American Nuclear Society

4th International Topical Meeting on Nuclear Plant Instrumentation, Control and Human Machine Interface Technology

September 19-22, 2004
Hyatt Capital Square
Columbus, Ohio

Preliminary Program & Registration Materials

Sponsored by: The ANS Human Factors Division, Operations and Power Division and the ANS Ohio Section
Co-Sponsored by: The Ohio State University, EPRI, DOE, NRC, IAEA and OECD/NEA
American Nuclear Society

4th International Topical Meeting on Nuclear Plant Instrumentation, Control and Human Machine Interface Technology

Hyatt Capital Square • Columbus, Ohio • September 19-22, 2004

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NPIC & HMIT 2004 is the Fourth American Nuclear Society International Topical meeting on Nuclear Power Plant Instrumentation, Control and Human-Machine Interface Technologies. The first three meetings are considered to be the most significant international meetings in the past decade with a focus on Nuclear Plant I&C and Human Machine Interface Technologies. NPIC & HMIT 2004 will build on the tradition established in the first three meetings. It will feature expanded international participation, and a technical exhibit with vendors of I&C and HMIT equipment and products.

Conference Banquet:
The conference banquet, sponsored by Battelle Memorial Institute, will be at the world famous Columbus Center of Science and Industry (COSI), and the speaker will be Kathryn Sullivan, the first American woman to walk in space. The banquet will be held Tuesday evening from 6:30 p.m. to 10:00 p.m.
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<tr>
<td></td>
<td>Larry Erin</td>
<td>Don Miller</td>
<td>Ted Quinn</td>
<td>Joe Naser</td>
<td>Richard Wood</td>
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Technical Program Committee

<table>
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Meeting Schedule Summary

4th International Topical Meeting on Nuclear Plant Instrumentation, Control and Human Machine Interface Technology
Hyatt Capital Square • Columbus, Ohio • September 19-22, 2004

Sunday, September 19, 2004
8:00 a.m. – 5:00 p.m.
Professional Development Workshop

Monday, September 20, 2004
8:00 a.m. – 10:30 a.m.
Plenary Session
10:45 a.m. – 12:15 p.m.
Technical Sessions
  Human Performance Modeling (Demo)
  Human Reliability Analysis
  Procedures and Training
  Research Reactor I&C Applications
  Environmental Compatibility
  Maintenance and Condition Monitoring
  Pre-Developed Systems and Software
12:30 p.m. - 1:30 p.m. Lunch
1:45 p.m. – 5:00 p.m.
Technical Sessions
  User Interface Design and Analysis Tools
  Advances in HMI Technology
  Licensing Panel 1
  Advanced Measurements – Neutron Detection & Power Measurement 2
  Modernization Experience II – Extensive Replacement
  Signal Analysis
  Safety Critical Software V&V
6:30 p.m. - 10:00 p.m. Conference Banquet
  Sponsored by Battelle Memorial Institute

Wednesday, September 22, 2004
8:00 a.m. – 8:45 a.m.
Plenary Session
9:00 a.m. – 12:15 p.m.
Technical Sessions
  Human Factors Considerations in Plant Safeguards and Security
  New Approaches to Information Design
  Measurement Uncertainty
  Future I&C Systems
  Non-reactor Applications
  Virtual Reality: Applications and Issues
  Quantitative Reliability Analysis of Digital Systems
12:30 p.m. - 1:30 p.m. Lunch
1:45 p.m. – 5:00 p.m.
Technical Sessions
  Licensing Panel 2
  HMI Test, Evaluation, and V&V
  DOE/EPRI Guidelines for Digital I&C and Control Room Modernization
  Advanced Measurements – Techniques and Sensors
  Design Approaches to Digital Upgrades
  Reactor Noise Analysis
  Software and Digital Systems Reliability
6:30 p.m. - 10:00 p.m. Conference Banquet
  Sponsored by Battelle Memorial Institute

Thursday, September 23, 2004
8:00 a.m. – 5:00 p.m.
EC SC45A Working Group A9
8:30 a.m. – 4:00 p.m.
NRC Workshop on International Research Activities

Friday, September 24, 2004
8:30 a.m. – noon
NRC Workshop on International Research Activities
**4th International Topical Meeting on Nuclear Plant Instrumentation, Control and Human Machine Interface Technology**  
Hyatt Capital Square • Columbus, Ohio • September 19-22, 2004

### I&C Tracks

**Digital I&C Track**
- Pre-Developed Systems and Software  
- Software Development  
- Safety Critical Software Verification and Validation  
- Quantitative Reliability Analysis of Digital Systems  
- Software and Digital System Reliability  
- Design Approaches to Digital Upgrades  
  
  **Monday AM**
  - Planning for I&C Modernization
  - Plant Modernization Experience I - Individual Systems
  - Plant Modernization Experience II - Extensive Replacement
  - Non-Reactor Applications
  
  **Monday PM**
  - Research Reactor I&C Applications
  - Advanced Neutron and Power Measurement I
  - Advanced Neutron and Power Measurements II
  - Future I&C Systems
  - Advanced Measurement Techniques & Sensors
  
  **Tuesday AM**
  - Maintenance and Condition Monitoring
  - Diagnostics
  - Prognostics
  - Signal Analysis
  - Reactor Noise Analysis
  
  **Tuesday PM**
  - Environmental Compatibility
  - Licensing Issues for Advanced I&C Technologies
  - Licensing Panel 1
  - Measurement Uncertainty
  - Licensing Panel 2

### Modernization Track

**Monday PM**
- Planning for I&C Modernization
- Plant Modernization Experience I - Individual Systems
- Plant Modernization Experience II - Extensive Replacement
- Non-Reactor Applications

**Tuesday AM**
- Research Reactor I&C Applications
- Advanced Neutron and Power Measurement I
- Advanced Neutron and Power Measurements II
- Future I&C Systems
- Advanced Measurement Techniques & Sensors

**Tuesday PM**
- Maintenance and Condition Monitoring
- Diagnostics
- Prognostics
- Signal Analysis
- Reactor Noise Analysis

**Wednesday AM**
- Environmental Compatibility
- Licensing Issues for Advanced I&C Technologies
- Licensing Panel 1
- Measurement Uncertainty
- Licensing Panel 2

### Operations Track

**Monday AM**
- Maintenance and Condition Monitoring
- Diagnostics
- Prognostics
- Signal Analysis
- Reactor Noise Analysis

**Monday PM**
- Environmental Compatibility
- Licensing Issues for Advanced I&C Technologies
- Licensing Panel 1
- Measurement Uncertainty
- Licensing Panel 2

**Tuesday AM**
- Maintenance and Condition Monitoring
- Diagnostics
- Prognostics
- Signal Analysis
- Reactor Noise Analysis

**Tuesday PM**
- Environmental Compatibility
- Licensing Issues for Advanced I&C Technologies
- Licensing Panel 1
- Measurement Uncertainty
- Licensing Panel 2

### Licensing Track

**Monday AM**
- Maintenance and Condition Monitoring
- Diagnostics
- Prognostics
- Signal Analysis
- Reactor Noise Analysis

**Monday PM**
- Environmental Compatibility
- Licensing Issues for Advanced I&C Technologies
- Licensing Panel 1
- Measurement Uncertainty
- Licensing Panel 2

**Tuesday AM**
- Maintenance and Condition Monitoring
- Diagnostics
- Prognostics
- Signal Analysis
- Reactor Noise Analysis

**Tuesday PM**
- Environmental Compatibility
- Licensing Issues for Advanced I&C Technologies
- Licensing Panel 1
- Measurement Uncertainty
- Licensing Panel 2

**Wednesday AM**
- Maintenance and Condition Monitoring
- Diagnostics
- Prognostics
- Signal Analysis
- Reactor Noise Analysis

