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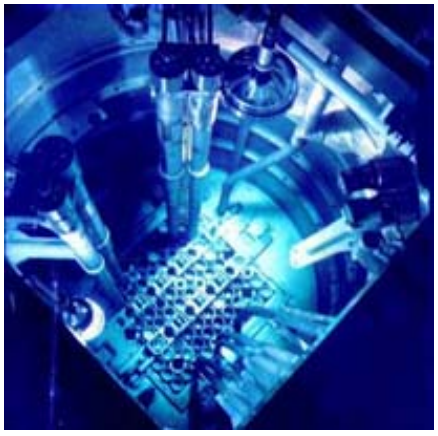
RERTR



The **Reduced Enrichment for Research and Test Reactors (RERTR) Program** was initiated by the United States Department of Energy in 1978 with the mission of developing the technologies necessary to convert research and test reactors from the use of fuels and targets containing highly-enriched uranium (HEU, = or > 20% U-235) to the use of fuels and targets containing low enriched uranium (LEU, < 20% U-235). This mission is consistent with the United States nonproliferation policy goal of minimizing and eventually eliminating the use of highly-enriched uranium in civil programs worldwide.

Contacts for further information:

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FUEL DEVELOPMENT
Low enriched uranium fuels for research and test reactors

REACTOR CONVERSION ANALYSES
Design and safety analyses for research and test reactors

MO-99 PRODUCTION
Radioisotope production

DOCUMENTS

SPENT FUEL ACCEPTANCE POLICY

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REFERENCE DOCUMENTS


INTERNATIONAL MEETINGS


TRAINING
Under construction

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ABSTRACTS AND PAPERS PRESENTED AT THE 2002 INTERNATIONAL RERTR MEETING

The 24th International Meeting on Reduced Enrichment for Research and Test Reactors (RERTR) was held in San Carlos de Bariloche, Argentina on November 3-8, 2002. The available abstracts and papers that were presented at this meeting are provided below.

WELCOME ADDRESS

- Welcome Address
  Pablo Adelfang (CNEA, Argentina)

- Welcome Address
  Jon R. Phillips (DOE, USA)

NATIONAL AND INTERNATIONAL PROGRAMS

- Status and Progress of the RERTR Program in the Year 2002
  A. Travelli (ANL, USA)

- Russian RERTR Program as a Part of Joint US DOE-RF MINATOM Collaboration on Elimination of the Threat Connected to the Use of HEU in Research Reactors
  N. Arkhangelsky (MINATOM, Russia)

- Progress of the United States Foreign Research Reactor Spent Nuclear Fuel Acceptance Program
  M. Clapper (DOE, USA)

- Management of Spent Fuel From Research Reactors in Latin America: A Regional Approach

  J.R. Maiorino (IPEN, Brazil), O. Novara (CNEA, Argentina), A.J. Soares (IPEN, Brazil),
  J. Klein (CCHEN, Chile), R. Mazón (ININ, Mexico), I. Llamas (IPEN, Peru), I. Ritchie, and
  J. Guarnizo (IAEA, Austria)

- RERTR Activities in Argentina

  P. Adelfang, L. Alvarez, and E. Pasqualini (CNEA, Argentina)

- Progress on RERTR Issues in Australia

  M.I. Ripley and K.W. Horlock (ANSTO, Australia)

- Status of Reduced Enrichment Program for Research Reactors in Japan

K. Shimizu (JAERI, Japan) and Y. Nakagome (Kyoto University, Japan)

- Jules Horowitz Reactor, Basic Design

  Y. Bergamaschi, Y. Bouilloux, P. Chantoin, B. Guigon, X. Bravo, C. Germain, M. Rommens, and P. Tremodeux (CEA/CADARACHE, France)

- Improving Nuclear Safety at International Research Reactors: The Integrated Research Reactor Safety Enhancement Program (IRRSEP)

D. Huizenga, D. Newton, and J. Connery (DOE, USA)

FUEL DEVELOPMENT, MANUFACTURING AND QUALIFICATION

- Russian RERTR Program: Advanced LEU Fuel Development for Research Reactors

  A.V. Vatulin, A.V. Morozov, Y.A. Stetskiy, V.A. Mishunin, A.N. Fedorov, V.B. Suprun,
  I. Trifonov, V.I. Sorokin (VNIINM, Russia)

