

8th International Conference on Facility Operations: Safeguards Interface 2008

**Portland, Oregon
30 March-4 April 2008**

ISBN: 978-1-61567-015-4

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571
www.proceedings.com

Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2008) by the American Nuclear Society
All rights reserved.

Printed by Curran Associates, Inc. (2009)

For permission requests, please contact the American Nuclear Society
at the address below.

American Nuclear Society
555 North Kensington Avenue
LaGrange Park, Illinois 60526

Phone: (800) 323-3044
(708) 352-6611
Fax: (708) 352-0499

www.ans.org

TABLE OF CONTENTS

SESSION 2

Methods for Independently Verifying Nuclear Material Flows at Commercial Enrichment Plants	1
<i>Dunbar Lockwood, J. Michael Whitaker</i>	
Evaluation of a RF-based Approach for Tracking UF₆ Cylinders at a Uranium Enrichment Plant	9
<i>C. A. Pickett, J. R. Younkin, D. N. Kovacic, M. D. Laughter, J. Hines, B. Boyer, B. Martinez</i>	
Safeguarding a NWS International Enrichment Center as an Enriched Uranium Store.....	25
<i>Michael M. Curtis</i>	
FEMO: a Flow and Enrichment Monitor for Verifying Compliance with International Safeguards Requirements at a Gas Centrifuge Enrichment Facility.....	33
<i>J. E. Gunning, M. D. Laughter, J. March-Leuba</i>	

SESSION 3

The Tile-map Based Vulnerability Assessment Code of a Physical Protection System: SAPE (Systematic Analysis of Protection Effectiveness)	45
<i>Sung Soon Jang, Sung-Woo Kwak, Hosik Yoo, Jung-Soo Kim, Wan Ki Yoon</i>	
Integration of Safeguards into the Design and Operation of a 40,000 MTU Spent Nuclear Fuel Storage Facility	53
<i>John Parkyn</i>	
Design Features of Independent Spent Fuel Storage Installations (ISFSI) Security	N/A
<i>W. Jacobs</i>	
Radioactive Sealed Sources: Integration of Safeguards and Security with Safety	57
<i>Melanie P. May, Peter V. O'Connell, Ruth A. Watkins</i>	

SESSION 4

Aerosol and Particulate Dispersion in Nuclear Facilities - Sampling and Measurements.....	63
<i>J. H. Barnes IV, C. L. Lewis, G. L. Wagner, D. S. Decroix, D. M. Korzekwa</i>	
Bulk Analysis of International Atomic Energy Agency Environmental Samples in Support of International Safeguards.....	78
<i>N. A. Wogman, K. B. Olsen, O. T. Farmer III</i>	
Aerosol and Particulate Dispersion in Nuclear Facilities - Modeling and Simulation Results.....	87
<i>David S. DeCroix, James H. Barends, Cris L. Lewis</i>	
Qualification and implementation of Environmental Sample Screening Methods into Standard Analysis Protocol	N/A
<i>S. LaMont</i>	

SESSION 5

An Assessment of the Proliferation Resistance of Materials in Advanced Nuclear Fuel Cycles	99
<i>C. G. Bathke, R. K. Wallace, J. R. Ireland, M. W. Johnson, K. S. Bradley, B. B. Ebbinghaus, H. A. Manini, B. W. Smith, A. W. Prichard</i>	
Strengthening Safeguards in the Nuclear Fuel Cycle: 1. Diversion Scenarios in the Nuclear Fuel Cycle.....	106
<i>D. Nusbaum, Z. Karpas, Y. Sadan, G. Reich, J. Bedell, S. P. LaMont, J. R. Phillips, R. Goorevich</i>	
Use of Chemical and Isotopic Tracers as Part of an Improved Safeguards Approach in Uranium Conversion Facilities	111
<i>S. P. LaMont, J. R. Phillips, J. Bedell, R. Goorevich, D. Nusbaum, Z. Karpas, E. Maimon, Y. Sadan, G. Reich</i>	
Assessment of Proliferation Resistance Requirements for Fast-reactor Fuel-cycle Facilities	131
<i>Sunil Chirayath, Richard Metcalf, Jean Ragusa, Paul Nelson</i>	
In-Situ Safeguards Verification of Low Burn-up Pressurized Water Reactor Spent Fuel Assemblies.....	143
<i>Young S. Ham, Shivakumar Sitaraman, Iljin Park, Jungsoo Kim, Gil Hoon Ahn</i>	

