plan in the next decade
A.16.	<b>M. Salam</b> R. Hasan, MD A. Haque, MD A. Kalam A. Rahman M. Rahman, MD. A. Sarder, MD B. Shohag, MD. A. Soner, MD. M. Uddin S. Uddin, MD.	Bangladesh	Role of BAEC research reactor in the development of nuclear science and power programs in Bangladesh
<b>10:30–11:00</b>	<i>Coffee/Tea Break</i> <b>Poster Session in all topics</b>		<b>(A) Utilization and Applications</b> <b>(B) Common Management Considerations</b> <b>(C) Safety of Research Reactors</b> <b>(D) Operation and Maintenance</b> <b>(E) Spent Fuel Management and Decommissioning</b> <b>(F) New Research Reactor Projects</b> <b>(G) Security of Research Reactors</b>

## FRIDAY, 20 NOVEMBER 2015

**11:00–12:30**    **SESSION B (cont'd):**  
**Common Management Consideration**

**Chair:**            **M. Gavrilas, USA**  
**Co-Chair:**       **A. Shork, IAEA**

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<i>No. of Paper IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Paper</i>
B.05. (keynote)	<b>A. Shokr</b> A. Borio di Tigliole D. Ridikas K. Muhammad	IAEA	Management of the IAEA cross cutting activities on research reactors
B.06.	<b>Y. Ellethy</b>	Egypt	Graded approach applications in nuclear research reactors
B.07.	<b>K. Niedzwied</b> M. Schneidr	Germany	Safety reviews of research reactors in Germany – Graded approach for the periodic safety review according to § 19a of the Atomic Energy Act
B.08.	<b>M. Snell</b> G.A. Baum D. Wheeler	USA	Leveraging safety programs to improve and support security programs

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**12:30–13:30**    **PANEL SESSION:**  
Summary Discussion, Conclusions and  
Recommendations

**Chair:**            **P. Adelfang,        Argentina**

**Experts Panel:** **H. Abou-Yehia     France**  
**A. Bychkov        Russian Federation**  
**T. Ivanova         OECD-NEA**  
**N. Ramamoorthy   India**  
**G. Storr            Australia**

**Conference  
Rapporteur**      **W. Deitrich        USA**

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## FRIDAY, 20 NOVEMBER 2015

### 13:30–14:00 CLOSING SESSION

**J. C. Lentijo**

Deputy Director General, Department of  
Nuclear Safety and Security

Closing remarks by IAEA

**G. Rzentkowski**

Director, Division of Nuclear Installation  
Safety (NSNI)

**M. Venkatesh**

Director, Division of Physical and Chemical  
Sciences (NAPC)

**C. Xerri**

Director, Division of Nuclear Fuel Cycle  
and Waste Technology (NEFW)

#### Conference Scientific Secretaries:

**A. Borio di Tigliole**

NEFW/Research Reactor Section

**D. Ridikas**

NAPC/Physics Section

**A. Shokr**

NSNI/Research Reactor Safety Section

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### 15:00–17:00 TECHNICAL TOUR

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## POSTER SESSIONS

Topics covered include:

- (A) Utilization and Applications
- (B) Common Management Considerations
- (C) Safety of Research Reactors
- (D) Operation and Maintenance
- (E) Spent Fuel Management and Decommissioning
- (F) New Research Reactor Projects
- (G) Security of Research Reactors

### POSTER SESSION A UTILIZATION AND APPLICATIONS

<i>No. of Poster IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Poster</i>
A.17.	<b>E. Griesmayer</b> R. Bergmann H. Böck M. Cagnazzo P. Kavargin M. Villa	Austria	A novel neutron flux monitor based on diamond detectors at the Vienna TRIGA Mark II reactor
A.18.	<b>A. Zakaria</b> S. Aktar T.K. Datta S.G. Eriksson S.M. Yunus	Bangladesh	Synthesis, cation distribution and crystal structure of the spinel oxides $Zn_xMn_{1-x}FeCrO_4$ ( $0.2 \leq x \leq 0.8$ ) by neutron diffraction
A.19.	<b>A. Canella Avelar</b> W. Ferreira R. Jacimovic C. Munita	Brazil	Two reactors in two continents: a successful experience in neutron activation analysis of phosphate and limestone samples
A.20.	<b>A. Canella Avelar</b>	Brazil	Nuclear education and research reactors in Brazil
A.21.	<b>J. Rataj</b> T. Bily L. Sklenka	Czech Republic	The enhancement of VR-1 reactor utilization for practical education using portable neutron generator
A.22	<b>L. Sklenka</b> J. Hulka O. Huml H. Mala J. Rataj P. Rulik M. Stefanik P. Zlebcik	Czech Republic	Development of new instrumentation MONTE-1 for advanced testing of detection equipment of monitoring and intervening groups in the case of nuclear accidents and of early detection network equipment at the training reactor VR-1

