



Canadian Nuclear  
Laboratories  
Laboratoires Nucléaires  
Canadiens

## 4<sup>th</sup> International Technical Meeting on Small Reactors

Ottawa, Ontario CANADA

2016 November 2-3

(Optional Tour to Chalk River November 4)

Organized by the CNS and CNL



# Preliminary Program

*Registration and Cocktails*

*Tuesday, November 1*

*Delta Ottawa City Centre Hotel, 101 Lyon St. North, Ottawa, Ontario*

**18:00-19:00**

**Registration and Welcome Cocktails, Delta Ottawa City Centre Hotel,  
Concierge Lounge**

*Day 1*

*Wednesday, November 2*

<b>Time</b>	<b>Description</b>	<b>Speaker/Author(s)</b>
<b>Plenary 1 (Richelieu/Frontenac Room)</b>		
08:30-08:40	Welcome	S. Bushby (AECL)
08:40-09:00	SMRs; a Riddle, Wrapped in a Mystery, Inside an Enigma, and CNL's Role in Unwrapping That	R. Holmes (Chief Scientist, CNL)
09:00-09:20	The Role of Credible Research and Development Information in Supporting a Safety Case	T. Jamieson (Vice-President, CNSC)
09:20-09:40	Overview of Initiatives Related to GHG reductions in which the Federal Departments of Environment and Climate Change and Natural Resources Have Been Engaged Since COP21	N. Ali (Environment and Climate Change Canada)
09:40-10:00	Ontario's Current and Future Energy Needs and Ongoing Activities on SMRs	W. Lam (Ministry of Energy, Govt. of Ontario)
10:00-10:30	<b>Break</b>	
<b>Plenary 2 (Richelieu/Frontenac Room)</b>		
10:30-10:50	Placing Innovative Nuclear Reactors into Communities - The Need for Research and Innovation Related to Public Engagement	N. Alexander (Sylvia Fedoruk Canadian Centre for Nuclear Innovation)
10:50-11:10	TBD	C. Heysel (McMaster University)
11:10-11:30	TBD	TBD
11:30-11:45	<b>Group Photo</b>	
12:00-13:00	<b>Conference Lunch (Richelieu/Frontenac Room)</b>	
<i>Parallel Session A:1 - SMRs for North/Arctic Locations (Richelieu Room)</i>		
<i>Wed. Nov. 2</i>		
13:00-13:20	Melting Permafrost and Site Conditions for Small Modular Reactor Installations in Remote Northern Canada Communities	D. Malcolm (Malcolm & Associates)
13:20-13:40	Small Modular Reactors for Remote Community Energy Needs	N. Gnanapragasam, M. Gaudet, L. Gardner, H. Boniface, M. Yetisir (CNL)