- Russian RERTR Program Works Status

  V. Chernyshov (JSC "TVEL", Russia), V. Aden, E. Kartashov, V. Lukichev (RDIPE, Russia), and A. Enin (NCCP, Russia)

- LEU WWR-M2 Fuel Qualification

  K.A. Konoplev, R.G. Pikulik, A.S. Zakharov, L.V. Tedoradze, G.V. Paneva, and
  D.V. Tschmshkyan (Petersburg Nuclear Physics Institute, Russia)

- Results of IRT-4M Type FA's Testing in the WWR-CM Reactor (Tashkent)

  V.M. Chernyshov (JSC "TVEL", Russia), E.P. Ryazantsev, P.M. Egorenkov, V.A. Nassonov (RRC "KI", Russia), B.S. Yuldashev, K.Kh. Karabaev, A.A. Dosimbaev (INP, Uzbekistan), V.G. Aden, E.F. Kartashev, V.A. Lukichev (RDIPE, Russia), A.B. Aleksandrov and A.A. Yenin (JSC NZHK, Russia)

- CERCA UMo Development. Status as of October 2002

Ch. Jarousse, J.P. Durand, Y. Lavastre and M. Grasse (CERCA, France)

- Progress of U-Mo Dispersion Rod Fuel Qualification Program in Korea

C.K. Kim, K.H. Kim, J.M. Park, D.B. Lee, S.J. Oh, K.H. Lee, H.T. Chae, and D.S. Sohn (KAERI, Korea)

- Manufacturing and Investigation of U-Mo LEU Fuel Granules by Hydride-Dehydride Processing

Y.A. Stetskiy, Y.I. Trifonov, A.V. Mitrofanov, V.I. Samarin (VNIINM, Russia)

- U-Mo Alloy Powder Obtained Through Selective Hydriding. Particle Size Control

S. Balart, P. Bruzzoni and M.S. Granovsky (CNEA, Argentina)

- Scaling up the Production Capacity of U-Mo Powder by HMD Process

E.E. Pasqualini, M. López, L.J. Helzel García, P. Echenique and P. Adelfang (CNEA, Argentina)

- Modeling of High-Density U-Mo Dispersion Fuel Plate Performance
  S.L. Hayes, G.L. Hofman, M.K. Meyer, J. Rest and J.L. Snelgrove (ANL, USA)

- Interdiffusion Between U-Mo Alloys and Al
  M.I. Mirandou (I.T. J. Sábato UNSAM-CNEA, Argentina), S.N. Balart, M. Ortiz and M.S. Granovsky (CNEA, Argentina) and G.L. Hofman (ANL, USA)

- Atomistic Modelling of the Interdiffusion of Al in the U-Mo Based Fuel
  J.E. Garcés (CNEA, Argentina and Ohio Aerospace Institute, USA), A.C. Marino (CNEA, Argentina) and G. Bozzolo (Ohio Aerospace Institute and NASA Glenn Research Center, USA)

- Development and Validation of an Improved Version of the DART Code
  H. Taboada (CNEA, Argentina), J. Rest (ANL, USA), V.M. Moscarda, M. Markiewicz and E. Estévez (CNEA, Argentina)

- Description of ECRI (CNEA's MTR Fuel Fabrication Plant)
  P. Echenique, J. Fabro, D. Podestá, M. Restelli, G. Rossi, L. Alvarez, and P. Adelfang (CNEA, Argentina)

- Hydraulic and Hydrodynamic Tests for Design Evaluation of Research Reactors Fuel Elements

R. Kulichevsky, A. Ghiselli Martín, J. Fiori and P. Yedros (CNEA, Argentina)

- Quality Management Program According to the ISO 9001:2000 for the High Density Research Reactor Fuel Development Project (CADRIP)

M.M. Mazzini, L. Mamberto, and A.F. Piazza (CNEA, Argentina)

FUEL PERFORMANCE

- Progress in Irradiation Performance of Experimental Uranium-Molybdenum Dispersion Fuel

G.L. Hofman and M.K. Meyer (ANL, USA)

- Behaviour of Irradiated Uranium Silicide Fuel Revisited

M.R. Finlay (ANSTO, Australia), G.L. Hofman, J. Rest and J.L. Snelgrove (ANL, USA)

- Post-Irradiation Examination of U_3Si_x-Al Fuel Element Manufactured and Irradiated in Argentina

  G. Ruggirello, H. Calabroni and M. Sánchez (CNEA, Argentina), and G.L. Hofman (ANL, USA)

- The LFR Facility (CNEA) for Burnup Determination in Uranium Silicide Fuels 20% ^{235}U

C. Devida, E. Gautier, D. Gil, and A. Stankevicius (CNEA, Argentina)

- Study of Application and Testing of the Experimental Fuel Assembly with 36%, 19.8% Enrichment