SESSION 6

A Nonproliferation Impact Assessment of the GNEP Program.....	151
<i>Mark Goodman, Robert Bari, Pete Heine, John Murphy, Jon Phillips, Monica Regalbuto, Michael D. Rosenthal, James Sprinkle, Richard Wallace, Ed Wonder, Roald Wigeland, Mary Anne Yates</i>	
Determination of Decommissioned Status of Research Reactor and Critical Assembly and LWR Facilities with Respect to Safeguards Concerns.....	162
<i>B. D. Boyer, C. J. Carroll, J. U. Valente</i>	
Safeguarding of a UREX + Facility: Feasibility Testing of a Reactor Plant Operator Advisory System with Real-time Data from a Representative Solvent Extraction Process.....	174
<i>T. Y. C. Wei, M. C. Regalbuto, J. F. Krebs, Y. S. Park, A. S. Hebdon, H. Ley</i>	
Safeguards Envelope: the First Steps	181
<i>Richard Metcalf, Jean Ragusa, Robert Bean</i>	

SESSION 7

A Review of Process Monitoring for Safeguards.....	190
<i>Tom Burr, Michael Ehinger, John Howell</i>	
Fully Integrating the Design Process	201
<i>T. A. Bjornard, R. S. Bean</i>	
Process Monitoring Techniques Applied to Nuclear Nonproliferation	211
<i>J. Wesley Hines, Belle R. Upadhyaya, James J. Henkel</i>	
Institutionalizing Safeguards by Design for Nuclear Facilities	221
<i>Jim Morgan, Don Kovacic, Michael Whitaker, Trond Bjornard, Scott DeMuth</i>	

SESSION 8

Active Neutron and Photon Based Inspection Techniques for Nuclear and Other Threats.....	230
<i>Tsahi Gozani</i>	

Safeguards and Security Interface – A Practical Example.....	239
<i>Marius Stein, Michael Haase</i>	
Simulated Process Test Bed for Integrated Safeguards Operations Monitoring	246
<i>Mark D. Laughter, Alan M. Krichinsky, Jairus B. Hines, Don N. Kovacic, James R. Younkin</i>	

POSTER SESSION

Analytical Chemistry Capabilities in Support of Nuclear Materials Programs at Los Alamos National Laboratory.....	255
<i>Amy S. Wong</i>	
Proliferation Resistance of the DUPIC Fuel Cycle Using the INPRO User Manual.....	264
<i>J. H. Park, Y. D. Lee, M. S. Yang, J. W. Lee, E. Haas</i>	
Monte Carlo Modeling Evaluation to Determine the Most Accurate Measurement System for Quantifying the Enriched Uranium Mass of Machine Turnings Collected Within a Small Can.....	276
<i>S. J. Tobin, W. H. Geist, J. D. Long</i>	
Intrinsic Dosimetry of Glass Containers Used to Transport Nuclear Materials: Potential Implications to the Field of Nuclear Forensics	289
<i>J.M. Schwantes, S.D. Miller, K. Piper, M. Murphy, J.E. Amonette, S. Bonde, D. Duckworth</i>	
Spent Fuel Verification Using a Digital Cerenkov Viewing Device	301
<i>J. D. Chen, D.A. Parcey, A.F. Gerwing, B.D. Wilcox, R. Kosierb, M. Larsson, K. Axell, J. Dalhberg, B. Lindberg, F. Vinna, E. Sundkvist</i>	
A Green Approach to SNF Reprocessing: Are Common Household Reagents the Answer?	308
<i>Shane M. Peper, Bruce K. McNamara, Matthew J. O'Hara, Matthew Douglas</i>	
The Multiple Isotope Material Basis Set (MIMBS) Method for Handheld Instrument and Portal Monitor Isotope Identification.....	315
<i>R. J. Estep, B. A. Sapp</i>	
Electrochemically-Modulated Separation and Mass Spectrometric Analysis of Actinides in Difficult Matrices	325
<i>Douglas C. Duckworth, Martin Liezers, Scott A. Lehm, Matt Douglass</i>	
Rapid Automated Radiochemical Analyzer for Determination of Targeted Radionuclides in Nuclear Process Streams	335
<i>Matthew J. O'Hara, Philip C. Durst, Jay W. Grate, Oleg B. Egorov, Tim A. DeVol</i>	