<i>No. of Poster IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Poster</i>
A.23.	<b>Y. Ellethy</b>	Egypt	ETRR-2 complex strategic plan (SP) - radioisotope production and marketing
A.24.	<b>F. Foulon</b> G. Badeau A. Borio di Tigliole N. Huot S. Ivanovic B. Lescop G. J. Vyshniauskas X. Wohleber	France	Internet reactor laboratory project: an overview and the experience of the ISIS research reactor
A.25.	<b>K. Gyamfi</b> E.O. Amponsah-Abu J. Gbadago K. Gyamfi K. Tuffour- Achampong	Ghana	Development of nuclear science and technology programmes, including nuclear power programme in Ghana – The role of Ghana research reactor-1
A.26	<b>R. Baranyai</b>	Hungary	Budapest research reactor – multipurpose utilization
A.27.	<b>T. Tegás Sutondo</b> A. Agus Taftazani S. Syarip	Indonesia	Utilization of KARTINI reactor's beam port for PGNAA experimental facility
A.28.	<b>L. Suparlina</b> T.M. Sembiring T. Surbakti	Indonesia	Safe management and utilization of the RSG-GAS reactor
A.29.	<b>A. Salvini</b>	Italy	Utilization of TRIGA Pavia for the study of radiation-induced damage in different materials upon neutron irradiation
A.30.	<b>I. Silachyov</b>	Kazakhstan	Instrumental neutron-activation analysis of geological samples for long-lived rare earths using internal mono standard method
A.31.	<b>B. El Bakkari</b> H. Boukhal Y. Boulaic T. El Bardouni C. El Younoussi B. Nacir	Morocco	Production of I-131 at the Moroccan Triga mark II RR: feasibility and safety analysis

A.32.	<b>C. El Younoussi</b>	Morocco	Monte Carlo design of a new thermal neutron beam facility at the CENM TRIGA MARK II RR using MCNP6
	Y. Boulaich		
	B. El Bakkari		
	T. El Bardouni		
	B. Nacir		
A.33.	<b>A. Varivtcev</b>	Russian Federation	Irradiation rig with a fuel heater in the BOR-60 reactor
	O. Ishunina		
	Yu. Naboishchikov		
	N. Poglyad		
	M. Sharonova		
	I. Zhemkov		

<i>No. of Poster IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Poster</i>
A.34.	<b>L. Snoj</b> L. Barbot Ž. Stancar	Slovenia	Evaluation of biases and experimental uncertainties of the fission rate profile measurements at the JSI TRIGA Mark II research reactor
A.35.	<b>L. Nassan</b> B. Abdallah A. Sarheel	Syria	Studying the efficiency of deposited metal films on teflon utilization as neutron threshold detectors in the research MNSR
A.36.	<b>K. Kaiser</b> J. Emmer L. Martin	USA	Enhanced capability for low fluence operations at the annular core research reactor
A.37.	<b>S. Landsberger</b> S. Biegalski	USA	Research reactors in support of nuclear forensics investigations
A.38.	<b>F. Kungurov</b> S. Baytelesov U. Salikhbaev D. Yusupov	Uzbekistan	Safe and effective utilization of WWR-SM research reactor

**POSTER SESSION B**  
**COMMON MANAGEMENT CONSIDERATIONS**

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<i>No. of Poster IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Poster</i>
B.09.	<b>C. Pickett</b>	USA	Safeguards and security challenges for research reactors
B.10.	<b>T. Bonner</b> B. Meppen	USA	Integrated security management/design; design and integration of programs for protection from sabotage and theft

