



**Sixth CNS  
International  
Conference on  
CANDU  
Maintenance**

**Sunday, November 16, 2003**

Registration 16:00 – 20:00

Welcome Reception 18:00 – 20:00  
King II (Sponsored by GE Canada)

**Monday, November 17, 2003**

Registration & Coffee Speakers' Breakfast 07:30 – 08:30  
King I (Sponsored by Canatom)

PLENARY SESSION 08:30 – 10:00  
Regency A, B, C  
Welcoming Remarks :  
Martin Reid, Conference Chair,  
Ontario Power Generation, Pickering  
Duncan Hawthorne,  
Honorary Conference Chair, President &  
CEO, Bruce Power

Coffee Break 10:00 – 10:30  
(Sponsored by ES Fox)

**SESSION 1 10:30 – 12:00**

**1A : FUEL CHANNELS & END FITTINGS—ASSESSMENTS**  
Regency Salon A  
Chair: Marc Leger, AECL

**1B : WATER UPGRADING**  
Regency Salon B  
Chair: John Roberts, Bruce Power

**1C : PERFORMANCE & PLANT LIFE IMPROVEMENT [1]**  
Regency Salon C  
Chair: Herman Stremmler, GE Canada

**1D : STEAM GENERATOR LIFE MANAGEMENT**  
Oak Room (Concourse Level)  
Chair: Bill Schneider, B & W Canada

Luncheon 12:00 – 13:30  
King I (Sponsored by Ontario Power Generation)  
Guest Speaker Mike Lees, Director Business  
Development and Marketing B&W Canada

**SESSION 2 13:30 – 15:00**

**2A : FUEL CHANNELS & END FITTINGS — INSPECTIONS**  
Regency Salon A  
Chair: Colette Taylor, AECL

**2B : MAINTENANCE PROGRAMS [1]**  
Regency Salon B  
Chair: Bob Tapping, AECL

**2C : PERFORMANCE & PLANT LIFE IMPROVEMENT [2]**  
Regency Salon C  
Chair: Jim Nickerson, AECL

**2D : FEEDER INSPECTIONS**  
Oak Room (Concourse Level)  
Chair: John Slade, NB Power

Coffee Break 15:00 – 15:30  
(Sponsored by Framatome ANP)

**SESSION 3 15:30 – 17:00**

**3A : INSPECTION TECHNOLOGY — FUEL CHANNELS**  
Regency Salon A  
Chair: Doug Mahler, GE Canada

**3B : MAINTENANCE PROGRAMS [2]**  
Regency Salon B  
Chair: Barry King, B & W Canada

**3C : PERFORMANCE & PLANT LIFE IMPROVEMENT [3]**  
Regency Salon C  
Chair: Marc Paiment, OPG

**3D : FEEDER ASSESSMENT & MITIGATION [1]**  
Oak Room (Concourse Level)  
Chair: Tracy Gendron, AECL

Reception 17:15 – 18:00  
King II (Sponsored by Bruce Power)

Dinner 18:00  
King I (Sponsored by AECL)  
Guest Speaker Philip Klintworth  
Advent Engineering (US Navy – Retired)

**Tuesday, 18 November 2003**

Registration & Coffee Speakers' Breakfast 07:30 – 08:30  
King I

**SESSION 4 08:30 – 10:00**

**4A : FEEDER ASSESSMENT & MITIGATION [2]**  
Regency Salon A  
Chair: Tracy Gendron, AECL

**4B : VALVE MAINTENANCE**  
Regency Salon B  
Chair: Greg Shikaze, B & W Canada

**4C : INSPECTION TECHNOLOGY — STEAM GENERATORS**  
Regency Salon C  
Chair: Carmina Maruska, OPG

**4D : INSTRUMENTATION & CONTROL**  
Regency Salon D  
Chair: Frank Didomizio, GE Canada

Coffee Break 10:00 – 10:30

**SESSION 5 10:30 – 12:00**

**5A : FUEL CHANNELS & END FITTINGS — UNIVERSAL DELIVERY MACHINE**  
Regency Salon A  
Chair: Eric Williams, Bruce Power

**5B : INSPECTION TECHNOLOGY**  
Regency Salon B  
Chair: Nick van den Brekel, OPG

**5C : STEAM GENERATOR MODIFICATIONS**  
Regency Salon C  
Chair: Mahvash Mirzai, AECL

**5D : FUEL HANDLING**  
Regency Salon D  
Chair: Don Burnett, AECL

Luncheon 12:00 – 13:30  
King I (Sponsored by RCM Technologies &  
ES Fox); Guest Speaker Ken Hedges  
Vice-President, ACR Business Unit, AECL

