RERTR 2010 — 32nd International Meeting on Reduced Enrichment for Research and Test Reactors

October 10-14, 2009
Sana Lisboa Hotel
Lisbon, Portugal

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 2010 International Meeting on Reduced Enrichment for Research and Test Reactors." The meeting is being organized by Argonne National Laboratory, Instituto Tecnológico e Nuclear (ITN) and Idaho National Laboratory and will be held in Lisbon, Portugal from October 10-14, 2010. This will be the 32nd annual meeting in a series on the same general subject regarding conversion of reactors within the Global Threat Reduction Initiative.

Technical Program (Final)

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This document is to be considered as **FINAL**. Eventual updated versions of this document will be published as soon as they become available on the RERTR web site at www.rertr.anl.gov/rertr10/agenda.shtml

The Meeting Organizers:

Argonne NATIONAL LABORATORY

itn

INL Idaho National Laboratory

RERTR 2010 — 32nd International Meeting on Reduced Enrichment for Research and Test Reactors
Lisbon, Portugal — October 10-14, 2010

PROGRAM

Sunday
Registration: 3:00 – 6:30 p.m., Castelo Ballroom Foyer
Reception: 6:30 – 8:30 p.m., The Babcock & Wilcox Company, UChicago Argonne LLC and Battelle Energy Alliance
Castelo I & II Ballroom