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**POSTER SESSION C**  
**SAFETY OF RESEARCH REACTORS**

<i>No. of Poster IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Poster</i>
C.18.	<b>S. Sikorin</b> Y. Damarad T. Hryharovich A. Kuzmin S. Mandzik S. Polazau I. Soltan	Belarus	Benchmark criticality experiments for uranium-zirconium hydride multiplying systems with 21% enriched uranium-235
C.19.	<b>R. Abou-Alo</b>	Egypt	Criticality safety of spent fuel storage of a typical research reactor (WWR-C) during accidental conditions using Monte Carlo (MCNP-5) code
C.20.	<b>L. Suparlina</b> T. M. Sembiring T. Surbakti	Indonesia	Safety analysis of test fuel elements U3Si2Al 4.8 gU/CC and 5.2 gU/CC
C.21.	<b>M. Margulis</b> E. Gilad	Israel	IAEA MTR benchmark static calculations using Serpent and DYN3D codes
C.22.	<b>D. Sumkhuu</b> Y. Pepelyshev A.K. Popov	Mongolia	Some results of dynamics modelling of the IBR-2M pulsed reactor of periodic operation
C.23.	<b>R. Khan</b> R. Ali M. A. Babar H. Böck T. Stummer	Pakistan	Safety parameters of the Pakistan research reactor -1
C.24.	<b>B. Lee</b> S. Park S. Yang	Rep. of Korea	Two phase vertical stratification in decay tank of research reactor.
C.25.	<b>J. Park</b> C. Park S. Park	Rep. of Korea	CFD simulation of the flow inversion in an uniformly heated thin rectangular channel array
C.26.	<b>Y. Pesnya</b> D. Erak V. Nasonov	Russian Federation	Analysis of possible accidents consequences at the IR-8 research reactor
C.27.	<b>P. Kohut</b> L. Bobek E. Mohan	USA	Research reactor radiological consequence analysis for licensing applications
C.28.	<b>P. Kohut</b> P. Domitr J. Ramsey	USA	Dynamic analysis of a TRIGA reactor

**POSTER SESSION D**  
**OPERATION AND MAINTENANCE**

<i>No. of Poster IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Poster</i>
D.16.	<b>M. Izerrouken</b> A. Ameur S. Berkani O. Menchi A. Sari D. Tahtat R. Zamoun	Algeria	Radiation induced damage in signal cable insulator
D.17.	<b>H. Böck</b> D. Winfield	Austria	Open-pool research reactor corrosion events
D.18.	<b>M. Villa</b> H. Böck R. Bergmann J. Herrmann M. Kaše M. Kroc J. Matoušek M. Prokš V. Valenta	Austria	The new I&C system of the TRIGA Mark II reactor Vienna
D.19.	<b>J. Sandoval</b> A. Hernández E. López	Colombia	Instrumentation and control upgrade at the Triga IAN-R1 nuclear research reactor
D.20.	<b>M. Kropik</b> J. Rataj M. Sunka	Czech Republic	Testing of new research reactor protection system
D.21.	<b>J. Matousek</b> V. Juricek M. Kochova Z. Mojžiš	Czech Republic	I&C refurbishment of LVR-15 research reactor in Rez
D.22.	<b>M. Ibrahim</b>	Egypt	Feasibility study for IAEA research reactor core loaded with thorium–uranium fuel
D.23.	<b>L. Rodriguez</b> C. Lobry	France	AREVA solutions for I&C in research reactors
D.24.	<b>T. Schmidt</b> N. Guilliard J. Starflinger	Germany	Preventive maintenance and replacements at zero-power reactor SUR-100 at Stuttgart of University

- D.25. **M. Varvayanni** Greece Perspectives and issues raised by the restart of the Greek research reactor - 1 following an extended shutdown  
N. Catsaros  
A. Ikonomopoulos  
A. Stubos
- D.26. **G. Ferenc** Hungary Aging management and maintenance at the Budapest research reactor  
G. Toth

<i>No. of Poster IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Poster</i>
D.27.	<b>K. Dinesh</b> A. Babu G. Srinivasan K. Sureshkumar	India	Operation, maintenance and life extension of fast breeder test reactor
D.28.	<b>T. Makmal</b> O. Aviv E. Gilad	Israel	A simple NDT spectrometry method for burnup evaluation of MTR-type fuel assemblies
D.29.	<b>E. Tomarchio</b> F. D'Aleo M. Giardina	Italy	Maintenance operation on AGN-201 "COSTANZA" nuclear research reactor of Palermo university
D.30.	<b>M. Palomba</b> M. Carta L. Falconi M. Sepielli	Italy	Activities at TRIGA RC-1 ENEA research reactor
D.31.	<b>R. Irkimbekov</b> A. Baygozhina V. Kotov A. Pakhnits A. Surayev A. Vurim V. Vityuk	Kazakhstan	About the fuel tests features at the IGR research reactor
D.32.	<b>N. Ramli</b> M. F. Abd Farid A. Abd Rahim Z. Masood	Malaysia	Operation & maintenance of PUSPATI TRIGA reactor
D.33.	<b>N. Abubakar</b> A.R. Abubakar B. B. Dewu A.A. Mati I. Yusuf	Nigeria	Design of improvised manual control unit for NIRR-1 pneumatic transfer system RABBIT TYPE-A
D.34.	<b>M. Latif</b>	Pakistan	Ageing management of Pakistan research reactor-1
D.35.	<b>H.J. Kim</b> Y. W. Tahk J. Yim	Rep. of Korea	KJRR UMO fuel licensing and current status
D.36.	<b>R. Abdel Aziz</b> A. E. Mohammed	Sudan	Optimization of material test research reactor fuel densities
D.37.	<b>R. Schickler</b> S. R. Reese	USA	Reflector replacement at the Oregon state TRIGA reactor