**SESSION 6 13:30 – 14:30**

**6A : FUEL CHANNELS & END FITTINGS — MAINTENANCE**  
Regency Salon A  
Chair: Brent Smith, NB Power

**6B : STEAM GENERATORS — INSPECTIONS**  
Regency Salon B  
Chair: Ed Price, AECL (Ret'd)

**6C : STEAM GENERATORS — ASSESSMENTS**  
Regency Salon C  
Chair: Jeff Millman, B & W Canada

November 16–18, 2003  
Holiday Inn On King, Toronto, Canada

# PLENARY SESSION

## ■ Welcoming Remarks

**Martin Reid, Conference Chair**

*Ontario Power Generation, Pickering*

**Duncan Hawthorne, Honorary Conference Chair**

*President & CEO, Bruce Power*

## ■ Keynote Speakers

**Jarmo Tanhua**

*Manager, Electrical and Automation Maintenance*

*TVO, Finland*

**David Scott**

*Director, Commercial Products & Field Services*

*Atomic Energy of Canada Limited*

**Ricardo Tibaldi**

*Station Manager, Embalse Nuclear Power Plant, Argentina*

# FUEL CHANNELS & END FITTINGS — ASSESSMENTS

Chair: Marc Léger, Atomic Energy of Canada Limited

- **Innovation in Pressure Tube Life Assessment**  
**B. Guler, D. Kalenchuk, A. Celovsky**  
*Atomic Energy of Canada Limited*
- **Development of a Finite Element Modal Model for a CANDU Fuel Channel**  
**J. Park, B.S. Kim, J.H. Lee, G.Y. Park**  
*Korea Atomic Energy Research Institute*  
**C.J. Kim**  
*Korea Hydro & Nuclear Power Company Ltd.*

1A

# WATER UPGRADING

1B

Chair: John Roberts, Bruce Power

- **Combined Electrolysis and Catalytic Exchange (CECE) Technology – An Economical Alternative for Heavy Water Upgraders Using Water Distillation**  
**D.K. Ryland, R.R. Sadhankar**  
*Atomic Energy of Canada Limited*
- **Catalytic Removal of Dissolved Oxygen for Nuclear and Non-Nuclear Applications**  
**S. Suppiah, D.L. Burns, C.R. Aelick**  
*Atomic Energy of Canada Limited*

# PERFORMANCE & PLANT LIFE IMPROVEMENT (1)

1C

**Chair: Herman Stremmer, GE Canada**

- **ECCS Strainers – From Design to Installation**

  - D.B. Rhodes**

  - Atomic Energy of Canada Limited*

  - A. Criminisi**

  - Ontario Power Generation*

  - N.J. Fisher, A. Eyvindson**

  - Atomic Energy of Canada Limited*

- **Improved Station Performance Through the Use of Sub-Micron Filters**

  - W. Walker**

  - Pall Canada Ltd.*

  - D. Guzonas**

  - Atomic Energy of Canada Limited*

  - G. Svarovsky**

  - Ontario Power Generation*

# STEAM GENERATOR LIFE MANAGEMENT

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Chair: Bill Schneider, Babcock & Wilcox Canada

- **Steam Generator Life Management**  
P.J. King, R. McGillivray, W. Reinhardt,  
J. Millman, B. King, W. Schneider  
*Babcock & Wilcox Canada*
  
- **Steam Generator Return to Service Following  
Extended Layup**  
J. Sherin  
*Bruce Power*  
R.L. Tapping, S. Roy  
*Atomic Energy of Canada Limited*
  
- **Maintenance and Life Management of Steam Generators at  
EMBALSE Nuclear Station**  
R. Sainz, G. Díaz, H. Sveruga  
*Nucleoeléctrica Argentina S.A.*  
T.K. Ramakrishnan, S. Azeez  
*Atomic Energy of Canada Limited*

