

**31st Annual Conference of the  
Canadian Nuclear Society & 34th  
CNS/CNA Student  
Conference 2010**

**Montreal, Quebec, Canada  
24-27 May 2010**

**Volume 1 of 2**

ISBN: 978-1-61782-363-3

**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© (2010) by the Canadian Nuclear Society  
All rights reserved.

Printed by Curran Associates, Inc. (2011)

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

Canadian Nuclear Society  
480 University Avenue, Suite 200  
Toronto, Ontario, Canada M5G 1V2

Phone: (416) 977-7620

Fax: (416) 977-8131

[cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## VOLUME 1

### **PLENARY IA: NEW-BUILD & REFURBISHMENT**

<b>Unique Fuel Cycle Capabilities of CANDU</b> .....	1
<i>Tony De Vuono</i>	
<b>NB Power</b> .....	33
<i>Gaëtan Thomas</i>	

### **PLENARY IB: NEW-BUILD & REFURBISHMENT**

<b>AREVA and the Nuclear Renaissance</b> .....	65
<i>Mike Ruyssveldt</i>	
<b>The Nuclear Situation in the UK</b> .....	88
<i>John Roberts</i>	
<b>Gentilly-2 Refurbishment Project</b> .....	134
<i>Claude Drouin</i>	

### **CONFERENCE LUNCHEON & W.B. LEWIS LECTURE**

<b>Nuclear Energy in This Century – A Bird in the Hand</b> .....	171
<i>D. Meneley</i>	

### **T1: SPECIAL SESSION DEDICATED TO THE MEMORY OF PROF. DANIEL ROZON**

<b>History of RFSP for CANDU Fuel Management and Safety Analysis</b> .....	186
<i>Dave Jenkins, Benjamin Rouben, Wei Shen</i>	
<b>The GPT saga at École Polytechnique</b> .....	196
<i>Alain Hébert, Guy Marleau</i>	
<b>Fuel Management in CANDU Reactors: Daniel Rozon's Contribution</b> .....	205
<i>D. Rozon, Elisabeth Varin, Richard Chambon</i>	
<b>Considerations in Recycling Used Natural Uranium Fuel from CANDU Reactors in Canada</b> .....	221
<i>Peter Boczar, Terry Rogers, Derek Lister</i>	

### **T2: PROCESS SYSTEMS**

<b>Hitachi Turbine Technology For Nuclear Applications</b> .....	249
<i>Yutaka Yamashita, Takeshi Kudo, Naoki Akane</i>	
<b>Experience of Application of Clamp-on Cross-Correlation Flow Meter in Nuclear Industry</b> .....	265
<i>Yuri Gurevich, Vi Ton, Sergey Kotenyov, Chanlei Zhao, Brendan Sharp, Armando Lopez</i>	
<b>Reliability Analysis Of Nuclear Piping System Using Semi-Markov Process Model</b> .....	277
<i>Arun Veeramany, Mahesh Pandey</i>	
<b>Three Dimensional Finite Element Analysis of Weld Overlay Application on a Plastically Formed Feeder Tube</b> .....	288
<i>Francis Ku, Pete Riccardella, Michael Lashley, Yu Chen, Raymond Yee</i>	

### **T3: MATERIAL PROPERTIES AND APPLICATIONS**

<b>Investigation into the Application of Polyetherimide to Nuclear Waste Storage Containers</b> .....	300
<i>Yasmine Saboui, H. W. Bonin, V. T. Bui</i>	
<b>Development Of Gaseous Hydrogen Charging Of Zr Alloys Using A Coulometric Titration Technique</b> .....	327
<i>Mouna Saoudi, Joe Mouris, Zhang He</i>	

<b>The Use Of Electron Backscattered Diffraction For Material Characterization At Chalk River Laboratories</b> .....	336
<i>Colin Judge</i>	
<b>Crystallography of Hydrides in Textured Zircaloy-4 Sheets</b> .....	346
<i>Kiran Kumar, Jerzy A. Szpunar, Zhang He</i>	