**Wednesday PM**
- Environmental Compatibility
- Licensing Issues for Advanced I&C Technologies
- Licensing Panel 1
- Measurement Uncertainty
- Licensing Panel 2

### HMI Tracks

**HMI Modernization Track**

**Tuesday AM**
- Plant Experience and Lessons Learned from Plant Modernization
- DOE/EPRI Guidelines for Digital I&C and Control Room Modernization
- Procedures and Training
- Monitoring, Surveillance, and Alarms

**Wednesday AM**
- Concepts of Operations for Advanced Reactors
- Advances in Human-Automation Interaction
- Advances in HMI Technology
- New Approaches to Information Design

**Wednesday PM**
- Human Reliability Analysis
- Human Performance Modeling
- Regulatory Approaches to Advanced and Innovative Design
- User Interface Design and Analysis Tools
- Virtual Reality: Applications and Issues
- HMI Test, Evaluation, and V&V

### Advanced Reactors and Concepts Track

**Monday PM**
- Plant Experience and Lessons Learned from Plant Modernization
- DOE/EPRI Guidelines for Digital I&C and Control Room Modernization
- Procedures and Training
- Monitoring, Surveillance, and Alarms

**Tuesday AM**
- Concepts of Operations for Advanced Reactors
- Advances in Human-Automation Interaction
- Advances in HMI Technology
- New Approaches to Information Design

**Tuesday PM**
- Human Reliability Analysis
- Human Performance Modeling
- Regulatory Approaches to Advanced and Innovative Design
- User Interface Design and Analysis Tools
- Virtual Reality: Applications and Issues
- HMI Test, Evaluation, and V&V

### Methods and Tools Track

**Monday AM**
- Plant Experience and Lessons Learned from Plant Modernization
- DOE/EPRI Guidelines for Digital I&C and Control Room Modernization
- Procedures and Training
- Monitoring, Surveillance, and Alarms

**Monday PM**
- Concepts of Operations for Advanced Reactors
- Advances in Human-Automation Interaction
- Advances in HMI Technology
- New Approaches to Information Design

**Tuesday AM**
- Human Reliability Analysis
- Human Performance Modeling
- Regulatory Approaches to Advanced and Innovative Design
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- Virtual Reality: Applications and Issues
- HMI Test, Evaluation, and V&V

**Tuesday PM**
- Plant Experience and Lessons Learned from Plant Modernization
- DOE/EPRI Guidelines for Digital I&C and Control Room Modernization
- Procedures and Training
- Monitoring, Surveillance, and Alarms

**Wednesday AM**
- Concepts of Operations for Advanced Reactors
- Advances in Human-Automation Interaction
- Advances in HMI Technology
- New Approaches to Information Design

**Wednesday PM**
- Human Reliability Analysis
- Human Performance Modeling
- Regulatory Approaches to Advanced and Innovative Design
- User Interface Design and Analysis Tools
- Virtual Reality: Applications and Issues

### Organizational Issues Track

**Monday PM**
- Plant Experience and Lessons Learned from Plant Modernization
- DOE/EPRI Guidelines for Digital I&C and Control Room Modernization
- Procedures and Training
- Monitoring, Surveillance, and Alarms

**Tuesday AM**
- Concepts of Operations for Advanced Reactors
- Advances in Human-Automation Interaction
- Advances in HMI Technology
- New Approaches to Information Design

**Tuesday PM**
- Human Reliability Analysis
- Human Performance Modeling
- Regulatory Approaches to Advanced and Innovative Design
- User Interface Design and Analysis Tools
- Virtual Reality: Applications and Issues

**Wednesday AM**
- Plant Experience and Lessons Learned from Plant Modernization
- DOE/EPRI Guidelines for Digital I&C and Control Room Modernization
- Procedures and Training
- Monitoring, Surveillance, and Alarms

**Wednesday PM**
- Concepts of Operations for Advanced Reactors
- Advances in Human-Automation Interaction
- Advances in HMI Technology
- New Approaches to Information Design

### Human Factors Considerations in Plant Safeguards and Security

**Monday PM**
- Plant Experience and Lessons Learned from Plant Modernization
- DOE/EPRI Guidelines for Digital I&C and Control Room Modernization
- Procedures and Training
- Monitoring, Surveillance, and Alarms

**Tuesday AM**
- Concepts of Operations for Advanced Reactors
- Advances in Human-Automation Interaction
- Advances in HMI Technology
- New Approaches to Information Design

**Tuesday PM**
- Human Reliability Analysis
- Human Performance Modeling
- Regulatory Approaches to Advanced and Innovative Design
- User Interface Design and Analysis Tools
- Virtual Reality: Applications and Issues

**Wednesday AM**
- Plant Experience and Lessons Learned from Plant Modernization
- DOE/EPRI Guidelines for Digital I&C and Control Room Modernization
- Procedures and Training
- Monitoring, Surveillance, and Alarms

**Wednesday PM**
- Concepts of Operations for Advanced Reactors
- Advances in Human-Automation Interaction
- Advances in HMI Technology
- New Approaches to Information Design

**Wednesday AM**
- Human Reliability Analysis
- Human Performance Modeling
- Regulatory Approaches to Advanced and Innovative Design
- User Interface Design and Analysis Tools
- Virtual Reality: Applications and Issues
Monday, September 20, 2004

8:00 a.m. – 10:30 a.m.
Plenary Session
Session Chair:

10:45 a.m. – 12:15 p.m.
Technical Sessions
Human Performance Modeling (Demo)
   Session Chair: Tom Engh, Micro Analysis & Design
Human Reliability Analysis
   Session Chair: David Gertman, INEEL
Procedures and Training
   Session Chair: Valerie Barnes, PSHA, Inc.
Research Reactor I&C Applications
   Session Chair: Bob Edwards, Pennsylvania State University
Environmental Compatibility
   Session Chair: Layla Sandell, EPRI
Maintenance and Condition Monitoring
   Session Chair: Hash Hashemian, Analysis and Measurement Services Corporation
Pre-Developed Systems and Software
   Session Chair: Ray Torok, EPRI

1:45 p.m. – 5:00 p.m.
Technical Sessions
Safety Culture and Risk Communication
   Session Chair: Autumn Szabo, NRC
Concepts of Operations for Advanced Reactors
   Session Chair: Jacques Hugo, PBMR (Pty) Ltd.
Monitoring, Surveillance, and Alarms
   Session Chair: William Brown, BNL
Licensing Issues for Advanced I&C Technologies
   Session Chair: Matt Chiramal, NRC
Planning for I&C Modernization
   Session Chair: John Heffler, Altran
Diagnostics
   Session Chair: Wes Hines, University of Tennessee, Knoxville
Software Development
   Session Chair: Oleg Brenman, Westinghouse

5:30 p.m. – 7:00 p.m.
Special Session
Cyber Security at Nuclear Power Plants
   Session Chair: Matthew Chiramal, NRC
Tuesday, September 21, 2004

8:00 a.m. – 8:45 a.m.
Plenary Session
   Session Chair:

9:00 a.m. – 12:15 p.m.
Technical Sessions
   Regulatory Approaches to Advanced and Innovative Design
      Session Chair: Joel Kramer, NRC
   Advances in Human-Automation Interaction
      Session Chair: Andres Bye, Halden Reactor Project
   Plant Experience and Lessons Learned from Plant Modernization Programs
      Session Chair: Bob Fink, CDF Services, Inc.
   Advanced Neutron and Power Measurements 1
      Session Chair: Bob Fielder, Luna Innovations, Inc.
   Plant Modernization Experience I – Individual Systems
      Session Chair: Joseph Naser, EPRI
   Prognostics
      Session Chair: Don Jarrell, PNNL