Session	Session Title	Time		Paper Title	Authors
Monday	**Meeting Room: Castelo VIII & IX Ballroom, SANA Lisboa Hotel**				
	Welcome	**8:30 a.m.**		Welcome to Portugal and RERTR-2010	Prof. Júlio Montalvão e Silva Instituto Tecnológico e Nuclear
	Global HEU Minimization Efforts		1	International Atomic Energy Agency	Tero Varjoranta Division of Nuclear Fuel Cycle and Waste Technology
			2	United States	Kenneth Baker DOE-NNSA
			3	Russian Federation	Ivan Kamenskikh Rosatom
		10:00 - 10:30 am Coffee Break and Refreshments			
1	**Overview of International Conversion Programs** *Chair: Andrew Bieniawski*	**10:30 a.m**	1	Russian-Designed Research Reactor Conversions	N. Arkhangelskiy
			2	New IAEA Activities in Support of HEU Minimization	P. Adelfang, K. Alldred, E. Bradley, C. Morris, R. Sollychin
			3	Progress and Status of European Research Reactor Conversions	J. Marques
			4	Furthering HEU Minimization Through Conversions	C. Landers
			5	Status of Reduced Enrichment Program for Research Reactors in Japan	K. Ohki, T. Inoue, H. Unesaki
			6	Who Needs HEU Anyway? The Effect of Research Reactor Conversion on Reactor Usage	F. Dalnoki-Veress
		12:30 - 1:30 pm - Lunch Break			
2	**Recent International HEU Minimization Milestones** *Co-Chairs: P. Staples, P. Adelfang*	**1:30 p.m.**	1	HEU Removal from Chile's RECH-2 Reactor	F. Lopez
			2	Full Core Conversion of the Kyoto University Research Reactor (KUR) from HEU to LEU	H. Unesaki, T. Sano, T. Misawa, K. Nakajima
			3	HEU To LEU Conversion of University of Wisconsin Nuclear Reactor	K. Austin
			4	Irradiation Testing of Lead Test Assemblies from CERCA in MARIA Research Reactor	G. Krzysztoszek, W. Mieleszczenko, A. Mołdysz
			5	2010 Progress Report on RERTR Activities in Argentina	H. Blaumann, A. Bonini, P. Cristini, L. de Lio, L. Dell'Occhio, D. Gil, A. Gonzalez, M. López, M. Mirandou, H. Taboada
		3:30 - 4:00 p.m. Coffee Break and Refreshments			
3	**International Perspectives on Fuel Development** *Co-Chairs: J. Snelgrove, C.K. Kim*	**4:00 p.m.**	1	US Progress in LEU Fuel Development	D. Wachs
			2	Development of High Density LEU Fuel for Research Reactors	A. Vatulin
			3	Recent Activity of the International Fuel Development Working Group	W. Petry
			4	LEONIDAS UMo Dispersion Fuel Qualification Program: Progress and Prospects	F. Frery, H. Guyon, E. Koonen, S. Van Den Berghe, P. Lemoine, F. Charollais, C. Jarousse, D. Geslin
5:30 p.m. Adjourn					
Tuesday	**Meeting Room: Castelo VIII & IX Ballroom, SANA Lisboa Hotel**				
4	**Conversion Experience and Planning** *Co-Chairs: F. Wijtsma, J. Matos*	**8:00 a.m.**	1	Neutronics and Thermal Hydraulics Calculation for Full Core Conversion from HEU to LEU FUEL of the DALAT Nuclear Research Reactor	V. Pham, N. Nguyen, V. Le, T. Huynh, B. Luong, K. Nguyen
			2	TOUTATIS: ILL Conversion Feasibility Study	Y. Calzavara, F. Frery, F. Thomas, H. Guyon, A. Bergeron, A. Tentner, J. Stevens
			3	The Jamaican SLOWPOKE Utilization and Core Conversion Plans	C. Grant
			4	Converting the WWR-M Research Reactor in Ukraine from HEU to LEU Fuel by the End of 2010	Y. Mahlers, V. Makarovsky, I. Maliuk, O. Rudyk
			5	Beyond the Nuclear Security Summit and NPT Review Conference: The International Politics of Advancing HEU Reduction	M. Pomper, C. Harvey
		10:00 - 10:30 a.m. Coffee Break and Refreshments			
5	**Fuel Development - PIE Results** *Co-Chairs: A. Leenaers, D. Wachs*	**10:30 a.m.**	1	KOMO-4 Test PIE Results	J. Park, H. Ryu, J. Yang, Y. Lee, B. Yoo, Y. Jung, H. Kim, C. Kim, Y. Kim, G. Hofman
			2	Post Irradiation of RERTR/AFIP Exeriments	A. Robinson, D. Wachs
			3	The Main Results of Investigation of Modified Dispersion LEU U-Mo Fuel Tested in the MIR Reactor	A. Izhutov, V. Alexandrov, A. Novosyolov, V. Starkov, A. Sheldyakov, V. Shishin, V. Iakovlev, I. Dobrikova, A. Vatulin, G. Kulakov, V. Suprun
			4	IRIS-TUM: Microstructure of the Unirradiated Plates	R. Jungwirth, W. Petry, A. Röhrmoser, J. Allenou, X. Iltis
			5	Microstructural Characterization of Irradiated U_3Si_2/Al Dispersion Fuel	J. Gan, B. Miller, D. Keiser, A. Robinson, D. Wachs