#### **T4: EDUCATION AND PUBLIC OUTREACH**

<b>Letting the People Speak: The Public Consultation Process for Nuclear Power in Alberta and Saskatchewan</b> .....	356
<i>Duane Bratt</i>	
<b>UNENE: An Update on Nuclear Education and Research</b> .....	373
<i>Basma Shalaby, Victor Snell, Benjamin Rouben</i>	
<b>Earning The Social Licence For Nuclear Operations</b> .....	381
<i>Kathleen Duguay, Jacquie Hoornweg</i>	
<b>Utilization of Information and Communications Technology (ICT) to Improve Workforce Efficiency</b> .....	392
<i>Adam Haines, Jeremy Rasmussen</i>	

#### **34TH CNS-Can STUDENT CONFERENCE (NON-PEER REVIEWED)**

<b>Thermal Aspects of Uranium Nitride, Mixed Oxide and Thoria Fuels as Applied to SuperCritical Water-Cooled Nuclear Reactors</b> .....	404
<i>Lisa Grande, Adrianexy Rodriguez-Prado, Sally Mikhael, Bryan Villamere, Leyland Allison, Igor Pioro</i>	
<b>An Automated Delayed Neutron Counting System for Mass Determination of Fissile Isotopes in Special Nuclear Materials at the Royal Military College of Canada</b> .....	413
<i>M. T. Sellers, E. C. Corcoran, D. G. Kelly</i>	
<b>Investigation of Self-Powered Gamma Flux Detectors with Lead (II) Oxide Serving As Both Emitter And Insulator</b> .....	423
<i>H. Shi, Shuwei Yue, Guy Jonkmans, Bhaskar Sur, John Hilborn</i>	
<b>Development of Heat-Transfer Correlation for Water Flowing in Vertical Bare Tubes at Supercritical Conditions</b> .....	435
<i>Sahil Gupta, Amjad Farah, Krysten King, Sarah Mokry, Igor Pioro</i>	
<b>Radiation Exposure During Solar Particle Events</b> .....	448
<i>Hani Al Anid, B. J. Lewis, L. G. I. Bennett</i>	
<b>Nuclear Steam-Reheat Options: World Experience</b> .....	459
<i>Eugene Saltanov, Krysten King, Amjad Farah, Igor Pioro</i>	
<b>A Study of Selected Forced-Convection SuperCritical-Water Heat-Transfer Correlations for Vertical Bare Tubes Based On a Wide-Range Dataset</b> .....	467
<i>Amjad Farah, Krysten King, Sahil Gupta, Sarah Mokry, Wargha Peiman, Igor Pioro</i>	
<b>Subcooled and Saturated Boiling Heat Transfer Data Compared with Existing Correlations</b> .....	480
<i>B. A. Statham</i>	
<b>Probabilistic Risk and Safety Assessments in Supercritical Water Reactors</b> .....	489
<i>Ima Ituen</i>	
<b>Pressure-Tube Super-Critical Water Reactor Design Features Affecting Station Blackout</b> .....	496
<i>Kate Heckman</i>	
<b>Nuclear Refurbishment in Canada A Case Study of Refurbishment activities at Ontario Power Generation</b> .....	504
<i>Marina Freire-Gormaly</i>	
<b>Diametral Creep Prediction of Pressure Tube using Statistical Regression Methods</b> .....	514
<i>D. Kim, Jung Yang Lee, M. G. Na, C. Jang</i>	
<b>Model Support for an Out-Reactor-Instrumented-Defected-Fuel- Experiment to Validate the RMC Fuel Oxidation Model</b> .....	521
<i>A. D. Quastel, E. C. Corcoran, B. J. Lewis, W. T. Thompson, C. Thiriet, G. Hadaller</i>	
<b>Modelling a RD-14M LOCA Experiment with the TRACE Thermal-Hydraulics Code</b> .....	536
<i>D. W. Hummel</i>	
<b>The Implementation of an Automated Direct Sensitivity Analysis Tool to Thermalhydraulic Codes</b> .....	548
<i>Andrew Morreale</i>	
<b>Modelling and Analysis of a (Th,Pu)O<sub>2</sub> Fuel Bundle Experiment in ZED-2 Using SCALE6 and TSUNAMI</b> .....	560
<i>Ting Zhu</i>	

