

9th International Topical Meeting on Nuclear Plant Instrumentation, Control, and Human-Machine Interface Technologies

(NPIC & HMIT 2015)

**Charlotte, North Carolina, USA
22-26 February 2015**

Volume 1 of 3

ISBN: 978-1-5108-0809-6

Printed from e-media with permission by:

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



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Chairs: Robert Fink (CDF Services Inc.), Gordon Ian Procter (NECSA)

1276[Application of Alarm Inhibition Techniques in Human-Machine Interface Design](#)

Xueqin Chu, Zepeng Cui (China Nuclear Control System Eng Co., Ltd.), Jose Enrique Gilabert Bausa (Tecnatom S.A.)

1285[Detecting Open Supply Conductors by State Estimation](#)

G. L. Kusic (Power Systems Consultants)

HMIT.3-Advances in Human-Automation Collaboration

Chairs: Mateo Ramos (Tecnatom), Katya Le Blanc (INL)

1294[The Optimized Design and Use of Automated Control Systems—State of the Literature and Proposed Research](#)

Joel M. Haight, Daniel G. Cole, Ervin Sejdic (Univ of Pittsburgh)

1301[Levels of Automation: Impacts on Performance, Workload, and Situation Awareness](#)

Katya Le Blanc, Johanna Oxstrand (INL)

1313[Human-Automation Function Allocation](#)

Lewis F. Hanes (Consultant), Robert Fink (CDF Services, Inc), Joseph Naser (EPRI)

NPIC.6-General Topics in Instrumentation and Controls—I

Chairs: Charles R. Morris (IAEA), Joshua Emmer (SNL)

1326[Pressure Control for a Pressurizer in a Pulsed System](#)

Michael Smith (AREVA Federal Services LLC), Sukumar Kamalasadana (Univ of North Carolina), Walter Van Hove (ORNL)

1336[Methods for Identification and Analysis of Safe Operating Boundary of Dynamic Systems](#)

Xirong Ning, Jin Jiang (Univ of Western Ontario)

NPIC.5-EMC/EMI

Chairs: Steve Lopez (EPRI), Chad Kiger (AMS)

1352 [Study of EMI/RFI Impact on Neutron Flux Monitor Signal Transmission Lines](#)

E. S. Martazov, N. A. Selyaev, V. A. Fedorov (National Research Nuclear Univ “MEPhI”), V. A. Vorobyev, Y. A. Kashchuk (Inst “Project Center ITER”)

1363 [Electromagnetic Compatibility Concerns of In-Situ Welding on Instrumentation and Control Systems](#)

D. M. Nace, C. J. Kiger (AMS)

HMIT.1-Human Factors Lessons Learned from Fukushima Accident

Chairs: Charlie McCarthy (Northrop Grumman), Bill Williamson (TVA)

1372 [Post-Facta Review of Emergency Response Support System \(ERSS\) in Japan—Before and After Fukushima Daiichi Accident](#)

Hidekazu Yoshikawa (Harbin Eng Univ)

1383 [Assessing Human and Organizational Factors for Implementing Beyond-DBA Strategies in Nuclear Power Plants: Regulatory Activities in Korea](#)

Young S. Yoon, Yun H. Chung, Min C. Kim (KINS)

1391 [Prediction of Severe Accident Occurrence Time by using SVM](#)

Seung Geun Kim, Young Gyu No, Poong Hyun Seong (KAIST)

NPIC.1-Advances in Monitoring, Diagnostics and Prognostics Technologies—III

Chairs: Cristina Corrales Quiros (Tecnatom), Noushin Amini (Texas A&M Univ)

1399 [Lifetime Modeling of Equipment at Nuclear Power Plants](#)

Olli Saarela, John Einar Hulsund (Inst for Energy Technology)

1409 [Comparison of Prognostic Techniques for Estimating the Remaining Useful Life of Nuclear Plant Components](#)

B. D. Shumaker, D. E. McCarter, N. A. Bond, H. M. Hashemian (AMS)

1420 [Using Pattern Recognition for On-Line Sensor Prognostics and Diagnostics in Nuclear Power Plants](#)

Christopher J. D'Angelo, Charles J. Hansen, Daniel G. Cole (Univ of Pittsburgh)

1430 [Monitoring the Level Dynamics in a Hydraulic Loop Through the Use of a Coaxial Reflectometric Sensor and a Low Pulsatility Pump](#)