# FUEL CHANNELS & END FITTINGS — INSPECTIONS

2A

Chair: Colette Taylor, Atomic Energy of Canada Limited

- Fuel Channel Diameter Creep Measurement Using a Modified SLARette Tool  
G. Rousseau, J. Bherer, M. Drouin,  
C. Tremblay  
*Hydro-Québec*
- Hydro-Québec MED (Diametric Expansion Measurement)  
J. Bherer, C. Tremblay  
*Hydro-Québec*
- Tools for Computer-Assisted Analysis of Fuel Channel Inspection Data  
T. Joulin, D. Horn, T.W. Krause, K.R. Chaplin,  
D. Dunford, E.G. Long  
*Atomic Energy of Canada Limited*

# MAINTENANCE PROGRAMS (1)

Chair: Bob Tapping, Atomic Energy of Canada Limited

- **Program Strategies for Maintenance Management, Organization & Planning**  
*J.I. Czegeny*  
*Ontario Power Generation*
  
- **Nuclear Maintenance Work Volume Model**  
*M. Thibeault*  
*Ontario Power Generation*
  
- **Pickering A – Ontario Power Generation Rotating Equipment PDM Integrated Reporting**  
*K. Slater, P. Reitknecht*  
*Ontario Power Generation*



## PERFORMANCE & PLANT LIFE IMPROVEMENT (2)

2C

**Chair: Jim Nickerson, Atomic Energy of Canada Limited**

- **Innovation to Reality For Improved Pump Seal Performance**  
**W. Wong, A Eyvindson, D.B. Rhodes**  
*Atomic Energy of Canada Limited*
- **Inflatable Airlock Door Seals for Improved Performance**  
**T. Sykes, K. Weisenberg, R. Yeung, F. Briscoe**  
*Atomic Energy of Canada Limited*

# FEEDER INSPECTIONS

Chair: John Slade, New Brunswick Power

- **Development of Ultrasonic Techniques for Feeder Cracking Inspection at Gentilly-2**  
**G. Rousseau, J.-F. Coté, G. Lepage, E. Lavoie**  
*Hydro-Québec*
- **On the Development of the Métar Family of Inspection Tools**  
**E. Lavoie, G. Rousseau, L. Reynaud**  
*Hydro-Québec*

# INSPECTION TECHNOLOGY — FUEL CHANNELS

3A

Chair: Doug Mahler, GE Canada

- **Implementation of Advanced Spacer Detection and High Accuracy Gap on SLAR**  
**T.W. Krause, J.J. Schankula, T. Joulin, S. Craig**  
*Atomic Energy of Canada Limited*
- **Fuel Channel Inspection with AFCIS**  
**W. Mayo, G. Van Drunen, D. Kalenchuk,  
R. Gunn**  
*Atomic Energy of Canada Limited*
- **Modification of Gentilly-2 SLARette Inspection System for Delivering Ontario Power Generation's ANDE Inspection Tools**  
**M. Cantin, G. Rousseau, J. Bherer**  
*Hydro-Québec*  
**J. Drossis, G. Jarvis**  
*Ontario Power Generation*

# MAINTENANCE PROGRAMS (2)

3B

Chair: Barry King, Babcock & Wilcox Canada

- **Using Systematic Aging Assessments to Improve Effectiveness of Plant Maintenance Programs**  
**P. Watson, J.X. Yang, R.F. Dam, J.H. Nickerson**  
*Atomic Energy of Canada Limited*
- **Challenges of Adolescent and Maturing Nuclear Plants:  
A Chemistry Perspective on Maintenance & Outages**  
**J.G. Roberts**  
*Bruce Power*
- **Maintenance Optimization at Bruce Power**  
**K.R. Ellis, R.E. Tout**  
*Bruce Power*