<b>Modeling CANDU Header Conditions: Coupling CFD and Thermal Hydraulic Tools</b> .....	570
<i>P. Szymanski</i>	
<b>Aspects of Hydrogen Production Using a SuperCritical Water-Cooled Nuclear Reactor</b> .....	574
<i>Andrew Lukomski, Igor Pioro, Kamiel Gabriel</i>	
<b>Characterization of Electrohydrodynamic Heat Transport Components in a Space-type Nuclear Reactor</b> .....	584
<i>A. Lipchitz, G. Harvel</i>	
<b>Development of a Radiofrequency Linear Ion Trap for <math>\beta</math> Decay Study</b> .....	595
<i>G. Li, N. D. Scielzo, R. E. Segel, P. F. Bertone, F. Buchinger, S. Caldwell, A. Chaudhuri, J. A. Clark, J. E. Crawford, C. M. Deibel, J. Fallis, S. Gulick, G. Gwinner, D. Lascar, A. F. Levand, M. Pedretti, G. Savard, D. Seweryniak, K. S. Sharma, J. Van Schelt, M. G. Sternberg, T. Sun, A. H. Wuosmaa, Raymond Yee</i>	
<b>Best Estimate SBLOCA Analysis of CANDU 9 Systems Part II: Control System Modelling</b> .....	601
<i>Fang Bao</i>	
<b>Effects of Gamma Radiation Versus Peroxide on Carbon Steel Corrosion</b> .....	611
<i>K. Daub, X. Zhang, J. J. Noël, J. C. Wren</i>	
<b>The Phase Transport and Reactions of <math>\gamma</math>-Irradiated Aqueous-Ionic Liquids</b> .....	620
<i>S. Howett, J. Joseph, S. Peiris, Z. Ding, J. C. Wren</i>	
<b>Theoretical and Experimental Analysis of Ultrasonic Cross Correlation Flow Measurement Technology</b> .....	630
<i>A. Gurevich, S. Selvaratnarajah, I. Abdalla</i>	
<b>Corrosion of Ag-Ag<sub>2</sub>O in Iodide Solutions: A Potential Radioiodine Immobilization Route</b> .....	641
<i>S. Pretty, P. Keech, X. Zhang, J. C. Wren</i>	
<b>An Electrochemical Study Of H<sub>2</sub>O<sub>2</sub> Decomposition on Single-Phase <math>\alpha</math>-Fe<sub>2</sub>O<sub>3</sub> Films</b> .....	648
<i>Dong Fu</i>	
<b>The Effect of Interfacial Mass Transfer on Steady-State Water Radiolysis</b> .....	684
<i>P. A. Yakubuskie, J. Joseph, J. C. Wren</i>	
<b>Neutronic Analysis of an Incorporated Thorium – Uranium Breeder-Booster in CANDU-6</b> .....	695
<i>Bradford Holmes, Mohamed Geweida</i>	
<b>Synthesis and Characterisation of a Lithium Ferrite Electrode for Nuclear Reactor Applications</b> .....	708
<i>M. Manley, William Cook</i>	
<b>Application of Neutron Diffraction in Characterization of Texture Evolution during High-Temperature Creep in Magnesium Alloys</b> .....	716
<i>Anton Sediako, Scott Shook, Sven Vogel, Dimitry Sediako</i>	
<b>Heat Transfer in a Bundle Cooled with Supercritical Freon-12</b> .....	726
<i>Wargha Peiman, Ashley Milner, Caleb Pascoe, Hemal Patel, Graham Richards, Igor Pioro</i>	
<b>The Effects of Surface Mechanical Attrition Treatment (SMAT) on the Electrochemical and Surface Properties of Alloy 600</b> .....	739
<i>M. Faichuk, S. Ramamurthy, W. M. Lau</i>	
<b>System Study of CANDU/LWR Synergy in Advanced Nuclear Fuel Cycles</b> .....	749
<i>Y. Friedlander</i>	
<b>Thermal-Elastic Deformation of CANDU Pressure Tube Following Fuel Element to Pressure Tube Contact</b> .....	760
<i>Farshad Talebi, Azin Behdadi, John C. Luxat</i>	

