

15th International Symposium on the Packaging and Transportation of Radioactive Materials

(PATRAM 2007)

**Miami, Florida, USA
21-26 October 2007**

Volume 1 of 3

ISBN: 978-1-62276-930-8

Printed from e-media with permission by:

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



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

Copyright© (2007) by the Institute of Nuclear Materials Management
All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact the Institute of Nuclear Materials Management
at the address below.

Institute of Nuclear Materials Management
111 Deer Lake Road, Suite 100
Deerfield, IL 60015

Phone: (847) 480-9573

Fax: (847) 480-9282

www.inmm.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

WELCOMING REMARKS

Emerging Issues in Radioactive Material Transport	1
<i>Lorne Green</i>	
Experiences and Perspectives of Package Testing Under Hypothetical Accident Conditions	8
<i>Bernhard Droste</i>	

CONCURRENT TECHNICAL SESSIONS

SESSION A – PACKAGE TESTING TO ENVIRONMENTS DIFFERENT FROM REGULATORY TEST ENVIRONMENT - I

Helicopter Drop Testing of Type B Packages in the UK	16
<i>Robert A. Vaughan, Lyn M. Farrington</i>	
Early Accident-simulating Testing of Radioactive Material Packages in Road Vehicles	27
<i>Ronald B. Pope, Lawrence B. Shappert, Chris Taylor, Robert A. Vaughan</i>	
Early Structural Testing of Type B Radioactive Material Packages in the U.S. to Environments Beyond the Regulatory Package Structural Test Standards	35
<i>H. R. Yoshimura, Ronald B. Pope, Lawrence B. Shappert, M. Kubo</i>	
Smash Hit! Magnox Lesson for Today	44
<i>Clive N. Young, Chi-Fung Tso, Danny Vince</i>	
Testing of Type B Packages in Japan to Conditions Different from the Regulatory Package Test Standard	52
<i>Toshiari Saegusa, Chihiro Itoh, Hidetsugu Yamakawa, Toshiari Saegusa, Koji Shirai</i>	
Recent Assessments in the U.S. of Type B Packages to Impacts Beyond the Regulatory Package Test Standards	60
<i>Doug Ammerman, Bob Kalan, John R. Cook, Andrew Murphy</i>	
Package Performance Evaluation: Our Latest 30-Year Experience	71
<i>Pierre Malesys</i>	
Evaluation of Safety of French Type B Package Designs in Severe Accident Environments Other Than Regulatory	81
<i>Gilles Sert, O. Doare, M. T. Lizot</i>	

SESSION B – PACKAGE DESIGNS – FRESH FUEL

Development of a Type B PWR Fresh Fuel Package	89
<i>Charles J. Temus, Richard Montgomery</i>	
Performance Characteristics and Capability of the M4/12 MOX Package	96
<i>Anthony Cory</i>	
Packaging Development for MOX Transport from France to Japan	105
<i>Lilian Viallon, Laurent Stachetti, Kazuhito Takeda</i>	
The New TN International Casks: Designing for the Environment	111
<i>Christine Georges, Laurent Carlier, Caroline Mollat Du Jourdin</i>	
The New ATR Fresh Fuel Shipping Package	120
<i>Andrew T. Kee, Craig R. Tyler</i>	
Development of a Department of Energy Replacement for the 110-Gallon Specification 6M Shipping Container	128
<i>Jeffrey G. Arbital, Paul T. Mann</i>	
Multipurpose Fresh Fuel Package	136
<i>Charles J. Temus, Tom Criddle</i>	
AREVA NP Next Generation Fresh UO ₂ Fuel Assembly Shipping Cask: SCALE – CRISTAL Comparisons Lead to Safety Criticality Confidence	144
<i>Michel E. Doucet, R. Montgomery, B. O'Donnell, M. Landrieu</i>	

SESSION C – SECURITY AND RISK ASSESSMENT OVERVIEW

Threat Analysis for the Transport of Radioactive Material using Morphological	152
<i>Thomas P. Ritchey</i>	
Radioactive Material Transport Security — Awareness and Application of New Recommendations	162
<i>Ann-Margreth Eriksson, Richard R. Rawl, Michael E. Wangler</i>	
A Risk Based Approach to Design of Security Arrangements	170
<i>Robert E. Luna, Ken B. Sorenson, H. Richard Yoshimura</i>	
Transportation Safety Risk for Source Recovery vs. Consequence of Leaving Radioactive Sources in Place and Vulnerable Due to Limited Transport Options or Denial of Shipment	178
<i>Justin M. Griffin, Leroy Leonard</i>	

Human Factors Approach an Efficient Management Tool for the Safety of Nuclear Transportation	185
<i>Laurent De Raspede, Philippe Renard</i>	
Transportation Risk Assessments — What Can We Learn from 30 Years of Predictions?	192
<i>Thomas I. McSweeney, Stephen J. Maheras</i>	
NRC Spent Fuel Transportation Risk Assessment Methodology	204
<i>Doug Ammerman, Carlos Lopez, John R. Cook</i>	

SESSION D – TRANSPORT OF MIXED OXIDE FUELS

MOX Transport by Road and Sea	212
<i>Alastair A. Brown</i>	
JAEA Sea Transport of MOX Powder	218
<i>Takafumi Kitamura, Yuichiro Ouchi</i>	
Shipments of Unirradiated MOX-fuel-elements to Nuclear Power Plants in Germany with Special Security Truck Service — An Overview of the Last 20 Years	219
<i>Ulrich H. Alter</i>	
Feedback on the Use of the MX6 and MX8 Fuel Transport Casks	225
<i>Gilles Potier, Thierry Lallemand</i>	
EUROFAB Project, An Example of International Transport of Plutonium and MOX Fuels	233
<i>Laurent Blachet, Arvid Jensen, George Meyers, Patrick Jacot, Jean Pierre Bariteau, Fred Yapuncich</i>	
The Packaging and Transportation of Futurix-FTA Fuel Pins	242
<i>F. Yapuncich, D. Ohayon, L. Mariette, A. Ross, D. Snedeker, S. Hayes</i>	
Return of the Fuel from the German Compact Sodium-Cooled Nuclear Reactor Facility KNK II with the CASTOR® KNK	250
<i>R. Vallentin, C. Dominke-Bendix, I. Graffunder, O. Patzold</i>	
Status of Nuclear and Radiation Safety of SNF Transportation in Russia and Challenges for Transportation of MOX from VVER-1000 Reactors	258
<i>Mikhail M. Morev</i>	