Francesco Cordella, Mauro Cappelli, Massimo Sepielli (ENEA UTFISST)

1442 [Assessment of Neural Network Capability to Predict the Remaining Useful Life of Electric Motors](#)

Federico Barbieri (Univ of Ferrara), J Wesley Hines (Univ of Tennessee), Michael Sharp (Univ of Tennessee), Mauro Venturini (Univ of Ferrara)

1454 [Parameters-Free Conservation-Based Equipment Fault Diagnosis](#)

R. Vilim, Y. Park, A. Grelle (ANL)

NPIC.4-Digital System Reliability

Chairs: Raymond L. Herb (Southern Nuclear), Richard T. Wood (ORNL)

1465 [Application of a Context-Based Statistical Testing Method for Quantifying Software Reliability to an Example System](#)

Tsong-Lun Chu, Athi Varuttamaseni, Joo Seok Baek, Meng Yue (BNL), Tim Kaser, George Marts, Paul Murray, Bently Harwood (INL), Ming Li (NRC)

1475 [Development of an Approach for the Reliability Analysis of Net-Work Topologies in Digital I&C Systems,](#)

Falk Lindner, Ewgenij Piljugin, Pascal Vogt (GRS)

1483 [Development of an Automatic Fault Injection Simulator for Evaluating the Reliability of Digital I&C Systems](#)

Seung Jun Lee, Wondea Jung (KAERI)

1491 [Fault Tree Analysis of Nuclear Power Control and Test Facility Shutdown Systems](#)

Sungwhan Cho, Jin Jiang (Univ of Western Ontario)

1504 [Quantitative Methods for Reliability and Fault Tolerance of Digital Instrumentation and Control Systems](#)

G. W. Morton, B. D. Shumaker, B. H. Cady, H. M. Hashemian (AMS)

1515 [Design of Advanced RPS Architecture and Reliability Analysis using Markov Model](#)

Gwang Seop Son (KAERI/KAIST), Dong Hoon Kim (KAERI), Hyun Gook Kang (KAIST)

1529 [Dynamic Data Transmission Frequency Decision for Distributed Control Systems](#)

Qingtgi Guo, Mike Pietrykowski, Carol Smidts (Ohio State)

HMIT.3-Use of Simulation for Human Factors Engineering

Chairs: Julia Ann Forbes (Altran), Jacques Hugo (INL)

1539 [Human Factors Engineering, Simulator and Operator Roadmap to Analysis, Design and Verification and Validation](#)

Charles Weaver (Pacific Science & Eng Group), Zen Wang, Steven Freel (Consultant)

1548 [Applications of the CANDU[®] Main Control Room Mock-Up](#)

R. Leger, S. Malcolm (Candu Energy Inc.)

1560 [How to Run a Control Room Simulator Research Study](#)

Ronald L. Boring (INL), Wondea Jung (KAERI), Nathan Lau (Virginia Polytechnic Inst & State Univ), Gyrd Skraaning, Jr. (OECD Halden Reactor Project)

1569 [Neutron Source Facility Training Simulator Based on EPICS](#)

Young Soo Park, Thomas Wei, Richard Vilim, Austin Grelle, Pawel Dworzanski, Yan Cao, Yousry Gohar (ANL)

1579 [Pre-Validation of a New Interactive Operating Panel System for a Nuclear Power Plant Training Simulator](#)

Hanna Koskinen, Jari O. Laarni (VTT Technical Research Centre of Finland), Kalle Torkkeli, Eero Vesaoja (Fortum)

1589 [Virtual Research Reactor with Interactive Control Room for Reactor Operator Training](#)

Yoshinori Satoh (Toshiba Corp.), Xuefeng Zhu, Ye Li, Christopher A. Kuprianczyk, Rizwan-Uddin (Univ of Illinois at Urbana-Champaign)

1597 [Operator Acceptance of Mobile Data Collection Technology](#)

Greg A. Jamieson, Kent Carlson, Gladys Lee, Benjamin Hayes (Univ of Toronto)

1606 [Leverage Technology for Innovation: Do Things Better Tomorrow than Done Today](#)

Joseph A. Naser (EPRI), invited

NPIC.3-Wireless Technologies for Nuclear Systems

Chairs: John Pericci (Lockheed Martin), Joseph Murray (Mission Technical Services)