## **T5: PHYSICS 1**

<b>Qualification of a Computer Program to Analyze Shutdown System Flux Detector Response in Point Lepreau Generating Station</b> .....	778
<i>Quincy Alexander, Vinicius N. P Anghel, Daniel Comeau, Milan Ducic, Roxana Hutanu, Guy Jonkmans, Jonathon McKay, Bhaskar Sur, Dean Taylor</i>	
<b>Physics Analysis on the NRU Core for an Accident Scenario of a Loop Pressure Tube Crack</b> .....	790
<i>Timothy Leung</i>	
<b>Experience with WOLSONG-1 Phase-B Pre-Simulations Using WIMS/DRAGON/RFSP-IST Code Suite</b> .....	802
<i>Dai-Hai Chung, Bong-Ghi Kim, Sung Min Kim, Hyung-Bum Suh, Han-Sang Kim, Hyung-Jin Kim</i>	
<b>Inverse Kinetics For Subcritical Systems with Varying External Sources</b> .....	814
<i>Cristiano Silva, Daniel Palma, Alessandro Gonçalves, Aquilino Martinez</i>	
<b>Fuel-Pin Flux Reconstruction for CANDU Applications</b> .....	826
<i>Mohamed Dahmani, Wei Shen, Brian Phelps</i>	
<b>Neutron Diffusion Waves In CANDU<sup>®</sup> Reactors</b> .....	836
<i>Vinicius N. P Anghel, Guy Jonkmans, Dimitar V. Altiparmakov, Bhaskar Sur</i>	

<b>Models For Resonance Self-Shielding Calculation in Neutronic Analysis of the CANDU-SCWR Fuel Channel.....</b>	<b>845</b>
<i>Geneviève Harrisson, Guy Marleau</i>	

## **T6: THERMALHYDRAULICS**

<b>Numerical Simulation of Cross-Flow in Tube-Bundles to Model Flow Circulation of the Moderator in CANDU-6 .....</b>	<b>855</b>
<i>Romain Necciari, Alberto Teyssedou, Marcelo Reggio</i>	
<b>CNSC Expectations for Resolution of the Hydrogen Safety Issues .....</b>	<b>878</b>
<i>Magda Rizk, Alexandre Viktorov</i>	
<b>Qinshan CANDU® 6 Main Heat Transport System High Operational Performance .....</b>	<b>889</b>
<i>Wolfgang Hartmann, Chun Zeng, Jinjun Feng</i>	
<b>NUCIRC Thermal-Hydraulic Applications in Support of CANDU® Plant Design and Operation .....</b>	<b>904</b>
<i>Asmae Elalami, Wolfgang Hartmann, Arian Espahbod, Mohammad Tochaie</i>	
<b>Comparison of Turbulent Models for CANDU Moderator Following a Pressure Tube to Calandria Tube Contact.....</b>	<b>917</b>
<i>Aziz Behdadi, John C. Luxat</i>	
<b>Computational Fluid Dynamics Model for Liquid Poison Injection in the ACR-1000® Design.....</b>	<b>932</b>
<i>Fei Song, Reza Noghrehkar, Leslie Morris, Ken Hau</i>	
<b>Benchmarking Severe Accident Computer Codes for Heavy Water Reactor Applications .....</b>	<b>942</b>
<i>Jong Ho Choi</i>	

## **VOLUME 2**

## **T7: SAFETY MANAGEMENT AND SAFETY CULTURE**

<b>CNSC Power Reactor Operating License Reform .....</b>	<b>953</b>
<i>Ken Lafrenière</i>	
<b>An Approach for Risk Informed Safety Culture Assessment for Canadian Nuclear Power Stations .....</b>	<b>958</b>
<i>William R Nelson</i>	
<b>Risk-Informed Decision-Making in Canadian Nuclear Regulation.....</b>	<b>968</b>
<i>George Ishack</i>	
<b>Safety Analysis: Its Role and Current Trends.....</b>	<b>977</b>
<i>Alexandre Viktorov</i>	
<b>Application of the CNSC Risk-Informed Decision-Making Process in Nuclear Power Regulation: An Example .....</b>	<b>989</b>
<i>George Ishack</i>	