**POSTER SESSION E**  
**RESEARCH REACTOR SPENT FUEL**  
**MANAGEMENT & DECOMMISSIONING**

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<i>No. of Poster IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Poster</i>
E.05.	<b>X. Masseau</b> S. Massieux	France	Management of the transition between definitive shutdown and decommissioning
E.06.	<b>F. Foulon</b> G. Badeau M. Dubois S. Ivanovic P. Jouenne B. Lescop	France	ULYSSE reactor decommissioning: the waste management methodology
E.07.	<b>G. Mank</b> G. Damm E. Deleon M. Maxted G. Modolo R. Pierce A. Wilden	Germany	Management of spent high temperature reactor graphite pebble bed fuel

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**POSTER SESSION F**  
**NEW RESEARCH REACTOR PROJECTS**

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<i>No. of Poster IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Poster</i>
F.10.	<b>J. Lupiano Contreras</b> A. S. Doval	Argentina	COQUI: A single purpose reactor
F.11.	<b>T. Sembiring</b> S. Pinem G. R. Sunaryo	Indonesia	Conceptual design of the new Indonesia research reactor project
F.12.	<b>B. Munkhbat</b> N. Nanzad Z. Tsoodol	Mongolia	Design study on suitable research reactor for Mongolia
F.13.	<b>H. Chae</b>	Rep. of Korea	Project status of the Kijang research reactor in Korea
F.14	<b>I. Tretiyakov</b>	Russian Federation	MBIR reactor: an innovative tool for innovative research and substantiation of advanced designs

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**POSTER SESSION G**  
**SECURITY OF RESEARCH REACTORS**

<i>No. of Poster IAEA-CN-231-</i>	<i>Name</i>	<i>Designating Member State/Organization</i>	<i>Title of Poster</i>
G.06.	<b>E. Ryan</b>	Australia	Developing a security plan
G.07.	<b>M. East</b> S. Bayer	Australia	Nuclear security reviews: the Australian experience
G.08.	<b>E. Susilowati</b>	Indonesia	Enabling nuclear security management system to be implemented at the GA SIWABESSY research reactor
G.09.	<b>D. Ek</b> J. Pelletier M. Thompson	USA	Adversary threat environment and its impact on nuclear security
G.10.	<b>D. Ek</b> D. Farr D. Martinez J. Pelletier M. Thompson	USA	1st security responder tabletop exercises
G.11.	<b>D. Ek</b> M. Clarke M. Ekman H. Pennington E. Ryan	USA	Coordinated research project - Strengthening research reactor security
G.12.	<b>D. Ek</b> J. Adams	USA	Similarities and difference between safety analysis and sabotage analysis
G.13.	<b>M. Williams</b> B. Smith N. Pope J. Lewis	USA	Practical assessment of a facility nuclear material accounting and control (NMAC) system for nuclear security
G.14.	<b>T. N. Bonner</b> D. Greehalgh T. Harris M. Shannon J. Townsend	USA	Tabletop methodology for addressing the insider threat
G.15.	<b>T. Edmunds</b>	USA	Insider threat analysis and mitigation in research reactors
G.16.	<b>M. Williams</b> L. Joel N. Pope P. Thomas	USA	Taking steps to protect against the insider threat
G.17.	<b>R. Anderson</b>	USA	The need for cyber informed engineering expertise for nuclear research reactors
G.18.	<b>D. Stanford</b>	USA	Radiological sabotage training per INFCIRC 225
G.19.	<b>K. De Castro</b> E. Rogers	USA	Systematic nuclear security culture enhancement programme for research reactors