1616 [Application of Wireless Communication in the Monitoring System of RBMK Parameters During Maintenance](#)

A. B. Rakhmatulin, N. A. Selyaev, V. A. Fedorov, (National Research Nuclear Univ "MEPhI")

1625 [Strategy for Implementation of Wireless Technologies in the Electromagnetic Environment of Nuclear Power Plants](#)

C. J. Kiger, C. L. Lowe (AMS)

1634 [International Activities to Develop Guidance on the Integration of Wireless Devices in Nuclear Power Plants](#)

C. J. Kiger (AMS)

1641 [A Literature Review on Radiation Effects on Wireless Post-Accident Monitoring Systems and Rad-Hardened Design Techniques](#)

Qiang Huang, Jin Jiang (Univ of Western Ontario)

1662 [Radiation Effects on Commercial Off the Shelf Wireless Transmitter](#)

Jorge V. Carvajal, Nicola G. Arlia, Michael D. Heibel (Westinghouse)

NPIC.3-R&D on Nuclear Instrumentation and Control

Chairs: Bjorn Wahlstrom (Retired), Brent Shumaker (AMS)

1673 [Supercritical Carbon Dioxide Brayton Cycle Control for a Nuclear Power Plant: Load Following and Decay Heat Removal](#)

Anton Moiseyev, James J. Sienicki (ANL)

1685 [Role and Opportunity of Nuclear I&C under the Changing Regulatory Environment in South Korea](#)

Gyunyoung Heo (Kyung Hee Univ), Poong Hyun Seong, Hyun Gook Kang (KAIST)

1694[Digital Sensor Technology](#)

Ken D. Thomas (INL), Edward L. Quinn, Jerry L. Mauck, Richard M. Bockhorst
(Technology Resources)

1702[Construction and Preliminary Testing of an NPP Concrete Containment Wall with Simulated Defects](#)

Kyle Hoegh (Univ of Minnesota), Dwight Clayton (ORNL), Katelyn Freeseaman, Lev Khazanovich (Univ of Minnesota), invited

1715[Real-Time Control Systems Simulations for a Molten Salt Nuclear Reactor](#)

Michael Kristufek, Daniel G. Cole (Univ of Pittsburgh)

1726[Digital Actuator Technology](#)

Ken D. Thomas (INL), Edward L. Quinn, Jerry L. Mauck, Richard M. Bockhorst
(Technology Resources)

1734[Flow Characteristics Analysis of USC Overload Turbine Control Valve for Nuclear Power Plant](#)

P. K. Bhowmik, K. Y. Suh, J. A. Shamim, A. Gairola (Seoul Natl Univ)

NPIC.6-General Topics in Instrumentation and Control—II

Chairs: Julie Irene Reed (Westinghouse), Anton Alexandrovich Andrashov (Radiy Research & Production Corp)

1746[A Physical Simulator in Supporting of Research and Development for Instrumentation and Control Systems in Nuclear Power Plants](#)

Jin Jiang, Jianping Ma, Ataul Bari, Drew J. Rankin (Univ of Western Ontario), invited

1753[Key Developments of a Rod Control System](#)

Marc Pouillot, H el ene Jegou, Jean-Michel Palaric, Arnaud Duthou (Rolls-Royce)

1762[Development and Release of an Automated Testing Platform for Non Q Use Software in the U.S. Commercial Nuclear Market](#)

David Kenneth Cory (Rolls-Royce Nuclear Services)

1769[The Research of a New Radioactive Aerosol Continuous Monitor](#)

Changli Mu, Zihan Huang, Hounkun Xu, Jiang Bian, Yin Yin, Ge Wang (Beijing Research Center for Radiation Application)

NPIC.5- Hazard and Failure-Mode Analysis

1779[Managing Common-Cause Failure Issues in Digital Instrumentation and Control Systems](#)

R. Torok (EPRI), B. Geddes (Southern Engineering Services)

1790[Technical Basis for Hazard Analysis of an NPP Digital Safety System](#)

Sushil Birla, Bernard Dittman (NRC)

1800[Assessment of Hazard Analysis Methods for Nuclear Power Cyber Security](#)

Phil Turner, Tim Wheeler, Lon Dawson, Alice Muna (SNL)

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NPIC.5-Safety-Related System Qualification and V&V