1:45 p.m. – 5:00 p.m.
Technical Sessions
   User Interface Design and Analysis Tools
      Session Chair: Daniel Tassett, ISRN, France
   Advances in HMI Technology
      Session Chair: Jim Easter, Cognitive Systems Engineering Center (CSEC) of ManTech International Corp.
   Licensing Panel 1
      Session Chair: Ted Quinn, Technology Resources
   Advanced Neutron and Power Measurements 2
      Session Chair: Don Miller, The Ohio State University
   Plant Modernization Experience II – Extensive Replacement
      Session Chair: Thuy Nguyen, EDF
   Signal Analysis
      Session Chair: Leonard Bond, PNNL
   Safety Critical Software V&V
      Session Chair: Larry Erin, Westinghouse
Wednesday, September 22, 2004

8:00 a.m. – 8:45 a.m.  
**Plenary Session**  
Session Chair:  

9:00 a.m. – 12:15 p.m.  
**Technical Sessions**  
- **Human Factors Considerations in Plant Safeguards and Security**  
  Session Chair: J. Persensky, NRC  
- **New Approaches to Information Design**  
  Session Chair: Dominique Pirus, EDF  
- **Measurement Uncertainty**  
  Session Chair: Bob Fredrickson, Exelon  
- **Future I&C Systems**  
  Session Chair: Gary Johnson, LLNL  
- **Non-reactor Applications**  
  Session Chair: Roy Raychaudhuri, Sargent & Lundy  
- **Virtual Reality: Applications and Issues**  
  Session Chair: Lew Hanes, Consultant  
- **Quantitative Reliability Analysis of Digital Systems**  
  Session Chair: Steve Kerch, Westinghouse  

1:45 p.m. – 5:00 p.m.  
**Technical Sessions**  
- **Licensing Panel 2**  
  Session Chair: Ted Quinn, Technology Resources  
- **HMI Test, Evaluation, and V&V**  
  Session Chair: Scott Malcolm, Atomic Energy of Canada  
- **DOE/EPRI Guidelines for Digital I&C and Control Room Modernization**  
  Session Chair: Joe Naser, EPRI  
- **Advanced Measurements – Techniques and Sensors**  
  Session Chair: David Holcomb, ORNL  
- **Design Approaches to Digital Upgrades**  
  Session Chair: Carl Vitalbo, Westinghouse  
- **Reactor Noise Analysis**  
  Session Chair: Ozvald Glocker, Ontario Power Generation  
- **Software and Digital Systems Reliability**  
  Session Chair: Larry Erin, Westinghouse
**Technical Program**

**4th International Topical Meeting on Nuclear Plant Instrumentation, Control and Human Machine Interface Technology**

Hyatt Capital Square • Columbus, Ohio • September 19-22, 2004

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**Sunday, September 19, 2004**

8:00 a.m. – 5:00 p.m.

**Professional Development Workshop**

“Digital Instrumentation Upgrades”

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**Monday, September 20, 2004**

8:00 a.m. – 10:30 a.m.

**Plenary Session**

- Carl Paperiello, Director, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission
- Walter Apley, Vice President, Battelle Memorial Institute
- William Bohike, Senior Vice President, Exelon Corporation

10:45 a.m. – 12:15 p.m.

**Technical Sessions**

- **Human Performance Modeling (Demo)**
  - *Session Chair: Tom Engh, Micro Analysis & Design*
  - “Human Performance Modeling Demonstration Session”, Tom Engh and Christopher Plott (Micro Analysis & Design)

- **Human Reliability Analysis**
  - *Session Chair: David Gertman, INEEL*
  - “Diagnosis Performance Of Emergency Situation In Nuclear Power Plants”, Wondea Jung, Jinkyun Park and Jae W. Kim (Korea Atomic Energy Research Institute)
  - “Mixed Model For Usability Evaluation Of The SPAR-H Human Reliability Method”, David I. Gertman, Ronald L. Boring, Julie L. Marble, and Harold S. Blackman (Idaho National Engineering and Environmental Laboratory)

- **Procedures and Training**
  - *Session Chair: Valerie Barnes, PSAH, Inc.*
  - “Feature Extraction And Characterization Of Transient Scenarios For Training Of BWR Operators”, Yoshinori Hiroya, Akira Miyamoto, Makoto Takahashi, Masaharu Kitamura (Graduate School of Engineering, Tohoku University), Akinobu Nakajima (BWR Operator Training Center Corporation)
  - “Use Of Remote Handheld Computers For Operating And Maintenance Procedures”, Joseph Stephen DeBor (DeBor and Associates)

- **Research Reactor I&C Applications**
  - *Session Chair: Bob Edwards, Pennsylvania State University*
  - “Internet Access To Reactor Control Experiments”, Gary L. Meyers and Robert M. Edwards (Pennsylvania State University)

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**Environmental Compatibility**

- *Session Chair: Layla Sandell, EPRI*
  - “Qualification Of Microprocessor-Based Commercial-Off-The-Shelf (COTS) Equipment For Nuclear Power Plant Safety System Applications”, Kofi Korsah and Richard T. Wood (Oak Ridge National Laboratory), Saliman Isa (South Carolina State University), Christina Antonescu (NRC)
  - “Wireless Technologies And Their Application To Nuclear Power Plants”, Brian Kaldenbach, Michael Moore and Wayne Manges (Oak Ridge National Laboratory)
  - “An Assessment Of Industrial Wireless Protocols In The Nuclear Power Plant Environment”, Stephen Smith and Paul D. Ewing (Oak Ridge National Laboratory), Chen Jin and Mostofa K. Hallowader (University of Tennessee)

**Maintenance and Condition Monitoring**

- *Session Chair: Hash Hashemian, Analysis and Measurement Services Corporation*
  - “IAEA Activities Related To ‘Maintenance And Condition Monitoring In Nuclear Power Plants’, Ki-Sig Kang (International Atomic Energy Agency)
  - “The ‘AVTOTEST’ System For The NPIC Equipment Diagnostics Automation”, Gabriel Nik Alexakov, S.N. Grouzdev, N.A. Selyaev, A.G. Ter, and V.A. Fedorov (Moscow Engineering Physics Institute)
  - “On-Line Early Fault Detection, Diagnostics, And Prognostics For Condition-Based Predictive Maintenance”, Joseph Albert Naser, II, Ramesh Shankar and Aaron Hussey (Electric Power Research Institute)

**Pre-Developed Systems and Software**

- *Session Chair: Ray Torok, EPRI*
  - “Digital -safety included”, Kurt Zeck, Reinhard Schildheuer and Alfred Weich (TUV)
  - “An OASIS based qualified display system”, Vincent David, C. Aussaguès and S. Louise (French Atomic Energy Agency)
  - “Generic Qualification of Commercial Grade Digital Devices”, Carl Paperiello

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1:45 p.m. – 5:00 p.m.