G.20.	<b>R. Leitch</b> R. Brigantic D. Stanford	USA	Worst case unacceptable radiological consequence (URC) evaluation using QLRAM
G.21.	<b>R. Hoffman</b>	USA	Cyber security considerations at research reactor facilities
G.22.	<b>S. Datres</b> W. Brunsdon W. Yaegle	USA	Commercial off-the-shelf technology as a force multiplier at research reactors

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IAEA Safety Standards Series No. SSG-22	Use of a Graded Approach in the Application of the Safety Requirements of Research Reactors	2012	IAEA TECDOC Series No. 1743	Compendium of Neutron Beam Facilities for High Precision Nuclear Data Measurements	2014
IAEA Technical Reports Series No. 473	Nuclear Data for the Production of Therapeutic Radionuclides	2012	IAEA Training Course Series No. 57	Hands-on Training Courses Using Research Reactors and Accelerators	2014
IAEA Safety Standards Series No. SSG-24	Safety in the Utilization and Modification of Research Reactors	2012	IAEA Technical Reports Series No. 477	Development and Applications of Residual Stress Measurements Using Neutron Beams	2014
IAEA TECDOC Series No. 1681	Neutron Transmutation Doping of Silicon at Research Reactors	2012	IAEA Nuclear Energy Series No. NP-T-5.3	Applications of Research Reactors	2014
IAEA Nuclear Energy Series No. NP-T-5.1	Specific Considerations and Milestones for a Research Reactor Project	2012	IAEA Nuclear Energy Series No. NP-T-5.6	Technical Requirements in the Bidding Process for a New Research Reactor	2014
IAEA Nuclear Energy Series No. SSG-20	Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report	2012	IAEA TECDOC Series No. 1748	Project Experiences in Research Reactor Ageing Management Modernization and Refurbishment	2014
IAEA TECDOC Series No. 1724	Applications of Research Reactors towards Research on Materials for Nuclear Fusion Technology	2013	IAEA Safety Standards Series No. SSG-37	Instrumentation and Control Systems and Software Important to Safety for Research Reactors	2015
IAEA TECDOC Series No. 1715	Commercial Products and Services of Research Reactors	2013	IAEA Technical Reports Series No. 480	Research Reactor Benchmarking Database: Facility Specification and Experimental Data	2015
IAEA Nuclear Energy Series No. NF-T-5.4	Non-HEU Production Technologies for Molybdenum-99 and Technetium-99m	2013	IAEA Technical Reports Series No. 478	Feasibility of Producing Molybdenum-99 on a Small Scale Using Fission of Low Enriched Uranium or Neutron Activation of Natural Molybdenum	2015
IAEA Proceedings Series STI/PUB/1592	Management and Storage of Research Reactor Spent Nuclear Fuel: Proceedings of a Technical Meeting held in Thurso, United Kingdom, 19–22 October 2009	2013	IAEA TECDOC Series No. 1762	Operating Experience from Events Reported to the IAEA Incident Reporting System for Research Reactors	2015
IAEA Safety Reports Series No. 75	Implementation of a Management System for Operating Organizations of Research Reactors	2013	IAEA TECDOC Series No 1773	Use of Neutron Beams for Materials Research Relevant to Nuclear Energy Sector	2015
IAEA Safety Report Series No. 80	Safety Reassessment for Research Reactors in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant	2014			

## **FORTHCOMING SCIENTIFIC MEETINGS SCHEDULED BY THE IAEA**

2016

International Conference on Human and Organizational Aspects of Assuring Nuclear Safety – Exploring 30 Years of Safety Culture

22-26 February; Vienna, Austria

International Conference on Effective Nuclear Regulatory Systems: Sustaining Improvements Globally

11-15 April; Vienna, Austria

International Conference on Advancing the Global Implementation of Decommissioning and Environmental Remediation Programmes

23-27 May; Madrid, Spain

International Conference on Integrated Medical Imaging in Cardiovascular Diseases (IMIC 2016)

10-14 October; Vienna, Austria

26th IAEA Fusion Energy Conference

17-22 October; Kyoto, Japan

3rd International Conference on Nuclear Knowledge Management – Challenges and Approaches

7-11 November; Vienna, Austria

International Conference on the Safety of Radioactive Waste Management

21-25 November; Vienna, Austria

2nd International Conference on Nuclear Security

5-9 December, Vienna, Austria

For information on forthcoming scientific meetings, please consult the IAEA website: <http://www.iaea.org/>

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If you wish to do so towards the end of the conference, we would appreciate it if you could provide us with your feedback using the evaluation form available on the App.

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## NOTES

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