SESSION A – PACKAGE TESTING TO ENVIRONMENTS DIFFERENT FROM REGULATORY TEST ENVIRONMENT - II

Extra-regulatory Testing of RAM Packages — An Industrial View	259
<i>William Wilkinson</i>	
Evaluating Type B Package Response to Impacts onto Different Targets	264
<i>Doug Ammerman</i>	
Testing of Packages with LSA Materials in Very Severe Mechanical Impact Conditions with Measurement of Airborne Release	272
<i>Oliver Nolte, Wolf Koch, Hubert Lodding, Florentin Lange, Reinhard Martens, Eugen Hormann</i>	
Early Thermal Testing of Type B Radioactive Material Packages in the U.S. to Environments Beyond the Regulatory Package Thermal Test Standards	280
<i>Ronald B. Pope, H. R. Yoshimura, M. Kubo</i>	
Effects of Tunnel Fires on the Behavior of Spent Nuclear Fuel Casks	297
<i>Christopher S. Bajwa, Earl P. Easton</i>	
Recent Assessments in the U.S. of Spent Fuel Packages Exposed to Severe Thermal Environments Different from Regulatory Standards	320
<i>Carlos Lopez, Ken B. Sorenson, John R. Cook, Andrew J. Murphy</i>	
Assessing the Response of Type B Packages to Maritime Accident Environments	333
<i>Doug Ammerman, Jeremy Sprung</i>	
Estimation of Radionuclides Concentrations in the Ocean at the Hypothetical Submergence of Fresh MOX Fuel Package	340
<i>Daisuke Tsumune, Toshiaki Saegusa, Chihiro Ito</i>	

SESSION B – RADIATION PROTECTION

Issues on Exemption Levels for Package Surface Contamination Simply Derived from IAEA-TECDOC-1449 “Radiological Aspects of Non-fixed Contamination of Packages and Conveyances”	348
<i>Haruyuki Ogino, Takatoshi Hattori</i>	
Establishing Risk-Informed Non-Fixed Surface Contamination Limits for Spent Fuel Transportation Casks	355
<i>Richard R. Rawl, Richard W. Leggett, John R. Cook</i>	
Transport of Low-Level NORM — A Case for Consistency and Practicality	363
<i>Richard R. Rawl, Richard W. Leggett, John R. Cook</i>	
Implementation of the Radiation Protection Program for Carriers in Canada	371
<i>Sylvain Faillé</i>	
Update on Regulatory Issues Associated with Criticality Safety of Spent Fuel Casks Considering Water Inleakage	378
<i>Nancy L. Osgood, Carl J. Withee, Meraj Rahimi, Gordon Bjorkman</i>	

Efficient Licensing of Package Designs for Fissile Material	383
<i>Dennis Mennerdahl</i>	

SESSION C – INTERNATIONAL SECURITY EFFORTS AND EMERGENCY RESPONSE

International Working Group for Sabotage Concerns of Transport and Storage Casks	391
<i>Bruno Autrusson, Olivier Loiseau, Martin A. Molecke, Ken B. Sorenson, Gunter Pretzsch, Wenzel Brucher</i>	
Consequences of a Nuclear Material Transport Sabotage: A General Approach for the Case Study of Sabotage Per Use of an Armor Piercing Weapon	399
<i>Olivier Loiseau, B. Autrusson, P. Funk</i>	
Spent Fuel Sabotage Testing: Depleted Uranium Oxide Aerosol Results	407
<i>Martin A. Molecke, John E. Brockmann, Lindsay A. Klenmert, Michele Steyskal, Michael W. Gregson, Wolfgang Koch, Oliver Nolte</i>	
Airborne Release from Vitrified High Level Waste Due to Sabotage	415
<i>Olivier Nolte, Wenzel Brucher, Reinhard Martens, Wolfgang Koch, Gunter Pretzsch, Andreas Holzwarth, Florentin Lange</i>	
Parametric Study of the Release of Spent Fuel Aerosol Resulting from HEDD Attack	423
<i>Robert E. Luna, H. Richard Yoshimura, Ken B. Sorenson</i>	
UKAEA Transport Emergency Arrangements	428
<i>Terence D. Kelly</i>	
Crisis Communication in Radioactive Transportation: How to Put Lipstick on a Bull Dog	435
<i>Bernard Monot</i>	
Optimizing Transport Security Risk Analysis/Emergency Response Preparedness	442
<i>Daniel Chanson, Pascal Chollet, Eric Guerel</i>	

SESSION D – RADIATION PROTECTION AND MANAGEMENT CONTROLS

A Review of 10 Years: Radioactive Material Transport Incidents and Accidents Experience in Germany	447
<i>Günther Schwarz, Florence-Nathalie Sentuc</i>	
Public and Occupational Radiation Exposures Arising from the Normal Transport of Radiographic Radiation Sources in Germany	455
<i>Florence-Nathalie Sentuc, Günther Schwarz</i>	
Development of New Monitoring System for Activity Distribution Estimation in Large Waste Container for LSA-II Material	462
<i>Michiya Sasaki, Takatoshi Hattori</i>	
Development of Contents Specifications for the Transport of Radioactive Waste	470
<i>Iain Gray, Bill Sievwright</i>	
Roadrunner Transportation Package Containment Seal Damage Investigation — Operating Experience	478
<i>Ulf Stahmer, D. Howe</i>	

SESSION E – ANALYSIS OF VARIOUS IMPACT EVENTS

Comparison of UF₆ Packages Under Certification Test and Accident Conditions	485
<i>Carlos Lopez, Douglas J. Ammerman, G. Scott Mills, Earl P. Easton, Adelaide S. Giantelli</i>	
Package Performance Study Status Update	499
<i>Daniel Huang, Abdul H. Sheikh</i>	
BAM Cask Design Evaluation Using Drop Tests and Numerical Calculations: Accidental Cask Drop without Impact Limiters onto a Storage Building Foundation	506
<i>Holger Völzke, Dietmar Wolff, Linan Qiao, Karl Feutlinske, Uwe Zencker, Andre Musolff</i>	
Experimental Studies of Free-Standing Spent Fuel Storage Cask Subjected to Strong Earthquake	514
<i>Koji Shirai, M. Wataru, T. Saegusa</i>	
Design Features that Enhance Spent Fuel Canister Integrity Under Drop Impact	522
<i>Gordon Bjorkman Jr., Jason M. Piotter</i>	
Simulation Study of Concrete Material Numeric Model in the Evaluation of Storage Cask’s Tipping Over Event	530
<i>Norihiro Kageyama, Koji Shirai, Kosuke Nanba, Takao Shirakura, Masahiko Ouchi</i>	
Confinement Analysis of Dual Purpose Metal Cask Subjected to Impulsive Loads During Handling Accidents	538
<i>Koji Shirai, H. Takeda, T. Saegusa</i>	
Application of the Karagozian and Case Material Model to Cemented Wastes Under Accident Conditions	546
<i>Gordon Turner</i>	
On the Essential Characteristics of Underground Storage of Spent Nuclear Fuel in the HI-STORM 100 System	547
<i>Kris Singh</i>	