B.S. Yuldashev, U.S. Salikhbaev, Kh. Karabaev, and S. Baytelesov (INP, Uzbekistan)

- Irradiation Behavior of Atomized and Comminuted U_3Si_2/Al Mini-Plate Fuels

  J.M. Park, K.H. Kim, B.O. Yoo, Y.H. Jung, D.B. Lee, C.K. Kim and D.S. Sohn (KAERI, Korea), G.L. Hofman and J.L. Snelgrove (ANL, USA)

- Detection of Delamination Defects in Plate Type Fuel Elements Applying an Automated C-Scan Ultrasonic System

P. Katchadjian, C. Desimone, C. Ziobrowski, and A. Garcia (CNEA, Argentina)

- Description of the PIE Facility for Research Reactors Irradiated Fuels in

CNEA

A. Bisca, R. Coronel, V. Homberger, A. Quinteros, and M. Ratner (CNEA, Argentina)

HEU AND LEU FUEL CYCLE

- U.S. Uranium Supply to the Research and Test Reactor Community

E.M. Parker (BWXT, USA)

- Using Molybdenum Depleted in ^{95}Mo in UMo Fuel

K. Bakker and F. Wijtsma (NRG Petten, The Netherlands), A. Bos, C. Mol and H. Rakhorst (Urenco Nederland, The Netherlands), M. Bretscher, G. Hofman and J. Snelgrove (ANL, USA)

- Research Reactor Spent Fuel Management in Argentina

M.A. Audero, A.M. Bevilacqua, A.M. Mehlich, and O. Novara (CNEA, Argentina)

- German Research Reactor Back-end Provisions

S. Köster (German Federal Ministry of Economics and Technology, Germany) and G. Gruber (RWE NUKEM GmbH, Germany)

- On the Importance of Ending the Use of HEU in the Nuclear Fuel Cycle: an Updated Assessment

A. Glaser (MIT, USA) and F.von Hippel (Princeton University, USA)

- A Reevaluation of Physical Protection Standards for Irradiated HEU Fuel

E. Lyman and A. Kuperman (Nuclear Control Institute, USA)

LEU TARGET DEVELOPMENT

- Low Enrichment Mo-99 Target Development Program at ANSTO

T.M. Donlevy, P.J. Anderson, D. Beattie, B. Braddock, S. Fulton, R.

Godfrey, R. Law,
S. McNiven, P. Sirkka, G. Storr, D. Wassink, A. Wong, and G. Yeoh
(ANSTO, Australia)

- ANL Progress in Developing a Target and Process for Converting CNEA Mo-99 Production to LEU

G.F. Vandegrift, A. Gelis S. Aase, A.J. Bakel, E. Freiberg, and C. Conner (ANL, USA)

- Production of Molybdenum-99 From Low Enriched Uranium Targets

P.R. Cristini, H.J. Cols, R. Bavaro, M. Bronca, R. Centurión and D. Cestau (CNEA, Argentina)

- The LEU Target Development and Conversion Program for the Maple Reactors and New Processing Facility

G.R. Malkoske (MDS Nordion, Canada)

- ANL Progress in Minimizing Effects of LEU Conversion on Calcination of Fission Product ^{99}Mo Acid Waste Solution

A.J. Bakel, K.J. Quigley, and G. F. Vandegrift (ANL, USA)

- Neutronic Analysis for the Fission Mo Production Using LEU Target at HANARO

B.C. Lee and H. Kim (KAERI, Korea)

- Laboratory Research on Back End Issues of the Mo-99 Production

M. Falcon, A. Russo, F. Schickendantz and J. Vaccaro (CNEA, Argentina)

- Considerations in the Design of a High Power Medical Isotope Production Reactor

R.M. Ball (Ball Systems Company, USA), H.W. Nordyke and R. Brown (TCI, USA)

- Study of Alumina Use as a Separation Step in Mo-99 Production

M.V. Wilkinson, A.V. Mondino and A. Manzini (CNEA, Argentina)

- Considerations on the ^{90}Sr Recovery as Part of a Process for ^{99}Mo Production from LEU Fission

M.C. Fornaciari Iljadica, J.C. Furnari and I.M. Cohen (CNEA, Argentina)

LICENSING, SAFETY AND CORE ASSESSMENT

- Safety Aspects and Licensing Requirements for New Fuel Qualification Tests and Use in Research Reactors

H. Abou Yehia, G. Bars and P. Tran Daï (IRSN, France)

- Authorisation to Irradiate Two U_3Si_2 Prototype Silicide Fuel Elements in the RA-3 Research Reactor