Technical Sessions

Safety Culture and Risk Communication
Session Chair: Autumn Szabo, NRC
“Assessing Nuclear Plant Risk Management Effectiveness”, John Gaertner (EPRI), Dr. Stephen M. Hess (Sensortext, Inc.)
“Creating Practical Frameworks For Safety Culture Improvement”, Charles E. Packer (Cherrystone Management, Inc.)
“Issues Of Safety Culture; Reflections From The LearnSafe Project”, Bjorn Wahlstrom (VITT Industrial Systems), Carl Rollenhagen (SwedPower AB)

Concepts of Operations for Advanced Reactors
Session Chair: Jacques Hugo, PBMR (Pty) Ltd.
“Examing Concept of Operations in Future Plants”, John M. O’Hara, James Higgins, and William Brown (Brookhaven National Laboratory), Joel Kramer and J. Persensky (U.S. Nuclear Regulatory Commission)

Planning for I&C Modernization
Session Chair: John Heller, Altran

Monitoring, Surveillance, and Alarms
Session Chair: William Brown, BNL
“A Sub-Grouping Technique For Eliminating False Alarms Caused By Fault Propagation In Signal Validation”, Bingjing Su, Chenggang Yu (University of Cincinnati)

Licensing Issues for Advanced I&C Technologies
Session Chair: Matt Chirnmal, NRC
“Model Of Modernized I&C Expert Reviews”, Mikhail A. Yastrebentovsky (State Center on Nuclear and Radiation Safety)
“Regulatory Review Of The Test Features Of The Digital Plant Protection System For Ulchin Nuclear Power Plant Units 5 And 6”, Hyun Shin Park, Dai I. Kim, Soung Hun Oh, and Bok Ryu Kim (Korea Institute of Nuclear Safety (KINS)), Kern Joong Kim (Chungnam National University)

Lessons Learned From Applying US NRC Digital I&C Regulations To Lungmen Project”, Swu Yih (Institute of Nuclear Energy Research), Matthew Chirnmal (Nuclear Regulatory Commission), Chang-Fu Chuang (ROCAEC)
“Approach To The V&V Plan For NRC Approval Of The SYNCOR VICTOREEN Model 956A Digital Ratemeter”, Edward Lawrence Quinn (Technology Resources)

Planning for I&C Modernization
Session Chair: John Heller, Altran

Instrumentation And Control Modernization Strategic Research And Development Planning At EPRI For The Nuclear Industry”, Joseph Albert Naser, II (Electric Power Research Institute)
“Digital I&C Upgrade Considerations”, Glenn E. Lang (Functional Design Services), N. Jack Stringfellow, Stephen C. Swanson (Southern Nuclear Company)

Methodologies, Guidelines And Strategy For Instrumentation And Control Asset Management”, William Kurth (Exelon Nuclear), Joseph Naser (EPRI)

Business Case For DCS vs. Standalone I&C Upgrades”, William Eales (Wolf Creek Nuclear Operating Company) and Dan Wingbergmoeleh (Ameren UE – Callaway Plant)
“Managing I&C Reliability And Obsolescence”, Raymond Torok (EPRI) and Ray DiSandro (Exelon Nuclear)

Diagnostics
Session Chair: Wes Hines, University of Tennessee, Knoxville

“A Unified Approach to Fault Diagnosis of IRIS Helical Coil Steam Generators”, Belle R. Upadhyaya and Ke Zhao (University of Tennessee)

Development of Vertical Pump Diagnostic System Using Ultrasonic Vibrometer”, Kenji Osaki, Yukio Watananbe, Shigeru Kanemoto, Shigeo Nakayama, Koji Higuma (Toshiba Corporation)
“Sensor Operability Validation Under Model Misspecification”, Aleksay Urmanov and Kenny Gross (Sun Microsystems, Inc.)

Software Development
Session Chair: Oleg Brenman, Westinghouse

“Construction Of An Effective Parallel Development Environment For Nuclear Power Plant Instrumentation And Control Software Systems”, Ja-Yeon Jun, Shin-Hwa Im, and Hyun-Chul Han (Software Research Center), Cheong Youn (Chungnam National University), Cyril S. Ku (William Paterson University), Se Woo Cheon and Kee Choon Kwon (Korea Atomic Energy Research Institute)
Tuesday, September 21, 2004

8:00 a.m. – 8:45 a.m.
Plenary Session
To Be Announced

9:00 a.m. – 12:15 p.m.
Technical Sessions

Regulatory Approaches to Advanced and Innovative Design
Session Chair: Joel Kramer, NRC
“Regulatory Review Of Advanced And Innovative Human-System Interface Technologies”, John M. O’Hara and James C. Higgins (Brookhaven National Laboratory), Paul M. Lewis, J.J. Persensky, and James P. Bongarra, Jr. (U.S. Nuclear Regulatory Commission)
“Regulatory Strategy And Experience Of Human Factors Reviews Of Modernization Programs”, Anna Maria Ostlund (Swedish Nuclear Power Inspectorate)
“I&I Detail Beyond Design Certification Required For Issue Of A Combined Operating License”, Edward Lawrence Quinn (Longenecker and Associates), Dr. Kyle Turner (McCallum-Turner, Inc.)
“An Approach To Risk-Informing Human Factors Engineering Review Guidance”, James Bongarra (NRC)

Advances in Human-Automation Interaction
Session Chair: Andras Bya, Halden Reactor Project
“How a Functional Approach Allow to Set an On-line Flexible Level of Automation for NPP’s Computerized Operation”, Pirus Dominique (EDF)
“Design of Human-System Interfaces for the Central Control Rooms of Nuclear Power Plants to Facilitate Extended Teamwork”, Ann Britt Skjerve, Stine Strand and Gyrd Skraaning, Jr. (OECD Halden Reactor Project)
“An Experimental Study on Factors That Make Operators Difficult in Performing the Diagnosis Procedure of a Nuclear Power Plant”, Jinkyun Park and Wondea Jung (Korea Atomic Energy Research Institute)

Plant Experience and Lessons Learned from Plant Modernization Programs
Session Chair: Bob Fink, CDF Services, Inc.
“The Ringhals HSI And Control Room Modernization Program – The Practical Application Of A Contemporary User And HF Based HSI Design Process”, Martin Olof Forsberg (Ringhals AB Sweden)
“The Control Room Upgrade In The Oskarshamn 1 Modernization Project”, Thomas Gunnarsson and Jan Erik Farbrot (OKG Oskarshamn Nuclear Power Plant)

“Modifications At Nuclear Power Plants - International Views About The Role Of Human Factors”, Daniel Tassett, H. McRobbie, P. Pyy, A. Frischkneht (Institute for Radiological Protection and Nuclear Safety)
“A Vendor’s Perspective On Control Room Modernization”, Daryl L. Harmon and Steve Kerch (Westinghouse Electric Company)
“Integration Of Human Factors Engineering Into The refurbishment Of A Multi-Unit CANDU Station”, Angie Kozak (Bruce Power)
“Comanche Peak Control Room Modernization Experience”, Dave Whitsitt (TXU Electric)

Advanced Neutron and Power Measurements
Session Chair: Bob Fielder, Luna Innovations, Inc.
“BWR Core Monitoring without LPRM Adaption”, Carlos Vidal (K. Effective LLC), Flavio Giust (Nordostschweizerische Kraftwerke AG), Daniel Greiner (Kernkraftwerk Leibstadt AG)
“Micro-Pocket Fission Detectors (MPFD) for Near-Core and In-Core Neutron Flux Monitoring”, Douglas S. McGregor, J.K. Shultis, M.F. Ohmes, A.S.M. Sabbir Ahmed, and R. Ortiz (Kansas State University)
“Nuclear Reactor Power Monitoring Using Silicon Carbide SemiConductor Radiation Detectors”, Edward Lawrence Quinn (Technology Resources)

Plant Modernization Experience I – Individual Systems
Session Chair: Joseph Naser, EPRI
“Tuning And Optimizing Advanced Feedwater Control System Of PWR”, Chuan-Chung Chen (Taiwan Power Company)
“Minimum Throttling Feedwater Control In VVER-1000 And PWR NPPs”, Borys Symkin (LViv ORGRES, JSV), Francis Thauvex (Westinghouse Electric Belgium), Oleg Brennan (Westinghouse Electric Company)
“Application Of A Pre-Qualified Digital Platform For A Diesel Generator Load Sequencer”, Carl Vitalbo and Lawrence E. Erin (Westinghouse Electric Company)