SESSION F – CRITICALITY AND SHIELDING

Method to Evaluate Limits of Lattice Expansion in Light Water Reactor Fuel from an Axial Impact Accident During Transport	556
<i>Peter Purcell</i>	

Influence of the Accident Behaviour of Spent Fuel Elements on Criticality Safety of Transport Packages — Some Basic Considerations	565
<i>Ingo Reiche</i>	
Assumptions on Presence of Water for the Criticality Analysis for Packages Equipped with Multiple High Standard Water Barriers	571
<i>Marie Thérèse Lizot, Gilles Sert, Veronique Rouyer, Laure Carenini, Izascun Ortiz De Echevarria Diez</i>	
Multiple Barriers: An Alternative to the Assessment of the Fuel Assemblies During Accident Conditions of Transport	579
<i>Pierre Malesys</i>	
IAEA Activities Related to Burnup Credit	588
<i>William Danker</i>	
Implementation of a Burn-up Credit Approach for Transport and Storage Cask	596
<i>Frédéric Riou, P. Malesys, D. Sicard, M. Tardy, M. Lein</i>	
Shielding Assessment of a Variety of Transport Flasks Carrying Mixed Oxide Fuel or Vitrified Residue on Board the Pacific Heron Ship	606
<i>Anton Murfin, Michael H. Dean</i>	
Verification Tests of Neutron Shielding Materials and Shielding Assessment	614
<i>Takeshi Ichihashi, Akira Ogawa, Daiichi Ishiko, Makoto Morishima</i>	
TN International Accurate Shielding Analysis for Casks	621
<i>Stavros Kitsos</i>	

SESSION G – PACKAGE DESIGNS - WASTES

TGC36 a Dual Purpose Cask for the Transport and Interim Storage of Compacted Waste (CSD-C)	626
<i>Olaf Oldiges, Jean Michel Boniface</i>	
A New Way for the Dual Purpose Cask TNTM24: A Global Solution Offer	633
<i>Justo Garcia, Nathalie Allimann</i>	
VRTF: A New Package for the Transport of Vitrified Residue Waste from Sellafield to Japan	640
<i>Gary Jones</i>	
Latest Innovative Type B Packaging Designs Developed by CEA and TN International for Fresh and Used Nuclear Fuels and Waste Transportation	648
<i>J. Dumesnil, F. C. Hugon, S. Claverie Forgues, P. Malvache, S. Pichon, P. Valbuena, P. Grisolano</i>	
A Type B(U) Package to Store and Transport Medical Sources	657
<i>Alberto Orsini, S. Boria, R. Bove, G. Forassati</i>	
The New Type B(U) Cask in the Swedish Transport System	664
<i>Lise Watzek, W. Dybeck</i>	
Development of Type IP-2 Packages for Low and Intermediate Level Radioactive Waste	671
<i>Sunghwan Chung, Jongrak Choi, Minchul Kim, Seungho Lee</i>	
Packaging, Transportation and Disposition of Radioactively Contaminated Lead	678
<i>Eugene J. Gleason, Gerry Holden</i>	

SESSION H – MANAGEMENT CONTROLS

Automated Transportation Management System (ATMS)	684
<i>Jim Portsmouth, Brady Lester</i>	
Transport Organisation at the European Commission’s Joint Research Centre in Geel (BE)	692
<i>Andreas Fessler</i>	
Russian Expertise in Certification of Packages for Transportation of Fresh Nuclear Fuel in Accordance with Safety Requirements of IAEA Rules (TS-R-1) Concerning Transportation of Fissile Materials by Air	700
<i>Liudmila Barabenkova, V. I. Shapovalov, A. I. Morenko, V. A. Yakushev</i>	

VOLUME 2

Benchmarking Transportation Logistics Practices for Effective System Planning	704
<i>Alex Thrower, J. Jones, M. Keister, J. Patric, P. Singley</i>	
Technical and Regulatory Considerations in Using Freight Containers as Industrial Packages	721
<i>Mark Hawk, Erich Opperman, Ronald B. Natali</i>	
Extension of Container Life Through Low-Cost Probabilistic Assessment	730
<i>Tim Gleed-Owen</i>	
Keys to Success of the LANL TA-18 Facility Nuclear Material De-inventory Project	739
<i>Paul T. Mann, James B. Tollison</i>	

SESSION A – DROP TESTING - I

Structural Integrity of “MSF” Transport and Storage Cask Based on Full-Scale and 1/2 5 Scale Drop Test Results	746
<i>Junichi Kishimoto, Hiroki Tamaki, Suguru Hode, Tadashi Kimura, Tomofumi Yamamoto</i>	

Comparison of Experimental Results from Drop Testing of a Spent Fuel Package Design Using a Full-scale Prototype Model and a Reduced-scale Model	754
<i>Thomas Quercetti, Sven Schubert, Karsten Müller</i>	
Comparison of the Behavior of a Finned and Unfinned Surface During a Drop Test of a Cask onto a Steel Bar	762
<i>Roland Hueggenberg</i>	
Suggestions for the Correct Performance of the IAEA 1 m Puncture Test with Small-scale Packages Considering Similarity Theory Aspects	763
<i>Frank Wille, V. Ballheimer, B. Droste</i>	
Drop Test Results of the Full-scale Constor® V/TC Prototype	771
<i>Karsten Mueller, Andre Musolff, Martin Neumann, Arsene Kadji, Bernhard Droste</i>	
Using Small Scale Model Impact Limiter in the Design Safety Assessment of Transport Casks for Radioactive Material	778
<i>Martin Neumann, Bernhard Droste, Frank Wille</i>	
Drop Testing of the NCS 45	786
<i>Franz Hilbert, Christian Kuschke, Thomas Goedecke, Tino Neumeyer</i>	
Impact Limiter Drop Testing for a TN-40 Transportation Package	794
<i>Steve Streutker, Peter Shih</i>	
Regulatory Testing of a Modern Medical Isotope Transportation Package	802
<i>Steven E. Sisle, Brandon D. Thomas, Robert D. Quinn</i>	

SESSION B – STRUCTURAL MATERIALS/CLADDING/SOURCE PACKAGINGS

A Method for Dynamic Fracture Toughness Evaluation of Ductile Cast Iron for Safety Assessment of Radioactive Material Transportation Casks	810
<i>Vivek M. Chavan</i>	
Application Limits of Low-Ductile Cast Iron for Radioactive Waste Containers	811
<i>Uwe Zencker, Mike Weber, Oliver Kovacs, Linan Qiao, Bernhard Droste</i>	
On the Variation in Ductility of Ductile Cast Iron for Spent Nuclear Fuel Packages and its Correlation with Casting Defects and Material Microstructure	819
<i>Karl-Fredrik Nilsson, Vratko Vokal, Philip Minnebo</i>	
Development of Forged Steel Applied to Main Body of Type BU Package	829
<i>Toshihiro Matsuoka, Kentaro Yoshimoto, Kimonobu Hojo, Ryuichi Yamamoto</i>	
Mechanical Characteristics of Fuel Rods in Transport Conditions	837
<i>Sarah Fourgeaud, Marie-Therese Lizot, Marc Petit, Jean Desquines, Christophe Getrey</i>	
The S300 Special Form Source Overpack	845
<i>Philip W. Noss, Justin M. Griffin</i>	
Development & Certification of a Capsule for Sealed Source Encapsulation	853
<i>Danny A. Martinez</i>	
A New Family of Type B Radioactive Material Transportation Packages	860
<i>Marriott Doral</i>	