R.M. Waldman (ARN, Argentina)

- Analysis of a Possible Experimental Assessment of a Prototype Fuel Element Containing Burnable Poison in the RA-3 Reactor

A.M. Lerner and M. Madariaga (ARN, Argentina)

- Startup Test Results and Model Evaluation for the HEU to LEU Conversion of the UMass-Lowell Research Reactor

J.R. White and L. Bobek (UMass-Lowell, USA)

- FRG-1 Compact Core with Higher Density Fuel. Experience From the First to the Equilibrium Core

W. Knop, W. Jager and P. Schreiner (GKSS, Germany)

- Comparisons of Diffusion Theory and Monte Carlo Burnup

N.A. Hanan, R.B. Pond, M.M. Bretscher and J.E. Matos (ANL, USA)

- Thermal-Hydraulic Analysis of Uranium Silicide Fuel Elements To Be Irradiated in the RA-3 Reactor Within the Qualification Program

S. Halpert and L. Vázquez (CNEA, Argentina)

- Safety Aspects on Dependability Management for a Triga Research Reactor in Romania

G. Vieru (INR, Romania)

- Description of WIMS-D Library Update Project (WLUP)

F. Leszczynski (CNEA, Argentina)

- Uncertainties Assessment for Safety Margins Evaluation in MTR Reactors Core Thermal-Hydraulic Design

M. Giménez, M. Schlamp and A. Vertullo (CNEA, Argentina)

- Calculation-Measurement Comparison for Control Rods Reactivity in RA-3 Nuclear Reactor

G. Estryk and A. Gomez (CNEA, Argentina)

- Burn-up Measurements at the RECH-1 Research Reactor

  C. Henríquez, G. Navarro, C. Pereda, H. Torres, L. Peña, J. Klein, D. Calderón (CCHEN, Chile), and A.J. Kestelman (CNEA, Argentina)

- Characterization of Burned Fuel of the TRIGA IPR-R1 Research Reactor Using Monteburns Code

H. Moura Dalle (CDTN/CNEN, Brazil), R. Jeraj (Jozef Stefan Institute, Slovenia), and E.B. Tambourgi (UNICAMP, Brazil)

- Performance Uncertainties of LEU Mo-99 Targets for HANARO

D.K. Cho, M.H. Kim (Kyung Hee University, Korea), and B.C. Lee (KAERI, Korea)

CORE CONVERSION

- Status of HEU-LEU Conversion of FRJ-2

G. Damm and R. Nabbi (Forschungszentrum Jülich, Germany)

- The Proposed Use of Low Enriched Uranium Fuel in the High Flux Australian Reactor (HIFAR)

D. Vittorio and G. Durance (ANSTO, Australia)

- Neutronic Performance of the U-Mo Fuel Type in the Replacement Research Reactor

E. Villarino and D. Hergenreder (INVAP S.E., Argentina)

- Feasibility Study of Using Low Enriched Uranium Fuel for Research Reactor in Sofia

T. Apostolov and S. Belousov (INRNE-BAS, Bulgaria)

- Neutronic Performance of Several LEU Fuel Assembly Designs for the WWR-SM Research Reactor in Uzbekistan

  M.M. Bretscher, N.A. Hanan, and J.E. Matos (ANL, USA), B.S. Yuldashev, S. Baytelesov, and A. Rakhmanov (INP, Uzbekistan)

- Neutronic Performance of the WWR-M Research Reactor in Ukraine

  R.B. Pond, N.A. Hanan and J.E. Matos (ANL, USA), Y. Mahlers, and A. Dyakov
  (Kiev Institute for Nuclear Research, Ukraine)

- Conversion Program of the WWR-K Research Reactor Core to Use Low Enrichment Uranium

  F.M. Arinkin, V.A. Vatulin, Sh.Kh. Gizatulin, P.M. Egorenkov, T.M. Zhantikin, Zh.R. Zhotabaev, Yu.A. Stetskiy, A.Zh. Takibaev, S.V. Talanov and P.V. Chakrov (AEC, Kazakhstan)

- The Fuel Cycle of Reactor PIK

Y.V. Petrov, A.N. Erykalov, and M.S. Onegin (Petersburg Nuclear Physics Institute, Russia)

- Computational Design of Parameters of IRT-2M with Enrichment Below 20% for Low Power Research Reactors

K. Mat•jka, •. Sklenka and I. Škola (CTU, Czech Republic)

- The Current Status of Dalat Nuclear Research Reactor and Proposed Core Conversion Studies