Prognostics
Session Chair: Don Jarrell, PNNL
“The Development Of Condition Monitoring Technology For A Check Valve Using Acoustic Emission Sensor”, Seung-Hwan Seong and Jung-Soo Kim (Korea Atomic Energy Research Institute), Seop Hur, Jung-Tak Kim, and Won-Man Park (KAERI)
“Condition Monitoring For Improved Maintenance In German NPP’s”, Dieter H. Wach (Institute for Safety Technology (ISTec) Ltd.)
“Impedance Based Condition Monitoring Of Instrumentation And Control Cables In Nuclear Power Plant”, Yao Tung Hsu and Cheng-Tsong Kuo (Institute for Nuclear Energy Research, Taiwan, ROC)
“Condition Monitoring Methods Using The Fiber-Optics Techniques”, Seop Hur, S.H. Nam, S.H. Seong, and J.T. Kim (Korea Atomic Energy Research Institute), V. Luk (Sandia National Laboratory), I.S. Hwang (Seoul National University)
“On-LineEarly Fault Detection & Diagnosis With The Aladdin: An In-Core Electrical Circuit”, Davide Roverso (OECD Halden Reactor Project)
**NPIC & HMIT - 2004**

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**Technical Sessions**

### User Interface Design and Analysis Tools
- **Session Chair:** Daniel Tassett, ISRN, France
  - "A Large Scale Implementation Of Human Factors Engineering For Lungmen Nuclear Power Project", Tung-Ming Wu, Jean-Yee Lee (Taiwan Power Company)
  - "A User Interface Style Guide For The Reactor Protection System Cabinet Operator Module", Hyun-Chul Lee, Dong-Young Lee, In-Seok Oh and Jung-Woon Lee (Korea Atomic Energy Research Institute)
  - "French EPR Project: A Preliminary Test To Assess The Feasibility Of The Design Principles Under Consideration For Computerized Operation", Jean-Paul Labarthe (Electricité de France)
  - "Envisioning Future Control Room Information Needs", Eric Davey (Crew Systems Solutions)

### Advances in HMI Technology
- **Session Chair:** Jim Easter, Cognitive Systems Engineering Center (CSEC) of ManTech International Corp.
  - "The Design and Development of a Task Support System for Advanced Human-System Interfaces", Jacques Hugo (PBMR (Pty) Ltd.)
  - "Wiring a Human-in-the Loop", Stephen W. Kercel (University of New England) Wyane W. Manges (Manges Management Consultants, Inc.), Arthur S. Reber (Brooklyn College of CUNY)
  - "A Novel Strategy for Coupling Data into the Human Nervous System", Paul Bach-y-Rita, M.D. (University of Wisconsin), Stephen W. Kercel (University of New England)
  - "Development of the Advanced CANDU Reactor Control Centre", Scott Malcolm (Atomic Energy of Canada) and Angie Kozak (Bruce Power Incorporated)

### Licensing Panel 1
- **Session Chair:** Ted Quinn, Technology Resources
  - Panelists to be announced.

### Advanced Neutron and Power Measurements 2
- **Session Chair:** Don Miller, The Ohio State University
  - "A Mathematical Model of SiC Detectors as Power Monitors", Mehdi Reisi Fard, Thomas E. Blue, and Don W. Miller (Ohio State University), F.H. Rudy, A.R. Dulloo, and J.G. Seidel (Westinghouse Electric Co.)
  - "Effect of Detector-Capacitance and Cable on SiC Detector-Cable System Performance", Mehdi Reisi Fard, Thomas E. Blue, and Don W. Miller (Ohio State University)
  - "The Dependence Of Location Within Central Reflector On Detector Count Rate And Burn-Up For SiC Power Monitors In The GT-MHR", Benone Lohan, Dr. Thomas E. Blue, and Dr. Don W. Miller (Ohio State University)
  - "Nuclear-Optical Converters for Neutron Detection", Gary L. Johnson (Lawrence Livermore National Laboratory), Anatoli A. Sinyanski, Sergei P. Melnikov, Leonid E. Dovbysh, (Russian Federal Nuclear Center, All-Russia Scientific Research Institute of Experimental Physics (VNIIEF))
  - "Elevated Temperature Performance of an Aluminum Nitride Based In-Core Power Monitor", David E. Holcomb (Oak Ridge National Laboratory)
  - "Design of the Processing Electronics and Performance Evaluation of a Miniature, Scintillation-Based, In-Core, Self-Powered Flux and Temperature Probe for High Temperature Gas Reactors", Thomas Landis (Ohio State University)

### Plant Modernization Experience II – Extensive Replacement
- **Session Chair:** Thuy Nguyen, EDF
  - "Implementation Of The SPINLINE 3 Diverse Protection System At The IGNALINA RBMK 1500 Unit Two Nuclear Power Plant", Claude Esenmjaud, Dominique Moulin and Andrew Rounding (Data Systems & Solutions)
  - "Software-Hardware Complexes For Systems On Control And Protection Of Nuclear Reactors", Alexander A Siora, V. Tokarev, E. Bakhmach, A. Grabenko (Radly)
  - "Experience As To Development The New Computerized Informational Systems For VVER-1000, And Stage-By-Stage Reconstruction Of Those Under Operation", Alexander H. Gorelik (Kharkov Institute of Complex Automation) and V. Yeliseyev (SPRA)
  - "Planning And Preparation For Factory And Site Tests For The I&C Systems Of Lungmen Project", J.Y. Lee (Taipower Company, Taiwan)
  - "Digital Upgrade Lessons Learned", Ed Bradley and Ron Jarrett (Tennessee Valley Authority)

### Signal Analysis
- **Session Chair:** Leonard Bond, PNLL
  - "Uncertainty Estimation For Empirical Signal Validation Modeling", J. Wesley Hines and Brandon Rasmussen (University of Tennessee)
  - "Merging Inferential Models And Independent Component Analysis For 2-Channel Redundant Sensor Monitoring", J. Wesley Hines and J. Ding (University of Tennessee)
  - "Conception Of In-Core Monitoring Software At NPP With WWER", Valery I. Buriyan (SNIIP-ATOM)
  - "An Investigation Of The Zero-Order Local Polynomial Regression Estimator And Its Associated Uncertainty", Brandon Rasmussen (EPRI)
  - "A Case Study In The Application Of Physics-Based Prognostics", Don Jarrell (Pacific Northwest National Laboratory (PNLL))

### Safety Critical Software V&V
- **Session Chair:** Larry Erin, Westinghouse
  - "Criteria And Associated Tool For Functional Test Coverage Of Safety Critical Software", Jean Gassino, Pascal Regnier (IRSN), Bruno Marre, Benjamin Blanc (C.E.A.)
  - "Quantitative Evaluation Of Fault Coverage For Digitalized Systems In NPPs", Sukjoon Kim, Pong Hyun Seong, Jun Seok Lee (Korea Advanced Institute of Science and Technology)
  - "Software Verification For Nuclear Reactor Rod Control System", Dae Won Chung (Honam University), Soonman Kwon (Korea Electrotechnology Research Institute) Kook-Hun Kim, Young-Ho Gong (Korea Nuclear Instrumentation & Control System R&D Center)
  - "Digital Control System Pre-Tests Using Plant Specific Simulators", Burkhard Holl, Dr. Wolfgang Wischer and Helmut Probst (Kraftwerks-Simulator-Gessenicht mbH)

**Wednesday, September 22, 2004**

8:00 a.m. – 8:45 a.m.
**Plenary Session**
- To Be Announced

9:00 a.m. – 12:15 p.m.
**Technical Sessions**
- **Human Factors Considerations in Plant Safeguards and Security**
  - **Session Chair:** J. Persensky, NRC
**Non-reactor Applications**