SESSION C – APPLICATION OF REGULATIONS

Promoting the Safe Transport of Radioactive Material: Activities of ISO	891
<i>Pierre Malesys</i>	
Rationale for the Deuterium and Beryllium Limitations in the Modified para. 672(a) in IAEA Transport Regulation	899
<i>Daiichiro Ito, Akihiko Terada, Hiroaki Taniuchi, Makoto Hirose, Hideo Akiyama, Kazushige Kurayama, Mitsuo Ishii</i>	
Approvals Process a Consistent Approach by Industry	908
<i>Marc Flynn</i>	
Some Aspects on the Harmonization Between the IAEA, Regulations for the Safe Transport of Radioactive Material, and the UN “Recommendations on the Transport of Dangerous Goods”	916
<i>Christel Fasten, Frank Nitsche</i>	
Efficient Preparation and Management of the Package Safety Case	922
<i>Anthony Cory</i>	
The European Technical Guide on Package Design Safety Reports for Transport Packages Containing Radioactive Material	931
<i>Frank Nitsche, Jim Stewart, Ingo Reiche, Steve Whittingham</i>	
Schedules of Provisions of the IAEA Regulations for the Safe Transport of Radioactive Material, TS-R-1 (2005 Edition)	939
<i>Christel Fasten, George Sallit, David Rowe, Frank Nitsche</i>	

SESSION D – TRANSPORT OF RESEARCH REACTOR FUEL AND UF₆

Experience of Natural UF₆ Transport from Canada to Japan	946
<i>Tadahiko Yamashita, Y. Miura, D. Toguri</i>	
Industry Experience with Thermal Protectors on 48-inch UF₆ Cylinders	954
<i>Ben Dekker</i>	

Transport of DUF₆ Cylinders	962
<i>George Taylor, Cavanaugh Mims, Debra D. Markelonis, Warren Baugh, Adrenne H. Diffin</i>	
Planning, Preparation, and Transport of the High-Enriched Uranium Spent Nuclear Fuel from Czech Republic to Russia Federation	972
<i>Michael J. Tyacke, Igor Bolshinsky, Frantisek Svitak</i>	
Repatriation of VINCA RA Reactor Spent Fuel	980
<i>Edward Bradley, J. Kelly, I. Goldman, M. Pesic, P. Adelfang, D. Jinchuk</i>	
Pilot Study on the Return of Waste from Reprocessed Fuel Elements from German Research Reactors from the Reprocessing Plant in Dounreay, Scotland	988
<i>Marion Tholen, Wilhelm Bollingerfehr</i>	

SESSION E – POSTER SESSION

Type AF Certificate for Transportation of Low Enriched Uranium Oxide (LEUO) for Disposal	996
<i>Erich K. Opperman, Kenneth R. Yates</i>	
RADCALC: An Analytical Tool for Shippers of Radioactive Material and Waste	1002
<i>Ashok Kapoor, Larry Stuhl</i>	
Selection Process for New Nuclear Material Shipping Container Design Agent	1009
<i>Paul T. Mann, James B. Tollison</i>	
An Overview of the 20 Years Romanian Experience on Packaging and Components Testing According to the National and International Regulation	1014
<i>Gheorghe Vieru</i>	
The Use of Polymeric Barrier System (PBS) for Control of Contamination During D&D Operations and Shipping of Radiological Waste	1021
<i>Nathan L. Bridges, Fred Campbell</i>	
Conception and Production Technology of Dual Purpose Transport Casks with Advanced Safety	1029
<i>V. Z. Matveev, A. I. Morenko, V. I. Shapovalov, A. A. Maslov, V. K. Orlov, A. G. Semenov, V. M. Sergeev, O. I. Uferov, A. M. Visik</i>	
Safe Transport of Radioactive Material — Codes of Practice for the United Kingdom	1037
<i>Neil A. Carr</i>	
Best Practices in Minimising Surface Contamination: A Discussion of British Energy’s Operational Experience with Irradiated Fuel Transport Flasks	1038
<i>Richard James, Julian Robertshaw</i>	
Statistical Analysis of Dynamic Fracture Toughness Data of Two DCI Large Scale Specimen Test Series	1046
<i>Wolfram Baer</i>	
Investigation of Seal Effects According to Axial Compression Variation of Metal Seals for Transport and Storage Casks	1053
<i>Ulrich Probst, Peter Hagenow, Holger Volzke, Dietmar Wolff, Peter Wossidlo, Behboud Abbasi, Andreas Achelpohler-Schulte, Sebastian Schulz</i>	
Multi-Purpose Transportation Package — Design and Licensing by Analysis	1061
<i>Greg Morandin, Stavash Khajehpour, Eric Freeman</i>	
Characterisation of Shock Absorber Deformation by Optical Surface Digitalisation	1070
<i>Klaus-Peter Gruender, Daniel Kadoke, Karsten Muller, Andre Musolff</i>	
Rational Shielding Ability Evaluation for the Interim Storage Facility by Using Transportable Storage Casks	1076
<i>Mitsufumi Asami, Seiki Ohnishi, Naoteru Odano</i>	
IRSN’S Experience Feedback List for the Transport Package Design Safety Appraisals	1084
<i>Sophie Le Mao, Marianne Moutarde, Marie-Therese Lizot, Gilles Sert</i>	
Denials and Delays of Shipments in the Transport of Radioactive Materials in Brazil	1091
<i>Ana Celia F. Sobreira, Denise Bemelmans</i>	
RAJ-II and NPC Shipping Containers Development and Licensing Status	1095
<i>Andrew K. Langston</i>	
Use of Alcan’s Al-B₄C Metal Matrix COMPOSITE as Neutron Absorber Material in TN International’s Transportation and Storage Casks	1101
<i>Gilles Bonnet, V. Rohr, X. G. Chen, J. L. Bernier, R. Chiocca, H. Issard</i>	
Transnuclear’s NUHOMS[®] MP197 Transportation Package with Higher Burnup and Higher Heat Load Canisters as a Payload	1110
<i>Jayant Bondre, Vyacheslav V. Guzeyev</i>	
Experience on Return Shipments of Research Reactor Spent Nuclear Fuels from JAEA-TOKAI	1115
<i>Kendo Tamura, Kaoru Matsuzawa, Tsuyoshi Kusunoki, Nobuyuki Kouda</i>	
Periodic Inspection of the Spent Fuel Transport Package	1123
<i>Ju-Chan Lee, Kyung-Sik Bang, Il-Je Cho, Woo-Seok Choi, Ki-Seog Seo</i>	
Case Study: Occupational Exposures in the Transport of Radioactive Material — REM Indústria e Comércio, Ltda. Brazil	1131
<i>Denise Bemelmans, Michelle Cristina Barbosa Neves, Helder Nogueira</i>	
Experimental Investigation of Dry Storage Cask Heat Transfer	1136
<i>K. S. Bang, J. C. Lee, K. S. Seo, D. H. Kim, K. H. Lee, D. K. Lee</i>	
Safety Test Status of a Radioactive Material Transport Package in South Korea	1143
<i>Ki Seog Seo, Kyoung Sik Bang, Ju Chan Lee, Woo Seok Choi, Kyoung O. Nam</i>	
Development of Neutron Absorber (MAXUSTM) for High Burn-up Spent Nuclear Fuel	1149
<i>Toshiaki Yamazaki, Toshimasa Nishiyama, Kazuto Sanada, Hideki Ishii</i>	