P. Van Lam, L. Vinh Vinh, H.T. Nghiem, L.B. Vien and N.K. Cuong (NRI, Vietnam)

- Guidelines to Upgrade and Convert the Argentine's Research Reactor RA6

M.J. Abbate, P. Adelfang, R. Calabrese and M.M. Sbaffoni (CNEA, Argentina)

- Revisiting the HFR-Petten LEU Conversion Study

N.A. Hanan, R.B. Pond and J.E. Matos (ANL, USA)

- A Study of HANARO Core Conversion Using High Density U-Mo Fuel

K.H. Lee, C.S. Lee, B.C. Lee, S.J. Park, H. Kim and C.K. Kim (KAERI, Korea)

- LEU-Fuelled SLOWPOKE-2 Research Reactors: Operational Experience and Utilisation

G. Kennedy, J. St. Pierre (Nuclear Engineering Institute, Canada), L.G.I. Bennett, and K.S. Nielsen (Royal Military College, Canada)

- Calculations in Support of the MNR Core Conversion

S.E. Day, M.P. Butler and W.J. Garland (McMaster University, Canada)

ACCEPTANCE PROGRAM AND SPENT FUEL TRANSPORTATION

- Challenges and Achievements: Shipment of 255 DIDO Fuel Elements to the Savannah River Site to Empty the Storage and Reactor Pools at Risoe

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M. Bagger Hansen (Risoe National Laboratory, Denmark), J. L. Mondanel (COGEMA Logistics, France), and C. Anne (NAC International, USA)

- Present Status of JMTR Spent Fuel Shipment

M. Miyazawa, M. Watanabe, M. Yokokawa, H.Sato, and H. Ito (JAERI, Japan)

- Preparations for the Shipment of RA-3 Reactor Irradiated Fuel

A. Goldschmidt, O. Novara and J. Lafuente (CNEA, Argentina)

- Shipment of VIN•A Institute's HEU Fresh Fuel to Russia

M. Peši• and O. Šoti• (VIN•A Institute, Yugoslavia)

- Spent Fuel Storage and Transportation – ANSTO Experience

A. Irwin (ANSTO, Australia)

- Regional Dual-Purpose Cask for the Storage and Transport of Research Reactor Spent Fuel

M.M. Neto (IPEN/CNEN, Brazil) and R.P. Mourão (CDTN/CNEN/MG, Brazil)

- Adoption of TS-1-R, the Most Recent Challenge to Cask Certification

J. Patterson (NAC International, USA)

- A New Generation in the Family of Packages for Transportation

J.L. Mondanel (COGEMA Logistics, France)

- U.S. Spent Fuel Transportation Security in the Post 9/11 World

C. Anne, J. Patterson, and B. Williams (NAC International, USA)

SPENT FUEL MANAGEMENT

- Corrosion of Research Reactor Al-Clad Spent Fuel in Water

O.S. Bendereskaya (NIIAR, Ulyanovsk Region, Russia), P.K. De (BARC,

Mumbai, India), R. Haddad (CNEA, Argentina), J.P. Howell (SRS, USA), A.B. Johnson Jr. (PNNL, USA), S. Laoharojanaphand (OAEV, Thailand), S. Luo (CIAE, China), L.V.Ramanathan (IPEN, Brazil), I. Ritchie (IAEA, Austria), N. Hussain (PINST, Pakistan), I. Vidowsky (KFKI-AERI, Hungary), and V. Yakovlev (RRC "KI", Russia)

- Corrosion Surveillance Programme for Latin American Research Reactor Al-Clad Spent Fuel in Water

  L.V. Ramanathan (IPEN, Brazil), R. Haddad (CNEA, Argentina) and I. Ritchie (IAEA, Austria)

- Visual Inspection System and Sipping Design for Spent Fuel at TRIGA Mark III Reactor of Mexico

A. Delfín and R. Mazón (ININ, Mexico)

- Immobilization of Preconditioned Spent Fuel From Nuclear Research Reactors in a Ceramic Matrix

  D.O. Russo, D.S. Rodríguez, A.D. Heredia, M. Sanfilippo, M.E. Sterba and P. Mateos

(CNEA, Argentina)

- Spent Fuel From Nuclear Research Reactors Immobilized in Sintered Glass

P. Mateos, D.O. Russo, D. Rodriguez, A. Heredia, M. Sanfilippo and M. Sterba (CNEA, Argentina)

- Material Characterization and Corrosion Control in Wet Storage of Chilean Spent Fuel

C. Lamas, J. Klein and I. Escobar (CCHEN, Chile)