Chairs: John W. Hefler (ALTRAN), Wendell Morton (NRC)

1808[Observations on Qualification of Software in Commercial-Grade Digital instrumentation and Control Systems](#)

Rossnyev Alvarado, Timothy Mossman (NRC)

1818[Progressive Testing of Safety Logic Based on Intermediate Outputs](#)

François Chériaux, Laurence Picci (EdF R&D)

1827[t-Wise-Based Multi-Fault Injection Technique for the Verification of Safety Critical I&C Systems](#)

Vyacheslav Kharchenko (National Aerospace Univ), Oleksandr Gordieiev (Univ of Banking of the National Bank of Ukraine), Sergiy Vilkomir (East Carolina Univ), Oleg Odarushchenko (RPC Rادی)

1837[Justifying Digital COTS Components when Compliance Cannot be Demonstrated—The Cogs Approach](#)

Sofia Guerra, Nick Chozos, Dan Sheridan (Adelard LLP)

1849[Nuclear Qualified Proximity Position Sensors—Technology Overview and Benefits to Existing Plants and Gen Platforms](#)

Greg Merrifield (Emerson Process Management/TopWorx)

1855[Detection of Failures in Floating Point Calculations in Safety I&C—Implementation and Application](#)

Arndt Lindner, Christian Gerst, Josef Maertz, Andreas Moelleken (TÜV Rheinland ISTec GmbH)

NPIC.1-Cable Aging and Cable Condition Monitoring

Chairs: Robert Austin (EPRI), Robert Leger (Candu Energy Inc.)

1865[Cable Aging and Condition Monitoring: A Practical Review](#)

Robert Konnik (Marmon Innovation & Technology Group)

1875[Cable Aging and Condition Monitoring of Radiation Resistant Nano-Dielectrics in Advanced Reactor Applications](#)

Robert C. Duckworth, M. Parans Paranthaman, Tolga Aytug, Michelle K. Kidder, Georgios Polizos, Keith J. Leonard (ORNL), invited

1885[Testing Live Cables in Nuclear Power Plants](#)

J. B. McConkey, D. M. Nace, H. M. Hashemian (AMS)

1894[Properties of Cables Exposed to Simultaneous Thermal and Radiation Aging](#)

Xiaoyan Wu, Yuming Li, Zhimin Zhong (State Nuclear Power Plant Service Co.)

1900[Research on Advanced Passive Nuclear Power Plant Cable Ageing and Qualification for Harsh Environment in China](#)

Tianyang Lou, Shenjie Gu, Yanyun Lu (SNERDI), Fucai Liang (Jiangsu Shangshang Cable Group)

1907[Rheological Analysis and Vibrational Spectroscopy for Enhanced Condition Monitoring and Lifetime Prediction of Cable Materials](#)

Brian G. Risch (Prysmian Cables and Systems)

NPIC.2-Cyber Security Issues Related to Digital I&C Systems—I

Chairs: Ludovic Pietre-Cambacedes (EdF), Daniel G. Cole (Univ of Pittsburgh)

1917[IEC 62859: Towards an International Standard on the Coordination Between Safety and Cybersecurity for Nuclear I&C Systems](#)

Ludovic Pietre-Cambacedes (EdF), Edward L. Quinn (Technology Resources)

1922[A New International Standard on Cybersecurity for Nuclear Power Plants: IEC 62645—Requirements for Security Programmes for Computer-Based Systems](#)

Edward L. Quinn (Technology Resources), Leroy Hardin (NRC), Ludovic Pietre-Cambacedes (EdF)

1928[Considerations for Integrating Cyber Security Requirements into the Nuclear Facility Emergency Preparedness Plan](#)

Jason M. Hollern, Paris F. Stringfellow (AREVA)

1936[Coordination and Interface of Cyber Security and Digital Instrumentation and Control System Reviews](#)

John Thorp, Karl Sturzebecher, Samir Darball, Steven Arndt (NRC), invited

1944[Lessons Learned from Conducting Large Scale Fault Injection Experiments on Safety Critical Digital I&C Systems](#)

Carl R. Elks (Virginia Commonwealth Univ), Barry W. Johnson, Ron Williams (Univ of Virginia), Nishant George (Intel), Michael Reynolds (Thomas Nelson College)

1960[Project Methodology for the Implementation of Cyber Security Controls](#)

Sarosh Muncherji (Honeywell Process Solutions), invited

1970[High Assurance Cybersecurity Controls Against Persistent and Targeted Attacks on Instrumentation and Control Systems in Nuclear Facilities](#)

Pavol Zavorsky (Areva NP Controls) Karl Waedt, Andrey Kuskov (Areva GmbH)

NPIC.4-Use of Simulation for Design, Engineering, and Maintenance

Chairs: Scott Patterson (Rock Creek Tech LLC), Bruce Geddes (Southern Engineering Services, Inc.)