CEA/TN International Joint Venture for an International Casks Fleet	1155
<i>Dumesnil Jérôme</i>	
Periodic Inspection for KN-12 in Korea	1156
<i>Bok Hyoung Lee, Dae Hyung Cho, Un Kap Cho</i>	
Safety Regulations for the Transport of Radioactive Materials in Korea	1163
<i>Woon-Kap Cho, Bok-Hyoung Lee, Dae-Hyung Cho</i>	
Development and Reliability Verification of Aluminum Alloys for Basket of Transport and Storage Cask for Spent Nuclear Fuel	1171
<i>Takaharu Maeguchi, Daiichi Ishiko, Yoshiharu Kam Iwaki, Tomofumi Yamamoto</i>	
Optimization of Fabrication Condition of Metal Cask Neutron Shielding Part Which Applied Simulation of Curing Behavior of Epoxy Resin	1177
<i>Mamoru Kamoshida, Naoki Kumagai, Koji Fujimura, Takeshi Hiranuma, Masashi Shimizu</i>	
Organizing the Safety of Radioactive Material Transports from the CEA Marcoule Site	1184
<i>Jean-Marc Moulinier</i>	
Numerical Simulation of Leak Tightness Under Drop Accident Conditions	1185
<i>Stefan Offermanns, E. Roos, U. Mayer, K. H. Enrich, H. Scheib</i>	
Development of Cross Section SFCX-J33 for Spent Fuel Transport Cask Shielding Calculation	1192
<i>Mitsuo Matsumoto, N. Odano, S. Ohnishi, M. Morishima, M. Ohmura</i>	
Improvement of Atmospheric and Ocean Dispersion Model in Supporting System for Emergency Response to Maritime Transport Accident Involving Radioactive Material	1200
<i>Naoteru Odano, Hideyuki Oka</i>	
Packages for Final Storage with Optimized Use of Metallic Waste	1208
<i>Wolfgang Steinwarz</i>	
A New Ship for PNTL — A Report on the Launch of the Latest Ship to Join the PNTL Fleet	1209
<i>Steve Dutton</i>	
Shielding Integrity Test for Pre-service Inspection of KN-12 Transport Cask	1210
<i>Il Je Cho, Duck Kee Min, Ju Chan Lee, Gil Sung You, Ji Sup Yoon</i>	
Rancho Seco Reactor Vessel Segmentation Project & Packaging Large Components	1218
<i>Michael Snyder</i>	
Status of Burnup Credit for Spent Fuel Analysis and Certification in Transportation and Dry Storage	1243
<i>Andrew B. Barto</i>	
Development of a New Transportation/Storage Cask System for Use by the DOE Russian Research Reactor Fuel Return Program	1244
<i>Michael J. Tyacke, Jiri Rycheky, Sergey Komarov, Alexander Dudchenko, Frantisek Svitak, Miroslav Picek, Alexey Smirnov, Edward Bradley, Konstantin Golubkin</i>	
Overview of the Separation Processes Studied Worldwide for the Actinides in Spent Fuels	1255
<i>Ashraf El Sayed Mohamed</i>	
Packaging and Transportation Safety – Critical to Department of Energy Site Cleanup and Closure	1256
<i>Ella McNeil</i>	
Spent Fuel Transport Using a Cask Charged Outside the Pool	1257
<i>Marco Nasta, Romina Quintiliani, Luigi Brusa, Fernanda Di Gasbarro, Michele Gili</i>	
Testing of Spent Fuel Storage/Transport Packages in Japan	1265
<i>Toshiari Saegusa, Chihiro Itoh, Hidetsugu Yamakawa, Koji Shirai, Hirofumi Takeda, Masumi Wataru</i>	

SESSION A – THERMAL TESTING AND ANALYSIS - I

Thermal Analysis of the KN-12 Spent Nuclear Fuel Transfer Cask	1273
<i>Dallsun Um</i>	
CDF Simulations of Fuel Cladding and Basket Surface Temperatures in an MPC Rail Cask During Normal Transport	1274
<i>Mithun Gudipati, Miles Greiner</i>	
Simulations of Natural Convection/Radiation Heat Transfer for Horizontal and Vertical Arrays of Heated Rods Inside a Uniform Temperature Enclosure	1287
<i>Pablo Araya, Narayana Rao Chalasani, Miles Greiner</i>	
Computational Modelling to Predict Waste Package Performance Under Fire Accident Conditions	1300
<i>Gordon Turner, Bill Siewright, Chris Fry</i>	
Temperature Response of a Rail-Cask Size Pipe Calorimeter in Large-Scale Pool Fires	1308
<i>Marcelo A. Del Valle, M. Alex Kramer, Miles Greiner, Carlos Lopez, Ahti Suo-Anttila</i>	
Natural Convection/Radiation Heat Transfer Simulations Within the Fuel Regions of a Truck Cask Under IDCFR71-Format Fire Conditions	1318
<i>Venkata V. R. Venigalla, Miles Greiner</i>	
Burn Testing of Polyurethane Foam Shielded with Ceramic Fiber Paper	1329
<i>Thomas J. Criddle, Joseph C. Nichols</i>	
Small-scale Fire Testing of Polymer as an Encapsulant for Magnox Waste	1337
<i>Gordon Turner, Dave Willcox, Glen Baker</i>	