13:40-14:00	Northern Indigenous Peoples & The Prospects for Nuclear Energy	K. Coates & D. Landrie-Parker (University of Saskatchewan)
14:00-14:20	The Trusted Informant: Showing Empathy to Build Credibility	E. Lloyd (University of Saskatchewan)
14:20-14:35	<b>Break</b>	
<i>Wed. Nov. 2</i>		
<i>Parallel Session A:2 - Advanced SMRs &amp; New Technologies (Richelieu Room) Wed. Nov. 2</i>		
14:35-14:55	StarCore Nuclear SMR	D. Dabney, D. Poole, M. Yates (StarCore Nuclear)
14:55-15:15	The Known Unknowns of Molten Salt Reactors	R.E. Ortega Pelayo, M. Edwards (CNL)
15:15-15:35	Conceptual Design of EM Pump for Lead-Alloy-Cooled Advanced Small Modular Reactor	J. Kwak, H. Kim (Ulsan National Institute of Science and Technology)
15:35-15:55	SEALER: A Small Lead-Cooled Reactor for Power Production in the Canadian Arctic	J. Wallenius, I. Mickus, S. Qvist (LeadCold Reactors), S. Bortot (Kungliga Tekniska Högskolan)
15:35-15:55	Preliminary Studies of Supercritical CO <sub>2</sub> Cycle Application for Small Modular Reactor with a Desalination Capability	W.W. Lee, S.-J. Bae, J.-I. Lee (Korea Advanced Institute of Science and Technology)
16:10-16:20	<b>Break</b>	
<i>Parallel Session A:3 - SMR Reactor Physics (Richelieu Room) Wed. Nov. 2</i>		
16:10-16:30	Neutronics of Materials for Small High-Temperature Reactors	R. Tannous, C. Rangacharyulu (University of Saskatchewan), D. Guzonas, L. Leung (CNL), D. Chorney, J. Zimmer (Saskatchewan Research Council)
16:30-16:50	Source-Term Evaluation for Advanced Small Modular Reactor Concepts	D. Hummel (CNL)
16:50-17:10	Modeling of Excess-Reactivity Transients in the SEALER Lead-Cooled Reactors	A. Zhuchkova, N. Chornoboy, S. Golesorkhi (CNL)
17:10-17:30	Optimization of Reactivity Feedbacks for Autonomous Small PWR	A.A.E. Abdelhameed, Y. Kim (Korea Advanced Institute of Science and Technology)
<i>End of Parallel Session A</i>		
<i>Parallel Session B:1 - Applications of Research Reactors (Frontenac Room) Wed. Nov. 2</i>		
13:00-13:20	Dedicated Neutron-Imaging Systems at Reactor-Based Neutron Sources for Versatile Applications in Science and Technology	E. Lehmann (Paul Scherrer Institut)
13:20-13:40	Solidification Behaviour of Unmodified and Sr-Modified Eutectic Si in Binary Al-6Si and A319 Al Alloys Using In-Situ Neutron Diffraction	E. Vandersluis (Ryerson University), D. Sediako (Canadian Neutron Beam Centre), C. Ravindran (Ryerson University), A. Elsayed, G. Byczynski (Nemak Canada Corporation)
13:40-14:00	In-Situ Neutron Diffraction Study of Zircaloy-4 Subjected to Biaxial Tension	M. Gharghouri, D. McDonald, L. Xiao, R. Ham-Su (CNL)

14:00-14:20	Dakota-Driven Optimization of Research-Reactor Operation and Experiments: Example of Neutron-Activation Experiments	R. Schow, T. Jevremovic (University of Utah)
14:20-14:30	<b>Break</b>	
<b>Parallel Session B:2 - Neutron-Beam Applications (Frontenac Room)</b>		<b>Wed. Nov. 2</b>
14:30-14:50	Materials Research Using Neutron Beams Contributes to Clean-Energy Objectives	D. Banks (Canadian Neutron Beam Centre)
14:50-15:10	Neutron Diffraction for the Advancement of Metal Hydrides	J. Lang (CNL), J. Huot (Université du Québec)
15:10-15:30	Biomedical Research Using Neutron Beams	M.C. Rheinstadter (McMaster University)
15:30-15:50	Development of New Neutron Methods and Applications at NRU	R. Rogge, G. Bentoumi, F. Ali (CNL)
15:50-16:10	Accelerator-Based Neutron Source	P. Brown (Melex Corporation), W. Diamond (AECL, Retired), G. McRae (Carleton University), B.P. Bromley (CNS)
16:10-16:20	<b>Break</b>	
<b>Parallel Session B:3 - Passive Safety and Underground Containment Structures (Frontenac Room)</b>		<b>Wed. Nov. 2</b>
16:20-16:40	Improving Passive Safety in Small Modular Reactors by Quantifying SMR-Specific Natural Decontamination Phoretic Phenomena	S. Talabi (Pittsburgh Technical)
16:40-17:00	Research on the Passive Safety System during SMR ACP100+	W. Zeng, D. Song (Nuclear Power Institute of China)
17:00-17:20	Operational Monitoring of Small Modular Reactor Facilities	W. Mayo, D. Horn, Y. Han, S. Jaffer (CNL)
17:20-17:40	Seismic-Hazard Analysis of Deeply Embedded Small Modular Reactor Structures	W. Jiang, M. Pandey, W.-C. Xie (University of Waterloo)
<b>End of Parallel Session B</b>		
18:00-21:00	<b>Conference Banquet</b> <b>Cocktails - 6:00 pm, Dinner Buffet - 6:30 pm</b>	