## **T8: PLANT-LIFE MANAGEMENT AND REFURBISHMENT**

<b>Impact of Flow Accelerated Corrosion (FAC) on Feeder Refurbishment Planning .....</b>	<b>1003</b>
<i>Mikko Jyrkama, Mahesh Pandey</i>	
<b>The Experience of Safety System Refurbishment in Wolsong Unit 1.....</b>	<b>1012</b>
<i>Jung Yang Lee, I Sun Hwang, Jin Huh, Tae Keun Park, Deuck Soo Lee, Dong I Nam, Eui Yob Hwang</i>	
<b>Initiation Phase of the Nuclear Refurbishment at Darlington Nuclear Generating Station.....</b>	<b>1024</b>
<i>Marina Freire-Gormaly</i>	
<b>Condition Assessment of Installed Nuclear Power Plant (I&amp;C) Cables .....</b>	<b>1034</b>
<i>K. Anandakumaran</i>	
<b>A Containment Analysis for SBLOCA without ECI in the Refurbished Wolsong-1 Nuclear Power Plant.....</b>	<b>1046</b>
<i>Techmo Kim, Bokja Moon, Changjoon Bae, Seonghee Lee, Chuljin Choi, Deuck Soo Lee, Sungmin Kim</i>	
<b>Gentilly-2 CANDU Nuclear Power Plant Level 1 Fire and Flood PSA – Insights on a Work in Progress .....</b>	<b>1057</b>
<i>Khaled Joobar, C Selman, J-F. Bolduc, Nava Dominguez, A. Bellil, T. Houasnia, R. Vaillancourt</i>	
<b>Localized Thinning Assessment - Service Life Extension for Darlington Feeders .....</b>	<b>1070</b>
<i>Ming Li, Jason Van Wart, Irfan Haq</i>	

## **T9: ENVIRONMENT AND WASTE MANAGEMENT 1**

<b>Portable Gamma-Ray Spectrometry for Decommissioning: Anywhere, Anytime, Anything</b> .....	1090
<i>Michael Atlas, Ernie Bialas</i>	
<b>Predicting the Time Course of Radionuclides in Aquatic Food Webs Following Pulse Releases</b> .....	1097
<i>David J. Rowan</i>	
<b>Best Available Technique (BAT) Assessment Applied to ACR-1000® Waste and Heavy Water Management Systems</b> .....	1108
<i>Melanie Catherine Sachar, Serge Julien, Ken Hau</i>	
<b>Protecting Fresh Water Resources during a Large-scale Low-Level Radioactive Waste Clean-up Project with Best Available Technology</b> .....	1115
<i>Gary Vandergaast, Glenn Case</i>	
<b>Making Strides on the Port Hope Area Initiative: Canada's Largest Low-Level Radioactive Waste Clean-up Project</b> .....	1128
<i>Christine Fahey, Glenn Case</i>	
<b>Use of Compound-Specific Isotope Analyses as a Tool to Demonstrate Biodegradation of Petroleum Hydrocarbons in Contaminated Groundwater</b> .....	1140
<i>Daniel Bouchard, Patrick Hohener, Daniel Hunkeler</i>	
<b>Human Health Risk Assessment for Radiological and Chemical Contaminants at Site with Historical Contamination</b> .....	1152
<i>Nava Garisto, Farrah Cooper, Rebecca Peters</i>	

## **T10: ADVANCED REACTORS AND APPLICATIONS**

<b>Optimization of Power-Cycle Arrangements for Supercritical Water Cooled Reactors (SCWRS)</b> .....	1162
<i>Laure Lizon-A-Lugrin, Alberto Teyssedou, Igor Pioro</i>	
<b>Canada's Used Nuclear Fuel Waste: A 20 Trillion Dollar Energy Resource Energy Extraction and Partial Detoxification in Fast-Neutron Reactors</b> .....	1179
<i>Peter Ottensmeyer</i>	
<b>Denatured Molten Salt Reactors (DMSR): An Idea Whose Time Has Finally Come?</b> .....	1191
<i>David Leblanc</i>	
<b>Draft Layout, Containment and Performance of the Safety System of the European Supercritical Water-Cooled Reactor</b> .....	1203
<i>Joerg Starflinger, Marc Schlagenhauser, Christina Köhly, Thomas Schulenberg, Stefan Rothschnitt, Dietmar Bittermann</i>	
<b>Research and Development Initiatives in Support of the Conceptual Design for the CANDU Supercritical Water-Cooled Reactor</b> .....	1216
<i>Daniel Brady, David Guzonas, Wenyue Zheng, Laurence Leung</i>	

## **PLENARY II: PERFORMANCE & ENVIRONMENTAL IMPROVEMENTS**

<b>Performance Improvement - Business Excellence Processes</b> .....	1230
<i>Jill Doucett</i>	
<b>Severe Accident Management - Emergency Containment Filtered Venting</b> .....	1240
<i>William Cooper</i>	
<b>The Development of CANDU in China</b> .....	1280
<i>Chun Zeng</i>	
<b>Enhancing Performance Through Collaboration</b> .....	1312
<i>John Froats</i>	