SESSION 9

Conducting a State Systems of Accounting for and Control of Nuclear Materials Training Program at the University of Missouri Research Reactor.....	345
<i>R. S. Stevens, D. E. Berning, J. D. Robertson, J. M. Gahl, W. A. Meyer, M. A. Flagg, L. P. Foyto</i>	
New Perspectives in Forging a Career Path in Safeguards in the United States Government, the DOE Laboratory System and the IAEA	354
<i>B. D. Boyer, P. C. Durst, M. J. Schanfein</i>	
Nuclear Safeguards and Security Education at Russian Universities	366
<i>Mark H. Killinger, Kent O. Goodey, Gilbert W. Butler, Cristen L. Duncan</i>	
A New Framework for Measuring Organizational Effectiveness in Safeguards & Security – Why Such a Big Deal?.....	374
<i>Jeff Jay</i>	

Revision of ANSI N15.8, Nuclear Material Control Systems for Nuclear Power Plants	385
<i>M. Williams, Thomas Morello</i>	

SESSION 10

Computer Simulation of IAEA Inspections for Strengthened Safeguards	393
<i>George Baldwin, Karl Horak, Deborah Haycraft</i>	
Projected Virtual Reality to Enhance Safeguards & Increase Operations Insight	401
<i>K. Michel, J. Determan, P. Durst, B. Hayes, R. Rothrock, A. Watkins</i>	
Building a Knowledge Base for Safeguards Measurement Techniques at Texas A&M University with the Oak Ridge National Laboratory Safeguards Laboratory	410
<i>C. Gariazzo, W. Charlton, A. Solodov, H. Rollen</i>	

SESSION 11

A Portal Monitor to Verify UF6 Process Flows.....	417
<i>W. K. Pitts, P. C. Durst, M. W. Shaver</i>	
Improved Safeguards Efficiencies through Continuous Item Monitoring at Gas Centrifuge Enrichment Plants.....	421
<i>D. N. Kovacic, J. M. Whitaker, Brian Boyer, M. M. Curtis</i>	
The Real Time Mass Evaluation System as a Tool for Detection of Undeclared Cascade Operation at GCEPs	429
<i>Jochen F. A. Delbeke, John Howell, Gustav Eklund, Greet Janssens=Maenhout, Paolo Peerani, Willem Janssens</i>	
An Analysis of Advanced Safeguards Approaches For New Large-Scale Enrichment Plants.....	439
<i>Philip Casey Durst</i>	

SESSION 12

Using RF Technology for Protected Asset Tracking.....	447
<i>C. A. Picket, G. D. Richardson, B. J. Stinson, J. R. Younkin</i>	
Integrated GPS-RFID-Radiation Systems for Nuclear Material Safeguards and Security Tracking.....	N/A
<i>K. Michal</i>	
Modernization Technology: Implementing Advance Technology Applications into DOE Material Management Programs.....	454
<i>R. E. Koenig</i>	
Radio Frequency Identification (RFID) at the Y-12 National Security Complex	N/A
<i>M. Ellis</i>	

