

# RERTR 2011 — 33<sup>rd</sup> INTERNATIONAL MEETING ON REDUCED ENRICHMENT FOR RESEARCH AND TEST REACTORS

October 23-27, 2011  
Santiago Marriott Hotel  
Santiago, Chile



The U.S. Department of Energy / National Nuclear Security Administration's Office of Global Threat Reduction in cooperation with the International Atomic Energy Agency will host the "RERTR 2011 International Meeting on Reduced Enrichment for Research and Test Reactors." The meeting is being organized by Argonne National Laboratory, Chilean Nuclear Energy Commission (CCHEN) and Idaho National Laboratory and will be held in Santiago, Chile from October 23-27, 2011. This will be the 33rd annual meeting in a series on the same general subject regarding conversion of reactors within the Global Threat Reduction Initiative.

## Technical Program (Preliminary)

Last modified: Oct. 13, 2011

This document is still subject to minor changes and is to be considered as **PRELIMINARY**. Please check frequently back with us for updates. Updated versions of this document will be published as soon as they become available on the RERTR web site at [www.rertr.anl.gov/meeting\\_announcements/2011/agenda.shtml](http://www.rertr.anl.gov/meeting_announcements/2011/agenda.shtml).

The Meeting Organizers:



# RERTR 2011 — 33<sup>rd</sup> International Meeting on Reduced Enrichment for Research and Test Reactors

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## PRELIMINARY PROGRAM

Sunday

Registration: 3:00 – 6:30 p.m., Maipo and Ballroom Foyer  
Reception: 6:30 – 8:30 p.m., The Babcock & Wilcox Company  
Santiago Marriott Hotel — Plaza Gacitua