## **T11: PHYSICS 2**

<b>Application of the Full 3-D Collision Probability Method to Randomly Distributed Spherical Fuel Elements</b> .....	1323
<i>Marc-André Lajoie, Guy Marleau</i>	
<b>Physics Experiments in the Zed-2 Reactor Using CANFLEX-RU</b> .....	1334
<i>Julian Atfield, Michael Zeller</i>	
<b>Advances in the ACR-1000® Reactor Regulating System and Reactor Control</b> .....	1348
<i>Galina Leroy, Ron Robinson</i>	

<b>Probability Table Monte Carlo Method Applied to CANDU-6 Cell Calculation in DRAGON</b> .....	1361
<i>Nicolas Martin, Alain Hébert</i>	
<b>Monte Carlo Simulation of Neutron Transport Applied to Criticality: Focus on Sources and Flux Convergence Issues</b> .....	1373
<i>Joachim Miss, Yann Richet, Olivier Jacquet</i>	
<b>An Analytical Approximation for the Prediction of Transients with Temperature Feedback</b> .....	1384
<i>Daniel Palma, Adilson Silva, Alessandro Gonçalves, Aquilino Martinez</i>	
<b>Study of Power End Peaking for NRU Loop Fuel Calculations</b> .....	1392
<i>T. S. Nguyen, R. E. Donders</i>	

## **T12: SAFETY & LICENSING**

<b>Simulating Molten Fuel-Moderator Interactions with the Code MC3D</b> .....	1403
<i>Jeremy Licht</i>	
<b>Equivalent Moderator Subcooling Methodology to Determine Fuel Channel Integrity Upon Pressure Tube and Calandria Tube Contact</b> .....	1413
<i>Liqun Sun, Bruce Willemsen</i>	
<b>Heat Transfer Parameters for Glass-Peened Calandria Tube in Pressure Tube and Calandria Tube Contact Conditions</b> .....	1436
<i>Liqun Sun, Bruce Willemsen</i>	
<b>The Development of Trip Coverage Maps for the McMaster Nuclear Reactor</b> .....	1460
<i>Kurt Stoll, Simon Day, John C. Luxat</i>	
<b>Regulatory Oversight of Refurbishment Projects in Canada</b> .....	1472
<i>Jeff Stevenson, François Rinfret</i>	
<b>Regulatory Assessment of Integrated Safety Reviews for Nuclear Plants Refurbishment</b> .....	1482
<i>Al Omar, Christian Carrier</i>	

## **T13: OPERATIONS AND MAINTENANCE**

<b>Development Strategy of the Improved Standard Technical Specification for Wolsong CANDU-6 Nuclear Power Plants</b> .....	1493
<i>Sung Min Kim, Hyeong Taek Kim, Seong Soo Choi</i>	
<b>Consideration of Inspection Uncertainties in the Probabilistic Assessment of Steam Generator Tubing</b> .....	1500
<i>Mahesh Pandey, Dongliang Lu, Jovica Riznic</i>	
<b>Maintenance Optimization through Risk Based Ageing Management Program</b> .....	1515
<i>Marie-Charlotte Barreau, Isadora Cornish-Bowden, Laurent Augé, Richard Frenette</i>	
<b>A Proposed Structural, Risk-Informed Approach to the Periodicity of CANDU-6 Nuclear Containment Integrated Leak Rate Testing</b> .....	1527
<i>Nabil Saliba, Dražan Komljenovic, Luc Chouinard, Raynald Vaillancourt, Guy Chrétien, Vladimir Gocovski</i>	

## **T14: INSTRUMENTATION AND CONTROL**

<b>Ultrasonic Flow Monitoring of SDS/ECI Feeder Channels</b> .....	1551
<i>Jian Yang, Chanlei Zhao</i>	
<b>Nuclear Installation's Instrumentation and Control Systems on the Basis of Advanced RADIY™ Platform</b> .....	1557
<i>E Bakhmach, O Siora, V Kharchenko, V Bezsalyi, Volodymyr Sklyar, A Andrashov</i>	
<b>DCS Emulator Development for the ACR-1000® Simulator</b> .....	1568
<i>Yasuhiro Nakashima, Randy Trueman, Kazuhiko Ishii</i>	
<b>The Effect of Intermittent Operation on Local Fission Rate in the McMaster Nuclear Reactor</b> .....	1580
<i>Andrew Morreale, Simon Day, William Garland</i>	
<b>Gamma Radiation Scanning of Nuclear Waste Storage Tile Holes</b> .....	1593
<i>Arjun Das, Shuwei Yue, Bhaskar Sur, James Johnston, Michel Gaudet, Murray Wright, Neil Burton</i>	
<b>Control System Design Considerations in a Modern Nuclear Power Plant</b> .....	1603
<i>Phil Foster, Gilbert Raiskums, John Harber, Sunil Tikku</i>	