		12:15 - 1:30 p.m. Lunch Break			
6	**Fuel Development Poster Session, Castelo I & II Ballroom** *Organizer: J. Holland*	**1:30 p.m.**	1	Co-Rolling Process Development for Production of Zr Coated U-10Mo Alloy Foils	D. Hammon, K. Clarke, A. Clarke, D. Alexander, A. Kelly
			2	Scale-Up of the HIP Bonding Process for Aluminum Clad – LEU Reactor Fuel	J. Katz, K. Clarke, B. Aikin, V. Vargas, A. Kelly, D. Dombrowski
			3	Plasma Sprayed and Electrospark Deposited Zirconium Metal Diffusion Barrier Coatings	K. Hollis, M. Pena
			4	An Influence of Porosity Development in U-Mo Fuel Particles on the Performance of U-Mo/Al Dispersion Fuel	O. Golosov, S. Averin, V. Panchenko, M. Lyutikova
			5	Determination of Crystalline Phases in the Uranium Silicide by X-ray Diffraction	C. Kniess, E. de Carvalho, M. Durazzo, A.Saliba-Silva, L. Prestes, H. Riella
			6	Microstructural Development During Irradiation of AFIP-1 Fuel Plates	D. Keiser, Jr., J-F Jue, A. Robinson
			7	Gamma Decomposition and Powder Formation of γ-U/8Mo Nuclear Fuel	V. de Oliveira, U. de Carvalho, H. Riella
			8	In-Situ X-ray Diffraction Study of the U(Mo)/Si Solid State Reaction	A. Leenaers and S. Van den Berghe, W. Knaepen, C. Detavernier
			9	Spatially Resolved Strain Fields in RERTR Fuel Plates	M. Okuniewski, P. Medvedev, H. Ozaltun, J-F Jue, B. Rabin, G. Moore, B. Park, D. Brown, L. Balogh, J. A. Neal, J. Terry, D. Olive, Y. Trenikhina, S. Chattopadhyay, T. Shibata, H. Ganegoda, J. Okasinski, S. Seifert
			10	Studies on Hot Rolled Interdiffusion Pair U-10Mo/AA1050	A. Saliba-Silva, I. Martins, E. De Carvalho, M. Durazzo, H. Riella
			11	Quantitative Determination of Crystalline Phases in the U_3Si_2 Dispersion-Type Fuel Plates by the Rietveld Method	C. Kniess, B. Aguiar, E. Carvalho, H. Riella, W. Ferraz
			12	The OSU Hydro-Mechanical Fuel Test Facility: Standard Fuel Element Testing	W. Marcum, B. Woods, A. Phillips, R. Ambrosek, J. Wiest
			13	Remelting and Thermal Treatment to Homogenate U-Zr-Nb and U-Nb Alloy	B. Aguiar, C. Kniess, H. Riella, W. Ferraz
			14	Uranium - Molybdenum Fuel Foil Fabrication Activities at the Y-12 National Security Complex	H. Longmire, J. Gooch, A. DeMint, J. Morrell, V. Belt
		2:30 - 3:00 p.m. Coffee Break and Refreshments			
7	**Mo-99 International Production Development** *Co-Chairs: L. Barbosa, R. Hamilton*	**3:00 p.m.**	1	Status of Conversion of the South African SAFARI-1 Reactor and Mo-99 Prodcution Process to LEU	G. Ball
			2	IAEA Activities to Support the Transition of Molybdenum-99 Production Away From the Use of Highly Enriched Uranium (HEU)	E. Bradley, K. Alldred, P. Adelfang, N. Ramamoorthy, D. Ridikas
			3	A Proposed International Project of Low-Enriched Uranium Salt Solution Reactor for Medical Isotope Production	S. Khamyanov, S. Voloshin
			4	Safety Aspects of Research Reactor Core Modification for Fission Molybdenum-99 Production	M. Gaheen
5:00 p.m. Adjourn					

Wednesday — Parallel Sessions

Meeting Room I: Castelo VIII & XI Ballroom
Meeting Room II: Castelo I & II Ballroom

Wednesday	**Meeting Room I: Castelo VIII & IX Ballroom, SANA Lisboa Hotel**				
8	**High-Performance Reactor Conversion** *Co-Chairs: J. Stevens, E. Woolstenhulme*	**8:00 a.m.**	1	LEU Conversion Activities at the MIT Research Reactor: Use of Neutronic Models for Safety Analyses	T. Newton, Jr., N. Horelik, P. Romano, B. Forget, E. Pilat, E. Wilson, J. Stevens, A. Bergeron, and B. Dionne
			2	The University of Missouri Research Reactor HEU to LEU Fuel Conversion Project Status	J. C. McKibben, K. Kutikkad, L. Foyto, N. Peters, G. Solbrekken, J Kennedy, J. Stillman, E. Feldman, B. Dionne, J. Stevens
			3	Conversion Status for the NIST Center for Neutron Research Reactor (NBSR) and Mitigation Strategies	S. O'Kelly, W. Richards, M. Rowe, R. Williams, L-Y Cheng, A. Cuadra, D. Diamond, A. Hanson
			4	ATR LEU Monolithic and Dispersed with Boron-10 Loading Minimization Design – Neutronics Performance Analysis	G. S. Chang
			5	Transitioning LEU Conversion Activities at the High Flux Isotope Reactor	D. Renfro, R. Primm, G. Ilas, J. Freels, D. Cook, J. Sease, D. Pinkston
		10:00 - 10:30 a.m. Coffee Break and Refreshments			
9	**Conversion Analysis and Methods Part I** *Co-Chairs: Y. Calzavara, H. Odoi*	**10:30 p.m.**	1	Neutronics and Thermal Hydraulics Analysis for the Six- and Eight-Tube Mixed LEU Cores of WWR-SM at INP at Republic of Uzbekistan	S. Baytelesov, A. Dosimbaev, F. Kungurov, A. Safarov, U. Salikhbaev, N. Hanan, P. Garner
			2	Estimation of Control Rod Worth from Measurements at the BR2 Reactor Using Kinetics Equations with Included Photoneutrons	S. Kalcheva, E. Koonen
			3	HEU-LEU Transitional Core Analysis for the MIT Research Reactor Conversion	L-W Hu, S. Kim
			4	Nuclear Design of Kyoto University Research Reactor (KUR) with LEU Core	T. Sano, H. Unesaki, K. Nakajima