**Day 2****Thurs. Nov. 3**

<b>Time</b>	<b>Description</b>	<b>Speaker/Author(s)</b>
<b>Plenary 3: Supplier Panel (Richelieu/Frontenac Room)</b>		<b>Thurs. Nov. 3</b>
08:30-10:00	The design and deployment of small and advanced reactors offer an opportunity for a new paradigm in supplier engagement and innovation. The panel of suppliers will discuss innovations in fabrication, welding, robotics, remote control, standardization, fuel/core loading and removal that will ensure the highest levels of safety and reliability in off grid or remote applications while remaining cost competitive with alternative energy production systems. The panel will also outline how early supplier engagement can help ensure practical solutions to challenges posed by new operating and maintenance regimes.	

10:00-10:20 **Break**

***Parallel Session C – Licensing (Richelieu Room)***

***Thurs. Nov. 3***

10:20-10:40	Update on the CNSC'S SMR Discussion Paper	K. Lee (CNSC)
10:40-11:00	Establishing Right-Sized Regulations for Small Modular Reactors - Updates on Establishing SMR-Specific Emergency Planning Zones	S. Talabi (Pittsburgh Technical)
11:00-11:20	Design Challenges with Licensing SMRs – A Perspective from a Nuclear Industry Service Provider	A. Lee (SNC Lavalin Inc.)
11:20-11:40	The CNSC Safety and Control Area Framework – Consideration Beyond Reactor Design for Small Modular Reactors	M. de Vos (CNSC)
11:40-12:00	Transportation of Sealed SMR Cores	M. Chapman, J. McLellan (CNL)

***End of Parallel Session C***

***Parallel Session D - Research Reactor Physics (Frontenac Room)***

***Thurs. Nov. 3***

10:20-10:40	Multi-Physics Modelling of Small Modular Reactors with Serpent 2 and Thermal Hydraulics Solvers	R. Tuominen, V. Valtavirta (VTT Technical Research Centre of Finland Ltd.)
10:40-11:00	A Coupled Neutronics-Thermohydraulics Model of the Homogeneous SLOWPOKE Reactor for Applications to Transient States	B. Limbeek, H.W. Bonin, P.K. Chan (Royal Military College of Canada, J.W. Hilborn (AECL, Retired)
11:00-11:20	Progress on Reactor Kinetics Measurements in ZED-2	L.R. Yaraskavitch, J.E. Atfield, E.T. Rand (CNL)
11:20-11:40	Dynamic Simulations of Reactor Transients with Geant 4	E.T. Rand, K. Hartling, L.R. Yaraskavitch (CNL)

***End of Parallel Session D***

12:00-13:00 ***Conference Lunch***

***Parallel Session E – Water-Cooled SMRs (Richelieu Room)***

***Thurs. Nov. 3***

13:00-13:20	Joint Study of Thermal Utilization Applications for a Small-to-Medium-Sized BWR – University of Saskatchewan Activities	D. Konkin (University of Saskatchewan)
13:20-13:40	Hitachi's Activity in the Joint Study on Thermal Utilization of the Double MS BWR: A Modular Simplified & Medium Small Reactor	T. Ikegawa, K. Kito (Hitachi Ltd.), K. Nishida (Hitachi-GE Nuclear Energy, Ltd.)
13:40-14:00	A High-Performance Soluble-Boron-Free Small Modular Reactor Core	M.-S. Yahya, Y. Kim (Korea Advanced Institute of Science and Technology)
14:00-14:20	Study on the Thermal Performance of the Fuel Assembly under Low-Flow Conditions	Z. Qiu (Nuclear Power Institute of China)