## **T15: ENVIRONMENT AND WASTE MANAGEMENT 2**

<b>Fate and Transport Modelling of Uranium in Port Hope Harbour</b> .....	1616
<i>Camilo Pinilla, Nava Garisto, Rebecca Peters</i>	
<b>Validation of a Long-Term Tritium Dynamical Model</b> .....	1632
<i>Vlad Korolevych, Sang Bog Kim</i>	
<b>Gas Generation Model for OPG's Low and Intermediate Level Radioactive Waste Deep Geologic Repository</b> .....	1644
<i>Kelly Sedor, Paul Suckling, Paul Humphreys, Fraser King</i>	
<b>Muon Tomography for Imaging Nuclear Waste and Spent Fuel Verification</b> .....	1656
<i>Guy Jonkmans, Vinicius N. P Anghel, Martin Thompson</i>	
<b>Ecological Risk Assessment for Radiological and Chemical Contaminants at a Site with Historical Contamination</b> .....	1668
<i>Nava Garisto, Allison Janes, Rebecca Peters</i>	
<b>Transportable Automated Iodine-131 and Xenon-133 Sampling System</b> .....	1678
<i>Quincy Alexander, S Alexander, D Everall, Guy Jonkmans, N Munir, M O'Kane, Blair Smith, Bhaskar Sur, Gordon Tapp, P Tonner, Shuwei Yue</i>	
<b>Comparison of Dose Estimate Results from Radioecological Risk Assessment Models RESRAD-BIOTA, ERICA Tool and SENES Risk Model Using a Case Study</b> .....	1688
<i>Nava Garisto, Ryan Kovacs, Allison Janes</i>	

## **T16: RADIATION AND MEDICAL-RADIONUCLIDE PRODUCTION**

<b>Retrospective dosimetry with EPR and OSL at McMaster University</b> .....	1700
<i>Jeroen Thompson, D. R. Boreham, W. J. Rink, R. Mistry</i>	
<b>Modelling of Aircrew Radiation Exposure During Solar Particle Events</b> .....	1711
<i>Hani Al Anid, B. J. Lewis, L. G. I. Bennett, Masashi Takada</i>	
<b>Photo Production of Isotopes for Medical and Industrial Usages</b> .....	1724
<i>Barbara Szpunar, Chary Rangacharyulu</i>	
<b>Producing Molybdenum-99 in CANDU Reactors</b> .....	1738
<i>Jerry Cuttler</i>	
<b>Imaging Radioactive Components Inside a CANDU® Reactor Using Gamma Radiation Scanning</b> .....	1744
<i>Shuwei Yue, Blair Smith, Guy Jonkmans, James Johnston, Gordon Tapp, Daniel Comeau, Dean Taylor, Bhaskar Sur</i>	

## **CONFERENCE LUNCHEON II**

<b>Materials R&amp;D with Neutron Beams - How the NRU Reactor Serves Canada further as a Unique Resource for Science and industry</b> .....	1753
<i>John Root</i>	

## **PLENARY III: NUCLEAR SCIENCE & TECHNOLOGY AND HEALTH**

<b>Medical Isotopes and Emerging Nuclear Medicine Technologies</b> .....	1785
<i>Jean-Luc Urbain</i>	
<b>Ensuring Nuclear Safety in Research and Health</b> .....	1834
<i>Michael Binder</i>	
<b>NRU Return to Service</b> .....	1855
<i>William Pilkington</i>	
<b>The History of ZED-2</b> .....	1874
<i>Rick Jones</i>	

## **ADDITIONAL PAPERS**

<b>Development and Test of a GEM-Based TEPC for Neutron Protection Dosimetry</b> .....	1895
<i>M. Seydaliev, C. Wang</i>	
<b>The Impact of Public Perception and Education on Utilized Rates of Civilian Nuclear Power</b> .....	1908
<i>J. R. Deal, Anna Solvei Tison</i>	
<b>Author Index</b>	