1982[Simulation, Monitoring and Diagnostics for Integral Inherently Safe LWR \(I²S-LWR\)](#)

Matthew R. Lish, Belle R. Upadhyaya, J. Wesley Hines, Ryan A. Tarver (Univ of Tennessee)

1993[Development of Dynamic Models for Thermal-Hydraulic Processes Based on Simscape Toolbox](#)

Binggang Cui, Jin Jiang (Univ of Western Ontario)

2007[A Study of Analytical Redundancy of the Nuclear Power Control and Test Facility Heater Control Process](#)

Sungwhan Cho, Jin Jiang (Univ of Western Ontario)

2021[Dynamic Modeling of a Small Modular Reactor for Control and Monitoring](#)

Jeff R. Kapernick, Belle R. Upadhyaya, Troy A. Eckleberry, J. Wesley Hines (Univ of Tennessee), Brent D. Shumaker, Hashem M. Hashemian (AMS)

2033[Transient Analysis for HTPBR and PCHE Coupled System](#)

Kushal D. Badgajar, Sangchul Won (Pohang Univ of Science and Technology), Om P. Singh (Indian Inst of Technology), John C. Lee (Univ of Michigan)

2044[Reverse Engineering of Nuclear Electronics](#)

Ibrahim Tarik Ozbolat, Jingzhu Xu, Timothy Marler (Univ of Iowa)

2050[Assessment of Simulation Advantages on Nuclear DCS Projects](#)

Frezza Krystel, Klein-Jaby Martine (AREVA NP), Pascal Gain (CORYS T.E.S.S.)

2061[The Use of Simulation Testing for Engineering and Validation of a Safety Related Digital Control System](#)

Jason A. Reed (AREVA Inc.)

HMIT.3 -Advances in HFE Design and Analysis Tools

Chairs: Shi Ji (CGNPC/CNPDC), Carol S. Smidts (Ohio State)

2070[New Environment for Human Factors Engineering Analysis, Design and Test](#)

Cristina Corrales, Luis Fernández, Luis Rejas y Fernando Ortega (Tecnatom)

[2080 Using Virtual Mock-Ups and Automated Assistance to Support Human Factors Engineering Design Evaluation Activities for Control Room Layouts](#)

Michael N. Louka (OECD Halden Reactor Project)

[2087 An Integrated Suite of Tools to Support Human Factors Engineering](#)

Jacques V. Hugo (INL)

[2098 Practical Application of a User-Centered Design Management Strategy](#)

Jessica Stevens, Kevin LaFerriere, Jeffrey Jones, (NuScale Power)

[2109 Progress and Lessons Learned in Establishing the Integrated Control Room and Operator Performance Laboratory \(INCONTROL\) for Digital Instrumentation and Control and Human Factors Research in Nuclear Power](#)

Bob Bailey (Center for Advanced Eng & Research), Carl Elks (Virginia Commonwealth Univ), Nathan Lau (Virginia Tech), Matt Demas (Univ of Virginia)

[2121 Development of a New Safety Culture Evaluation Method Using Reliability Analysis Methods](#)

Sangmin Han, Seung Min Lee, Poong Hyun Seong (KAIST)

HMIT.3-Computerized Operator Decision and Support Systems

Chairs: Robert M. Bailey (Center for Advanced Eng & Research), Kurt L. Davis (BEA/Irradiation Testing)

[2130 Reduction of Uncertainty of Thermal Performance Calculations in Nuclear Power Plants](#)

E. Wingstedt, O. Saarela (OECD Halden Reactor Project)

[2141 A Cognitive Engineering Principle for HFE Validation of Computerized HMI](#)

Vincent Pargade (AREVA NP)

[2148 An Operator Support System for Reactor Transients using Fuzzy Logic](#)