**Future I&C Systems**

Session Chair: Dominique Pirus, EDF

“EPRI Strategic Research And Development Planning For Plant Information Integration And Evaluation For The Nuclear Industry”, Joseph Albert Naser, II (Electric Power Research Institute)

“Information Display: Considerations For Designing Modern Computer-Based Display Systems”, John M. O’Hara (Brookhaven National Laboratory), Dominique Pirus (EDF), Leo Beltratchti (Wilmington, NC)

“Primosc HSI For Computerized Operation”, Pirus Dominique (EDF)

“Process Displays According To A Functional Hierarchy”, Jette Lundtang Paulsen and Sten Weber (Risø National Laboratory)

“A Building Block For Information Rich Displays”, Alf Ove Braseth, Øystein Veland and Robin Welch (OECD Halden Reactor Project)

**Measurement Uncertainty**

Session Chair: Bob Fredrickson, Exelon


“Statistical Drift Control Methods Using Plant Specific As-Found/As-Let Data”, Seung-Cheol Jang and Jae-Joo Ha (Korea Atomic Energy Research Institute), Tae-Jin Lim (Soong-Sil University)

“Calibration Reduction System Implementation At The Sizewell B Nuclear Power Plant”, Hashem M. Hashemian, G.W. Morton, and B.D. Shumaker (Analysis and Measurement Services Corporation), David Lillis (Sizewell B Power Station), Steve Orme (British Energy Generation Limited)

“On-Line Calibration Monitoring With PEANO”, Mario Hoffmann (OECD Halden Reactor Project)

“Use Of Allowable Value To Ensure The Safety Limits In Nuclear Plants Are Not Exceeded”, Robert Fredrickson (Exelon), Edward (Ted) L. Quinn (Longenecker and Associates)

“Quantifying The Measurement Uncertainty Propagation In Flux/Power Reconstruction”, Mihaela Biro and Tunc Ademir (Ohio State University)

“Development And Approval Of An International Standard For Instrument Setpoints”, Edward Lawrence Quinn (Technology Resources)

**Future I&C Systems**

Session Chair: Gary Johnson, LLNL

“The Constitution Of Test Bed And Typical Control Loop For Advanced I&C Systems Of Nuclear Power Plants”, Tsung-Chieh Cheng, Ming-Huei Chen (Institute of Nuclear Energy Research), Yeong-Hwa Chang (Chang Gung University)

“Investment Protection Concept For The Next Generation Nuclear Power Plants”, Hendrik A. Grobbeaar, J.B.B. Blignaut (PBMR)

“How To Achieve Observability Of Reactor Installation”, Mikhail Mitelman and V.N. Durnev (Inkor Ltd.)

“Stability Analysis Of A Two-Phase Test Loop”, Weidong He and Robert M. Edwards (Pennsylvania State University)

“Common Control Facility For Multi-Unit IRIS Plants”, Steve Paul and Jesse E. Love (Bechtel Power Corporation), Larry E. Conway (Westinghouse Electric Corporation)

**Non-reactor Applications**

Session Chair: Roy Raychaudhuri, Sargent & Lundy


“Unified Software Architecture For The Blend Down Monitoring System Instrument”, Tom Marks (Los Alamos National Laboratory), Jose March-Leuba (Oak Ridge National Laboratory), Joseph Glaser (DOE/NNSA/NA-232)

“Implementation Of The Neutron Detection System For Californium Source Characterization”, Taner Uckan and Jose March-Leuba (Oak Ridge National Laboratory)


**Virtual Reality: Applications and Issues**

Session Chair: Lew Hanes, Consultant


“Use Of Visualization Technology to Improve Human Decision-Making”, Lewis F. Hanes (Consultant)

“The Virtual Nuclear Laboratory”, Nick Karancevic (University of Illinois at Urbana-Champaign)

“Internet Virtual Reality Environment for Simulating, Predicting, and Minimizing Worker Radiation Exposure”, Brian Hajek (The Ohio State University), Kiddo Kang (Korea Hydro & Nuclear Power Co.), Yonsik Lee (Kunsan National University), YooJin Shin (Kwangwoon University)

**Quantitative Reliability Analysis of Digital Systems**

Session Chair: Steve Kerch, Westinghouse


“Suitability Review Of Reliability Analysis Of The Digital Plant Protection System For Ulchin NPP Units 5&6”, Choong-Heui Jeong and Cheol-Soo Goo (Korea Institute of Nuclear Safety), Cheol-Hoon Lee (Chungnam National University)


“Development And Application Of Risk Analysis Techniques For Digital I&C Systems”, Swu Yih (Institute of Nuclear Energy Research)

1:45 p.m. – 5:00 p.m.

**Technical Sessions**

**Licensing Panel 2**

Session Chair: Ted Quinn, Technology Resources

Panelists to be announced.

**HMI Test, Evaluation, and V&V**

Session Chair: Scott Malcolm, Atomic Energy of Canada

“Analysis Of Operator Practices As A Means Of Integrated System Validation”, Paula Savioja and Leena Norros (VT Technical Research Centre of Finland)

“Validation - Experience And Ongoing Challenges”, Eric Davey (Crew Systems Solutions)

“Towards Faster, Better, Cheaper V&V Of Human-Machine Interfaces: A Model-Based Approach”, Jean-Yves Fiset (Shumac)

“A Calibration Approach To Integrated System Validation”, Gyrd Skraaning, Jr., Per Øivind Braarud, and Jan O. Heimdal (OECD Halden Reactor Project)

“Validation Of The Bruce A Unit 3 And 4 SCA – A Case Study”, Kira Berntson and Angie Kozak (Bruce Power), J. Scott Malcolm (Atomic Energy of Canada, Limited), and Don McGregor (Acres International)
DOE/EPRI Guidelines for Digital I&C and Control Room Modernization

Session Chair: Joe Naser, EPRI

“Program to Develop Guidance for Nuclear Power Plant Control Room and Human-System Interface Modernization for Planners, Designers, Implementers, Users, and Maintainers”, Joseph Albert Naser, II (Electric Power Research Institute), Glen Morris (U.S. Department of Energy)

“Planning for Control Room Modernization”, Bob Fink (CDF Services, Inc.), Douglas Hill (MPR Associates, Inc.), and Joseph Naser (EPRI)


“Incorporation of Human Factors Engineering Analysis and Tools”, John M. O’Hara and William Brown (Brookhaven National Laboratory)


Advanced Measurements Techniques and Sensors

Session Chair: David Holcomb, ORNL


“Development Of Materials For Long Term In Core Fuel Monitors”, Eric R Kreidler (Ohio State University)

“Calibration And Testing Of A Johnson Noise Thermometer”, Ern E. Hall, Adam T. Orosz, Don W. Miller (Ohio State University), Roger Kinsner and David E. Holcomb (Nuclear Science and Technology Division)

“Traceability Of Thermal Power Measurements”, Herb Estrada, Don Augustin and Ernie Hauser (Caldon, Inc.)

“Fabry-Perot Fiber Optic Sensors For Ex-Core In-Containment Applications”, Hanying Liu and Don W. Miller (OSU), Joseph Talnagi (Ohio State University)

“Development Of Non-Intrusive Thermal Flowmeter For In-Core Measurement”, Hanying Liu and Joseph W. Harpster (Intek Corporation)

Design Approaches to Digital Upgrades

Session Chair: Carl Vitalbo, Westinghouse

“FGPA-based Module to Replace Microprocessor-based Board in Nuclear I&C System” Laurence Picci (Electricité de France)


“Single Loop Control Systems”, Steve Yang, Tim McCreary, Allen Hsu, John Stevens (HF Controls Corporation)


“Inexperiencing Fault Tolerant Digital Control” James T. Martel (Invesys)

Reactor Noise Analysis

Session Chair: Ozvald Glocker, IAEA

“The Use Of Wavelet Transform And Artificial Neural Networks In The Loose Part Monitoring System”, Stefan Figedy (VUJE Trnava, Inc.)


