

Final Program

Alternative Nuclear Waste Forms

January 18-23, 2004

**Alyeska Resort
1000 Arlberg Avenue
Girdwood, Alaska, 99587, USA
Tel: 1-907-754-1111 Fax: 1-907-754-2200**

Conference Co-Chairs

Linn W. Hobbs

Massachusetts Institute of Technology, USA

William E. Lee

University of Sheffield, UK

Kaye Hart

ANSTO, Australia

William J. Weber

Pacific Northwest National Laboratory, USA

ECI

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British Nuclear Fuels Ltd.

Australian Nuclear Science and Technology Organization

Pacific Northwest National Laboratory

Cambridge-MIT Institute

Sunday, January 18, 2004

16:00 – 18:00 Registration

18:00 – 18:30 Reception

18:30 – 20:00 Dinner

20:00 – 22:30 **Session 0: Overviews of Alternative National Disposition Strategies**
Chair: Kaye Hart (Australian Embassy in Washington, DC, and ANSTO, Menai, NSW, Australia)

Thierry Advocat (CEA Marcoule, France), “French Research on Waste Conducted within the Framework of the Law of December 30, 1991”

Boris F. Myasoedov (Vernadsky Institute of Geochemistry and Analytical Chemistry and Russian Academy of Sciences, Moscow, Russia), Sergey Stefanovsky (SIA Radon, Moscow, Russia), “High-Level Waste Disposition Strategies in the Russian Federation”

Joel T. Case (Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID, USA), “U.S. Department of Energy Disposition Strategies for High-Level Waste and Spent Nuclear Fuel”

Ian D. Hudson, (British Nuclear Fuels, Ltd, Sellafield, Cumbria, UK), “Alternative National Disposition Strategies: A UK Perspective”

NOTES

- **All technical sessions will be held in Columbia B & C.**
- **Poster sessions will be held in the Columbia Foyer.**
- **Meals will be in Columbia A. The two exceptions are Tuesday dinner at the Seven Glaciers Restaurant on the mountaintop and Thursday dinner in Prince Court.**
- **Please observe “No Smoking” at ECI technical sessions, meals and social hours.**
- **Speakers should allow time at the end of their presentation for questions and discussion.**

Monday, January 19, 2004

7:00 – 8:00 Breakfast

8:00 – 12:00

Session I: Glass Processing and Alternative Glasses

Chair: William E. Lee (ISL, University of Sheffield, UK)

Thierry Advocat, J. L. Dussossoy, J. Lacombe, R. Doquang, F. Bart, I. Bardez, J. F. Hollebecque (CEA Marcoule, France), "Immobilization of High-Level Waste in Borosilicate Glasses and Glass-Ceramics by Vitrification Processing"

Sergey Stefanovsky (SIA Radon, Moscow, Russia), "Cold Crucible Inductive Melting of Vitreous and Ceramic Waste Forms"

Jay A. Roach, Vince Maio (Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID, USA), "Cold Crucible Induction Melting at Idaho National Engineering and Environmental Laboratory"

Albert S. Aloy, R. A. Soshnikov (V. G. Khlopin Radium Institute, St. Petersburg, Russia), Delbert E. Day, C. W. Kim (University of Missouri-Rolla, Rolla, MO, USA), "Alternative Phosphate-Based Glasses and their Processing in a Cold Crucible"

10:00 – 10:30

Coffee break

Michael Ojovan (ISL, University of Sheffield, UK), "Self-Sustaining Immobilization Processes"

Swami V. Raman, Vince Maio (Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID, USA), "Novel Structure in a Novel Glass for a Novel Nuclear Waste as Analyzed by Conventional Raman Spectroscopy"

12:00 – 13:00

Lunch

13:00 – 17:00

ad hoc Sessions/Free time

17:00 – 18:30

Poster Session and Social Hour

18:30 – 19:30

Dinner

19:30 – 22:00

Session II: Crystallization, Glass-Ceramic and Composite Waste Forms

Chair: Joel T. Case (Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID, USA)

William E. Lee (ISL, University of Sheffield, UK), "Relation between Wasteform Microstructure and Processing Route: The Trend to Higher Crystallinity"

Michael Ojovan (ISL, University of Sheffield, UK), "Glass-Composite Materials for Immobilization of Low and Intermediate-Level Radioactive Wastes"

Ian W. Donald, B. L. Metcalfe and S. K. Fong (AWE plc, Aldermaston, Reading, UK), "Overview of Work at AWE on the Immobilization of Chloride-Containing Wastes"

Monday, January 19, 2004 (continued)

Sergey Stefanovsky (SIA Radon, Moscow, Russia), "Silicotitanate Glass-Ceramic Crystalline Materials for Immobilization of Radioactive Slags and Soils"