Session	Session Title	Time	Paper Title	Authors
<b>Monday Meeting Room: Torres del Paine G-ABC Ballroom, Santiago Marriott Hotel</b>				
	<b>Welcome</b>	<b>8:00 a.m.</b>	Welcome to Chile and RERTR-2011	Chilean Departmental Minister
	<b>Global HEU Minimization Efforts</b>		1 IAEA Activities in Support to HEU Minimization: 2011 Update 2 Global Threat Reduction Initiative and International HEU Minimization 3 Conversion of the Czech Republic LVR-15 Research Reactor to Operation with LEU Fuel 4 Operational Experience of Kyoto University Research Reactor (KUR) with LEU Fuel 5 U.S. and Russian Cooperation on Converting Research Reactors in Russia	P. Adelfang A. Bieniawski M. Koleska, V. Broz H. Unesaki, T. Sano, K. Nakajima J. Chamberlin
<b>10:00 - 10:30 am Coffee Break and Refreshments</b>				
<b>1</b>	<b>Overview of International Conversion Programs</b> <i>Chair: A. Bieniawski</i>	<b>10:30 a.m.</b>	1 Qualification Process of LEU Fuel - CERCA Type and Conversion Planning for MARIA Research Reactor 2 LEONIDAS U(Mo) Dispersion Fuel Qualification Program: Progress and Perspectives 3 Conversion Progress of United States High Performance Research Reactor 4 ININ TRIGA Mark III Reactor Conversion to Use LEU Fuel Instead of HEU/LEU Standard Fuel 5 Program of Critical Assembly Conversion to Low-enriched Uranium Fuel at the Institute of Nuclear Physics in Kazakhstan	G. Krzysztoszek, Z. Marcinkowska, K. Pytel, N. Hanan F. Charollais, P. Lemoine, Y. Calzavara, H. Guyon, E. Koonen, S. Van den Berghe, C. Jousse, D. Geslin C. Landers J. F. Callejas F. Arinkin, P. Chakrov, L. Chekushina, Sh. Gizatulim, S. Koltochnik, A. Shaimerdenov, N. Hanan, P. Garner, J. Roglans-Ribas
<b>12:30 - 1:30 pm - Lunch Break</b>				
<b>2</b>	<b>Recent International HEU Minimization Efforts and Milestones</b> <i>Co-Chairs: J. Chamberlin, P. Adelfang</i>	<b>1:30 p.m.</b>	1 Shipment of HEU Fuel from Pamir Reactor in Belarus to Russia and Conversion to High Density LEU Fuel 2 Realization of the Full-Core Conversion Program for the WWR-M Research Reactor in Ukraine 3 Overview of GTRI Foreign Reactor Conversion Efforts 4 On the Feasibility Study for Utilization of Low Enrichment Uranium Fuel at Kyoto University Assembly (KUCA) 5 GTRI Progress in Technology Development for Conversion of Mo-99 Production to Low Enriched Uranium	S. Sikorin, S. Mandzik, S. Polazau, T. Hryharovich, S. Alekseev, Sh. T. Tuhvatulin, E. Dyakov, I. Daragan, I. Bolshinsky, Y. Gohar, J. Thomas Y. Mahlers, V. Makarovskiy, I. Maliuk, O. Rudyk J. Roglans-Ribas H. Unesaki, T. Misawa, T. Sano, K. Nakajima G. Vandegrift, D. Stepinski, J. Jerden, A. Gelis, E. Krahn, L. Hafenrichter, J. Holland
<b>3:30 - 4:00 p.m. Coffee Break and Refreshments</b>				
<b>3</b>	<b>International Perspectives on Fuel Development</b> <i>Co-Chairs: C. Landers, C. K. Kim</i>	<b>4:00 p.m.</b>	1 Start of Low-Enriched Fuel Lead Test Assemblies in the WWR-K Reactor Core 2 Main Results of the Development of High Density LEU Fuel for Russian Research Reactors 3 Status and Progress of R&D in High Density Nuclear Fuel at the CCHEN 4 US Progress in LEU Fuel Development 5 Overview of the GTRI Fuel Fabrication Capability	F. Arinkin, P. Chakrov, L. Chekushina, Sh. Gizatulim, S. Koltochnik, D. Nakipov, A. Shaimerdenov, Zh. Zhotabaev, N. Hanan, P. Garner, J. Roglans-Ribas A. Vatulin, I. Dobrikova, V. Suprun, A. Izhutov, E. Novoselov, V. Alexandrov, A. Ykovlev, V. Shishin L. Olivares, J. Marin, M. Barrera, C. Gutierrez, J. Lisboa, J. Espinoza M. Meyer D. Burkes, H. Longmire, D. Dombrowski, L. Cole
<b>6:00 p.m. Adjourn</b>				
<b>Tuesday Meeting Room: Torres del Paine G-ABC Ballroom, Santiago Marriott Hotel</b>				
<b>4</b>	<b>Conversion Experience and Planning</b> <i>Co-Chairs: F. Wijtsma, J. Matos</i>	<b>8:00 a.m.</b>	1 State of Work on Calculation Studies of the MIR Reactor Conversion 2 Study of Feasibility of HEU to LEU Conversion for IVG-1M Reactor 3 Planning the HEU to LEU Transition for the NBSR 4 Core Performance Improvement Using U <sub>3</sub> Si <sub>2</sub> -Al Fuel in the RP-10 Modernization 5 Status Update on Conversion to LEU Based Mo-99 Production in South Africa	A. Izhutov Y. Aleynikov, A. Azimkhanov, E. Beisembayev, D. Ganovichev, P. Garner, V. Gnyrya, N. Hanan, V. Ignashev, Yr. Vassiliev, A. Vurim, A. Kolbaenkov, A. Kolodeshnikov, Yu. Popov, I. Prozorova, V. Zuev A. Hanson, D. Diamond E. Villarino, A. Padilla G. Ball, O. Knoesen, A. Kocher
<b>10:00 - 10:30 a.m. Coffee Break and Refreshments</b>				
<b>5</b>	<b>Fuel Development - PIE Results</b> <i>Co-Chairs: G. Hofman, C. Jarousse</i>	<b>10:30 a.m.</b>	1 IRIS4 Experiment: PIE on Oxidized U-Mo Dispersion Fuel 2 Selenium Fuel - Heavy Ion Irradiation of UMo/Al Samples With Protective Si and ZrN Layers	C. Valot, I. Aubrun, J. Lamontagne, T. Blay, L. Brunaud, P. Delion, N. Monchalain, M. Ripert, F. Charollais, M. C. Anselmet, P. Lemoine R. Jungwirth, T. Zweifel, H. Y. Chiang, W. Petry, S. Van den Berghe, A. Leenaers