		12:15 - 1:30 p.m. Lunch Break			
10	**Safety Analysis** *Co-Chairs: S. Kalcheva, T. Newton*	**1:30 p.m.**	1	Safety Analysis for LTA Irradiation Test at the WWR-K Research Reactor	F. Arinkin, L. Chekushina, P. Chakrov, Sh. Gizatulin, S. Koltochnik A. Shaimerdenov
			2	Transient Analyses for Full Core Conversion from HEU to LEU of the DALAT Nuclear Research Reactor	B. Luong, V. Le, T. Huynh, K. Nguyen
			3	Impact of Photoneutrons on Transients for the MURR and MITR HEU and LEU Cores	B. Dionne, N. Hanan
			4	Thermal-Hydraulic Safety Analyses for Conversion of the Laue Langevin Institute (ILL) High Flux Reactor (RHF) from HEU to LEU Fuel	A. Tentner, F. Thomas, A. Bergeron, J. Stevens
		3:00 - 3:30 p.m. Coffee Break and Refreshments			
11	**Mo-99 Production - Technology Development** *Co-Chairs: E. Bradley, G. Ball*	**3:30 p.m.**	1	Studies on the Separation of Mo-99 from Nitric Acid Medium by Alumina	M. Yamaura, A.Freitas, A. Yamamura, R. Tanaka, C. Forbicini, R. Camilo, I. Araujo
			2	Argonne Activities for the Production of Mo-99 Using LINAC Irradiation of Mo-100	S. Chemerisov, A. Gelis, P. Tkac, D. Bowers, V. Makarashvili, A. Bakel, G. Vandegrift
			3	Thermal Hydraulic Design Verification of LEU Plates Irradiation in Research Reactor Core	I. Abdelrazik, M. Gaheen
			4	An Effort to Improve U Foil Fabrication Technology of Roll-casting for Fission Mo Target	C. Kim, Y. Woo, K. Kim, J. Oh, M. Sim
5:00 p.m. Adjourn		**6:00 – 10:00 p.m. Reception — Sponsored by Necsa**			
Wednesday	**Meeting Room II: Castelo I & II Ballroom, SANA Lisboa Hotel**				
12	**Fuel Development - Fuel Fabrication Technology** *Co-Chairs: F. Charollais, A. Röhrmoser*	**8:00 a.m.**	1	Development Status of U-10Mo Monolithic Fuel Foil Fabrication at the Idaho National Laboratory	G. Moore, B. Rabin, J-F Jue, C. Clark, N. Woolstenhulme, B. Park, S. Steffler, M. Chapple, M. Marshall, J. Green, B. Mackowiak
			2	Babcock & Wilcox UMo Plate Fabrication Experience	M. Nilles, J. Wight
			3	Update on Uranium-Molybdenum Fuel Foil Fabrication Activities at the Y-12 National Security Complex	H. Longmire, J. Gooch, A. DeMint, J. Morrell, V. Belt
			4	Overview of LANL Progress for Fuel Development and Fuel Fabrication Capability	D. E. Dombrowski
			5	Monolithic U-Mo Based Plate Development New Findings	S. Balart, A. Gonzalez, M. López, M. Mirandou, F. Rice, H. Taboada, D. Wachs
		10:00 - 10:30 a.m. Coffee Break and Refreshments			