Tuesday, January 20, 2004

7:00 – 8:00 Breakfast

8:00 – 12:00 **Session III: Crystalline Waste Forms for Disposition and Transmutation Fuel**

Chair: Denis Strachan (Pacific Northwest National Laboratory, Richland, WA, USA)

Boris Burakov (V. G. Khlopin Radium Institute, St. Petersburg, Russia), "Ceramics for Immobilization of Plutonium and Americium"

Neil C. Hyatt (ISL, University of Sheffield, UK), "Ceramic Nuclear Wasteforms for the Future: New Materials and Novel Processes"

Robin W. Grimes (Imperial College, London, UK) "Materials Selection for Crystalline Waste Forms via Atomistic Simulation"

Vittorio Luca, E. R. (Lou) Vance (ANSTO, Menai, NSW, Australia), "The Immobilization of Cesium and Strontium in Ceramic Materials derived from Tungstate Sorbents"

10:00 – 10:30 Coffee Break

Ewan R. Maddrell (British Nuclear Fuels Ltd, Sellafield, Cumbria, UK and University of Cambridge, UK), "Titanate Ceramics for Advanced Reprocessing Technologies"

E. R. (Lou) Vance (ANSTO, Menai, NSW, Australia), "Disposition of Fission Products in Inert Matrix Fuels"

12:00 – 13:00 Lunch

13:00 – 15.30 Free time

15:30 – 16:00 Coffee break

16:00 – 19:00 **Session IV: Cementitious Approaches to High- and Intermediate-level Wastes**

Chair: Ian D. Hudson (British Nuclear Fuels Ltd, Sellafield, Cumbria, UK)

Neil B. Milestone, J. Hill and J. H. Sharp (University of Sheffield, Sheffield, UK), "Finding the Ideal Cement System for Encapsulation and Immobilization of Intermediate Level Radioactive Wastes"

Boris F. Myasoedov (Vernadsky Institute of Geochemistry and Analytical Chemistry and Russian Academy of Sciences, Moscow, Russia), "Room-Temperature-Setting Chemically Bonded Phosphate Ceramic Alternative Waste Forms"

E. N. Kovarskaya and A. S. Aloy (V. G. Khlopin Radium Institute, St. Petersburg, Russia), "Iron-Phosphate Cement (IPC) as an Alternative Matrix for Alpha-Bearing Solid Waste"

Tuesday, January 20, 2004 (continued)

Hugh Godfrey (British Nuclear Fuels Ltd, Sellafield, Cumbria, UK), "Assessment of 10-Year Old Samples of Iron Floc Waste Encapsulated in a Cement Matrix"

Alan K. Herbst, Vince Maio (Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID, USA), "Solidification of Acidic, High Nitrate Nuclear Wastes by Grouting or Absorption of Silica Gel"

Darryl D. Siemer (Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID, USA) and Barry Scheetz and Michael Grutzeck (Pennsylvania State University, University Park, PA, USA), "Cementitious Solidification of Steam Reformed DOE Salt Wastes"

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| 19:10 and 19:20 | Scheduled tram to Seven Glaciers Restaurant – Top of the Mountain |
| 19:30 – 20:00 | Social Hour on Mountaintop |
| 20:00 – 21:00 | Dinner on the Mountaintop |
| 21:00 – 21:45 | Social Hour on the Mountaintop |

Wednesday, January 21, 2004

7:00 – 8:00 Breakfast

8:00 – 12:00 **Session V: Radiation Effects in Glassy and Crystalline Waste Form Phases—I**

Chair: Ian Farnan (University of Cambridge, UK)

William J. Weber (Pacific Northwest National Laboratory, Richland, WA, USA), "Effects of Alpha Decay on the Structure of Glasses for the Immobilization of Plutonium and other Actinides"

Thierry Advocat, S. Peugeot, X. Deschanel, F. Jorion, D. Gosset, V. Aubin (CEA Marcoule, France), "Radiation Effects in Oxide-Based Wasteforms: The Cases of Borosilicate Glass, Titanate-Based Ceramics and Phosphate-Based Ceramics"

Alain Chartier (CEA Saclay, France), "Simulation of Radiation Effects in Solid Waste Forms"

10:00 – 10:30 Coffee Break

Linn W. Hobbs (MIT, Cambridge, MA, USA) and Kostya Trachenko, University of Cambridge, UK), "Topological Bases for Amorphizability: Structural Redundancy, Percolation Thresholds and Recrystallization Options"

Alexandra Navrotsky (University of California–Davis, Davis, CA, USA), "Energetics of Disorder, Amorphization and Melting of Ceramics Relevant to Nuclear Waste Disposal"