			3	KOMO Test PIE Results		J. Park, H. Ryu, J. Yang, Y. Lee, B. Yoo, Y. Jung, H. Kim, C. Kim, Y. Kim, G. Hofman
			4	Recent Results of Microstructural Characterization of Irradiated RERTR Fuels Using SEM		D. Keiser, Jr., J. Jue, B. Miller, J. Gan, A. Robinson, P. Medvedev
			5	Recent Development in TEM Characterization of Irradiated RERTR Fuel		J. Gan, B. Miller, D. Keiser, A. Robinson, J. Madden, P. Medvedev, D. Wachs
<b>12:30 - 2:00 p.m. Lunch Break</b>						
<b>6</b>	<b>Fuel Development - Fabrication Technology I</b> <i>Co-Chairs: F. Charollais, J. M. Park</i>	<b>2:00 p.m.</b>	1	Status of RERTR LEU-Mo Monolithic Fuel Fabrication Development		G. Moore, N. Woolstenhulme, B. Mackowiak, M. Marshall, P. Wolf, B. Park, S. Steffler, M. Chapple, J. Green
			2	Progress on Development of U Foil Fabrication Technology in KAERI		C. K. Kim, K. H. Kim, Y. M. Woo, M. S. Sim
			3	Overview of LANL Progress Development, Advanced Characterization Method Development, Prototype Fabrication and Alternative Process Development		D. Dombrowski
			4	Update on Uranium-Molybdenum Foil Fabrication Activities at the Y-12 National Security Complex		L. Jollay, H. A. Longmire, A. DeMint, J. Gooch
<b>3:30 - 4:00 p.m. Coffee Break and Refreshments</b>						
<b>7</b>	<b>Nonproliferation and International Security</b> <i>Co-Chairs: G. Ball, G. Vandegrift</i>	<b>4:00 p.m.</b>	1	Beyond Platitudes: Promoting HEU Minimization at the 2012 Nuclear Security Summit		M. Pomper
			2	IAEA/INFCIRC/225/Revision 5: New and Strengthened Guidance for the Physical Protection of Nuclear Material and Nuclear Facilities		M. Krupa
			3	Equivalent Fission Mo-99 Target Without Highly Enriched Uranium		L. Jollay, J. Creasy, C. Allen, G. Solbrekken
			4	DOE/NNSA's Office of Nuclear Safeguards and Security: Strengthening Nuclear Security Globally		M. Krupa
			5	Planning for New Research Reactors without HEU: IAEA Activities and Research Reactor Project Milestones		K. Aildred, P. Adelfang
<b>6:00 p.m. Adjourn</b>						
<b>Wednesday Meeting Room: Torres del Paine G-ABC Ballroom, Santiago Marriott Hotel</b>						
<b>8</b>	<b>High-Performance Reactor Conversion</b> <i>Co-Chairs: J. Stevens, D. Burkes</i>	<b>8:00 a.m.</b>	1	Fuel Management and Safety Analysis for LEU Conversion of the MIT Nuclear Reactor		T. Newton, Jr., L. W. Hu, B. Forget, N. Horelik, H. Connoway, T. Gerrity, K. Plumer, E. Wilson, J. Stevens
			2	The University of Missouri Research Reactor HEU to LEU Conversion Project Status		L. Foyt, K. Kutikkad, J. C. McKibben, N. Peters, G. Solbrekken, J. Kennedy, E. Feldman, J. Stevens, J. Stillman, C. Tzanos
			3	Path Forward to LEU Conversion at the NIST Center for Neutron Research		S. O'Kelly, R. Williams, J. Rowe
			4	ATR LEU Conversion Analysis Progress		S. Morrell, R. West
			5	Continuing LEU Conversion Activities at the High Flux Isotope Reactor		D. Renfro, D. Cook, J. Freels, G. Ilas, D. Pinkston, J. Sease, K. Smith
<b>10:00 - 10:30 a.m. Coffee Break and Refreshments</b>						