# PERFORMANCE & PLANT LIFE IMPROVEMENT [3]

3C

Chair: Marc Paiment, Ontario Power Generation

- **Cernavoda NPP Plant Life Management (PLiM) Program**  
**L. Delcea, P. Barbulescu, E. Moldoveanu, M. Serban**  
*Societatea Nationala Nuclearelectrica S.A., Romania*  
**V.S. Krishnan, R.F. Dam, J.H. Nickerson**  
*Atomic Energy of Canada Limited*
- **Refurbishment Programs**  
**C.S. Irish**  
*Nuclear Logistics, Inc.*
- **Benefits of a Systematic Approach to Maintenance for Safety and Safety-Related Systems**  
**R.F. Dam, S. Ayazzudin, J.H. Nickerson**  
*Atomic Energy of Canada Limited*

# FEEDER ASSESSMENT & MITIGATION [1]

Chair: Tracy Gendron, Atomic Energy of Canada Limited

- Overview of Feeder Issues  
**T.S. Gendron**  
*Atomic Energy of Canada Limited*
  
- Evaluation of Options for Life Cycle Management of Feeder Cracking at the Point Lepreau Generating Station  
**T.S. Gendron**  
*Atomic Energy of Canada Limited*  
**J.P. Slade**  
*New Brunswick Power*
  
- Use of Depleted Fuel as a Mitigation Method for Reducing FAC in Selected Channels  
**G. Rousseau, D. Brissette**  
*Hydro-Québec*

## FEEDER ASSESSMENT & MITIGATION [2]

Chair: Tracy Gendron, Atomic Energy of Canada Limited

### ■ Assessment of CANDU Feeders Subject to Flow Accelerated Corrosion

**S. Iyer**

*Atomic Energy of Canada Limited*

**J.P. Slade**

*New Brunswick Power*

### ■ Remaining Life Assessment of Pickering A Primary Heat Transport Outlet Feeder Elbows

**W. Lee**

*Ontario Power Generation*

**C. Schefski**

*Atomic Energy of Canada Limited*

**T. Lau, P. Floyd**

*Ontario Power Generation*

### ■ Light Water In-Reactor Loop Experiments to Support a CANDU HTS pH<sub>a</sub> Specification for Minimizing Feeder Wall Thinning

**A.J. Elliot, M.S. Godin, Z.H. Walker**

*Atomic Energy of Canada Limited*

# VALVE MAINTENANCE

Chair: Greg Shikaze, Babcock & Wilcox Canada

- **Hardfacing and Packings for Improved Valve Performance**  
**J.A. Aikin, J.N.F. Patrick, I. Inglis**  
*Atomic Energy of Canada Limited*
- **Alternative Packing Solutions for Manual and Modulating Valves**  
**W.A. Igel**  
*Technical Sealing Products, Inc.*  
*(Exclusive North American Distributor for LATTY International)*
- **New Developments in Valve Stem Sealing**  
**W.A. Igel**  
*Technical Sealing Products, Inc.*  
*(Exclusive North American Distributor for LATTY International)*



# INSPECTION TECHNOLOGY — STEAM GENERATORS

4C

Chair: Carmina Maruska, Ontario Power Generation

- Overview of Eddy Current Inspection Technology for CANDU SG Tubing

**L. Obrutsky, M. Mirzai**

*Atomic Energy of Canada Limited*

- Advances in Analysis of Eddy Current Data from Steam Generator Inspections

**D. Horn, R. Roiha, J. Lu**

*Atomic Energy of Canada Limited*

- Pre-Service Baseline Inspection Using X-Probe of Oconee Replacement Steam Generators

**M. Addario, P. Shipp**

*Babcock & Wilcox Canada*

**K. Davis**

*Duke Power*

**C. Fogal**

*R/D Tech*

# INSTRUMENTATION & CONTROL

40

Chair: Frank Didomizio, General Electric Canada

- **I&C Upgrading at Nuclear Power Plants**  
**A. Tamiri**  
*Ontario Power Generation*
  
- **Testing the Dynamics of Shutdown Systems Instrumentation in Reactor Trip Measurements**  
**O. Glöckler**  
*Ontario Power Generation*
  
- **Electrical and C&I Maintenance at Cernavoda NPP**  
**S. Hada, S. Voiculescu, D. Bigu**  
*Societatea Nationala Nuclearelectrica S.A., Romania*  
**V.S. Krishnan**  
*Atomic Energy of Canada Limited*