SESSION 13

Plutonium Inventory Measurement System (FISSTRACK®: PIMS)	459
<i>Dan Parvin</i>	
Implementation of a Risk Informed Analysis Approach to Optimize Safeguards	469
<i>Virginia Cleary, Gary Rochau, Carmen M. Mendez</i>	
The Impact of Safeguards Authentication Measures on the Facility Operator	476
<i>Keith Tolk, Peter Merkle, Massimo Aparo</i>	

Proactive Intelligence for Nuclear Nonproliferation.....	482
<i>Danielle Peterson, Antonio Sanfilippo, Bob Baddeley, Lyndsey Franklin</i>	

SESSION 14

Evaluating "Peaceful Purposes" Bona Fides - Options, Applications, Stakeholders.....	496
<i>Carrie Matthews</i>	
Secure Operations with Facility Monitoring	506
<i>Jeffrey George Parrott</i>	
Transparency: Building Trust and Confidence on an International Level.....	513
<i>Carmen M. Mendez, Virginia Cleary, Gary Rochau</i>	

SESSION 15

Safeguards First Principles Initiative (SFPI).....	520
<i>Amy Whitworth</i>	
NDA Measurement for Material in Dry-vacuum Traps	525
<i>J. L. Cochran, R. E. Valiga</i>	
Revising the Rules for Material Protection, Control and Accounting.....	531
<i>Edwin S. Lyman</i>	
A New Approach for Evaluating the Shipper-Receiver Difference (SRD) of Reprocessing Plants	540
<i>N. Peter, D. Sellinschegg</i>	

SESSION 16

An Uncertainty Budget for the IMCA Enrichment Meter Method Using NaI.....	551
<i>S. Philips, S. Croft, A. Bosko</i>	
Nuclear Archeology in a Bottle: Evidence of Pre-Trinity Reactor and Reprocessing Activities Recovered from a Burial Site at Hanford in 2004	N/A
<i>J. Schwantes</i>	
Nondestructive Measurements of Fissile Material Using Self-indication Neutron Resonance Absorption Densitometry (SINRAD).....	563
<i>A. M. LaFleur, W. S. Charlton, H. O. Menlove, M. Swinhoe</i>	
Falcon 5000 HPGe Based Nuclear Identifier: a Portable Tool for Safeguards Measurements.....	575
<i>A. Bosko, S. Croft, S. Philips</i>	

SESSION 17

Operation of On-Site Laboratory for Rokkasho Reprocessing Plant.....	587
<i>S. Hara, M. Kamata, T. Ohtani, H. Tomikawa</i>	
Application of Passive Multiplicity and Passive Neutron Albedo Reactivity to Quantifying Fissile Content in Spent Fuel Rods	595
<i>Stephen Tobin, Martyn Swinhoe, Howard Menlove, Michael Ehinger</i>	
Tank Monitoring Evaluation System	604
<i>B. Sirajov, X. Wang</i>	

Lead Slowing Down Spectroscopy for Direct Pu Mass Measurements	615
<i>J. J. Ressler, L. E. Smith, K. Anderson</i>	
Nuclear Material Tracking in Actinide Analytical Chemistry at Los Alamos National Laboratory	624
<i>K. Duran-Suazo, A. S. Wong, D. J. Martinez, J. T. Dyke</i>	

SESSION 18

Comparison of Costs Involved in Various Gas Centrifuge Enrichment Plant Safeguards Approach Options for IAEA Inspection	629
<i>B. D. Boyer, P. C. Durst</i>	
Nuclear Security as a Multidisciplinary Field of Study	641
<i>James E. Doyle</i>	
Technology Trends in Safeguards Instrumentation.....	651
<i>Marius Stein, Markku Koskelo</i>	

Author Index