SESSION B – PACKAGE DESIGNS – SPENT FUEL

Comparison Between Different Principles for Packaging Designs	1345
<i>Yves Chanzy, Pierre Malesys</i>	
Overview and Evaluation of TN New Technology for Storage and Transportation	1353
<i>Tara Neider, Robert Grubb</i>	
Developments on MSF Cask for Transport and Storage of Spent Nuclear Fuel	1360
<i>Tomofumi Yamamoto, Hiroki Tamaki, Kiminobu Hojo</i>	
A New Generation of Dry Transportable Storage for Spent Nuclear Fuel: NAC International's Technology for Modular, Advanced Generation, Nuclear All-purpose Storage — The MAGNASTOR™ System	1367
<i>Charles W. Pennington</i>	
Transnuclear's Design for Transportation, Aging, and Disposal (TAD) System	1375
<i>Jack Boshoven, Jayant Bondre</i>	
Transports of Irradiated Fuel Rods or Activated Components	1381
<i>Xavier Bairiot, Christophe Bruneel</i>	
Obtaining Certificates of Conformance for Transportation Packages Containing DOE-EM Standardized Canisters	1388
<i>Thomas J. Hill</i>	
Conception of Class “C” Package for Transportation of Spent Russia-made Nuclear Fuel from Research Reactors	1389
<i>Vyacheslav Shapovalov, A. I. Morenko, V. Z. Matveev, V. A. Yakushev, L. V. Barabenkova, A. V. Smirnov, S. V. Komarov, J. Haire, L. Dole</i>	

SESSION C – PHYSICAL PROTECTION MEASURES AND EMERGENCY RESPONSE

Development and Operational Experience of Global Positioning Systems for UF₆ Packages	1394
<i>Philip J. O'Keefe</i>	
Demonstration of a Geographic Information System Methodology to Quantify Risk Factors for the Transportation of Nuclear Materials	1395
<i>Kathleen M. Trauth, Milind M. Divate, Yingkui Li</i>	
Cooperation Between Japan and United States on the Physical Protection of Nuclear Material Transportation	1404
<i>Yuichiro Ohuchi, John R. Cochran, Takafumi Kitamura, John C. Matter, J. David Betsill, Ken B. Soren</i>	
Safety & Security in Transportation of Nuclear and Other Radioactive Materials	1416
<i>Angelaki N. Gotsev</i>	
Fast Reactor Recycle Fuel Thermal Load	1419
<i>Ben Cipiti, J. D. Smith, Ken Sorenson, Brent Dixon, William Halsey</i>	
Emergency Preparedness and Response in Case of A Hypothetical Accident with Nuclear Powered Vessel Traversing Suez Canal	1430
<i>Mohamed A. Salama</i>	

VOLUME 3

Terrorism and the Maritime Shipment of Nuclear Materials	1438
<i>Ronald C. Smith</i>	
Analysis of Serious Hazardous Materials Truck Crashes in the U.S.	1447
<i>Arthur H. Greenberg, Thomas McSweeney, Dan Blower, Mark Abkowitz, Mark Lepofsky</i>	

SESSION D – TRANSPORT BY SEA AND RAIL

Development of Rail Transport Solution to Large Nuclear Packages on Restricted Rail Routes Support Transport of Large Nuclear Packages on Restricted Rail Routes	1458
<i>Callum McLaurin</i>	
International Transport of Uranium Concentrates	1466
<i>Catherine Green</i>	
Sea Transport System for Low and Intermediate Level Radioactive Waste in Korea	1472
<i>Sunghwan Chung, Seungho Lee, Jongrak Choi, Yoondong Lee</i>	
International Cost Effective Transport of Reprocessed UO₃	1478
<i>Marc Flynn</i>	
Pacific Sandpiper Dose Rate Assessment for the Carriage of Sellafield Vitrified Residues	1486
<i>Michael H. Dean, Anton S. Murfin</i>	
New Construction of “KAIEI-MARU” for Transport of Nuclear Fuel Materials	1494
<i>Hideki Takatsuki, Akihiko Terada, Kensaku Aoki, Hirofumi Doi, Tadashi Sasao, Yoshihiro Matsumoto, Hiroaki Yokota, Hiroyuki Tsuji</i>	

SESSION E – IMPACT ANALYSIS

Dynamic Finite Element Analysis of a HLW Transport Cask with Polyurethane Impact Limiters in 9m Drop Tests	1500
<i>Uwe Zencker, Linan Qiao, Gunter Wieser, Bernhard Droste</i>	

Investigation of Drop Impact Behaviour of Cask Using Rigid Polyurethane Foams as Shock Absorbing Materials	1507
<i>Jun Okada, Satoshi Ashida, Masayuki Tanigawa, Akio Oiwa, Hitoshi Tobita</i>	
Demonstration of the Impact Performance of the Gravierer Flask	1515
<i>Chi-Fung Tso, John Harvey, Gary Jordan, Conrad Izatt, Robert Livesey</i>	
Dynamic Simulation of Bulk Tritium Shipping Package Subjected to Internal Pressure and Sequential Impacts	1527
<i>Tsu-Te Wu Wu, Allen Smith</i>	
Predicting the Response of the Impact Limiter in the HI-STAR Family of Transport Packages Using a Benchmarked LS-DYNA Dynamic Model	1528
<i>Kris Singh, John Zhai, Alan I. Soler</i>	
Structural Evaluation of a High Capacity, Mechanically Assembled Spent Fuel Basket Design	1536
<i>Michael C. Yaksh, S. Alan Lin</i>	
Numerical Simulation of the One Metre Drop Test on a Pin for CASTOR Cask	1543
<i>Karl-Fredrik Nilsson, Nikola Jaksic</i>	

SESSION F – DESIGN & MATERIALS – BASKET, GAMMA & NEUTRON SHIELDING

Development and Discussion of Design Code for Baskets Made of Aluminum Alloys and Borated Aluminum Alloys for Transport/Storage Packagings	1551
<i>Makoto Hirose, Kenji Miyata, Hiroshi Akamatsu, Toshiari Saegusa, Takahisa Nakatani, Tomofumi Yamamoto</i>	
Nickel-Based Gadolinium Alloy for Neutron Adsorption Application in RAM Packages	1559
<i>Gregg Wachs, J. W. Sterbentz, W. L. Hurt, P. E. McConnell, C. V. Robino, F. Tovesson, T. S. Hill</i>	
Development of Borated Aluminum Material for Basket of Transport/Storage Casks	1567
<i>Jun Shimojo, Hiroaki Taniuchi, Hiroshi Akamatsu, Dai Yokoe</i>	
Experience with Qualification of Metal Matrix Composites Used as Fixed Neutron Absorbers	1575
<i>Marlin L. Stoltz II, William Bracey, Gilles Bonnet</i>	
Development of a Non-Metallic Composite Fuel Support Structure for Transport and Storage	1587
<i>Charles J. Temus, Alec Ross</i>	
Development of KATS — Eco-friendly Spent Fuel Transport and Storage Cask	1595
<i>Hiroaki Taniuchi, H. Akamatsu, S. Nakasaku, J. Shimojo</i>	
Long term Stability and Fire Resistance of Neutron Shielding Materials, TNTM Resin Vyal-B and Kobesh EPR Resin	1603
<i>Dai Yokoe, Hiroaki Taniuchi, Hiroshi Akamatsu, Jun Shimojo, Pascale Abadie</i>	