Stylianios Chatzidakis, Miltiadis Alamaniotis, Lefteri H. Tsoukalas (Purdue Univ)

[2155 Computerized Operator Support System—Phase—II Development](#)

Thomas A. Ulrich, Ronald L. Boring, Roger T. Lew, Kenneth D. Thomas (INL)

2166 [Monitoring and Diagnostic Expert System for Reactor Coolant System](#)

Wenlin Wang, Ming Yang, Jun Yang (Harbin Eng Univ)

2175 [A Study on the Automated Accident Response Support for Severe Accident Prevention](#)

Seop Hur, Jong-Gyun Choi, Jae-Chang Park, Kwang-Seop Son, Chang-Hwoi Kim (KAERI)

HMIT.1-Human Performance Assessment

Chairs: Franz Altkind (ENSI), Arnaud Duthou (Rolls-Royce)

2183 [Development of Guideline to Collect HRA Data with Simulator Data for HRA Data Handbook](#)

Sun Yeong Choi, Jinkyun Park, Yochan Kim, Seunghwan Kim, Wondea Jung (KAERI)

2193 [Science-Based HRA: Experimental Comparison of Operator Performance to Information-Decision-Action-Crew \(IDAC\) Simulations](#)

Rachel Shirley, Carol Smidts (Ohio State), Ronald Boring (INL), Yuandan Li, Ali Mosleh (Univ of Maryland)

2203 [On-Line Application of Living PSA with Modularization Step by GO-FLOW Method](#)

Jun Yang, Ming Yang, Wang Wenlin (Harbin Eng Univ)

2213 [A Lesson Learned From Implementing the Final Plant Human Factors Engineering/Human-Systems Interface Design Verification for an Advanced Nuclear Power Plant](#)

Chih-Wei Yang, Tsung-Chieh Cheng, Wen-Wei Kuo (INER), Jin-Liang Liou, Tung-Ming Wu (Taiwan Power Co.)

2217 [“SCORE”—An Integrated Performance Measure for Control Room Validation](#)

P. Ø. Braarud, M. H. R. Eitrheim, A. Fernandes (OECD Halden Reactor Project)

2229 [Human Factors Engineering \(HFE\) Training for Nuclear Plant Engineers](#)

Julia Forbes (Altran-North America)

[2233Experiments on the Use of Bayesian Inference and Evaluation of Human-Machine Interfaces on Situation Awareness](#)

Seongkeun Kang, Poong Hyun Seong (KAIST)

[2245Consideration of a Framework for Evaluating Soft Control Execution Human Error in Advanced MCRs of NPPs](#)

Inseok Jang, Ar Ryum Kim, Poong Hyun Seong (KAIST), Wondea Jung (KAERI)

NPIC.6-General Topics in Instrumentation and Control—III

Chairs: Mykhaylo Yastrebenetsky (SSTC NRS), Lefteri H. Tsoukalas (Purdue Univ)

[2256Measurement of the Leak Rate From Primary Water Stress Corrosion Cracks in a Pressurized Water Reactor](#)

Jeremy Black Christyn Thornton, Shannon Murray, Luke Pumphrey, Sean Barry, Kathryn Kowis (Texas A&M Univ), Craig Harrington (EPRI), Noushin Amini (Texas A&M Univ)

[2266Non Linear, Advanced Pressure Controller for a PWR Pressurizer](#)

Mauro Cappelli (ENEA), Bernardino Castillo-Toledo (CINVESTAV del I.P.N.), Stefano Di Gennaro (Univ of L'Aquila)

[2279Analytically Compensated SGLC Test Facility](#)

Drew J. Rankin, Jin Jiang (Western Univ of Canada)

[2290Study on Continuous Monitor Device for Alpha, Beta, Gamma Aerosol](#)

Huang Zihan, Xu Hongkun, Mu Changli, Yin Yin, Bian Jiang, Wang Ge, Zhang Shuo (Beijing Research Center for Radiation Application)

NPIC.3-I&C Lessons Learned from Fukushima—I

Chairs: Christopher M. Wiegand (EPRI), Joy L. Rempe (Rempe and Associates, LLC)

[2300Lessons Learned from Historical Severe Accidents](#)

Gary Johnson, Dan Welbourne (Retired)

[2313Qualification of Data Obtained during a Severe Accident—Illustrative Examples from TMI-2 Evaluations](#)

Joy L. Rempe (Rempe and Associates, LLC), Darrell L. Knudson (INL), invited

2321 [A Case Study for BWR Instrumentation and Control Systems Performance During a Severe Accident](#)

Dwight A. Clayton, Willis P. Poore III (ORNL), Damian Peko (DOE)

2334 [Contribution of the Transient Recorder \(TREDISS\) for the Evaluation of the Accident in Fukushima Daiichi Nuclear Power Plants](#)

Osamu Kubota, Manabu Watanabe (TEPCO Systems Corp), Shinya Mizokami (Tokyo Electric Power Co.)