“Experience And Standardization In Loose Parts Monitoring Of German NPP’s”, Bernd Joachim Olma (Institute for Safety Technology (ISIec GmbH)

“Usefulness Of Reactor Noise Analysis”, Ozvald Glocker (Ontario Power Generation), Janos Eiler (IAEA), Hashem Hashemian (Analysis and Measurement Services), Ki-Sig Kang (IAEA)


“Acoustic Loose Parts Systems For Malfunction Detection”, Gabor Por (Budapest University of Technology and Economics)

Software and Digital Systems Reliability

Session Chair: Larry Erin, Westinghouse


“Issues Associated With Probabilistic Failure Modeling Of Digital Systems”, Tseng-Iun Chu (BNL)

“Development Of A Software Failure Modes And Effects Analysis Technique Based On Digital I&C System Failure Events”, Swu Yih (Institute of Nuclear Energy Research), Chih-Feng Fan, Wei-Chih Chen, Wan-Hui Tseng (Yuan Ze University, Taiwan)

“Defense-In-Depth And Diversity Assessments For Digital I&C Upgrades In Nuclear Power Plants”, Thuy Nguyen (EPRI/EdF)

**Fun Run/Walk**

A Fun Run/Walk will be held at 6:00 AM on Tuesday morning. Tee shirts will be awarded to all participants completing the event. (Extra shirts will be available for a charge after the race.) This will be a Predicted Time event. How fast you run/walk doesn't matter - only how well you are able to predict your finish time. Awards will be made for those finishing closest to their predictions. No watches are allowed. The course is a 3.4-mile loop through the famous and quaint German Village, covering the final portion of the Columbus Marathon course. Walkers will cover a two-mile distance, taking a shortcut part way through the course so that everyone finishes within a reasonable time. Please plan to join us for a good time.
Co-Located Meetings

4th International Topical Meeting on Nuclear Plant Instrumentation,
Control and Human Machine Interface Technology
Hyatt Capital Square • Columbus, Ohio • September 19-22, 2004

Professional Development Workshop, Sunday, 8:00 a.m. – 5:00 p.m. – Leader: Ted Quinn
This course addresses the latest developments on the use of software-based equipment on nuclear plant applications. This has become increasingly important as plants move into License Renewal, and in consideration of Obsolete Equipment replacement and upgrades. Speakers will provide the perspectives of the Nuclear Regulatory Commission, Electric Power Research Institute and industry as well as international participants, with emphasis on the most recent results and ongoing activities in licensing these safety-related and qualified commercial grade platforms and components in the current fleet of nuclear plants in the United States.

IEEE SC-5, Monday, 6:00 p.m. - 9:00 p.m. – Leader: Steve Fleger
IEEE Subcommittee 5, Human Factors, Control Facilities, and Reliability, of the Nuclear Power Engineering Committee develops and maintains human factors standards for nuclear facilities. The subcommittee is comprised of 13 active and 42 corresponding members, and has been in existence for over 20 years. The subcommittee typically meets 3 times per year. When possible the meetings are arranged to coincide with IEEE, NPEC, ANS or other related meetings. The meeting is open to all conference attendees. Please drop by if you'd like to learn more about SC-5 activities including the ongoing projects of our five Working Groups. We're always looking for new members.

IEC SC45A Working Group A9, Thursday, 8:00 a.m. – 5:00 p.m. – Leader: Ted Quinn
"IEC Subcommittee 45A Working Group 9 produces and maintains standards and reports on all aspects of instrumentation systems at the system or channel level including: electronic aspects, processing aspects, safety aspects. Current work includes development of standards regarding Setpoints, Critical Safety Function and Performance Monitoring Functions as well as EMI/RFI requirements and qualification. The meeting is open to all conference attendees. Please drop by if you would like to learn more about IEC 45A activities. While formal members must be appointed by their national committee of IEC we would be happy to have you learn more about our work and to help put you in contact with your national committee."

NRC Workshop on International Research Activities, Thursday, 8:30 a.m. – 4:00 p.m. and Friday, 8:30 a.m. – noon – Leader: Christina Antonescu
The NRC Office of Nuclear Regulatory Research will be establishing an international cooperative research association in the area of advanced I&C technologies (which can include human-system interactions and human factors engineering). The working name for this collaborative initiative will be the International Partnership for Research on Advanced Control and Instrumentation Technologies (IPRACIT). The purpose of this association is to enable development of a consensus, comprehensive research plan to address the safety aspects of digital I&C systems in nuclear power plants and to leverage the available research resources of international organizations through coordinated implementation of research activities and cooperative exchange of research findings. The expected benefit are that existing research gaps will be eliminated, unnecessary research duplication will be avoided, and the safety case for nuclear power application of digital I&C technologies will be confirmed and enhanced. Following the NPIC&HMIT 2004 meeting, an IPRACIT Workshop will be held on September 23-24 to initiate discussion among interested parties and identify potential research topics that can be included as part of the technical scope of the research association.
Purpose of Workshop:
This course addresses the latest developments on the use of software-based equipment on nuclear plant applications. This has become increasingly important as plants move into License Renewal, and in consideration of Obsolete Equipment replacement and upgrades. Speakers will provide the perspectives of the Nuclear Regulatory Commission, Electric Power Research Institute and industry as well as international participants, with emphasis on the most recent results and ongoing activities in licensing these safety-related and qualified commercial grade platforms and components in the current fleet of nuclear plants in the United States.

Outline of Workshop
1). Introduction by Don Miller - Ohio State University and former NRC ACRS Member ANS President.

2). Overview of Course outline - Ted Quinn, ANS Past President.

3). NRC NUREG 08000 Overview and Research Tasks including NRC Plan for Digital I&C Systems - Matt Chiramal (NRC) and Steve Arndt (NRC)

4). EPRI Programs and Lessons Learned including use of Risk Informed - Ray Torok (EPRI)

5). ABWR Experience and Lessons Learned - Doug Chapin – MPR and Taiwan - Representative (invited)

6). Utility Experience and Lessons Learned –TBD

7). Triconex - Experience and Lessons Learned - Clayton Scott

8). Westinghouse - Experience and Lessons Learned - Larry Erin (invited)

9). Framatome - Experience and Lessons Learned - Jerry Mauck (invited)


11). Panel Discussion
**Spouse Tours**

**Monday, September 20, 2004**  
*Columbus Zoo and Aquarium - 10:00 a.m. to 3:00 p.m.*

Located along the banks of the Scioto River in northwest Columbus, the zoo is home to over 700 species. There are beautiful gardens as well as the natural animal habitats and aquarium, which contain a large variety of fish and a manatee exhibit. There will be a buffet lunch in the Pavilion Room. There will be animal visitors and a talk by a zoo naturalist. Time will be allowed to walk the grounds and search out your favorite zoo resident. Jack Hanna has been instrumental in making our zoo a place that people from all over come to see. Many of you have seen him on the Tonight Show and Good Morning America with some of our local zoo residents. There will be transportation provided to and from the hotel. Cost for the day will be $40.  