# FUEL CHANNELS & END FITTINGS — UNIVERSAL DELIVERY MACHINE

Chair: Eric Williams, Bruce Power

- Design of The Bruce and Darlington Universal Delivery Machine Heads

**M.G. Gray**

*General Electric Canada*

**R. Brown**

*Ontario Power Generation*

- Pickering UDM Transportation System

**P.J. Brennan, J.J. Vissers**

*General Electric Canada*

**R. Brown**

*Ontario Power Generation*

- Digital Motion Control for Ontario Power Generation's Universal Delivery Machine

**D.W. Murray**

*General Electric Canada*

**A. Roberts**

*Ontario Power Generation*

5A

# INSPECTION TECHNOLOGY

5B

Chair: Nick van den Brekel, Ontario Power Generation

- **Shutdown Cooling Heat Exchanger Leak Found by X-Probe**  
**M. Cantin**  
*Hydro-Québec*  
**R. Lakhan**  
*R/D Tech*
- **Recent Applications of Phased Array Inspection for Turbine Components and Welded Structures**  
**P. Ciorau, D. MacGillivray, R. Hanson**  
*Ontario Power Generation*
- **Identification and Management of Cracking in 410 Stainless Turbine Blade Roots**  
**M. Clark, E. Lehockey, I. Thompson,**  
**R. Massey**  
*Kinectrics*

# STEAM GENERATOR MODIFICATIONS

5C

Chair: Mahvash Mirzai, Atomic Energy of Canada Limited

- **Steam Generator Thermal Sleeve Reconstruction**  
**E. Caton, A. Askari, P. Volder**  
*Babcock & Wilcox Canada*
- **Steam Generator Modifications and Repairs at Wolsong, Cernavoda, & Qinshan**  
**J. Vandenberg, R. Kizhatil, P. Caple**  
*Babcock & Wilcox Canada*
- **Auxiliary U-Bend Support Retrofit**  
**R. Horvath, S. Fluit, R. Kizhatil**  
*Babcock & Wilcox Canada*

# FUEL HANDLING

50

Chair: Don Burnett, Atomic Energy of Canada Limited

- Mechanism of Crud Migration Into the Fuelling Machine and its Effects  
T. Sie  
*Ontario Power Generation*
  
- Darlington Nuclear Fuelling Machine System Monitoring  
T. Sie  
*Ontario Power Generation*
  
- Fouling Issues Within CANDU Fuel Bay Purification Systems  
P. Angell  
*Atomic Energy of Canada Limited*  
J. Murray  
*Ontario Power Generation*

# FUEL CHANNELS & END FITTINGS — MAINTENANCE

6A

Chair: Brent Smith, New Brunswick Power

- Reactor Inspection & Maintenance Machine Senses and Homes in On Reactor End Fittings

**R.G. Fell**

*General Electric Canada*

**R. Brown**

*Ontario Power Generation*

- Feeder Hub Refurbishment to Reduce D<sub>2</sub>O Leakage

**B.D.J. Smith, H. de Boer, A. Duerden**

*Atomic Energy of Canada Limited*

**O. Lepik**

*Ontario Power Generation*

**D.J. Benton**

*Atomic Energy of Canada Limited*

# STEAM GENERATORS — INSPECTIONS

6B

Chair: Ed Price, Atomic Energy of Canada Limited (Ret'd)

- **Pickering A Steam Generators – Inspection of Boiler Feedwater Nozzles and Thermal Sleeves**

**C. Schefski, J. Pietralik**

*Atomic Energy of Canada Limited*

**C. Gluck, R. Richard, P. Floyd, T. Lau**

*Ontario Power Generation*

- **Tube to U-Bend Support Bar In-Situ Clearance Measurement**

**P. Shipp, R. Klarner, W. Schneider,**

**M. Addario**

*Babcock & Wilcox Canada*



# STEAM GENERATORS — ASSESSMENTS

6C

Chair: Jeff Millman, Babcock & Wilcox Canada

- Review of Failures of Recirculating Steam Generator Internals Due to Flow-Accelerated Corrosion

**J. Pietralik**

*Atomic Energy of Canada Limited*

- A Technique to Infer Steam Generator Fouling Factors from Tube Deposit Loading

**M. Yetisir, S. Laroche, C.W. Turner**

*Atomic Energy of Canada Limited*