2345 [Instrumentation for Severe Accident Monitoring](#)

James F. Gleason, Patrick J. Gleason (GLSEQ, LLC)

2351 [IAEA Guidance on Accident Monitoring Instrumentation](#)

Alexander Duchac, Janos Eiler, (IAEA), Gary L. Johnson (Retired)

2361 [Criteria for Enhancing Accident Monitoring Instrumentation to Address Lessons Learned from Fukushima](#)

David L. Rahn (NRC)

NPIC.5-Modeling Digital I&C Systems in PRA PSA

Chairs: Darrell Knudson (INL), Keith E. Holbert (Arizona State Univ)

2373 [Modeling Digital I&C Systems for PRA With Coloured Petri Nets](#)

Gilles Deleuze (EDF R&D), Nicolae Brinzei (Univ de Lorraine)

2381 [Moving Forward with Digital Reliability Assessments](#)

Terry W. Jackson (NRC), invited

2387 [An Experimental Evaluation of the Automated Reliability Prediction System \(ARPS\) Tool](#)

Xiang Li, Chetan Mutha, Carol Smidts, (Ohio State)

2396 [Study on MFM Method for Digital I&C System Reliability Modeling and Analysis](#)

Chao Zhang, Hai Zeng (State Nuclear Power Automation System Eng Co)

[2407 Design of a Platform for Reliability Analysis of Safety-Critical Digital I&C Software](#)

Ming Yang, Fengjun Li, Bowen Zhou, Hidekazu Yoshikawa (Harbin Eng Univ), invited

[2420 Test Based Reliability Quantification Method for a Safety Critical Software using Finite Test Sets](#)

Sung Min Shin, Sang Hun Lee, Hyun Gook Kang (KAIST), Han Seong Son (Joongbu Univ), Seung Jun Lee (KAERI)

NPIC.1-Cable Aging Management

Chairs: Leonard J. Bond (Iowa State Univ), Nicola Bowler (Iowa State Univ)

[2430 Effects of a Simulated LOCA on MI Cables and the Associated Signal Processing](#)

Andreas Lautenbacher, Ewald Liebhart (Mirion Technologies)

[2438 A New Test Method for Cable Insulation Degradation Assessment: Capacitive Sensing](#)

Nicola Bowler, Robert T. Sheldon, Emily M. Arvia (Iowa State Univ), invited

NPIC.2-Cyber Security Issues Related to Digital I&C Systems—II

Chairs: Joseph A. Naser (EPRI), Matt Gibson (EPRI)

[2446 Gates, Guards, Guns and Geeks: The Changing Face of Nuclear Security and the IAEA's Leading Role in Promoting Computer Security for Nuclear Facilities](#)

Donald D. Dudenhoeffer, Khammar Mrabit, John Hilliard, Michael T. Rowland (IAEA)

[2456 Cyber Security Procurement for Digital Instrumentation and Control Systems](#)

Bradley Geddes (SES), Matt Gibson (EPRI)

[2465 Data Communication Strategies and Cyber Security Defenses for a Safety Related Digital Control System](#)

Jason A. Reed (AREVA Inc.)

[2473 Enhancing Defense-in-Depth and Monitoring Programs to Protect Critical Digital Assets from Tampering](#)

Paul Martyak, Michael Thow (AREVA)

2479[Improving Cybersecurity Through the Use of the Cybersecurity Framework](#)

Thomas Conkle, Greg Witte (G2, Inc.)