13	**Minimization, Transportation and Fuel Disposition** *Co-Chairs: C. Messick, G. Krzysztoszek*	**10:30 a.m.**	1	Storage and Transport of Spent Fuel from Ghana Research Reactor-1 for Conversion from Highly-Enriched Uranium to Low-Enriched Uranium Fuel	E. Ampomah-Amoako, E. Akaho, B. Nyarko, K.Danso, R. Abrefah, R. Sogbadji, H. Odoi, S. Birikorang, K. Gyamfi, J. Matos, S-C Mo
			2	Recovery and Enrichment Reduction of Highly Enriched Uranium Contained in a Uranium Hexaflouride Cylinder	L. Aldave, H. Bello, A. Bonini, L. De Lio, L. Dell'Occhio, M. Falcón, T. Feijoo, A. Gauna, D. A. Gil, A. Rodriguez, J. Valdez
			3	Pyrochemical Scrap Recovery in the Fabrication of LEU Monolithic U-Mo Fuel for High Performance Research Reactors	J. Figueroa, M. Williamson, M. Van Kleeck, R. Blaskovitz, G.Vandegrift
			4	Status Report on the SNF Repatriation Project from VINCA Institute	S. Tozser, P. Adelfang, J. Boogaard
		12:15 - 1:30 p.m. Lunch Break			
14	**Fuel Development - Irradiation Testing and Analysis** *Co-Chairs: M. Lopez, F. Rice*	**1:30 p.m.**	1	Results of SEM Characterization of a Dispersion Fuel Plate with Al-2Si Matrix Tested in the RERTR-7 Experiment	D. Keiser, J. Jue, A. Robinson, P. Medvedev
			2	PIE Analysis of High-Density, High-Heat-Flux Full-Size U-Mo/Al-Si Dispersion Plates	G. Hofman, Y. Kim
			3	Effect of Si in Al and Third Alloying Elements in U-Mo on the Interaction Layer Growth: KOMO-4 Irradiation Test Results	J. Yang, J. Park, H. Ryu, C. Kim, Y. Ok, H. Kim, Y. Jung, Y. Kim, G. Hofman
			4	Behavior of Silicon on Improved Performance of U-Mo/Al-Si Dispersion - Analysis and Interpretation of KOMO-4 Test Results	Y. Kim, G. Hofman, J-M Park
		3:00 - 3:30 p.m. Coffee Break and Refreshments			
15	**Fuel Development - Fuel Performance Part I** *Co-Chairs: J-M Park, C. Jarousse*	**3:30 p.m.**	1	Main Results of the Development of High Density LEU Fuel for Russian Research Reactors	A. Vatulin, I. Dobrikova, V. Suprun, G. Kulakov, A. Izhutov, E. Novoselov, V. Alexandrov, A. Ykovlev, V. Shishin
			2	Irradiation Testing of the RERTR Fuel Miniplates with Burnable Absorbers in the Advanced Test Reactor	I. Glagolenko, D. Wachs, N. Woolstenhulme, G. Chang, B. Rabin, T. Wiencek
			3	Interim Report on U-10Mo Fuel Plate Blister Behaviors	F. Rice, D. Wachs, A. Robinson and J. Jue, R. Finlay
			4	Interdiffusion in the Si-Rich Layer of U-Mo/Al-Si Fuel	H. Ryu, J. Park, J. Yang, C. Kim, Y. Jung, Y. Kim
5:00 p.m. Adjourn		**6:00 – 10:00 p.m. Reception — Sponsored by Necsa**			