[www.columbuszoo.org](http://www.columbuszoo.org)

**Tuesday, September 21, 2004**  
*Ohio State House and Capitol City Tours - 10:00 a.m. to 4:00 p.m.*

Ohio's beautifully restored Civil War - era capitol building will begin our day. The Statehouse is the seat of the Ohio state government, a National Historic Landmark, and one of the nation's premier examples of Greek revival architecture. After our tour we will be served lunch across the hall from the governor's office. We have been told that if the Governor is in he sometimes steps across the hall to say hello. At 1:30 we will board the bus for our Capitol City tour. This tour is like a box of chocolates ... you never know what you going to get. Be prepared to find Mona Lisa lying down or a statue of a king modeled by a wrestler. There is story circulating that Christopher Columbus was blown off course on one of his journeys and wandered into the Mississippi to the Ohio and from there to the Scioto where he ran aground just south of Columbus. The Santa Maria can be seen docked just down the street from the Statehouse. Cost for the day will be $40.  

[www.statehouse.state.oh.us](http://www.statehouse.state.oh.us)  
[capcitytours@yahoo.com](mailto:capcitytours@yahoo.com)

**Wednesday, September 22, 2004**  
*Franklin Park Conservatory and Botanical Garden - 10:00 a.m. to 3:00 p.m.*

A lush Pacific water garden, a tropical rain forest, a rocky Himalayan mountain habitat plus acres of beautiful gardens can be seen at the conservatory. We will be given a tour plus some time to walk around on our own to explore these beautiful exhibits. Lunch will be served here in a private room and then there will be time to explore the gift shop before we return to the hotel.  

1-800-214-PARK  
Cost for the day will be $40.

If you would like more information about Columbus before you come you can visit  
[www.ExperienceColumbus.com](http://www.ExperienceColumbus.com)
### Meeting Registration Form

#### Fourth International Topical Meeting on Nuclear Plant Instrumentation, Control and Human-Machine Interface Technologies

Sponsored by: The ANS Human Factors Division, Operations and Power Division and the ANS Ohio Section

**Hyatt on Capitol Square • Columbus, Ohio**

**September 19-22, 2004**

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**Fill Out Completely - Please Print**

ANS Member ID #: _______________________

First Name/Middle Initial: _____________________________ Last Name: __________________________________

Title: _____________________________________________ Company/Affiliation: ___________________________

Street Address: ________________________________________________________________________________

☒ Company or ☐ Home  Please check if this is your: ☐ Primary Address or ☐ Address for Meeting Only

City/State/Zip Code: ___________________________________________ Country: ____________________________

Telephone: ___________________ Facsimile: ______________________  Email: ________________________

Note: Please check here if special accommodations are required to fully participate. ANS will contact you. ☒

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**Meeting Registration - NPIC & HMIT 2004**

[Complete registration includes one (1) ticket to the following events: Welcome Reception; Monday, Tuesday and Wednesday Luncheons; Banquet Dinner at COSI; and a copy of the available meeting materials on a CD-Rom. * Spouse registration includes one (1) ticket to: Reception; COSI Banquet Dinner; and continental breakfasts]

<table>
<thead>
<tr>
<th></th>
<th>Early Registration</th>
<th>After August 27th / Onsite</th>
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<tbody>
<tr>
<td>Complete Meeting</td>
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<tr>
<td>Single Day Registration</td>
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<tr>
<td>Sunday’s Digital Upgrades Workshop</td>
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<td>Student Registration</td>
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<tr>
<td>Spouse Registration</td>
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**Additional Tickets**

- Reception  
  - # of tickets ___ @ $30 each = $______
- COSI Banquet Dinner  
  - # of tickets ___ @ $40 each = $______
- Columbus Zoo and Aquarium  
  - # of tickets ___ @ $40 each = $______
- Ohio State House and Capital City Tours  
  - # of tickets ___ @ $40 each = $______
- Franklin Park Conservatory and Botanical Garden  
  - # of tickets ___ @ $40 each = $______
- Bound Copy of Proceedings  
  - # of copies ___ @ $50 each = $______

☐ I plan on participating in the Tuesday “Fun Run” at 6 am.  
  
  My T-Shirt size: ☐ S   ☐ M   ☐ L   ☐ XL

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**Grand Total and Form of Payment for Meeting Registration and Additional Tickets**

Grand Total of ALL functions and events:  

$ _______________

**Method of Payment**

☐ Check    ☐ American Express    ☐ VISA    ☐ MasterCard    ☐ Diners Club    ☐ Wire Transfer

Credit Card Number: ___________________________________________________________ Expiration Date: ___________

Cardholder’s Signature: __________________________________________________________

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Print Cardholder’s Name If Different Than Registrant

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Make checks payable to ANS in U.S. funds and mail to Brian K. Hajek, OSU Nuclear Engineering Program, 650 Ackerman Rd., Suite 255, Columbus, OH 43202. Credit card registrations may be faxed to 614/459-6387. Do not mail registrations which have been faxed. Registration cancellations must be made in writing prior to August 27th in order to receive a refund minus a $75 processing fee. Meeting registrations, workshop registrations and additional tickets cancelled after August 27th will not be refunded; however, you may send a substitute. Please send any questions to NPIC@columbus.rr.com.
HOTEL RESERVATION FORM
NPIC & HMIT 2004 Conference
September 19-22, 2004

HOTEL RESERVATIONS MUST BE RECEIVED BY AUGUST 31, 2004. After this date, reservations and conference rate will be subject to availability.

Hotel Phone: (614) 228-1234 • Reservation Fax: (614) 469-9664
Toll Free Reservations: (800) 233-1234
Send this form directly to the Hyatt on Capitol Square
Do NOT send this form to the American Nuclear Society

PLEASE PRINT OR TYPE

GUEST NAME(S): ______________________________________________________________________________
COMPANY: ____________________________________________________________________________________
MAILING ADDRESS: _____________________________________________________________________________
CITY/STATE/ZIP: ___________________________________ COUNTRY: ________________________________
TELEPHONE: ______________________________________ FAX: _____________________________________
ARRIVAL DATE: ____________________________________ DEPARTURE DATE: _________________________

PREFERRED ACCOMMODATIONS: Rates are subject to state and local sales taxes and fees
Accommodations:
❒ Single Occupancy : $110 per night
❒ Double Occupancy : $110 per night
❒ Triple Occupancy : $120 per night
❒ Quadruple Occupancy : $130 per night

Special Request: ❒ Smoking ❒ Non Smoking ❒ Handicap Accessible

Additional Requests: ______________________________________________________________________________

Expected Arrival Time: _____________________________________________________________________________

Check-in Time is 3:00 p.m. • Check-out Time is 12:00 Noon

METHOD OF PAYMENT:

Check # ___________

Credit Card: ❒ VISA ❒ MasterCard ❒ Discover ❒ American Express ❒ Other _________________

Credit Card Number: ___________________________________ Expiration Date: _______________________

Cardholder’s Name: ________________________________ Deposit Amount*: $____________________________

Cardholder’s Signature: __________________________________________________________________________

PLEASE NOTE: RESERVE YOUR ROOM EARLY!
HOTEL RESERVATIONS MUST BE RECEIVED BY August 31, 2004. After this date, reservations will be subject to availability.

• Reservations are filled on a first-come, first served basis.
• Rooms have been blocked both prior to and after the conference dates to enable attendees to extend their reservation period to allow for additional side meetings or visiting the Columbus area.
• The Hyatt on Capitol Square has a 24-hour cancellation policy (by 3pm prior to day of arrival). Any reservations that are not cancelled 24 hours in advance of arrival date will be charged one night’s room rate and tax as a no-show penalty.

* One night’s deposit (via check, major credit card, or money order) must accompany reservations. Room rates are subject to applicable state and local taxes (currently 6.75%) and applicable service or hotel specific fees (currently 10.00%) in effect at the hotel.

Hyatt on Capitol Square • Group Reservations Department • 75 East State Street • Columbus, OH 43215
Hotel Phone (614) 228-1234 • Reservation Fax (614) 469-9664 • Toll Free Reservation (800) 233-1234