2487[Hardware Health Monitoring in a Cyber-Secure Environment: Benefits and Strategies](#)

Colin Bryson (Rolls-Royce)

2496[A Test Bed for Digital I&C and Cyber Security for NPPs](#)

Yongkyu An, Calogero Sollima, Rizwan Uddin, Daniel Chen, Zbigniew Kalbarczyk, Tim Yardley, William Sanders (Univ of Illinois)

NPIC.4-Requirements Management for Digital I&C System Life Cycle

Chairs: Dwight A. Clayton (ORNL), J. Wesley Hines (Univ of Tennessee)

2503[First of a Kind Engineering in Digital I&C Projects](#)

Scott Patterson, Gregg Clarkson (Rock Creek Tech LLC), invited

2514[Adapting Requirements Management for Nuclear Power Plant Development](#)

Ted Martens (Lockheed Martin)

2523[The Method of Requirement Based System Testing using Testbed](#)

Jang-Yeol Kim, Dong Young Lee (KAERI)

HMIT.3-Visualization

Chairs: Vladimir Sklyar (Research and Production Corporation Radiy), Richard L. Rusaw (EPRI)

2533[Potential of Three-Dimensional Visualisations to Reduce Cognitive Demands and Possible Application Areas in Nuclear Power Industry](#)

Benedikt Petermeier (GRS)

2541[Augmented Reality—Informed Procedures for Performing Maintenance in Uncertainty and Hazardous Environments](#)

Young Soo Park (ANL), Xiaorui Zhao, Pawel Dworzanski, Scott Korthals, (Univ of Illinois–Chicago), Richard Vilim (ANL)

NPIC.6-General Topics in Instrumentation and Controls—IV

Chairs: Daniel Stiffler (Westinghouse), John A. Stevens (Doosan HF Controls Corp)

2549Challenges and Training Needs in NPP Automation Maintenance

Iina Aaltonen, Timo Kuula, Mikael Wahlström, Maiju Aikala, Jari Laarni (VTT Technical Research Centre of Finland)

2560Differences Between Analog and Digital I&C

Björn Wahlstrom (Aalto Univ)

HMIT.2-Group-View Wall Panels

Chairs: Jon Kvalem (OECD Halden Reactor Project), Svein Ragnar Nilsen (OECD Halden Reactor Project)

2570Rethinking Group-View Display Alternatives

William P. Myers, Greg A. Jamieson (Univ of Toronto)

2578Applying Cognitive Work Analysis to Large Screen Display Design

Sean W. Kortschot, Cole Wheeler, Billy Myers, Greg A. Jamieson (Univ of Toronto)

2587The Plant Panel: Feasibility Study of an Interactive Large Screen Concept for Process Monitoring and Operation

Lars Hurlen, Gyrd Skraaning, Jr. (Inst For Energy Technology/Halden Reactor Project), Billy Myers, Greg Jamieson (Univ of Toronto), Hanna Carlsson (KTH)

2597An Investigation on Glare Issues in the Main Control Room of the Advanced Nuclear Power Plant

Chih-Wei Yang, Tsung-Chieh Cheng, Wen-Wei Kuo (INER), Jin-Liang Liou (Taiwan Power Co.)

NPIC.3-I&C Lessons Learned from Fukushima—II

Chairs: Christopher M. Wiegand (EPRI), Christina Antonescu (NRC)

2603PWROG Severe Accident Management Technical Support Guidance for Instrumentation

Robert J. Lutz, Jr. (Consultant), N. Reed Labarge (Westinghouse), Roy Linthicum, Steven Pierson (Exelon), Jonathan Ford (AREVA Inc.), invited

[2609A New Safety Device to Improve the Plant Response Against the Extended Loss of Ac Power \(ELAP\) Accident](#)

Arnaldo Laborda Rami (ANAV)

[2616Conceptual Report for Severe Accident Mobile Investigator \(SAMI\)](#)

Stephen M. Lopez (EPRI), R. Pedan, S. Beaudry, P. Bluth, T. Ransom, T. Romero, N. Shore, D. Vang (Univ of North Carolina at Charlotte), invited

[2628Swiss Solutions for Providing Electrical Power in Cases of Long-Term Black-Out of the Grid](#)

Franz Altkind, Daniel Schmid (ENSI)

[2634Fukushima Lessons Learned: Mitigation and Containment of Severe Accident Conditions by Means of Glass-to-Metal Sealed Electrical Penetration Assemblies](#)

Oliver Wolfgang Fritz, Thomas Fink (SCHOTT AG), Joe Hale (SCHOTT North America, Inc.)