<b>9</b>	<b>Minimization, Transportation and Fuel Disposition</b> <i>Co-Chairs: T. Nelson, K. Aildred</i>	<b>10:30 a.m.</b>	1	Can RERTR Be Expanded to a Global HEU Phase-out?		A. Kuperman
			2	10 Years of IAEA Cooperation with the Russian Research Reactor Fuel Return Program		S. Tozser, P. Adelfang, E. Bradley
			3	The United States Foreign Research Reactor (FRR) Spent Nuclear Fuel (SNF) Acceptance Program: 2011 Update		C. Messick, J. Galan
			4	Return of SAFARI-1 US Origin HEU Fuel (Spent) to Savannah River		J. du Bruyn, C. Herselman, D. Tillwick
			5	Current Status and Issues Relative to LEU Spent Fuel of JMTR and JRR-3		H. Izumo, N. Hanawa, H. Nagadomi, Y. Torii, T. Inoue, H. Kawamura
<b>12:30 - 2:00 p.m. Lunch Break</b>						
<b>10</b>	<b>Conversion Analysis and Methods Part I</b> <i>Co-Chairs: C. Grant, J. C. McKibben</i>	<b>2:00 p.m.</b>	1	Study of Feasibility of HEU to LEU Conversion for IGR Reactor		Y. Aleynikov, V. Gaidachuk, D. Ganovichev, P. Garner, N. Hanan, V. Ignashev, Y. Vassiliev, A. Vurim, A. Kolodeshnikov, E. Kozlovski, A. Kurpesheva, I. Prozorova, V. Zuev
			2	Current Status of Conversion of Ghana Research Reactor Core to Low Enriched Uranium Core		H. Odoi, E. Akaho, B. Nyarko, R. Abrefah, E. Ampomah-Amoako, R. Sogbadji, S. Birikorang, J. Gbadago, J. Matos, J. Liaw, J. Morman, M. Kalimullah, S. C. Mo
			3	The Design of Additional Safety Rods for NIRR-1 HEU and Proposed LEU Cores Using MCNP Code		Y. Ibrahim, S. Jonah
			4	Evaluation of Thermal Hydraulic Limits Based on Statistical Propagation of Parametric Uncertainties		K. Chiang, L. Hu, B. Forget
<b>3:30 - 4:00 p.m. Coffee Break and Refreshments</b>						
<b>11</b>	<b>Fuel Development - Fabrication Technology II</b> <i>Co-Chairs: L. Olivares, L. Jollay</i>	<b>4:00 p.m.</b>	1	Quantitative Crystallographic Analysis of As-Fabricated Full Size IRIS-E-Future Nuclear Plates		H. Palancher, A. Bonnin, T. Zweifel, F. Charollais, M. Anselmet, P. Lemoine, V. Honkimäki, T. Buslaps, W. Petry, R. Jungwirth, M. Grasse, B. Stepnik
			2	Fabrication and Characterization of the Uranium Nitride Layer Coated U-Mo Spherical Particles		J. Yang, W. Cho, Y. Jeong, J. M. Park, C. K. Kim
			3	Summary of Temperature Influence in the Fabrication of Monolithic UMo-Zr Alloy Cladding Miniplates		M. López, A. Gonzalez, H. Taboada
			4	GTRI Progress in Developing Pyrochemical Processes for Recovery of Fabrication Scrap and		J. Figueroa, M. Williamson, M. Van Kleeck, R. Blaskovitz, J. Willit, G. Vandegrift
<b>6:30 - 8:00 p.m. Wine and Cheese Reception — Foyer Plaza Gacitua — Sponsored by UChicago Argonne LLC</b>						
<b>12</b>	<b>HEU Minimization Poster Session</b> <b>Torres del Paine DEF Ballroom</b> <i>Organizer: J. Holland</i>	<b>6:30 p.m.</b>	1	Corrosion Surveillance of LEU Uranium Silicide Spent Fuel Made in Chile During Their Wet Storage in the Pool of RECH-1 Research Test Reactor		C. Lamas, H. Torres, C. Henriquez
			2	Interfacial Strength of Al/Al and Al/Zr/DU-10wt%Mo Subject to Different Loading Modes		C. Liu, M. Lovato, W. Blumenthal