SESSION G – DEMONSTRATING SAFETY

Overview of Radioactive Material Transport in Japan and Experience Gained from TranSAS for Japan	1611
<i>Masahiro Aoki, Noriaki Usui</i>	
Feedback from the IAEA TranSAS Mission in France	1617
<i>David Landier</i>	
Understanding the Value of Stakeholder Collaboration from the Onset through All Phases of the Spent Fuel Transportation Project	1622
<i>Judith Holm, J. Offner, J. Patric</i>	
DOE Initiative to Identify Routes for Shipping Spent Nuclear Fuel and High-level Radioactive Waste to Yucca Mountain	1633
<i>Jay Jones, Alexander Thrower, L. Finewood, R. Coppage, R. Best</i>	
WIPP Transportation Safety Program: A Model Framework for Collaboration Among States and Agencies in the Transportation of Radioactive Waste	1643
<i>Anne Delain W. Clark, Tammy C. Ottmer</i>	
What Should RAM (Radioactive Material) Transportation Economics be Governed By?	1650
<i>Rehbinder Serge</i>	
Progress in Establishing a Relationship to Build Type B(U) Containers to U.S. Specifications for Isotope Transport	1657
<i>Michael A. Flagg, Kathleen M. Trauth</i>	

SESSION H – TRANSPORTATION OF LARGE OBJECTS/ GENERAL INTEREST

Transport of Core Components and Large Contaminated Objects in Sweden	1665
<i>Peter B. Dybeck, Ulrika Broman</i>	
Experience from Transport of Large Objects in Sweden from an Authority's Point of View	1673
<i>Birgitta Svahn, Helmuth Zika, Erik Welleman, Thomas Nilsson</i>	
Transport of Two Steam Generators From the Nuclear Power Station KWO to the Interim Storage Site of EWN	1679
<i>Burkhard Hartmann, Franz Hilbert, Michael Kubel, Burkhard Hartmann</i>	
Packaging and Transportation of the Dairyland LACBWR Reactor Vessel	1687
<i>Mark S. Lewis</i>	
Applying RFID Technology in Nuclear Materials Management	1694
<i>Yung Liu, Hanchung Tsai, Kun Chen, J. P. Norair, Steve Bellamy, Jim Shuler</i>	
Application of Polyurethane Foam for Impact Absorption and Thermal Insulation for Radioactive Materials Packagings	1705
<i>Allen C. Smith, G. A. Abramczyk, J. S. Bellamy, P. S. Blanton, W. L. Daugherty, S. L. Williamson</i>	

Consequences of Drop Test Parameter Limitations for Subsequent Package Design Safety Analysis	1712
<i>Frank Koch, Bernhard Droste, Torsten Krietsch</i>	
Robatel Industries Technologies	1719
<i>Fabien Labergri, Mathias Chazot, Christophe Bruneel</i>	

SESSION A – DESIGN METHODOLOGIES

Current Activities of the ASME Subgroup Nupack	1727
<i>Gerald M. Foster, Keith Morton, Paul McConnell</i>	
State-of-the-Art Assessment of Package Design Safety Analyses	1734
<i>Bernhard Droste, F. Wille, F. Koch, S. Schubert, S. Komann</i>	
Similarity Aspects for Closure Systems in Small-Scale Package Drop Testing	1742
<i>Viktor Ballheimer, Frank Koch, Christian Kuschke, Bernhard Droste</i>	
Criticality Specialists and Nuclear Engineers Working Towards a Harmonised Approach to Criticality Assessments of Transport Packages	1750
<i>Lyn Farrington, W. P. Darby</i>	
TCSC 1087: Good Practice Guide — The Application of Finite Element Analysis to Demonstrate Impact Performance of Transport Package Designs	1758
<i>Chi-Fung Tso, Bill Stevwright</i>	
Strain-Based Acceptance Criteria for Section III of the ASME Boiler and Pressure Vessel Code	1766
<i>Doug Ammerman, Gordon Bjorkman</i>	
Finite Element Mesh Considerations for Reduced Integration Elements	1774
<i>Gordon Bjorkman Jr., Jason M. Piotter</i>	
SG-600 — A Guide for the Testing of Small Fissile Material Packages	1781
<i>Matthew R. Feldman, Maximo Barela</i>	

SESSION B – MATERIALS INTERACTIONS/CONTAINMENT/SEALS

Gas Generation in Pu-O-H System	1787
<i>Shiu-Wing Tam</i>	
Catalytic Mitigation of Hydrogen Risk During Wet Transportation of Radioactive Materials	1788
<i>Valentin Rohr, R. Chiocca, H. Issard, F. Morfin, S. Derrouiche, F. Bini, J. C. Bertolini, J. L. Rousset</i>	
Analytical Prediction and Verification of Hydrogen-Air Deflagration Pressures Resulting from Transuranic Waste Radiolysis Inside of Sealed Containers	1797
<i>Brad A. Day</i>	
Potential Eutectic Failure Mechanism for Stainless Steel Cans Containing Plutonium Metal	1805
<i>Hanchung Tsai, Yung Liu, Allen Smith, Nick Gupta, Steve Bellamy</i>	
New Metallic Gaskets Qualification: Resistance to Accidental Conditions of Transport in TN International Casks	1819
<i>Regis Marlier, Herve Issard</i>	
Behaviour of Metallic Seals in CASTOR®-Casks Under Normal and Accident Conditions of Transport: Qualification and Assessment	1827
<i>Sven Schubert, Frank Koch, Ulrich Probst, Hans-Peter Winkler</i>	
Testing of Energized Inconel C-Springs for Use in Radioactive Material Packages Containing Tritium	1835
<i>Paul S. Blanton, Kurt R. Eberl</i>	
Development and Testing of the Blanton Clamshell Closure for use on Radioactive Material Packaging Drums	1843
<i>Terry Wickland, Paul S. Blanton, Heather Klebba</i>	

SESSION C – MANAGING SAFE TRANSPORT

Transportation Project Development and the National Environmental Policy Act	1852
<i>J. G. Lanthrum</i>	
Management System of the Logistics Business Unit	1859
<i>Daniel Lacroix, Steven White</i>	
Establishing an Integrated Packaging Program in a Multi-Corporate Environment	1868
<i>Paul T. Mann, James B. Tollison</i>	
Safety During Whole Lifetime-An Important Aspect in Safety Assessment of Sealed Radioactive Sources	1875
<i>Annette Rolle, Bernhard Droste</i>	
French Databases for Packagings Complying with an Approved Package Design and for Approval Certificates of Package Design	1882
<i>Karim Ben Ouaghrem, Marie-Therese Lizot</i>	
Aircraft Accident Rates	1890
<i>Rajesh Garg, Reinhard Menzel</i>	