***End of Parallel Session E***

***Parallel Session F: Updates on Research Reactors (Frontenac Room)***

***Thurs. Nov. 3***

12:00-12:20	A Very Efficient New Source for Production of EDM II	A. Bakharev (TU Munich)
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13:20-13:40	RMCC SLOWPOKE-2 Facility: 30 Years of Service to the Department of National Defence	P. Samuleev, P.K. Chan, H.W. Bonin, B. Ball, S. Jenner, C. McEwan, P. Hungler (Royal Military College of Canada)
13:40-14:00	Current Status of Nigeria Research Reactor-1 (NIRR-1); After Twelve Years of Operation	S. Agbo (Veritas University), Y. Ahmed (Ahmadu Bello University)

### ***End of Parallel Session F***

14:20-14:35 **Break**

### ***Parallel Session G - SMR Staffing and Fitness for Service (Richelieu Room) Thurs. Nov. 3***

14:35-14:55	Small Modular Reactor Staffing and Current Regulation	H. Hanke (CNL)
14:55-15:15	SMR Technology Demonstration: Are There Major Gaps in Safety Knowledge?	A. Viktorov (CNSC)
15:15-15:35	The Implication of Solving Inverse Problem in System Thermal-Hydraulic Analysis for Autonomous Operation of SMR	M.-G. Kim, J.-I. Lee (Korea Advanced Institute of Science & Technology)
15:35-15:55	Key Aspects for Design and Fitness-for-Service of Mechanical Components in Small Modular Reactors	S. Eom, N. Sadek, S. Xu, R. Awad (CNSC)

### ***End of Parallel Session G***

### ***Parallel Session H: SMR Safety Analysis (Frontenac Room) Thurs. Nov. 3***

14:35-14:55	Severe Accident Mitigation Feature of In-Vessel Corium Retention through External Reactor Vessel Cooling for SMART	R.-J. Park (Korea Atomic Energy Research Institute)
14:55-15:15	Benefits and Challenges of Design-Assist Probabilistic Safety Assessment for Small Modular Reactors	A. Trifanov, S. Ganguli (Kinectrics, Inc.)
15:15-15:35	Risk-Informed Design of ACP100 With a Level-1 Probabilistic Risk Assessment	J. Deng, H. Zhang (Nuclear Power Institute of China)
15:35-15:55	Safety Analysis Report for Small Nuclear Reactors	H. Ragheb (Safety Probe International)

### ***End of Parallel Session H***

15:55-16:10 **Break**

### ***Parallel Session I: SMR Economics, Evaluation Methodologies (Richelieu Room) Thurs. Nov. 3***

16:10-16:30	The Economics of Very Small Modular Reactors in the North	M. Moore (CNL)
16:30-16:50	Application of Technology and Vendor Readiness-Level Evaluations to Small Modular Reactors	J. Eastick, M. Pavlovic, B. Gihm, J. Sarvinis (Hatch Ltd.)
16:50-17:10	Small Nuclear Technology Compatibility Evaluation Methodology for a Project Application	B. Gihm, M. Pavlovic, B. Coulas, J. Sarvinis (Hatch Ltd.)
17:10-17:30	Major Cost Factors in Evaluating Very-Small-Nuclear- Reactor Economics	B. Gihm, J. Eastick, B. Coulas, J. Sarvinis (Hatch Ltd.)

***End of Sessions – Thank you for Your Participation!***

### ***Day 3 (Tour – Optional) Chalk River Laboratories, Ontario Friday November 4***

07:30 Depart for Chalk River Laboratories (Bus Pick-up)

17:30

Return to Ottawa Hotel (Account for possible slight delays on return time)

- Available only to those who pre-registered to attend the tour
- Wear flat-soled, closed-toe shoes and long pants
- Advise of severe allergies, pregnancy or medical conditions / devices
- All cameras must be left at Security, including cell phones / BlackBerrys / PDAs if camera-equipped