			3	Cladding Tightness Control of IRT-4M Fuel Assemblies	S. Baytelesov, F. Kungurov, U. Salikhbaev
			4	Thermal-Hydraulic Effects of Cladding-Meat Contact Faults	H. Breitkreutz, W. Petry
			5	Measurements of Elastic Modulus of Hot-extruded U-Mo/Al Dispersion Fuel	N. Wang, B. W. Leitch, L. Fu, A. Davidson
			6	Design and Testing of Prototypic Elements Containing Monolithic Fuel	N. Woolstenhulme, D. Wachs, M. Meyer
			7	Scale-Up of the HIP Bonding Process for Aluminum Clad-LEU Fuel	J. Katz, K. Clarke, B. Mihaila, J. Crapps, B. Aikin, V. Vargas, R. Weinberg, A. Duffield
			8	Semi-Homogeneous Reactor for Mo-99 Production: Conceptual Design	E. Pasqualini
			9	Possibility of Production of Molybdenum-99 Using Neutron Activation at the WWR-SM Research Reactor with LEU Fuel	U. Salikhbaev, S. Khujaev, S. Baytelesov, F. Kungurov, A. Boltbaev
			10	First Principles Study of Constitutional Point Defects in $oI20$ UAl <sub>4</sub>	L. Kniznik, P. Alonso, P. Gargano, G. Rubiolo
			11	Reuse of Ammonium Fluoride Generated in the Uranium Hexafluoride Conversion	J. Neto, H. Riella, E. de Carvalho, M. Durazza, L. Santos
			12	Analysis of Slag Formation During UF <sub>4</sub> Magnesiothermic Reduction	A. Saliba-Silva, B. Aguiar, E. de Carvalho, M. Durazzo
			13	Mg as a Matrix for U-Mo Dispersion Fuel	D. Keiser, Jr., D. Wachs, M. Meyer, A. Robinson
			14	Nanomechanical Behavior of U-10Mo/Zr/Al Fuel Assemblies	N. Mara, J. Crapps, T. Wynn, K. Clarke, P. Dickerson, B. Mihaila, D. Dombrowski
			15	Al-Si Matrix: Mixture or Alloy - An Annealing Study	A. Leenaers, S. Van den Berghe, A. Robinson, C. Detavernier
			16	Evaluation of $\gamma$ -U8Mo Nuclear Fuel Alloys	F. Oliveira, E. Carvalho, H. Riella
			17	ATR LEU Monolithic Foil-Type Fuel with Integral Cladding Burnable Absorber Design - Neutronics Performance Evaluation	G. S. Chang
			18	Fabrication Procedures for Manufacturing High Uranium Concentration Dispersion Fuel Elements	J. Souza, M. Durazzo
<b>Thursday Meeting Room: Torres del Paine G-ABC Ballroom, Santiago Marriott Hotel</b>					
<b>13</b>	<b>Fuel Development - Irradiation Testing and Analysis</b> <i>Co-Chairs: A. Izhutov, D. Wachs</i>	<b>8:00 a.m.</b>	1	Results of the Non-Destructive Analyses of the E-Future U(Mo)-Al(Si) Fuel Plates of the LEONIDAS Program	S. Van den Berghe, Y. Parthoen, A. Leenaers, E. Koonen, F. Charollais, P. Lemoine, Y. Calzavara, H. Guyon
			2	An Integrated Computational Fluid Dynamics and Fuel Mechanics Model for the Analysis of the E-Future Fuel Irradiation Experiment	A. Tentner, A. Bergeron, Y. S. Kim, G. Hofman, J. Stevens
			3	Results of the CERCA LTA Test and PIE in MARIA Reactor	W. Mielezczenko
			4	Interdiffusion Layer Growth Correlations for U-Mo/Al-Si Dispersion Fuel During Irradiation	Y. S. Kim, G. Hofman, J. Park, H. Ryu, A. Robinson, D. Wachs