SESSION D – DENIAL AND DELAY

The International Atomic Energy Agency’s Response to Denials of Shipments of Radioactive Material	1904
<i>Michael Wangler</i>	

Denial and Delay of Shipments: Patience, Prudence, Creativity	1905
<i>Michel Hartenstein</i>	
Facilitating the Shipments of Class 7 Radioactive Materials	1912
<i>Irjan Rahim</i>	
Sustaining Shipments	1920
<i>Lorne Green</i>	
Issues Impeding Global Recovery and Transportation of Disused Plutonium Sources: Limited Transport Options and Denials of Shipment	1926
<i>Justin M. Griffin, James M. Shuler</i>	
TN International and its Operational Feedback Regarding the Decommissioning of Obsolete Casks Dedicated to the Transport and/or Storage of Nuclear Raw Materials, Fuel and Spent Fuel	1932
<i>Franck Bimet, Nathalie Rennesson</i>	

SESSION E – THERMAL TESTING AND ANALYSIS – II/DROP TESTING - II

Consideration of Asymmetrical Heat Transmission and Distribution Using Numerical Methods	1942
<i>Frank Koch, Claus Bletzer, Gunter Wieser</i>	
Refined Thermal Modelling of a SNF-Shipping Cask Drying Process — Analytical and Statistical Approaches	1950
<i>Didier Colmont, Philippe Roblin</i>	
Peak Cladding Temperature in a Spent Fuel Storage or Transportation Cask	1958
<i>Jie Li, Haruko Murakami, Yung Liu, P. E. A. Gomez, Mithum Gudipati, Miles Greiner</i>	
Development of External Fin Structure for Transport and Storage Cask and Verification of Its Heat Dissipation Performance	1969
<i>Daïichi Ishiko, Kouichi Tanimoto, Takeshi Ichihashi, Hironori Noguchi</i>	
Impact Target Characterisation of the BAM Drop Test Facility	1976
<i>Karsten Muller, Nauka Melnik, Thomas Quercetti, Bernhard Droste</i>	
Estimation of Cask Deceleration and Impact Limiter Deformation Under 9m Drop Test Conditions Using the Calculation Tool “ImpactCalc”	1984
<i>Martin Neumann, Viktor Ballheimer, Frank Wille</i>	
Evaluation on Structural Integrity of “MSF” Transport and Storage Cask Based on Results of Drop Test	1992
<i>Yuichi Saito, Tadashi Kimura, Junichi Kishimoto, Akio Kitada, Yoshiyuki Saito</i>	
The Use of Impact Analysis in Licensing An Industrial Container for Transporting New Fuel	2000
<i>Stefan Stojko, Janak Patel</i>	

SESSION F – DESIGN & MATERIALS – IMPACT LIMITERS, QUALITY ASSURANCE

Spent Fuel Cask Impact Limiter Attachment Design Deficiencies	2018
<i>D. R. Leduc, J. L. England, R. R. Rothermel</i>	
Dynamic Shock Absorbing Property of Redwood and Balsa Wood for Transport/Storage Casks	2026
<i>Hiroshi Akamatsu, Hiroaki Taniuchi, Jun Shimajo, Dai Yokoe</i>	
Dependency of Temperature on Wooden Materials’ Mechanical Property and Effect of Impact Energy Absorption of Shock Absorbers	2034
<i>Yuichi Saito, Junichi Kishimoto, Chihiro Nishizaki, Akio Kitada</i>	
Official Monitoring of the Quality Assurance in the Manufacture of Spent Fuel and High-Level Waste Transport and Storage Casks	2041
<i>Manfred Baden, Uve Günther</i>	
Studies on Inspection Technology of Welding Joints for Spent Fuel Dry Casks	2049
<i>Satoshi Itooka, Kunio Maruoka, Masami Kato</i>	
Life Cycle Management of Radioactive Materials Packaging	2058
<i>Yung Liu, Steve Bellamy, Jim Shuler</i>	
Quality Assurance Audit for Radioactive Material Transportation Packaging	2070
<i>Bud Fabian, Julio Pardo, Vik Shah, Shiu-Wing Tam, Roberta Riel, William Toter, Yung Liu</i>	

SESSION G – RISK MANAGEMENT

Tractor/Trailer Accident Statistics	2078
<i>Douglas M. Osborn, G. Scott Mills, Jeremy L. Sprung</i>	
Comparison of Daytime and Night-time Population Adjacent to Interstate Highways in Metropolitan Areas Using LandScan USA	2086
<i>Paul E. Johnson</i>	
Criticality Risks During Transportation of Spent Nuclear Fuel	2093
<i>Albert J. Machiels</i>	
SARS: A Safeguards Accounting and Reporting Software	2094
<i>Slami Saadi, B. Mohammadi, S. Ait-Mohamed</i>	
Assessment of Accident Risk for Transport of Spent Nuclear Fuel to the Yucca Mountain Repository Using RADTRAN 5.5	2102
<i>Eileen M. Supko, John H. Kessler</i>	

Application of Decision-Aiding Techniques to Transportation Routes	2108
<i>Ruth F. Weiner</i>	
Uncertainty in Transportation Risk Assessment	2116
<i>Douglas M. Osborn, Matthew L. Dennis</i>	

SESSION H – TRANSPORT AND STORAGE OF SPENT FUEL AND HIGH LEVEL WASTE

State of the On-site Storage of Spent Fuel Assemblies at the German NPP Sites and First Experience with the Operation	2124
<i>Jochen Seidel, Frank Hirsch</i>	
European Experience in Transport/Storage Casks for Vitrified Residues	2129
<i>Damien Sicard, Jean Michel Boniface</i>	
The First Interim Spent Fuel Storage Facility in Europe Completely Loaded	2138
<i>Stanislav Kuba</i>	
Long Term Interim Storage Facility for Nuclear Reactor Compartments of Submarines — German Support for Utilization of Nuclear Submarines in Russia	2144
<i>Anton Erhard, Holger Volzke, Volker Noack, Wolfgang Weber, Dietmar Wolff, Dieter Rittscher, Holger Schmidt</i>	
Source Terms for Spent Fuel Transportation and Storage Cask Evaluation	2152
<i>Robert Einziger</i>	
Keeping Spent Fuel Cask Fleet Current	2161
<i>Frédéric Patalagoity, Camille Otton</i>	
Management of Spent Nuclear Fuel Dry Storage in Taiwan	2168
<i>Chih-Tien T. Liu, Ching-Tsuen Huang</i>	
Author Index	