12:00 – 13:00 Lunch

13:00 – 16:00 *ad hoc* sessions/Free time

16:00 – 16:30 Coffee Break

16:30 – 18:30 **Session VI: Partitioning of Radionuclides into Glass and Crystalline Phases**

Chair: Gregory R. Lumpkin (University of Cambridge, UK)

Bruce Begg (ANSTO, Menai, NSW, Australia), "Ceramic Waste Form Design and the Importance of Flexibility and Partitioning"

Sergey Stefanovsky (SIA Radon, Moscow, Russia), "Synroc-Type Materials for FSUE Production Association 'Mayak' High Level Waste"

Xavier Deschanel, Thierry Advocat (CEA Marcoule, France), "Solubility of Plutonium and Surrogates in Nuclear Glass Matrices"

18:30 – 19:00 Social Hour

19:00 – 20:00 Dinner

Wednesday, January 21, 2004 (continued)

20:00 – 22:30

Session VII: Long-Term Thermodynamic and Chemical Stability of Alternative Waste Forms

Chair: Alexandra Navrotsky (University of California–Davis, Davis, CA, USA)

B. P. (Pete) McGrail (Pacific Northwest National Laboratory, Richland, WA, USA), “Multiphase Flow and Reactive Chemical Transport Modeling of Disposal System Performance for Alternative Low-Activity Waste Forms”

Thierry Advocat, F. Bart, C. Fillet, H. Rabiller, P. McGlenn, G. Leturcq, P. Frugier, J. E. Lartigues (CEA Marcoule, France), “Long Term Chemical Durability of Titanate-Based and Phosphate-Based Ceramics Devoted to Separated Long-Lived Radionuclides”

Katheryn B. Helean (University of California–Davis, Davis, CA, USA), “Oxide Melt Solution Calorimetry of Lanthanide, Actinide and Other Refractory Oxides Relevant to Radioactive Waste Forms”

Gregory R. Lumpkin (University of Cambridge, UK), “What Do Natural Systems Tell Us about the Long-Term Performance of Ceramic Nuclear Waste?”

22:30 – 23:00

Social Hour

Thursday, January 22, 2004

- 7:00 – 8:00 Breakfast
- 8:00 – 12:00 **Session VIII: Politics and Public Acceptance of Alternative Disposal and Repository Strategies**
Chair: Linn W. Hobbs (MIT, Cambridge, MA, USA)
- Nicholas R. Gribble (British Nuclear Fuels Ltd, Sellafield, Cumbria, UK), "Process Development for Nuclear Waste Facilities"
- Werner Lutze (Catholic University, Washington, DC, USA), "Alternative HLW Management and Disposal Strategies"
- Kaye Hart (Australian Embassy in Washington, DC, and ANSTO, Menai, NSW Australia), "Government Priorities in Nuclear Waste Research"
- 10:00 – 10:30 Coffee break
- Round-Table Discussion on Research and Funding Strategies
- 12:00 – 13:00 Lunch
- 13:00 – 17:00 *ad hoc* sessions/Free time
- 17:00 – 18:30 **Poster Session and Social Hour**
- 19:00 – 21:00 Conference Banquet
- 21:00 – 21:30 Social Hour

Friday, January 23, 2004

7:00 – 8:00 Breakfast

8:00 – 11:30 **Session IX: Radiation Effects in Glassy and Crystalline Waste Form Phases—II**

Chair: William J. Weber (Pacific Northwest National Laboratory, Richland, WA, USA)

Denis Strachan (Pacific Northwest National Laboratory, Richland, WA, USA),
“Radiation Damage in Titanate Ceramics for Plutonium Disposition: Pyrochlore”

Denis Strachan (Pacific Northwest National Laboratory, Richland, WA, USA),
“Radiation Damage in Titanate Ceramics for Plutonium Disposition: Zirconolite”

Boris Burakov (V. G. Khlopin Radium Institute, St. Petersburg, Russia), “Self-irradiation of Crystalline Ceramics and Single Crystals doped with ²³⁸Pu: What Do We Know So Far?”

10:00 – 10:30 Coffee Break

Ian Farnan, Chris J. Packard (University of Cambridge, UK), Etienne Balan (Université Pierre & Marie Curie, Paris, France), William J. Weber (PNNL, Richland, WA, USA), “NMR Methods to Quantify and Identify Local Structure Resulting from Radiation Damage”

Sergey Stefanovsky (SIA Radon, Moscow, Russia), “Kosnarite-Based Ceramics for Intermediate-Level Waste Immobilization”

11:30 – 12:00 Wrap-up and conference close

12:00 Lunch

13:00 END OF CONFERENCE