			5	Progress on the KOMO-5 Irradiation Test	H. Ryu, J. Yang, Y. Lee, Y. Jung, C. K. Kim, C. Lee, C. Seo, H. Chae, J. M. Park
<b>10:00 - 10:30 a.m. Coffee Break and Refreshments</b>					
<b>14</b>	<b>Fuel Development - Fuel Performance</b> <i>Co-Chairs: M. Lopez, J. Shelgrove</i>	<b>10:30 a.m.</b>	1	Fuel Performance Aspects of the Advanced Test Reactor U-Mo Monolithic Demonstration Assembly Safety Basis	D. Wachs, D. Keiser, A. Robinson, G. Moore, N. Woolstenhulme, C. Clark, F. Rice, M. Lillo, D. Perez, G. Chang, J. Jue, D. Burkes, M. Meyer
			2	Fission Induced Microstructural Change in U-Mo Alloy Fuel	G. Hofman, Y. S. Kim
			3	Interactions Between UMo/Al Fuel and Diffusion Barriers, Nb and TiN, Under Heavy Ion Irradiation	H. Y. Chiang, R. Jungwirth, T. Zweifel, W. Schmid, W. Petry, F. Kraus
			4	Corrosion-Based Operational Limit for Aluminum Clad Research Reactor Fuel Plates	P. Medvedev
			5	Summary of Post Irradiation Examination Results of the AFIP-6 Failure	A. Robinson, D. Wachs, F. Rice, D. Perez
<b>12:30 - 2:00 p.m. Lunch Break</b>					
<b>15</b>	<b>Conversion Analysis and Methods Part II</b> <i>Co-Chairs: H. Odoi, N. Hanan</i>	<b>2:00 p.m.</b>	1	Neutronic Parameters of the IR-8 Reactor Core Consisting of IRT-3M Type FA's with U-9%Mo LEU Fuel Being Analyzed	Y. Pesnya, D. Erak, V. Nasonov, A. Taliev
			2	Feasibility Studies for LEU Conversion of the IRT MEPHI Reactor Using U-Mo Tubular Fuel	V. Alferov, E. Kryuchkov, M. Shchurovskaya
			3	Applicability of a Hot Channel Factor-Based Hot Stripe Approach to Model the Azimuthal Power Peaking in a BR2 Fuel Assembly	B. Dionne, C. Tzanos, J. Stevens, S. Kalcheva, E. Koonen
			4	Full Core Conversion Status of the Dalat Nuclear Research Reactor	V. L. Pham, N. D. Nguyen, B. V. Luong, T. N. Huynh, V. V. Le, K. C. Nguyen, M. T. Nguyen
<b>3:30 - 4:00 p.m. Coffee Break and Refreshments</b>					
<b>16</b>	<b>Safety Analysis</b> <i>Co-Chairs: T. Newton, E. Koonen</i>	<b>4:00 p.m.</b>	1	Investigation of Reactivity Insertion Transients at the BR2 Reactor Using Refined Multi-Channel PARET Models	S. Kalcheva, E. Koonen, A. P. Olson, B. Dionne, J. Stevens
			2	Neutron Spectrum Safety Analysis of HEU and LEU Cores	R. Sogbadji, H. Odoi, E. Akaho, B. Nyarko, R. Abrefah, E. Ampomah-Amoako, S. Birikorang, S. David
			3	Estimating Hot Channel Factors for a Generic MNSR Using Rodded Fuel Cooled by Natural Circulation	M. Kalimullah, B. Dionne, E. E. Feldman, J. E. Matos, A. P. Olson
			4	Sensitivity Analyses of IRT - SOFIA LEU Core: Sensitivity Analyses of Loss of Flow Accident	S. Belousov
<b>17</b>	<b>Summary and Closure</b> <i>Co-Chairs: J. Roglans and E. Cortes</i>	<b>5:30 p.m.</b>			
<b>Friday Technical Tour of Chilean Nuclear Energy Commission Facilities Board Bus at 8:30 a.m. — Return to Santiago Marriott Hotel by 12:30 p.m.</b>					