Thursday	Meeting Room: Castelo VIII & IX Ballroom, SANA Lisboa Hotel				
16	**Fuel Development - Fuel Performance Part II** *Co-Chairs: A. Izhutov, R. Finlay*	**8:00 a.m.**	1	Sputtering as a Coating Technique for Monolithic U Mo Fuel Plates	W. Schmid, S. Dirndorfer, R. Grossmann, H. Juranowitsch, W. Petry, C. Jarousse
			2	Microstructural Characterization of the E-Future Fresh Fuel Plates	X. Iltis, F. Charollais, M. Anselmet, P. Lemoine, A. Leenaers, S. Van den Berghe, E. Koonen, C. Jarousse, D. Geslin, F. Frery, H. Guyon
			3	Microstructural Characterization of Dispersion Fuel Miniplates Made of Hydrided U-7wt.%Mo Powder	L. Olivares, J. Marin, J. Lisboa, M. Barrera
			4	MTR Plates 3D Mechanical Modeling with MAIA	V. Marelle, J. Gatt
			5	Interfacial Tensile Strength of Al/Al and Al/Zr/DU-10wt.%Mo	C. Liu, M. Lovato, W. Blumenthal, K. Clarke, D. Alexander
	10:00 - 10:30 a.m. Coffee Break and Refreshments				
17	**Conversion Analysis and Methods Part II** *Co-Chairs: H. Unesaki, B. Dionne*	**10:30 a.m.**	1	Neutronics Codes and Methodologies Applied for the 3-D Whole Core Evaluations of the Fuel Cycle at the BR2 Reactor	S. Kalcheva, E. Koonen
			2	FRM-II, Monteburns Calculations	A. Röhrmoser
			3	Comparison of Babelli-Ishii Flow Instability Criterion with 75 Tests Done by Whittle and Forgan	M. Kalimullah, A. Olson
			4	Modifications of Fuel Cooling Circuit for MARIA Reactor to be Required for Conducting the Full Conversion of the Core	W. Mieleszczenko, W. Bykowski, A. Mołdysz
	12:00 - 1:30 p.m. Lunch Break				
18	**HEU Minimization Poster Session, Castelo I & II Ballroom** *Organizer: J. Holland*	**1:30 p.m.**	1	Sensitivity Test on Temperature Difference for Moderator Temperature Cofficient in a Pool Type Research Reactor	C. Park, C. Seo, G. Roh, B. Lee
			2	Safety Analyses of IRT-SOFIA LEU Core: Airborne Effluents Dose Assessment for Normal Operation	S. Belousov, A. Mladenov, T. Apostolov
			3	IRT-SOFIA, HEU to LEU Conversion: Regulatory Approval Tasks Soution	S. Belousov, T. Apostolov, N. Hanan, J. Matos
			4	Analysis of the BR2 Loss of Flow Tests	C. Tzanos, B. Dionne
			5	Development of a Production-Scale Dissolver for Nitric-Acid Dissolution of LEU Foils	J. Jerden Jr., S. Chemerisov, A. Hebden, S. Wiedmeyer, G. Vandegrift
			6	Comparison of Mo-99 Production through Neutronic Calculations on LEU Targets (UAl_x-Al and U-Ni) under the Similar Irradiation Conditions in the IEA-R1 Reactor Research	D. Domingos, A. Silva, F. Oliveira, J. Silva, P. Nishiyama, M. Yamaguchi
			7	Studies on the Gases Evolution during the Alkaline Dissolution of UAl_2-Al LEU Targets for the Production of Mo-99 in Brazil	R. Camilo, I. de Araujo, M. Yamaura, A. Mindrisz, S. Forbicini, C. de O. Forbicini
			8	Progress in Developing Electrochemical Dissolution of LEU Foils	A. Gelis, S. Wiedmeyer, G. Vandegrift
	3:00 - 3:30 p.m. Coffee Break and Refreshments				
19	**Summary and Closure** *Co-Chairs: J. Roglans and J. Marques*	**3:30 p.m.**			
4:30 p.m. Adjourn					